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Protocol Independent Multicast MIB for IPv4

Status of this Memo

This memo defines an Experimental Protocol for the Internet community. It does not specify an Internet standard of any kind. Discussion and suggestions for improvement are requested. Distribution of this memo is unlimited.

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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects used for managing the Protocol Independent Multicast (PIM) protocol for IPv4.

Table of Contents

1 Introduction	2
2 The SNMP Network Management Framework	2
3 Overview	3
4 Definitions	4
5 Security Considerations	22
6 Intellectual Property Notice	23
7 Acknowledgements	23
8 Authors' Addresses	24
9 References	24
10 Full Copyright Statement	27

1. Introduction

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects used for managing the Protocol Independent Multicast (PIM) protocol [16,17,18,19]. This MIB module is applicable to IPv4 multicast routers which implement PIM. This MIB does not support management of PIM for other address families, including IPv6. Such management may be supported by other MIBs.

2. The SNMP Network Management Framework

The SNMP Management Framework presently consists of five major components:

- o An overall architecture, described in RFC 2271 [1].
- o Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIV1 and described in STD 16, RFC 1155 [2], STD 16, RFC 1212 [3] and RFC 1215 [4]. The second version, called SMIV2, is described in STD 58, RFC 2578 [5], STD 58, RFC 2579 [6] and STD 58, RFC 2580 [7].
- o Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in STD 15, RFC 1157 [8]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in RFC 1901 [9] and RFC 1906 [10]. The third version of the message protocol is called SNMPv3 and described in RFC 1906 [10], RFC 2572 [11] and RFC 2574 [12].
- o Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, RFC 1157 [8]. A second set of protocol operations and associated PDU formats is described in RFC 1905 [13].
- o A set of fundamental applications described in RFC 2573 [14] and the view-based access control mechanism described in RFC 2575 [15].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the mechanisms defined in the SMI.

This memo specifies a MIB module that is compliant to the SMIV2. A MIB conforming to the SMIV1 can be produced through the appropriate translations. The resulting translated MIB must be semantically equivalent, except where objects or events are omitted because no translation is possible (use of Counter64). Some machine readable information in SMIV2 will be converted into textual descriptions in SMIV1 during the translation process. However, this loss of machine readable information is not considered to change the semantics of the MIB.

3. Overview

This MIB module contains one scalar and eight tables. Some of the objects in these tables are deprecated. This MIB contains deprecated objects since they are necessary for managing PIMv1 routers, but PIMv1 itself is obsoleted by PIMv2 [18,19].

The tables contained in this MIB are:

- (1) The PIM Interface Table contains one row for each of the router's PIM interfaces.
- (2) The PIM Neighbor Table contains one row for each of the router's PIM neighbors.
- (3) The PIM IP Multicast Route Table contains one row for each multicast routing entry whose incoming interface is running PIM.
- (4) The PIM Next Hop Table which contains one row for each outgoing interface list entry in the multicast routing table whose interface is running PIM, and whose state is pruned.
- (5) The (deprecated) PIM RP Table contains the PIM (version 1) information for IP multicast groups which is common to all RPs of a group.
- (6) The PIM RP-Set Table contains the PIM (version 2) information for sets of candidate Rendezvous Points (RPs) for IP multicast group addresses with particular address prefixes.
- (7) The PIM Candidate-RP Table contains the IP multicast groups for which the local router is to advertise itself as a Candidate-RP. If this table is empty, then the local router advertises itself as a Candidate-RP for all groups.
- (8) The PIM Component Table contains one row for each of the PIM domains to which the router is connected.

4. Definitions

```
PIM-MIB DEFINITIONS ::= BEGIN
```

IMPORTS

```
MODULE-IDENTITY, OBJECT-TYPE, experimental,
NOTIFICATION-TYPE,
Integer32, IpAddress, TimeTicks FROM SNMPv2-SMI
RowStatus, TruthValue FROM SNMPv2-TC
MODULE-COMPLIANCE, OBJECT-GROUP,
NOTIFICATION-GROUP FROM SNMPv2-CONF
ipMRouteGroup, ipMRouteSource,
ipMRouteSourceMask, ipMRouteNextHopGroup,
ipMRouteNextHopSource, ipMRouteNextHopSourceMask,
ipMRouteNextHopIfIndex,
ipMRouteNextHopAddress FROM IPROUTE-STD-MIB
InterfaceIndex FROM IF-MIB;
```

pimMIB MODULE-IDENTITY

```
LAST-UPDATED "200009280000Z" -- September 28, 2000
ORGANIZATION "IETF IDMR Working Group."
CONTACT-INFO
```

```
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```

```
Phone: +1 425 703 8835
EMail: dthaler@microsoft.com"
```

DESCRIPTION

```
"The MIB module for management of PIM routers."
```

```
REVISION "200009280000Z" -- September 28, 2000
```

DESCRIPTION

```
"Initial version, published as RFC 2934."
```

```
::= { experimental 61 }
```

```
pimMIBObjects OBJECT IDENTIFIER ::= { pimMIB 1 }
```

```
pimTraps OBJECT IDENTIFIER ::= { pimMIBObjects 0 }
```

```
pim OBJECT IDENTIFIER ::= { pimMIBObjects 1 }
```

pimJoinPruneInterval OBJECT-TYPE

```
SYNTAX Integer32
UNITS "seconds"
MAX-ACCESS read-write
STATUS current
```

```

DESCRIPTION
    "The default interval at which periodic PIM-SM Join/Prune
    messages are to be sent."
 ::= { pim 1 }

-- The PIM Interface Table

pimInterfaceTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF PimInterfaceEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The (conceptual) table listing the router's PIM interfaces.
        IGMP and PIM are enabled on all interfaces listed in this
        table."
    ::= { pim 2 }

pimInterfaceEntry OBJECT-TYPE
    SYNTAX      PimInterfaceEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry (conceptual row) in the pimInterfaceTable."
    INDEX       { pimInterfaceIfIndex }
    ::= { pimInterfaceTable 1 }

PimInterfaceEntry ::= SEQUENCE {
    pimInterfaceIfIndex      InterfaceIndex,
    pimInterfaceAddress      IPAddress,
    pimInterfaceNetMask      IPAddress,
    pimInterfaceMode         INTEGER,
    pimInterfaceDR           IPAddress,
    pimInterfaceHelloInterval Integer32,
    pimInterfaceStatus       RowStatus,
    pimInterfaceJoinPruneInterval Integer32,
    pimInterfaceCBSRPreference Integer32
}

pimInterfaceIfIndex OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The ifIndex value of this PIM interface."
    ::= { pimInterfaceEntry 1 }

pimInterfaceAddress OBJECT-TYPE
    SYNTAX      IPAddress

```

MAX-ACCESS read-only
STATUS current

DESCRIPTION

"The IP address of the PIM interface."
 ::= { pimInterfaceEntry 2 }

pimInterfaceNetMask OBJECT-TYPE

SYNTAX IPAddress
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"The network mask for the IP address of the PIM interface."
 ::= { pimInterfaceEntry 3 }

pimInterfaceMode OBJECT-TYPE

SYNTAX INTEGER { dense(1), sparse(2), sparseDense(3) }
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"The configured mode of this PIM interface. A value of
 sparseDense is only valid for PIMv1."
 DEFVAL { dense }
 ::= { pimInterfaceEntry 4 }

pimInterfaceDR OBJECT-TYPE

SYNTAX IPAddress
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"The Designated Router on this PIM interface. For point-to-
 point interfaces, this object has the value 0.0.0.0."
 ::= { pimInterfaceEntry 5 }

pimInterfaceHelloInterval OBJECT-TYPE

SYNTAX Integer32
UNITS "seconds"
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"The frequency at which PIM Hello messages are transmitted
 on this interface."
 DEFVAL { 30 }
 ::= { pimInterfaceEntry 6 }

pimInterfaceStatus OBJECT-TYPE

SYNTAX RowStatus
MAX-ACCESS read-create

```

STATUS      current
DESCRIPTION
    "The status of this entry.  Creating the entry enables PIM
    on the interface; destroying the entry disables PIM on the
    interface."
 ::= { pimInterfaceEntry 7 }

pimInterfaceJoinPruneInterval OBJECT-TYPE
SYNTAX      Integer32
UNITS       "seconds"
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "The frequency at which PIM Join/Prune messages are
    transmitted on this PIM interface.  The default value of
    this object is the pimJoinPruneInterval."
 ::= { pimInterfaceEntry 8 }

pimInterfaceCBSRPreference OBJECT-TYPE
SYNTAX      Integer32 (-1..255)
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "The preference value for the local interface as a candidate
    bootstrap router.  The value of -1 is used to indicate that
    the local interface is not a candidate BSR interface."
DEFVAL      { 0 }
 ::= { pimInterfaceEntry 9 }

-- The PIM Neighbor Table

pimNeighborTable OBJECT-TYPE
SYNTAX      SEQUENCE OF PimNeighborEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The (conceptual) table listing the router's PIM neighbors."
 ::= { pim 3 }

pimNeighborEntry OBJECT-TYPE
SYNTAX      PimNeighborEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "An entry (conceptual row) in the pimNeighborTable."
INDEX       { pimNeighborAddress }
 ::= { pimNeighborTable 1 }

```

```

PimNeighborEntry ::= SEQUENCE {
    pimNeighborAddress      IpAddress,
    pimNeighborIfIndex      InterfaceIndex,
    pimNeighborUpTime       TimeTicks,
    pimNeighborExpiryTime   TimeTicks,
    pimNeighborMode         INTEGER
}

pimNeighborAddress OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The IP address of the PIM neighbor for which this entry
        contains information."
    ::= { pimNeighborEntry 1 }

pimNeighborIfIndex OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The value of ifIndex for the interface used to reach this
        PIM neighbor."
    ::= { pimNeighborEntry 2 }

pimNeighborUpTime OBJECT-TYPE
    SYNTAX      TimeTicks
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The time since this PIM neighbor (last) became a neighbor
        of the local router."
    ::= { pimNeighborEntry 3 }

pimNeighborExpiryTime OBJECT-TYPE
    SYNTAX      TimeTicks
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The minimum time remaining before this PIM neighbor will be
        aged out."
    ::= { pimNeighborEntry 4 }

pimNeighborMode OBJECT-TYPE
    SYNTAX      INTEGER { dense(1), sparse(2) }
    MAX-ACCESS  read-only
    STATUS      deprecated

```



```

DESCRIPTION
    "The active PIM mode of this neighbor. This object is
    deprecated for PIMv2 routers since all neighbors on the
    interface must be either dense or sparse as determined by
    the protocol running on the interface."
 ::= { pimNeighborEntry 5 }

--
-- The PIM IP Multicast Route Table
--

pimIpMRouteTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF PimIpMRouteEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The (conceptual) table listing PIM-specific information on
        a subset of the rows of the ipMRouteTable defined in the IP
        Multicast MIB."
    ::= { pim 4 }

pimIpMRouteEntry OBJECT-TYPE
    SYNTAX      PimIpMRouteEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry (conceptual row) in the pimIpMRouteTable. There
        is one entry per entry in the ipMRouteTable whose incoming
        interface is running PIM."
    INDEX       { ipMRouteGroup, ipMRouteSource, ipMRouteSourceMask }
    ::= { pimIpMRouteTable 1 }

PimIpMRouteEntry ::= SEQUENCE {
    pimIpMRouteUpstreamAssertTimer  TimeTicks,
    pimIpMRouteAssertMetric          Integer32,
    pimIpMRouteAssertMetricPref     Integer32,
    pimIpMRouteAssertRPTBit         TruthValue,
    pimIpMRouteFlags                 BITS
}

pimIpMRouteUpstreamAssertTimer OBJECT-TYPE
    SYNTAX      TimeTicks
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The time remaining before the router changes its upstream
        neighbor back to its RPF neighbor. This timer is called the
        Assert timer in the PIM Sparse and Dense mode specification.

```

A value of 0 indicates that no Assert has changed the upstream neighbor away from the RPF neighbor."

```
 ::= { pimIpMRouteEntry 1 }
```

pimIpMRouteAssertMetric OBJECT-TYPE

```
SYNTAX      Integer32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The metric advertised by the assert winner on the upstream
    interface, or 0 if no such assert is in received."
 ::= { pimIpMRouteEntry 2 }
```

pimIpMRouteAssertMetricPref OBJECT-TYPE

```
SYNTAX      Integer32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The preference advertised by the assert winner on the
    upstream interface, or 0 if no such assert is in effect."
 ::= { pimIpMRouteEntry 3 }
```

pimIpMRouteAssertRPTBit OBJECT-TYPE

```
SYNTAX      TruthValue
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The value of the RPT-bit advertised by the assert winner on
    the upstream interface, or false if no such assert is in
    effect."
 ::= { pimIpMRouteEntry 4 }
```

pimIpMRouteFlags OBJECT-TYPE

```
SYNTAX      BITS {
                rpt(0),
                spt(1)
            }
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "This object describes PIM-specific flags related to a
    multicast state entry.  See the PIM Sparse Mode
    specification for the meaning of the RPT and SPT bits."
 ::= { pimIpMRouteEntry 5 }
```

--
-- The PIM Next Hop Table
--

```
pimIpMRouteNextHopTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF PimIpMRouteNextHopEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The (conceptual) table listing PIM-specific information on
        a subset of the rows of the ipMRouteNextHopTable defined in
        the IP Multicast MIB."
    ::= { pim 7 }
```

```
pimIpMRouteNextHopEntry OBJECT-TYPE
    SYNTAX      PimIpMRouteNextHopEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry (conceptual row) in the pimIpMRouteNextHopTable.
        There is one entry per entry in the ipMRouteNextHopTable
        whose interface is running PIM and whose
        ipMRouteNextHopState is pruned(1)."
```

```
INDEX          { ipMRouteNextHopGroup, ipMRouteNextHopSource,
                ipMRouteNextHopSourceMask, ipMRouteNextHopIfIndex,
                ipMRouteNextHopAddress }
```

```
::= { pimIpMRouteNextHopTable 1 }
```

```
PimIpMRouteNextHopEntry ::= SEQUENCE {
    pimIpMRouteNextHopPruneReason    INTEGER
}
```

```
pimIpMRouteNextHopPruneReason OBJECT-TYPE
    SYNTAX      INTEGER {
        other (1),
        prune (2),
        assert (3)
    }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object indicates why the downstream interface was
        pruned, whether in response to a PIM prune message or due to
        PIM Assert processing."
    ::= { pimIpMRouteNextHopEntry 2 }
```

-- The PIM RP Table

```
pimRPTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF PimRPEntry
    MAX-ACCESS  not-accessible
    STATUS      deprecated
```

DESCRIPTION

"The (conceptual) table listing PIM version 1 information for the Rendezvous Points (RPs) for IP multicast groups. This table is deprecated since its function is replaced by the pimRPSetTable for PIM version 2."

```
::= { pim 5 }
```

pimRPEntry OBJECT-TYPE

```
SYNTAX      PimRPEntry
MAX-ACCESS  not-accessible
STATUS      deprecated
DESCRIPTION
```

"An entry (conceptual row) in the pimRPTable. There is one entry per RP address for each IP multicast group."

```
INDEX       { pimRPGroupAddress, pimRPAddress }
::= { pimRPTable 1 }
```

```
PimRPEntry ::= SEQUENCE {
  pimRPGroupAddress  IpAddress,
  pimRPAddress       IpAddress,
  pimRPState         INTEGER,
  pimRPStateTimer    TimeTicks,
  pimRPLastChange    TimeTicks,
  pimRPRowStatus     RowStatus
}
```

pimRPGroupAddress OBJECT-TYPE

```
SYNTAX      IpAddress
MAX-ACCESS  not-accessible
STATUS      deprecated
DESCRIPTION
```

"The IP multicast group address for which this entry contains information about an RP."

```
::= { pimRPEntry 1 }
```

pimRPAddress OBJECT-TYPE

```
SYNTAX      IpAddress
MAX-ACCESS  not-accessible
STATUS      deprecated
DESCRIPTION
```

"The unicast address of the RP."

```
::= { pimRPEntry 2 }
```

pimRPState OBJECT-TYPE

```
SYNTAX      INTEGER { up(1), down(2) }
MAX-ACCESS  read-only
STATUS      deprecated
DESCRIPTION
```

```

    "The state of the RP."
 ::= { pimRPEntry 3 }

```

```
pimRPStateTimer OBJECT-TYPE
```

```
SYNTAX      TimeTicks
```

```
MAX-ACCESS read-only
```

```
STATUS      deprecated
```

```
DESCRIPTION
```

```

    "The minimum time remaining before the next state change.
    When pimRPState is up, this is the minimum time which must
    expire until it can be declared down.  When pimRPState is
    down, this is the time until it will be declared up (in
    order to retry)."
```

```
 ::= { pimRPEntry 4 }
```

```
pimRPLastChange OBJECT-TYPE
```

```
SYNTAX      TimeTicks
```

```
MAX-ACCESS read-only
```

```
STATUS      deprecated
```

```
DESCRIPTION
```

```

    "The value of sysUpTime at the time when the corresponding
    instance of pimRPState last changed its value."
```

```
 ::= { pimRPEntry 5 }
```

```
pimRPRowStatus OBJECT-TYPE
```

```
SYNTAX      RowStatus
```

```
MAX-ACCESS read-create
```

```
STATUS      deprecated
```

```
DESCRIPTION
```

```

    "The status of this row, by which new entries may be
    created, or old entries deleted from this table."
```

```
 ::= { pimRPEntry 6 }
```

```
-- The PIM RP-Set Table
```

```
pimRPSetTable OBJECT-TYPE
```

```
SYNTAX      SEQUENCE OF PimRPSetEntry
```

```
MAX-ACCESS not-accessible
```

```
STATUS      current
```

```
DESCRIPTION
```

```

    "The (conceptual) table listing PIM information for
    candidate Rendezvous Points (RPs) for IP multicast groups.
    When the local router is the BSR, this information is
    obtained from received Candidate-RP-Advertisements.  When
    the local router is not the BSR, this information is
    obtained from received RP-Set messages."
```

```
 ::= { pim 6 }
```

```

pimRPSetEntry OBJECT-TYPE
    SYNTAX      PimRPSetEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry (conceptual row) in the pimRPSetTable."
    INDEX       { pimRPSetComponent, pimRPSetGroupAddress,
                 pimRPSetGroupMask, pimRPSetAddress }
    ::= { pimRPSetTable 1 }

PimRPSetEntry ::= SEQUENCE {

    pimRPSetGroupAddress      IpAddress,
    pimRPSetGroupMask         IpAddress,
    pimRPSetAddress           IpAddress,
    pimRPSetHoldTime          Integer32,
    pimRPSetExpiryTime        TimeTicks,
    pimRPSetComponent         Integer32
}

pimRPSetGroupAddress OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The IP multicast group address which, when combined with
        pimRPSetGroupMask, gives the group prefix for which this
        entry contains information about the Candidate-RP."
    ::= { pimRPSetEntry 1 }

pimRPSetGroupMask OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The multicast group address mask which, when combined with
        pimRPSetGroupAddress, gives the group prefix for which this
        entry contains information about the Candidate-RP."
    ::= { pimRPSetEntry 2 }

pimRPSetAddress OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The IP address of the Candidate-RP."
    ::= { pimRPSetEntry 3 }

```

```
pimRPSetHoldTime OBJECT-TYPE
    SYNTAX      Integer32 (0..255)
    UNITS       "seconds"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The holdtime of a Candidate-RP.  If the local router is not
        the BSR, this value is 0."
    ::= { pimRPSetEntry 4 }
```

```
pimRPSetExpiryTime OBJECT-TYPE
    SYNTAX      TimeTicks
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The minimum time remaining before the Candidate-RP will be
        declared down.  If the local router is not the BSR, this
        value is 0."
    ::= { pimRPSetEntry 5 }
```

```
pimRPSetComponent OBJECT-TYPE
    SYNTAX      Integer32 (1..255)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        " A number uniquely identifying the component.  Each
        protocol instance connected to a separate domain should have
        a different index value."
    ::= { pimRPSetEntry 6 }
```

```
--
```

```
-- Note: { pim 8 } through { pim 10 } were used in older versions
-- of this MIB.  Since some earlier versions of this MIB have been
-- widely-deployed, these values must not be used in the future,
-- as long the MIB is rooted under { experimental 61 }.
--
```

```
-- The PIM Candidate-RP Table
```

```
pimCandidateRPTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF PimCandidateRPEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The (conceptual) table listing the IP multicast groups for
        which the local router is to advertise itself as a
        Candidate-RP when the value of pimComponentCRPHoldTime is
        non-zero.  If this table is empty, then the local router
```

```

        will advertise itself as a Candidate-RP for all groups
        (providing the value of pimComponentCRPHoldTime is non-
        zero)."
 ::= { pim 11 }

pimCandidateRPEntry OBJECT-TYPE
    SYNTAX      PimCandidateRPEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry (conceptual row) in the pimCandidateRPTable."
    INDEX       { pimCandidateRPGroupAddress,
                 pimCandidateRPGroupMask }
 ::= { pimCandidateRPTable 1 }

PimCandidateRPEntry ::= SEQUENCE {
    pimCandidateRPGroupAddress      IpAddress,
    pimCandidateRPGroupMask        IpAddress,
    pimCandidateRPAddress          IpAddress,
    pimCandidateRPRowStatus        RowStatus
}

pimCandidateRPGroupAddress OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The IP multicast group address which, when combined with
        pimCandidateRPGroupMask, identifies a group prefix for which
        the local router will advertise itself as a Candidate-RP."
 ::= { pimCandidateRPEntry 1 }

pimCandidateRPGroupMask OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The multicast group address mask which, when combined with
        pimCandidateRPGroupMask, identifies a group prefix for which
        the local router will advertise itself as a Candidate-RP."
 ::= { pimCandidateRPEntry 2 }

pimCandidateRPAddress OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The (unicast) address of the interface which will be

```



```

        advertised as a Candidate-RP."
 ::= { pimCandidateRPEntry 3 }

```

```
pimCandidateRPEntry OBJECT-TYPE
```

```

SYNTAX      RowStatus
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION

```

```

    "The status of this row, by which new entries may be
    created, or old entries deleted from this table."

```

```
 ::= { pimCandidateRPEntry 4 }
```

```
-- The PIM Component Table
```

```
pimComponentTable OBJECT-TYPE
```

```

SYNTAX      SEQUENCE OF PimComponentEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION

```

```

    "The (conceptual) table containing objects specific to a PIM
    domain. One row exists for each domain to which the router
    is connected. A PIM-SM domain is defined as an area of the
    network over which Bootstrap messages are forwarded.
    Typically, a PIM-SM router will be a member of exactly one
    domain. This table also supports, however, routers which
    may form a border between two PIM-SM domains and do not
    forward Bootstrap messages between them."

```

```
 ::= { pim 12 }
```

```
pimComponentEntry OBJECT-TYPE
```

```

SYNTAX      PimComponentEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION

```

```

    "An entry (conceptual row) in the pimComponentTable."

```

```

INDEX      { pimComponentIndex }
 ::= { pimComponentTable 1 }

```

```
PimComponentEntry ::= SEQUENCE {
```

```

    pimComponentIndex      Integer32,
    pimComponentBSRAddress  IPAddress,
    pimComponentBSRExpiryTime TimeTicks,
    pimComponentCRPHoldTime Integer32,
    pimComponentStatus      RowStatus
}

```

```
pimComponentIndex OBJECT-TYPE
```

```

SYNTAX      Integer32 (1..255)

```

```

MAX-ACCESS not-accessible
STATUS      current
DESCRIPTION
    "A number uniquely identifying the component.  Each protocol
    instance connected to a separate domain should have a
    different index value.  Routers that only support membership
    in a single PIM-SM domain should use a pimComponentIndex
    value of 1."
 ::= { pimComponentEntry 1 }

pimComponentBSRAddress OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The IP address of the bootstrap router (BSR) for the local
        PIM region."
    ::= { pimComponentEntry 2 }

pimComponentBSRExpiryTime OBJECT-TYPE
    SYNTAX      TimeTicks
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The minimum time remaining before the bootstrap router in
        the local domain will be declared down.  For candidate BSRs,
        this is the time until the component sends an RP-Set
        message.  For other routers, this is the time until it may
        accept an RP-Set message from a lower candidate BSR."
    ::= { pimComponentEntry 3 }

pimComponentCRPHoldTime OBJECT-TYPE
    SYNTAX      Integer32 (0..255)
    UNITS       "seconds"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The holdtime of the component when it is a candidate RP in
        the local domain.  The value of 0 is used to indicate that
        the local system is not a Candidate-RP."
    DEFVAL     { 0 }
    ::= { pimComponentEntry 4 }

pimComponentStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION

```

```

        "The status of this entry.  Creating the entry creates
        another protocol instance; destroying the entry disables a
        protocol instance."
 ::= { pimComponentEntry 5 }

-- PIM Traps

pimNeighborLoss NOTIFICATION-TYPE
  OBJECTS {
    pimNeighborIfIndex
  }
  STATUS current
  DESCRIPTION
    "A pimNeighborLoss trap signifies the loss of an adjacency
    with a neighbor.  This trap should be generated when the
    neighbor timer expires, and the router has no other
    neighbors on the same interface with a lower IP address than
    itself."
 ::= { pimTraps 1 }

-- conformance information

pimMIBConformance OBJECT IDENTIFIER ::= { pimMIB 2 }
pimMIBCompliances OBJECT IDENTIFIER ::= { pimMIBConformance 1 }
pimMIBGroups OBJECT IDENTIFIER ::= { pimMIBConformance 2 }

-- compliance statements

pimV1MIBCompliance MODULE-COMPLIANCE
  STATUS deprecated
  DESCRIPTION
    "The compliance statement for routers running PIMv1 and
    implementing the PIM MIB."
  MODULE -- this module
    MANDATORY-GROUPS { pimV1MIBGroup }

 ::= { pimMIBCompliances 1 }

pimSparseV2MIBCompliance MODULE-COMPLIANCE
  STATUS current
  DESCRIPTION
    "The compliance statement for routers running PIM Sparse
    Mode and implementing the PIM MIB."
  MODULE -- this module
    MANDATORY-GROUPS { pimV2MIBGroup }

  GROUP pimV2CandidateRPMIBGroup

```

```

DESCRIPTION
    "This group is mandatory if the router is capable of being a
    Candidate RP."

OBJECT      pimInterfaceStatus
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

 ::= { pimMIBCompliances 2 }

pimDenseV2MIBCompliance MODULE-COMPLIANCE
STATUS      current
DESCRIPTION
    "The compliance statement for routers running PIM Dense Mode
    and implementing the PIM MIB."
MODULE     -- this module

    MANDATORY-GROUPS { pimDenseV2MIBGroup }

OBJECT      pimInterfaceStatus
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

 ::= { pimMIBCompliances 3 }

-- units of conformance

pimNotificationGroup NOTIFICATION-GROUP
NOTIFICATIONS { pimNeighborLoss }
STATUS      current
DESCRIPTION
    "A collection of notifications for signaling important PIM
    events."
 ::= { pimMIBGroups 1 }

pimV2MIBGroup OBJECT-GROUP
OBJECTS { pimJoinPruneInterval, pimNeighborIfIndex,
          pimNeighborUpTime, pimNeighborExpiryTime,
          pimInterfaceAddress, pimInterfaceNetMask,
          pimInterfaceDR, pimInterfaceHelloInterval,
          pimInterfaceStatus, pimInterfaceJoinPruneInterval,
          pimInterfaceCBSRPreference, pimInterfaceMode,
          pimRPSetHoldTime, pimRPSetExpiryTime,
          pimComponentBSRAddress, pimComponentBSRExpiryTime,
          pimComponentCRPHoldTime, pimComponentStatus,
          pimIpMRouteFlags, pimIpMRouteUpstreamAssertTimer

```

```

    }
    STATUS current
    DESCRIPTION
        "A collection of objects to support management of PIM Sparse
        Mode (version 2) routers."
    ::= { pimMIBGroups 2 }

pimDenseV2MIBGroup OBJECT-GROUP
    OBJECTS { pimNeighborIfIndex,
              pimNeighborUpTime, pimNeighborExpiryTime,
              pimInterfaceAddress, pimInterfaceNetMask,
              pimInterfaceDR, pimInterfaceHelloInterval,
              pimInterfaceStatus, pimInterfaceMode
            }
    STATUS current
    DESCRIPTION
        "A collection of objects to support management of PIM Dense
        Mode (version 2) routers."
    ::= { pimMIBGroups 5 }

pimV2CandidateRPMIBGroup OBJECT-GROUP
    OBJECTS { pimCandidateRPAddress,
              pimCandidateRPRowStatus
            }
    STATUS current
    DESCRIPTION
        "A collection of objects to support configuration of which
        groups a router is to advertise itself as a Candidate-RP."
    ::= { pimMIBGroups 3 }

pimV1MIBGroup OBJECT-GROUP
    OBJECTS { pimJoinPruneInterval, pimNeighborIfIndex,
              pimNeighborUpTime, pimNeighborExpiryTime,
              pimNeighborMode,
              pimInterfaceAddress, pimInterfaceNetMask,
              pimInterfaceJoinPruneInterval, pimInterfaceStatus,
              pimInterfaceMode, pimInterfaceDR,
              pimInterfaceHelloInterval,
              pimRPState, pimRPStateTimer,
              pimRPLastChange, pimRPRowStatus
            }
    STATUS deprecated
    DESCRIPTION
        "A collection of objects to support management of PIM
        (version 1) routers."
    ::= { pimMIBGroups 4 }

pimNextHopGroup OBJECT-GROUP

```

```

OBJECTS { pimIpMRouteNextHopPruneReason }
STATUS current
DESCRIPTION
    "A collection of optional objects to provide per-next hop
    information for diagnostic purposes. Supporting this group
    may add a large number of instances to a tree walk, but the
    information in this group can be extremely useful in
    tracking down multicast connectivity problems."
 ::= { pimMIBGroups 6 }

pimAssertGroup OBJECT-GROUP
OBJECTS { pimIpMRouteAssertMetric, pimIpMRouteAssertMetricPref,
          pimIpMRouteAssertRPTBit }
STATUS current
DESCRIPTION
    "A collection of optional objects to provide extra
    information about the assert election process. There is no
    protocol reason to keep such information, but some
    implementations may already keep this information and make
    it available. These objects can also be very useful in
    debugging connectivity or duplicate packet problems,
    especially if the assert winner does not support the PIM and
    IP Multicast MIBs."
 ::= { pimMIBGroups 7 }

END

```

5. Security Considerations

This MIB contains readable objects whose values provide information related to multicast routing, including information on the network topology. There are also a number of objects that have a MAX-ACCESS clause of read-write and/or read-create, which allow an administrator to configure PIM in the router.

While unauthorized access to the readable objects is relatively innocuous, unauthorized access to the write-able objects could cause a denial of service. Hence, the support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

SNMPv1 by itself is such an insecure environment. Even if the network itself is secure (for example by using IPSec), even then, there is no control as to who on the secure network is allowed to access and SET (change/create/delete) the objects in this MIB.

It is recommended that the implementers consider the security features as provided by the SNMPv3 framework. Specifically, the use of the User-based Security Model RFC 2274 [12] and the View-based Access Control Model RFC 2275 [15] is recommended.

It is then a customer/user responsibility to ensure that the SNMP entity giving access to this MIB, is properly configured to give access to those objects only to those principals (users) that have legitimate rights to access them.

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7. Acknowledgements

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