



# IP Multicast Network Management

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## Version History

Version Number	Date	Notes
1	February 27, 2002	This document was created.
2	March 4, 2005	This document was updated.

The purpose of this document is to provide information about the Simple Network Management Protocol (SNMP) features in Cisco IOS software that are specific to IP multicast. This document also includes IP multicast network management configuration commands.

This document has the following sections:

- [SNMP Overview, page 1](#)
- [IP Multicast MIBs, page 3](#)
- [SNMP Traps for IP Multicast, page 5](#)
- [Related Documents, page 8](#)

## SNMP Overview

The Simple Network Management Protocol (SNMP) is an application layer protocol that facilitates the exchange of management information between network devices. It is part of the TCP/IP protocol suite. SNMP enables network administrators to manage network performance, find and solve network problems, and plan for network growth.

Management information is viewed as a collection of managed objects. Collections of related objects are defined in Management Information Base (MIB) modules. These modules are written using a subset of OSI's Abstract Syntax Notation One (ASN.1), termed the Structure of Management Information (SMI).

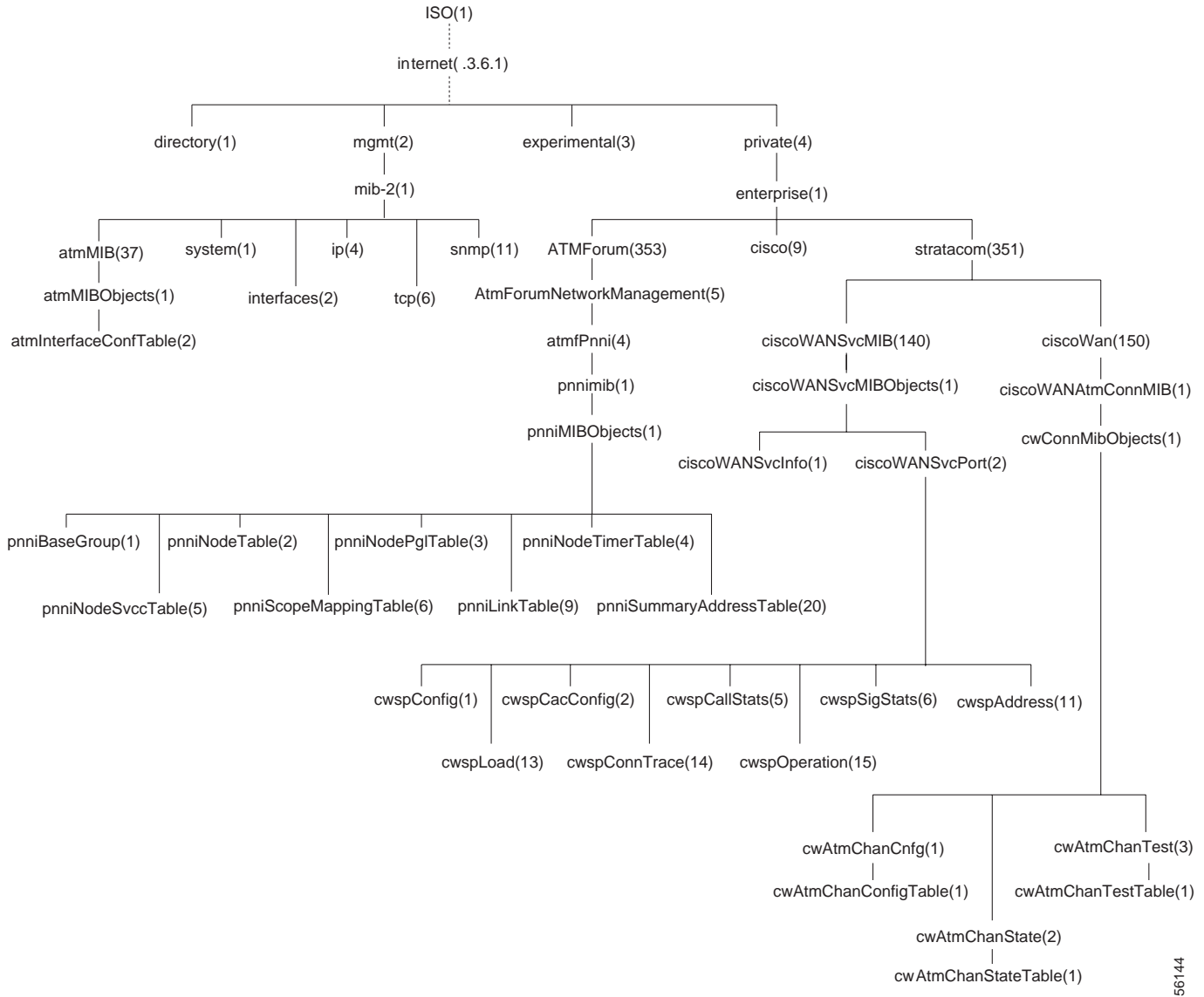
A MIB is a collection of information that is organized hierarchically. MIBs are accessed using a network management protocol such as SNMP. They are comprised of managed objects and are identified by object identifiers.



An object identifier (or object ID) uniquely identifies a managed object in the MIB hierarchy. The MIB hierarchy can be depicted as a tree that begins with the root and expands downward into branches. Each point in the tree is called a node and each node can have one or more branches, or terminate with a leaf node.

Figure 1 shows the MIB tree from its root, “ISO,” to some of its lower branches. The branches of primary interest are “mgmt” and “private.” The mgmt branch contains standard MIBs and the private branch contains enterprise MIBs. Private enterprises obtain branch number assignments from the Internet Assigned Numbers Authority (IANA). Cisco developers obtain branch number assignments in the Cisco branch from the Cisco Assigned Numbers Authority (CANA). For example, the branch of the tree that contains all the information about the enterprise MIBs has been assigned an object ID of “1.3.6.1.4.1.” The word “enterprise” is commonly used as a prefix in the MIB definitions instead of the longer term 1.3.6.1.4.1.

SNMP traps are used by managed devices to asynchronously report events to the Network Management Station (NMS). When certain types of events occur, a managed device sends a trap to the NMS.

**Figure 1** MIB Tree

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## IP Multicast MIBs

Table 1 provides information about the four IP multicast MIBs defined by the Internet Engineering Task Force (IETF).

**Table 1** *MIBs Defined by the IETF*

Protocol	Draft MIB Name	RFC MIB Name	RFC	Status
IP multicast routing	IPMROUTE-MIB.my	IPMROUTE-STD-MIB.my	RFC 2932	Proposed Standard
IGMP	IGMP-MIB.my	IGMP-STD-MIB.my	RFC 2933	Proposed Standard
PIM	—	PIM-MIB.my	RFC 2934	Experimental
MSDP	MSDP-MIB.my	—	Draft	—

[Table 2](#) provides information on the two Cisco IOS-specific MIBs that extend the capabilities of IP multicast beyond what is defined in the IETF MIBs (for example, Cisco IOS-specific configuration and feature elements).

**Table 2** *Cisco-Specific MIBs*

Protocol	MIB Name
IP multicast routing	CISCO-IPMROUTE-MIB.my
PIM	CISCO-PIM-MIB.my
Multicast VPN	CISCO-MVPN-MIB.my
IGMP Snooping	CISCO-IGMP-SNOOPING-MIB.my

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

[Table 3](#) provides information about the Cisco IOS releases in which the IP multicast MIBs have been implemented.

**Table 3** *IP Multicast MIB Release Information*

MIB Name	Cisco IOS/CatOS Release	Reference Source or Cisco Revision
IPMROUTE-MIB.my	11.2	draft-ietf-idmr-multicast-routmib-04.txt
IPMROUTE-MIB.my	12.0	draft-ietf-idmr-multicast-routmib-07.txt  <b>Note</b> Cisco IOS Release 12.2(15)T and later releases do not support IPMROUTE-MIB.my.
IPMROUTE-STD-MIB.my	12.0S, 12.2(15)T, 12.3	RFC 2932
IGMP-MIB.my	11.2	draft-ietf-idmr-igmp-mib-05.txt  <b>Note</b> Cisco IOS Release 12.2(4)T and later releases do not support the IGMP-MIB.my.
IGMP-STD-MIB.my	12.2(4)T	RFC 2933
PIM-MIB.my	11.2	—

**Table 3** *IP Multicast MIB Release Information (continued)*

MIB Name	Cisco IOS/CatOS Release	Reference Source or Cisco Revision
PIM-MIB.my	12.0	draft-ietf-idmr-pim-mib-04.txt
PIM-MIB.my	12.2(4)T, 12.0(15)S, 12.2(14)S	RFC 2934 <sup>1</sup>
MSDP-MIB.my	12.0 S, 12.1 T	draft-ietf-msdp-mib-03.txt <sup>2</sup>
CISCO-IPMROUTE-MIB.my	11.2	9610110000Z
CISCO-IPMROUTE-MIB.my	12.0	9902090000Z
CISCO-IPMROUTE-MIB.my	12.2(8)T, 12.0(16)S	200012200000Z
CISCO-PIM-MIB.my	12.2(4)T, 12.0(15)S, 12.2(14)S	200011020000Z
CISCO-MVPN-MIB.my	12.0(29)S	200402231200Z
CISCO-IGMP-SNOOPING-MIB.my	CatOS 7.5, 8.1	200303240000Z

1. Cisco IOS software does not support the pimIpMRouteTable and pimIpMRouteNextHop tables.
2. Cisco IOS software does not support the msdpRequestsTable table. It also does not support the msdpPeerFsmEstablishedTime, msdpPeerFsmEstablishedTransitions, msdpPeerEncapsulationState, msdpPeerEncapsulationType, msdpPeerConnectionAttempts, msdpPeerInNotifications, msdpPeerOutNotifications, and msdpPeerLastError objects from the msdpPeerTable table.

## SNMP Traps for IP Multicast

[Table 4](#) provides information about the supporting Cisco IOS releases and commands for IP multicast SNMP traps.

**Table 4** *SNMP Traps Cisco IOS Release Information*

SNMP Traps	Cisco IOS Release	Cisco IOS Command
PIM MIB Trap	12.0(15)S, 12.2(4)T	<b>snmp-server enable traps pim</b>
Cisco PIM MIB Traps	12.2(4)T, 12.0(15)S	<b>snmp-server enable traps pim</b>
Cisco IP Multicast Routing MIB Trap	12.1(3)T	<b>snmp-server enable traps ipmulticast</b>
MSDP MIB Traps	12.0(12)S, 12.1 T	<b>snmp-server enable traps msdp</b>
Cisco Multicast VPN MIB Trap	12.0(29)S	<b>snmp-server enable traps mvpn</b>

The following sections describe the IP multicast SNMP traps that are implemented in Cisco IOS software. The descriptions of the traps were copied from the MIB definitions.

### PIM MIB Trap

[Table 5](#) defines the pimNeighborLoss trap for the PIM MIB.

**Table 5** *PIM MIB Trap Definition*

Trap Name and Object ID	Definition
pimNeighborLoss 1.3.6.1.3.61.1.3.1.2.1	A pimNeighborLoss trap signifies the loss of an adjacency with a neighbor. This trap is generated when the neighbor timer expires, and the router has no other neighbors on the same interface with a lower IP address than itself.

## Cisco PIM MIB Traps

Table 6 defines the traps for the Cisco PIM MIB.

**Table 6** *Cisco PIM MIB Trap Definition*

Trap Name and Object ID	Definition
ciscoPimInterfaceUp 1.3.6.1.4.1.9.9.184.2.0.1	A ciscoPimInterfaceUp notification signifies the restoration of a PIM interface. This notification is generated whenever pimInterfaceStatus makes the transition into the “active” state. pimInterfaceStatus identifies the interface that was involved in the generation of this notification.
ciscoPimInterfaceDown 1.3.6.1.4.1.9.9.184.2.0.2	A ciscoPimInterfaceDown notification signifies the loss of a PIM interface. This notification is generated whenever an entry is about to be deleted from the PimInterfaceTable. pimInterfaceStatus identifies the interface that was involved in the generation of this notification.
ciscoPimRPMappingChange 1.3.6.1.4.1.9.9.184.2.0.3	<p>A ciscoPimRPMappingChange notification signifies a change in the RP mapping on the device in question. A change in RP mapping could result from addition of new entries to the RP mapping cache, deletion of existing entries, or a modification to an existing mapping. The type of change is indicated by cpimRPMappingChangeType. pimRPSetHoldTime is used to identify the row in the pimRPSetTable that is responsible for the generation of this notification.</p> <p>In case of modification to existing entries, a notification is generated once before the modification (with cpimRPMappingChangeType set to modifiedOldMapping) and once after modification (with cpimRPMappingChangeType set to modifiedNewMapping).</p> <p><b>Note</b> A high frequency of RP mapping change could result in a large number of ciscoPimRPMappingChange notifications being generated. Hence, in environments where the possibility of a high frequency of RP mapping change exists, enable this notification with utmost care.</p>

**Table 6** *Cisco PIM MIB Trap Definition (continued)*

Trap Name and Object ID	Definition
ciscoPimInvalidRegister 1.3.6.1.4.1.9.9.184.2.0.4	A ciscoPimInvalidRegister notification signifies that an invalid register message was received by this device.  This notification is generated whenever the cpimInvalidRegisterMsgsRcvd counter is incremented. cpimLastErrorOrigin, cpimLastErrorGroup, and cpimLastErrorRP should signify the source address, group address, and the RP address in the invalid register packet.
ciscoPimInvalidJoinPrune 1.3.6.1.4.1.9.9.184.2.0.5	A ciscoPimInvalidJoinPrune notification signifies the receipt of an invalid join or prune message.

## Cisco IP Multicast Routing MIB Trap

[Table 7](#) defines the ciscoIpMRouteMissingHeartBeats trap for the Cisco IP Multicast Routing MIB.

**Table 7** *Cisco IP Multicast Routing MIB Trap Definition*

Trap Name and Object ID	Definition
ciscoIpMRouteMissingHeartBeats 1.3.6.1.4.1.9.10.2.3.1.1	A ciscoIpMRouteMissingHeartBeats trap is sent if a multicast router with this feature enabled failed to receive the configured number of heartbeat packets from heartbeat sources within a configured time interval.

## MSDP MIB Traps

[Table 8](#) defines the traps for the MSDP MIB.

**Table 8** *MSDP MIB Trap Definitions*

Trap Name and Object ID	Definition
msdpEstablished <sup>1</sup> 1.3.6.1.3.92.1.1.7.1	An msdpEstablished event is generated when the MSDP Finite State Machine (FSM) enters the ESTABLISHED state.
msdpBackwardTransition 1.3.6.1.3.92.1.1.7.2	An msdpBackwardTransition event is generated when the MSDP FSM moves from a higher numbered state to a lower numbered state.

1. Cisco IOS software does not support the msdpEstablished trap.

## Cisco Multicast VPN MIB Trap

Table 9 defines the traps for the Cisco Multicast VPN MIB.

**Table 9** Cisco Multicast VPN MIB Trap Definitions

Trap Name and Object ID	Definition
ciscoMvpnMvrfChange 1.3.6.1.4.1.9.10.113.0.2	This notification signifies a change in the MVRF on the router. The possible events that require notification to the NMS include creation and deletion of the MVRF, and a change in the default or data MDT configuration of the MVRF.

## Related Documents

- *Cisco IOS SNMP Traps Supported and How to Configure Them*, Cisco Tech Note  
[http://www.cisco.com/warp/public/477/SNMP/snmp\\_traps.html](http://www.cisco.com/warp/public/477/SNMP/snmp_traps.html)
- *MSDP MIB*, Cisco IOS Release 12.1(5)T feature module  
<http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121t/121t5/dt5msdp.htm>
- “SNMP Commands” chapter, *Cisco IOS Configuration Fundamentals Command Reference*, Release 12.2  
[http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/ffun\\_r/ffrprt3/frf014.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/ffun_r/ffrprt3/frf014.htm)
- “System Management” chapter, *Cisco IOS Configuration Fundamentals Configuration Guide*, Release 12.2  
[http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/ffun\\_c/fcfrprt3/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/ffun_c/fcfrprt3/index.htm)