Protocol Independent Multicast (PIM) Bootstrap Router MIB

Status of This Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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

IMPORT

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.

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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 }
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,
pimBsrCandidateRPAdvInterval Unsigned32,
pimBsrCandidateRPPriority 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,  
pimBsrCandidateRFPriority,  
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:

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>OBJECT IDENTIFIER value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pimBsrMIB</td>
<td>{ mib-2 172 }</td>
</tr>
</tbody>
</table>

8. Acknowledgments

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

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


9.2. Informative References

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