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Protocol Independent Multicast MIB
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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) protocols (PIM-SM and BIDIR-PIM). This document obsoletes RFC 2934.

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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) protocols (PIM-SM [I-D.ietf-pim-sm-v2-new] and BIDIR-PIM [I-D.ietf-pim-bidir]).

This document obsoletes RFC 2934 [RFC2934]. RFC 2934 defined an experimental MIB module for managing the PIM protocols. The MIB module defined by this document is a complete re-working of the MIB module from RFC 2934, with major changes that include the following.

- This MIB module is independent of IP version, whereas RFC 2934 only supported IPv4.
- This MIB module includes support for managing BIDIR-PIM.
- This MIB module does not include support for managing PIM-DM.
- This MIB module does not include support for managing PIM-SM v1.
- This MIB module does not depend on the IPv4 Multicast Routing MIB defined in RFC 2932 [RFC2932].

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

2. The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to section 7 of RFC 3410 [RFC3410].

Managed objects are accessed via a virtual information store, termed

the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIv2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

3. Overview

This MIB module contains the following tables.

1. The PIM Interface Table, which contains one row per IP version for each interface of the router which is running PIM.

2. The PIM Neighbor Table, which contains one row for each of the router's PIM neighbors.

3. The PIM Neighbor Secondary Address Table, which contains one row for each secondary address advertised by each of the router's PIM neighbors.

4. The PIM Multicast Route Table, which contains one row for each multicast routing entry created by PIM.

5. 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.

6. The PIM Bidir DF-Election Table, which contains one row per interface for each Rendezvous Point (RP) for which Bidirectional-PIM Designated Forwarder (DF) election state is maintained.

7. The PIM RP-Set Table, which contains information about all the available Rendezvous Points for IP multicast group addresses with particular address prefixes.

8. The PIM Candidate-RP Table, which contains the IP multicast group prefixes for which the local router is to advertise itself as a Candidate-RP.

9. The PIM Scope Zone Table, which contains one row for each of the admin scoped zones in the PIM domain to which the router is connected.

This MIB module uses textual conventions defined in the IF-MIB [RFC2863] and the INET-ADDRESS-MIB [RFC4001].

4. Definitions

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

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, mib-2,
    NOTIFICATION-TYPE,
    Unsigned32, TimeTicks            FROM SNMPv2-SMI
    RowStatus, TruthValue            FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP,
    NOTIFICATION-GROUP               FROM SNMPv2-CONF
    InterfaceIndexOrZero,
```



```
    InterfaceIndex                   FROM IF-MIB
    InetAddressType,
    InetAddressPrefixLength,
    InetAddress, InetVersion         FROM INET-ADDRESS-MIB;

pimStdMIB MODULE-IDENTITY
    LAST-UPDATED "200504290000Z" -- April 29, 2005
    ORGANIZATION "IETF PIM Working Group"
    CONTACT-INFO
            "Email: pim@ietf.org"
    DESCRIPTION
            "The MIB module for management of PIM routers.

            Copyright (C) The Internet Society (2005).  This version of
            this MIB module is part of RFC yyyy; see the RFC itself for
            full legal notices."
-- RFC Ed.: replace yyyy with actual RFC number & remove this note
    REVISION     "200404290000Z" -- April 29, 2005
    DESCRIPTION  "Initial version, published as RFC yyyy."
-- RFC Ed.: replace yyyy with actual RFC number & remove this note
    ::= { mib-2 XXX }
-- RFC Ed.: replace XXX with IANA-assigned number & remove this note
```

```
pimMIBObjects OBJECT IDENTIFIER ::= { pimStdMIB 1 }
pimTraps      OBJECT IDENTIFIER ::= { pimMIBObjects 0 }
pim           OBJECT IDENTIFIER ::= { pimMIBObjects 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.
            PIM is enabled on all interfaces listed in this table."
    ::= { pim 1 }

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



```
    ::= { pimInterfaceTable 1 }

PimInterfaceEntry ::= SEQUENCE {
    pimInterfaceIfIndex              InterfaceIndex,
    pimInterfaceIPVersion            InetVersion,
    pimInterfaceAddressType          InetAddressType,
    pimInterfaceAddress              InetAddress,
    pimInterfaceNetMaskLength        InetAddressPrefixLength,
    pimInterfaceDR                   InetAddress,
    pimInterfaceHelloInterval        Unsigned32,
    pimInterfaceTrigHelloInterval    Unsigned32,
    pimInterfaceJoinPruneInterval    Unsigned32,
    pimInterfaceDFElectionRobustness Unsigned32,
    pimInterfaceHelloHoldtime        Unsigned32,
    pimInterfaceJoinPruneHoldtime    Unsigned32,
```

```
    pimInterfaceUseLanPruneDelay     TruthValue,
    pimInterfacePropagationDelay     Unsigned32,
    pimInterfaceOverrideInterval     Unsigned32,
    pimInterfaceUseGenerationID      TruthValue,
    pimInterfaceGenerationIDValue    Unsigned32,
    pimInterfaceUseDRPriority        TruthValue,
    pimInterfaceDRPriority           Unsigned32,
    pimInterfaceLanDelayEnabled      TruthValue,
    pimInterfaceEffectPropagDelay    Unsigned32,
    pimInterfaceEffectOverrideIvl    Unsigned32,
    pimInterfaceSuppressionEnabled   TruthValue,
    pimInterfaceBidirCapable         TruthValue,
    pimInterfaceDRPriorityEnabled    TruthValue,
    pimInterfaceBSRBorder            TruthValue,
    pimInterfaceStatus               RowStatus
}

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

pimInterfaceIPVersion OBJECT-TYPE
    SYNTAX     InetVersion
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The IP version of this PIM interface.  A physical interface
            may be configured in multiple modes concurrently, e.g. IPv4
            and IPv6, however the traffic is considered to be logically
```



```
            separate."
    ::= { pimInterfaceEntry 2 }

pimInterfaceAddressType OBJECT-TYPE
    SYNTAX     InetAddressType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
```

```
            "The address type of this PIM interface."
    ::= { pimInterfaceEntry 3 }

pimInterfaceAddress OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The primary IP address of this router on this PIM
            interface.  The InetAddressType is given by the
            pimInterfaceAddressType object."
    ::= { pimInterfaceEntry 4 }

pimInterfaceNetMaskLength OBJECT-TYPE
    SYNTAX     InetAddressPrefixLength
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The network mask length for the primary IP address of this
            router on this PIM interface.  The InetAddressType is given
            by the pimInterfaceAddressType object.  A value of 0
            indicates that the network mask length is unknown."
    ::= { pimInterfaceEntry 5 }

pimInterfaceDR OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The primary IP address of the Designated Router on this PIM
            interface.  The InetAddressType is given by the
            pimInterfaceAddressType object."
    ::= { pimInterfaceEntry 6 }

pimInterfaceHelloInterval OBJECT-TYPE
    SYNTAX     Unsigned32 (0..18000)
    UNITS      "seconds"
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
```



```
            "The frequency at which PIM Hello messages are transmitted
```

```
            on this interface.  This object corresponds to the
            'Hello_Period' timer value defined in the PIM-SM
            specification [I-D.ietf-pim-sm-v2-new].  A value of 0
            represents an 'infinite' interval, and indicates that
            periodic PIM Hello messages should not be sent on this
            interface."
    DEFVAL { 30 }
    ::= { pimInterfaceEntry 7 }

pimInterfaceTrigHelloInterval OBJECT-TYPE
    SYNTAX     Unsigned32 (0..60)
    UNITS      "seconds"
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "The maximum time before this router sends a triggered PIM
            Hello message on this interface.  This object corresponds to
            the 'Trigered_Hello_Delay' timer value defined in the PIM-SM
            specification [I-D.ietf-pim-sm-v2-new].  A value of 0 has
            no special meaning and indicates that triggered PIM Hello
            messages should always be sent immediately."
    DEFVAL { 5 }
    ::= { pimInterfaceEntry 8 }

pimInterfaceJoinPruneInterval OBJECT-TYPE
    SYNTAX     Unsigned32 (0..18000)
    UNITS      "seconds"
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "The frequency at which this router sends PIM Join/Prune
            messages on this PIM interface.  This object corresponds to
            the 't_periodic' timer value defined in the PIM-SM
            specification [I-D.ietf-pim-sm-v2-new].  A value of 0
            represents an 'infinite' interval, and indicates that
            periodic PIM Join/Prune messages should not be sent on this
            interface."
    DEFVAL { 60 }
    ::= { pimInterfaceEntry 9 }

pimInterfaceDFElectionRobustness OBJECT-TYPE
    SYNTAX     Unsigned32
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "The minimum number of PIM DF-Election messages that must be
            lost in order for DF election on this interface to fail."
```

```
    DEFVAL { 3 }
    ::= { pimInterfaceEntry 10 }

pimInterfaceHelloHoldtime OBJECT-TYPE
    SYNTAX     Unsigned32 (0..65535)
    UNITS      "seconds"
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The value set in the Holdtime field of PIM Hello messages
            transmitted on this interface.  A value of 65535 represents
            an 'infinite' holdtime.  Implementations are recommended
            to use a holdtime that is 3.5 times the value of
            pimInterfaceHelloInterval, or 65535 if
            pimInterfaceHelloInterval is set to 0."
    DEFVAL { 105 }
    ::= { pimInterfaceEntry 11 }

pimInterfaceJoinPruneHoldtime OBJECT-TYPE
    SYNTAX     Unsigned32 (0..65535)
    UNITS      "seconds"
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The value inserted into the Holdtime field of a PIM
            Join/Prune message sent on this interface.  A value of 65535
            represents an 'infinite' holdtime.  Implementations are
            recommended to use a holdtime that is 3.5 times the value of
            pimInterfaceJoinPruneInterval, or 65535 if
            pimInterfaceJoinPruneInterval is set to 0."
    DEFVAL { 210 }
    ::= { pimInterfaceEntry 12 }

pimInterfaceUseLanPruneDelay OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "Whether or not this router includes the LAN Prune Delay
            option in the PIM Hello messages it sends on this
            interface."
    DEFVAL { true }
    ::= { pimInterfaceEntry 13 }

pimInterfacePropagationDelay OBJECT-TYPE
    SYNTAX     Unsigned32 (0..32767)
```

```
    UNITS      "milliseconds"
    MAX-ACCESS read-create
```



```
    STATUS     current
    DESCRIPTION
            "The value this router inserts into the Propagation_Delay
            field of the LAN Prune Delay option in the PIM Hello
            messages it sends on this interface.  This object is only
            used if pimInterfaceUseLanPruneDelay is set to TRUE.
            Implementations should enforce a lower bound on the
            permitted values for this object to allow for scheduling and
            processing delays within the local router."
    DEFVAL { 500 }
    ::= { pimInterfaceEntry 14 }

pimInterfaceOverrideInterval OBJECT-TYPE
    SYNTAX     Unsigned32 (0..65535)
    UNITS      "milliseconds"
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "The value this router inserts into the Override_Interval
            field of the LAN Prune Delay option in the PIM Hello
            messages it sends on this interface.  This object is only
            used if pimInterfaceUseLanPruneDelay is set to TRUE."
    DEFVAL { 2500 }
    ::= { pimInterfaceEntry 15 }

pimInterfaceUseGenerationID OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "Whether or not this router includes the Generation ID
            option in the PIM Hello messages it sends on this
            interface."
    DEFVAL { true }
    ::= { pimInterfaceEntry 16 }

pimInterfaceGenerationIDValue OBJECT-TYPE
    SYNTAX     Unsigned32
    MAX-ACCESS read-only
```

```
    STATUS     current
    DESCRIPTION
            "The value of the Generation ID this router inserted in the
            last PIM Hello message it sent on this interface.  This
            object is 0 if pimInterfaceUseGenerationID is set to FALSE."
    ::= { pimInterfaceEntry 17 }

pimInterfaceUseDRPriority OBJECT-TYPE
    SYNTAX     TruthValue
```



```
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "Whether or not this router includes the DR Priority option
            in the PIM Hello messages it sends on this interface."
    DEFVAL { true }
    ::= { pimInterfaceEntry 18 }

pimInterfaceDRPriority OBJECT-TYPE
    SYNTAX     Unsigned32
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "The Designated Router Priority value inserted into the DR
            Priority option on this interface.  Numerically higher
            values for this object indicate higher priorities.  This
            object is only used if pimInterfaceUseDRPriority is set to
            TRUE."
    DEFVAL { 1 }
    ::= { pimInterfaceEntry 19 }

pimInterfaceLanDelayEnabled OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "Evaluates to TRUE if all routers on this interface are
            using the LAN Prune Delay option."
    ::= { pimInterfaceEntry 20 }

pimInterfaceEffectPropagDelay OBJECT-TYPE
    SYNTAX     Unsigned32 (0..32767)
```

```
    UNITS      "milliseconds"
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The Effective Propagation Delay on this interface.  This
            object is always 500 if pimInterfaceLanDelayEnabled is
            FALSE."
    ::= { pimInterfaceEntry 21 }

pimInterfaceEffectOverrideIvl OBJECT-TYPE
    SYNTAX     Unsigned32 (0..65535)
    UNITS      "milliseconds"
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The Effective Override Interval on this interface.  This
```



```
            object is always 2500 if pimInterfaceLanDelayEnabled is
            FALSE."
    ::= { pimInterfaceEntry 22 }

pimInterfaceSuppressionEnabled OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "Whether join suppression is enabled on this interface.
            This object is always TRUE if pimInterfaceLanDelayEnabled is
            FALSE."
    ::= { pimInterfaceEntry 23 }

pimInterfaceBidirCapable OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "Evaluates to TRUE if all routers on this interface are
            using the Bidirectional-PIM Capable option."
    ::= { pimInterfaceEntry 24 }

pimInterfaceDRPriorityEnabled OBJECT-TYPE
    SYNTAX     TruthValue
```

```
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "Evaluates to TRUE if all routers on this interface are
            using the DR Priority option."
    ::= { pimInterfaceEntry 25 }

pimInterfaceBSRBorder OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "Whether or not this interface acts as a border for all PIM
            Bootstrap messages."
    DEFVAL { false }
    ::= { pimInterfaceEntry 26 }

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 27 }

--
-- 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 2 }

pimNeighborEntry OBJECT-TYPE
    SYNTAX     PimNeighborEntry
```

```
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "An entry (conceptual row) in the pimNeighborTable."
    INDEX      { pimNeighborIfIndex,
                 pimNeighborAddressType,
                 pimNeighborAddress }
    ::= { pimNeighborTable 1 }

PimNeighborEntry ::= SEQUENCE {
    pimNeighborIfIndex              InterfaceIndex,
    pimNeighborAddressType          InetAddressType,
    pimNeighborAddress              InetAddress,
    pimNeighborUpTime               TimeTicks,
    pimNeighborExpiryTime           TimeTicks,
    pimNeighborLanPruneDelayPresent TruthValue,
    pimNeighborPropagationDelay     Unsigned32,
    pimNeighborOverrideInterval     Unsigned32,
    pimNeighborTBit                 TruthValue,
    pimNeighborGenerationIDPresent  TruthValue,
    pimNeighborGenerationIDValue    Unsigned32,
    pimNeighborBidirCapable         TruthValue,
    pimNeighborDRPriorityPresent    TruthValue,
    pimNeighborDRPriority           Unsigned32
}

pimNeighborIfIndex OBJECT-TYPE
    SYNTAX     InterfaceIndex
    MAX-ACCESS not-accessible
    STATUS     current
```



```
    DESCRIPTION
            "The value of ifIndex for the interface used to reach this
            PIM neighbor."
    ::= { pimNeighborEntry 1 }

pimNeighborAddressType OBJECT-TYPE
    SYNTAX     InetAddressType
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The address type of this PIM neighbor."
```

```
    ::= { pimNeighborEntry 2 }

pimNeighborAddress OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The primary IP address of this PIM neighbor.  The
            InetAddressType is given by the pimNeighborAddressType
            object."
    ::= { pimNeighborEntry 3 }

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 4 }

pimNeighborExpiryTime OBJECT-TYPE
    SYNTAX     TimeTicks
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The minimum time remaining before this PIM neighbor will
            be aged out.  The value zero indicates that this PIM
            neighbor will never be aged out."
    ::= { pimNeighborEntry 5 }

pimNeighborLanPruneDelayPresent OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "Evaluates to TRUE if this neighbor is using the LAN Prune
```



```
            Delay option."
    ::= { pimNeighborEntry 6 }

pimNeighborPropagationDelay OBJECT-TYPE
```

```
    SYNTAX     Unsigned32 (0..32767)
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The value of the Propagation_Delay field of the LAN Prune
            Delay option received from this neighbor.  This object is
            always 0 if pimNeighborLanPruneDelayPresent is FALSE."
    ::= { pimNeighborEntry 7 }

pimNeighborOverrideInterval OBJECT-TYPE
    SYNTAX     Unsigned32 (0..65535)
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The value of the Override_Interval field of the LAN Prune
            Delay option received from this neighbor.  This object is
            always 0 if pimNeighborLanPruneDelayPresent is FALSE."
    ::= { pimNeighborEntry 8 }

pimNeighborTBit OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "Whether the T bit was set in the LAN Prune Delay option
            received from this neighbor.  The T bit specifies the
            ability of the neighbor to disable join suppression.  This
            object is always TRUE if pimNeighborLanPruneDelayPresent is
            FALSE."
    ::= { pimNeighborEntry 9 }

pimNeighborGenerationIDPresent OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "Evaluates to TRUE if this neighbor is using the Generation
            ID option."
    ::= { pimNeighborEntry 10 }

pimNeighborGenerationIDValue OBJECT-TYPE
    SYNTAX     Unsigned32
    MAX-ACCESS read-only
    STATUS     current
```

```
    DESCRIPTION
            "The value of the Generation ID from the last PIM Hello
            message received from this neighbor.  This object is always
            0 if pimNeighborGenerationIDPresent is FALSE."
    ::= { pimNeighborEntry 11 }

pimNeighborBidirCapable OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "Evaluates to TRUE if this neighbor is using the
            Bidirectional-PIM Capable option."
    ::= { pimNeighborEntry 12 }

pimNeighborDRPriorityPresent OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "Evaluates to TRUE if this neighbor is using the DR Priority
            option."
    ::= { pimNeighborEntry 13 }

pimNeighborDRPriority OBJECT-TYPE
    SYNTAX     Unsigned32
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The value of the Designated Router Priority from the last
            PIM Hello message received from this neighbor.  This object
            is always 0 if pimNeighborDRPriorityPresent is FALSE."
    ::= { pimNeighborEntry 14 }

--
-- The PIM Neighbor Secondary Address Table
--

pimNbrSecAddressTable OBJECT-TYPE
    SYNTAX     SEQUENCE OF PimNbrSecAddressEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The (conceptual) table listing the secondary addresses
            advertised by each PIM neighbor (on a subset of the rows of
            the pimNeighborTable defined above)."
    ::= { pim 3 }
```

```
pimNbrSecAddressEntry OBJECT-TYPE
    SYNTAX     PimNbrSecAddressEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "An entry (conceptual row) in the pimNbrSecAddressTable."
    INDEX      { pimNbrSecAddressIfIndex,
                 pimNbrSecAddressType,
                 pimNbrSecAddressPrimary,
                 pimNbrSecAddress }
    ::= { pimNbrSecAddressTable 1 }

PimNbrSecAddressEntry ::= SEQUENCE {
    pimNbrSecAddressIfIndex InterfaceIndex,
    pimNbrSecAddressType    InetAddressType,
    pimNbrSecAddressPrimary InetAddress,
    pimNbrSecAddress        InetAddress
}

pimNbrSecAddressIfIndex OBJECT-TYPE
    SYNTAX     InterfaceIndex
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The value of ifIndex for the interface used to reach this
            PIM neighbor."
    ::= { pimNbrSecAddressEntry 1 }

pimNbrSecAddressType OBJECT-TYPE
    SYNTAX     InetAddressType
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The address type of this PIM neighbor."
    ::= { pimNbrSecAddressEntry 2 }

pimNbrSecAddressPrimary OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS not-accessible
    STATUS     current
```

```
    DESCRIPTION
            "The primary IP address of this PIM neighbor.  The
            InetAddressType is given by the pimNbrSecAddressType
            object."
    ::= { pimNbrSecAddressEntry 3 }

pimNbrSecAddress OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
```



```
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The secondary IP address of this PIM neighbor.  The
            InetAddressType is given by the pimNbrSecAddressType
            object."
    ::= { pimNbrSecAddressEntry 4 }

--
-- The PIM Multicast Route Table
--

pimMRouteTable OBJECT-TYPE
    SYNTAX     SEQUENCE OF PimMRouteEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The (conceptual) table listing one row for each multicast
            routing entry created by PIM."
    ::= { pim 4 }

pimMRouteEntry OBJECT-TYPE
    SYNTAX     PimMRouteEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "An entry (conceptual row) in the pimMRouteTable."
    INDEX      { pimMRouteAddressType,
                 pimMRouteGroup,
                 pimMRouteSource,
                 pimMRouteSourcePrefixLength }
    ::= { pimMRouteTable 1 }
```

```
PimMRouteEntry ::= SEQUENCE {
    pimMRouteAddressType           InetAddressType,
    pimMRouteGroup                 InetAddress,
    pimMRouteSource                InetAddress,
    pimMRouteSourcePrefixLength    InetAddressPrefixLength,
    pimMRouteUpTime                TimeTicks,
    pimMRouteExpiryTime            TimeTicks,
    pimMRouteType                  INTEGER,
    pimMRouteRPAddress             InetAddress,
    pimMRouteRPFIfIndex            InterfaceIndexOrZero,
    pimMRouteRPFNeighbor           InetAddress,
    pimMRouteUpstreamAssertTimer   TimeTicks,
    pimMRouteAssertRPTBit          TruthValue,
    pimMRouteAssertMetricPref      Unsigned32,
    pimMRouteAssertMetric          Unsigned32,
```



```
    pimMRouteFlags                 BITS
}

pimMRouteAddressType OBJECT-TYPE
    SYNTAX     InetAddressType
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The address type of this multicast routing entry."
    ::= { pimMRouteEntry 1 }

pimMRouteGroup OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The IP multicast group address for which this entry
            contains multicast routing information.  The InetAddressType
            is given by the pimMRouteAddressType object."
    ::= { pimMRouteEntry 2 }

pimMRouteSource OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
```

```
            "The IP address which when combined with the corresponding
            value of pimMRouteSourcePrefixLength identifies the sources
            for which this entry contains multicast routing information.
            The InetAddressType is given by the pimMRouteAddressType
            object."
    ::= { pimMRouteEntry 3 }

pimMRouteSourcePrefixLength OBJECT-TYPE
    SYNTAX     InetAddressPrefixLength
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The prefix length which when combined with the
            corresponding value of pimMRouteSource identifies the
            sources for which this entry contains multicast routing
            information.  The InetAddressType is given by the
            pimMRouteAddressType object.  A value of zero indicates that
            this entry contains multicast routing information for all
            sources."
    ::= { pimMRouteEntry 4 }

pimMRouteUpTime OBJECT-TYPE
```



```
    SYNTAX     TimeTicks
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The time since this multicast routing entry was created by
            the local router."
    ::= { pimMRouteEntry 5 }

pimMRouteExpiryTime OBJECT-TYPE
    SYNTAX     TimeTicks
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The minimum time remaining before this entry will be aged
            out.  The value zero indicates that this entry will never be
            aged out."
    ::= { pimMRouteEntry 6 }

pimMRouteType OBJECT-TYPE
```

```
    SYNTAX     INTEGER {
                  ssm (1),
                  asm (2),
                  bidir (3)
               }
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "This object indicates whether this entry represents an SSM
            (Source Specific Multicast, used with PIM-SM), ASM
            (Any Source Multicast, used with PIM-SM) or a BIDIR-PIM
            route."
    ::= { pimMRouteEntry 7 }

pimMRouteRPAddress OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The address of the Rendezvous Point (RP) for the group
            represented by pimMRouteGroup.  The InetAddressType is given
            by the pimMRouteAddressType object.  This object is zero if
            pimMRouteType is 'ssm', or if the RP address is unknown."
    ::= { pimMRouteEntry 8 }

pimMRouteRPFIfIndex OBJECT-TYPE
    SYNTAX     InterfaceIndexOrZero
    MAX-ACCESS read-only
    STATUS     current
```



```
    DESCRIPTION
            "The value of ifIndex for the RPF interface, from which IP
            datagrams sent by these sources to this multicast group
            address are accepted, or zero if the RPF interface is
            unknown."
    ::= { pimMRouteEntry 9 }

pimMRouteRPFNeighbor OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
```

```
            "The address of the RPF neighbor, from which IP datagrams
            sent by these sources to this multicast group address are
            received, or zero if the RPF neighbor is unknown or is not
            a PIM neighbor.  The InetAddressType is given by the
            pimMRouteAddressType object."
    ::= { pimMRouteEntry 10 }

pimMRouteUpstreamAssertTimer 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-SM specification
            [I-D.ietf-pim-sm-v2-new].  A value of zero indicates that no
            assert has changed the upstream neighbor away from the RPF
            neighbor."
    ::= { pimMRouteEntry 11 }

pimMRouteAssertRPTBit 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."
    ::= { pimMRouteEntry 12 }

pimMRouteAssertMetricPref OBJECT-TYPE
    SYNTAX     Unsigned32 (0..2147483647)
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The metric preference advertised by the Assert Winner on
```



```
            the upstream interface, or zero if no such assert is in
            effect."
    ::= { pimMRouteEntry 13 }

pimMRouteAssertMetric OBJECT-TYPE
```

```
    SYNTAX     Unsigned32
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The metric advertised by the Assert Winner on the upstream
            interface, or zero if no such assert is in effect."
    ::= { pimMRouteEntry 14 }

pimMRouteFlags 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 routing entry.  See the PIM-SM specification
            [I-D.ietf-pim-sm-v2-new] for the meaning of the RPT and SPT
            bits."
    ::= { pimMRouteEntry 15 }

--
-- The PIM Next Hop Table
--

pimMRouteNextHopTable OBJECT-TYPE
    SYNTAX     SEQUENCE OF PimMRouteNextHopEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The (conceptual) table containing information on outgoing
            interfaces for routing IP multicast datagrams, on which PIM
            Join/Prunes have been received."
    ::= { pim 5 }

pimMRouteNextHopEntry OBJECT-TYPE
    SYNTAX     PimMRouteNextHopEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "An entry (conceptual row) in the pimMRouteNextHopTable."
    INDEX      { pimMRouteNextHopAddressType,
```

```
                    pimMRouteNextHopGroup,
                    pimMRouteNextHopSource,
                    pimMRouteNextHopSourcePrefixLength,
                    pimMRouteNextHopIfIndex }
    ::= { pimMRouteNextHopTable 1 }

PimMRouteNextHopEntry ::= SEQUENCE {
    pimMRouteNextHopAddressType        InetAddressType,
    pimMRouteNextHopGroup              InetAddress,
    pimMRouteNextHopSource             InetAddress,
    pimMRouteNextHopSourcePrefixLength InetAddressPrefixLength,
    pimMRouteNextHopIfIndex            InterfaceIndex,
    pimMRouteNextHopUpTime             TimeTicks,
    pimMRouteNextHopForwarding         TruthValue,
    pimMRouteNextHopJoinPruneTimer     TimeTicks,
    pimMRouteNextHopAssertWinner       InetAddress,
    pimMRouteNextHopAssertTimer        TimeTicks,
    pimMRouteNextHopAssertRPTBit       TruthValue,
    pimMRouteNextHopAssertMetricPref   Unsigned32,
    pimMRouteNextHopAssertMetric       Unsigned32
}

pimMRouteNextHopAddressType OBJECT-TYPE
    SYNTAX     InetAddressType
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The address type of this multicast routing entry."
    ::= { pimMRouteNextHopEntry 1 }

pimMRouteNextHopGroup OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The IP multicast group for which this entry specifies an
            outgoing interface.  The InetAddressType is given by the
            pimMRouteNextHopAddressType object."
    ::= { pimMRouteNextHopEntry 2 }

pimMRouteNextHopSource OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The network address which when combined with the
            corresponding value of pimMRouteNextHopSourcePrefixLength
            identifies the sources for which this entry specifies an
```

```
            outgoing interface.  The InetAddressType is given by the
            pimMRouteNextHopAddressType object."
    ::= { pimMRouteNextHopEntry 3 }

pimMRouteNextHopSourcePrefixLength OBJECT-TYPE
    SYNTAX     InetAddressPrefixLength
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The network prefix length which when combined with the
            corresponding value of pimMRouteNextHopSource identifies the
            sources for which this entry specifies an outgoing
            interface.  The InetAddressType is given by the
            pimMRouteNextHopAddressType object.  A value of zero
            indicates that this entry specifies an outgoing interface
            for all sources."
    ::= { pimMRouteNextHopEntry 4 }

pimMRouteNextHopIfIndex OBJECT-TYPE
    SYNTAX     InterfaceIndex
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The ifIndex value of the outgoing interface."
    ::= { pimMRouteNextHopEntry 5 }

pimMRouteNextHopUpTime OBJECT-TYPE
    SYNTAX     TimeTicks
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The time since this entry was created by the local router."
    ::= { pimMRouteNextHopEntry 6 }

pimMRouteNextHopForwarding OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "Evaluates to TRUE if the outgoing interface represented by
            this entry is currently being used to forward IP datagrams."
    ::= { pimMRouteNextHopEntry 7 }
```

```
pimMRouteNextHopJoinPruneTimer OBJECT-TYPE
    SYNTAX     TimeTicks
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
```



```
            "The time remaining before the local router ceases
            forwarding on this interface."
    ::= { pimMRouteNextHopEntry 8 }

pimMRouteNextHopAssertWinner OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The IP address of the Assert Winner, or zero if no assert
            is in effect.  The InetAddressType is given by the
            pimMRouteNextHopAddressType object."
    ::= { pimMRouteNextHopEntry 9 }

pimMRouteNextHopAssertTimer OBJECT-TYPE
    SYNTAX     TimeTicks
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The time remaining before the PIM router leaves the current
            Assert state.  A value of 0 indicates that the router is in
            the NoInfo state."
    ::= { pimMRouteNextHopEntry 10 }

pimMRouteNextHopAssertRPTBit OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The value of the RPT bit advertised by the Assert Winner,
            or FALSE if no assert is in effect."
    ::= { pimMRouteNextHopEntry 11 }

pimMRouteNextHopAssertMetricPref OBJECT-TYPE
    SYNTAX     Unsigned32 (0..2147483647)
```

```
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The metric preference advertised by the Assert Winner, or
            zero if no assert is in effect."
    ::= { pimMRouteNextHopEntry 12 }

pimMRouteNextHopAssertMetric OBJECT-TYPE
    SYNTAX     Unsigned32
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The metric advertised by the Assert Winner, or zero if no
```



```
            assert is in effect."
    ::= { pimMRouteNextHopEntry 13 }

--
-- The PIM Bidir DF-Election Table
--

pimBidirDFElectionTable OBJECT-TYPE
    SYNTAX     SEQUENCE OF PimBidirDFElectionEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The (conceptual) table listing the per-RP Designated
            Forwarder (DF) Election state for each interface for all the
            RPs in BIDIR mode."
    ::= { pim 6 }

pimBidirDFElectionEntry OBJECT-TYPE
    SYNTAX     PimBidirDFElectionEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "An entry (conceptual row) in the pimBidirDFElectionTable."
    INDEX      { pimBidirDFElectionAddressType,
                 pimBidirDFElectionRPAddress,
                 pimBidirDFElectionIfIndex }
    ::= { pimBidirDFElectionTable 1 }
```

```
PimBidirDFElectionEntry ::= SEQUENCE {
    pimBidirDFElectionAddressType       InetAddressType,
    pimBidirDFElectionRPAddress         InetAddress,
    pimBidirDFElectionIfIndex           InterfaceIndex,
    pimBidirDFElectionWinnerAddress     InetAddress,
    pimBidirDFElectionWinnerUpTime      TimeTicks,
    pimBidirDFElectionWinnerMetricPref  Unsigned32,
    pimBidirDFElectionWinnerMetric      Unsigned32,
    pimBidirDFElectionState             INTEGER,
    pimBidirDFElectionStateTimer        TimeTicks
}

pimBidirDFElectionAddressType OBJECT-TYPE
    SYNTAX     InetAddressType
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The address type of the RP for which the DF state is being
            maintained."
    ::= { pimBidirDFElectionEntry 1 }
```



```
pimBidirDFElectionRPAddress OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The IP address of the RP for which the DF state is being
            maintained.  The InetAddressType is given by the
            pimBidirDFElectionAddressType object."
    ::= { pimBidirDFElectionEntry 2 }

pimBidirDFElectionIfIndex OBJECT-TYPE
    SYNTAX     InterfaceIndex
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The value of ifIndex for the interface for which the DF
            state is being maintained."
    ::= { pimBidirDFElectionEntry 3 }

pimBidirDFElectionWinnerAddress OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
```

```
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The primary IP address of the winner of the DF Election
            process.  The InetAddressType is given by the
            pimBidirDFElectionAddressType object.  A value of zero
            indicates there is currently no DF."
    ::= { pimBidirDFElectionEntry 4 }

pimBidirDFElectionWinnerUpTime OBJECT-TYPE
    SYNTAX     TimeTicks
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The time since the current winner (last) became elected as
            the DF for this RP."
    ::= { pimBidirDFElectionEntry 5 }

pimBidirDFElectionWinnerMetricPref OBJECT-TYPE
    SYNTAX     Unsigned32
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The metric preference advertised by the DF Winner, or zero
            if there is currently no DF."
    ::= { pimBidirDFElectionEntry 6 }
```



```
pimBidirDFElectionWinnerMetric OBJECT-TYPE
    SYNTAX     Unsigned32
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The metric advertised by the DF Winner, or zero if there is
            currently no DF."
    ::= { pimBidirDFElectionEntry 7 }

pimBidirDFElectionState OBJECT-TYPE
    SYNTAX     INTEGER {
                  dfOffer(1),
                  dfLose(2),
                  dfWinner(3),
```

```
                dfBackoff(4)
            }
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The state of this interface with respect to DF-Election for
            this RP.  The states correspond to the ones defined in the
            BIDIR-PIM specification [I-D.ietf-pim-bidir]."
    ::= { pimBidirDFElectionEntry 8 }

pimBidirDFElectionStateTimer OBJECT-TYPE
    SYNTAX     TimeTicks
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The minimum time remaining after which the local router
            will expire the current DF state represented by
            pimBidirDFElectionState."
    ::= { pimBidirDFElectionEntry 9 }

--
-- 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
            available Rendezvous Points (RPs) for IP multicast groups."
    ::= { pim 7 }

pimRPSetEntry OBJECT-TYPE
```



```
    SYNTAX     PimRPSetEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "An entry (conceptual row) in the pimRPSetTable."
    INDEX      { pimRPSetComponent,
                 pimRPSetAddressType,
```

```
                  pimRPSetGroupAddress,
                  pimRPSetGroupPrefixLength,
                  pimRPSetRPType,
                  pimRPSetRPAddress }
    ::= { pimRPSetTable 1 }

PimRPSetEntry ::= SEQUENCE {
    pimRPSetComponent         Unsigned32,
    pimRPSetAddressType       InetAddressType,
    pimRPSetGroupAddress      InetAddress,
    pimRPSetGroupPrefixLength InetAddressPrefixLength,
    pimRPSetRPType            INTEGER,
    pimRPSetRPAddress         InetAddress,
    pimRPSetBidirGroup        TruthValue,
    pimRPSetPriority          Unsigned32,
    pimRPSetHoldtime          Unsigned32,
    pimRPSetExpiryTime        TimeTicks,
    pimRPSetRPActive          TruthValue
}

pimRPSetComponent OBJECT-TYPE
    SYNTAX     Unsigned32 (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 1 }

pimRPSetAddressType OBJECT-TYPE
    SYNTAX     InetAddressType
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The address type of the IP multicast group."
    ::= { pimRPSetEntry 2 }

pimRPSetGroupAddress OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS not-accessible
```

```
    STATUS     current
    DESCRIPTION
            "The IP multicast group address which, when combined with
            the corresponding value of pimRPSetGroupPrefixLength, gives
            the group prefix for which this entry contains information
            about the RP.  The InetAddressType is given by the
            pimRPSetAddressType object."
    ::= { pimRPSetEntry 3 }

pimRPSetGroupPrefixLength OBJECT-TYPE
    SYNTAX     InetAddressPrefixLength
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The multicast group prefix length which, when combined
            with the corresponding value of pimRPSetGroupAddress, gives
            the group prefix for which this entry contains information
            about the RP.  The InetAddressType is given by the
            pimRPSetAddressType object.  A value of zero is not
            permitted for this object."
    ::= { pimRPSetEntry 4 }

pimRPSetRPType OBJECT-TYPE
    SYNTAX     INTEGER {
                  static (1),
                  bsr (2),
                  embedded (3),
                  other (4)
               }
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "This object indicates how the RP was learnt.  'static'
            means from local configuration, 'bsr' means the PIM
            Bootstrap Router (BSR) mechanism
            [I-D.ietf-pim-sm-bsr], 'embedded' means the Embedded-RP
            mechanism [RFC3956] where the RP address is embedded in the
            multicast group address, and 'other' means any other
            mechanism."
    ::= { pimRPSetEntry 5 }

pimRPSetRPAddress OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The IP address of the RP.  The InetAddressType is given by
            the pimRPSetAddressType object."
```

```
    ::= { pimRPSetEntry 6 }

pimRPSetBidirGroup OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "Evaluates to TRUE if groups belonging to the group prefix
            in this entry are to be used with BIDIR-PIM."
    ::= { pimRPSetEntry 7 }

pimRPSetPriority OBJECT-TYPE
    SYNTAX     Unsigned32 (0..255)
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The RP Priority in the PIM Candidate-RP-Advertisement
            message or PIM Bootstrap message by which this RP was
            learned.  Numerically higher values for this object indicate
            lower priorities, with the value zero denoting the highest
            priority.  This object is 0 if pimRPSetRPType is not 'bsr'."
    ::= { pimRPSetEntry 8 }

pimRPSetHoldtime OBJECT-TYPE
    SYNTAX     Unsigned32 (0..65535)
    UNITS      "seconds"
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The holdtime of this RP entry.  This object is 0 if
            pimRPSetRPType is not 'bsr'."
    ::= { pimRPSetEntry 9 }

pimRPSetExpiryTime OBJECT-TYPE
    SYNTAX     TimeTicks
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The minimum time remaining before the RP denoted by this
            entry will be declared down.  The value zero indicates that
            the RP will never be declared down."
    ::= { pimRPSetEntry 10 }
```

```
pimRPSetRPActive OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
```



```
            "Evaluates to TRUE if the RP in this entry is the currently
            active RP for the group range."
    ::= { pimRPSetEntry 11 }

--
-- 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."
    ::= { pim 8 }

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

PimCandidateRPEntry ::= SEQUENCE {
    pimCandidateRPAddressType       InetAddressType,
    pimCandidateRPAddress           InetAddress,
    pimCandidateRPGroupAddress      InetAddress,
    pimCandidateRPGroupPrefixLength InetAddressPrefixLength,
    pimCandidateRPBidir             TruthValue,
```

```
    pimCandidateRPStatus            RowStatus
}

pimCandidateRPAddressType OBJECT-TYPE
    SYNTAX     InetAddressType
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The address type of the Candidate-RP."
    ::= { pimCandidateRPEntry 1 }

pimCandidateRPAddress OBJECT-TYPE
```



```
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The (unicast) address which will be advertised as a
            Candidate-RP.  The InetAddressType is given by
            the pimCandidateRPAddressType object."
    ::= { pimCandidateRPEntry 2 }

pimCandidateRPGroupAddress OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The IP multicast group address which, when combined with
            the corresponding value of pimCandidateRPGroupPrefixLength,
            identifies a group prefix for which the local router will
            advertise itself as a Candidate-RP.  The InetAddressType is
            given by the pimCandidateRPAddressType object."
    ::= { pimCandidateRPEntry 3 }

pimCandidateRPGroupPrefixLength OBJECT-TYPE
    SYNTAX     InetAddressPrefixLength
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The multicast group address mask which, when combined with
            the corresponding value of pimCandidateRPGroupMask,
            identifies a group prefix for which the local router will
```

```
            advertise itself as a Candidate-RP.  The InetAddressType is
            given by the pimCandidateRPAddressType object.  A value of
            zero is not permitted for this object."
    ::= { pimCandidateRPEntry 4 }

pimCandidateRPBidir OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "If this object is set to TRUE, this group range is
            advertised to this RP as a BIDIR-PIM group range.  If it is
            set to FALSE, it is advertised as a PIM-SM group range."
    ::= { pimCandidateRPEntry 5 }

pimCandidateRPStatus 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 6 }

--
-- The PIM Scope Zone Table
--

pimScopeZoneTable OBJECT-TYPE
    SYNTAX     SEQUENCE OF PimScopeZoneEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The (conceptual) table containing objects specific to a
            scoped region within a PIM-SM domain.  One row exists for
            each scoped zone in each domain to which the router is
            connected.  A PIM-SM scoped zone is defined as an area
            within a PIM-SM domain over which PIM Bootstrap messages for
            the group range belonging to the scope are forwarded."
    ::= { pim 9 }
```

```
pimScopeZoneEntry OBJECT-TYPE
    SYNTAX     PimScopeZoneEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "An entry (conceptual row) in the pimScopeZoneTable."
    INDEX      { pimScopeZoneId }
    ::= { pimScopeZoneTable 1 }

PimScopeZoneEntry ::= SEQUENCE {
    pimScopeZoneId                   Unsigned32,
    pimScopeZoneCandidateBSR         TruthValue,
    pimScopeZoneCandidateBSRPriority Unsigned32,
    pimScopeZoneBSRAddressType       InetAddressType,
    pimScopeZoneBSRAddress           InetAddress,
    pimScopeZoneBSRExpiryTime        TimeTicks,
    pimScopeZoneStatus               RowStatus
}

pimScopeZoneId OBJECT-TYPE
    SYNTAX     Unsigned32 (1..255)
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "A number uniquely identifying an admin scoped zone within a
            domain."
```



```
    ::= { pimScopeZoneEntry 1 }

pimScopeZoneCandidateBSR OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "Whether or not the local router is a Candidate-BSR."
    DEFVAL { false }
    ::= { pimScopeZoneEntry 2 }

pimScopeZoneCandidateBSRPriority OBJECT-TYPE
    SYNTAX     Unsigned32 (0..255)
    MAX-ACCESS read-create
    STATUS     current
```

```
    DESCRIPTION
            "The priority value for the local router as a Candidate-BSR.
            Numerically higher values for this object indicate higher
            priorities.  This object is only used if
            pimScopeZoneCandidateBSR is TRUE."
    DEFVAL { 0 }
    ::= { pimScopeZoneEntry 3 }

pimScopeZoneBSRAddressType OBJECT-TYPE
    SYNTAX     InetAddressType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The type of address of the bootstrap router (BSR) for the
            local PIM scoped zone."
    ::= { pimScopeZoneEntry 4 }

pimScopeZoneBSRAddress OBJECT-TYPE
    SYNTAX     InetAddress (SIZE (4|16|20))
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The address of the bootstrap router (BSR) for the local PIM
            scoped zone.  The InetAddressType is given by the
            pimScopeZoneBSRAddressType object."
    ::= { pimScopeZoneEntry 5 }

pimScopeZoneBSRExpiryTime OBJECT-TYPE
    SYNTAX     TimeTicks
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The minimum time remaining before the bootstrap router in
```



```
            the local scoped zone will be declared down.  For candidate
            BSRs, this is the time until the component sends a PIM
            Bootstrap message.  For other routers, this is the time
            until it may accept a PIM Bootstrap message from a lower
            candidate BSR."
    ::= { pimScopeZoneEntry 6 }

pimScopeZoneStatus 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."
    ::= { pimScopeZoneEntry 7 }

--
-- PIM Traps
--

pimNeighborLoss NOTIFICATION-TYPE
    OBJECTS { pimNeighborUpTime }
    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 the same IP version and
            a lower IP address than itself."
    ::= { pimTraps 1 }

--
-- Conformance Information
--

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

--
-- Compliance Statements
--

pimMIBCompliance MODULE-COMPLIANCE
    STATUS  current
    DESCRIPTION
            "The compliance statement for PIM routers which implement
```



```
            the PIM MIB."
```

```
    MODULE  -- this module
    MANDATORY-GROUPS { pimNotificationGroup,
                       pimObjectGroup }
    ::= { pimMIBCompliances 1 }

--
-- Units of Conformance
--

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

pimObjectGroup OBJECT-GROUP
    OBJECTS { pimInterfaceAddressType,
              pimInterfaceAddress,
              pimInterfaceNetMaskLength,
              pimInterfaceDR,
              pimInterfaceHelloInterval,
              pimInterfaceTrigHelloInterval,
              pimInterfaceJoinPruneInterval,
              pimInterfaceDFElectionRobustness,
              pimInterfaceHelloHoldtime,
              pimInterfaceJoinPruneHoldtime,
              pimInterfaceUseLanPruneDelay,
              pimInterfacePropagationDelay,
              pimInterfaceOverrideInterval,
              pimInterfaceUseGenerationID,
              pimInterfaceGenerationIDValue,
              pimInterfaceUseDRPriority,
              pimInterfaceDRPriority,
              pimInterfaceLanDelayEnabled,
              pimInterfaceEffectPropagDelay,
              pimInterfaceEffectOverrideIvl,
              pimInterfaceSuppressionEnabled,
              pimInterfaceBidirCapable,
              pimInterfaceDRPriorityEnabled,
              pimInterfaceBSRBorder,
              pimInterfaceStatus,
              pimNeighborUpTime,
              pimNeighborExpiryTime,
              pimNeighborLanPruneDelayPresent,
              pimNeighborPropagationDelay,
```

```
                pimNeighborOverrideInterval,
                pimNeighborTBit,
                pimNeighborGenerationIDPresent,
                pimNeighborGenerationIDValue,
                pimNeighborBidirCapable,
                pimNeighborDRPriorityPresent,
                pimNeighborDRPriority,
                pimNbrSecAddress,
                pimMRouteUpTime,
                pimMRouteExpiryTime,
                pimMRouteType,
                pimMRouteRPAddress,
                pimMRouteRPFIfIndex,
                pimMRouteRPFNeighbor,
                pimMRouteUpstreamAssertTimer,
                pimMRouteAssertRPTBit,
                pimMRouteAssertMetricPref,
                pimMRouteAssertMetric,
                pimMRouteFlags,
                pimMRouteNextHopUpTime,
                pimMRouteNextHopForwarding,
                pimMRouteNextHopJoinPruneTimer,
                pimMRouteNextHopAssertWinner,
                pimMRouteNextHopAssertTimer,
                pimMRouteNextHopAssertRPTBit,
                pimMRouteNextHopAssertMetricPref,
                pimMRouteNextHopAssertMetric,
                pimBidirDFElectionWinnerAddress,
                pimBidirDFElectionWinnerUpTime,
                pimBidirDFElectionWinnerMetricPref,
                pimBidirDFElectionWinnerMetric,
                pimBidirDFElectionState,
                pimBidirDFElectionStateTimer,
                pimRPSetBidirGroup,
                pimRPSetPriority,
                pimRPSetHoldtime,
                pimRPSetExpiryTime,
                pimRPSetRPActive,
                pimCandidateRPBidir,
                pimCandidateRPStatus,
                pimScopeZoneCandidateBSR,
                pimScopeZoneCandidateBSRPriority,
                pimScopeZoneBSRAddressType,
                pimScopeZoneBSRAddress,
                pimScopeZoneBSRExpiryTime,
                pimScopeZoneStatus }
```

```
    STATUS  current
    DESCRIPTION
```



```
            "A collection of objects for managing PIM routers."
    ::= { pimMIBGroups 2 }

END
```

5. Security Considerations

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations. These are the tables and objects and their sensitivity/vulnerability:

TODO.

Some of the readable objects in this MIB module (i.e., objects with a MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments. It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP. These are the tables and objects and their sensitivity/vulnerability:

TODO.

SNMP versions prior to SNMPv3 did not include adequate security. 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 GET/SET (read/change/create/delete) the objects in this MIB module.

It is RECOMMENDED that implementers consider the security features as provided by the SNMPv3 framework (see [RFC3410], section 8), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

6. IANA Considerations

PIM-STD-MIB should be rooted under the mib-2 subtree. IANA is requested to assign { mib-2 XXX } to the PIM-STD-MIB module specified in this document.

7. Acknowledgements

This MIB module is based on the original work in RFC 2934 [RFC2934] by K. McCloghrie, D. Farinacci, D. Thaler and W. Fenner and has been updated based on feedback from the IETF's Protocol Independent Multicast (PIM) Working Group.

Jonathan Nicholas was the editor of early versions of this document.

8. References

8.1 Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC2434] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 2434, October 1998.

[RFC2578] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.

[RFC2579] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Textual Conventions for SMIv2",

STD 58, RFC 2579, April 1999.

[RFC2580] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Conformance Statements for SMIv2", STD 58, RFC 2580, April 1999.

[RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", RFC 2863, June 2000.

[RFC4001] Daniele, M., Haberman, B., Routhier, S., and J. Schoenwaelder, "Textual Conventions for Internet Network Addresses", RFC 4001, February 2005.

[I-D.ietf-pim-sm-v2-new] Fenner, B., Handley, M., Holbrook, H., and I. Kouvelas, "Protocol Independent Multicast - Sparse Mode PIM-SM):

Protocol Specification (Revised)", draft-ietf-pim-sm-v2-new-11 (work in progress), October 2004.

[I-D.ietf-pim-bidir] Handley, M., Kouvelas, I., Speakman, T., and L. Vicisano, "Bi-directional Protocol Independent Multicast (BIDIR-PIM)", draft-ietf-pim-bidir-07 (work in progress), March 2005.

[I-D.ietf-pim-sm-bsr] Bhaskar, N., "Bootstrap Router (BSR) Mechanism for PIM", draft-ietf-pim-sm-bsr-05 (work in progress), February 2005.

[RFC3956] Savola, P. and B. Haberman, "Embedding the Rendezvous Point (RP) Address in an IPv6 Multicast Address", RFC 3956, November 2004.

8.2 Informative References

[RFC3410] Case, J., Mundy, R., Partain, D., and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", RFC 3410, December 2002.

[RFC2932] McCloghrie, K., Farinacci, D., and D. Thaler, "IPv4 Multicast Routing MIB", RFC 2932, October 2000.

[RFC2934] McCloghrie, K., Farinacci, D., Thaler, D., and B. Fenner, "Protocol Independent Multicast MIB for IPv4", RFC 2934, October 2000.

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