



# Configuring Multicast Routing over GRE Tunnel

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## Prerequisites for Configuring Multicast Routing over GRE Tunnel

Before configuring multicast routing over GRE, you should be familiar with the concepts of IP Multicast Routing Technology and GRE Tunneling.

## Restrictions for Configuring Multicast Routing over GRE Tunnel

The following are the restrictions for configuring multicast routing over GRE tunnel:

- IPv6 multicast over GRE tunnel is not supported.
- The total number of supported multicast routes (mroutes) is 32000, across all tunnels.  
Use the formula  $8000 / (((\text{Number of tunnels}) / 4) + 1)$  to derive the number of mroutes.
- Bidirectional PIM is not supported.
- Multicast routing should be configured on the first hop router (FHR), the rendezvous point (RP) and the last hop router (LHR) to support multicast over the GRE tunnel.
- On Catalyst 3850 series switches, the tunnel source can be a loopback, physical, or L3 EtherChannel interface.
- No feature interactions such as IPSec, ACL, Tunnel counters, Crypto support, Fragmentation, Cisco Discovery Protocol (CDP), QoS, GRE keepalive, Multipoint GRE, etc. are supported on the GRE Tunnel.

# Information About Multicast Routing over GRE Tunnel

This chapter describes how to configure a Generic Route Encapsulation (GRE) tunnel to tunnel IP multicast packets between non-IP multicast areas. The benefit is that IP multicast traffic can be sent from a source to a multicast group, over an area where IP multicast is not supported. Multicast Routing over GRE Tunnel supports sparse mode and pim-ssm mode; and supports static RP and auto-RP. See Rendezvous Point and Auto-RP for information on configuring static RP and auto-RP.



**Note** Beginning in Cisco IOS XE Denali 16.3.1, multicast routing and NHRP are supported with GRE Tunneling. NHRP can optionally be configured along with the multicast configuration on the tunnel interface to facilitate dynamic discovery of tunnel end points. Please see NHRP for configuring NHRP on a tunnel interface.

## Benefits of Tunneling to Connect Non-IP Multicast Areas

- If the path between a source and a group member (destination) does not support IP multicast, a tunnel between them can transport IP multicast packets.

# How to Configure Multicast Routing over GRE Tunnel

## Configuring a GRE Tunnel to Connect Non-IP Multicast Areas

You can configure a GRE tunnel to transport IP multicast packets between a source and destination that are connected by a medium that does not support multicast routing.

### Procedure

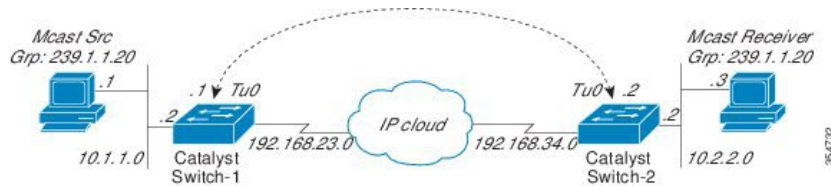
	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Device# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>ip multicast-routing</b> <b>Example:</b> Device(config)# ip multicast-routing	Enables IP multicast routing.

	Command or Action	Purpose
<b>Step 4</b>	<b>interface tunnel</b> <i>number</i> <b>Example:</b>  Device(config)# interface tunnel 0	Enters tunnel interface configuration mode.
<b>Step 5</b>	<b>ip address ip_address subnet_mask</b> <b>Example:</b>  Device(config-if)# ip address 192.168.24.1 255.255.255.252	Configures IP address and IP subnet.
<b>Step 6</b>	<b>ip pim sparse-mode</b> <b>Example:</b>  Device(config-if)# ip pim sparse-mode	Enables sparse mode of operation of Protocol Independent Multicast (PIM) on the tunnel interface with one of the following mode of operation:
<b>Step 7</b>	<b>tunnel source</b> { <i>ip-address</i>   <i>interface-name</i> } <b>Example:</b>  Device(config-if)# tunnel source 100.1.1.1	Configures the tunnel source.
<b>Step 8</b>	<b>tunnel destination</b> { <i>hostname</i>   <i>ip-address</i> } <b>Example:</b>  Device(config-if)# tunnel destination 100.1.5.3	Configures the tunnel destination.
<b>Step 9</b>	<b>end</b> <b>Example:</b>  Device(config-if)# end	Ends the current configuration session and returns to privileged EXEC mode.
<b>Step 10</b>	<b>show interface type number</b> <b>Example:</b>  Device# show interface tunnel 0	Displays tunnel interface information.

## Tunneling to Connect Non-IP Multicast Areas Example

The following example shows multicast-routing between a Catalyst 3650/3850 switch through a GRE tunnel.

Figure 1: Tunnel Connecting Non-IP Multicast Areas



In the figure above, the multicast source (10.1.1.1) is connected to Catalyst 3650/3850 Switch-1 and is configured for multicast group 239.1.1.20. The multicast receiver (10.2.2.3) is connected to Catalyst 3650/3850 Switch-2 and is configured to receive multicast packets for group 239.1.1.20. Separating Switch-1 and Switch-2 is an IP cloud, which is not configured for multicast routing.

A GRE tunnel is configured between Switch-1 to Switch-2 sourced with their loopback interfaces. Multicast-routing is enabled on Switch-1 and Switch-2. The **ip pim sparse-mode** command is configured on tunnel interfaces to support PIM in the sparse mode. Sparse mode configuration on the tunnel interfaces allows sparse-mode packets to be forwarded over the tunnel depending on rendezvous point (RP) configuration for the group.

### Switch-1 Configuration:

```
Device(config)# ip multicast-routing
Device(config)# interface Loopback0 //Tunnel source interface
Device(config-if)# ip address 2.2.2.2 255.255.255.255

Device(config)# interface Tunnel 10 //Tunnel interface configured for PIM
traffic
Device(config-if)# ip address 192.168.24.1 255.255.255.252
Device(config-if)# ip pim sparse-mode
Device(config-if)# ip nhrp map 192.168.24.3 4.4.4.4 //NHRP may optionally be
configured to dynamically discover tunnel end points.
Device(config-if)# ip nhrp map multicast 4.4.4.4
Device(config-if)# ip nhrp network-id 1
Device(config-if)# ip nhrp nhs 192.168.24.3
Device(config-if)# tunnel source Loopback0
Device(config-if)# tunnel destination 4.4.4.4

Device(config)# interface GigabitEthernet 0/0/0 //Source interface
Device(config-if)# ip address 10.1.1.2 255.255.255.0
Device(config-if)# ip pim sparse-mode
```

### Switch-2 Configuration:

```
Device(config)# ip multicast-routing
Device(config)# interface Loopback0 //Tunnel source interface
Device(config-if)# ip address 4.4.4.4 255.255.255.255

Device(config)# interface Tunnel 10 //Tunnel interface configured for PIM
traffic
Device(config-if)# ip address 192.168.24.2 255.255.255.252
Device(config-if)# ip nhrp map 192.168.24.4 2.2.2.2 //NHRP may optionally be
configured to dynamically discover tunnel end points.
Device(config-if)# ip nhrp map multicast 2.2.2.2
Device(config-if)# ip nhrp network-id 1
```

```

Device(config-if)# ip nhrp nhs 192.168.24.4
Device(config-if)# ip pim sparse-mode
Device(config-if)# tunnel source Loopback0
Device(config-if)# tunnel destination 2.2.2.2

Device(config)# interface GigabitEthernet 0/0/0 //Receiver interface
Device(config-if)# ip address 10.2.2.2 255.255.255.0
Device(config-if)# ip pim sparse-mode

```

## Additional References

The following sections provide references related to customizing IGMP.

### Standards and RFCs

Standard/RFC	Title
None	N/A

### 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: <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

### 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.	<a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a>

# Feature History and Information for IP Multicast Optimization: Optimizing PIM Sparse Mode in a Large IP Multicast Deployment

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](http://www.cisco.com/go/cfn). An account on Cisco.com is not required.

**Table 1: Feature Information for IP Multicast Optimization: Optimizing PIM Sparse Mode in a Large IP Multicast Deployment**

Feature Name	Releases	Feature Information
IP Multicast Optimization: Optimizing PIM Sparse Mode in a Large IP Multicast Deployment	Cisco IOS XE 3.2SE	This feature was implemented on the following platforms: