

## **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. When you are 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.

## **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.

There are two methods of implementing IGMP Proxy:

- IGMP Proxy for a Single Upstream Interface
- IGMP Proxy for Multiple Upstream Interfaces

### **IGMP Proxy for a Single Upstream Interface**

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

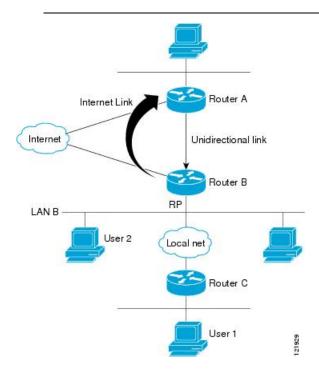
- Traditional UDL routing scenario--A UDL device with directly connected receivers.
- IGMP proxy scenario--UDL device without directly connected receivers.

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 switch) can be used.



#### 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.

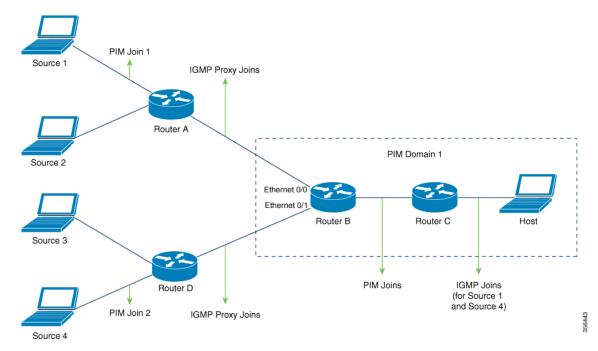


Note

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

#### **IGMP Proxy for Multiple Upstream Interfaces**

IGMP proxy also enables the user to request data from multiple upstream interfaces. You can implement IGMP proxy by this method if there are more number of upstream devices in the network. With this method, you can also implement IGMP proxy for a single upstream device as in any of the three scenarios described in the previous section.



In this method, IGMP proxy is used to enable the user to receive traffic from multiple upstream devices. The following sequence of events occurs:

- 1. The host is in PIM Domain 1 and sends multiple IGMP membership reports (join requests) to **Router C** requesting interest in different groups. **Router C** converts the IGMP joins to PIM joins and sends them to **Router B**. These requests should be sent upstream, from **Router B** to **Router A**. The routers are in two different PIM domains (not PIM neighbors).
- 2. **Router B** converts the PIM join messages to IGMP proxy joins so that it can be forwarded to the upward interfaces.
- **3.** A class-map is configured globally. This class-map describes the information about multicast groups. The IGMP proxy joins for different multicast groups are sent if the following conditions are met:
  - There is (\*, G) or and (S, G) entry for that group.
  - (\*, G) or the (S, G) entry has a NON-NULL OIF list.
- **4.** During the IGMP proxy intervals, the IGMP proxy joins for different groups are sent through the respective upstream interfaces.
- **5.** After the IGMP proxy join reaches **Router A**, it is forwarded to the different source devices as PIM join messages.

## **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	Enables privileged EXEC mode.
	Example:	• Enter your password if prompted.
	Device> enable	
Step 2	configure terminal	Enters global configuration mode.
	Example:	
	Device# configure terminal	
Step 3	interface type number	Enters interface configuration mode.
	Example:	• For the <i>type</i> and <i>number</i> arguments, specify the interface to be used as the UDL
	Device(config)# interface gigabitethernet 1/0/0	on the upstream device.

	Command or Action	Purpose	
Step 4	ip igmp unidirectional-link	Configures IGMP on the interface to be	
	Example:	unidirectional for IGMP UDLR.	
	Device(config-if)# ip igmp unidirectional-link		
Step 5	end	Ends the current configuration session an	
	Example:	returns to privileged EXEC mode.	
	Device(config-if)# end		

# 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	Enables privileged EXEC mode.	
	Example:	• Enter your password if prompted.	
	Device> enable		
Step 2	configure terminal	Enters global configuration mode.	
	Example:		
	Device# configure terminal		
Step 3	interface type number	Enters interface configuration mode.	
	Example:	• For the <i>type</i> and <i>number</i> arguments, specify the interface to be used as the	
	Device(config)# interface gigabitethernet 0/0/0	UDL on the downstream device for IGMP UDLR.	
Step 4	ip igmp unidirectional-link	Configures IGMP on the interface to be	
	Example:	unidirectional for IGMP UDLR.	
	Device(config-if)# ip igmp unidirectional-link		
Step 5	exit	Exits interface configuration mode and return	
	Example:	to global configuration mode.	
	Device(config-if)# exit		

	Command or Action	Purpose
Step 6	interface type number	Enters interface configuration mode.
	Example:  Device(config)# interface gigabitethernet 1/0/0	• For the <i>type</i> and <i>number</i> arguments, select an interface that is facing the nondirectly connected hosts.
Step 7	<pre>ip igmp mroute-proxy type number Example:  Device(config-if)# ip igmp mroute-proxy loopback 0</pre>	<ul> <li>Enables IGMP report forwarding of proxied (*, G) multicast static route (mroute) entries.</li> <li>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.</li> <li>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.</li> </ul>
Step 8	<pre>exit Example: Device(config-if)# exit</pre>	Exits interface configuration mode and returns to global configuration mode.
Step 9	<pre>interface type number Example: Device(config) # interface loopback 0</pre>	Enters interface configuration mode for the specified interface.  • In this example, loopback interface 0 is specified.
Step 10	<pre>ip igmp helper-address udl interface-type interface-number Example:  Device(config-if)# ip igmp helper-address udl gigabitethernet 0/0/0</pre>	<ul> <li>Configures IGMP helpering for UDLR.</li> <li>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.</li> <li>In the example topology, IGMP helpering 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.</li> </ul>
Step 11	ip igmp proxy-service	Enables the mroute proxy service.

	Command or Action	Purpose	
	Example:  Device(config-if)# ip igmp proxy-service	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.  Note The ip igmp proxy-service command is intended to be used with the ip igmp helper-address	
		(UDL) command.  • In this example, the <b>ip igmp proxy-service</b> 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 <b>ip igmp mroute-proxy</b> command (see Step 7).	
Step 12	<pre>end Example: Device(config-if)# end</pre>	Ends the current configuration session and returns to privileged EXEC mode.	
Step 13	<pre>show ip igmp interface Example:  Device# show ip igmp interface</pre>	(Optional) Displays multicast-related information about an interface.	
Step 14	<pre>show ip igmp udlr Example:  Device# show ip igmp udlr</pre>	(Optional) Displays UDLR information for directly connected multicast groups on interfaces that have a UDL helper address configured.	

# **Configuring the Downstream Device for IGMP Proxy for Multiple Upstream Interfaces**

Perform this task to configure the downstream device for IGMP Proxy for multiple upstream interfaces. (Referring to the figure earlier, all the steps are configured on the *Router B* interface facing the upstream device)

#### **Procedure**

	Command or Action	Purpose
Step 1	enable	Enables privileged EXEC mode.
	Example:	Enter your password if prompted.
	Device > enable	
Step 2	configure terminal	Enters global configuration mode.
	Example: Device# configure terminal	
Step 3	<pre>class-map type multicast-flows name Example: Device(config-if)# class-map type multicast-flows proxymap</pre>	Configures the interface with a class-map where the uplink interfaces for different multicast groups are defined.  The range of the multicast groups is from group 225.0.0.1 to 225.0.0.10.
Step 4	<pre>interface type number Example: Device(config)# interface ethernet 0/0</pre>	Enters interface configuration mode.  For the <i>type</i> and <i>number</i> arguments, specify the interface that is facing the host.
Step 5	<pre>ip igmp upstream-proxy class-map-name Example:   Device(config-if)# ip igmp upstream-proxy     proxymap</pre>	Enables the interface with an IGMP proxy. The IGMP proxy joins for those groups in the class map are sent if the following conditions are met:  • (*,G) or (S,G) mroute exists for the group in the same mvrf as the interface.  • (*,G) or (S,G) mroute has a NON-NULL OIF list.
Step 6	<pre>ip igmp iif-starg Example:    Device(config-if)# ip igmp iif-starg</pre>	Alters the RPF interface of the mroutes of those groups specified in the class map to Ethernet 0/0.
Step 7	<pre>ip igmp proxy-report-interval time Example:   Device(config-if) # ip igmp   proxy-report-interval 130</pre>	Configures the interval (in seconds) at which the proxy reports will be sent. The default value is 60 seconds.
Step 8	<pre>end Example: Device(config-if)# end</pre>	Ends the current configuration session and returns to privileged EXEC mode.
Step 9	<pre>show ip igmp interface Example: Device# show ip igmp interface</pre>	(Optional) Displays multicast-related information about an interface.

## **Configuration Examples for IGMP Proxy**

### **Example: Configuring the Upstream UDL Device for IGMP UDLR**

The following example shows how to configure the upstream UDL device for IGMP UDLR:

```
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
```

# Example: Configuring the Downstream UDL Device for IGMP UDLR with IGMP Proxy Support

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

```
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
```

# **Example: Configuring the Downstream Device for IGMP Proxy for Multiple Upstream Interfaces**

The following example shows how to configure the downstream device for IGMP proxy for multiple upstream interfaces.

```
interface gigabitethernet0/0
ip address 99.99.99.1 255.255.255.0
ip pim passive
ip igmp upstream-proxy 12
ip igmp iif-starg
ip igmp proxy-report-interval 100
end

class-map type multicast-flows 12
group 229.0.0.1
group 228.0.0.1 to 228.0.0.10
```

## **Additional References for IGMP Proxy**

The following sections provide references related to customizing IGMP.

#### **Related Documents**

Related Topic	Document Title
	See the IP Multicast Routing Commands section of the Command Reference (Catalyst 9300 Series Switches)

#### Standards and RFCs

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

## **Feature History for IGMP Proxy**

This table provides release and related information for the features explained in this module.

These features are available in all the releases subsequent to the one they were introduced in, unless noted otherwise.

Release	Feature	Feature Information
Cisco IOS XE Everest 16.5.1a	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.
Cisco IOS XE Amsterdam 17.1.1	IGMP Proxy for multiple upstream interfaces.	IGMP proxy enables the user to receive traffic from multiple upstream devices.

Use the Cisco Feature Navigator to find information about platform and software image support. To access Cisco Feature Navigator, go to <a href="http://www.cisco.com/go/cfn">http://www.cisco.com/go/cfn</a>.

Feature History for IGMP Proxy