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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 Bootstrap Router (BSR) mechanism for PIM.
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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. [I-D.ietf-pim-sm-v2-new], [I-D.ietf-pim-sm-bsr].

This draft was created by the removal of BSR MIB support from the draft PIM MIB [I-D.ietf-pim-mib-v2].

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 [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 [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, [RFC2578], STD 58, [RFC2579] and STD 58, [RFC2580].

3. Overview

This MIB module contains four tables. The tables are:

1. The BSR Candidate-RP Table, which contains one row for each multicast group address prefix for which the local router is to advertise itself as a Candidate-RP.

2. The BSR RP-Set Table, which contains one row for each group mapping that was learned via BSR.

3. The BSR Candidate-BSR Table, which contains one row for each Candidate-BSR configuration for the local router.

4. The BSR Elected BSR Table, which contains one row for each elected BSR.
This MIB module uses textual conventions defined in the IF-MIB [RFC2863], the INET-ADDRESS-MIB [RFC4001] and the IANA-RTPROTO-MIB.

4. Definitions

PIM-BSR-MIB DEFINITIONS ::= BEGIN

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

pimBsrMIB MODULE-IDENTITY
  LAST-UPDATED "200606160000Z" -- 16 June 2006
  ORGANIZATION "IETF PIM Working Group"
  CONTACT-INFO
    "Email: pim@ietf.org"
  DESCRIPTION
    "The MIB module for management of the Bootstrap Router (BSR) mechanism for PIM routers.

    Copyright (C) The Internet Society (2006). 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      "200606160000Z" -- 16 June 2006
    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
    --
    -- Top-level structure
    --

    pimBsrMIBObjects OBJECT IDENTIFIER ::= { pimBsrMIB 1 }
    pimBsrTraps      OBJECT IDENTIFIER ::= { pimBsrMIBObjects 0 }
    pimBsr           OBJECT IDENTIFIER ::= { pimBsrMIBObjects 1 }

    --
    -- The BSR Candidate-RP Table
    --
bsrCandidateRPTable OBJECT-TYPE
SYNTAX SEQUENCE OF BsrCandidateRPEntry
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."
::= { pimBsr 1 }

BsrCandidateRPEntry OBJECT-TYPE
SYNTAX BsrCandidateRPEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "An entry (conceptual row) in the bsrCandidateRPTable."
INDEX { bsrCandidateRPAddressType, bsrCandidateRPAddress, bsrCandidateRPGroupAddress, bsrCandidateRPGroupPrefixLength }
::= { bsrCandidateRPTable 1 }

BsrCandidateRPEntry ::= SEQUENCE {
    bsrCandidateRPAddressType InetAddressType,
    bsrCandidateRPAddress InetAddress,
    bsrCandidateRPGroupAddress InetAddress,
    bsrCandidateRPGroupPrefixLength InetAddressPrefixLength,
    bsrCandidateRPBidir TruthValue,
    bsrCandidateRPAdvTimer TimeTicks
    bsrCandidateRPStatus RowStatus }

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

bsrCandidateRPAddress OBJECT-TYPE
SYNTAX InetAddress (SIZE (4|8|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 bsrCandidateRPAddressType object."
::= { bsrCandidateRPEntry 2 }

bsrCandidateRPGroupAddress OBJECT-TYPE
SYNTAX     InetAddress (SIZE (4|8|16|20))
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"The IP multicast group address which, when combined with
the corresponding value of
bsrCandidateRPGroupPrefixLength, identifies a group
prefix for which the local router will advertise itself
as a Candidate-RP. The InetAddressType is given by the
bsrCandidateRPAddressType object."
::= { bsrCandidateRPEntry 3 }

bsrCandidateRPGroupPrefixLength OBJECT-TYPE
SYNTAX     InetAddressPrefixLength (4..128)
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"The multicast group address mask which, when combined
with the corresponding value of
bsrCandidateRPGroupAddress, identifies a group prefix
for which the local router will advertise itself as a
Candidate-RP. The InetAddressType is given by the
bsrCandidateRPAddressType object."
::= { bsrCandidateRPEntry 4 }

bsrCandidateRPBidir 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 }
::= { bsrCandidateRPEntry 5 }

bsrCandidateRPAdvTimer 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 address type."
::= { bsrCandidateRPEntry 7 }

bsrCandidateRPStatus 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."

::= { bsrCandidateRPEntry 8 }

--
-- The BSR RP-Set Table
--

bsrRPSetTable OBJECT-TYPE
SYNTAX     SEQUENCE OF BsrRPSetEntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"The (conceptual) table listing BSR-specific information
about PIM group mappings learned via BSR. There is one
entry in this table for every entry in the
pimGroupMappingTable with a pimGroupMappingOrigin value
of 'bsr'. [I-D.ietf-pim-mib-v2]"

::= { pimBsr 2 }

BsrRPSetEntry OBJECT-TYPE
SYNTAX     BsrRPSetEntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"An entry (conceptual row) in the bsrRPSetTable."
INDEX      { bsrGroupMappingAddressType,
                bsrGroupMappingGrpAddress,
                bsrGroupMappingGrpPrefixLength,
                bsrGroupMappingRPAddress }

::= { bsrRPSetTable 1 }

BsrRPSetEntry ::= SEQUENCE {
    bsrGroupMappingAddressType  InetAddressType,
    bsrGroupMappingGrpAddress   InetAddress,
    bsrGroupMappingGrpPrefixLength  InetAddressPrefixLength,
    bsrGroupMappingRPAddress    InetAddress,
    bsrRPSetPriority           Unsigned32,
    bsrRPSetHoldtime           Unsigned32,
    bsrRPSetExpiryTime         TimeTicks
}
bsrGroupMappingAddressType OBJECT-TYPE
   SYNTAX     InetAddressType
   MAX-ACCESS not-accessible
   STATUS     current
   DESCRIPTION
   "The Inet address type of the IP multicast group prefix."
   ::= { bsrRPSetEntry 2 }

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

   This address object is only significant up to
   bsrGroupMappingGrpPrefixLength 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."
   ::= { bsrRPSetEntry 3 }

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

bsrGroupMappingRPAddress 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
bsrGroupMappingAddressType object."
::= { bsrRPSetEntry 5 }

bsrRPSetPriority OBJECT-TYPE
SYNTAX     Unsigned32 (0..255)
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
"The RP Priority from 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."
::= { bsrRPSetEntry 6 }

bsrRPSetHoldtime OBJECT-TYPE
SYNTAX     Unsigned32 (0..65535)
UNITS      "seconds"
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
"The RP Holdtime from the PIM Candidate-RP-Advertisement
message or PIM Bootstrap message by which this RP was
learned."
::= { bsrRPSetEntry 7 }

bsrRPSetExpiryTime 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."
::= { bsrRPSetEntry 8 }

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

bsrCandidateBSRTable OBJECT-TYPE
SYNTAX     SEQUENCE OF BsrCandidateBSREntry
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 address family for which the local router is to advertise itself as a Candidate-BSR."

::= { pimBsr 3 }

bsrCandidateBSREntry OBJECT-TYPE
SYNTAX BsrCandidateBSREntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "An entry (conceptual row) in the bsrCandidateBSRTable."
INDEX { bsrCandidateBSRAddressType }
 ::= { bsrCandidateBSRTable 1 }

BsrCandidateBSREntry ::= SEQUENCE {
    bsrCandidateBSRAddressType InetAddressType,
    bsrCandidateBSRAddress InetAddress,
    bsrCandidateBSRPriority Unsigned32,
    bsrCandidateBSRHashMaskLength Unsigned32,
    bsrCandidateBSRElectedBSR TruthValue,
    bsrCandidateBSRBootstrapTimer TimeTicks,
    bsrCandidateBSRStatus RowStatus
}

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

bsrCandidateBSRAddress OBJECT-TYPE
SYNTAX InetAddress
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The (unicast) address which the local router will use to advertise itself as a Candidate-BSR. The InetAddressType is given by the bsrCandidateBSRAddressType object."
 ::= { bsrCandidateBSREntry 2 }

bsrCandidateBSRPriority 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 address type. Numerically higher values for this object indicate higher priorities."
DEFVAL { 0 }
::= { bsrCandidateBSREntry 3 }

bsrCandidateBSRHashMaskLength 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 address type. This object defaults to 30 if bsrCandidateBSRAddressType is 'ipv4' or 'ipv4z', and defaults to 126 if bsrCandidateBSRAddressType is 'ipv6' or 'ipv6z'."
-- DEFVAL { 30 or 126 }
::= { bsrCandidateBSREntry 4 }

bsrCandidateBSRElectedBSR OBJECT-TYPE
SYNTAX     TruthValue
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
"Whether the local router is the elected BSR for this address type."
::= { bsrCandidateBSREntry 5 }

bsrCandidateBSRBootstrapTimer 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 address type. Value of this object is zero if bsrCandidateBSRElectedBSR is 'FALSE'."
::= { bsrCandidateBSREntry 6 }

bsrCandidateBSRStatus 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."
::= { bsrCandidateBSREntry 7 }

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

bsrElectedBSRTable OBJECT-TYPE
SYNTAX     SEQUENCE OF BsrElectedBSREntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"The (conceptual) table containing information about
elected BSRs.  The table contains one row for each
address family for which there is an elected BSR."
::= { pimBsr 4 }

BsrElectedBSREntry OBJECT-TYPE
SYNTAX     BsrElectedBSREntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"An entry (conceptual row) in the bsrElectedBSRTable."
INDEX      { bsrElectedBSRAddressType }
::= { bsrElectedBSRTable 1 }

BsrElectedBSREntry ::= SEQUENCE {
  bsrElectedBSRAddressType      InetAddressType,
  bsrElectedBSRAddress          InetAddress,
  bsrElectedBSRPriority         Unsigned32,
  bsrElectedBSRHashMaskLength   Unsigned32,
  bsrElectedBSRExpiryTime       TimeTicks,
}

bsrElectedBSRAddressType OBJECT-TYPE
SYNTAX     InetAddressType
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"The address type of the elected BSR."
::= { bsrElectedBSREntry 1 }

bsrElectedBSRAddress 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 bsrElectedBSRAddressType
bsrElectedBSRPriority 

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."

::= { bsrElectedBSREntry 3 }

bsrElectedBSRHashMaskLength 

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 address type."

::= { bsrElectedBSREntry 4 }

bsrElectedBSRExpiryTime 

SYNTAX             TimeTicks
MAX-ACCESS         read-only
STATUS             current
DESCRIPTION        "The minimum time remaining before the elected BSR for this address type will be declared down."

::= { bsrElectedBSREntry 5 }

--
-- PIM BSR Traps
--

bsrElectedBSRLostElection 

NOTIFICATION-TYPE
OBJECTS { bsrCandidateBSRElectedBSR }
STATUS             current
DESCRIPTION        "A bsrElectedBSRLostElection trap should be generated when current E-BSR lost election to a new Candidate BSR current E-BSR, start sending BootStrap Messages. Only an E-BSR should generate this trap.

This notification is generated when bsrCandidateBSRElectedBSR becomes FALSE."
bsrCandidateBSRWinElection NOTIFICATION-TYPE
  OBJECTS { bsrCandidateBSRElectedBSR }
  STATUS current
  DESCRIPTION
  "A bsrCandidateBSRWinElection trap should be generated when a C-BSR wins BSR Election. Only an E-BSR should generate this trap.

  This notification is generated when bsrCandidateBSRElectedBSR becomes TRUE"

REFERENCE "I-D.ietf-pim-sm-bsr section 3.1"
::= { pimBsrTraps 2 }

-- -- Conformance Information -- --
pimBsrMIBConformance OBJECT IDENTIFIER ::= { pimBsrMIB 2 }
pimBsrMIBCompliances OBJECT IDENTIFIER ::= { pimBsrMIBConformance 1 }
pimBsrMIBGroups OBJECT IDENTIFIER ::= { pimBsrMIBConformance 2 }

-- -- Compliance Statements -- --
pimBsrMIBCompliance MODULE-COMPLIANCE
  STATUS current
  DESCRIPTION
  "The compliance statement for PIM routers which implement the PIM BSR MIB."
  MODULE -- this module
  MANDATORY-GROUPS { pimBsrObjectGroup }

    GROUP pimBsrDiagnosticsGroup
    DESCRIPTION
    "This group is optional."
    ::= { pimBsrMIBCompliances 1 }

-- -- Units of Conformance -- --
pimBsrObjectGroup OBJECT-GROUP
5. Security Considerations

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.

6. IANA Considerations

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

7. Acknowledgements

This MIB module is based on the original work in [I-D.ietf-pim-mib-v2] by R. Sivaramu, J. Lingard and B. Joshi.

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

8. References

8.1. Normative References


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


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Acknowledgment

Funding for the RFC Editor function is currently provided by the Internet Society.