Abstract

This memo defines an portion of the Management Information Base (MIB) for use with network management protocols in the Internet community.

In particular, it describes managed objects to configure and/or monitor Multicast in MPLS/BGP IP VPNs (MVPN) on a router.

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1 Introduction

Multicast in MPLS/BGP IP VPNs (MVPN) is specified in [MVPN], [BGP-MVPN] and [MVPN-WILDCARD]. These specifications support either PIM or BGP as the protocol for exchanging VPN multicast (referred to as C-multicast states, where 'C-' stands for 'VPN Customer-') among PEs. In the rest of this document we'll use the term "PIM-MVPN" to refer to PIM being used for exchanging C-multicast states, and "BGP-MVPN" to refer to BGP being used for exchanging C-multicast states.

This document defines a standard MIB for MVPN-specific objects that are generic to both PIM-MVPN and BGP-MVPN.

This document borrowed some text from Cisco PIM-MVPN MIB [CISCO-MIB]. For PIM-MVPN this document attempts to provide coverage comparable to [CISCO-MIB], but in a generic way that applies to both PIM-MVPN and BGP-MVPN.

Comments should be made directly to the BESS WG at bess@ietf.org.

1.1 Terminology

This document adopts the definitions, acronyms and mechanisms described in [MVPN] and other documents that [MVPN] refers to. Familiarity with Multicast, MPLS, L3VPN, MVPN concepts and/or mechanisms is assumed.

Interchangeably, the term Multicast VRF (MVRF) and MVPN are used to refer to a particular Multicast VPN instantiation on a particular PE device.

2 MVPN MIB

This MIB enables configuring and/or monitoring of MVPNs on PE devices: the whole multicast VPN machinery and the per-MVRFs information, including the configuration, status and operational details, such as different P-Multicast Service Interfaces (PMSIs) and the provider tunnels implementing them.

2.1 Summary of MIB Module

The configuration and states specific to an MVPN include the following:

- C-multicast routing exchange protocol (PIM or BGP)
- I-PMSI, S-PMSI and corresponding provider tunnels
- Mapping of c-multicast states to PMSI/tunnels

To represent them, the following tables are defined.

```
+--------------+    +-------------------+    +-----------------+
| MvpnBgp      | -> |   MvpnPmsiConfig  | <- | MvpnSpmsiConfig |
+--------------+    +-------------------+    +-----------------+

+--------------+    +-------------------+    +-----------------+
| MvpnGeneral  | -> | L2L3VpnMcastPmsi  | <- | MvpnSpmsi      |
+--------------+    | TunnelAttribute   |    +-----------------+

+--------------+    +-------------------+
| MvpnInterAs  |    | MvpnMroute        |
| Ipmsi        |    +-------------------+
```

- `mvpnGeneralTable`

An entry in this table is created for each MVRF in the device, for general configuration/states of the MVRF, including Inclusive PMSI (I-PMSI) configuration.

Existence of the corresponding VRF in [L3VPN-MIB] is necessary for a row to exist in this table.

- `mvpnBgpGeneralTable`

This table augments `mvpnGeneralTable` and is for BGP-MVPN specific information.

- `mvpnSpmsiConfigTable`

This table contains objects for Selective PMSI (S-PMSI) configurations in an MVRF.

- `mvpnPmsiConfigTable`

Both I-PMSI configuration (in `mvpnGeneralEntry`) and S-PMSI
configuration (in mvpnSpmsiConfigEntry) refer to entries in this table.

- **mvpnIpmsiTable**

  This table contains all advertised and received intra-as I-PMSIs. With PIM-MVPN, it is applicable only when BGP-Based Autodiscovery of MVPN Membership is used.

- **mvpnInterAsIpmsiTable**

  This table contains all advertised and received inter-as I-PMSIs. With PIM-MVPN, it is applicable only when BGP-Based Autodiscovery of MVPN Membership is used.

- **mvpnSpmsiTable/Etnry**

  This table contains all advertised or received S-PMSIs.

- **12l3VpnMcastPmsiTunnelAttributeTable**

  This table is defined separately in 12L3VpnMcastMIB [L2L3MVPN-MIB], which is common for both VPLS Multicast and MVPN. It contains sent/received PMSI attribute entries referred to by mvpnIpmsiEntry, mvpnSpmsiEntry, mvpnInterAsIpmsiEntry, and other MIB objects (e.g., VPLS Multicast ones).

- **mvpnMrouteTable**

  This table augments ipMcastMIB.ipMcast.ipMcastRouteTable [MROUTE-MIB], for some MVPN specific information.

### 2.2 MIB Module Definitions

**MCAST-VPN-MIB DEFINITIONS ::= BEGIN**

**IMPORTS**

  MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE, experimental, Unsigned32
  FROM SNMPv2-SMI

  MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
  FROM SNMPv2-CONF

  TruthValue, RowPointer, RowStatus, TimeStamp, TimeInterval
  FROM SNMPv2-TC

  SnmpAdminString
FROM SNMP-FRAMEWORK-MIB

InetAddress, InetAddressType
FROM INET-ADDRESS-MIB

MplsLabel
FROM MPLS-TC-STD-MIB

mplsL3VpnVrfName, MplsL3VpnRouteDistinguisher
FROM MPLS-L3VPN-STD-MIB

ipMcastRouteEntry
FROM IPMCAST-MIB

L2L3VpnMcastProviderTunnelType
FROM L2L3-VPN-MCAST-MIB;

mvpnMIB MODULE-IDENTITY
LAST-UPDATED "201405071200Z"  -- 07 May 2014 12:00:00 GMT
ORGANIZATION "IETF Layer-3 Virtual Private Networks Working Group."
CONTACT-INFO
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   zzhang@juniper.net
   Comments and discussion to bess@ietf.org"

DESCRIPTION
"This MIB contains managed object definitions for multicast in BGP/MPLS IP VPNs defined by [MVPN].
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-- Revision history.
REVISION "201405071200Z"  -- 07 May 2014 12:00:00 GMT
DESCRIPTION
  "Initial version of the draft."
 ::= { experimental 99 }  -- number to be assigned

-- Top level components of this MIB.
mvpnNotifications OBJECT IDENTIFIER ::= { mvpnMIB 0 }

-- tables, scalars
mvpnObjects       OBJECT IDENTIFIER ::= { mvpnMIB 1 }

-- conformance information
mvpnConformance   OBJECT IDENTIFIER ::= { mvpnMIB 2 }

-- mvpn Objects
mvpnScalars OBJECT IDENTIFIER ::= { mvpnObjects 1 }
mvpnGeneral OBJECT IDENTIFIER ::= { mvpnObjects 2 }
mvpnConfig OBJECT IDENTIFIER ::= { mvpnObjects 3 }
mvpnStates OBJECT IDENTIFIER ::= { mvpnObjects 4 }

-- Scalar Objects

mvpnMvrfNumber OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The total number of MVRFs that are present on this device, whether for IPv4, IPv6, or mLDP C-Multicast."
::= { mvpnScalars 1 }

mvpnMvrfNumberV4 OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The number of MVRFs for IPv4 C-Multicast that are present in this device."
::= { mvpnScalars 2 }

mvpnMvrfNumberV6 OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The number of MVRFs for IPv6 C-Multicast that are present in this device."
::= { mvpnScalars 3 }

mvpnMvrfNumberPimV4 OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The number of PIM-MVPN MVRFs for IPv4 C-Multicast that are present in this device."
::= { mvpnScalars 4 }

mvpnMvrfNumberPimV6 OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of PIM-MVPN MVRFs for IPv6 C-Multicast that are present in this device."
::= { mvpnScalars 5 }

mvpnMvrfNumberBgpV4 OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of BGP-MVPN MVRFs for IPv4 C-Multicast that are present in this device."
::= { mvpnScalars 6 }

mvpnMvrfNumberBgpV6 OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of BGP-MVPN MVRFs for IPv6 C-Multicast that are present in this device."
::= { mvpnScalars 7 }

mvpnMvrfNumberMldp OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of BGP-MVPN MVRFs for mLDP C-Multicast that are present in this device."
::= { mvpnScalars 8 }

mvpnNotificationEnable OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"If this object is TRUE, then the generation of all notifications defined in this MIB is enabled."
DEFVAL { false }
::= { mvpnScalars 9 }

-- General MVRF Information Table

mvpnGeneralTable OBJECT-TYPE
SYNTAX SEQUENCE OF MvpnGeneralEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

"This table specifies the general information about the MVRFs present in this device."
 ::= { mvpnGeneral 1 }

mvpnGeneralEntry OBJECT-TYPE
SYNTAX MvpnGeneralEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"An entry in this table is created for each MVRF in the device."
INDEX { mplsL3VpnVrfName, mvpnGenAddressFamily }
 ::= { mvpnGeneralTable 1 }

MvpnGeneralEntry ::= SEQUENCE {
 mvpnGenAddressFamily       INTEGER,
 mvpnGenOperStatusChange    INTEGER,
 mvpnGenOperChangeTime      TimeStamp,
 mvpnGenCmcastRouteProtocol INTEGER,
 mvpnGenIpmsiConfig         RowPointer,
 mvpnGenInterAsPmsiConfig   RowPointer,
 mvpnGenUmhSelection        INTEGER,
 mvpnGenSiteType            INTEGER,
 mvpnGenSptnlLimit          Unsigned32,
 mvpnGenRowStatus           RowStatus
}

mvpnGenAddressFamily OBJECT-TYPE
SYNTAX INTEGER { ipv4(1), ipv6(2) }
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The Address Famamily that this entry is for"
 ::= { mvpnGeneralEntry 1 }

mvpnGenOperStatusChange OBJECT-TYPE
SYNTAX INTEGER { createdMvrf(1), deletedMvrf(2), modifiedMvrfIpmsiConfig(3), modifiedMvrfSpmsiConfig(4) }
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object describes the last operational change that
happened for the given MVRF.

createdMvrf - indicates that the MVRF was created in the device.

deletedMvrf - indicates that the MVRF was deleted from the device. A row in this table will never have mvpnGenOperStatusChange equal to deletedMvrf(2), because in that case the row itself will be deleted from the table. This value for mvpnGenOperStatusChange is defined mainly for use in mvpnMvrfChange notification.

modifiedMvrfIpmsiConfig - indicates that the I-PMSI for the MVRF was configured, deleted or changed.

modifiedMvrfSpmsiConfig - indicates that the S-PMSI for the MVRF was configured, deleted or changed.

DEFVAL { createdMvrf }
::= { mvpnGeneralEntry 2 }

mvpnGenOperChangeTime OBJECT-TYPE
SYNTAX TimeStamp
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The time at which the last operational change for the MVRF in question took place. The last operational change is specified by mvpnGenOperStatusChange."
::= { mvpnGeneralEntry 3 }

mvpnGenCmcastRouteProtocol OBJECT-TYPE
SYNTAX INTEGER { pim (1),
bgp (2)
}
MAX-ACCESS read-write
STATUS current
DESCRIPTION "The protocol used to signal C-multicast states across the provider core.
pim(1): PIM (PIM-MVPN).
bgp(2): BGP (BGP-MVPN)."
::= { mvpnGeneralEntry 4 }

mvpnGenIpmsiConfig OBJECT-TYPE
SYNTAX RowPointer
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"This points to a row in mvpnPmsiConfigTable, for I-PMSI configuration."
::= { mvpnGeneralEntry 5 }

mvpnGenInterAsPmsiConfig OBJECT-TYPE
SYNTAX RowPointer
MAX-ACCESS read-write
STATUS current
DESCRIPTION "This points to a row in mvpnPmsiConfigTable, for inter-as I-PMSI configuration, in case of segmented inter-as provider tunnels."
::= { mvpnGeneralEntry 6 }

mvpnGenUmhSelection OBJECT-TYPE
SYNTAX INTEGER {
    highest-pe-address  (1),
    c-root-group-hashing (2),
    ucast-umh-route (3)
}
MAX-ACCESS read-write
STATUS current
DESCRIPTION "The UMH selection method for this mvpn, as specified in section 5.1.3 of [MVPN]:
  highest-pe-address  (1): PE with the highest address
  c-root-group-hashing (2): hashing based on (c-root, c-group)
  ucast-umh-route (3): per ucast route towards c-root"
::= { mvpnGeneralEntry 7 }

mvpnGenSiteType OBJECT-TYPE
SYNTAX INTEGER {
    sender-receiver (1),
    receiver-only (2),
    sender-only (3)
}
MAX-ACCESS read-write
STATUS current
DESCRIPTION "Whether this site is a receiver-only site or not.
  sender-receiver (1): both sender and receiver site.
  receiver-only (2): receiver-only site.
  sender-only (3): sender-only site."
::= { mvpnGeneralEntry 8 }

mvpnGenSptnlLimit OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS    read-write
STATUS        current
DESCRIPTION   "The max number of selective provider tunnels this device
               allows for this mvpn."
::= { mvpnGeneralEntry 9}

mvpnGenRowStatus OBJECT-TYPE
SYNTAX        RowStatus
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION   "This is used to create or delete a row in this table."
::= { mvpnGeneralEntry 10 }

-- General BGP-MVPN table

mvpnBgpGeneralTable OBJECT-TYPE
SYNTAX        SEQUENCE OF MvpnBgpGeneralEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION   "This table augments the mvpnGeneralTable and is for BGP-MVPN
               specific information."
::= { mvpnGeneral 2 }

MvpnBgpGeneralEntry OBJECT-TYPE
SYNTAX        MvpnBgpGeneralEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION   "The mvpnBgpGeneralEntry matches and augments an
               mvpnGeneralEntry for a BGP-MVPN instance, with BGP-MVPN
               specific informatoin."
AUGMENTS      { mvpnGeneralEntry }
::= { mvpnBgpGeneralEntry }

MvpnBgpGeneralEntry ::= SEQUENCE {
  mvpnBgpGenMode INTEGER,
  mvpnBgpGenVrfRtImport MplsL3VpnRouteDistinguisher,
  mvpnBgpGenSrcAs Unsigned32
}

mvpnBgpGenMode OBJECT-TYPE
SYNTAX        INTEGER {
  rpt-spt    (1),
  spt-only   (2)
}
For two different BGP-MVPN modes:
   rpt-spt(1): inter-site shared tree mode
   spt-only(2): inter-site source-only tree mode.

::= { mvpnBgpGeneralEntry 1}

mvpnBgpGenVrfRtImport OBJECT-TYPE
SYNTAX             MplsL3VpnRouteDistinguisher
MAX-ACCESS         read-write
STATUS             current
DESCRIPTION
   "The VRF Route Import Extended Community that this device
    adds to unicast vpn routes that it advertises for this mvpn."
::= { mvpnBgpGeneralEntry 2}

mvpnBgpGenSrcAs      OBJECT-TYPE
SYNTAX            Unsigned32
MAX-ACCESS        read-only
STATUS            current
DESCRIPTION
   "The Source AS number in Source AS Extended Community that this
    device adds to the unicast vpn routes that it advertises for
    this mvpn."
::= { mvpnBgpGeneralEntry 3}

-- PMSI Configuration Table

mvpnPmsiConfigTable  OBJECT-TYPE
SYNTAX        SEQUENCE OF MvpnPmsiConfigEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
   "This table specifies the configured PMSIs."
::= { mvpnConfig 1 }

mvpnPmsiConfigEntry OBJECT-TYPE
SYNTAX        MvpnPmsiConfigEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
   "An entry in this table is created for each PMSI configured
    on this router. It can be referred to by either I-PMSI
    configuration (in mvpnGeneralEntry) or S-PMSI configuration
    (in mvpnSpmsiConfigEntry)"
INDEX       { mvpnPmsiConfigTunnelType,
    mvpnPmsiConfigTunnelAuxInfo,
mvpnPmsiConfigTunnelPimGroupAddressType, 
mvpnPmsiConfigTunnelPimGroupAddress, 
mvpnPmsiConfigTunnelOrTemplateName } 
::= { mvpnPmsiConfigTable 1 }

MvpnPmsiConfigEntry ::= SEQUENCE { 
mvpnPmsiConfigTunnelType                 L2L3VpnMcastProviderTunnelType, 
mvpnPmsiConfigTunnelAuxInfo              Unsigned32, 
mvpnPmsiConfigTunnelPimGroupAddressType  InetAddressType, 
mvpnPmsiConfigTunnelPimGroupAddress      InetAddress, 
mvpnPmsiConfigTunnelOrTemplateName       SnmpAdminString, 
mvpnPmsiConfigEncapsType                 INTEGER, 
mvpnPmsiConfigRowStatus                  RowStatus }

mvpnPmsiConfigTunnelType OBJECT-TYPE
SYNTAX        L2L3VpnMcastProviderTunnelType
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "Type of tunnel used to instantiate the PMSI."
::= { mvpnPmsiConfigEntry 1 }

mvpnPmsiConfigTunnelAuxInfo OBJECT-TYPE
SYNTAX        Unsigned32
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "Additional tunnel information depending on the type.
  pim: In case of S-PMSI, number of groups starting at
  mvpnPmsiConfigTunnelPimGroupAddress.
  This allows a range of PIM provider tunnel
  group addresses to be specified in S-PMSI case.
  In I-PMSI case, it must be 1.
  rsvp-p2mp: 1 for statically specified rsvp-p2mp tunnel
  2 for dynamically created rsvp-p2mp tunnel
  ingress-replication:
    1 for using any existing p2p/mp2p lsp
    2 for dynamically creating new p2p lsp"
::= { mvpnPmsiConfigEntry 2 }

mvpnPmsiConfigTunnelPimGroupAddressType OBJECT-TYPE
SYNTAX        InetAddressType
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "In case of PIM provider tunnel, the type of tunnel address."
::= { mvpnPmsiConfigEntry 3 }

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mvpnPmsiConfigTunnelPimGroupAddress OBJECT-TYPE
SYNTAX        InetAddress
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
"In case of PIM provider tunnel, the provider tunnel address."
::= { mvpnPmsiConfigEntry 4 }

mvpnPmsiConfigTunnelOrTemplateName OBJECT-TYPE
SYNTAX        SnmpAdminString
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
"The tunnel name or template name used to create tunnels. Depending on mvpnPmsiConfigTunnelType and mvpnPmsiConfigTunnelAuxInfo:
dynamically created rsvp-p2mp tunnel: template name
statically specified rsvp-p2mp tunnel: tunnel name
ingress-replication using dynamically created lsps: template name
other: null"
::= { mvpnPmsiConfigEntry 5 }

mvpnPmsiConfigEncapsType OBJECT-TYPE
SYNTAX        INTEGER { greIp (1),
                             ipIp (2),
                             mpls (3) }
MAX-ACCESS    read-write
STATUS        current
DESCRIPTION
"The encapsulation type to be used, in case of PIM tunnel or ingress-replication."
::= { mvpnPmsiConfigEntry 6 }

mvpnPmsiConfigRowStatus OBJECT-TYPE
SYNTAX        RowStatus
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
"Used to create/modify/delete a row in this table."
::= { mvpnPmsiConfigEntry 7 }

-- S-PMSI configuration table

mvpnSpmsiConfigTable  OBJECT-TYPE
SYNTAX        SEQUENCE OF MvpnSpmsiConfigEntry
This table specifies S-PMSI configuration.

```plaintext
mvpnSpmsiConfigEntry OBJECT-TYPE
SYNTAX        MvpnSpmsiConfigEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
   "An entry is created for each S-PMSI configuration."
INDEX       {  mplsL3VpnVrfName,
                 mvpnSpmsiConfigCmcastAddressType,
                 mvpnSpmsiConfigCmcastGroupAddress,
                 mvpnSpmsiConfigCmcastGroupPrefixLen,
                 mvpnSpmsiConfigCmcastSourceAddress,
                 mvpnSpmsiConfigCmcastSourcePrefixLen }
::= { mvpnSpmsiConfigTable 1 }

MvpnSpmsiConfigEntry ::= SEQUENCE {
    mvpnSpmsiConfigCmcastAddressType     InetAddressType,
    mvpnSpmsiConfigCmcastGroupAddress    InetAddress,
    mvpnSpmsiConfigCmcastGroupPrefixLen  Unsigned32,
    mvpnSpmsiConfigCmcastSourceAddress   InetAddress,
    mvpnSpmsiConfigCmcastSourcePrefixLen Unsigned32,
    mvpnSpmsiConfigThreshold             Unsigned32,
    mvpnSpmsiConfigPmsiPointer           RowPointer,
    mvpnSpmsiConfigRowStatus             RowStatus
}
```

```
mvpnSpmsiConfigCmcastAddressType OBJECT-TYPE
SYNTAX        InetAddressType
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
   "Type of C-multicast address"
::= { mvpnSpmsiConfigEntry 1 }
```

```
mvpnSpmsiConfigCmcastGroupAddress OBJECT-TYPE
SYNTAX        InetAddress
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
   "C-multicast group address"
::= { mvpnSpmsiConfigEntry 2 }
```

```
mvpnSpmsiConfigCmcastGroupPrefixLen OBJECT-TYPE
```
INTERNET DRAFT            L3VPN Multicast MIB             March 14, 2016

SYNTAX        Unsigned32
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "C-multicast group address prefix length.
   A group 0 (or ::0) with prefix length 32 (or 128)
   indicates wildcard group, while a group 0 (or ::0)
   with prefix length 0 indicates any group."
::= { mvpnSpmsiConfigEntry 3 }

mvpnSpmsiConfigCmcastSourceAddress OBJECT-TYPE
SYNTAX        InetAddress
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "C-multicast source address"
::= { mvpnSpmsiConfigEntry 4 }

mvpnSpmsiConfigCmcastSourcePrefixLen OBJECT-TYPE
SYNTAX        Unsigned32
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "C-multicast source address prefix length.
   A source 0 (or ::0) with prefix length 32 (or 128)
   indicates a wildcard source, while a source 0 (or ::0)
   with prefix length 0 indicates any source."
::= { mvpnSpmsiConfigEntry 5 }

mvpnSpmsiConfigThreshold OBJECT-TYPE
SYNTAX        Unsigned32  (0..4294967295)
UNITS         "kilobits per second"
MAX-ACCESS    read-write
STATUS        current
DESCRIPTION    "The bandwidth threshold value which when exceeded for a
   multicast routing entry in the given MVRF, triggers usage
   of S-PMSI."
::= { mvpnSpmsiConfigEntry 6 }

mvpnSpmsiConfigPmsiPointer OBJECT-TYPE
SYNTAX        RowPointer
MAX-ACCESS    read-write
STATUS        current
DESCRIPTION    "This points to a row in mvpnPmsiConfigTable,
   to specify tunnel attributes."
::= { mvpnSpmsiConfigEntry 7 }

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mvpnSpmsiConfigRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION "Used to create/modify/delete a row in this table."
::= { mvpnSpmsiConfigEntry 8 }

-- Table of intra-as I-PMSIs advertised/received

mvpnIpmsiTable OBJECT-TYPE
SYNTAX SEQUENCE OF MvpnIpmsiEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "This table is for all advertised/received I-PMSI advertisements."
::= { mvpnStates 1 }

mvpnIpmsiEntry OBJECT-TYPE
SYNTAX MvpnIpmsiEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "An entry in this table corresponds to an I-PMSI advertisement that is advertised/received on this router. This represents all the sender PEs in the MVPN, with the provider tunnel they use to send traffic."
INDEX { mplsL3VpnVrfName, mvpnIpmsiAfi, mvpnIpmsiRD, mvpnIpmsiOrigAddrType, mvpnIpmsiOrigAddress }
::= { mvpnIpmsiTable 1 }

MvpnIpmsiEntry ::= SEQUENCE {
  mvpnIpmsiAfi            Unsigned32,
  mvpnIpmsiRD             MplsL3VpnRouteDistinguisher,
  mvpnIpmsiOrigAddrType   InetAddressType,
  mvpnIpmsiOrigAddress    InetAddress,
  mvpnIpmsiUpTime         TimeInterval,
  mvpnIpmsiAttribute      RowPointer
}

mvpnIpmsiAfi OBJECT-TYPE
SYNTAX Unsigned32 {1,2}
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The address family this I-PMSI is for.
  1 - IPv4
  2 - IPv6"
 ::= { mvpnIpmsiEntry 1 }

mvpnIpmsiRD OBJECT-TYPE
SYNTAX MplsL3VpnRouteDistinguisher
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The Route Distinguisher in this I-PMSI."
 ::= { mvpnIpmsiEntry 2 }

mvpnIpmsiOrigAddrType OBJECT-TYPE
SYNTAX InetAddressType
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The Internet address type of mvpnIpmsiOrigAddress."
 ::= { mvpnIpmsiEntry 3 }

mvpnIpmsiOrigAddress OBJECT-TYPE
SYNTAX InetAddress
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The BGP address of the device that originated the I-PMSI."
 ::= { mvpnIpmsiEntry 4 }

mvpnIpmsiUpTime OBJECT-TYPE
SYNTAX TimeInterval
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The time since this I-PMSI was first advertised/received by the device."
 ::= { mvpnIpmsiEntry 5 }

mvpnIpmsiAttribute OBJECT-TYPE
SYNTAX RowPointer
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Points to a row in the l2L3VpnMcastPmsiTunnelAttributeTable."
 ::= { mvpnIpmsiEntry 6 }

-- Table of inter-as I-PMSIs advertised/received
mvpnInterAsIpmsiTable OBJECT-TYPE
SYNTAX        SEQUENCE OF MvpnInterAsIpmsiEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
 "This table is for all advertised/received inter-as I-PMSI
 advertisements."
 ::= { mvpnStates 2 }

mvpnInterAsIpmsiEntry OBJECT-TYPE
SYNTAX        MvpnInterAsIpmsiEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
 "An entry in this table corresponds to an inter-as I-PMSI
 advertisement that is advertised/received on this router. This
 represents all the ASes in the MVPN, with the provider tunnel used to send traffic to."
INDEX  { mplsL3VpnVrfName,
            mvpnInterAsIpmsiAfi,
            mvpnInterAsIpmsiRD,
            mvpnInterAsIpmsiSrcAs }
 ::= { mvpnInterAsIpmsiTable 1 }

MvpnInterAsIpmsiEntry ::= SEQUENCE {
    mvpnInterAsIpmsiAfi          Unsigned32,
    mvpnInterAsIpmsiRD           MplsL3VpnRouteDistinguisher,
    mvpnInterAsIpmsiSrcAs        Unsigned32,
    mvpnInterAsIpmsiAttribute    RowPointer
}

mvpnInterAsIpmsiAfi OBJECT-TYPE
SYNTAX        Unsigned32 { 1|2 }
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
 "The address family this I-PMSI is for.
  1 - IPv4
  2 - IPv6"
 ::= { mvpnInterAsIpmsiEntry 1 }

mvpnInterAsIpmsiRD OBJECT-TYPE
SYNTAX        MplsL3VpnRouteDistinguisher
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
 "The Route Distinguisher in this inter-as I-PMSI."
 ::= { mvpnInterAsIpmsiEntry 2 }

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mvpnInterAsIpmsiSrcAs OBJECT-TYPE
SYNTAX        Unsigned32
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "The source-as in this inter-as I-PMSI."
 ::= { mvpnInterAsIpmsiEntry 3 }

mvpnInterAsIpmsiAttribute OBJECT-TYPE
SYNTAX        RowPointer
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION    "Points to a row in the l2L3VpnMcastPmsiTunnelAttributeTable."
 ::= { mvpnInterAsIpmsiEntry 4 }

-- Table of S-PMSIs advertised/received
mvpnSpmsiTable OBJECT-TYPE
SYNTAX        SEQUENCE OF MvpnSpmsiEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "This table has information about the S-PMSIs sent/received
by a device."
 ::= { mvpnStates 3 }

mvpnSpmsiEntry OBJECT-TYPE
SYNTAX        MvpnSpmsiEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "An entry in this table is created or updated for each S-PMSI
advertised/received in a particular MVRF."
INDEX  { mplsL3VpnVrfName,
 mvpnSpmsiCmcastAddrType,
 mvpnSpmsiCmcastGroup,
 mvpnSpmsiCmcastGroupPrefixLen,
 mvpnSpmsiCmcastSource,
 mvpnSpmsiCmcastSourcePrefixLen,
 mvpnSpmsiOrigAddrType,
 mvpnSpmsiOrigAddress}
 ::= { mvpnSpmsiTable 1 }

MvpnSpmsiEntry ::= SEQUENCE {
 mvpnSpmsiCmcastAddrType          InetAddressType,
 mvpnSpmsiCmcastGroup            InetAddress,
 mvpnSpmsiCmcastGroupPrefixLen   Unsigned32,
mvpnSpmsiCmcastSource OBJECT-TYPE
SYNTAX        InetAddress,
mvpnSpmsiCmcastSourcePrefixLen OBJECT-TYPE
SYNTAX        Unsigned32,
mvpnSpmsiOrigAddrType OBJECT-TYPE
SYNTAX        InetAddressType,
mvpnSpmsiOrigAddress OBJECT-TYPE
SYNTAX        InetAddress,
mvpnSpmsiTunnelAttribute OBJECT-TYPE
SYNTAX        RowPointer,
mvpnSpmsiUpTime OBJECT-TYPE
SYNTAX        TimeInterval,
mvpnSpmsiExpTime OBJECT-TYPE
SYNTAX        TimeInterval,
mvpnSpmsiRefCnt OBJECT-TYPE
SYNTAX        Unsigned32
}

mvpnSpmsiCmcastAddrType OBJECT-TYPE
SYNTAX        InetAddressType
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "The Internet address type of mvpnSpmsiCmcastGroup/Source."
::= { mvpnSpmsiEntry 1 }

mvpnSpmsiCmcastGroup OBJECT-TYPE
SYNTAX        InetAddress
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "S-PMSI C-multicast group address.
If it is 0 (or ::0), this is a wildcard group,
and mvpnSpmsiCmcastGroupPrefixLen must be 32 (or 128)."
::= { mvpnSpmsiEntry 2 }

mvpnSpmsiCmcastGroupPrefixLen OBJECT-TYPE
SYNTAX        Unsigned32
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "S-PMSI C-multicast group address prefix length."
::= { mvpnSpmsiEntry 3 }

mvpnSpmsiCmcastSource OBJECT-TYPE
SYNTAX        InetAddress
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION    "S-PMSI C-multicast source address.
If it is 0 (or ::0), this is a wildcard source,
and mvpnSpmsiCmcastSourcePrefixLen must be 32 (or 128)."
::= { mvpnSpmsiEntry 4 }

mvpnSpmsiCmcastSourcePrefixLen OBJECT-TYPE
SYNTAX        Unsigned32
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "S-PMSI C-multicast source address prefix length."
::= { mvpnSpmsiEntry 5 }

mvpnSpmsiOrigAddrType OBJECT-TYPE
SYNTAX InetAddressType
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The Internet address type of mvpnSpmsiOrigAddress."
::= { mvpnSpmsiEntry 6 }

mvpnSpmsiOrigAddress OBJECT-TYPE
SYNTAX InetAddress
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The BGP address of the device that originated the S-PMSI."
::= { mvpnSpmsiEntry 7 }

mvpnSpmsiTunnelAttribute OBJECT-TYPE
SYNTAX RowPointer
MAX-ACCESS read-only
STATUS current
DESCRIPTION "A row pointer to the l2L3VpnMcastPmsiTunnelAttributeTable"
::= { mvpnSpmsiEntry 8 }

mvpnSpmsiUpTime OBJECT-TYPE
SYNTAX TimeInterval
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The time since this S-PMSI was first advertised/received by the device."
::= { mvpnSpmsiEntry 9 }

mvpnSpmsiExpTime OBJECT-TYPE
SYNTAX TimeInterval
MAX-ACCESS read-only
STATUS current
DESCRIPTION "For UDP-based S-PMSI signaling for PIM-MVPN, the amount of time remaining before this received S-PMSI Join Message expires, or the next S-PMSI Join Message refresh is to be
advertised again from the device.
Otherwise, it is 0."
::= { mvpnSpmsiEntry 10 }

mvpnSpmsiRefCnt OBJECT-TYPE
SYNTAX        Unsigned32
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
  "The number of c-multicast routes that are mapped to
  this S-PMSI."
::= { mvpnSpmsiEntry 11 }

-- Table of multicast routes in an MVPN

mvpnMrouteTable OBJECT-TYPE
SYNTAX        SEQUENCE OF MvpnMrouteEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
  "This table augments ipMcastRouteTable, to provide some MVPN
  specific information."
::= { mvpnStates 4 }

mvpnMrouteEntry OBJECT-TYPE
SYNTAX        MvpnMrouteEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
  "The mvpnMrouteEntry matches and augments an ipMcastRouteEntry,
  with MVPN specific information, such as PMSI used."
AUGMENTS      { ipMcastRouteEntry }
::= { mvpnMrouteTable 1 }

MvpnMrouteEntry ::= SEQUENCE {
  mvpnMroutePmsiPointer               RowPointer,
  mvpnMrouteNumberOfLocalReplication  Unsigned32,
  mvpnMrouteNumberOfRemoteReplication Unsigned32
}

mvpnMroutePmsiPointer OBJECT-TYPE
SYNTAX        RowPointer
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
  "The I-PMSI or S-PMSI this C-multicast route is using.
  This is important because an implementation may not have an
  interface corresponding to a provider tunnel,

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that can be used in ipMcastRouteNextHopEntry.

 ::= { mvpnMrouteEntry 1 }

mvpnMrouteNumberOfLocalReplication OBJECT-TYPE
SYNTAX        Unsigned32
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
"Number of replications for local receivers. For example, if an ingress PE needs to send traffic out of N PE-CE interfaces, then mvpnMrouteNumberOfLocalReplication is N."
 ::= { mvpnMrouteEntry 2 }

mvpnMrouteNumberOfRemoteReplication OBJECT-TYPE
SYNTAX        Unsigned32
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
"Number of local replications for remote PEs. For example, if the number of remote PEs that need to receive traffic is N, then mvpnMrouteNumberOfRemoteReplication is N in case of Ingress Replication, but may be less than N in case of RSVP-TE or mLDP P2MP tunnels, depending on the actual number of replications the PE needs do."
 ::= { mvpnMrouteEntry 3 }

-- MVPN Notifications

mvpnMvrfChange NOTIFICATION-TYPE
OBJECTS     {
          mvpnGenOperStatusChange
       }
STATUS      current
DESCRIPTION
"A mvpnMvrfChange notification signifies a change about a MVRF in the device. The change event can be creation of the MVRF, deletion of the MVRF or an update on the I-PMSI or S-PMSI configuration of the MVRF. The change event is indicated by mvpnGenOperStatusChange embedded in the notification. The user can then query mvpnGeneralTable, and/or mvpnSpmsiConfigTable to get the details of the change as necessary.

Note: Since the creation of a MVRF is often followed by configuration of I-PMSI and/or S-PMSIs for the MVRF, more than one (three at most) notifications for a MVRF may be generated serially, and it is really not necessary to
generate all three of them. An agent may choose to generate a notification for the last event only, that is for S-PMSI configuration.

Similarly, deletion of I-PMSI and S-PMSI configuration on a MVRF happens before a MVRF is deleted and it is recommended that the agent send the notification for MVRF deletion event only."

 ::= { mvpnNotifications 2 }

-- MVPN MIB Conformance Information

mvpnGroups OBJECT IDENTIFIER ::= { mvpnConformance 1 }
mvpnCompliances OBJECT IDENTIFIER ::= { mvpnConformance 2 }

-- Compliance Statements

mvpnCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION "The compliance statement "
MODULE -- this module
MANDATORY-GROUPS {
   mvpnScalarGroup,
   mvpnGeneralGroup,
   mvpnSpmsiConfigGroup,
   mvpnSpmsiGroup,
   mvpnMrouteGroup
}

GROUP mvpnIpmsiGroup
DESCRIPTION "This group is mandatory for systems that support BGP signaling for I-PMSI."

GROUP mvpnInterAsIpmsiGroup
DESCRIPTION "This group is mandatory for systems that support Inter-AS Segmented I-PMSI."

GROUP mvpnBgpGeneralGroup
DESCRIPTION "This group is mandatory for systems that support BGP-MVPN."

 ::= { mvpnCompliances 1 }
-- units of conformance

mvpnScalarGroup OBJECT-GROUP
OBJECTS {
mvpnMvrfNumber,
mvpnMvrfNumberV4,
mvpnMvrfNumberV6,
mvpnMvrfNumberPimV4,
mvpnMvrfNumberPimV6,
mvpnMvrfNumberBgpV4,
mvpnMvrfNumberBgpV6,
mvpnMvrfNumberMldp,
mvpnNotificationEnable
}
STATUS current
DESCRIPTION
"These objects are used to monitor/manage
global MVPN parameters."
::= { mvpnGroups 1 }

mvpnGeneralGroup OBJECT-GROUP
OBJECTS {
mvpnGenOperStatusChange,
mvpnGenOperChangeTime,
mvpnGenCmcastRouteProtocol,
mvpnGenIpmsiConfig,
mvpnGenInterAsPmsiConfig,
mvpnGenUmhSelection,
mvpnGenSiteType,
mvpnGenSptnlLimit,
mvpnGenRowStatus
}
STATUS current
DESCRIPTION
"These objects are used to monitor/manage
per-VRF MVPN parameters."
::= { mvpnGroups 2 }

mvpnPmsiConfigGroup OBJECT-GROUP
OBJECTS {
mvpnPmsiConfigEncapsType,
mvpnPmsiConfigRowStatus
}
STATUS current
DESCRIPTION
"These objects are used to monitor/manage
PMSI tunnel configurations."
::= { mvpnGroups 3 }
mvnpSpmsiConfigGroup  OBJECT-GROUP
  OBJECTS {
    mvnpSpmsiConfigThreshold,
    mvnpSpmsiConfigPmsiPointer,
    mvnpSpmsiConfigRowStatus
  }
  STATUS    current
  DESCRIPTION
    "These objects are used to monitor/manage
    S-PMSI configurations."
  ::= { mvnpGroups 4 }

mvnpIpmsiGroup    OBJECT-GROUP
  OBJECTS {
    mvnpIpmsiUpTime,
    mvnpIpmsiAttribute
  }
  STATUS    current
  DESCRIPTION
    "These objects are used to monitor/manage
    Intra-AS I-PMSI attributes."
  ::= { mvnpGroups 5 }

mvnpInterAsIpmsiGroup    OBJECT-GROUP
  OBJECTS {
    mvnpInterAsIpmsiAttribute
  }
  STATUS    current
  DESCRIPTION
    "These objects are used to monitor/manage
    Inter-AS I-PMSI attributes."
  ::= { mvnpGroups 6 }

mvnpSpmsiGroup    OBJECT-GROUP
  OBJECTS {
    mvnpSpmsiTunnelAttribute,
    mvnpSpmsiUpTime,
    mvnpSpmsiExpTime,
    mvnpSpmsiRefCnt
  }
  STATUS    current
  DESCRIPTION
    "These objects are used to monitor/manage
    S-PMSI attributes."
  ::= { mvnpGroups 7 }

mvnpMrouteGroup    OBJECT-GROUP
  OBJECTS {

mvpnMrouteNumberOfLocalReplication,
mvpnMrouteNumberOfRemoteReplication
}
STATUS       current
DESCRIPTION
"These objects are used to monitor/manage
VPN multicast forwarding states."
::= { mvpnGroups 8 }

mvpnBgpGeneralGroup OBJECT-GROUP
  OBJECTS {
    mvpnBgpGenMode,
    mvpnBgpGenVrfRtImport,
    mvpnBgpGenSrcAs
  }
STATUS       current
DESCRIPTION
"These objects are used to monitor/manage BGP-MVPN"
::= { mvpnGroups 9 }

mvpnOptionalGroup OBJECT-GROUP
  OBJECTS {
    mvpnMroutePmsiPointer
  }
STATUS       current
DESCRIPTION
"Support of these object is not required."
::= { mvpnGroups 10 }

END

3 Security Considerations

This MIB contains some read-only objects that may be deemed sensitive
by some though perhaps not all operators. It also contains some read-
write objects, whose setting will change the device’s behavior related
to MVPN. Appropriate security procedures related to SNMP in general
but not specific to this MIB need to be implemented by concerned
operators.

4 IANA Considerations

IANA is requested to root MIB objects in the MIB module contained in
this document under the mib-2 subtree.

5 Acknowledgement

Some of the text has been taken almost verbatim from [CISCO-MIB].
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6 References

6.1 Normative References


6.2 Informative References


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