



## Configuring PGM Host and Router Assist

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### Note

Support for the PGM Host feature has been removed. Use of this feature is not recommended.

This module describes the PGM Host and Router Assist feature. PGM Host and Router Assist enables Cisco routers to support multicast applications that operate at the PGM transport layer and the PGM network layer, respectively.

The PGM Reliable Transport Protocol itself is implemented on the hosts of the customer. For information on PGM Reliable Transport Protocol, refer to the Internet Engineering Task Force (IETF) protocol specification draft named *PGM Reliable Transport Protocol Specification* .

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## Information About PGM Host and Router Assist

### PGM Overview



### Note

Support for the PGM Host feature has been removed. Use of this feature is not recommended.

Pragmatic General Multicast (PGM) is a reliable multicast transport protocol for multicast applications that require reliable, ordered, duplicate-free multicast data delivery from multiple sources to multiple receivers. PGM guarantees that a receiver in a multicast group either receives all data packets from transmissions and retransmissions, or can detect unrecoverable data packet loss. PGM is intended as a solution for multicast applications with basic reliability requirements. PGM has two main parts: a host element (also referred to as the transport layer of the PGM protocol) and a network element (also referred to as the network layer of the PGM protocol).

The transport layer of the PGM protocol has two main parts: a source part and a receiver part. The transport layer defines how multicast applications send and receive reliable, ordered, duplicate-free multicast data from multiple sources to multiple receivers. PGM Host is the Cisco implementation of the transport layer of the PGM protocol.

The network layer of the PGM protocol defines how intermediate network devices (such as routers and switches) handle PGM transport data as the data flows through a network. PGM Router Assist is the Cisco implementation of the network layer of the PGM protocol.

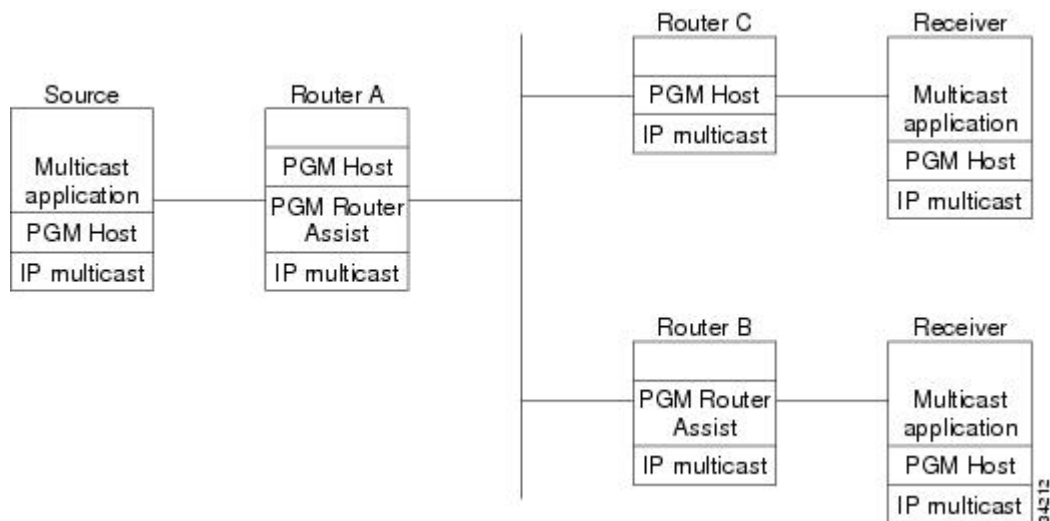
**Note**

PGM contains an element that assists routers and switches in handling PGM transport data as it flows through a network. Unlike the Router Assist element, the Host element does not have a current practical application.

PGM is network-layer independent; PGM Host and Router Assist in the Cisco IOS software support PGM over IP. Both PGM Host and Router Assist use a unique transport session identifier (TSI) that identifies each individual PGM session.

The figure shows a simple network topology using the PGM Host and Router Assist feature.

**Figure 1: Network Topology Using PGM Host and Router Assist**



When the router is functioning as a network element (PGM Router Assist is configured) and PGM Host is configured (Router A in the figure), the router can process received PGM packets as a virtual PGM Host, originate PGM packets and serve as its own first hop PGM network element, and forward received PGM packets.

When the router is functioning as a network element and PGM Host is not configured (Router B in the figure), the router forwards received PGM packets as specified by PGM Router Assist parameters.

When the router is not functioning as a network element and PGM Host is configured (Router C in the figure), the router can receive and forward PGM packets on any router interface simultaneously as specified by PGM Host feature parameters. Although this configuration is supported, it is not recommended in a PGM network because PGM Host works optimally on routers that have PGM Router Assist configured.

# How to Configure PGM Host and Router Assist



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**Note** Support for the PGM Host feature has been removed. Use of this feature is not recommended.

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## Enabling PGM Host



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When enabling PGM Host on your router, you must source PGM packets through a vif or out a physical interface installed in the router.

Sourcing PGM packets through a vif enables the router to send and receive PGM packets through any router interface. The vif also serves as the interface to the multicast applications that reside at the PGM network layer.

Sourcing IP multicast traffic out a specific physical or logical interface type (for example, an Ethernet, serial, or loopback interface) configures the router to send PGM packets out that interface only and to receive packets on any router interface.

## Prerequisites

- PGM Reliable Transport Protocol is configured on hosts connected to your network.
- PGM Router Assist is configured on intermediate routers and switches connected to your network.
- IP multicast routing is configured on all devices connected to your network that will be processing IP multicast traffic, including the router on which you are configuring PGM Host.
- Protocol Independent Multicast (PIM) or another IP multicast routing protocol is configured on each PGM interface in your network that will send and receive IP multicast packets.
- A PGM multicast virtual host interface (vif) is configured on the router (if you do not plan to source PGM packets through a physical interface installed on the router). The vif enables the router to send and receive IP multicast packets on several different interfaces at once, as dictated by the multicast routing tables on the router.

## Enabling PGM Host with a Virtual Host Interface

To enable PGM Host globally on the router and to configure the router to source PGM packets through a vif, use the following command in global configuration mode:

Command	Purpose
Router(config)# <b>ip pgm host</b>	<p>Enables PGM Host (both the source and receiver parts of the PGM network layer) globally on the router and configures the router to source PGM packets through a vif.</p> <p><b>Note</b> You must configure a vif by using the <b>interface vif number</b> global configuration command on the router before enabling PGM Host on the router; otherwise, the router will not know to use the vif to source PGM packets and PGM Host will not be enabled on the router.</p>

See the [PGM Host with a Virtual Interface Example](#), on page 9 section later in this module for an example of enabling PGM Host with a virtual interface.

## Enabling PGM Host with a Physical Interface

To enable PGM Host globally on the router and to configure the router to source PGM packets through a physical interface, use the following commands in global configuration mode:

### SUMMARY STEPS

1. Router(config)# **ip pgm host**
2. Router(config)# **ip pgm host source-interface type number**

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	Router(config)# <b>ip pgm host</b>	Enables PGM Host (both the source and receiver part of the PGM network layer) globally on the router.
<b>Step 2</b>	Router(config)# <b>ip pgm host source-interface type number</b>	Configures the router to source PGM packets through a physical (or logical) interface.

### What to Do Next

See the [PGM Host with a Physical Interface Example](#), on page 9 section later in this module for an example of enabling PGM Host with a physical interface.

## Verifying PGM Host Configuration



**Note** Support for the PGM Host feature has been removed. Use of this feature is not recommended.

To verify that PGM Host is configured correctly on your router, use the following **show** commands in EXEC mode:

- Use the **show ip pgm host sessions** command to display information about current open PGM transport sessions:

```
Router> show ip pgm host sessions
Idx  GSI                Source Port  Type      State  Dest Port  Mcast Address
1    0000000000000000  0           receiver  listen 48059     224.3.3.3
2    9CD72EF099FA     1025        source    conn   48059     224.1.1.1
```

Specifying a traffic session number or a multicast IP address with the **show ip pgm host sessions** command displays information specific to that PGM transport session:

```
Router> show ip pgm host sessions 2
Idx  GSI                Source Port  Type      State  Dest Port  Mcast Address
2    9CD72EF099FA     1025        source    conn   48059     224.1.1.1

stream-type (apdu), ttl (255)

spm-ambient-ivl (6000), txw-adv-secs (6000)
txw-adv-timeout-max (3600000), txw-rte (16384), txw-secs (30000)
ncf-max (infinite), spm-rpt-ivl (3000), ihb-min (1000)
ihb-max (10000), join (0), tpdu-size (16384)
txw-adv-method (time), tx-buffer-mgmt (return)

ODATA packets sent           0
   bytes sent                 0
RDATA packets sent           0
   bytes sent                 0
Total bytes sent              0
ADPUs sent                    0
APDU transmit memory errors  0
SPM packets sent              6
NCF packets sent              0
NAK packets received          0
   packets received in error  0
General bad packets          0
TX window lead                0
TX window trail               0
```

- Use the **show ip pgm host traffic** command to display traffic statistics at the PGM transport layer:

```
Router> show ip pgm host traffic
General Statistics :

Sessions in                   0
   out                        0
Bytes in                       0
   out                        0

Source Statistics :

ODATA packets sent           0
   bytes sent                 0
RDATA packets sent           0
   bytes sent                 0
```

```

Total bytes sent                0
ADPUs sent                      0
APDU transmit memory errors    0
SPM packets sent                0
NCF packets sent                0
NAK packets received           0
NAK packets received in error  0

```

## Receiver Statistics :

```

ODATA packets received          0
ODATA packets received in error 0
ODATA valid bytes received      0
RDATA packets received          0
RDATA packets received in error 0
RDATA valid bytes received      0
Total valid bytes received      0
Total bytes received in error   0
ADPUs received                  0
SPM packets received            0
SPM packets received in error   0
NCF packets received            0
NCF packets received in error   0
NAK packets received            0
NAK packets received in error   0
NAK packets sent                0
Undeliverable packets           0
General bad packets             0
Bad checksum packets            0

```

## Enabling PGM Router Assist

When enabling PGM Router Assist on your router, you must set up your router to forward PGM packets through a vif or out a physical interface installed in the router.

Setting up your router to forward PGM packets through a vif enables the router to forward PGM packets through any router interface. The vif also serves as the interface to the multicast applications that reside at the PGM network layer.

Setting up your router to forward PGM packets out a specific physical or logical interface type (for example, an Ethernet, serial, or loopback interface) configures the router to forward PGM packets out that interface only.

### Prerequisites

- PGM Reliable Transport Protocol is configured on hosts connected to your network.
- IP multicast is configured on the router upon which you will enable PGM Router Assist.
- PIM is configured on each PGM interface.

## Enabling PGM Router Assist with a Virtual Host Interface

To enable PGM Router Assist on a vif, use the following command in interface configuration mode:

Command	Purpose
Router(config-if)# <b>ip pgm router</b>	Enables the router to assist PGM on this interface.  <b>Note</b> You must configure a vif by using the <b>interface vif number</b> global configuration command on the router before enabling PGM Assist on the router; otherwise, PGM Assist will not be enabled on the router.

## Enabling PGM Router Assist with a Physical Interface

To enable PGM Router Assist on the router and to configure the router to forward PGM packets through a physical interface, use the following commands in interface configuration mode:

Command	Purpose
Router(config-if)# <b>ip pgm router</b>	Enables the router to assist PGM on this interface.

# Monitoring and Maintaining PGM Host and Router Assist

This section provides information on monitoring and maintaining the PGM Host and Router Assist feature.

## Monitoring and Maintaining PGM Host



**Note** Support for the PGM Host feature has been removed. Use of this feature is not recommended.

To reset PGM Host connections, use the following command in privileged EXEC mode:

Command	Purpose
Router# <b>clear ip pgm host defaults traffic }</b>	Resets PGM Host connections to their default values and clears traffic statistics.

To enable PGM Host debugging, use the following command in privileged EXEC mode:

Command	Purpose
Router# <b>debug ip pgm host</b>	Displays debug messages for PGM Host.

To display PGM Host information, use the following commands in user EXEC mode, as needed:

Command	Purpose
Router> <b>show ip pgm host defaults</b>	Displays the default values for PGM Host traffic.
Router> <b>show ip pgm host sessions</b> [ session-number  group-address ]	Displays open PGM Host traffic sessions.
Router> <b>show ip pgm host traffic</b>	Displays PGM Host traffic statistics.

## Monitoring and Maintaining PGM Router Assist

To clear PGM traffic statistics, use the following command in privileged EXEC mode:

Command	Purpose
Router# <b>clear ip pgm router</b> [[ <b>traffic</b> [ <i>type number</i> ]]   [ <b>rtx-state</b> [ <i>group-address</i> ]]]	Clears the PGM traffic statistics. Use the <b>rtx-state</b> keyword to clear PGM retransmit state.

To display PGM information, use the following command in privileged EXEC mode:

Command	Purpose
Router# <b>show ip pgm router</b> [[ <b>interface</b> [ <i>type number</i> ]]   [ <b>state</b> [ <i>group-address</i> ]]   [ <b>traffic</b> [ <i>type number</i> ]]] [ <b>verbose</b> ]	Displays information about PGM traffic statistics and TSI state. The TSI is the transport-layer identifier for the source of a PGM session. Confirms that PGM Router Assist is configured, although there might not be any active traffic. Use the <b>state</b> or <b>traffic</b> keywords to learn whether an interface is actively using PGM.



## PGM Host and Router Assist Configuration Examples



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### PGM Host with a Virtual Interface Example



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**Note** Support for the PGM Host feature has been removed. Use of this feature is not recommended.

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The following example shows PGM Host (both the source and receiver part of the PGM network layer) enabled globally on the router and PGM packets sourced through virtual host interface 1 (vif1). PGM packets can be sent and received on the vif and on the two physical interfaces (ethernet1 and ethernet2) simultaneously.

```
ip multicast-routing
ip routing
ip pgm host
interface vif1
ip address 10.0.0.1 255.255.255.0
ip pim dense-mode
no ip directed-broadcast
no ip mroute-cache
interface ethernet1
ip address 10.1.0.1 255.255.255.0
ip pim dense-mode
no ip directed-broadcast
no ip mroute-cache
media-type 10BaseT
interface ethernet2
ip address 10.2.0.1 255.255.255.0
ip pim dense-mode
no ip directed-broadcast
no ip mroute-cache
media-type 10BaseT
```

### PGM Host with a Physical Interface Example



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**Note** Support for the PGM Host feature has been removed. Use of this feature is not recommended.

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The following example shows PGM Host (both the source and receiver part of the PGM network layer) enabled globally on the router and PGM packets sourced out of physical Ethernet interface 1. PGM packets can be received on physical Ethernet interfaces 1 and 2 simultaneously.

```
ip multicast-routing
ip routing
ip pgm host
ip pgm host source-interface ethernet1
ip pgm host source-interface ethernet2
interface ethernet1
ip address 10.1.0.1 255.255.255.0
ip pim dense-mode
```

```

no ip directed-broadcast
no ip mroute-cache
media-type 10BaseT
interface ethernet2
ip address 10.2.0.1 255.255.255.0
ip pim dense-mode
no ip directed-broadcast
no ip mroute-cache
media-type 10BaseT

```

## PGM Router Assist with a Virtual Interface Example

The following example shows PGM Router Assist (the PGM network layer) enabled on the router and the router set up to forward PGM packets on virtual host interface 1 (vif1). PGM packets can be received on interfaces vif1, ethernet1, and ethernet2 simultaneously.

```

ip multicast-routing
ip routing
interface vif1
ip address 10.0.0.1 255.255.255.0
ip pim dense-mode
ip pgm router
no ip directed-broadcast
no ip mroute-cache
interface ethernet1
ip address 10.1.0.1 255.255.255.0
ip pim dense-mode
ip pgm router
no ip directed-broadcast
no ip mroute-cache
media-type 10BaseT
interface ethernet2
ip address 10.2.0.1 255.255.255.0
ip pim dense-mode
ip pgm router
no ip directed-broadcast
no ip mroute-cache
media-type 10BaseT

```

## PGM Router Assist with a Physical Interface Example

The following example shows PGM Router Assist (the PGM network layer) enabled on the router and the router set up to forward PGM packets out of physical Ethernet interfaces 1 and 2. PGM packets can be received on physical Ethernet interfaces 1 and 2 simultaneously.

```

ip multicast-routing
ip routing
interface ethernet1
ip address 10.1.0.1 255.255.255.0
ip pim dense-mode
ip pgm router
no ip directed-broadcast
no ip mroute-cache
media-type 10BaseT
interface ethernet2
ip address 10.2.0.1 255.255.255.0
ip pim dense-mode
ip pgm router
no ip directed-broadcast
no ip mroute-cache
media-type 10BaseT

```

## Feature Information for PGM Host and Router Assist

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 PGM Host and Router Assist**

Feature Name	Releases	Feature Information
Pragmatic General Multicast (PGM)	12.2(15)T Cisco IOS XE Release 3.8S	Pragmatic General Multicast (PGM) is a reliable multicast transport protocol for applications that require ordered, duplicate-free, multicast data delivery from multiple sources to multiple receivers.
PGM Host	12.2(15)T	PGM has two primary parts; network element and host style functions. This feature implements the host side functionality of PGM.

