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L2L3 VPN Multicast MIB
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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 two MIB modules which will be used by other MIB modules for monitoring and/or configuring Layer 2 and Layer 3 Virtual Private Networks that support multicast.

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1. Introduction

In BGP/MPLS Virtual Private Networks (VPNs), Border Gateway Protocol (BGP) is used for distributing routes and MultiProtocol Label Switching (MPLS) is used for forwarding packets accross service provider networks.

The procedures for supporting multicast in BGP/MPLS Layer 3 (L3) VPN are specified in [RFC6513]. The procedures for supporting multicast in BGP/MPLS Layer 2 (L2) VPN are specified in [RFC7117]. Throughout this document, we will use the term "L2L3VpnMCast network" to mean BGP/MPLS L2 and L3 VPN that support multicast.

L2L3VpnMCast networks use various transport mechanisms for forwarding a packet to all or a subset of Provider Edge routers (PEs) across service provider networks. These transport mechanisms are abstracted as provider tunnels (P-tunnels). The type of a P-tunnel indicates the type of the tunneling technology used to establish the P-tunnel. The syntax and semantics of an identifier of the established are determined by the type of the P-tunnel [RFC6514]. The P-tunnel type and the P-tunnel identifier together identify a P-tunnel.

A BGP attribute that specifies information of a P-tunnel is called Provider Multicast Service Interface (PMSI) tunnel attribute. The PMSI tunnel attribute is advertised/received by PEs in BGP auto-discovery (A-D) routes. [RFC6514] defines the format of a PMSI tunnel attribute. The P-tunnel type and the P-tunnel identifier are in a PMSI tunnel attribute.

This document describes textual conventions (TCs) and common managed objects (MOs) which will be used by other Management Information Base (MIB) modules for monitoring and/or configuring L2L3VpnMCast network.

This document defines two TCs to represent

(a) the type of a P-tunnel and
(b) the identifier of a P-tunnel

respectively.

The document also defines MOs that will provide the information contained in a PMSI tunnel attribute and corresponding P-tunnel information.

1.1. Terminology

This document adopts the definitions, acronyms and mechanisms described in [RFC6513] [RFC6514] [RFC7117] and other documents that they refer to. Familiarity with Multicast, MPLS, Layer 3 VPN, Multicast VPN concepts and/or mechanisms is assumed. Some terms specifically related to this document are explained below.

"Provider Multicast Service Interface (PMSI)" [RFC6513] is a conceptual interface instantiated by a P-tunnel, a transport mechanism used to deliver multicast traffic. A PE uses it to send customer multicast traffic to all or some PEs in the same VPN.

There are two kinds of PMSIs: "Inclusive PMSI (I-PMSI)" and "Selective PMSI (S-PMSI)" [RFC6513]. An I-PMSI is a PMSI that enables a PE attached to a particular Multicast VPN to transmit a message to all PEs in the same VPN. An S-PMSI is a PMSI that enables a PE attached to a particular Multicast VPN to transmit a message to some of the PEs in the same VPN.

Throughout this document, we will use the term "PMSI" to refer both "I-PMSI" and "S-PMSI."

The key words "MUST", "SHOULD", "RECOMMENDED", and "MAY" 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 RFC 3410 [RFC3410].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIv2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

3. Summary of MIB Modules

This document defines two MIB modules: L2L3-VPN-MCAST-TC-MIB and L2L3-VPN-MCAST-MIB.

- o L2L3-VPN-MCAST-TC-MIB contains two Textual Conventions: L2L3VpnMcastProviderTunnelType and L2L3VpnMcastProviderTunnelId. L2L3VpnMcastProviderTunnelType provides an enumeration of the P-tunnel types. L2L3VpnMcastProviderTunnelId represents an identifier of a P-tunnel.

- o L2L3-VPN-MCAST-MIB defines a table l2L3VpnMcastPmsiTunnelAttributeTable. An entry in this table corresponds to the attribute information of a specific P-tunnel on a PE router. Entries in this table will be used by other MIB modules for monitoring and/or configuring L2L3VpnMCast network. The table index uniquely identifies a P-tunnel. It is composed of a type and indentifier of a P-tunnel. The table may also be used in conjunction with other MIBs, such as MPLS Traffic Engineering MIB (MPLS-TE-STD-MIB) [RFC3812], to obtain further information about a P-tunnel. It may also be used in conjunction with the Interfaces Group MIB (IF-MIB) [RFC2863] to obtain further information about the interface corresponding to a P-tunnel.

4. Definitions

4.1. L2L3-VPN-MCAST-TC-MIB Object Definitions

```
L2L3-VPN-MCAST-TC-MIB DEFINITIONS ::= BEGIN

IMPORTS
  MODULE-IDENTITY, mib-2
     FROM SNMPv2-SMI                            -- [RFC2578]

  TEXTUAL-CONVENTION
     FROM SNMPv2-TC;                            -- [RFC2579]

l2L3VpnMcastTCMIB MODULE-IDENTITY
  LAST-UPDATED "201710041200Z"  -- 4th October, 2017
```

```
    ORGANIZATION "IETF BESS Working Group."
    CONTACT-INFO
          "        Zhaohui Zhang
                   Juniper Networks, Inc.
                   10 Technology Park Drive
                   Westford, MA 01886
                   USA
                   Email: zzhang@juniper.net

                   Hiroshi Tsunoda
                   Tohoku Institute of Technology
                   35-1, Yagiyama Kasumi-cho
                   Taihaku-ku, Sendai, 982-8577
                   Japan
                   Email: tsuno@m.ieice.org

                   Comments and discussion to bess@ietf.org
          "
    DESCRIPTION
        "This MIB module specifies textual conventions for
         Border Gateway Protocol/MultiProtocol Label
         Switching Layer 2 and Layer 3 Virtual Private Network
         that support multicast (L2L3VpnMCast network).

         Copyright (C) The Internet Society (2017).
        "

    -- Revision history.

    REVISION "201710041200Z"  -- 4th October, 2017
    DESCRIPTION
        "Initial version, published as RFC XXXX."

    -- RFC Ed.: replace XXXX with actual RFC number and remove this note

    ::= { mib-2 AAAA }

    -- IANA Reg.: Please assign a value for "AAAA" under the
    -- 'mib-2' subtree and record the assignment in the SMI
    -- Numbers registry.

    -- RFC Ed.: When the above assignment has been made, please
    -- remove the above note
    -- replace "AAAA" here with the assigned value and
    -- remove this note.
```

```
  -- Textual convention

  L2L3VpnMcastProviderTunnelType ::= TEXTUAL-CONVENTION
    STATUS       current
    DESCRIPTION
        "This textual convention enumerates values
         representing the type of a provider tunnel (P-tunnel)
         used for L2L3VpnMCast network.
         These labeled numbers are aligned with the definition
         of Tunnel types in Section 5 of [RFC6514] and
         Section 14.1 of [RFC7524].

         The enumerated values and the corresponding P-tunnel type
         are as follows:

           noTunnelInfo       (0) : no tunnel information present
                                                          [RFC6514]
           rsvpP2mp           (1) : RSVP-TE P2MP LSP     [RFC4875]
           ldpP2mp            (2) : mLDP P2MP LSP        [RFC6388]
           pimSsm             (3) : PIM-SSM Tree         [RFC7761]
           pimAsm             (4) : PIM-SM Tree          [RFC7761]
           pimBidir           (5) : BIDIR-PIM Tree       [RFC5015]
           ingressReplication (6) : Ingress Replication [RFC6513]
           ldpMp2mp           (7) : mLDP MP2MP LSP       [RFC6388]
           transportTunnel    (8) : Transport Tunnel     [RFC7524]

         These numbers are registered at IANA.
         A current list of assignments can be found at
          <https://www.iana.org/assignments/bgp-parameters/
           bgp-parameters.xhtml#pmsi-tunnel-types>.
        "
    REFERENCE
        "RFC4875
         RFC5015
         RFC6388
         RFC6513
         RFC6514, Section 5
         RFC7385
         RFC7524, Section 14.1
         RFC7761
        "
```

```
    SYNTAX       INTEGER
         {
           noTunnelInfo       (0),
           rsvpP2mp           (1),
           ldpP2mp            (2),
           pimSsm             (3),
           pimAsm             (4),
           pimBidir           (5),
           ingressReplication (6),
           ldpMp2mp           (7),
           transportTunnel    (8)
         }

  L2L3VpnMcastProviderTunnelId ::= TEXTUAL-CONVENTION
    STATUS       current
    DESCRIPTION
        "This textual convention represents the tunnel identifier
         of a P-tunnel.

         The size of the identifier depends on the address family
         (IPv4 or IPv6) and the value of the corresponding
         L2L3VpnMcastProviderTunnelType object.

         The corresponding L2L3VpnMcastProviderTunnelType object
         represents the type of the tunneling technology used
         to establish the P-tunnel.

         The size of the identifier for each tunneling technology
         is summarized below.

          L2L3VpnMcastProviderTunnelType            Size (in octets)
           (tunneling technology)                      IPv4  IPv6
         ------------------------------------------------------------
           noTunnelInfo       (No tunnel information)    0     0
           rsvpP2mp           (RSVP-TE P2MP LSP)        12    24
           ldpP2mp            (mLDP P2MP LSP)           17    29
           pimSsm             (PIM-SSM Tree)             8    32
           pimAsm             (PIM-SM Tree)              8    32
           pimBidir           (BIDIR-PIM Tree)           8    32
           ingressReplication (Ingress Replication)      4    16
           ldpMp2mp           (mLDP MP2MP LSP)          17    29
           transportTunnel    (Transport Tunnel)         8    32

         Tunnel type is set to 'No tunnel information present'
         when the PMSI Tunnel attribute carries no tunnel
         information (no Tunnel Identifier).
         The value of the corresponding L2L3VpnMcastProviderTunnelId
         object will be a string of length zero.
```

```
        For tunnel type rsvpP2mp(1), the corresponding Tunnel
        Identifier is composed of Extended Tunnel ID (4 octets in IPv4,
        16 octets in IPv6), Reserved (2 octets), Tunnel ID (2 octets),
        and P2MP ID (4 octets).
        The size of the corresponding L2L3VpnMcastProviderTunnelId
        object will be 12 octets in IPv4 and 24 octets in IPv6.

        For tunnel type ldpP2mp(2), the corresponding Tunnel Identifier
        is the P2MP Forwarding Equivalence Class (FEC) Element
        [RFC6388]. The size of the corresponding
        L2L3VpnMcastProviderTunnelId object will be 17 octets
        in IPv4 and 29 octets in IPv6.

        For tunnel type pimSsm(3), PimAsm(4), and PimBidir(5), the
        corresponding Tunnel Identifier is composed of the source IP
        address and the group IP address.
        The size of the corresponding L2L3VpnMcastProviderTunnelId
        object will be 8 octets in IPv4 and 32 octets in IPv6.

        For tunnel type ingressReplication(6), the Tunnel Identifier is
        the unicast tunnel endpoint IP address of the local PE.
        The size of the corresponding L2L3VpnMcastProviderTunnelId
        object will be 4 octets in IPv4 and 16 octets in IPv6.

        For tunnel type ldpMp2mp(7), the Tunnel Identifier is
        MP2MP FEC Element [RFC6388].
        The size of the corresponding L2L3VpnMcastProviderTunnelId
        object will be 17 octets in IPv4 and 29 octets in IPv6.

        For tunnel type transportTunnel(8), the Tunnel Identifier
        is a tuple of Source PE Address and Local Number,
        which is a number that is unique to the Source PE [RFC7524].
        Both Source PE Address and Local Number are 4 octets in IPv4
        and 16 octets in IPv6.
        The size of the corresponding L2L3VpnMcastProviderTunnelId
        object will be 8 octets in IPv4 and 32 octets in IPv6.
       "
    REFERENCE
       "RFC6514, Section 5
        RFC4875, Section 19.1
        RFC6388, Section 2.2 and 3.2
        RFC7524, Section 14.1
       "
    SYNTAX       OCTET STRING ( SIZE (0|4|8|12|16|17|24|29|32) )

  END
```

4.2. L2L3-VPN-MCAST-MIB Object Definitions

```
L2L3-VPN-MCAST-MIB DEFINITIONS ::= BEGIN

IMPORTS
  MODULE-IDENTITY, OBJECT-TYPE, mib-2, zeroDotZero
     FROM SNMPv2-SMI                            -- [RFC2578]

  MODULE-COMPLIANCE, OBJECT-GROUP
     FROM SNMPv2-CONF                           -- [RFC2580]

  RowPointer
     FROM SNMPv2-TC                             -- [RFC2579]

  MplsLabel
     FROM MPLS-TC-STD-MIB                       -- [RFC3811]

  L2L3VpnMcastProviderTunnelType,
  L2L3VpnMcastProviderTunnelId
     FROM L2L3-VPN-MCAST-TC-MIB;                -- [RFCXXXX]

  -- RFC Ed.: replace XXXX with actual RFC number and remove this note


l2L3VpnMcastMIB MODULE-IDENTITY
  LAST-UPDATED "201710041200Z"  -- 4th October, 2017
  ORGANIZATION "IETF BESS Working Group."
  CONTACT-INFO
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                 Taihaku-ku, Sendai, 982-8577
                 Japan
                 Email: tsuno@m.ieice.org

                 Comments and discussion to bess@ietf.org
        "
```

```
    DESCRIPTION
        "This MIB module defines a table representing the attribute
         information of the provider tunnels (P-tunnels) on a PE router.
         This MIB module will be used by other MIB modules designed for
         monitoring and/or configuring Border Gateway
         Protocol/MultiProtocol Label Switching
         Layer 2 and Layer 3 Virtual Private
         Network that support multicast (L2L3VpnMCast network).
         Copyright (C) The Internet Society (2017).
        "
    -- Revision history.

    REVISION "201710041200Z"  -- 4th October, 2017
    DESCRIPTION
        "Initial version, published as RFC XXXX."

    -- RFC Ed.: replace XXXX with actual RFC number and remove this note

    ::= { mib-2 BBBB }

    -- IANA Reg.: Please assign a value for "BBBB" under the
    -- 'mib-2' subtree and record the assignment in the SMI
    -- Numbers registry.

    -- RFC Ed.: When the above assignment has been made, please
    -- remove the above note
    -- replace "BBBB" here with the assigned value and
    -- remove this note.

  -- Top level components of this MIB.
  l2L3VpnMcastStates      OBJECT IDENTIFIER
                          ::= { l2L3VpnMcastMIB 1 }

  l2L3VpnMcastConformance OBJECT IDENTIFIER
                          ::= { l2L3VpnMcastMIB 2 }





  -- tables, scalars, conformance information
  -- Table of PMSI Tunnel Attributes

  l2L3VpnMcastPmsiTunnelAttributeTable OBJECT-TYPE
     SYNTAX        SEQUENCE OF L2L3VpnMcastPmsiTunnelAttributeEntry
     MAX-ACCESS    not-accessible
     STATUS        current
```

```
    DESCRIPTION
        "An entry in this table corresponds to
         the attribute information of a specific
         P-tunnel on a PE router.
         A part of attributes correspond to fields in
         a Provider Multicast Service Interface (PMSI) Tunnel
         attribute advertised and received by a PE router.
         The entries will be referred to by other MIB modules
         for monitoring and/or configuring L2L3VpnMCast network.
        "
    REFERENCE
        "RFC6514, Section 5"
    ::= { l2L3VpnMcastStates 1 }

  l2L3VpnMcastPmsiTunnelAttributeEntry OBJECT-TYPE
    SYNTAX        L2L3VpnMcastPmsiTunnelAttributeEntry
    MAX-ACCESS    not-accessible
    STATUS        current
    DESCRIPTION
        "A conceptual row corresponding to a specific
         P-tunnel on this router.
        "
    REFERENCE
        "RFC6514, Section 5"
    INDEX {
            l2L3VpnMcastPmsiTunnelAttributeType,
            l2L3VpnMcastPmsiTunnelAttributeId
          }
    ::= { l2L3VpnMcastPmsiTunnelAttributeTable 1 }

  L2L3VpnMcastPmsiTunnelAttributeEntry ::=
     SEQUENCE {
         l2L3VpnMcastPmsiTunnelAttributeType
             L2L3VpnMcastProviderTunnelType,
         l2L3VpnMcastPmsiTunnelAttributeId
             L2L3VpnMcastProviderTunnelId,
         l2L3VpnMcastPmsiTunnelAttributeFlags
             OCTET STRING,
         l2L3VpnMcastPmsiTunnelAttributeMplsLabel
             MplsLabel,
         l2L3VpnMcastPmsiTunnelPointer
             RowPointer,
         l2L3VpnMcastPmsiTunnelIf
             RowPointer,
         l2L3VpnMcastPmsiTunnelAttributeAddlFlags
             OCTET STRING
     }
```

```
  l2L3VpnMcastPmsiTunnelAttributeType OBJECT-TYPE
     SYNTAX        L2L3VpnMcastProviderTunnelType
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
         "This object indicates the type of the tunneling technology
          used to establish the P-tunnel corresponding to this entry.

          When BGP-based PMSI signaling is used, the value of
          this object corresponds to the Tunnel Type field
          in the PMSI Tunnel attribute advertised/received
          in an PMSI auto-discovery (A-D) route.
         "
     REFERENCE
         "RFC6514, Section 5"
     ::= { l2L3VpnMcastPmsiTunnelAttributeEntry 1 }

  l2L3VpnMcastPmsiTunnelAttributeId OBJECT-TYPE
     SYNTAX        L2L3VpnMcastProviderTunnelId
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
         "This object represents the Tunnel Identifier field, which
          uniquely identifies a P-tunnel, in the PMSI Tunnel attribute
          of the P-tunnel corresponding to this entry.

          The size of the identifier depends on the address family
          (IPv4 or IPv6) and the value of the corresponding
          l2L3VpnMcastPmsiTunnelAttributeType object i.e., the type of
          the tunneling technology used to establish the P-tunnel.
         "
     REFERENCE
         "RFC6514, Section 5"
     ::= { l2L3VpnMcastPmsiTunnelAttributeEntry 2 }









  l2L3VpnMcastPmsiTunnelAttributeFlags OBJECT-TYPE
     SYNTAX        OCTET STRING (SIZE (1))
     MAX-ACCESS    read-only
     STATUS        current
```

```
    DESCRIPTION
        "This object represents the Flags field in the PMSI Tunnel
         attribute of the P-tunnel corresponding to this entry.
         The Flags field has the following format.

            0 1 2 3 4 5 6 7
           +-+-+-+-+-+-+-+-+
           |U|E|    U    |L|
           +-+-+-+-+-+-+-+-+
            E: Extension flag [RFC7902]
            U: Unassigned
            L: Leaf Information Required flag [RFC6514]

         When BGP-based PMSI signaling is used, the PMSI Tunnel
         attribute of the P-tunnel will be advertised/received
         in an PMSI auto-discovery (A-D) route. The value of
         this object corresponds to the Flags field in the attribute.

         When the P-tunnel does not have a correspondent PMSI tunnel
         attribute, the value of this object will be 0.

         These flags are registered at IANA.
         A current list of assignments can be found at
         <https://www.iana.org/assignments/bgp-parameters/
          bgp-parameters.xhtml#pmsi-tunnel-attributes>.
        "
    REFERENCE
        "RFC6514, Section 5
         RFC7902, Section 3
        "
    ::= { l2L3VpnMcastPmsiTunnelAttributeEntry 3 }

  l2L3VpnMcastPmsiTunnelAttributeMplsLabel OBJECT-TYPE
    SYNTAX        MplsLabel
    MAX-ACCESS    read-only
    STATUS        current
    DESCRIPTION
        "This object represents the MPLS Label in the PMSI Tunnel
         attribute of the P-tunnel corresponding to this entry.

         When BGP-based PMSI signaling is used, the PMSI Tunnel
         attribute of the P-tunnel will be advertised/received
         in an PMSI auto-discovery (A-D) route. The value of
         this object corresponds to the MPLS Label in the attribute.

         When the P-tunnel does not have correspondent PMSI tunnel
         attribute, the value of this object will be 0 that
         indicates the absence of any MPLS Label.
```

```
        "
    REFERENCE
        "RFC6514, Section 5"
    ::= { l2L3VpnMcastPmsiTunnelAttributeEntry 4 }

  l2L3VpnMcastPmsiTunnelPointer OBJECT-TYPE
    SYNTAX        RowPointer
    MAX-ACCESS    read-only
    STATUS        current
    DESCRIPTION
        "The P-tunnel identified by
         l2L3VpnMcastPmsiTunnelAttributeId may be represented
         as an entry in some other table, e.g.,
         mplsTunnelTable [RFC3812]. This object specifies
         the pointer to the row pertaining to the entry.

         If such an entry does not exist, the value of this object
         MUST be zeroDotZero.
        "
    REFERENCE
        "RFC3812, Section 6.1 and Section 11"
    DEFVAL        { zeroDotZero }

    ::= { l2L3VpnMcastPmsiTunnelAttributeEntry 5 }


  l2L3VpnMcastPmsiTunnelIf OBJECT-TYPE
    SYNTAX        RowPointer
    MAX-ACCESS    read-only
    STATUS        current
    DESCRIPTION
        "If the P-tunnel identified by
         l2L3VpnMcastPmsiTunnelAttributeId has a corresponding
         entry in the ifXTable [RFC2863], this object will
         point to the row pertaining to the entry in the ifXTable.
         Otherwise, this object MUST be set to zeroDotZero.
        "
    REFERENCE
        "RFC2863, Section 6"
    DEFVAL        { zeroDotZero }
    ::= { l2L3VpnMcastPmsiTunnelAttributeEntry 6 }



  l2L3VpnMcastPmsiTunnelAttributeAddlFlags OBJECT-TYPE
    SYNTAX        OCTET STRING (SIZE (6))
    MAX-ACCESS    read-only
    STATUS        current
```

```
    DESCRIPTION
        "This object represents BGP Additional PMSI Tunnel
         Attribute Flags Extended Community defined in [RFC7902].

         The Additional PMSI Tunnel Attribute Flags is a string
         of 48 one-bit Flags and has the following format.

            0                   1                   2
            0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3
           +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
           |               |               |               |
           +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

                        3                   4
            4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7
           +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
           |               |               |               |
           +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

         When BGP-based PMSI signaling is used, the PMSI Tunnel
         attribute of the P-tunnel will be advertised/received
         in an PMSI auto-discovery (A-D) route.
         When the Extension flag of
         l2L3VpnMcastPmsiTunnelAttributeFlags object is set,
         the value of this object corresponds to the value of
         Additional PMSI Tunnel Attribute Flags Extended
         Community in the advertised/received PMSI
         auto-discovery (A-D) route.

         When the Extension flag of
         l2L3VpnMcastPmsiTunnelAttributeFlags object is not set,
         the value of this object will be 0.

         These flags are registered at IANA.
         A current list of assignments can be found at
         <https://www.iana.org/assignments/bgp-extended-communities/
          bgp-extended-communities.xhtml
          #additional-pmsi-tunnel-attribute-flags>.
        "
    REFERENCE
        "RFC6514, Section 5
         RFC7902, Section 2
        "
    ::= { l2L3VpnMcastPmsiTunnelAttributeEntry 7 }


  -- Conformance Information
```

```
  l2L3VpnMcastCompliances OBJECT IDENTIFIER
                          ::= { l2L3VpnMcastConformance 1 }
  l2L3VpnMcastGroups      OBJECT IDENTIFIER
                          ::= { l2L3VpnMcastConformance 2 }


  -- Compliance Statements

  l2L3VpnMcastCoreCompliance MODULE-COMPLIANCE
      STATUS  current
      DESCRIPTION
         "The core compliance statement for SNMP entities
          which implement this L2L3-VPN-MCAST-MIB Module."
      MODULE  -- this module

      MANDATORY-GROUPS {
           l2L3VpnMcastPmsiFieldGroup
      }
      ::= { l2L3VpnMcastCompliances 1 }

  l2L3VpnMcastFullCompliance MODULE-COMPLIANCE
      STATUS  current
      DESCRIPTION
         "The full compliance statement for SNMP entities
          which implement this L2L3-VPN-MCAST-MIB Module."
      MODULE  -- this module

      MANDATORY-GROUPS {
           l2L3VpnMcastPmsiFieldGroup,
           l2L3VpnMcastOptionalGroup
      }
      ::= { l2L3VpnMcastCompliances 2 }

  -- units of conformance

  l2L3VpnMcastPmsiFieldGroup    OBJECT-GROUP
      OBJECTS {
          l2L3VpnMcastPmsiTunnelAttributeFlags,
          l2L3VpnMcastPmsiTunnelAttributeAddlFlags,
          l2L3VpnMcastPmsiTunnelAttributeMplsLabel
      }
      STATUS      current
      DESCRIPTION
          "Support of these objects is required."
      ::= { l2L3VpnMcastGroups 1 }

  l2L3VpnMcastOptionalGroup    OBJECT-GROUP
      OBJECTS {
```

```
        l2L3VpnMcastPmsiTunnelPointer,
        l2L3VpnMcastPmsiTunnelIf
    }
    STATUS      current
    DESCRIPTION
        "Support of these objects is optional."
    ::= { l2L3VpnMcastGroups 2 }

END
```

5. Security Considerations

There are no management objects defined in these MIB modules that have a MAX-ACCESS clause of read-write and/or read-create. So, if this MIB module is implemented correctly, then there is no risk that an intruder can alter or create any management objects of this MIB module via direct SNMP SET operations.

Some of the readable objects in these MIB modules (i.e., objects with a MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments. It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP. These are the tables and objects and their sensitivity/vulnerability:

- o the l2L3VpnMcastPmsiTunnelAttributeTable collectively shows the P-tunnel network topology and its performance characteristics. For instance, l2L3VpnMcastPmsiTunnelAttributeId in this table will contain the identifier that uniquely identifies a created P-tunnel. This identifier may be composed of source and multicast group IP addresses. l2L3VpnMcastPmsiTunnelPointer and l2L3VpnMcastPmsiTunnelIf will point to the corresponding entries in other tables containing configuration and/or performance information of a P-tunnel and its interface. If an Administrator does not want to reveal this information, then these objects should be considered sensitive/vulnerable.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPsec), there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB module.

Implementations SHOULD provide the security features described by the SNMPv3 framework (see [RFC3410]), and implementations claiming compliance to the SNMPv3 standard MUST include full support for authentication and privacy via the User-based Security Model (USM)

[RFC3414] with the AES cipher algorithm [RFC3826]. Implementations MAY also provide support for the Transport Security Model (TSM) [RFC5591] in combination with a secure transport such as SSH [RFC5592] or TLS/DTLS [RFC6353].

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 indeed GET or SET (change/create/delete) them.

6. IANA Considerations

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

7. References

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