

INTERNET-DRAFT  
Intended Status: Proposed Standard  
Expires: 2015-04-23

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2014-10-23

MPLS/BGP Layer 3 VPN Multicast  
Management Information Base

[draft-ietf-bess-mvpn-mib-00](#)

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-based Layer-3 VPN (MVPN) on an MVPN router.

Status of this Memo

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## 0 Draft history

This draft is a first pass at a MIB document for [\[MVPN\]](#). As such, it should be considered as a early work.

Some aspects of BGP-MVPN (see definition below in "Introduction"), such as exranet, may be specified in future revisions.

[note to author/reviewers: conformance groups to be added ]

[this section should be removed as soon as its stops being relevant]

## 1 Introduction

Multicast in MPLS/BGP L3 VPNs is specified in [{\[MVPN\], \[BGP-MVPN\]}](#). 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 [{\[MVPN\], \[BGP-MVPN\]}](#) with PIM being used for exchanging C-multicast states, and "BGP-MVPN" to refer to [{\[MVPN\], \[BGP-MVPN\]}](#) with BGP is 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 Layer-3 VPN (L3VPN) WG at [l3vpn@ietf.org](mailto:l3vpn@ietf.org).

### 1.1 Terminology

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](#) [\[RFC2119\]](#).

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 MVRF and MVPN are used to refer to a partiular Multicast VPN instantiation on a particular PE device.

2 MVPN MIB

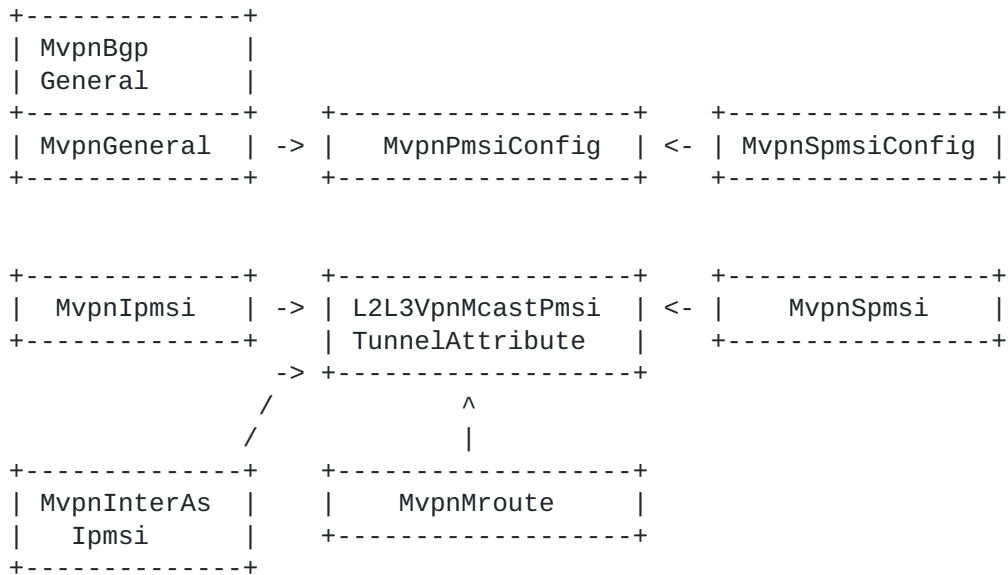
This MIB enables configuring and/or monitoring of MVPNs on PE devices: the whole multicast VPN machinery and the per-MVRFs information, including the configuration, status and operational details, such as different PMSIs and the provider tunnels implementing them.

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.



- mvpnGeneralTable/Entry

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

Existence of the corresponding VRF in [L3VPN-MIB] is necessary for

a row to exist in this table.

- mvpnBgpGeneralTable/Entry

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

- mvpnSpmsiConfigTable/Entry

This table contains objects for S-PMSI configurations in an MVRP.

- mvpnPmsiConfigTable/Entry

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

- mvpnIpmsiTable/Entry

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

- mvpnInterAsIpmsiTable/Entry

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

- mvpnSpmsiTable/Entry

This table contains all advertised or received S-PMSIs.

- l2l3VpnMcastPmsiTunnelAttributeTable/Entry

This table is defined separately in l2l3VpnMcastMIB [[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/Entry

This table augments ipMcastMIB.ipMcast.ipMcastRouteTable, 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 "201301071200Z" -- 07 January 2013 12:00:00 GMT  
ORGANIZATION "IETF Layer-3 Virtual Private  
Networks Working Group."

CONTACT-INFO

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Comments and discussion to l3vpn@ietf.org"

DESCRIPTION

"This MIB contains managed object definitions for  
multicast in BGP/MPLS IP VPNs defined by [[MVPN](#)].  
Copyright (C) The Internet Society (2013)."

-- Revision history.

REVISION "201301071200Z" -- 07 January 2013 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 number of MVRFs for IPv4 or IPv6 or mLDP C-Multicast
         that are present in this device."
    ::= { 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 every MVRF in the
    device."
INDEX           { mplsL3VpnVrfName }
 ::= { mvpnGeneralTable 1 }

MvpnGeneralEntry ::= SEQUENCE {
    mvpnGenOperStatusChange      INTEGER,
    mvpnGenOperChangeTime       TimeStamp,
    mvpnGenCmcastRouteProtocolV4 INTEGER,
    mvpnGenCmcastRouteProtocolV6 INTEGER,
    mvpnGenIpmsiConfigV4        RowPointer,
    mvpnGenIpmsiConfigV6        RowPointer,
    mvpnGenInterAsPmsiConfigV4  RowPointer,
    mvpnGenInterAsPmsiConfigV6  RowPointer,
    mvpnGenRowStatus             RowStatus
}

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 1 }

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 2 }

mvpnGenCmcastRouteProtocolV4 OBJECT-TYPE

SYNTAX INTEGER { pim (1),  
 bgp (2)  
 }

MAX-ACCESS read-write  
STATUS current

DESCRIPTION

"Protocol used to signal IPv4 C-multicast states across the provider core.

pim(1): PIM (PIM-MVPN).  
bgp(2): BGP (BGP-MVPN)."

::= { mvpnGeneralEntry 3 }

mvpnGenCmcastRouteProtocolV6 OBJECT-TYPE

SYNTAX INTEGER { pim (1),  
 bgp (2)

```
    }
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
    "Protocol used to signal IPv6 C-multicast states across the
    provider core.
    pim(1): PIM (PIM-MVPN).
    bgp(2): BGP (BGP-MVPN)."
```

::= { mvpnGeneralEntry 4 }

mvpnGenIpmsiConfigV4 OBJECT-TYPE

```
SYNTAX          RowPointer
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
    "This points to a row in mvpnPmsiConfigTable,
    for I-PMSI configuration for IPv4."
```

::= { mvpnGeneralEntry 5 }

mvpnGenIpmsiConfigV6 OBJECT-TYPE

```
SYNTAX          RowPointer
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
    "This points to a row in mvpnPmsiConfigTable,
    for I-PMSI configuration for IPv6."
```

::= { mvpnGeneralEntry 6 }

mvpnGenInterAsPmsiConfigV4 OBJECT-TYPE

```
SYNTAX          RowPointer
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
    "This points to a row in mvpnPmsiConfigTable,
    for inter-as I-PMSI configuration for IPv4, in case of segmented
    inter-as provider tunnels."
```

::= { mvpnGeneralEntry 7 }

mvpnGenInterAsPmsiConfigV6 OBJECT-TYPE

```
SYNTAX          RowPointer
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
    "This points to a row in mvpnPmsiConfigTable,
    for inter-as I-PMSI configuration for IPv6, in case of segmented
    inter-as provider tunnels."
```

::= { mvpnGeneralEntry 8 }

```

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 9 }

-- 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 }
    ::= { mvpnBgpGeneralTable 1 }

MvpnBgpGeneralEntry ::= SEQUENCE {
    mvpnBgpGenMode          INTEGER,
    mvpnBgpGenUmhSelection  INTEGER,
    mvpnBgpGenSiteType     INTEGER,
    mvpnBgpGenCmcastImportRt MplsL3VpnRouteDistinguisher,
    mvpnBgpGenSrcAS        Unsigned32,
    mvpnBgpGenSptnlLimit   Unsigned32
}

mvpnBgpGenMode OBJECT-TYPE
    SYNTAX      INTEGER {
                    rpt-spt (1),
                    spt-only (2)
                }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "For two different BGP-MVPN modes:
        rpt-spt(1): intersite-site shared tree mode

```

```

    spt-only(2): inter-site source-only tree mode."
 ::= { mvpnBgpGeneralEntry 1}

```

```

mvpnBgpGenUmhSelection 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"

 ::= { mvpnBgpGeneralEntry 2}

```

```

mvpnBgpGenSiteType 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."

 ::= { mvpnBgpGeneralEntry 3}

```

```

mvpnBgpGenCmcastImportRt OBJECT-TYPE
  SYNTAX          MplsL3VpnRouteDistinguisher
  MAX-ACCESS      read-write
  STATUS          current
  DESCRIPTION
    "The C-multicast Import RT that this device adds to
    unicast vpn routes that it advertises for this mvpn."

 ::= { mvpnBgpGeneralEntry 4}

```

```

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 5}

mvpnBgpGenSptnlLimit OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-write

STATUS current

## DESCRIPTION

"The max number of selective provider tunnels this device allows for this mvpn."  
 ::= { mvpnBgpGeneralEntry 6}

-- 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 }

```

```

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

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table specifies S-PMSI configuration."

::= { mvpnConfig 2 }

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
    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 }

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 }

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 every 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        InetAddress,
    mvpnSpmsiCmcastSourcePrefixLen Unsigned32,
    mvpnSpmsiOrigAddrType        InetAddressType,
    mvpnSpmsiOrigAddress          InetAddress,
    mvpnSpmsiTunnelAttribute     RowPointer,
    mvpnSpmsiUpTime               TimeInterval,
    mvpnSpmsiExpTime              TimeInterval,
    mvpnSpmsiRefCnt               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,
    mvpnMrouteDataRate            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,
        that can be used in ipMcastRouteNextHopEntry."
 ::= { mvpnMrouteEntry 1 }

mvpnMrouteNumberOfLocalReplication OBJECT-TYPE
    SYNTAX          Unsigned32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "Number of replications to local receivers."

```

```
 ::= { mvpnMrouteEntry 2 }
```

```
mvpnMrouteNumberOfRemoteReplication OBJECT-TYPE
```

```
SYNTAX      Unsigned32
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "Number of (local) replications to remote receivers."
```

```
 ::= { mvpnMrouteEntry 3 }
```

```
mvpnMrouteDataRate OBJECT-TYPE
```

```
SYNTAX      Unsigned32 (0..4294967295)
```

```
UNITS       "kilobits per second"
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The data rate for traffic following this route."
```

```
 ::= { mvpnMrouteEntry 4 }
```

```
-- 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,
    mvpnGenCmcastRouteProtocolV4,
    mvpnGenCmcastRouteProtocolV6,
    mvpnGenIpmsiConfigV4,
    mvpnGenIpmsiConfigV6,
    mvpnGenInterAsPmsiConfigV4,
    mvpnGenInterAsPmsiConfigV6,
    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 }

mvpnSpmsiConfigGroup    OBJECT-GROUP
OBJECTS {
    mvpnSpmsiConfigThreshold,
    mvpnSpmsiConfigPmsiPointer,
    mvpnSpmsiConfigRowStatus
}
STATUS      current
```

```
DESCRIPTION
    "These objects are used to monitor/manage
    S-PMSI configurations."
 ::= { mvpnGroups 4 }

mvpnIpmsiGroup    OBJECT-GROUP
OBJECTS {
    mvpnIpmsiUpTime,
    mvpnIpmsiAttribute
}
STATUS            current
DESCRIPTION
    "These objects are used to monitor/manage
    Intra-AS I-PMSI attributes."
 ::= { mvpnGroups 5 }

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

mvpnSpmsiGroup    OBJECT-GROUP
OBJECTS {
    mvpnSpmsiTunnelAttribute,
    mvpnSpmsiUpTime,
    mvpnSpmsiExpTime,
    mvpnSpmsiRefCnt
}
STATUS            current
DESCRIPTION
    "These objects are used to monitor/manage
    S-PMSI attributes."
 ::= { mvpnGroups 7 }

mvpnMrouteGroup    OBJECT-GROUP
OBJECTS {
    mvpnMrouteNumberOfLocalReplication,
    mvpnMrouteNumberOfRemoteReplication,
    mvpnMrouteDataRate
}
STATUS            current
DESCRIPTION
    "These objects are used to monitor/manage
```

```
        VPN multicast forwarding states."
 ::= { mvpnGroups 8 }

mvpnBgpGeneralGroup   OBJECT-GROUP
  OBJECTS {
    mvpnBgpGenMode,
    mvpnBgpGenUmhSelection,
    mvpnBgpGenSiteType,
    mvpnBgpGenCmcastImportRt,
    mvpnBgpGenSrcAs,
    mvpnBgpGenSptnlLimit
  }
  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**

<Security considerations text>

### **4 IANA Considerations**

<IANA considerations text>

### **5 Acknowledgement**

Some of the text has been taken almost verbatim from [[CISCO-MIB](#)].

We would like to thank Yakov Rekhter, Jeffrey Haas, Huajin Jeng, Durga Prasad Velamuri for their helpful comments.

### **6 References**

#### **6.1 Normative References**

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## **6.2 Informative References**

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