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Definitions of Managed Objects for the LDP Point-to-Multipoint and Multipoint-to-Multipoint Label Switched Paths
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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols. In particular it defines objects for managing multicast LDP point-to-multipoint (P2MP) and multipoint-to-multipoint (MP2MP) Label Switched Paths. The MIB module defined in this document is extension of LDP MIB defined in RFC3815 which supports only for LDP point-to-point LSPs.

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1. Introduction

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols. In particular it defines objects for managing multicast LDP point-to-multipoint (P2MP) and multipoint-to-multipoint (MP2MP) Label Switched Paths. The MIB module defined in this document is extension of LDP MIB defined in RFC3815 which supports only for LDP point-to-point LSPs.

The RFC3815 describes only unicast Managed objects for the Label distribution protocol. The RFC6388 describes LDP protocol extensions for the point to multipoint and multipoint to multipoint LSPs. The RFC 6826 describes multicast LDP inband signalling for P2MP and MP2MP LSPs.

This document defines a MIB module for managing and controlling mLDP P2MP and MP2MP LSPs. It builds on the objects and tables defined in [RFC3815] for mLDP MIB.

2. The Internet-Standard Management Framework

[[CREF1: The title and text for this section has been copied from the official boilerplate, and should not be modified unless the official boilerplate text from the OPS Area web site has changed. See RFC4818 section 3.1 for a discussion of the boilerplate section.]]

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to section 7 of RFC 3410 [RFC3410].

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

3. Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14, RFC 2119 [RFC2119].

4. Overview

This document focusses on the management of following multicast LDP (mLDP) features, which were defined after unicast LDP [RFC5036].

RFC6388: Label Distribution Protocol Extensions for Point-to-Multipoint and Multipoint-to-Multipoint Label Switched Paths.

RFC6826: Multipoint LDP In-Band Signaling for Point-to-Multipoint and Multipoint-to-Multipoint Label Switched Paths.

RFC7060: Using LDP Multipoint Extensions on Targeted LDP Sessions.

[I-D.ietf-rtgwg-mofrr] Multicast only Fast Re-Route.

[I-D.ietf-mpls-mldp-node-protection] mLDP Node Protection.

For all the above features, the mLDP MIB needs to include the following information:

- Session Capability (P2MP, MP2MP) information: configured capability, negotiated capability.

- mLDP FECs: include opaque information (Generic LSP Identifier, source and group address) and MoFRR enable.

- Primary and backup upstream session when mLDP MoFRR enabled.

- Active and inactive upstream session for make before break.

- mLDP Traffic stats per mLDP Fec: The traffic stats for mLDP fec.

- mLDP Traffic stats per per Interface: The mLDP traffic stats per Interface.

- Traps when mLDP Fec LSP up, down.

5. Future Considerations

Any new opaque TLVs added for any other mLDP features, the opaque value object in the mplsMldpFecTable need to be enhanced accordingly.

6. Structure of the MIB Module

This section describes the structure of the mLDP MIB. In this MIB MPLS-MLDP-STD-MIB, scalar objects, table objects and notifications are defined. Following section describes in details about each object.

6.1. Summary of mLDP Scalar Objects

New scalar objects mplsMldpP2mpCapable and mplsMldpMp2mpCapable are defined to provide the mLDP capabilities of P2MP, MP2MP support.

New scalar objects mplsMldpMbbCapable and mplsMldpMbbTime are defined to provide MBB capability information.

New scalar object mplsMldpNumFecs which will give the total number of mLDP FECs setup on the LSR.

Another New scalar object mplsMldpNumFecsActive, which will give the total number of active mLDP FECs.

New scalar objects mplsMldpPlrCapable, mplsMldpMptCapable, mplsMldpProtLsrCapable and mplsMldpNodeProtCapable are defined to provide mLDP node protection capabilities.

6.2. Summary of mLDP Table Objects

mplsLdpPeerCapabilityTable to include peer capability information.

mplsMldpSessionStatsTable : This table contains the number of mLDP FECs received and advertised to particular LDP session.

mplsMldpFecTable: This table is similar to point to point mplsLdpFecTable and will have mLDP specific Fec information.

mplsMldpFecBranchStatsTable : This table contains the traffic statistics for the given mLDP FECs on particular interface.

mplsMldpFecUpstreamSessTable : Includes the upstream session info for the particular mLDP Fec and also includes the primary or backup upstream session, that may be used for mLDP MoFRR.

mplsMldpInterfaceStatsTable : This table contains the traffic statistics for all mLDP related FECs.

7. mLDP Scalar Objects

There are ten scalars, listed below are defined for this MIB module.

7.1. mplsMldpP2mpCapable

The mplsMldpP2mpCapable scalar object denotes whether the LSR is capable of supporting multicast LDP with Point-to-Multipoint capability.

7.2. mplsMldpMp2mpCapable

The mplsMldpMp2mpCapable scalar object denotes whether the LSR is capable of supporting multicast LDP with Multipoint-to-Multipoint LSPs.

7.3. mplsMldpMbbCapable

The mplsMldpMbbCapable scalar object denotes whether the LSR is capable of supporting multicast LDP with MBB (make before break) feature mentioned in the section 8 of RFC 6388 .

7.4. mplsMldpMbbTime

The mplsMldpMbbTime scalar object denotes MBB time for which LSR is waiting for MBB Ack from upstream node. This timer helps LSR to prevent waiting indefinitely for the MBB Notification from upstream node.

7.5. mplsMldpNumFecs

The mplsMldpNumFecs provides a read-only counter of the number of mLDP FECs setup on this LSR.

7.6. mplsMldpNumFecsActive

The mplsMldpNumFecsActive provides a read-only counter of the number of mLDP FECs Active on this LSR.

7.7. mplsMldpPlrCapable

The mplsMldpPlrCapable scalar object denotes whether the LSR is capable of supporting PLR capability as specified in the section 5.1 of [I-D.ietf-mpls-mldp-node-protection].

7.8. mplsMldpMptCapable

The mplsMldpMptCapable scalar object denotes whether the LSR is capable of supporting MPT capability as specified in the section 5.2 of [I-D.ietf-mpls-mldp-node-protection].

7.9. mplsMldpProtLsrCapable

The mplsMldpProtLsrCapable scalar object denotes whether the LSR is capable of supporting the "Protected LSR" capability as specified in the section 5.3 of [I-D.ietf-mpls-mldp-node-protection].

7.10. mplsMldpNodeProtCapable

The mplsMldpNodeProtCapable scalar object denotes whether the LSR is capable of supporting the "Node Protection" capability as specified in the section 5.4 of [I-D.ietf-mpls-mldp-node-protection].

8. mLDP Table Objects

8.1. LDP Peer Capability Table mplsLdpPeerCapabilityTable

The new table mplsLdpPeerCapabilityTable is read-only table, which contains learned capability information from LDP peer. This table augments the mplsLdpPeerTable, which is defined in RFC 3815.

8.2. mLDP Session Stats Table: mplsMldpSessionStatsTable

The mplsMldpSessionStatsTable is a read-only table which contains mLDP statistical information on sessions. This table augments the mplsLdpSessionStatsTable, which is defined in the RFC 3815.

8.3. mLDP Fec Table: mplsMldpFecTable

The mplsMldpFecTable is a table which contains FEC (Forwarding Equivalence Class) information relating to point to multi-point and multipoint to multipoint LDP LSP. Each entry/row represents a single FEC Element. This table is similar LDP LSP FEC Table, mplsLdpLspFecTable, which is defined in the RFC 3815, which associates FECs with the LSPs.

8.4. mLDP Fec Branch Traffic statistics Table: mplsMldpFecBranchStatsTable

This table mplsMldpFecBranchStatsTable gives the information about number of packets and number of bytes sent out on particualr downstream session or on outgoing interface.

8.5. mLDP Fec Upstreaam Session Table: mplsMldpFecUpstreamSessTable

The mplsMldpFecUpstreamSessTable is a read-only table which contains mLDP upstream session information for mLDP Fec. This table is similar to mplsInSegmentLdpLspTable. This table will also have information about primary, backup upstream session, and also indicates whether the label is in MBB request or MBB Ack received state.

8.6. mLDP Interface Traffic statistics Table: mplsMldpInterfaceStatsTable

This table mplsMldpInterfaceStatsTable gives the information about number of mLDP packets and number of mLDP bytes sent and received on particualr interface for all mLDP FECs.

9. The mLDP Notifications

The RFC 3815 defined some of the notifications related to session and P2P Fec. In this MIB, the following notification added to support mLDP features.

The mplsMldpFecUp and mplsMldpFecDown notifications are generated when mLDP FEC changes the state to UP and Down.

The mplsMldpMoFrrStatusChange notification is generated when mLDP MoFRR status switches from primary to backup path and vice versa.

10. Relationship to Other MIB Modules

This section describes relationships between MIB tables defined in this document as part of MPLS-MLDP-STD-MIB, and the tables defined in MPLS-LDP-STD-MIB [RFC3815] and MPLS-LSR-STD-MIB [RFC3813].

The Figure 1 shows the diagrammatic representation of the relationship between MPLS-MLDP-STD-MIB, MPLS-LDP-STD-MIB and MPLS-LSR-STD-MIB. An arrow in the Figure shows that the MIB table pointed from contains a reference to the MIB table pointed to.

10.1. Diagrammatic Representation

```
       mplsMldpFecTable
           |
           |
           v
          mplsLdpLspFecTable
              |      |    |
              |      |    +----------------+
              |      |                     |
              |      +---------------+     v
              |                      |     mplsMldpFecUpstreamSessTable
              +--->mplsXCTable--+    |
                                |    |
                                |    |
                                |    |
                                |  mplsMldpFecBranchStatsTable
                                |        |
                                |        |
                                |        |
       mplsInSegmentTable<------+        |
                                |        |
                                v        |
                     mplsOutSegmentTable<-+
```

Figure 1 : Dependencies Between MIB Tables

Figure 1

10.2. Relationship to the LSR MIB

The LSR MIB [RFC3813] have below tables, which cross connects the incoming label to outgoing label. Below Tables will be used for mLDP also in the similar way as in the point to point LDP LSPs.

mplsXCTable

mplsInSegmentTable

mplsOutSegmentTable

10.3. Relationship to the LDP MIB

The MIB module defined in this document is extension of MPLS-LDP-STD-MIB to support multicast LDP features.

Below optional tables in MPLS-LDP-STD-MIB, will also be used in mLDP for associating the mLDP LSPs to LSR-MIB tables.

mplsLdpLspFecTable

mplsInSegmentLdpLspTable

mplsOutSegmentLdpLspTable

11. Multicast MPLS Label Distribution Protocol MIB Definitions

```
MPLS-MLDP-STD-MIB DEFINITIONS ::= BEGIN
IMPORTS
   MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,
   Unsigned32, Counter32, Counter64, TimeTicks
      FROM SNMPv2-SMI                                   -- RFC 2578
   MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
      FROM SNMPv2-CONF                                  -- RFC 2580
   TruthValue, RowStatus, StorageType, TimeStamp
      FROM SNMPv2-TC                                    -- RFC 2579

   InterfaceIndex
        FROM IF-MIB                                    --  [RFC2020]

   mplsStdMIB, MplsLdpIdentifier
      FROM MPLS-TC-STD-MIB                              -- RFC 3811

   MplsIndexType
      FROM MPLS-LSR-STD-MIB                             -- RFC 3813

   IndexInteger, IndexIntegerNextFree
      FROM DIFFSERV-MIB                                 -- RFC 3289

   InetAddress, InetAddressType
      FROM INET-ADDRESS-MIB                             -- RFC 4001

   mplsLdpStdMIB
      FROM MPLS-LDP-STD-MIB                             -- RFC 3815
   ;

 mplsMldpStdMIB MODULE-IDENTITY
      LAST-UPDATED "201510120000Z"  -- October 12, 2015
      ORGANIZATION "Multiprotocol Label Switching (mpls)
                    Working Group"
      CONTACT-INFO

          "     Kishore Tiruveedhula
                Juniper Networks
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Comments about this document should be emailed
directly to the MPLS working group mailing list at
mpls@lists.ietf.org"

```
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            restrictions with respect to this document.

            The initial version of this MIB module was published in
            RFC XXXX. For full legal notices see the RFC itself or see:
            http://www.ietf.org/copyrights/ianamib.html
-- RFC Editor. Please replace XXXX with the RFC number for this
-- document and remove this note.

            This MIB module contains managed object definitions for mLDP LSPS
            defined in Label Distribution Protocol Extensions Point-to-
Multipoint and
            Multipoint-to-Multipoint Label Switched Paths, RFC 6388, November
            2011."

         REVISION "2015101200Z"  -- October 12, 2015
         DESCRIPTION
           "Initial version issued as part of RFC XXXX."
-- RFC Editor. Please replace XXXX with the RFC number for this
-- document and remove this note.

         ::= { mplsStdMIB YYY }
-- RFC Editor. Please replace YYY with the codepoint issued by IANA
-- and remove this note.

   -- Top level components of this MIB module.


   -- notifications
```

```
   mplsMldpNotifications OBJECT IDENTIFIER ::= { mplsMldpStdMIB 0 }
   -- tables, scalars
   mplsMldpScalars       OBJECT IDENTIFIER ::= { mplsMldpStdMIB 1 }
   mplsMldpObjects       OBJECT IDENTIFIER ::= { mplsMldpStdMIB 2 }

  -- MPLS mLDP LSP scalars.

   mplsMldpP2mpCapable OBJECT-TYPE
         SYNTAX      INTEGER {
                       enable(1),
                       disable(2)
                     }
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
            "This object provides the P2MP capability of the LSR."

         REFERENCE
           "Section 2.1 of [RFC6388]."

      ::= { mplsMldpScalars 1 }


  mplsMldpMp2mpCapable OBJECT-TYPE
         SYNTAX      INTEGER {
                       enable(1),
                       disable(2)
                     }
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
           "This object provides MP2MP capability of the LSR."

         REFERENCE
           "Section 3.1 of [RFC6388]."

      ::= { mplsMldpScalars 2 }


  mplsMldpMbbCapable OBJECT-TYPE
         SYNTAX      INTEGER {
                       enable(1),
                       disable(2)
                     }
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
           "This object provides MBB (make before break) capability of the
LSR."
```

```
         REFERENCE
           "Section 8.3 of [RFC6388]."

      ::= { mplsMldpScalars 3 }

     mplsMldpMbbTime OBJECT-TYPE
         SYNTAX      Unsigned32 (1..300)
         UNITS       "seconds"
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
           "The 32-bit unsigned integer value provides the time for waiting MBB
Ack
            from upstream node."

         DEFVAL { 30 }
         ::= { mplsMldpScalars 4 }


   mplsMldpNumFecs OBJECT-TYPE
      SYNTAX        Unsigned32
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "The number of active and passive mLdp Fecs on this device."

      ::= { mplsMldpScalars 5 }

   mplsMldpNumFecsActive OBJECT-TYPE
      SYNTAX        Unsigned32
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "The number of mLdp FECs Active on this device. The mLDP FEC is
           considered active if the mplsMldpFecOperStatus is up(1)."

      ::= { mplsMldpScalars 6 }

   mplsMldpPlrCapable OBJECT-TYPE
         SYNTAX      INTEGER {
                       enable(1),
                       disable(2)
                     }
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
           "This object provides Point of Local Repair (PLR)
            capability of the LSR."
```

```
         REFERENCE
           "Section 5.1 of [I-D.ietf-mpls-mldp-node-protection]."

      ::= { mplsMldpScalars 7 }

   mplsMldpMptCapable OBJECT-TYPE
         SYNTAX      INTEGER {
                       enable(1),
                       disable(2)
                     }
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
           "This object provides  Merge Point (MPT) capability of the LSR."

         REFERENCE
           "Section 5.2 of [I-D.ietf-mpls-mldp-node-protection]."

      ::= { mplsMldpScalars 8 }

   mplsMldProtLsrCapable OBJECT-TYPE
         SYNTAX      INTEGER {
                       enable(1),
                       disable(2)
                     }
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
           "This object provides Protected LSR capability."

         REFERENCE
           "Section 5.3 of [I-D.ietf-mpls-mldp-node-protection]."

      ::= { mplsMldpScalars 9 }

   mplsMldProtNodeProtCapable OBJECT-TYPE
         SYNTAX      INTEGER {
                       enable(1),
                       disable(2)
                     }
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
           "This object provides Node Protection capability of the LSR."

         REFERENCE
           "Section 5.3 of [I-D.ietf-mpls-mldp-node-protection]."
```

```
      ::= { mplsMldpScalars 10 }

   -- End of MPLS mLDP scalars.

   -- MPLS mLDP tables.

     --
     -- The MPLS LDP Peer Capability Table
     --

     mplsLdpPeerCapabilityTable OBJECT-TYPE
         SYNTAX      SEQUENCE OF MplsLdpPeerCapabilityEntry
         MAX-ACCESS  not-accessible
         STATUS      current
         DESCRIPTION
             "This table will have learned information relating to Mldp.
         ::= { mplsMldpObjects 1 }

     mplsLdpPeerCapabilityEntry OBJECT-TYPE
         SYNTAX      MplsLdpPeerCapabilityEntry
         MAX-ACCESS  not-accessible
         STATUS      current
         DESCRIPTION
             "Information about a single Peer which is related
             to a Session.  This table is augmented by
             the mplsLdpSessionTable."
         INDEX       { mplsLdpEntityLdpId,
                       mplsLdpEntityIndex,
                       mplsLdpPeerLdpId }

         ::= { mplsLdpPeerCapabilityTable 1 }

     mplsLdpPeerCapabilityEntry ::= SEQUENCE {
         mplsLdpPeerLdpId                MplsLdpIdentifier,
         mplsLdpPeerCapability           Integer32,
     }

     mplsLdpPeerCapability OBJECT-TYPE
         SYNTAX      BITS {
                        none (0),
                        p2mp (1),
                        mp2mp(2),
                        mbb  (3),
                        upstream-label-assignment  (4),
                        dynamic (5),
                        plr (6),
                        mpt (7),
                        prot-lsr (8),
```

```
                        node-prot (9)
                    }
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
          " This will indicate the LDP capability information about peer.
          The p2mp indicates peer supports P2MP Capability.
          The mp2mp indicates peer supports MP2MP Capability.
          The mbb indicates peer supports MBB Capability.
          The upstream-label-assignment indicates peer supports Upstream label
          assignment Capability.
          The dynamic indicates peer supports dynamic Capability.
          The plr indicates Point of Local Repair Capability.
          The mpt indicates Point of Merge Point Capability.
          The prot-lsr indicates Protected LSR Capability.
          The node-prot indicates Node Protection LSR Capability.
          "

        REFERENCE
        "RFC6388, Section 2.1 for P2MP Capability TLV.
        and the section 3.1 for MP2MP Capability TLV.
        The RFC6388 for MBB Capability TLV.
        RFC5561 Section 9 for Dynamic Capability Announcement TLV.
        RFC6389 Section 3 for Upstream Label Assignment Capability TLV.
        Section 5 of [I-D.ietf-mpls-mldp-node-protection] describes for Point
of Local Repair (plr)
        capability,  Merge Point (mpt)  capability,
        The Protected LSR (port-lsr) and Node Protection (node-prot)
Capability. "

        ::= { mplsLdpPeerCapability 2 }

    --
    -- The MPLS mLDP Session Statistics Table
    --

    mplsMldpSessionStatsTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF MplsMldpSessionStatsEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "A table of statistics related to mLDP on Sessions.
            This table AUGMENTS the mplsLdpSessionStatsTable."
        ::= { mplsMldpObjects 2 }

    mplsMldpSessionStatsEntry OBJECT-TYPE
        SYNTAX      MplsMldpSessionStatsEntry
        MAX-ACCESS  not-accessible
```

```
        STATUS      current
        DESCRIPTION
```

```
            "An entry in this table represents mLDP statistical
            information on a single session between an LDP
            Entity and LDP Peer."

        AUGMENTS       { mplsLdpSessionStatsEntry }
        ::= { mplsmMldpSessionStatsTable 1 }

    MplsMldpSessionStatsEntry ::= SEQUENCE {
        mplsMldpSessionStatsNumFecsSent           Counter32,
        mplsMldpSessionStatsNumMbbReqSentState    Counter32,
        mplsMldpSessionStatsNumFecsRcvd           Counter32,
        mplsMldpSessionStatsNumMbbReqRcvdState    Counter32,
        mplsMldpSessionStatsNumMbbResetAckByTimer Counter32
    }

    mplsMldpSessionStatsNumFecsSent OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "This object counts the number of mLDP FECs sent on this
            session. If the FEC is withdrawn, then this number is
            decremented.

            Discontinuities in the value of this counter can occur
            at re-initialization of the management system, and at
            other times as indicated by the value of
            mplsLdpSessionDiscontinuityTime."

        ::= { mplsMldpSessionStatsEntry 1 }

    mplsMldpSessionStatsNumMbbReqSentState OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "This object counts the number of mLDP FECs sent on this
            session and waiting for MBB Ack. This counter will get incremented
            when MBB req sent for a label on this session and will get
            decremented when the MBB Ack received.

        ::= { mplsMldpSessionStatsEntry 2 }


    mplsMldpSessionStatsNumFecsRcvd OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
```

```
         DESCRIPTION
             "This object counts the number of mLDP FECs received on this
             session. If the FEC is withdrawn from the downstream session,
             then this is decremented.

             Discontinuities in the value of this counter can occur
             at re-initialization of the management system, and at
             other times as indicated by the value of
             mplsLdpSessionDiscontinuityTime."

         ::= { mplsMldpSessionStatsEntry 3 }

    mplsMldpSessionStatsNumMbbReqRcvdState OBJECT-TYPE
         SYNTAX      Counter32
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
             "This object counts the number of mLDP FECs received on this
             session and waiting for sending MBB Ack. This counter will get
             incremented when MBB req is received for a label on this session
             and will get decremented when the MBB Ack sent."

         ::= { mplsMldpSessionStatsEntry 4 }


    mplsMldpSessionStatsNumMbbResetAckByTimer OBJECT-TYPE
         SYNTAX      Counter32
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
             "This object counts the number mLDP FECs for which the MBB Ack is
             reset by MBB timer, in which the LSR is waiting for MBB ack.

         ::= { mplsMldpSessionStatsEntry 5 }

     --
     -- Mpls mLDP FEC Table
     --

     mplsMldpFecTable OBJECT-TYPE
         SYNTAX      SEQUENCE OF MplsFecEntry
         MAX-ACCESS  not-accessible
         STATUS      current
         DESCRIPTION
             "This table represents the FEC
             (Forwarding Equivalence Class)
             Information associated with an mLDP LSP."
```

```
        ::= { mplsMldpObjects 3 }


    mplsMldpFecEntry OBJECT-TYPE
        SYNTAX      MplsMldpFecEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "Each row represents a single mLDP FEC Element."
        INDEX       { mplsMldpFecIndex }

        ::= { mplsMldpFecTable 1 }

    MplsMldpFecEntry ::= SEQUENCE {
        mplsMldpFecIndex               IndexInteger,
        mplsMldpFecType                INTEGER,
        mplsMldpFecRootAddrType        InetAddressType,
        mplsMldpFecRootAddr            InetAddress,
        mplsMldpFecOpaqueType          INTEGER,
        mplsMldpFecOpaqueGenLspId      Unsigned32,
        mplsMldpFecOpaqueTransitSourceOrBidirAddrType   InetAddressType,
        mplsMldpFecOpaqueTransitSourceOrBidirAddr       InetAddress,
        mplsMldpFecOpaqueTransitGroupAddrType           InetAddressType,
        mplsMldpFecOpaqueTransitGroupAddr               InetAddress,
        mplsMldpFecAdminStatus         INTEGER,
        mplsMldpFecOperStatus          INTEGER,
        mplsMldpFecMoFrr               INTEGER,
        mplsMldpFecLsrState            INTEGER,
        mplsMldpFecUpTime              TimeStamp
    }

    mplsMldpFecIndex OBJECT-TYPE
        SYNTAX      IndexInteger
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "The index which uniquely identifies this entry."

        ::= { mplsMldpFecEntry 1 }


    mplsMldpFecType  OBJECT-TYPE
        SYNTAX      INTEGER {
                       p2mp(6),
                       mp2mpUpstream(7),
                       mp2mpDownstream(8)
                    }
        MAX-ACCESS  read-only
```

```
        STATUS      current
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The type of the FEC.  If the value of this object
            is 6, then it is P2MP Fec Type, and 7, 8 are correspond to
            MP2MP upstream and downstream type."

        REFERENCE
            "RFC6388, Section 2.2. The P2MP FEC Element and the section 3.3
            for the MP2MP Fec elements."

        ::= { mplsMldpFecEntry 2 }

    mplsMldpFecRootAddrType  OBJECT-TYPE
        SYNTAX      InetAddressType
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The value of this object is the type of the
            Internet address.  The value of this object,
            decides how the value of the mplsMldpFecRootAddr object
            is interpreted."
        REFERENCE
            "RFC6388, Section 2.2. The P2MP FEC Element and the section 3.3
            for the MP2MP Fec elements."

        ::= { mplsMldpFecEntry 3 }

    mplsMldpFecRootAddr     OBJECT-TYPE
        SYNTAX      InetAddress
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The value of this object is interpreted based
            on the value of the mplsMldpFecRootAddrType object.
            This is ingress node address for the mLDP LSP."

        REFERENCE
            "RFC6388, Section 2.2. The P2MP FEC Element and the section 3.3
            for the MP2MP Fec elements."

        ::= { mplsMldpFecEntry 4 }


    mplsMldpFecOpaqueType  OBJECT-TYPE
        SYNTAX      INTEGER {
                       genericLspId(1),
```

```
                        transitIpv4Source(3),
                        transitIpv6Source(4),
                        transitIpv4Bidir(5),
                        transitIpv6Bidir(6)
                     }
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
           "This is opaque type of the mLDP FEC. The value of this object is
           shown below.

             1 - The Generic LSP Identifier
             3 - Transit IPv4 Source TLV
             4 - Transit IPv6 Source TLV
             5 - Transit IPv4 Bidir TLV
             6 - Transit IPv6 Bidir TLV.
             "
         ::= { mplsMldpFecEntry 5 }

      mplsMldpFecOpaqueGenLspId OBJECT-TYPE
         SYNTAX      Unsigned32
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
             "The 32-bit unsigned integer value which is to represent Generic
             LSP ID. This value is only valid if the mplsMldpFecOpaqueType is
             genericLspId(1), otherwise 0 must be returned."

         REFERENCE
             "RFC6388, Section 2.3.1."

         ::= { mplsMldpFecEntry 6 }

     mplsMldpFecOpaqueTransitSourceOrBidirAddrType        OBJECT-TYPE
         SYNTAX      InetAddressType
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
             "The value of this object is the type of the
             Internet address.  The value of this object,
             decides how the value of the
mplsMldpFecOpaqueTransitSourceOrBidirAddr
             object is interpreted."
         REFERENCE
             "RFC6826, Section 3.1."

         ::= { mplsMldpFecEntry 7 }
```

```
     mplsMldpFecOpaqueTransitSourceOrBidirAddr OBJECT-TYPE
```

```
        SYNTAX      InetAddress
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The value of this object is interpreted based
            on the value of the mplsMldpFecOpaqueTransitSourceOrBidirAddrType
             object.  This is source node address for the mLDP inband LSP."

        REFERENCE
            "RFC6826, Section 3.1."

        ::= { mplsMldpFecEntry 8 }

    mplsMldpFecOpaqueTransitGroupAddrType        OBJECT-TYPE
        SYNTAX      InetAddressType
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The value of this object is the type of the
            Internet address.  The value of this object,
            decides how the value of the  mplsMldpFecOpaqueTransitGroupAddr
            object is interpreted."

        REFERENCE
            "RFC6826, Section 3.2."

        ::= { mplsMldpFecEntry 9 }

    mplsMldpFecOpaqueTransitGroupAddr OBJECT-TYPE
        SYNTAX      InetAddress
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The value of this object is interpreted based
            on the value of the mplsMldpFecOpaqueTransitGroupAddrType
             object.  This is group node address for the mLDP inband LSP."

        REFERENCE
            "RFC6826, Section 3.2."

        ::= { mplsMldpFecEntry 10 }


  mplsMldpFecAdminStatus OBJECT-TYPE
     SYNTAX       INTEGER {
                     up(1),        -- ready to pass data
                     down(2)       -- out of service
                   }
```

```
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "Indicates the admin status of this mLDP FEC."

      DEFVAL { up }

      ::= { mplsMldpFecEntry 11 }

   mplsMldpFecOperStatus OBJECT-TYPE
      SYNTAX        INTEGER {
                      up(1),             -- ready to pass data
                      down(2)            -- out of service
                    }
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "Indicates the actual operational status of this mLDP Fec."

      ::= { mplsMldpFecEntry 12 }

     mplsMldpFecMoFrr OBJECT-TYPE
        SYNTAX      INTEGER {
                      enable(1),
                      disable(2)
                    }
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
           "This object provides whether MoFRR enabled for this mLDP FEC.
           on this mLDP FEC. As mentioned in the section 3.2 of [I-D.ietf-
rtgwg-mofrr],
           When this is enabled, then mLDP may select two upstream sessions,
           one is primary and other one is backup. The backup traffic is
           discarded when the primary upstream session is UP. When the
           primary upstream session goes down, the traffic from the backup
           upstream session will be forwarded to downstream.
            "

      ::= { mplsMldpFecEntry 13 }

   mplsMldpFecLsrState OBJECT-TYPE
      SYNTAX        INTEGER {
                       egress(1),
                       bud(2),
                       transit(3),
                       ingress(4)
                    }
```

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

```
      STATUS        current
      DESCRIPTION
           "Indicates the role of FEC either egress, bud, transit or ingress"

      ::= { mplsMldpFecEntry 14 }

   mplsMldpFecUpTime OBJECT-TYPE
      SYNTAX        TimeStamp
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
          "This values shows Fec UP time. This is time since
mplsMldpFecOperStatus is UP."

      ::= { mplsMldpFecEntry 15 }

   -- MPLS mLDP LSP Branch Traffic Stats Table.

   mplsMldpFecBranchStatsTable  OBJECT-TYPE
      SYNTAX        SEQUENCE OF MplsMldpFecBranchStatsEntry
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
           "This table provides mLDP Fec branch MPLS Traffic Stats
            information."

      ::= { mplsMldpObjects 4 }

   mplsMldpFecBranchStatsEntry OBJECT-TYPE
      SYNTAX        MplsMldpFecBranchStatsEntry
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
           "An entry in this table is created by the LSR for each
            downstream branch (out-segment) from this LSR for this mLDP
            LSP. Each downstream session may represent a single out-segment.

            Each entry in the table is indexed by the four identifiers
            of the mLDP LSP, and the out-segment that identifies the
            outgoing branch."

         INDEX       { mplsLdpEntityLdpId,
                       mplsLdpEntityIndex,
                       mplsLdpPeerLdpId,
                       mplsMldpFecBranchFecIndex,
                       mplsMldpFecBranchOutSegIndex
                     }

      ::= { mplsMldpFecBranchStatsTable 1 }
```

```
MplsMldpFecBranchStatsEntry ::= SEQUENCE {
      mplsMldpFecBranchFecIndex          MplsIndexType,
      mplsMldpFecBranchOutSegIndex       MplsIndexType,
      mplsMldpFecBranchStatsPackets      Counter64,
      mplsMldpFecBranchStatsBytes        Counter64,
      mplsMldpFecBranchStatsDiscontinuityTime TimeStamp
}

mplsMldpFecBranchFecIndex          OBJECT-TYPE
   SYNTAX        MplsIndexType
   MAX-ACCESS    not-accessible
   STATUS        current
   DESCRIPTION
          "This index identifies the mLDP FEC entry in the
           mplsMldpFecTable.  This is same as mplsMldpFecIndex."

      ::= { mplsMldpFecBranchStatsEntry 1 }


mplsMldpFecBranchOutSegIndex          OBJECT-TYPE
   SYNTAX        MplsIndexType
   MAX-ACCESS    not-accessible
   STATUS        current
   DESCRIPTION
        "This object identifies an outgoing branch from this mLDP LSP
         Its value is unique within the context of the mLDP LSP.

          This contains the same value as the mplsOutSegmentIndex in the
          MPLS-LSR-STD-MIBs mplsOutSegmentTable."

      ::= { mplsMldpFecBranchStatsEntry 2 }

mplsMldpFecBranchStatsPackets OBJECT-TYPE
   SYNTAX        Counter64
   MAX-ACCESS    read-only
   STATUS        current
   DESCRIPTION
        "This object represent the 64-bit value, which gives the number
         of packets forwarded by the mLDP LSP onto this branch.
         This object should be read in conjunction with
         mplsMldpFecBranchStatsDiscontinuityTime."

   ::= { mplsMldpFecBranchStatsEntry 3 }

mplsMldpFecBranchStatsBytes OBJECT-TYPE
   SYNTAX        Counter64
   MAX-ACCESS    read-only
   STATUS        current
```

```
      DESCRIPTION
           "This object represent the 64-bit value, which gives the number
            of bytes forwarded by the mLDP LSP onto this branch.
            This object should be read in conjunction with
            mplsMldpFecBranchStatsDiscontinuityTime."

      ::= { mplsMldpFecBranchStatsEntry 4 }

   mplsMldpFecBranchStatsDiscontinuityTime OBJECT-TYPE
      SYNTAX      TimeStamp
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
           "The value of sysUpTime on the most recent occasion at which
            any one or more of this rows Counter32 or Counter64 objects
            experienced a discontinuity. If no such discontinuity has
            occurred since the last re-initialization of the local
            management subsystem, then this object contains a zero
            value."
      ::= { mplsMldpFecBranchStatsEntry 5 }

   -- End of mplsMldpFecBranchStatsTable


   -- MPLS mLDP LSP Upstream Session Table.

   mplsMldpFecUpstreamSessTable  OBJECT-TYPE
      SYNTAX        SEQUENCE OF MplsMldpFecUpstreamSessEntry
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
           "This table provides mLDP Fec upstream Session information."

      ::= { mplsMldpObjects 5 }

   mplsMldpFecUpstreamSessEntry OBJECT-TYPE
      SYNTAX        MplsMldpFecUpstreamSessEntry
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
           "An entry in this table is created by the LSR for each
            upstream session (in-segment) from this LSR for this mLDP
            LSP. Each upstream session may represent a single in-segment.

            Each entry in the table is indexed by the four identifiers
            of the mLDP LSP, and the in-segment that identifies the
            incoming traffic."
```

```
        INDEX       { mplsLdpEntityLdpId,
                      mplsLdpEntityIndex,
                      mplsLdpPeerLdpId,
                      mplsMldpFecUpstreamSessFecIndex,
                      mplsMldpFecUpstreamSessInSegIndex
                    }

      ::= { mplsMldpFecUpstreamSessTable 1 }

   MplsmLdpFecUpstreamSessEntry ::= SEQUENCE {
         mplsMldpFecUpstreamSessFecIndex     MplsIndexType,
         mplsMldpFecUpstreamSessInSegIndex   MplsIndexType,
         mplsMldpFecUpstreamSessPrimary      INTEGER,
         mplsMldpFecUpstreamSessActive       INTEGER,
         mplsMldpFecUpstreamSessPackets      Counter64,
         mplsMldpFecUpstreamSessBytes        Counter64,
         mplsMldpFecUpstreamSessDiscontinuityTime TimeStamp
   }

   mplsMldpFecUpstreamSessFecIndex          OBJECT-TYPE
      SYNTAX        MplsIndexType
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
             "This index identifies the mLDP FEC entry in the
              mplsMldpFecTable."

         ::= { mplsMldpFecUpstreamSessEntry 1 }


   mplsMldpFecUpstreamSessInSegIndex          OBJECT-TYPE
      SYNTAX        MplsIndexType
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
           "This object identifies an upstream session from this mLDP LSP
            Its value is unique within the context of the mLDP LSP.

             This contains the same value as the mplsInSegmentIndex in the
             MPLS-LSR-STD-MIBs mplsInSegmentTable."

         ::= { mplsMldpFecUpstreamSessEntry 2 }

    mplsMldpFecUpstreamSessPrimary  OBJECT-TYPE
         SYNTAX      INTEGER {
                        primary(1),
                        backup(2)
                     }
```

```
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "This indicated wether the received traffic from upstream is
            primary or backup. This is valid only if the MoFRR
            (mplsMldpFecMoFrr) is enabled on this FEC."

        ::= { mplsMldpFecUpstreamSessEntry 3 }

    mplsMldpFecUpstreamSessActive  OBJECT-TYPE
        SYNTAX      INTEGER {
                       active(1),
                       inactive(2)
                    }
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
        "This indicates whether the upstream session is active, means the
        LSR programmed the forwarding engine to receive the traffic from
        this upstream session. This will be Inactive if the LSR is wating
        for MBB Ack."

        ::= { mplsMldpFecUpstreamSessEntry 4 }

   mplsMldpFecUpstreamSessPackets      OBJECT-TYPE
      SYNTAX        Counter64
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "This object represent the 64-bit value, which gives the number
            of packets received by the mLDP LSP from this upstream
            session.  This object should be read in conjunction with
            mplsMldpFecUpstreamSessDiscontinuityTime."

      ::= { mplsMldpFecUpstreamSessEntry 5 }

   mplsMldpFecUpstreamSessBytes      OBJECT-TYPE
      SYNTAX        Counter64
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "This object represent the 64-bit value, which gives the number
            of bytes received by the mLDP LSP from this upstream
            session.  This object should be read in conjunction with
            mplsMldpFecUpstreamSessDiscontinuityTime."

      ::= { mplsMldpFecUpstreamSessEntry 6 }
```

```
   mplsMldpFecUpstreamSessDiscontinuityTime OBJECT-TYPE
      SYNTAX      TimeStamp
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
           "The value of sysUpTime on the most recent occasion at which
            any one or more of this rows Counter32 or Counter64 objects
            experienced a discontinuity. If no such discontinuity has
            occurred since the last re-initialization of the local
            management subsystem, then this object contains a zero
            value."
      ::= { mplsMldpFecUpstreamSessEntry 7 }

   -- End of mplsMldpFecBranchStatsTable


   -- MPLS mLDP Interface Traffic Stats Table.

   mplsMldpInterfaceStatsTable  OBJECT-TYPE
      SYNTAX        SEQUENCE OF MplsMldpInterfaceStatsEntry
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
           "This table provides mLDP  Traffic Stats on specified interface."

      ::= { mplsMldpObjects 6 }

   mplsMldpInterfaceStatsEntry OBJECT-TYPE
      SYNTAX        MplsMldpInterfaceStatsEntry
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
           "An entry in this table is created by the LSR for each
            downstream branch (out-segment) from this LSR for this mLDP
            LSP. Each downstream session may represent a single out-segment.

            Each entry in the table is indexed by the four identifiers
            of the mLDP LSP, and the out-segment that identifies the
            outgoing branch."

         INDEX       { mplsMldpInterfaceIndex
                     }

      ::= { mplsMldpInterfaceStatsTable 1 }

   MplsMldpInterfaceStatsEntry ::= SEQUENCE {
         mplsMldpInterfaceIndex                InterfaceIndex,
         mplsMldpInterfaceStatsSentPackets     Counter64,
```

```
        mplsMldpInterfaceStatsSentBytes        Counter64,
        mplsMldpInterfaceStatsRecvPackets      Counter64,
        mplsMldpInterfaceStatsRecvBytes        Counter64
   }

   mplsMldpInterfaceIndex          OBJECT-TYPE
      SYNTAX        InterfaceIndex
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
             "This index identifies the specific interface. "

        ::= { mplsMldpInterfaceStatsEntry 1 }

   mplsMldpInterfaceStatsSentPackets OBJECT-TYPE
      SYNTAX        Counter64
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
            "This is 64 bit value, which gives the number of packets
            forwarded by all mLDP LSPs onto this interface."

      ::= { mplsMldpInterfaceStatsEntry 2 }

   mplsMldpInterfaceStatsSentBytes OBJECT-TYPE
      SYNTAX        Counter64
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
            "This is 64 bit value, which gives the number of bytes
            forwarded by all mLDP LSPs onto this interface."

      ::= { mplsMldpInterfaceStatsEntry 3 }


  mplsMldpInterfaceRecvPackets OBJECT-TYPE
      SYNTAX        Counter64
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
            "This is 64 bit value, which gives the number of packets
            received by all mLDP LSPs from this interface."

      ::= { mplsMldpInterfaceStatsEntry 4 }

   mplsMldpInterfaceStatsRecvBytes OBJECT-TYPE
      SYNTAX        Counter64
      MAX-ACCESS    read-only
```

```
      STATUS        current
      DESCRIPTION
            "This is 64 bit value, which gives the number of bytes
            received by all mLDP LSPs from this interface."

      ::= { mplsMldpInterfaceStatsEntry 5 }

   -- End of mplsMldpInterfaceStatsTable

   -- Notifications.

   mplsMldpFecUp NOTIFICATION-TYPE
      OBJECTS     {
         mplsMldpFecAdminStatus,
         mplsMldpFecOperStatus
      }
      STATUS      current
      DESCRIPTION
           "This notification is generated when a mplsMldpFecOperStatus
            object changes from down to up."

      ::= { mplsMldpNotifications 1 }

   mplsMldpFecDown NOTIFICATION-TYPE
      OBJECTS     {
         mplsMldpFecAdminStatus,
         mplsMldpFecOperStatus
      }
      STATUS      current
      DESCRIPTION
           "This notification is generated when a mplsMldpFecOperStatus
            object changes from up to down."

      ::= { mplsMldpNotifications 2 }


   mplsMldpMoFrrStatusChange NOTIFICATION-TYPE
      OBJECTS     {
         mplsMldpFecUpstreamSessPrimary,
      }
      STATUS      current
      DESCRIPTION
           "This notification is generated when a
mplsMldpFecUpstreamSessPrimary
            object changes from primary to backup and vice versa."

            ::= { mplsMldpNotifications 3 }

   -- End of notifications.
```

12. Security Considerations

This MIB module is useful for the configuration of certain objects and monitoring of mLDP LSPs.

There are no management objects defined in this MIB module 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 this MIB module (i.e., objects with a MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments. It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP. These are the tables and objects and their sensitivity/vulnerability:

- o mplsMldpFecTable
- o mplsLdpPeerCapabilityTable
- o mplsMldpSessionStatsTable
- o mplsMldpFecBranchStatsTable
- o mplsMldpFecUpstreamSessTable
- o mplsMldpInterfaceStatsTable
- o mplsMldpNumFecs
- o mplsMldpNumFecsActive
- o mplsMldpMbbTime

Above listed tables and objects show information about the mLDP LSPs, its route through the network, and its traffic statistics. Knowledge of this information could be used to compromise the network, or simply to breach confidentiality. If an Administrator does not want to reveal this information, these tables and 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.

13. IANA Considerations

This is new MPLS MIB module, contained in this document and IANA is requested to assign an oid (mplsStdMIB YYY) under the mplsStdMIB subtree to the MPLS-MLDP-STD-MIB module specified in this document.

14. Acknowledgments

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15. References

15.1. Normative References

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Appendix A. Change Log

Appendix B. Open Issues

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