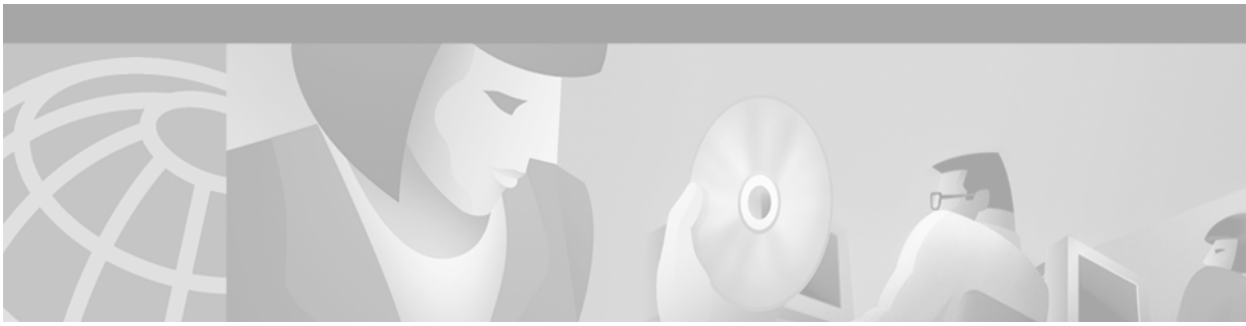

PGM Host and Router Assist Commands

Use the commands in this chapter to configure and monitor the Pragmatic General Multicast (PGM) Host and Router Assist features. For configuration information and examples of PGM Host and Router Assist, refer to the "Configuring PGM Host and Router Assist" chapter in the *Cisco IOS IP Configuration Guide*.

clear ip pgm host

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

To reset Pragmatic General Multicast (PGM) Host connections to their default values and to clear traffic statistics, use the **clear ip pgm host** command in privileged EXEC mode.

clear ip pgm host {**defaults** | **traffic**}

Syntax Description

defaults	Resets all PGM Host connections to their default values.
traffic	Clears all PGM Host traffic statistics.

Defaults

No default behavior or values.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(1)T	This command was introduced.

Usage Guidelines

This command should be used only in rare cases or during debugging. A reason to reset all PGM Host connections to their default values is to eliminate configuration errors in one step. A reason to clear traffic statistics is to make diagnostic testing easier.

Examples

The following example resets all PGM Host connections to their default values:

```
Router# clear ip pgm host defaults
```

The following example clears all PGM Host traffic statistics:

```
Router# clear ip pgm host traffic
```

Related Commands

Command	Description
ip pgm host	Enables PGM Host.
show ip pgm host defaults	Displays default values for PGM Host traffic.
show ip pgm host traffic	Displays PGM Host traffic statistics.

clear ip pgm router

To clear Pragmatic General Multicast (PGM) traffic statistics, use the **clear ip pgm router** command in EXEC mode.

clear ip pgm router [[**traffic** [*type number*]] | [**rtx-state** [*group-address*]]]

Syntax Description

traffic [*type number*]	(Optional) Interface type and number whose PGM traffic statistics are cleared. If no interface type and number are provided, all traffic statistics are cleared.
rtx-state [*group-address*]	(Optional) IP address of the multicast group whose PGM resend state is cleared. If no group address is provided, all resend state is cleared. Clearing resend state means the router will not forward any retransmissions corresponding to that state.

Command Modes

EXEC

Command History

Release	Modification
12.0(5)T	This command was introduced.

Usage Guidelines

This command should be used only in rare cases or during debugging. Normally, the resend state memory is freed automatically when the information is no longer useful. Also, using this command briefly affects the normal PGM behavior.

A reason to clear traffic statistics is to make diagnostic testing easier.

A reason to clear state might be to free the memory consumed by such state. PGM resend state times out if no traffic keeps it alive.

Examples

The following example clears all PGM resend state from the router:

```
Router# clear ip pgm router rtx-state
```

Related Commands

Command	Description
ip pgm router	Enables PGM Router Assist and thereby allows PGM to operate more efficiently on the router.
show ip pgm router	Displays PGM Reliable Transport Protocol state and statistics.

ip pgm host

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

To enable Pragmatic General Multicast (PGM) Host, use the **ip pgm host** command in global configuration mode. To disable PGM Host and close all open PGM Host traffic sessions, use the **no** form of this command.

ip pgm host [**source-interface** {*type number*} | *connection-parameter*]

no ip pgm host

Syntax Description

source-interface *type number*	(Optional) Interface type and number on which to run PGM Host.
connection-parameter	(Optional) Configures advanced PGM Host connection parameters. The optional configuration parameters should only be configured by experts in PGM technology. See Table 26 for a comprehensive list of the optional connection parameters and their definitions.

Defaults

PGM Host is not enabled.

Command Modes

Global configuration

Command History

Release	Modification
12.1(1)T	This command was introduced.

Usage Guidelines

Using the **ip pgm host** command without a keyword or an argument enables PGM Host on the router and configures the router to source PGM packets through a virtual host interface (vif).

Specifying a physical or logical interface type (for example, an Ethernet, serial, or loopback interface) with the **ip pgm host source-interface** command configures the router to source PGM packets out of the physical or logical interface.

Note You must first enable PGM Host globally on the router using the **ip pgm host** command before sourcing PGM packets out of a physical or logical interface using the **ip pgm host source-interface** command.

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 configures the router to send PGM packets out that interface only and to receive packets on any router interface.

When both PGM Host and Router Assist are enabled on the router, 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. Refer to the "Configuring PGM Host and Router Assist" chapter of the *Cisco IOS IP Configuration Guide* for more information about PGM Router Assist.

Table 26 lists the available parameters for the *connection-parameter* argument. The parameters should be configured only by experts in PGM technology. Use the **no ip pgm host** *connection-parameter* command to return a parameter to its default value.

Table 26 ip pgm host Connection Parameters

Parameter	Definition
ihb-max *milliseconds*	(Optional) Sets the source path message (SPM) interheartbeat timer maximum. The default is 10000 milliseconds (ms).
ihb-min *milliseconds*	(Optional) Sets the SPM interheartbeat timer minimum. The default is 1000 ms.
join *milliseconds*	(Optional) Sets the amount of time the PGM Host waits, when running in router mode, for client requests. The default is 0 ms.
nak-gen-ivl *milliseconds*	(Optional) Sets the amount of time the PGM Host waits for a PGM negative acknowledgment (NAK) data packet. The default is 60000 ms.
nak-rb-ivl *milliseconds*	(Optional) Sets the amount of time the PGM Host waits before sending a PGM NAK data packet. The default is 500 ms.
nak-rdata-ivl *milliseconds*	(Optional) Sets the amount of time the PGM Host waits for a re-sent PGM NAK (NAK RDATA) data packet. The default is 2000 ms.
nak-rpt-ivl *milliseconds*	(Optional) Sets the amount of time the PGM Host waits for a PGM NAK confirmation (NAK NCF) data packet. The default is 2000 ms.
ncf-max *packets-per-second*	(Optional) Sets the maximum number of PGM NAK confirmation data packets (NAK NCFs) the PGM Host sends per second. The default is infinite.
rx-buffer-mgmt {**full** | **minimum**}	(Optional) Sets the type of receive data buffers (full or minimum) for the PGM Host. The default is minimum.
spm-ambient-ivl *milliseconds*	(Optional) Sets the amount of time the PGM Host waits for a PGM SPM ambient data packet. The default is 6000 ms.
spm-rpt-ivl *milliseconds*	(Optional) Sets the amount of time the PGM Host waits for a PGM SPM repeat data packet. The default is 3000 ms.
stream-type {**apdu** | **byte**}	(Optional) Sets the data stream type (apdu or byte) for the PGM Host. The default is apdu.
tpdu-size *number*	(Optional) Sets the size of the source transport data unit (TPDU) for the PGM Host. The available range is 41 through 16384 bytes. The default is 1400 bytes.

Table 26 ip pgm host Connection Parameters (continued)

Parameter	Definition
ttl *number*	(Optional) Sets the time-to-live (TTL) value on the PGM Host for sent multicast data packets. The default is 255 hops. The TTL value for a packet is decremented by 1 as the packet passes through a router.
tx-buffer-mgmt {**keep** | **return**}	(Optional) Sets the type of transmit data buffers (keep or return) for the PGM Host. The default is return.
tx-adv-method {**data** | **time**}	(Optional) Sets the type of advanced transmit window method (data or time) for the PGM Host. The default is time.
txw-adv-secs *milliseconds*	(Optional) Sets the size of advanced transmit window for the PGM Host. The default is 6000 ms.
txw-rte *bytes-per-second*	(Optional) Sets the data transmit rate for the PGM Host. The default is 16,384 bytes per second.
txw-secs *milliseconds*	(Optional) Sets the data transmit window size for the PGM Host. The default is 30,000 ms.
txw-timeout-max *milliseconds*	(Optional) Sets the amount of time the PGM Host waits for data packets, even if the PGM Host receives PGM NAK data packets. The default is 3,600,000 ms.

Examples

The following example enables PGM Host (both the source and receiver part of the PGM network layer) globally on the router and configures the router to source PGM packets through a vif:

```
ip pgm host
```

The following example enables PGM Host globally on the router and configures the router to source PGM packets out of physical Ethernet interface 0/1:

```
ip pgm host
ip pgm host source-interface ethernet 0/1
```

Related Commands

Command	Description
clear ip pgm host	Resets PGM Host connections to their default values and clears traffic statistics.
ip pgm router	Enables PGM Router Assist and thereby allows PGM to operate more efficiently on the router.
show ip pgm host defaults	Displays the default values for PGM Host traffic.
show ip pgm host sessions	Displays open PGM Host traffic sessions.
show ip pgm host traffic	Displays PGM Host traffic statistics.

ip pgm router

To enable Pragmatic General Multicast (PGM) Router Assist and thereby allow PGM to operate more efficiently on the router, use the **ip pgm router** command in interface configuration mode. To disable PGM Router Assist for the interface, use the **no** form of this command.

ip pgm router

no ip pgm router

Syntax Description

This command has no arguments or keywords.

Defaults

PGM Router Assist is disabled for the interface.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(5)T	This command was introduced.

Usage Guidelines

This command is highly recommended for optimal deployment of PGM Reliable Transport Protocol on a host.

Examples

In the following example, PGM Router Assist is configured on Ethernet interfaces 0 and 1:

```
ip multicast-routing
interface ethernet 0
 ip pim sparse-dense-mode
 ip pgm router
interface ethernet 1
 ip pim sparse-dense-mode
 ip pgm router
```

Related Commands

Command	Description
clear ip pgm router	Clears PGM traffic statistics.
ip pgm host	Enables PGM Host.
show ip pgm router	Displays PGM Reliable Transport Protocol state and statistics.

show ip pgm host defaults

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

To display the default values for Pragmatic General Multicast (PGM) Host traffic, use the **show ip pgm host defaults** command in EXEC mode.

show ip pgm host defaults

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values.

Command Modes

EXEC

Command History

Release	Modification
12.1(1)T	This command was introduced.

Usage Guidelines

The default values displayed in the **show ip pgm host defaults** command output are applied to every new host connection that is opened.

Examples

The following is sample output from the **show ip pgm host defaults** command:

```
Router> show ip pgm host defaults

Source Session Default Values :

    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)

Receiver Session Default Values :

    nak-gen-ivl (60000), nak-rb-ivl (500), nak-rdata-ivl (2000)
    nak-rpt-ivl (2000), rx-buffer-mgmt (minimum), rx-local-retrans (none)

Common Default Values:

    stream-type (apdu), ttl (255)

Address used to source packets:(10.1.1.1)
```

Table 27 describes the fields Source Session Default Values, Receiver Session Default Values, Common Default Values, and Address used to source packets shown in the sample output. See Table 26 for a definition of each individual default value in the sample output.

Table 27 show ip pgm host defaults Field Descriptions

Field	Description
Source Session Default Values	Displays the values for source-specific PGM Host traffic defaults.
Receiver Session Default Values	Displays the values for receiver-specific PGM Host traffic defaults.
Common Default Values	Displays the values for PGM Host traffic defaults that are common between a source and a receiver.
Address used to source packets	The unicast IP address that the virtual host is using to originate PGM packets.

Related Commands

Command	Description
clear ip pgm host	Resets PGM Host connections to their default values and clears traffic statistics.
ip pgm host	Enables PGM Host.
show ip pgm host sessions	Displays open PGM Host traffic sessions.
show ip pgm host traffic	Displays PGM Host traffic statistics.

show ip pgm host sessions

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

To display open Pragmatic General Multicast (PGM) Host traffic sessions, use the **show ip pgm host sessions** command in EXEC mode.

show ip pgm host sessions [*session-number* | *group-address*]

Syntax Description

session-number	(Optional) PGM Host traffic session number.
group-address	(Optional) PGM Host multicast group address.

Defaults

No default behavior or values.

Command Modes

EXEC

Command History

Release	Modification
12.1(1)T	This command was introduced.

Usage Guidelines

If a session number or multicast group address is not specified, all open traffic sessions are displayed.

Examples

The following example shows all open traffic sessions:

```
Router> show ip pgm host sessions

Idx  GSI           Source Port  Type     State   Dest Port  Mcast Address
1    000000000000  0            receiver listen  48059      224.3.3.3
2    9CD72EF099FA  1025         source   conn    48059      224.1.1.1
```

The following example shows traffic information for traffic session number 2:

```
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
```

The following example shows traffic information for multicast group address 244.1.1.1:

```
Router> show ip pgm host sessions 244.1.1.1

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
```

Table 28 describes the significant fields shown in the displays.

Table 28 show ip pgm host sessions Field Descriptions

Field	Description
Idx	The local index for the traffic session.
GSI	The global source identifier for the traffic session.
Source Port	The source port for the traffic session.
Type	Source or receiver session.
State	The state of the session. For example, connected or listening.
Dest Port	The destination port for the traffic session.
Mcast Address	The IP multicast address for the traffic session.
ODATA	Normal data packet.

Table 28 show ip pgm host sessions Field Descriptions (continued)

Field	Description
RDATA	Re-sent data packet.
ADPUs	Application data units.
SPM	Source path message.
NCF	Negative acknowledgment (NAK) confirmation packet.
NAK	NAK packet.

Related Commands

Command	Description
clear ip pgm host	Resets PGM Host connections to their default values and clears traffic statistics.
ip pgm host	Enables PGM Host.
show ip pgm host defaults	Displays the default values for PGM Host traffic.
show ip pgm host traffic	Displays PGM Host traffic statistics.

show ip pgm host traffic

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

To display Pragmatic General Multicast (PGM) Host traffic statistics, use the **show ip pgm host traffic** command in EXEC mode.

show ip pgm host traffic

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values.

Command Modes

EXEC

Command History

Release	Modification
12.1(1)T	This command was introduced.

Usage Guidelines

Use this command to view traffic statistics at the PGM transport layer.

Examples

The following is sample output from the **show ip pgm host traffic** command:

```
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
          packets received in error         0

Receiver Statistics :
```

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

Table 29 describes the significant fields shown in the display.

Table 29 show ip pgm host traffic Field Descriptions

Field	Description
General Statistics	Displays statistics that relate to both the traffic source and the receiver.
Source Statistics	Displays statistics that relate to the traffic source.
Receiver Statistics	Displays statistics that relate to the traffic receiver.

Related Commands

Command	Description
clear ip pgm host	Resets PGM Host connections to their default values and clears traffic statistics.
ip pgm host	Enables PGM Host.
show ip pgm host defaults	Displays the default values for PGM Host traffic.
show ip pgm host sessions	Displays open PGM Host traffic sessions.

show ip pgm router

To display Pragmatic General Multicast (PGM) Reliable Transport Protocol state and statistics, use the **show ip pgm router** command in EXEC mode.

show ip pgm router [[**interface** [*type number*]] | [**state** [*group-address*]] | [**traffic** [*type number*]]] [**verbose**]

Syntax Description

interface [*type number*]	(Optional) Displays interfaces on which PGM Router Assist is configured.
state [*group-address*]	(Optional) Displays PGM resend state information per transport session identifier (TSI). If no group address is specified, resend state for all groups is shown.
traffic [*type number*]	(Optional) Displays PGM packet counters. If no interface type and number are specified, traffic on all interfaces is displayed. These statistics do not reflect the number of PGM data packets (ODATA) that are forwarded in a session, because these are forwarded transparently by IP multicast.
verbose	(Optional) Displays extended information about outgoing interface lists, timers, Forward Error Connections (FECs), and Designated Local Retransmitters (DLRs).

Command Modes

EXEC

Command History

Release	Modification
12.0(5)T	This command was introduced.

Examples

The following is sample output of the **show ip pgm router** command with the **interface** keyword:

```
Router# show ip pgm router interface

Address         Interface
10.1.0.2        Ethernet1/0/0 (measured drop rate 0%)
10.3.0.2        Ethernet1/0/4 (measured drop rate 0%)
```

Table 30 describes the significant fields shown in the display.

Table 30 show ip pgm router Field Descriptions

Field	Description
Address	IP address of the interface running PGM Router Assist.
Interface	Interface type and number on the router that is running PGM Router Assist, plus the drop rate measured on the interface.

The following is sample output of the **show ip pgm router** command with the **traffic** keyword. An RDATA fragment is a part of an RDATA packet that has been fragmented at the IP layer while in transit. The PGM network element has seen two RDATA packets that were each fragmented into three IP fragments.

```
Router# show ip pgm router traffic

FastEthernet0/0
  NAKs received                 2
  NCFs transmitted              2
 RDATA forwarded                2
 RDATA frags forwarded          6
  SPMs received                 4
       used                     4
  SPMs forwarded               33
Serial0/0
  NAKs forwarded                2
  NAKs retransmitted            2
  NCFs received                 4
 RDATA received                 2
 RDATA frags received           6
  SPMs received                33
       used                    33
```

The following is sample output of the **show ip pgm router** command with the **state** and **verbose** keywords. The timer associated with each session is an idle timer; the TSI state is deleted when this timer expires. The measured loss rates are indicated as follows:

- link_lr: worst reported link loss rate
- path_lr: worst reported path loss rate
- receiver_lr: worst reported receiver loss rate
- cr_lead: sequence number associated with worst receiver loss rate
- cr_worst_rec: IP address that reported worst loss rate

```
Router# show ip pgm router state verbose

TSI                Group            Neighbor        TGSIZE
0A0700C85555-1000  227.7.7.7        rpf/source       N/A        00:04:25
  (link_lr 7%, path_lr 4%, receiver_lr 10%
  cr_lead 6256421, cr_worst_rec 134.45.0.126)
```

The following sample output shows state after receivers have reported loss of certain packets. Negative acknowledgments (NAKs) have been received for each of the two sessions in the previous example. After the loss, the router has state for the lost packets. The “sqn 1990” indicates that a receiver lost a packet with sequence number 1990 and is requesting that it be re-sent.

```
Router# show ip pgm router state verbose

TSI                Group            Neighbor        TGSIZE
0A0700C85555-1000  227.7.7.7        rpf/source       N/A        00:04:55
   sqn        1990            age   4 ELIM TMR
       Ethernet1/0/0
   sqn        1991            age    5 (anticipated)
0A0700C85555-2000 234.4.3.2         rpf/source       16         00:04:55
   sqn (       125,          7) age   10
       Serial5/0 prty # 7
```

For the selective TSI, the output shows resend state for sequence number 1990. This state was created by a NAK received on Ethernet interface 1/0/0. “ELIM TMR” indicates that the state is currently eliminating duplicates of any NAK that is pending and any new NAKs for this sequence number will not be forwarded.

State shown for sequence 1991 is anticipated state, indicating that it was created by a NAK confirmation (NCF) for a NAK sent by some other PGM router with the same PGM upstream neighbor as this router.

For the TSI with parity, the state shown was created by a parity NAK for seven packets of the Transmission Group 125. This state was received on Serial interface 5/0; “# 7” indicates that seven parity packets must be forwarded out this interface.

Related Commands

Command	Description
clear ip pgm router	Clears PGM traffic statistics.
ip pgm router	Enables PGM Router Assist and thereby allows PGM to operate more efficiently on the router.