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B. Joshi
Infosys Technologies Ltd.
R. Bijlani

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Protocol Independent Multicast (PIM) Bootstrap Router MIB

Status of This Memo

Abstract

This document 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 Bootstrap Router (BSR) mechanism for PIM (Protocol Independent Multicast).

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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 Bootstrap Router (BSR) mechanism for PIM [RFC4601], [RFC5059].

This document was created by moving some of the PIM BSR-specific MIB tables from one of the earlier versions of PIM MIB [RFC5060].

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. Conventions

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].

4. Overview

This MIB module contains four tables. The tables are:

1. The Candidate-RP Table, which contains one row for each multicast group address prefix for which the local router is configured to advertise itself as a Candidate-RP (C-RP). This table exists on routers that are configured as Candidate-RP.

2. The Elected BSR RP-Set Table, which contains one row for each Group-to-RP mapping that was received in C-RP advertisements. This table exists on a router that is an elected BSR (E-BSR).

3. The Candidate-BSR Table, which contains one row for each Candidate-BSR configuration for the local router. This table exists on routers that are configured as Candidate-BSR.

4. The Elected-BSR Table, which contains one row for each elected BSR. This table exists on a router that is an elected BSR.

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

5. Definitions

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

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE,
    NOTIFICATION-TYPE,
    mib-2, Unsigned32, TimeTicks     FROM SNMPv2-SMI
    RowStatus, TruthValue,
    StorageType                      FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP,
    NOTIFICATION-GROUP               FROM SNMPv2-CONF
    InetAddressType,
    InetAddressPrefixLength,
    InetAddress,
    InetZoneIndex                    FROM INET-ADDRESS-MIB;

pimBsrMIB MODULE-IDENTITY
    LAST-UPDATED "200805280000Z" -- 28 May 2008
    ORGANIZATION
            "IETF Protocol Independent Multicast (PIM) Working Group"
    CONTACT-INFO
            "Email: pim@ietf.org
             WG charter:
             http://www.ietf.org/html.charters/pim-charter.html"
    DESCRIPTION
            "The MIB module for management of the Bootstrap Router
            (BSR) mechanism for PIM routers.

            Copyright (C) The IETF Trust (2008).  This version
            of this MIB module is part of RFC 5240; see the RFC
            itself for full legal notices."
    REVISION     "200805280000Z" -- 28 May 2008
    DESCRIPTION  "Initial version, published as RFC 5240."
    ::= { mib-2 172 }

--
-- Top-level structure
--

pimBsrNotifications   OBJECT IDENTIFIER ::= { pimBsrMIB 0 }
pimBsrObjects         OBJECT IDENTIFIER ::= { pimBsrMIB 1 }
```

```
   --
   -- Conformance Information
   --

   pimBsrConformance OBJECT IDENTIFIER ::= { pimBsrMIB 2 }
   pimBsrCompliances OBJECT IDENTIFIER ::= { pimBsrConformance 1 }
   pimBsrGroups      OBJECT IDENTIFIER ::= { pimBsrConformance 2 }

   --
   -- The BSR Candidate-RP Table
   --

   pimBsrCandidateRPTable OBJECT-TYPE
       SYNTAX     SEQUENCE OF PimBsrCandidateRPEntry
       MAX-ACCESS not-accessible
       STATUS     current
       DESCRIPTION
               "The (conceptual) table listing the IP multicast group
               prefixes for which the local router is to advertise
               itself as a Candidate-RP."
       ::= { pimBsrObjects 1 }

   pimBsrCandidateRPEntry OBJECT-TYPE
       SYNTAX     PimBsrCandidateRPEntry
       MAX-ACCESS not-accessible
       STATUS     current
       DESCRIPTION
               "An entry (conceptual row) in the
                pimBsrCandidateRPTable."
       INDEX      { pimBsrCandidateRPAddressType,
                    pimBsrCandidateRPAddress,
                    pimBsrCandidateRPGroupAddress,
                    pimBsrCandidateRPGroupPrefixLength }
       ::= { pimBsrCandidateRPTable 1 }

   PimBsrCandidateRPEntry ::= SEQUENCE {
       pimBsrCandidateRPAddressType       InetAddressType,
       pimBsrCandidateRPAddress           InetAddress,
       pimBsrCandidateRPGroupAddress      InetAddress,
       pimBsrCandidateRPGroupPrefixLength InetAddressPrefixLength,
       pimBsrCandidateRPBidir             TruthValue,
       pimBsrCandidateRPAdvTimer          TimeTicks,
       pimBsrCandidateRPPriority          Unsigned32,
       pimBsrCandidateRPAdvInterval       Unsigned32,
       pimBsrCandidateRPHoldtime          Unsigned32,
       pimBsrCandidateRPStatus            RowStatus,
       pimBsrCandidateRPStorageType       StorageType
   }
```

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

   pimBsrCandidateRPAddress OBJECT-TYPE
       SYNTAX     InetAddress (SIZE (4|8|16|20))
       MAX-ACCESS not-accessible
       STATUS     current
       DESCRIPTION
               "The (unicast) address that will be advertised as a
               Candidate-RP.  The InetAddressType is given by the
               pimBsrCandidateRPAddressType object."
       ::= { pimBsrCandidateRPEntry 2 }

   pimBsrCandidateRPGroupAddress OBJECT-TYPE
       SYNTAX     InetAddress (SIZE (4|8|16|20))
       MAX-ACCESS not-accessible
       STATUS     current
       DESCRIPTION
               "The IP multicast group address that, when combined with
               the corresponding value of
               pimBsrCandidateRPGroupPrefixLength, identifies a group
               prefix for which the local router will advertise itself
               as a Candidate-RP.  The InetAddressType is given by the
               pimBsrCandidateRPAddressType object.

               This address object is only significant up to
               pimBsrCandidateRPGroupPrefixLength bits.  The
               remainder of the address bits are zero.  This is
               especially important for this field, which is part of
               the index of this entry.  Any non-zero bits would
               signify an entirely different entry."
       ::= { pimBsrCandidateRPEntry 3 }

   pimBsrCandidateRPGroupPrefixLength OBJECT-TYPE
       SYNTAX     InetAddressPrefixLength (4..128)
       MAX-ACCESS not-accessible
       STATUS     current
       DESCRIPTION
               "The multicast group address mask that, when combined
               with the corresponding value of
               pimBsrCandidateRPGroupAddress, identifies a group prefix
               for which the local router will advertise itself as a
               Candidate-RP.  The InetAddressType is given by the
```

```
                pimBsrCandidateRPAddressType object."
        ::= { pimBsrCandidateRPEntry 4 }

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

    pimBsrCandidateRPAdvTimer OBJECT-TYPE
        SYNTAX      TimeTicks
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
                "The time remaining before the local router next sends
                a Candidate-RP-Advertisement to the elected BSR for
                this zone."
        ::= { pimBsrCandidateRPEntry 6 }

    pimBsrCandidateRPPriority OBJECT-TYPE
        SYNTAX      Unsigned32 (0..255)
        MAX-ACCESS read-create
        STATUS      current
        DESCRIPTION
                "The priority for this Candidate-RP advertised in
                 Candidate-RP-Advertisements."
        REFERENCE "RFC 5059, section 3.2"
        DEFVAL { 192 }
        ::= { pimBsrCandidateRPEntry 7 }

    pimBsrCandidateRPAdvInterval OBJECT-TYPE
        SYNTAX      Unsigned32 (1..26214)
        UNITS       "seconds"
        MAX-ACCESS read-create
        STATUS      current
        DESCRIPTION
                "A Candidate-RP generates Candidate-RP-Advertisements
                periodically.  This object represents the time interval
                in seconds between two consecutive advertisements."

        REFERENCE "RFC 5059, sections 3.2 and 5"
        DEFVAL { 60 }
```

```
        ::= { pimBsrCandidateRPEntry 8 }

    pimBsrCandidateRPHoldtime OBJECT-TYPE
        SYNTAX     Unsigned32 (0..65535)
        UNITS      "seconds"
        MAX-ACCESS read-create
        STATUS     current
        DESCRIPTION
                "Holdtime for this Candidate-RP.  The amount of time (in
                seconds) this Candidate-RP entry is valid.

                This object's value can be zero only when this C-RP is
                shutting down."

        REFERENCE "RFC 5059, section 4.2"
        DEFVAL { 150 }

        ::= { pimBsrCandidateRPEntry 9 }

    pimBsrCandidateRPStatus 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.

                This status object can be set to active(1) without
                setting any other columnar objects in this entry.

                All writable objects in this entry can be modified
                when the status of this entry is active(1)."

        ::= { pimBsrCandidateRPEntry 10 }


    pimBsrCandidateRPStorageType OBJECT-TYPE
        SYNTAX     StorageType
        MAX-ACCESS read-create
        STATUS     current
        DESCRIPTION
                "The storage type for this row.  Rows having the value
                'permanent' need not allow write-access to any columnar
                objects in the row."
          DEFVAL { nonVolatile }
       ::= { pimBsrCandidateRPEntry 11 }

    --
```

```
   -- The BSR Elected BSR RP-Set Table
   --

   pimBsrElectedBSRRPSetTable OBJECT-TYPE
       SYNTAX     SEQUENCE OF PimBsrElectedBSRRPSetEntry
       MAX-ACCESS not-accessible
       STATUS     current
       DESCRIPTION
               "The (conceptual) table listing BSR-specific information
               about PIM group mappings learned via C-RP advertisements
               or created locally using configurations.  This table is
               maintained only on the Elected BSR.

               An Elected BSR uses this table to create Bootstrap
               messages after applying a local policy to include some
               or all of the group mappings in this table."

       ::= { pimBsrObjects 2 }

   pimBsrElectedBSRRPSetEntry OBJECT-TYPE
       SYNTAX     PimBsrElectedBSRRPSetEntry
       MAX-ACCESS not-accessible
       STATUS     current
       DESCRIPTION
               "An entry (conceptual row) in the
                pimBsrElectedBSRRPSetTable."
       INDEX      { pimBsrElectedBSRGrpMappingAddrType,
                    pimBsrElectedBSRGrpMappingGrpAddr,
                    pimBsrElectedBSRGrpMappingGrpPrefixLen,
                    pimBsrElectedBSRGrpMappingRPAddr }
       ::= { pimBsrElectedBSRRPSetTable 1 }

   PimBsrElectedBSRRPSetEntry ::= SEQUENCE {
       pimBsrElectedBSRGrpMappingAddrType      InetAddressType,
       pimBsrElectedBSRGrpMappingGrpAddr       InetAddress,
       pimBsrElectedBSRGrpMappingGrpPrefixLen  InetAddressPrefixLength,
       pimBsrElectedBSRGrpMappingRPAddr        InetAddress,
       pimBsrElectedBSRRPSetPriority           Unsigned32,
       pimBsrElectedBSRRPSetHoldtime           Unsigned32,
       pimBsrElectedBSRRPSetExpiryTime         TimeTicks,
       pimBsrElectedBSRRPSetGrpBidir           TruthValue
   }

   pimBsrElectedBSRGrpMappingAddrType OBJECT-TYPE
       SYNTAX     InetAddressType
       MAX-ACCESS not-accessible
       STATUS     current
       DESCRIPTION
```

```
                "The Inet address type of the IP multicast group
                prefix."
        ::= { pimBsrElectedBSRRPSetEntry 2 }

    pimBsrElectedBSRGrpMappingGrpAddr OBJECT-TYPE
        SYNTAX     InetAddress (SIZE (4|8|16|20))
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
                "The IP multicast group address that, when combined
                with pimBsrElectedBSRGrpMappingGrpPrefixLen, gives the
                group prefix for this mapping.  The InetAddressType is
                given by the pimBsrElectedBSRGrpMappingAddrType object.

                This address object is only significant up to
                pimBsrElectedBSRGrpMappingGrpPrefixLen bits.  The
                remainder of the address bits are zero.  This is
                especially important for this field, which is part of
                the index of this entry.  Any non-zero bits would
                signify an entirely different entry."
        ::= { pimBsrElectedBSRRPSetEntry 3 }

    pimBsrElectedBSRGrpMappingGrpPrefixLen OBJECT-TYPE
        SYNTAX     InetAddressPrefixLength (4..128)
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
                "The multicast group prefix length that, when combined
                with pimBsrElectedBSRGrpMappingGrpAddr, gives the group
                prefix for this mapping.  The InetAddressType is given by
                the pimBsrElectedBSRGrpMappingAddrType object.  If
                pimBsrElectedBSRGrpMappingAddrType is 'ipv4' or 'ipv4z',
                this object must be in the range 4..32.  If
                pimBsrElectedBSRGrpMappingAddrType is 'ipv6' or 'ipv6z',
                this object must be in the range 8..128."
        ::= { pimBsrElectedBSRRPSetEntry 4 }

    pimBsrElectedBSRGrpMappingRPAddr OBJECT-TYPE
        SYNTAX     InetAddress (SIZE (4|8|16|20))
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
                "The IP address of the RP to be used for groups within
                this group prefix.  The InetAddressType is given by the
                pimBsrElectedBSRGrpMappingAddrType object."
        ::= { pimBsrElectedBSRRPSetEntry 5 }

    pimBsrElectedBSRRPSetPriority OBJECT-TYPE
```

```
        SYNTAX     Unsigned32 (0..255)
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
                "The priority for RP.  Numerically higher values for
                this object indicate lower priorities, with the value
                zero denoting the highest priority."
        REFERENCE "RFC 5059, section 4.1"
        ::= { pimBsrElectedBSRRPSetEntry 6 }

    pimBsrElectedBSRRPSetHoldtime OBJECT-TYPE
        SYNTAX     Unsigned32 (0..65535)
        UNITS      "seconds"
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
                "The holdtime for RP"
        REFERENCE "RFC 5059, section 4.1"
        ::= { pimBsrElectedBSRRPSetEntry 7 }

    pimBsrElectedBSRRPSetExpiryTime 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."
        ::= { pimBsrElectedBSRRPSetEntry 8 }

    pimBsrElectedBSRRPSetGrpBidir OBJECT-TYPE
        SYNTAX     TruthValue
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
                "If this object is TRUE, this group range with this
                RP is a BIDIR-PIM group range.  If it is set to FALSE,
                it is a PIM-SM group range."
        ::= { pimBsrElectedBSRRPSetEntry 9 }

    --
    -- The BSR Candidate-BSR Table
    --

    pimBsrCandidateBSRTable OBJECT-TYPE
        SYNTAX     SEQUENCE OF PimBsrCandidateBSREntry
        MAX-ACCESS not-accessible
        STATUS     current
```

```
        DESCRIPTION
                "The (conceptual) table containing Candidate-BSR
                configuration for the local router.  The table contains
                one row for each zone for which the local router is
                to advertise itself as a Candidate-BSR."
        ::= { pimBsrObjects 3 }

    pimBsrCandidateBSREntry OBJECT-TYPE
        SYNTAX     PimBsrCandidateBSREntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
                "An entry (conceptual row) in the
                pimBsrCandidateBSRTable."
        INDEX      { pimBsrCandidateBSRZoneIndex }
        ::= { pimBsrCandidateBSRTable 1 }

    PimBsrCandidateBSREntry ::= SEQUENCE {
        pimBsrCandidateBSRZoneIndex        InetZoneIndex,
        pimBsrCandidateBSRAddressType      InetAddressType,
        pimBsrCandidateBSRAddress          InetAddress,
        pimBsrCandidateBSRPriority         Unsigned32,
        pimBsrCandidateBSRHashMaskLength   Unsigned32,
        pimBsrCandidateBSRElectedBSR       TruthValue,
        pimBsrCandidateBSRBootstrapTimer   TimeTicks,
        pimBsrCandidateBSRStatus           RowStatus,
        pimBsrCandidateBSRStorageType      StorageType
    }

    pimBsrCandidateBSRZoneIndex OBJECT-TYPE
        SYNTAX     InetZoneIndex (1..4294967295)
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
                "The zone index uniquely identifies the zone on a
                device to which this Candidate-BSR is attached.  There is
                one entry for each zone in ipMcastZoneTable.  Scope-level
                information for this zone can be extracted from
                ipMcastZoneTable in IP Multicast MIB [RFC5132].

                Zero is a special value used to request the default zone
                for a given scope.  Zero is not a valid value for this
                object."

        ::= { pimBsrCandidateBSREntry 1 }

    pimBsrCandidateBSRAddressType OBJECT-TYPE
        SYNTAX     InetAddressType
```

```
        MAX-ACCESS read-create
        STATUS     current
        DESCRIPTION
                "The address type of the Candidate-BSR."
        ::= { pimBsrCandidateBSREntry 2 }

    pimBsrCandidateBSRAddress OBJECT-TYPE
        SYNTAX     InetAddress
        MAX-ACCESS read-create
        STATUS     current
        DESCRIPTION
                "The (unicast) address that the local router will
                use to advertise itself as a Candidate-BSR.  The
                InetAddressType is given by the
                pimBsrCandidateBSRAddressType object."
        ::= { pimBsrCandidateBSREntry 3 }

    pimBsrCandidateBSRPriority OBJECT-TYPE
        SYNTAX     Unsigned32 (0..255)
        MAX-ACCESS read-create
        STATUS     current
        DESCRIPTION
                "The priority value for the local router as a
                Candidate-BSR for this zone.  Numerically higher
                values for this object indicate higher priorities."
        DEFVAL { 0 }
        ::= { pimBsrCandidateBSREntry 4 }

    pimBsrCandidateBSRHashMaskLength OBJECT-TYPE
        SYNTAX     Unsigned32 (0..128)
        MAX-ACCESS read-create
        STATUS     current
        DESCRIPTION
                "The hash mask length (used in the RP hash function)
                that the local router will advertise in its Bootstrap
                messages for this zone.  This object defaults
                to 30 if pimBsrCandidateBSRAddressType is 'ipv4' or
                'ipv4z' , and defaults to 126 if
                pimBsrCandidateBSRAddressType is 'ipv6' or 'ipv6z'."
        ::= { pimBsrCandidateBSREntry 5 }

    pimBsrCandidateBSRElectedBSR OBJECT-TYPE
        SYNTAX     TruthValue
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
                "Whether the local router is the elected BSR for this
                zone."
```

```
        ::= { pimBsrCandidateBSREntry 6 }

    pimBsrCandidateBSRBootstrapTimer OBJECT-TYPE
        SYNTAX     TimeTicks
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
                "The time remaining before the local router next
                originates a Bootstrap message for this zone.
                Value of this object is zero if
                pimBsrCandidateBSRElectedBSR is 'FALSE'."
        ::= { pimBsrCandidateBSREntry 7 }

    pimBsrCandidateBSRStatus 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.

                This status object can be set to active(1) without
                setting any other columnar objects in this entry.

                All writable objects in this entry can be modified
                when the status of this entry is active(1)."
        ::= { pimBsrCandidateBSREntry 8 }

    pimBsrCandidateBSRStorageType OBJECT-TYPE
        SYNTAX     StorageType
        MAX-ACCESS read-create
        STATUS     current
        DESCRIPTION
                "The storage type for this row.  Rows having the value
                'permanent' need not allow write-access to any columnar
                objects in the row."
          DEFVAL { nonVolatile }
       ::= { pimBsrCandidateBSREntry 9 }

    --
    -- The BSR Elected-BSR Table
    --

    pimBsrElectedBSRTable OBJECT-TYPE
        SYNTAX     SEQUENCE OF PimBsrElectedBSREntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
```

```
                "The (conceptual) table containing information about
                elected BSRs.  The table contains one row for each
                zone for which there is an elected BSR."
        ::= { pimBsrObjects 4 }

    pimBsrElectedBSREntry OBJECT-TYPE
        SYNTAX     PimBsrElectedBSREntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
                "An entry (conceptual row) in the
                 pimBsrElectedBSRTable."
        INDEX      { pimBsrElectedBSRZoneIndex }
        ::= { pimBsrElectedBSRTable 1 }

    PimBsrElectedBSREntry ::= SEQUENCE {
        pimBsrElectedBSRZoneIndex        InetZoneIndex,
        pimBsrElectedBSRAddressType      InetAddressType,
        pimBsrElectedBSRAddress          InetAddress,
        pimBsrElectedBSRPriority         Unsigned32,
        pimBsrElectedBSRHashMaskLength   Unsigned32,
        pimBsrElectedBSRExpiryTime       TimeTicks
    }

    pimBsrElectedBSRZoneIndex OBJECT-TYPE
        SYNTAX     InetZoneIndex (1..4294967295)
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
                "The zone index uniquely identifies the zone on a
                device to which this Elected BSR is attached.  There
                is one entry for each zone in ipMcastZoneTable.
                Scope-level information for this zone can be extracted
                from ipMcastZoneTable in IP Multicast MIB [RFC5132].

                Zero is a special value used to request the default zone
                for a given scope.  Zero is not a valid value for this
                object."

        ::= { pimBsrElectedBSREntry 1 }

    pimBsrElectedBSRAddressType OBJECT-TYPE
        SYNTAX     InetAddressType
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
                "The address type of the elected BSR."
        ::= { pimBsrElectedBSREntry 2 }
```

```
   pimBsrElectedBSRAddress OBJECT-TYPE
       SYNTAX     InetAddress (SIZE (4|8|16|20))
       MAX-ACCESS read-only
       STATUS     current
       DESCRIPTION
               "The (unicast) address of the elected BSR.  The
               InetAddressType is given by the
               pimBsrElectedBSRAddressType object."
       ::= { pimBsrElectedBSREntry 3 }

   pimBsrElectedBSRPriority OBJECT-TYPE
       SYNTAX     Unsigned32 (0..255)
       MAX-ACCESS read-only
       STATUS     current
       DESCRIPTION
               "The priority value for the elected BSR for this address
               type.  Numerically higher values for this object indicate
               higher priorities."
       ::= { pimBsrElectedBSREntry 4 }

   pimBsrElectedBSRHashMaskLength OBJECT-TYPE
       SYNTAX     Unsigned32 (0..128)
       MAX-ACCESS read-only
       STATUS     current
       DESCRIPTION
               "The hash mask length (used in the RP hash function)
               advertised by the elected BSR for this zone."
       ::= { pimBsrElectedBSREntry 5 }

   pimBsrElectedBSRExpiryTime OBJECT-TYPE
       SYNTAX     TimeTicks
       MAX-ACCESS read-only
       STATUS     current
       DESCRIPTION
               "The minimum time remaining before the elected BSR for
               this zone will be declared down."
       ::= { pimBsrElectedBSREntry 6 }

   --
   -- PIM BSR Notifications
   --

   pimBsrElectedBSRLostElection   NOTIFICATION-TYPE
       OBJECTS { pimBsrElectedBSRAddressType,
                 pimBsrElectedBSRAddress,
                 pimBsrElectedBSRPriority }
       STATUS     current
       DESCRIPTION
```

```
                "A pimBsrElectedBSRLostElection notification should be
                generated when current E-BSR lost election to a new
                Candidate-BSR.  Only an E-BSR should generate this
                notification.

                This notification is generated when
                pimBsrCandidateBSRElectedBSR becomes FALSE."

        REFERENCE "RFC 5059, section 3.1"
        ::= { pimBsrNotifications 1 }

    pimBsrCandidateBSRWinElection   NOTIFICATION-TYPE
        OBJECTS { pimBsrCandidateBSRElectedBSR }
        STATUS     current
        DESCRIPTION
                "A pimBsrCandidateBSRWinElection notification should be
                generated when a C-BSR wins BSR Election.  Only an
                E-BSR should generate this notification.

                This notification is generated when
                pimBsrCandidateBSRElectedBSR becomes TRUE."

        REFERENCE "RFC 5059, section 3.1"
        ::= { pimBsrNotifications 2 }

    --
    -- Compliance Statements
    --

    pimBsrCompliance MODULE-COMPLIANCE
        STATUS  current
        DESCRIPTION
                "The compliance statement for PIM routers that implement
                the Bootstrap Router (BSR) mechanism."
        MODULE  -- this module
        MANDATORY-GROUPS { pimBsrObjectGroup }

          GROUP   pimBsrDiagnosticsGroup
          DESCRIPTION
              "This group is optional."

        ::= { pimBsrCompliances 1 }

    --
    -- Units of Conformance
    --

    pimBsrObjectGroup OBJECT-GROUP
```

```
        OBJECTS { pimBsrCandidateRPBidir,
                  pimBsrCandidateRPAdvTimer,
                  pimBsrCandidateRPPriority,
                  pimBsrCandidateRPAdvInterval,
                  pimBsrCandidateRPHoldtime,
                  pimBsrCandidateRPStatus,
                  pimBsrCandidateRPStorageType,
                  pimBsrElectedBSRRPSetPriority,
                  pimBsrElectedBSRRPSetHoldtime,
                  pimBsrElectedBSRRPSetExpiryTime,
                  pimBsrElectedBSRRPSetGrpBidir,
                  pimBsrCandidateBSRAddress,
                  pimBsrCandidateBSRAddressType,
                  pimBsrCandidateBSRPriority,
                  pimBsrCandidateBSRHashMaskLength,
                  pimBsrCandidateBSRElectedBSR,
                  pimBsrCandidateBSRBootstrapTimer,
                  pimBsrCandidateBSRStatus,
                  pimBsrCandidateBSRStorageType,
                  pimBsrElectedBSRAddress,
                  pimBsrElectedBSRAddressType,
                  pimBsrElectedBSRPriority,
                  pimBsrElectedBSRHashMaskLength,
                  pimBsrElectedBSRExpiryTime }
        STATUS  current
        DESCRIPTION
                "A collection of objects for managing the Bootstrap
                Router (BSR) mechanism for PIM routers."
        ::= { pimBsrGroups 1 }

    pimBsrDiagnosticsGroup NOTIFICATION-GROUP
        NOTIFICATIONS  { pimBsrElectedBSRLostElection,
                         pimBsrCandidateBSRWinElection }
        STATUS  current
        DESCRIPTION
                "Objects providing additional diagnostics related to
                the Bootstrap Router (BSR) mechanism for PIM routers."
        ::= { pimBsrGroups 2 }

    END
```

6. 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:

- A new Candidate-BSR with high priority or modification of priority (bsrCandidateBSRPriority) of an existing Candidate-BSR can take over the functionality of an Elected BSR, which can prevent and disrupt the services.

- A new Candidate-RP with lower priority or modification of priority (bsrCandidateRPPriority) of an existing Candidate-RP can force other routers to select itself for a particular group prefix. This can prevent and disrupt the services provided through this group prefix.

The following are the read-write and read-create objects defined in this MIB module:

bsrCandidateRPBidir
bsrCandidateRPPriority
bsrCandidateRPAdvInterval
bsrCandidateRPHoldtime
bsrCandidateBSRAddressType
bsrCandidateBSRAddress
bsrCandidateBSRPriority
bsrCandidateBSRHashMaskLength

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:

pimBsrCandidateRPAdvTimer
pimBsrElectedBSRRPSetPriority
pimBsrElectedBSRRPSetHoldtime
pimBsrElectedBSRRPSetExpiryTime
pimBsrElectedBSRRPSetGrpBidir
pimBsrCandidateBSRElectedBSR
pimBsrCandidateBSRBootstrapTimer
pimBsrElectedBSRAddressType
pimBsrElectedBSRAddress
pimBsrElectedBSRPriority
pimBsrElectedBSRHashMaskLength
pimBsrElectedBSRExpiryTime

In this MIB module, possible effects that can be induced by GET operations include:

- Determination of Elected BSR, Candidate-BSRs, and Candidate-RPs in the Multicast Network topology. This information may be sensitive and may be used in preparation for Denial-of-Service (DoS) attacks including any of the attacks described above.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPsec), there is still no control over whom on the secure network is allowed to access (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 access (read/change/create/delete) them.

7. IANA Considerations

The MIB module in this document uses the following IANA-assigned OBJECT IDENTIFIER values recorded in the SMI Numbers registry:

Descriptor	OBJECT IDENTIFIER value
pimBsrMIB	{ mib-2 172 }

8. Acknowledgments

This MIB module is based on the original work in [RFC5060] by R. Sivaramu, J. Lingard, and B. Joshi.

Many thanks to Bill Fenner, Stig Venaas, Nidhi Bhaskar, David Mcwalter, David Harrington, and J. W. Atwood for their feedback on this MIB module.

Suggested IPv6 multicast MIBs by R. Sivaramu and R. Raghunarayan have been used for comparison while editing this MIB module.

9. References

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Authors' Addresses

Bharat Joshi
Infosys Technologies Ltd.
44 Electronics City, Hosur Road
Bangalore 560 100
India

EMail: bharat_joshi@infosys.com
URI: http://www.infosys.com/

Raina Bijlani

EMail: rainab@gmail.com

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