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**Definitions of Managed Objects for the LDP Point-to-Multipoint and
Multipoint-to-Multipoint Label Switched Paths
draft-tiruveedhula-mpls-mldp-mib-01**

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

[[anchor3: 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.

[MoFRR] Multicast only Fast Re-Route [draft-ietf-rtgwg-mofrr-03](#) .

[MLDP_NODE_PROT] 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 fetures, 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 `mplsMldpNumFecsConfigured` which will give the total number of mLDP FECs configured 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. mplsMldpNumFecsConfigured

The mplsMldpNumFecsConfigured provides a read-only counter of the number of mLDP FECs configured 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 [[MLDP_NODE_PROT](#)]

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 [[MLDP_NODE_PROT](#)]

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 [[MLDP_NODE_PROT](#)]

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 [[MLDP_NODE_PROT](#)]

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 particular downstream session or on outgoing interface.

8.5. mLDP Fec Upstream 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 particular 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.

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

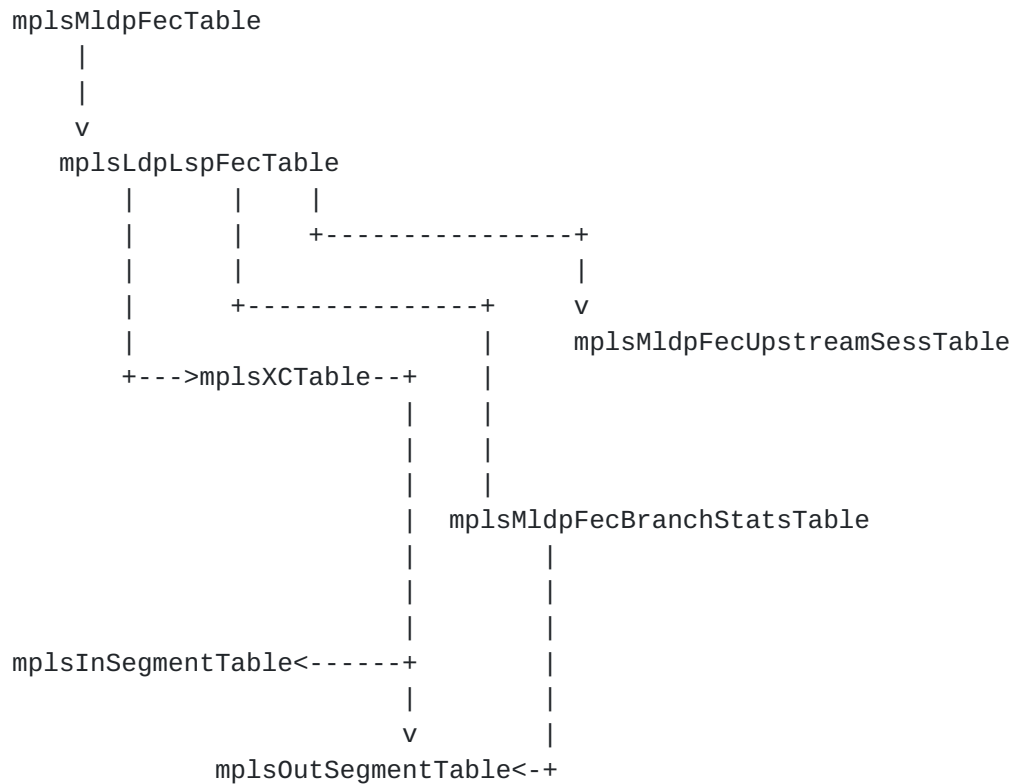


Figure 1 : Dependencies Between MIB Tables

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 "201401310000Z" -- Jan 31, 2014
ORGANIZATION "Multiprotocol Label Switching (mpls)
Working Group"

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directly to the MPLS working group mailing list at
mpls@lists.ietf.org"

DESCRIPTION

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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 "201401310000Z" -- Jan 31, 2014

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 16-bit integer value provides the time for waiting MBB Ack from upstream node."

DEFVAL { 30 }

::= { mplsMldpScalars 4 }

mplsMldpNumFecsConfigured OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of mLdp FECs configured 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 [[MLDP_NODE_PROT](#)]."

::= { 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 [[MLDP_NODE_PROT](#)]."

::= { 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 [[MLDP_NODE_PROT](#)]."

::= { 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 [MLDP\_NODE\_PROT]."  
  
 ::= { 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.
    p2mp indicates peer supports P2MP Capability.
    mp2mp indicates peer supports MP2MP Capability.
    mbb indicates peer supports MBB Capability.
    upstream-label-assignment indicates peer supports Upstream label
    assignment Capability.
    dynamic indicates peer supports dynamic 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.
 MLDP_NODE_PROT [section 5](#) for PLR capability, MPT capability,
 The Protected LSR and The Node Protection 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 }  
 ::= { mplsMldpSessionStatsTable 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.

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.

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,
mplsMldpFecOpaqueValue	MplsMldpFecOpaqueValue,
mplsMldpFecAdminStatus	INTEGER,
mplsMldpFecOperStatus	INTEGER,
mplsMldpFecMoFrr	INTEGER,
mplsMldpFecLsrState	INTEGER,

}

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(0x06),
 MP2MPUpstream(0x07)
 MP2MPDownstream(0x08)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The type of the FEC. If the value of this object is 0x06, then it is P2MP Fec Type, and 0x7, 0x8 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 {
 generic-lsp-id(0x01),
 transit-ipv4-source(0x03)
 transit-ipv6-source(0x04)
 transit-ipv4-bidir(0x05)
 transit-ipv6-bidir(0x06)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The type of the FEC. If the value of this object is 0x06, then it is P2MP Fec Type, and 0x7, 0x8 are correspond to MP2MP upstream and downstream type.

0x01 - The Generic LSP Identifier

0x03 - Transit IPv4 Source TLV


```

0x04 - Transit IPv6 Source TLV
0x05 - Transit IPv4 Bidir TLV
0x06 - Transit IPv6 Bidir TLV.
"

```

```
 ::= { mplsMldpFecEntry 5 }
```

```
mplsMldpFecOpaqueValue OBJECT-TYPE
```

```
SYNTAX MplsMldpFecOpaqueValue
```

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

```
STATUS current
```

```
DESCRIPTION
```

```

    "This object contains the opaque value of mLDP Fec. This opaque
    value depends in the type mplsMldpFecOpaqueType. "

```

```
 ::= { mplsMldpFecEntry 6 }
```

```
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 7 }
```

```
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 8 }
```

```
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 [[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 9 }

mplsMldpFecLsrState OBJECT-TYPE

SYNTAX INTEGER {
egress(0x01),
bud(0x02),
transit(0x03),
ingress(0x04),
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates the role of FEC either egress, bud, transit or ingress"

::= { mplsMldpFecEntry 10 }

MplsMldpFecOpaqueValue ::= CHOICE {

mplsMldpFecOpaqueGenLspId Unsigned32,

mplsMldpFecOpaqueTransitSource

MplsMldpFecOpaqueTransitSourceEntry,

mplsMldpFecOpaqueTransitBidir

MplsMldpFecOpaqueTransitBidirEntry,

}

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. "

REFERENCE

"[RFC6388, Section 2.3.1.](#)"

::= { mplsMldpFecOpaqueValue 1 }

MplsMldpFecOpaqueTransitSourceEntry ::= SEQUENCE {

mplsMldpFecOpaqueTransitSourceAddrType

InetAddressType,

```
    mplsMldpFecOpaqueTransitSourceAddr      InetAddress,
    mplsMldpFecOpaqueTransitGroupAddrType    InetAddressType,
    mplsMldpFecOpaqueTransitGroupAddr        InetAddress,
}

mplsMldpFecOpaqueTransitSourceAddrType      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 mplsMldpFecOpaqueTransitSourceAddr
        object is interpreted."
    REFERENCE
        "RFC6826, Section 3.1."

    ::= { MplsMldpFecOpaqueTransitSourceEntry 1 }

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

    REFERENCE
        "RFC6826, Section 3.1."

    ::= { MplsMldpFecOpaqueTransitSourceEntry 2 }

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."

    ::= { MplsMldpFecOpaqueTransitSourceEntry 3 }
```


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."](#)

::= { MplsMldpFecOpaqueTransitSourceEntry 4 }

MplsMldpFecOpaqueTransitBidirEntry ::= SEQUENCE {

mplsMldpFecOpaqueTransitBidirRPAddrType InetAddressType,

mplsMldpFecOpaqueTransitBidirRPAddr InetAddress,

mplsMldpFecOpaqueTransitBidirGroupAddrType InetAddressType,

mplsMldpFecOpaqueTransitBidirGroupAddr InetAddress,

}

mplsMldpFecOpaqueTransitBidirRPAddrType 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

'mplsMldpFecOpaqueTransitBidirRPAddr' object is interpreted."

REFERENCE

["RFC6826, Section 3.3."](#)

::= { MplsMldpFecOpaqueTransitBidirEntry 1 }

mplsMldpFecOpaqueTransitBidirRPAddr OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is interpreted based on the value of the 'mplsMldpFecOpaqueTransitBidirRPAddrType' object. This is RP (Rendezvous Point) node address for the mLDP inband LSP."

REFERENCE

["RFC6826, Section 3.3."](#)


```
::= { MplsMldpFecOpaqueTransitBidirEntry 2 }
```

```
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 3.3."
```

```
::= { MplsMldpFecOpaqueTransitBidirEntry 3 }
```

```
mplsMldpFecOpaqueTransitBidirGroupAddr OBJECT-TYPE
```

```
SYNTAX      InetAddress
```

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

```
STATUS      current
```

```
DESCRIPTION
```

```
"The value of this object is interpreted based
on the value of the 'mplsMldpFecOpaqueTransitBidirGroupAddrType'
object. This is group node address for the mLDP inband LSP."
```

```
REFERENCE
```

```
"RFC6826, Section 3.3."
```

```
::= { MplsMldpFecOpaqueTransitBidirEntry 4 }
```

```
-- 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  Counter32,
    mplsMldpFecBranchStatsHCPackets Counter32,
    mplsMldpFecBranchStatsBytes    Counter32,
    mplsMldpFecBranchStatsHCBytes  Counter32,
    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-MIB's mplsOutSegmentTable."
```



```
::= { MplsMldpFecBranchStatsEntry 2 }
```

```
mplsMldpFecBranchStatsPackets OBJECT-TYPE
```

```
SYNTAX Counter32
```

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

```
STATUS current
```

```
DESCRIPTION
```

```
"Number of packets forwarded by the mLDP LSP onto this branch.  
This object should represents the 32-bit value of the least  
significant part of the 64-bit value if both  
mplsMldpFecBranchStatsHCPackets is returned.  
This object should be read in conjunction with  
mplsMldpFecBranchStatsDiscontinuityTime."
```

```
::= { MplsMldpFecBranchStatsEntry 3 }
```

```
mplsMldpFecBranchStatsHCPackets OBJECT-TYPE
```

```
SYNTAX Counter64
```

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

```
STATUS current
```

```
DESCRIPTION
```

```
"High capacity counter for number of packets forwarded by the  
mLDP onto this branch.  
This object should be read in conjunction with  
mplsMldpFecBranchStatsDiscontinuityTime."
```

```
::= { MplsMldpFecBranchStatsEntry 4 }
```

```
mplsMldpFecBranchStatsBytes OBJECT-TYPE
```

```
SYNTAX Counter32
```

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

```
STATUS current
```

```
DESCRIPTION
```

```
"Number of bytes forwarded by the mLDP LSP onto this branch.  
This object should represents the 32-bit value of the least  
significant part of the 64-bit value if both  
mplsMldpFecBranchStatsHCBytes is returned.  
This object should be read in conjunction with  
mplsMldpFecBranchStatsDiscontinuityTime."
```

```
::= { MplsMldpFecBranchStatsEntry 5 }
```

```
mplsMldpFecBranchStatsHCBytes OBJECT-TYPE
```

```
SYNTAX Counter64
```

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

```
STATUS current
```

```
DESCRIPTION
```

```
"High capacity counter for number of bytes forwarded
```


by the mLDP LSP onto this branch.
This object should be read in conjunction with
mplsMldpFecBranchStatsDiscontinuityTime."

::= { MplsMldpFecBranchStatsEntry 6 }

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 row's 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 7 }

-- 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
    }

```

```
 ::= { mplsMldpFecBranchStatsTable 1 }
```

```

MplsmLdpFecUpstreamSessEntry ::= SEQUENCE {
    mplsMldpFecUpstreamSessFecIndex      MplsIndexType,
    mplsMldpFecUpstreamSessInSegIndex    MplsIndexType,
    mplsMldpFecUpstreamSessPrimary       INTEGER,
    mplsMldpFecUpstreamSessActive        INTEGER,
    mplsMldpFecUpstreamSessPackets       Counter32,
    mplsMldpFecUpstreamSessHCPackets     Counter32,
    mplsMldpFecUpstreamSessBytes         Counter32,
    mplsMldpFecUpstreamSessHCBytes       Counter32,
    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-MIB's mplsInSegmentTable."

```

```
 ::= { MplsmLdpFecUpstreamSessEntry 2 }
```

```

mplsMldpFecUpstreamSessPrimary OBJECT-TYPE
    SYNTAX      INTEGER {
        primary(0x01),
        backup(0x02)
    }

```


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(0x01),
Inactive(0x02)
}

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 Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of packets received by the mLDP LSP from this upstream session. This object should represents the 32-bit value of the least significant part of the 64-bit value if both mplsMldpFecUpstreamSessHCPackets is returned. This object should be read in conjunction with mplsMldpFecUpstreamSessDiscontinuityTime."

::= { MplsmLdpFecUpstreamSessEntry 5 }

mplsMldpFecUpstreamSessHCPackets OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"High capacity counter for number of packets received by the mLDP LSP from this upstream session. This object should be read in conjunction with mplsMldpFecUpstreamSessDiscontinuityTime."


```
::= { MplsMdpFecUpstreamSessEntry 6 }
```

```
mplsMdpFecUpstreamSessBytes      OBJECT-TYPE
```

```
    SYNTAX          Counter32
```

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

```
    STATUS          current
```

```
    DESCRIPTION
```

```
        "Number of bytes received by the mLDP LSP from this upstream
        session.  This object should represents the 32-bit value of
        the least significant part of the 64-bit value if both
        mplsMdpFecUpstreamSessHCPackets is returned.
        This object should be read in conjunction with
        mplsMdpFecUpstreamSessDiscontinuityTime."
```

```
::= { MplsMdpFecUpstreamSessEntry 7 }
```

```
mplsMdpFecUpstreamSessHCBytes OBJECT-TYPE
```

```
    SYNTAX          Counter64
```

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

```
    STATUS          current
```

```
    DESCRIPTION
```

```
        "High capacity counter for number of bytes received
        by the mLDP LSP from this upstream session.
        This object should be read in conjunction with
        mplsMdpFecUpstreamSessDiscontinuityTime."
```

```
::= { MplsMdpFecUpstreamSessEntry 8 }
```

```
mplsMdpFecUpstreamSessDiscontinuityTime 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 row's 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."
```

```
::= { MplsMdpFecUpstreamSessEntry 9 }
```

```
-- End of mplsMdpFecBranchStatsTable
```

```
-- MPLS mLDP Interface Traffic Stats Table.
```

```
mplsMdpInterfaceStatsTable OBJECT-TYPE
```

```
    SYNTAX          SEQUENCE OF MplsMdpInterfaceStatsEntry
```


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 Counter32,
 mplsMldpInterfaceStatsSentHCPackets Counter32,
 mplsMldpInterfaceStatsSentBytes Counter32,
 mplsMldpInterfaceStatsSentHCBytes Counter32,
 mplsMldpInterfaceStatsRecvPackets Counter32,
 mplsMldpInterfaceStatsRecvHCPackets Counter32,
 mplsMldpInterfaceStatsRecvBytes Counter32,
 mplsMldpInterfaceStatsRecvHCBytes Counter32,
 }

mplsMldpInterfaceIndex OBJECT-TYPE

SYNTAX InterfaceIndex
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"This index identifies the specific interface. "

::= { MplsMldpInterfaceStatsEntry 1 }

mplsMldpInterfaceStatsSentPackets OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only
STATUS current
DESCRIPTION

"Number of packets forwarded by all mLDP LSPs onto this interface.
This object should represents the 32-bit value of the least significant part of the 64-bit value if both mplsMldpInterfaceStatsSentHCPackets is returned. "

::= { MplsMldpInterfaceStatsEntry 2 }

mplsMldpInterfaceStatsSentHCPackets OBJECT-TYPE

SYNTAX Counter64
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"High capacity counter for number of packets forwarded by the all mLDP LSPs onto this interface. "

::= { MplsMldpInterfaceStatsEntry 3 }

mplsMldpInterfaceStatsSentBytes OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"Number of bytes received and forwarded by all mLDP LSPs onto this interface.
This object should represents the 32-bit value of the least significant part of the 64-bit value if both mplsMldpInterfaceStatsSentHCBytes is returned."

::= { MplsMldpInterfaceStatsEntry 4 }

mplsMldpInterfaceStatsSentHCBytes OBJECT-TYPE

SYNTAX Counter64
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"High capacity counter for number of bytes forwarded by the mLDP LSP onto this branch."

::= { MplsMldpInterfaceStatsEntry 5 }

mplsMldpInterfaceRecvPackets OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of packets received by all mLDP LSPs onto this interface.

This object should represents the 32-bit value of the least significant part of the 64-bit value if both mplsMldpInterfaceStatsRecvHCPackets is returned. "

::= { MplsMldpInterfaceStatsEntry 6 }

mplsMldpInterfaceStatsRecvHCPackets OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"High capacity counter for number of packets received by the all mLDP LSPs onto this interface. "

::= { MplsMldpInterfaceStatsEntry 7 }

mplsMldpInterfaceStatsRecvBytes OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of bytes received by all mLDP LSPs onto this interface.

This object should represents the 32-bit value of the least significant part of the 64-bit value if both mplsMldpInterfaceStatsRecvHCBytes is returned."

::= { MplsMldpInterfaceStatsEntry 8 }

mplsMldpInterfaceStatsRecvHCBytes OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"High capacity counter for number of bytes received by the all mLDP LSPs onto this interface."

::= { MplsMldpInterfaceStatsEntry 9 }

-- 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 }

-- 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 mplsMldpNumFecsConfigured
- 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 under the mplsStdMIB subtree to the MPLS-MDLP-STD-MIB module specified in this document.

14. Acknowledgments

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[Appendix A.](#) Change Log

[Appendix B.](#) Open Issues

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