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Definitions of Managed Objects for
the Multiprotocol Label Switching, Label Distribution Protocol (LDP)

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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects for the Multiprotocol Label Switching, Label Distribution Protocol (LDP).

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1. Introduction

This document defines 4 MIB Modules which together support the configuration and monitoring of the Label Distribution Protocol (LDP). The Label Distribution Protocol (LDP) [\[RFC3036\]](#) is one type of Multiprotocol Label Switching (MPLS) protocols described in [\[RFC3031\]](#) and [\[RFC3032\]](#). Utilizing all 4 MIB Modules allows an operator to configure LDP sessions using 3 different Layer 2 media. The Layer 2 media supported by the MIB Modules are Ethernet, ATM and Frame Relay as described in [\[RFC3036\]](#), [\[RFC3034\]](#) and [\[RFC3035\]](#).

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

2. The Internet-Standard Management Framework

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

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIV2, which is described in STD 58, [RFC 2578](#) [\[RFC2578\]](#), STD 58, [RFC 2579](#) [\[RFC2579\]](#) and STD 58, [RFC 2580](#) [\[RFC2580\]](#).

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[3.](#) Structure of the MIB Modules

This section describes the structure of the LDP MIB Modules.

[3.1.](#) Overview

There are 4 MIB Modules in this document. These MIB Modules are the MPLS-LDP-STD-MIB, the MPLS-LDP-GENERIC-STD-MIB, the MPLS-LDP-ATM-STD-MIB and the MPLS-LDP-FRAME-RELAY-STD-MIB. The MPLS-LDP-STD-MIB defines objects which are common to all LDP implementations. The MPLS-LDP-GENERIC-STD-MIB defines Layer 2 Per Platform Label Space objects for use with the MPLS-LDP-STD-MIB. The MPLS-LDP-ATM-STD-MIB defines Layer 2 Asynchronous Transfer Mode (ATM) objects for use with the MPLS-LDP-STD-MIB. The MPLS-LDP-FRAME-RELAY-STD-MIB defines Layer 2 FRAME-RELAY objects for use with the MPLS-LDP-STD-MIB.

The MPLS-LDP-STD-MIB Module MUST be implemented and at least one of the Layer 2 MIB Modules MUST be implemented by an Agent developer on an Label Switching Router (LSR) or Label Edge Router (LER). As an example, if an Label Switching Router (LSR) or Label Edge Router (LER) implementation intends to support LDP utilizing a Layer 2 of Ethernet, then the MPLS-LDP-STD-MIB and the MPLS-LDP-GENERIC-STD-MIB Modules MUST be implemented. If an LSR/LER implementation intends to support LDP utilizing a Layer 2 of ATM, then the MPLS-LDP-STD-MIB Module and the MPLS-LDP-ATM-MIB Module MUST be implemented. If an LSR/LER implementation intends to support LDP utilizing a Layer 2 of FRAME-RELAY, then the MPLS-LDP-STD-MIB Module and the MPLS-LDP-FRAME-RELAY-STD-MIB Module MUST be implemented. An LDP implementation that utilizes all three Layer 2 media (Ethernet, Frame-Relay, ATM) MUST support all 4 MIB Modules. Each of the Modules will be discussed in detail in the following sections.

There are 2 compliance statements for each MIB Module. One compliance statement is for full compliance which allows both

configuration and monitoring via SNMP. The other compliance statement is for read-only compliance which allows only monitoring via SNMP.

[3.2.](#) Future Considerations

The LDP Specification [[RFC3036](#)] does not specify the use of VPNs or multicast for LDP, and thus, objects related to these areas have not been included.

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[RFC2684] does not describe VP merge capability and so this feature has not been included.

These areas need to be specified in the LDP Specification or other specifications prior to being added in this or any other MIB document.

[3.3.](#) Interface Indexing

Interface Indexes as specified in [[RFC2863](#)] are used in these MIB Modules. The descriptions of the ifIndexes denote which ifIndex is being used. The use of ifIndex is for actual existing connections.

[3.4.](#) Differences from the LDP Specification

Currently, there are 3 differences between this specification and the LDP Specification. As described in the Introduction, this document is almost entirely based on the LDP specification. The differences are documented here.

The first difference is that the LDP Entity Table contains some DEFVAL clauses which are not specified explicitly in the LDP Specification. These values, although not documented in the LDP Specification, are widely used by existing LDP MIB implementations and thus, have been adopted within this MPLS-LDP-STD-MIB module. Please note, they can certainly be changed during row creation or a subsequent SET request.

A second difference is the mplsLdpEntityConfGenericLRTTable in the

MPLS-LDP-GENERIC-STD-MIB Module. This table, although provided as a way to reserve a range of generic labels, does not exist in the LDP Specification. It was added to the MIB due to a request from the working group and because this table was considered useful for reserving a range of generic labels.

The third difference is documented by the TEXTUAL-CONVENTION, MplsAtmVcIdentifier which is in the MPLS-TC-STD-MIB [[MPLSTCMIB](#)]. This TC was added to restrict vci values to be greater than 31 as described in [RFC 3035](#) [[RFC3035](#)].

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[3.5.](#) The MPLS-LDP-STD-MIB Module

This MIB Module contains objects which are common to all LDP implementations. This MIB Module MUST always be implemented along with one or more of the Layer 2 MIB Modules.

This table allows the Label Edge Router (LER) or the Label Switching Router (LSR) to initiate and/or receive requests to establish LDP sessions. As the LDP protocol distributes labels and establishes sessions with Peers most of the tables in this module are populated by the agent as instructed by the LDP protocol. The exception is the mplsFecTable and the mplsLdpLspFecTable which can be configured by the operator to specify Forwarding Equivalence Class information for an LSP.

Some scalars and each table in the MPLS-LDP-STD-MIB Module is described in the following subsections.

[3.5.1.](#) LDP Scalar Objects

There are several scalar objects in the LDP MIB module. The mplsLdpLsrId is a read-only scalar object which reports Label Switching Router's (LSR's) Identifier. This MUST be a globally unique value, such as the 32-bit router ID assigned to the LSR.

The mplsLdpLsrLoopDetectionCapable scalar object denotes whether the

LSR is capable of supporting loop detection and if so, which form of loop detection.

There are two LastChange scalar objects, `mplsLdpEntityLastChange` and `mplsLdpPeerLastChange`. These objects give an indication of there was a change in the number of entries in the table, or if any of the values in the respective tables changed. Please see the object's description for more details.

The `mplsLdpEntityIndexNext` scalar object is described in the next section.

[3.5.2.](#) The LDP Entity Table

The MPLS-LDP-STD-MIB provides objects to configure/set-up potential LDP sessions on a specific LSR/LER. The `mplsLdpEntityTable` is used to configure information which is used by the LDP protocol to setup potential LDP Sessions.

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Each entry/row in this table represents a single LDP Entity. There is no maximum number of LDP Entities specified. However, there is an `mplsLdpEntityIndexNext` object which should be retrieved by the command generator prior to creating an LDP Entity. If the `mplsLdpEntityIndexNext` object is zero, this indicates that the LSR/LER is not able to create another LDP Entity at that time.

[3.5.2.1.](#) Changing Values After Session Establishment

One way to manually modify a session's parameters is by using SNMP to change the MIB objects related to that session. Please note, special care should be taken if MIB objects which are used in the MPLS LDP Session Initialization need to be modified. If the modification of any of these MIB variables takes place anytime after the start of session initialization, then the entire session must be halted. Any information learned by that session must be discarded. The objects should then be modified, and session initialization started. Assuming that the configuration was done correctly, then a new session will be created.

For example, assume that an operator wishes to change the configuration of a Label Range which is used by a Session that has

already been established. The operator should change the `mplsLdpEntityAdminStatus` to "disable(2)". Setting the `mplsLdpEntityAdminStatus` to "disable(2)" will cause the session to be torn down (i.e. this will signal to LDP that it should send out tear down messages for that session). Also, all information related to that session should be removed from this MIB by the Agent. This includes Peer information (i.e. relevant row in the `mplsPeerTable`) and Session statistics (i.e. relevant row in the `mplsLdpSessionTable`). Also, if the MPLS-LSR-STD-MIB module [[LSRMIB](#)] is implemented and the optional Mapping Table objects are implemented, then all information related to the LSPs in this session should be removed from these MIB modules. [For more information please see the section on "The Mapping Tables".] At this point, the operator could modify the Label Range. Lastly, the operator should set the `mplsLdpEntityAdminStatus` to "enable(1)". At this point session initialization should occur. The LDP Entity goes through the Session Initialization in order to communicate the new Label Ranges to the Peer and establish new LSPs.

[3.5.3.](#) The LDP Entity Statistics Table

The `mplsLdpEntityStatsTable` is a read-only table which contains statistical information related to failed attempts to establish sessions. Each row in this table AUGMENTS an `mplsLdpEntityEntry`. This table could be used to give insight into how to reconfigure values so that a session could be successfully established. For example, if the `mplsLdpEntityStatsSessionRejectedLRErrors` Counter object was increasing, then this would indicate that the Label Range (LR) may need to be adjusted.

[3.5.4.](#) The LDP Peer Table

The `mplsLdpPeerTable` is a read-only table which contains information about LDP Peers known to LDP Entities. In other words, the Peer information is learned by LDP through initialization or discovery. This table should be populated by the agent as directed by the LDP protocol.

A row in this table is related to one or more rows in the Hello Adjacency Table and related to a single row in the Session Table. The values in the Peer table are specific to a Peer and may or may not be the same values used in the session. The reason is that the Peer and Entity negotiate certain values. The Entity's values are configured in the mplsLdpEntityTable and the Peer's values are learned (and placed into the mplsLdpPeerTable). The mplsLdpSessionTable shows the values used in establishing the session.

One example, of when the Peer's values and the Session's values may differ is with the Peer's Path Limit information. The Peer's Path Limit information is learned from the session initialization phase. The actual value for the Path Vector Limit is the Peer's value and may not be the same value that appears in the session. There could be a mismatch in this value between the Entity and the Peer. In the event of a mismatch, then the session will use the Path Limit set by the Entity (and not the Peer).

The Peer Table information was placed in a separate table from the Session information to allow for a more comprehensive and coherent MIB model.

[3.5.5.](#) The LDP Session Table

The LDP Session Table is a read-only table. Each entry in this table represents a single session between an LDP Entity and a Peer. The mplsLdpSessionEntry AUGMENTS the mplsLdpPeerEntry.

The information in this table is learned during session establishment. NOTE: rows in this table will appear during session initialization.

[3.5.6.](#) The LDP Session Statistics Table

The mplsLdpSessionStatsTable is a read-only table which contains statistical information on sessions. This table AUGMENTS the

mplsLdpPeerTable.

[3.5.7.](#) The LDP Hello Adjacency Table

This is a table of all adjacencies between all LDP Entities and all LDP Peers. A Session may have one or more adjacencies. A session should not have zero adjacencies, because this indicates that the session has lost contact with the Peer. A session which has zero Hello Adjacencies should be removed.

[3.5.8.](#) The LDP LSP Table

The Label Information Base (LIB) contains information about labels learned by the LSR. The LIB for LDP, CR-LDP and MPLS-RSVP (i.e. all currently defined MPLS protocols) is represented in the LSR MIB [[LSRMIB](#)]. The LIB is represented by the LSR MIB's mplsXCTable (mpls Cross Connect Table), mplsInSegmentTable (mpls In Segment Table) and the mplsOutSegmentTable (mpls Out Segment Table). The mplsXCTable models the cross-connection of the incoming label with a specific outgoing label. The mplsInSegmentTable stores the incoming label's information, and the mplsOutSegmentTable stores the outgoing label's information.

The LDP Session that created the LSP and the LSP's (incoming label, outgoing label) pair along with other information is contained in the MPLS-LSR-STD-MIB module's mplsXCTable, the mplsInSegmentTable and the mplsOutSegmentTable.

In order to utilize the MPLS-LSR-STD-MIB module's mplsXCTable,

mplsInSegmentTable and mplsOutSegmentTable for LDP LSPs, there needs to be a mechanism to associate LDP sessions with LDP LSPs created as a result of those LDP sessions. The mplsInSegmentLdpLspTable and mplsOutSegmentLdpLspTable in this MIB contain information to find the LDP LSP entries in the mplsInSegmentTable, mplsOutSegmentTable and the mplsXCTable.

These two tables, the mplsInSegmentLdpLspTable and mplsOutSegmentLdpLspTable, have been made optional in the conformance section of the MIB. They only need to be supported if the LSR MIBs mplsInSegmentTable, mplsOutSegmentTable and mplsXCTable are

implemented.

As discussed in the section, "Changing Values after Session Establishment", if a session is torn down, then all the information related to this session, must be removed from the both LDP MIB and, if implemented, from the LSR MIB.

[3.5.9.](#) The FEC Table

The FEC Table is a table which contains FEC (Forwarding Equivalence Class) information. Each entry/row represents a single FEC Element. There is also an LDP LSP FEC Table, `mplsLdpLspFecTable`, which associates FECs with the LSPs.

[3.5.10.](#) The LDP Session Peer Address Table

The MPLS LDP Session Peer Address Table is a table which extends the `mplsLdpSessionTable`. This table is a read-only table which stores Addresses learned after session initialization via Address Message advertisement.

[3.6.](#) LDP Notifications

Currently, there are several notifications which are specific for LDP. These are described in this section. There are no objects which enable or disable notifications from being generated. [RFC 3413](#) [[RFC3413](#)] contains MIB modules which can be implemented that will enable or disable these notifications from being generated.

The `mplsLdpInitSessionThresholdExceeded` notification indicates to the operator that there may be a misconfigured `mplsLdpEntityEntry` because the session associated with this Entity is not being established, and

the Entity keeps trying to establish the session. A side effect of this situation is that a row in the `mplsLdpSessionTable` may not be reaching the operational state as indicated by the `mplsLdpSessionState` object. If the value of `mplsLdpEntityInitSessionThreshold` is 0 (zero) then this is equal to specifying the value of infinity for the threshold, and the `mplsLdpInitSessionThresholdExceeded` notification will never be sent.

The `mplsLdpPathVectorLimitMismatch` notification is generated when there is a mismatch in the Path Vector Limits between the Entity and Peer during session initialization. The session uses the value which is configured as the Entity's Path Vector Limit. However, a notification should be generated to indicate that a mismatch occurred. For further details, please see [Section 3.5.3](#) of the LDP Specification [[RFC3036](#)].

The `mplsLdpSessionUp` and `mplsLdpSessionDown` notifications are generated when there is an appropriate change in the `mplsLdpSessionState` object, e.g. when sessions change state (Up to Down for the `mplsLdpSessionDown` notification, or Down to Up for the `mplsLdpSessionUp` notification). There was discussion about combining these two notifications into a single notification, however, some NMS applications can utilize two different notifications, rather than having to parse the varbind list of a single notification. For example, the SessionDown is matched to a SessionUp notification more easily by some NMS applications, than having to parse a Varbind list in a SessionChange type of notification.

[3.7.](#) LDP Notification Frequency

LDP Notifications are expected to be few in number when LDP is ubiquitously deployed in a relatively stable network. A notification receiver, e.g. an NMS, that receives these notifications should not be overwhelmed by the frequency of LDP notifications. If this assertion proves to be inaccurate, then a throttling object to throttle these notifications may be added to future versions of the MPLS-LDP-STD-MIB.

[4.](#) MPLS Label Distribution Protocol MIB Definitions

```
MPLS-LDP-STD-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    OBJECT-TYPE, MODULE-IDENTITY, NOTIFICATION-TYPE,
```

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Integer32, Counter32, Unsigned32

FROM SNMPv2-SMI

MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP

FROM SNMPv2-CONF

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

InetAddressPrefixLength,
InetAddressType,
InetAddress,
InetPortNumber
FROM INET-ADDRESS-MIB

IndexInteger,
IndexIntegerNextFree
FROM DIFFSERV-MIB

mplsStdMIB,
MplsLabelDistributionMethod,
MplsLdpIdentifier,
MplsLdpLabelType,
MplsLspType,
MplsLsrIdentifier,
MplsRetentionMode
FROM MPLS-TC-STD-MIB

MplsIndexType
FROM MPLS-LSR-STD-MIB;

mplsLdpStdMIB MODULE-IDENTITY
LAST-UPDATED "200311181200Z" -- 18 November 2003
ORGANIZATION "Multiprotocol Label Switching (mpls)
Working Group"
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Loa Andersson, email: loa@pi.se

MPLS Working Group, email: mpls@uu.net"

DESCRIPTION

"Copyright (C) The Internet Society (2003). This version of this MIB module is part of RFCXXX; see the RFC itself for full legal notices.

This MIB contains managed object definitions for the 'Multiprotocol Label Switching, Label Distribution Protocol, LDP' document."

REVISION "200311181200Z" -- 18 November 2003

DESCRIPTION

"Initial version published as part of RFC XXXX."

-- Please see the IANA Considerations Section.

-- The requested mplsStdMIB subId is 4, e.g.

-- ::= { mplsStdMIB 4 }

::= { mplsStdMIB XXX } -- to be assigned by IANA

--*****

mplsLdpNotifications OBJECT IDENTIFIER ::= { mplsLdpStdMIB 0 }

mplsLdpObjects OBJECT IDENTIFIER ::= { mplsLdpStdMIB 1 }

mplsLdpConformance OBJECT IDENTIFIER ::= { mplsLdpStdMIB 2 }

--*****

-- MPLS LDP Objects

--*****

mplsLdpLsrObjects OBJECT IDENTIFIER ::= { mplsLdpObjects 1 }

mplsLdpEntityObjects OBJECT IDENTIFIER ::= { mplsLdpObjects 2 }

--

-- The MPLS Label Distribution Protocol's

-- Label Switching Router Objects

--

`mplsLdpLsrId OBJECT-TYPE``SYNTAX MplsLsrIdentifier``MAX-ACCESS read-only``STATUS current``DESCRIPTION``"The Label Switching Router's Identifier."``::= { mplsLdpLsrObjects 1 }``mplsLdpLsrLoopDetectionCapable OBJECT-TYPE``SYNTAX INTEGER {``none(1),``other(2),``hopCount(3),``pathVector(4),``hopCountAndPathVector(5)``}``MAX-ACCESS read-only``STATUS current``DESCRIPTION``"A indication of whether this
Label Switching Router supports
loop detection.``none(1) -- Loop Detection is not supported
on this LSR.``other(2) -- Loop Detection is supported but
by a method other than those
listed below.``hopCount(3) -- Loop Detection is supported by
Hop Count only.``pathVector(4) -- Loop Detection is supported by
Path Vector only.``hopCountAndPathVector(5) -- Loop Detection is
supported by both Hop Count
And Path Vector.`

Since Loop Detection is determined during Session Initialization, an individual session may not be running with loop detection. This object simply gives an indication of whether or not the LSR has the ability to support Loop Detection and which types."

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```
::= { mplsLdpLsrObjects 2 }
```

```
--  
-- The MPLS Label Distribution Protocol Entity Objects  
--
```

```
mplsLdpEntityLastChange OBJECT-TYPE
```

```
    SYNTAX TimeStamp
```

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

```
    STATUS current
```

```
    DESCRIPTION
```

```
        "The value of sysUpTime at the time of the most  
        recent addition or deletion of an entry  
        to/from the mplsLdpEntityTable/mplsLdpEntityStatsTable, or  
        the most recent change in value of any objects in the  
        mplsLdpEntityTable.
```

```
        If no such changes have occurred since the last  
        re-initialization of the local management subsystem,  
        then this object contains a zero value."
```

```
::= { mplsLdpEntityObjects 1 }
```

```
mplsLdpEntityIndexNext OBJECT-TYPE
```

```
    SYNTAX IndexIntegerNextFree
```

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

```
    STATUS current
```

```
    DESCRIPTION
```

```
        "This object contains an appropriate value to  
        be used for mplsLdpEntityIndex when creating  
        entries in the mplsLdpEntityTable. The value  
        0 indicates that no unassigned entries are  
        available."
```

```
::= { mplsLdpEntityObjects 2 }
```

```
mplsLdpEntityTable OBJECT-TYPE
```

```
    SYNTAX SEQUENCE OF MplsLdpEntityEntry
```

```
    MAX-ACCESS not-accessible
```

```
    STATUS current
```

```
    DESCRIPTION
```

```
        "This table contains information about the
```

MPLS Label Distribution Protocol Entities which exist on this Label Switching Router (LSR) or Label Edge Router (LER)."

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::= { mplsLdpEntityObjects 3 }

mplsLdpEntityEntry OBJECT-TYPE

SYNTAX MplsLdpEntityEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in this table represents an LDP entity.

An entry can be created by a network administrator

or by an SNMP agent as instructed by LDP."

INDEX { mplsLdpEntityLdpId, mplsLdpEntityIndex }

::= { mplsLdpEntityTable 1 }

MplsLdpEntityEntry ::= SEQUENCE {

mplsLdpEntityLdpId	MplsLdpIdentifier,
mplsLdpEntityIndex	IndexInteger,
mplsLdpEntityProtocolVersion	Unsigned32,
mplsLdpEntityAdminStatus	INTEGER,
mplsLdpEntityOperStatus	INTEGER,
mplsLdpEntityTcpDscPort	InetPortNumber,
mplsLdpEntityUdpDscPort	InetPortNumber,
mplsLdpEntityMaxPduLength	Unsigned32,
mplsLdpEntityKeepAliveHoldTimer	Unsigned32,
mplsLdpEntityHelloHoldTimer	Unsigned32,
mplsLdpEntityInitSessionThreshold	Integer32,
mplsLdpEntityLabelDistMethod	MplsLabelDistributionMethod,
mplsLdpEntityLabelRetentionMode	MplsRetentionMode,
mplsLdpEntityPathVectorLimit	Integer32,
mplsLdpEntityHopCountLimit	Integer32,
mplsLdpEntityTransportAddrKind	INTEGER,
mplsLdpEntityTargetPeer	TruthValue,
mplsLdpEntityTargetPeerAddrType	InetAddressType,
mplsLdpEntityTargetPeerAddr	InetAddress,
mplsLdpEntityLabelType	MplsLdpLabelType,
mplsLdpEntityDiscontinuityTime	TimeStamp,
mplsLdpEntityStorageType	StorageType,
mplsLdpEntityRowStatus	RowStatus

}

mplsLdpEntityLdpId OBJECT-TYPE
SYNTAX MplsLdpIdentifier
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The LDP identifier."

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REFERENCE

"[RFC3036](#), LDP Specification, Section on LDP Identifiers."
::= { mplsLdpEntityEntry 1 }

mplsLdpEntityIndex OBJECT-TYPE

SYNTAX IndexInteger
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

"This index is used as a secondary index to uniquely identify this row. Before creating a row in this table, the 'mplsLdpEntityIndexNext' object should be retrieved. That value should be used for the value of this index when creating a row in this table. NOTE: if a value of zero (0) is retrieved, that indicates that no rows can be created in this table at this time.

A secondary index (this object) is meaningful to some but not all, LDP implementations. For example an LDP implementation which uses PPP would use this index to differentiate PPP sub-links.

Another way to use this index is to give this the value of ifIndex. However, this is dependant on the implementation."

::= { mplsLdpEntityEntry 2 }

mplsLdpEntityProtocolVersion OBJECT-TYPE

SYNTAX Unsigned32(1..65535)
MAX-ACCESS read-create
STATUS current
DESCRIPTION

"The version number of the LDP protocol which will be used in the session initialization message.

[Section 3.5.3](#) in the LDP Specification specifies that the version of the LDP protocol is negotiated during session establishment. The value of this object represents the value that is sent in the initialization message."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.3](#) Initialization Message."

DEFVAL { 1 }

::= { mplsLdpEntityEntry 3 }

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mplsLdpEntityAdminStatus OBJECT-TYPE

SYNTAX INTEGER {
 enable(1),
 disable(2)
}

MAX-ACCESS read-create
STATUS current

DESCRIPTION

"The administrative status of this LDP Entity. If this object is changed from 'enable' to 'disable' and this entity has already attempted to establish contact with a Peer, then all contact with that Peer is lost and all information from that Peer needs to be removed from the MIB. (This implies that the network management subsystem should clean up any related entry in the mplsLdpPeerTable. This further implies that a 'tear-down' for that session is issued and the session and all information related to that session cease to exist).

At this point the operator is able to change values which are related to this entity.

When the admin status is set back to 'enable', then this Entity will attempt to establish a new session with the Peer."

DEFVAL { enable }

::= { mplsLdpEntityEntry 4 }

mplsLdpEntityOperStatus OBJECT-TYPE

```

SYNTAX      INTEGER {
                unknown(1),
                enabled(2),
                disabled(3)
            }
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The operational status of this LDP Entity.

    The value of unknown(1) indicates that the
    operational status cannot be determined at
    this time. The value of unknown should be
    a transient condition before changing
    to enabled(2) or disabled(3)."
```

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```
::= { mplsLdpEntityEntry 5 }
```

mplsLdpEntityTcpDscPort OBJECT-TYPE

```

SYNTAX      InetPortNumber
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "The TCP Discovery Port for
    LDP. The default value is the well-known
    value of this port."
REFERENCE
    "RFC3036, LDP Specification, Section 2.4.1,
    Basic Discovery Mechanism, Section 2.4.2,
    Extended Discovery Mechanism, Section
    3.10, Well-known Numbers, and Section 3.10.1.
    UDP and TCP Ports."
DEFVAL { 646 }
::= { mplsLdpEntityEntry 6 }
```

mplsLdpEntityUdpDscPort OBJECT-TYPE

```

SYNTAX      InetPortNumber
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "The UDP Discovery Port for
    LDP. The default value is the
    well-known value for this port."
```

REFERENCE

"[RFC3036](#), LDP Specification, [Section 2.4.1](#),
Basic Discovery Mechanism, [Section 2.4.2](#),
Extended Discovery Mechanism, [Section](#)
[3.10](#), Well-known Numbers, and [Section 3.10.1](#).
UDP and TCP Ports."

DEFVAL { 646 }

::= { mplsLdpEntityEntry 7 }

mplsLdpEntityMaxPduLength OBJECT-TYPE

SYNTAX Unsigned32 (256..65535)

UNITS "octets"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The maximum PDU Length that is sent in
the Common Session Parameters of an Initialization
Message. According to the LDP Specification [[RFC3036](#)]
a value of 255 or less specifies the

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default maximum length of 4096 octets, this is why
the value of this object starts at 256. The operator
should explicitly choose the default value (i.e. 4096),
or some other value.

The receiving LSR MUST calculate the maximum PDU
length for the session by using the smaller of its and
its peer's proposals for Max PDU Length."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.3](#).
Initialization Message."

DEFVAL { 4096 }

::= { mplsLdpEntityEntry 8 }

mplsLdpEntityKeepAliveHoldTimer OBJECT-TYPE

SYNTAX Unsigned32 (1..65535)

UNITS "seconds"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The 16-bit integer value which is the proposed keep
alive hold timer for this LDP Entity."

DEFVAL { 40 }

::= { mplsLdpEntityEntry 9 }

mplsLdpEntityHelloHoldTimer OBJECT-TYPE

SYNTAX Unsigned32 (0..65535)

UNITS "seconds"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The 16-bit integer value which is the proposed Hello hold timer for this LDP Entity. The Hello Hold time in seconds.

An LSR maintains a record of Hellos received from potential peers. This object represents the Hold Time in the Common Hello Parameters TLV of the Hello Message.

A value of 0 is a default value and should be interpreted in conjunction with the mplsLdpEntityTargetPeer object.

If the value of this object is 0: if the value of the mplsLdpEntityTargetPeer object is false(2), then this

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specifies that the Hold Time's actual default value is 15 seconds (i.e. the default Hold time for Link Hellos is 15 seconds). Otherwise if the value of the mplsLdpEntityTargetPeer object is true(1), then this specifies that the Hold Time's actual default value is 45 seconds (i.e. the default Hold time for Targeted Hellos is 45 seconds).

A value of 65535 means infinite (i.e. wait forever).

All other values represent the amount of time in seconds to wait for a Hello Message. Setting the hold time to a value smaller than 15 is not recommended, although not forbidden according to [RFC3036](#)."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.2.](#), Hello Message."

DEFVAL { 0 }

::= { mplsLdpEntityEntry 10 }

mplsLdpEntityInitSessionThreshold OBJECT-TYPE

SYNTAX Integer32(0..100)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"When attempting to establish a session with a given Peer, the given LDP Entity should send out the SNMP notification, 'mplsLdpInitSessionThresholdExceeded', when the number of Session Initialization messages sent exceeds this threshold.

The notification is used to notify an operator when this Entity and its Peer are possibly engaged in an endless sequence of messages as each NAKs the other's Initialization messages with Error Notification messages. Setting this threshold which triggers the notification is one way to notify the operator. The notification should be generated each time this threshold is exceeded and for every subsequent Initialization message which is NAK'd with an Error Notification message after this threshold is exceeded.

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A value of 0 (zero) for this object indicates that the threshold is infinity, thus the SNMP notification will never be generated."

REFERENCE

"[RFC3036](#), LDP Specification,
[Section 2.5.3](#) Session Initialization."

DEFVAL { 8 }

::= { mplsLdpEntityEntry 11 }

mplsLdpEntityLabelDistMethod OBJECT-TYPE

SYNTAX MplsLabelDistributionMethod

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"For any given LDP session, the method of label distribution must be specified."
 ::= { mplsLdpEntityEntry 12 }

mplsLdpEntityLabelRetentionMode OBJECT-TYPE

SYNTAX MplsRetentionMode

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The LDP Entity can be configured to use either conservative or liberal label retention mode.

If the value of this object is conservative(1) then advertized label mappings are retained only if they will be used to forward packets, i.e. if label came from a valid next hop.

If the value of this object is liberal(2) then all advertized label mappings are retained whether they are from a valid next hop or not."

::= { mplsLdpEntityEntry 13 }

mplsLdpEntityPathVectorLimit OBJECT-TYPE

SYNTAX Integer32 (0..255)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"If the value of this object is 0 (zero) then Loop Dection for Path Vectors is disabled.

Otherwise, if this object has a value greater than

zero, then Loop Dection for Path Vectors is enabled, and the Path Vector Limit is this value. Also, the value of the object, 'mplsLdpLsrLoopDetectionCapable', must be set to either 'pathVector(4)' or 'hopCountAndPathVector(5)', if this object has a value greater than 0 (zero), otherwise it is ignored."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 2.8](#) Loop Dection, [Section 3.4.5](#) Path Vector TLV."

::= { mplsLdpEntityEntry 14 }

mplsLdpEntityHopCountLimit OBJECT-TYPE

SYNTAX Integer32 (0..255)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"If the value of this object is 0 (zero),
then Loop Detection using Hop Counters is
disabled.

If the value of this object is greater than
0 (zero) then Loop Detection using Hop
Counters is enabled, and this object
specifies this Entity's maximum allowable
value for the Hop Count.

Also, the value of the object
mplsLdpLsrLoopDetectionCapable must be set
to either 'hopCount(3)' or
'hopCountAndPathVector(5)' if this object
has a value greater than 0 (zero), otherwise
it is ignored."

DEFVAL { 0 }

::= { mplsLdpEntityEntry 15 }

mplsLdpEntityTransportAddrKind OBJECT-TYPE

SYNTAX INTEGER {
 interface(1),
 loopback(2)
 }

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This specifies whether the loopback or interface
address is to be used as the transport address
in the transport address TLV of the

hello message.

If the value is interface(1), then the IP
address of the interface from which hello
messages are sent is used as the transport
address in the hello message.

Otherwise, if the value is loopback(2), then the IP address of the loopback interface is used as the transport address in the hello message."

DEFVAL { loopback }
::= { mplsLdpEntityEntry 16 }

mplsLdpEntityTargetPeer OBJECT-TYPE

SYNTAX TruthValue
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"If this LDP entity uses targeted peer then set this to true."
DEFVAL { false }
::= { mplsLdpEntityEntry 17 }

mplsLdpEntityTargetPeerAddrType OBJECT-TYPE

SYNTAX InetAddressType
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The type of the internetwork layer address used for the Extended Discovery. This object indicates how the value of mplsLdpEntityTargetPeerAddr is to be interpreted."
::= { mplsLdpEntityEntry 18 }

mplsLdpEntityTargetPeerAddr OBJECT-TYPE

SYNTAX InetAddress
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The value of the internetwork layer address used for the Extended Discovery. The value of mplsLdpEntityTargetPeerAddrType specifies how this address is to be interpreted."
::= { mplsLdpEntityEntry 19 }

mplsLdpEntityLabelType OBJECT-TYPE

SYNTAX MplsLdpLabelType
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"Specifies the optional parameters for the LDP Initialization Message.

If the value is generic(1) then no optional parameters will be sent in the LDP Initialization message associated with this Entity.

If the value is atmParameters(2) then a row must be created in the mplsLdpEntityAtmTable, which corresponds to this entry.

If the value is frameRelayParameters(3) then a row must be created in the mplsLdpEntityFrameRelayTable, which corresponds to this entry."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.3.](#), Initialization Message."

::= { mplsLdpEntityEntry 20 }

mplsLdpEntityDiscontinuityTime 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 entity's counters suffered a discontinuity. The relevant counters are the specific instances associated with this entity of any Counter32 object contained in the 'mplsLdpEntityStatsTable'. If no such discontinuities have occurred since the last re-initialization of the local management subsystem, then this object contains a zero value."

::= { mplsLdpEntityEntry 21 }

mplsLdpEntityStorageType OBJECT-TYPE

SYNTAX StorageType

```

MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "The storage type for this conceptual row.
    Conceptual rows having the value 'permanent(4)'
    need not allow write-access to any columnar
    objects in the row."
DEFVAL{ nonVolatile }
::= { mplsLdpEntityEntry 22 }

```

mplsLdpEntityRowStatus OBJECT-TYPE

```

SYNTAX        RowStatus
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "The status of this conceptual row. All writable
    objects in this row may be modified at any
    time, however, as described in detail in
    the section entitled, 'Changing Values After
    Session Establishment', and again described
    in the DESCRIPTION clause of the
    mplsLdpEntityAdminStatus object, if a session
    has been initiated with a Peer, changing objects
    in this table will wreak havoc with the session
    and interrupt traffic. To repeat again:
    the recommended procedure is to
    set the mplsLdpEntityAdminStatus to down, thereby
    explicitly causing a session to be torn down. Then,
    change objects in this entry, then set
    the mplsLdpEntityAdminStatus to enable,
    which enables a new session to be initiated."
::= { mplsLdpEntityEntry 23 }

```

--

-- The MPLS LDP Entity Statistics Table

--

mplsLdpEntityStatsTable OBJECT-TYPE

```

SYNTAX        SEQUENCE OF MplsLdpEntityStatsEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
    "This table is a read-only table which augments
    the mplsLdpEntityTable. The purpose of this
    table is to keep statistical information about

```

the LDP Entities on the LSR."
 ::= { mplsLdpEntityObjects 4 }

mplsLdpEntityStatsEntry OBJECT-TYPE

SYNTAX MplsLdpEntityStatsEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A row in this table contains statistical information about an LDP Entity. Some counters contained in a row are for fatal errors received during a former LDP Session associated with this entry. For example, an LDP PDU received on a TCP connection during an LDP Session contains a fatal error. That error is counted here, because the session is terminated.

If the error is NOT fatal (i.e. the Session remains), then the error is counted in the mplsLdpSessionStatsEntry."

AUGMENTS { mplsLdpEntityEntry }

::= { mplsLdpEntityStatsTable 1 }

MplsLdpEntityStatsEntry ::= SEQUENCE {

mplsLdpEntityStatsSessionAttempts	Counter32,
mplsLdpEntityStatsSessionRejectedNoHelloErrors	Counter32,
mplsLdpEntityStatsSessionRejectedAdErrors	Counter32,
mplsLdpEntityStatsSessionRejectedMaxPduErrors	Counter32,
mplsLdpEntityStatsSessionRejectedLRErrors	Counter32,
mplsLdpEntityStatsBadLdpIdentifierErrors	Counter32,
mplsLdpEntityStatsBadPduLengthErrors	Counter32,
mplsLdpEntityStatsBadMessageLengthErrors	Counter32,
mplsLdpEntityStatsBadTlvLengthErrors	Counter32,
mplsLdpEntityStatsMalformedTlvValueErrors	Counter32,
mplsLdpEntityStatsKeepAliveTimerExpErrors	Counter32,
mplsLdpEntityStatsShutdownReceivedNotifications	Counter32,
mplsLdpEntityStatsShutdownSentNotifications	Counter32

}

mplsLdpEntityStatsSessionAttempts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A count of the Session Initialization messages which were sent or received by this LDP Entity and

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were NAK'd. In other words, this counter counts the number of session initializations that failed.

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 `mplsLdpEntityDiscontinuityTime`."

::= { mplsLdpEntityStatsEntry 1 }

`mplsLdpEntityStatsSessionRejectedNoHelloErrors` OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A count of the Session Rejected/No Hello Error Notification Messages sent or received by this LDP Entity.

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 `mplsLdpEntityDiscontinuityTime`."

::= { mplsLdpEntityStatsEntry 2 }

`mplsLdpEntityStatsSessionRejectedAdErrors` OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A count of the Session Rejected/Parameters Advertisement Mode Error Notification Messages sent or received by this LDP Entity.

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 `mplsLdpEntityDiscontinuityTime`."

::= { mplsLdpEntityStatsEntry 3 }

`mplsLdpEntityStatsSessionRejectedMaxPduErrors` OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current
DESCRIPTION
"A count of the Session Rejected/Parameters

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Max Pdu Length Error Notification Messages sent
or received by this LDP Entity.

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
mplsLdpEntityDiscontinuityTime."

::= { mplsLdpEntityStatsEntry 4 }

mplsLdpEntityStatsSessionRejectedLRErrors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A count of the Session Rejected/Parameters
Label Range Notification Messages sent
or received by this LDP Entity.

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
mplsLdpEntityDiscontinuityTime."

::= { mplsLdpEntityStatsEntry 5 }

mplsLdpEntityStatsBadLdpIdentifierErrors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object counts the number of Bad LDP Identifier
Fatal Errors detected by the session(s)
(past and present) associated with this LDP Entity.

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
mplsLdpEntityDiscontinuityTime."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.1.2](#)."
 ::= { mplsLdpEntityStatsEntry 6 }

mplsLdpEntityStatsBadPduLengthErrors OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

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DESCRIPTION

"This object counts the number of Bad PDU Length Fatal Errors detected by the session(s) (past and present) associated with this LDP Entity.

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 mplsLdpEntityDiscontinuityTime."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.1.2](#)."
 ::= { mplsLdpEntityStatsEntry 7 }

mplsLdpEntityStatsBadMessageLengthErrors OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"This object counts the number of Bad Message Length Fatal Errors detected by the session(s) (past and present) associated with this LDP Entity.

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 mplsLdpEntityDiscontinuityTime."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.1.2](#)."
 ::= { mplsLdpEntityStatsEntry 8 }

mplsLdpEntityStatsBadTlvLengthErrors OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"This object counts the number of Bad TLV Length Fatal Errors detected by the session(s) (past and present) associated with this LDP Entity.

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 mplsLdpEntityDiscontinuityTime."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.1.2](#)."
::= { mplsLdpEntityStatsEntry 9 }

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mplsLdpEntityStatsMalformedTlvValueErrors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object counts the number of Malformed TLV Value Fatal Errors detected by the session(s) (past and present) associated with this LDP Entity.

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 mplsLdpEntityDiscontinuityTime."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.1.2](#)."
::= { mplsLdpEntityStatsEntry 10 }

mplsLdpEntityStatsKeepAliveTimerExpErrors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object counts the number of Session Keep Alive Timer Expired Errors detected by the session(s) (past and present) associated with this LDP Entity.

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 mplsLdpEntityDiscontinuityTime."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.1.2](#)."

::= { mplsLdpEntityStatsEntry 11 }

mplsLdpEntityStatsShutdownReceivedNotifications OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object counts the number of Shutdown Notifications received related to session(s) (past and present) associated with this LDP Entity.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at

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other times as indicated by the value of
mplsLdpEntityDiscontinuityTime."

::= { mplsLdpEntityStatsEntry 12 }

mplsLdpEntityStatsShutdownSentNotifications OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object counts the number of Shutdown Notifications sent related to session(s) (past and present) associated with this LDP Entity.

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
mplsLdpEntityDiscontinuityTime."

::= { mplsLdpEntityStatsEntry 13 }

--

-- The MPLS LDP Peer Table

--

mplsLdpSessionObjects OBJECT IDENTIFIER ::= { mplsLdpObjects 3 }

mplsLdpPeerLastChange OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime at the time of the most recent addition or deletion to/from the mplsLdpPeerTable/mpsLdpSessionTable."

::= { mplsLdpSessionObjects 1 }

mplsLdpPeerTable OBJECT-TYPE

SYNTAX SEQUENCE OF MplsLdpPeerEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Information about LDP peers known by Entities in the mplsLdpEntityTable. The information in this table is based on information from the Entity-Peer interaction during session initialization but is not appropriate

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for the mplsLdpSessionTable, because objects in this table may or may not be used in session establishment."
::= { mplsLdpSessionObjects 2 }

mplsLdpPeerEntry OBJECT-TYPE

SYNTAX MplsLdpPeerEntry

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 }

::= { mplsLdpPeerTable 1 }

MplsLdpPeerEntry ::= SEQUENCE {

mplsLdpPeerLdpId	MplsLdpIdentifier,
mplsLdpPeerLabelDistMethod	MplsLabelDistributionMethod,
mplsLdpPeerPathVectorLimit	Integer32,
mplsLdpPeerTransportAddrType	InetAddressType,
mplsLdpPeerTransportAddr	InetAddress

}

mplsLdpPeerLdpId OBJECT-TYPE
SYNTAX MplsLdpIdentifier
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The LDP identifier of this LDP Peer."
::= { mplsLdpPeerEntry 1 }

mplsLdpPeerLabelDistMethod OBJECT-TYPE
SYNTAX MplsLabelDistributionMethod
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"For any given LDP session, the method of
label distribution must be specified."
::= { mplsLdpPeerEntry 2 }

mplsLdpPeerPathVectorLimit OBJECT-TYPE
SYNTAX Integer32 (0..255)
MAX-ACCESS read-only
STATUS current

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DESCRIPTION

"If the value of this object is 0 (zero) then
Loop Dection for Path Vectors for this Peer
is disabled.

Otherwise, if this object has a value greater than
zero, then Loop Dection for Path Vectors for this
Peer is enabled and the Path Vector Limit is this value."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 2.8](#) Loop Dection,
[Section 3.4.5](#) Path Vector TLV."

::= { mplsLdpPeerEntry 3 }

mplsLdpPeerTransportAddrType OBJECT-TYPE

SYNTAX InetAddressType
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"The type of the Internet address for the

mplsLdpPeerTransportAddr object. The LDP specification describes this as being either an IPv4 Transport Address or IPv6 Transport Address which is used in opening the LDP session's TCP connection, or if the optional TLV is not present, then this is the IPv4/IPv6 source address for the UPD packet carrying the Hellos.

This object specifies how the value of the mplsLdpPeerTransportAddr object should be interpreted."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 2.5.2](#) Transport Connection Establishment and [Section 3.5.2.1](#) Hello Message Procedures."

::= { mplsLdpPeerEntry 4 }

mplsLdpPeerTransportAddr OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The Internet address advertised by the peer in the Hello Message or the Hello source address.

The type of this address is specified by the

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value of the mplsLdpPeerTransportAddrType object."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 2.5.2](#) Transport Connection Establishment and [Section 3.5.2.1](#) Hello Message Procedures."

::= { mplsLdpPeerEntry 5 }

--

-- The MPLS LDP Sessions Table

--

mplsLdpSessionTable OBJECT-TYPE

SYNTAX SEQUENCE OF MplsLdpSessionEntry

MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "A table of Sessions between the LDP Entities
 and LDP Peers. This table AUGMENTS the
 mplsLdpPeerTable. Each row in this table
 represents a single session."
 ::= { mplsLdpSessionObjects 3 }

mplsLdpSessionEntry OBJECT-TYPE
 SYNTAX MplsLdpSessionEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "An entry in this table represents information on a
 single session between an LDP Entity and LDP Peer.
 The information contained in a row is read-only.

Please note: the Path Vector Limit for the
 Session is the value which is configured in
 the corresponding mplsLdpEntityEntry. The
 Peer's Path Vector Limit is in the
 mplsLdpPeerPathVectorLimit object in the
 mplsLdpPeerTable.

Values which may differ from those configured are
 noted in the objects of this table, the
 mplsLdpAtmSessionTable and the
 mplsLdpFrameRelaySessionTable. A value will
 differ if it was negotiated between the
 Entity and the Peer. Values may or may not

be negotiated. For example, if the values
 are the same then no negotiation takes place.
 If they are negotiated, then they may differ."
 AUGMENTS { mplsLdpPeerEntry }
 ::= { mplsLdpSessionTable 1 }

MplsLdpSessionEntry ::= SEQUENCE {
 mplsLdpSessionStateLastChange TimeStamp,
 mplsLdpSessionState INTEGER,
 mplsLdpSessionRole INTEGER,
 mplsLdpSessionProtocolVersion Unsigned32,

```

mplsLdpSessionKeepAliveHoldTimeRem TimeInterval,
mplsLdpSessionKeepAliveTime           Unsigned32,
mplsLdpSessionMaxPduLength             Unsigned32,
mplsLdpSessionDiscontinuityTime        TimeStamp
}

```

```

mplsLdpSessionStateLastChange OBJECT-TYPE
    SYNTAX TimeStamp
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The value of sysUpTime at the time this
        Session entered its current state as
        denoted by the mplsLdpSessionState
        object."
    ::= { mplsLdpSessionEntry 1 }

```

```

mplsLdpSessionState OBJECT-TYPE
    SYNTAX INTEGER {
        nonexistent(1),
        initialized(2),
        openrec(3),
        opensent(4),
        operational(5)
    }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The current state of the session, all of the
        states 1 to 5 are based on the state machine
        for session negotiation behavior."
    REFERENCE
        "RFC3036, LDP Specification, Section 2.5.4,
        Initialization State Machine."
    ::= { mplsLdpSessionEntry 2 }

```

```

mplsLdpSessionRole OBJECT-TYPE
    SYNTAX INTEGER {
        unknown(1),
        active(2),
        passive(3)
    }
    MAX-ACCESS read-only

```


STATUS current

DESCRIPTION

"During session establishment the LSR/LER takes either the active role or the passive role based on address comparisons. This object indicates whether this LSR/LER was behaving in an active role or passive role during this session's establishment.

The value of unknown(1), indicates that the role is not able to be determined at the present time."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 2.5.3.](#),
Session Initialization"

::= { mplsLdpSessionEntry 3 }

mplsLdpSessionProtocolVersion OBJECT-TYPE

SYNTAX Unsigned32(1..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The version of the LDP Protocol which this session is using. This is the version of the LDP protocol which has been negotiated during session initialization."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.3](#),
Initialization Message."

::= { mplsLdpSessionEntry 4 }

mplsLdpSessionKeepAliveHoldTimeRem OBJECT-TYPE

SYNTAX TimeInterval

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The keep alive hold time remaining for this session."

::= { mplsLdpSessionEntry 5 }

mplsLdpSessionKeepAliveTime OBJECT-TYPE

SYNTAX Unsigned32 (1..65535)

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The negotiated KeepAlive Time which represents the amount of seconds between keep alive messages. The mplsLdpEntityKeepAliveHoldTimer related to this Session is the value that was proposed as the KeepAlive Time for this session.

This value is negotiated during session initialization between the entity's proposed value (i.e. the value configured in mplsLdpEntityKeepAliveHoldTimer) and the peer's proposed KeepAlive Hold Timer value. This value is the smaller of the two proposed values."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.3](#), Initialization Message."

::= { mplsLdpSessionEntry 6 }

mplsLdpSessionMaxPduLength OBJECT-TYPE

SYNTAX Unsigned32 (1..65535)

UNITS "octets"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of maximum allowable length for LDP PDUs for this session. This value may have been negotiated during the Session Initialization. This object is related to the mplsLdpEntityMaxPduLength object. The mplsLdpEntityMaxPduLength object specifies the requested LDP PDU length, and this object reflects the negotiated LDP PDU length between the Entity and the Peer."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.3](#), Initialization Message."

::= { mplsLdpSessionEntry 7 }

mplsLdpSessionDiscontinuityTime 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 session's counters suffered a discontinuity. The relevant counters are the specific instances associated with this session of any Counter32 object contained in the mplsLdpSessionStatsTable.

The initial value of this object is the value of sysUpTime when the entry was created in this table.

Also, a command generator can distinguish when a session between a given Entity and Peer goes away and a new session is established. This value would change and thus indicate to the command generator that this is a different session."

::= { mplsLdpSessionEntry 8 }

--

-- The MPLS LDP Session Statistics Table

--

mplsLdpSessionStatsTable OBJECT-TYPE

SYNTAX SEQUENCE OF MplsLdpSessionStatsEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of statistics for Sessions between LDP Entities and LDP Peers. This table AUGMENTS the mplsLdpPeerTable."

::= { mplsLdpSessionObjects 4 }

mplsLdpSessionStatsEntry OBJECT-TYPE

SYNTAX MplsLdpSessionStatsEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

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

```
AUGMENTS          { mplsLdpPeerEntry }
 ::= { mplsLdpSessionStatsTable 1 }

MplsLdpSessionStatsEntry ::= SEQUENCE {
    mplsLdpSessionStatsUnknownMesTypeErrors Counter32,
    mplsLdpSessionStatsUnknownTlvErrors      Counter32
}

mplsLdpSessionStatsUnknownMesTypeErrors OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object counts the number of Unknown Message Type
        Errors detected by this LSR/LER during 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."
    ::= { mplsLdpSessionStatsEntry 1 }

mplsLdpSessionStatsUnknownTlvErrors OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object counts the number of Unknown TLV Errors
        detected by this LSR/LER during 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."
    ::= { mplsLdpSessionStatsEntry 2 }

--
-- The MPLS LDP Hello Adjacency Table
--

mplsLdpHelloAdjacencyObjects OBJECT IDENTIFIER ::=
    { mplsLdpSessionObjects 5 }

mplsLdpHelloAdjacencyTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF MplsLdpHelloAdjacencyEntry
```

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```
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
    "A table of Hello Adjacencies for Sessions."
 ::= { mplsLdpHelloAdjacencyObjects 1 }
```

```
mplsLdpHelloAdjacencyEntry OBJECT-TYPE
SYNTAX        MplsLdpHelloAdjacencyEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
    "Each row represents a single LDP Hello Adjacency.
    An LDP Session can have one or more Hello
    Adjacencies."
    INDEX      { mplsLdpEntityLdpId,
                  mplsLdpEntityIndex,
                  mplsLdpPeerLdpId,
                  mplsLdpHelloAdjacencyIndex }
 ::= { mplsLdpHelloAdjacencyTable 1 }
```

```
MplsLdpHelloAdjacencyEntry ::= SEQUENCE {
    mplsLdpHelloAdjacencyIndex      Unsigned32,
    mplsLdpHelloAdjacencyHoldTimeRem TimeInterval,
    mplsLdpHelloAdjacencyHoldTime   Unsigned32,
    mplsLdpHelloAdjacencyType       INTEGER
}
```

```
mplsLdpHelloAdjacencyIndex OBJECT-TYPE
SYNTAX        Unsigned32 (1..4294967295)
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
    "An identifier for this specific adjacency."
 ::= { mplsLdpHelloAdjacencyEntry 1 }
```

```
mplsLdpHelloAdjacencyHoldTimeRem OBJECT-TYPE
SYNTAX        TimeInterval
UNITS         "seconds"
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "If the value of this object is 65535,
    this means that the hold time is infinite"
```

(i.e. wait forever).

Otherwise, the time remaining for

this Hello Adjacency to receive its
next Hello Message.

This interval will change when the 'next'
Hello Message which corresponds to this
Hello Adjacency is received unless it
is infinite."

::= { mplsLdpHelloAdjacencyEntry 2 }

mplsLdpHelloAdjacencyHoldTime OBJECT-TYPE

SYNTAX Unsigned32 (0..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The Hello hold time which is negotiated between
the Entity and the Peer. The entity associated
with this Hello Adjacency issues a proposed
Hello Hold Time value in the
mplsLdpEntityHelloHoldTimer object. The peer
also proposes a value and this object represents
the negotiated value.

A value of 0 means the default,
which is 15 seconds for Link Hellos
and 45 seconds for Targeted Hellos.
A value of 65535 indicates an
infinite hold time."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.2](#) Hello Message"

::= { mplsLdpHelloAdjacencyEntry 3 }

mplsLdpHelloAdjacencyType OBJECT-TYPE

SYNTAX INTEGER {
link(1),
targeted(2)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

```
"This adjacency is the result of a 'link'
hello if the value of this object is link(1).
Otherwise, it is a result of a 'targeted'
hello, targeted(2)."
```

```
::= { mplsLdpHelloAdjacencyEntry 4 }
```

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```
--
-- Session Label (LSP) Mapping to LSR MIB's
-- In Segment LIB Information.
--
```

```
--
-- NOTE: the next 2 tables map to the
-- MPLS-LSR-STD-MIB's MplsInSegmentTable
-- and MplsOutSegmentTable. The
-- cross-connect (XC) information is not
-- represented here as it can be gleaned
-- from the MPLS-LSR-STD-MIB.
--
```

```
mplsInSegmentLdpLspTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF MplsInSegmentLdpLspEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table of LDP LSP's which
        map to the mplsInSegmentTable in the
        the MPLS-LSR-STD-MIB module."
    ::= { mplsLdpSessionObjects 6 }
```

```
mplsInSegmentLdpLspEntry OBJECT-TYPE
    SYNTAX      MplsInSegmentLdpLspEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry in this table represents information
        on a single LDP LSP which is represented by
        a session's index triple (mplsLdpEntityLdpId,
        mplsLdpEntityIndex, mplsLdpPeerLdpId) AND the
        index for the mplsInSegmentTable
```

(mplsInSegmentLdpLspLabelIndex) from the
MPLS-LSR-STD-MIB.

The information contained in a row is read-only."
INDEX { mplsLdpEntityLdpId,
mplsLdpEntityIndex,
mplsLdpPeerLdpId,
mplsInSegmentLdpLspIndex
}
::= { mplsInSegmentLdpLspTable 1 }

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MplsInSegmentLdpLspEntry ::= SEQUENCE {
 mplsInSegmentLdpLspIndex
 mplsInSegmentLdpLspLabelType
 mplsInSegmentLdpLspType
}
MplsIndexType,
MplsLdpLabelType,
MplsLspType

mplsInSegmentLdpLspIndex OBJECT-TYPE
SYNTAX MplsIndexType
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "This contains the same value as the
 mplsInSegmentIndex in the
 MPLS-LSR-STD-MIB's mplsInSegmentTable."
::= { mplsInSegmentLdpLspEntry 1 }

mplsInSegmentLdpLspLabelType OBJECT-TYPE
SYNTAX MplsLdpLabelType
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The Layer 2 Label Type."
::= { mplsInSegmentLdpLspEntry 2 }

mplsInSegmentLdpLspType OBJECT-TYPE
SYNTAX MplsLspType
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The type of LSP connection."
::= { mplsInSegmentLdpLspEntry 3 }


```
--
-- Session Label (LSP) Mapping to LSR MIB's
-- Out Segment LIB Information.
--
```

```
mplsOutSegmentLdpLspTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF MplsOutSegmentLdpLspEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table of LDP LSP's which
        map to the mplsOutSegmentTable in the
        the MPLS-LSR-STD-MIB."
```

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```
::= { mplsLdpSessionObjects 7 }
```

```
mplsOutSegmentLdpLspEntry OBJECT-TYPE
    SYNTAX      MplsOutSegmentLdpLspEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry in this table represents information
        on a single LDP LSP which is represented by
        a session's index triple (mplsLdpEntityLdpId,
        mplsLdpEntityIndex, mplsLdpPeerLdpId) AND the
        index (mplsOutSegmentLdpLspIndex)
        for the mplsOutSegmentTable.

        The information contained in a row is read-only."
    INDEX      { mplsLdpEntityLdpId,
                  mplsLdpEntityIndex,
                  mplsLdpPeerLdpId,
                  mplsOutSegmentLdpLspIndex
                }
    ::= { mplsOutSegmentLdpLspTable 1 }
```

```
MplsOutSegmentLdpLspEntry ::= SEQUENCE {
    mplsOutSegmentLdpLspIndex          MplsIndexType,
    mplsOutSegmentLdpLspLabelType      MplsLdpLabelType,
    mplsOutSegmentLdpLspType           MplsLspType
}
```

```

mplsOutSegmentLdpLspIndex OBJECT-TYPE
    SYNTAX      MplsIndexType
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "This contains the same value as the
        mplsOutSegmentIndex in the
        MPLS-LSR-STD-MIB's mplsOutSegmentTable."
    ::= { mplsOutSegmentLdpLspEntry 1 }

```

```

mplsOutSegmentLdpLspLabelType OBJECT-TYPE
    SYNTAX      MplsLdpLabelType
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The Layer 2 Label Type."
    ::= { mplsOutSegmentLdpLspEntry 2 }

```

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```

mplsOutSegmentLdpLspType OBJECT-TYPE
    SYNTAX      MplsLspType
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The type of LSP connection."
    ::= { mplsOutSegmentLdpLspEntry 3 }

```

```

--
-- Mpls FEC Table
--

```

```

mplsFecObjects OBJECT IDENTIFIER ::=
    { mplsLdpSessionObjects 8 }

```

```

mplsFecLastChange OBJECT-TYPE
    SYNTAX      TimeStamp
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The value of sysUpTime at the time of the most

```

recent addition/deletion of an entry
to/from the mplsLdpFecTable or
the most recent change in values to any objects
in the mplsLdpFecTable.

If no such changes have occurred since the last
re-initialization of the local management subsystem,
then this object contains a zero value."

::= { mplsFecObjects 1 }

mplsFecIndexNext OBJECT-TYPE

SYNTAX IndexIntegerNextFree

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object contains an appropriate value to
be used for mplsFecIndex when creating
entries in the mplsFecTable. The value
0 indicates that no unassigned entries are
available."

::= { mplsFecObjects 2 }

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mplsFecTable 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 LSP."

::= { mplsFecObjects 3 }

mplsFecEntry OBJECT-TYPE

SYNTAX MplsFecEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each row represents a single FEC Element."

INDEX { mplsFecIndex }

::= { mplsFecTable 1 }

```

MplsFecEntry ::= SEQUENCE {
    mplsFecIndex          IndexInteger,
    mplsFecType            INTEGER,
    mplsFecAddrType       InetAddressType,
    mplsFecAddr           InetAddress,
    mplsFecAddrPrefixLength  InetAddressPrefixLength,
    mplsFecStorageType     StorageType,
    mplsFecRowStatus       RowStatus
}

```

```

mplsFecIndex OBJECT-TYPE
    SYNTAX      IndexInteger
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The index which uniquely identifies this entry."
    ::= { mplsFecEntry 1 }

```

```

mplsFecType OBJECT-TYPE
    SYNTAX      INTEGER {
                    prefix(1),
                    hostAddress(2)
                }
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The type of the FEC.  If the value of this object

```

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is 'prefix(1)' then the FEC type described by this row is an address prefix.

If the value of this object is 'hostAddress(2)' then the FEC type described by this row is a host address."

REFERENCE

"[RFC3036, Section 3.4.1](#). FEC TLV."

```

::= { mplsFecEntry 2 }

```

```

mplsFecAddrType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  read-create
    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 mplsFecAddr object is interpreted."

REFERENCE

"[RFC3036, Section 3.4.1](#). FEC TLV."

::= { mplsFecEntry 4 }

mplsFecAddr OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The value of this object is interpreted based on the value of the 'mplsFecAddrType' object.

This address is then further interpreted as an being used with the address prefix, or as the host address. This further interpretation is indicated by the 'mplsFecType' object. In other words, the FEC element is populated according to the Prefix FEC Element value encoding, or the Host Address FEC Element encoding."

REFERENCE

"[RFC3036, Section 3.4.1](#) FEC TLV."

::= { mplsFecEntry 5 }

mplsFecAddrPrefixLength OBJECT-TYPE

SYNTAX InetAddressPrefixLength

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"If the value of the 'mplsFecType' is 'hostAddress(2)' then this object is undefined.

If the value of 'mplsFecType' is 'prefix(1)' then the value of this object is the length in bits of the address prefix represented by 'mplsFecAddr', or zero. If the value of this object is zero, this indicates that the prefix matches all addresses. In this case the address prefix MUST also be zero (i.e. 'mplsFecAddr')

```

        should have the value of zero.)"
REFERENCE
    "RFC3036, Section 3.4.1. FEC TLV."
DEFVAL { 0 }
::= { mplsFecEntry 3 }

mplsFecStorageType OBJECT-TYPE
    SYNTAX      StorageType
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The storage type for this conceptual row.
        Conceptual rows having the value 'permanent(4)'
        need not allow write-access to any columnar
        objects in the row."
    DEFVAL { nonVolatile }
    ::= { mplsFecEntry 6 }

mplsFecRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The status of this conceptual row.  If the value of this
        object is 'active(1)', then none of the writable objects
        of this entry can be modified, except to set this object
        to 'destroy(6)'.

        NOTE: if this row is being referenced by any entry in
        the mplsLdpLspFecTable, then a request to destroy
        this row, will result in an inconsistentValue error."
    ::= { mplsFecEntry 7 }

```

--

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-- LDP LSP FEC Table
--

```

mplsLdpLspFecLastChange OBJECT-TYPE
    SYNTAX TimeStamp
    MAX-ACCESS read-only

```

STATUS current

DESCRIPTION

"The value of sysUpTime at the time of the most recent addition/deletion of an entry to/from the mplsLdpLspFecTable or the most recent change in values to any objects in the mplsLdpLspFecTable.

If no such changes have occurred since the last re-initialization of the local management subsystem, then this object contains a zero value."

::= { mplsLdpSessionObjects 9 }

mplsLdpLspFecTable OBJECT-TYPE

SYNTAX SEQUENCE OF MplsLdpLspFecEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table which shows the relationship between LDP LSPs and FECs. Each row represents a single LDP LSP to FEC association."

::= { mplsLdpSessionObjects 10 }

mplsLdpLspFecEntry OBJECT-TYPE

SYNTAX MplsLdpLspFecEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry represents a LDP LSP to FEC association."

INDEX { mplsLdpEntityLdpId,
mplsLdpEntityIndex,
mplsLdpPeerLdpId,
mplsLdpLspFecSegment,
mplsLdpLspFecSegmentIndex,
mplsLdpLspFecIndex
}

::= { mplsLdpLspFecTable 1 }

MplsLdpLspFecEntry ::= SEQUENCE {
mplsLdpLspFecSegment INTEGER,
mplsLdpLspFecSegmentIndex MplsIndexType,

```

mplsLdpLspFecIndex      IndexInteger,
mplsLdpLspFecStorageType StorageType,
mplsLdpLspFecRowStatus  RowStatus
}

mplsLdpLspFecSegment OBJECT-TYPE
    SYNTAX INTEGER {
                                inSegment(1),
                                outSegment(2)
                            }
    MAX-ACCESS not-accessible
    STATUS      current
    DESCRIPTION
        "If the value is inSegment(1), then this
        indicates that the following index,
        mplsLdpLspFecSegmentIndex, contains the same
        value as the mplsInSegmentLdpLspIndex.

        Otherwise, if the value of this object is
        outSegment(2), then this
        indicates that following index,
        mplsLdpLspFecSegmentIndex, contains the same
        value as the mplsOutSegmentLdpLspIndex."
    ::= { mplsLdpLspFecEntry 1 }

```

```

mplsLdpLspFecSegmentIndex OBJECT-TYPE
    SYNTAX      MplsIndexType
    MAX-ACCESS not-accessible
    STATUS      current
    DESCRIPTION
        "This index is interpreted by using the value
        of the mplsLdpLspFecSegment.

        If the mplsLdpLspFecSegment is inSegment(1),
        then this index has the same value as
        mplsInSegmentLdpLspIndex.

        If the mplsLdpLspFecSegment is outSegment(2),
        then this index has the same value as
        mplsOutSegmentLdpLspIndex."
    ::= { mplsLdpLspFecEntry 2 }

```



```

mplsLdpLspFecIndex    OBJECT-TYPE
    SYNTAX              IndexInteger
    MAX-ACCESS          not-accessible
    STATUS              current
    DESCRIPTION
        "This index identifies the FEC entry in the
        mplsFecTable associated with this session.
        In other words, the value of this index
        is the same as the value of the mplsFecIndex
        that denotes the FEC associated with this
        Session."
    ::= { mplsLdpLspFecEntry 3 }

```

```

mplsLdpLspFecStorageType OBJECT-TYPE
    SYNTAX              StorageType
    MAX-ACCESS          read-create
    STATUS              current
    DESCRIPTION
        "The storage type for this conceptual row.
        Conceptual rows having the value 'permanent(4)'
        need not allow write-access to any columnar
        objects in the row."
    DEFVAL { nonVolatile }
    ::= { mplsLdpLspFecEntry 4 }

```

```

mplsLdpLspFecRowStatus OBJECT-TYPE
    SYNTAX              RowStatus
    MAX-ACCESS          read-create
    STATUS              current
    DESCRIPTION
        "The status of this conceptual row.  If the
        value of this object is 'active(1)', then
        none of the writable objects of this entry
        can be modified.

        The Agent should delete this row when
        the session ceases to exist.  If an
        operator wants to associate the session with
        a different FEC, the recommended
        procedure is (as described in detail in the section
        entitled, 'Changing Values After Session
        Establishment', and again described in the
        DESCRIPTION clause of the
        mplsLdpEntityAdminStatus object)
        is to set the mplsLdpEntityAdminStatus to

```

down, thereby explicitly causing a session to be torn down. This will also cause this entry to be deleted.

Then, set the `mplsLdpEntityAdminStatus` to enable which enables a new session to be initiated. Once the session is initiated, an entry may be added to this table to associate the new session with a FEC."

::= { mplsLdpLspFecEntry 5 }

--

-- Address Message/Address Withdraw Message Information

--

-- This information is associated with a specific Session
-- because Label Address Messages are sent after session
-- initialization has taken place.

--

`mplsLdpSessionPeerAddrTable` OBJECT-TYPE

SYNTAX SEQUENCE OF `MplsLdpSessionPeerAddrEntry`

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table 'extends' the `mplsLdpSessionTable`. This table is used to store Label Address Information from Label Address Messages received by this LSR from Peers. This table is read-only and should be updated when Label Withdraw Address Messages are received, i.e. Rows should be deleted as appropriate.

NOTE: since more than one address may be contained in a Label Address Message, this table 'sparse augments', the `mplsLdpSessionTable`'s information."

::= { mplsLdpSessionObjects 11 }

`mplsLdpSessionPeerAddrEntry` OBJECT-TYPE

SYNTAX `MplsLdpSessionPeerAddrEntry`

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in this table represents information on a session's single next hop address which was advertised in an Address Message from the LDP peer.

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The information contained in a row is read-only."

```
INDEX          { mplsLdpEntityLdpId,
                  mplsLdpEntityIndex,
                  mplsLdpPeerLdpId,
                  mplsLdpSessionPeerAddrIndex
                }
 ::= { mplsLdpSessionPeerAddrTable 1 }
```

`mplsLdpSessionPeerAddrEntry` ::= SEQUENCE {
 mplsLdpSessionPeerAddrIndex Unsigned32,
 mplsLdpSessionPeerNextHopAddrType InetAddressType,
 mplsLdpSessionPeerNextHopAddr InetAddress
}

`mplsLdpSessionPeerAddrIndex` OBJECT-TYPE
 SYNTAX Unsigned32 (1..4294967295)
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "An index which uniquely identifies this entry within
 a given session."
 ::= { mplsLdpSessionPeerAddrEntry 1 }

`mplsLdpSessionPeerNextHopAddrType` OBJECT-TYPE
 SYNTAX InetAddressType
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The internetwork layer address type of this Next Hop
 Address as specified in the Label Address Message
 associated with this Session. The value of this
 object indicates how to interpret the value of
 mplsLdpSessionPeerNextHopAddr."
 ::= { mplsLdpSessionPeerAddrEntry 2 }

`mplsLdpSessionPeerNextHopAddr` OBJECT-TYPE
 SYNTAX InetAddress
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The next hop address. The type of this address
 is specified by the value of the
 mplsLdpSessionPeerNextHopAddrType."

REFERENCE

"[RFC3036, Section 2.7](#). LDP Identifiers
and Next Hop Addresses"

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::= { mplsLdpSessionPeerAddrEntry 3 }

--- Notifications

mplsLdpInitSessionThresholdExceeded NOTIFICATION-TYPE

OBJECTS {
 mplsLdpEntityInitSessionThreshold
}

STATUS current

DESCRIPTION

"This notification is generated when the value of
the 'mplsLdpEntityInitSessionThreshold' object
is not zero, and the number of Session
Initialization messages exceeds the value
of the 'mplsLdpEntityInitSessionThreshold' object."

::= { mplsLdpNotifications 1 }

mplsLdpPathVectorLimitMismatch NOTIFICATION-TYPE

OBJECTS {
 mplsLdpEntityPathVectorLimit,
 mplsLdpPeerPathVectorLimit
}

STATUS current

DESCRIPTION

"This notification is sent when the
'mplsLdpEntityPathVectorLimit' does NOT match
the value of the 'mplsLdpPeerPathVectorLimit' for
a specific Entity."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.3](#)."

::= { mplsLdpNotifications 2 }

mplsLdpSessionUp NOTIFICATION-TYPE

OBJECTS {
 mplsLdpSessionState,
 mplsLdpSessionDiscontinuityTime,

```

        mplsLdpSessionStatsUnknownMesTypeErrors,
        mplsLdpSessionStatsUnknownTlvErrors
    }
    STATUS      current
    DESCRIPTION
        "If this notification is sent when the
        value of 'mplsLdpSessionState' enters

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```

        the 'operational(5)' state."
    ::= { mplsLdpNotifications 3 }

mplsLdpSessionDown NOTIFICATION-TYPE
    OBJECTS      {
        mplsLdpSessionState,
        mplsLdpSessionDiscontinuityTime,
        mplsLdpSessionStatsUnknownMesTypeErrors,
        mplsLdpSessionStatsUnknownTlvErrors
    }
    STATUS      current
    DESCRIPTION
        "This notification is sent when the
        the value of 'mplsLdpSessionState' leaves
        the 'operational(5)' state."
    ::= { mplsLdpNotifications 4 }

--*****
-- Module Conformance Statement
--*****

mplsLdpGroups
    OBJECT IDENTIFIER ::= { mplsLdpConformance 1 }

mplsLdpCompliances
    OBJECT IDENTIFIER ::= { mplsLdpConformance 2 }

--
-- Full Compliance
--

mplsLdpModuleFullCompliance MODULE-COMPLIANCE

```

STATUS current
DESCRIPTION
 "The Module is implemented with support
 for read-create and read-write. In other
 words, both monitoring and configuration
 are available when using this MODULE-COMPLIANCE."

MODULE -- this module
 MANDATORY-GROUPS { mplsLdpGeneralGroup,
 mplsLdpNotificationsGroup
 }

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GROUP mplsLdpLspGroup
DESCRIPTION
 "This group must be supported if the LSR MIB is
 implemented, specifically the mplsInSegmentTable,
 the mplsOutSegmentTable or the mplsXCTable."

OBJECT mplsLdpEntityTargetPeerAddrType
SYNTAX InetAddressType { unknown(0), ipv4(1), ipv6(2) }
DESCRIPTION
 "An implementation is only required to support
 'unknown(0)', IPv4 and globally unique IPv6 addresses."

OBJECT mplsLdpEntityTargetPeerAddr
SYNTAX InetAddress (SIZE(0|4|16))
DESCRIPTION
 "An implementation is only required to support IPv4 and
 globally unique IPv6 addresses."

OBJECT mplsLdpEntityRowStatus
SYNTAX RowStatus { active(1) }
WRITE-SYNTAX RowStatus { createAndGo(4), destroy(6) }
DESCRIPTION
 "Support for createAndWait and notInService is not
 required."

OBJECT mplsFecAddrType
SYNTAX InetAddressType { unknown(0), ipv4(1), ipv6(2) }
DESCRIPTION
 "An implementation is only required to support
 'unknown(0)', IPv4 and globally unique IPv6 addresses."

OBJECT mplsFecAddr
SYNTAX InetAddress (SIZE(0|4|16))
DESCRIPTION
 "An implementation is only required to support IPv4 and
 globally unique IPv6 addresses."

OBJECT mplsFecRowStatus
SYNTAX RowStatus { active(1) }
WRITE-SYNTAX RowStatus { createAndGo(4), destroy(6) }
DESCRIPTION
 "Support for createAndWait and notInService is not
 required."

OBJECT mplsLdpLspFecRowStatus

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SYNTAX RowStatus { active(1) }
WRITE-SYNTAX RowStatus { createAndGo(4), destroy(6) }
DESCRIPTION
 "Support for createAndWait and notInService is not
 required."

OBJECT mplsLdpSessionPeerNextHopAddrType
SYNTAX InetAddressType { unknown(0), ipv4(1), ipv6(2) }
DESCRIPTION
 "An implementation is only required to support
 'unknown(0)', IPv4 and globally unique IPv6 addresses."

OBJECT mplsLdpSessionPeerNextHopAddr
SYNTAX InetAddress (SIZE(0|4|16))
DESCRIPTION
 "An implementation is only required to support IPv4
 and globally unique IPv6 addresses."

::= { mplsLdpCompliances 1 }

--
-- Read-Only Compliance
--

mplsLdpModuleReadOnlyCompliance MODULE-COMPLIANCE
 STATUS current

DESCRIPTION

"The Module is implemented with support for read-only. In other words, only monitoring is available by implementing this MODULE-COMPLIANCE."

MODULE -- this module

MANDATORY-GROUPS { mplsLdpGeneralGroup,
mplsLdpNotificationsGroup
}

GROUP mplsLdpLspGroup

DESCRIPTION

"This group must be supported if the LSR MIB is implemented, specifically the mplsInSegmentTable, the mplsOutSegmentTable or the mplsXCTable."

OBJECT mplsLdpEntityProtocolVersion

MIN-ACCESS read-only

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DESCRIPTION

"Write access is not required."

OBJECT mplsLdpEntityAdminStatus

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT mplsLdpEntityTcpDscPort

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT mplsLdpEntityUdpDscPort

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT mplsLdpEntityMaxPduLength

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT mplsLdpEntityKeepAliveHoldTimer
 MIN-ACCESS read-only
 DESCRIPTION
 "Write access is not required."

OBJECT mplsLdpEntityHelloHoldTimer
 MIN-ACCESS read-only
 DESCRIPTION
 "Write access is not required."

OBJECT mplsLdpEntityInitSessionThreshold
 MIN-ACCESS read-only
 DESCRIPTION
 "Write access is not required."

OBJECT mplsLdpEntityLabelDistMethod
 MIN-ACCESS read-only
 DESCRIPTION
 "Write access is not required."

OBJECT mplsLdpEntityLabelRetentionMode
 MIN-ACCESS read-only
 DESCRIPTION

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"Write access is not required."

OBJECT mplsLdpEntityPathVectorLimit
 MIN-ACCESS read-only
 DESCRIPTION
 "Write access is not required."

OBJECT mplsLdpEntityHopCountLimit
 MIN-ACCESS read-only
 DESCRIPTION
 "Write access is not required."

OBJECT mplsLdpEntityTransportAddrKind
 MIN-ACCESS read-only
 DESCRIPTION
 "Write access is not required."

OBJECT mplsLdpEntityTargetPeer

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT mplsLdpEntityTargetPeerAddrType

SYNTAX InetAddressType { unknown(0), ipv4(1), ipv6(2) }

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required.

An implementation is only required to support

'unknown(0)', IPv4 and globally unique IPv6 addresses."

OBJECT mplsLdpEntityTargetPeerAddr

SYNTAX InetAddress (SIZE(0|4|16))

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required.

An implementation is only required to support IPv4 and globally unique IPv6 addresses."

OBJECT mplsLdpEntityLabelType

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT mplsLdpEntityStorageType

MIN-ACCESS read-only

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DESCRIPTION

"Write access is not required."

OBJECT mplsLdpEntityRowStatus

SYNTAX RowStatus { active(1) }

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required, and active is the only status that needs to be supported."

OBJECT mplsFecType

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT mplsFecAddrPrefixLength
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT mplsFecAddrType
SYNTAX InetAddressType { unknown(0), ipv4(1), ipv6(2) }
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required.
An implementation is only required to support
'unknown(0)', IPv4 and globally unique IPv6 addresses."

OBJECT mplsFecAddr
SYNTAX InetAddress (SIZE(0|4|16))
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required.
An implementation is only required to support IPv4 and
globally unique IPv6 addresses."

OBJECT mplsFecStorageType
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT mplsFecRowStatus
SYNTAX RowStatus { active(1) }
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required, and active is the
only status that needs to be supported."

OBJECT mplsLdpLspFecStorageType
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT mplsLdpLspFecRowStatus
SYNTAX RowStatus { active(1) }

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required, and active is the only status that needs to be supported."

OBJECT mplsLdpSessionPeerNextHopAddrType

SYNTAX InetAddressType { unknown(0), ipv4(1), ipv6(2) }

DESCRIPTION

"An implementation is only required to support 'unknown(0)', IPv4 and globally unique IPv6 addresses."

OBJECT mplsLdpSessionPeerNextHopAddr

SYNTAX InetAddress (SIZE(0|4|16))

DESCRIPTION

"An implementation is only required to support IPv4 and globally unique IPv6 addresses."

::= { mplsLdpCompliances 2 }

-- units of conformance

mplsLdpGeneralGroup OBJECT-GROUP

OBJECTS {

mplsLdpLsrId,
mplsLdpLsrLoopDetectionCapable,
mplsLdpEntityLastChange,
mplsLdpEntityIndexNext,
mplsLdpEntityProtocolVersion,
mplsLdpEntityAdminStatus,
mplsLdpEntityOperStatus,
mplsLdpEntityTcpDscPort,
mplsLdpEntityUdpDscPort,
mplsLdpEntityMaxPduLength,

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mplsLdpEntityKeepAliveHoldTimer,
mplsLdpEntityHelloHoldTimer,
mplsLdpEntityInitSessionThreshold,
mplsLdpEntityLabelDistMethod,
mplsLdpEntityLabelRetentionMode,
mplsLdpEntityPathVectorLimit,
mplsLdpEntityHopCountLimit,

mplsLdpEntityTransportAddrKind,
mplsLdpEntityTargetPeer,
mplsLdpEntityTargetPeerAddrType,
mplsLdpEntityTargetPeerAddr,
mplsLdpEntityLabelType,
mplsLdpEntityDiscontinuityTime,
mplsLdpEntityStorageType,
mplsLdpEntityRowStatus,
mplsLdpEntityStatsSessionAttempts,
mplsLdpEntityStatsSessionRejectedNoHelloErrors,
mplsLdpEntityStatsSessionRejectedAdErrors,
mplsLdpEntityStatsSessionRejectedMaxPduErrors,
mplsLdpEntityStatsSessionRejectedLRErrors,
mplsLdpEntityStatsBadLdpIdentifierErrors,
mplsLdpEntityStatsBadPduLengthErrors,
mplsLdpEntityStatsBadMessageLengthErrors,
mplsLdpEntityStatsBadTlvLengthErrors,
mplsLdpEntityStatsMalformedTlvValueErrors,
mplsLdpEntityStatsKeepAliveTimerExpErrors,
mplsLdpEntityStatsShutdownReceivedNotifications,
mplsLdpEntityStatsShutdownSentNotifications,
mplsLdpPeerLastChange,
mplsLdpPeerLabelDistMethod,
mplsLdpPeerPathVectorLimit,
mplsLdpPeerTransportAddrType,
mplsLdpPeerTransportAddr,
mplsLdpHelloAdjacencyHoldTimeRem,
mplsLdpHelloAdjacencyHoldTime,
mplsLdpHelloAdjacencyType,
mplsLdpSessionStateLastChange,
mplsLdpSessionState,
mplsLdpSessionRole,
mplsLdpSessionProtocolVersion,
mplsLdpSessionKeepAliveHoldTimeRem,
mplsLdpSessionKeepAliveTime,
mplsLdpSessionMaxPduLength,
mplsLdpSessionDiscontinuityTime,
mplsLdpSessionStatsUnknownMesTypeErrors,
mplsLdpSessionStatsUnknownTlvErrors,

mplsLdpSessionPeerNextHopAddrType,
mplsLdpSessionPeerNextHopAddr,
mplsFecLastChange,

```

mplsFecIndexNext,
mplsFecType,
mplsFecAddrType,
mplsFecAddr,
mplsFecAddrPrefixLength,
mplsFecStorageType,
mplsFecRowStatus
}
STATUS    current
DESCRIPTION
    "Objects that apply to all MPLS LDP implementations."
::= { mplsLdpGroups 1 }

```

```

mplsLdpLspGroup OBJECT-GROUP
OBJECTS {
    mplsInSegmentLdpLspLabelType,
    mplsInSegmentLdpLspType,
    mplsOutSegmentLdpLspLabelType,
    mplsOutSegmentLdpLspType,
    mplsLdpLspFecLastChange,
    mplsLdpLspFecStorageType,
    mplsLdpLspFecRowStatus
}
STATUS    current
DESCRIPTION
    "These objects are for LDP implementations
    which interface to the Label Information Base (LIB)
    in the MPLS-LSR-STD-MIB. The LIB is
    represented in the mplsInSegmentTable,
    mplsOutSegmentTable and mplsXCTable."
::= { mplsLdpGroups 2 }

```

```

mplsLdpNotificationsGroup NOTIFICATION-GROUP
NOTIFICATIONS { mplsLdpInitSessionThresholdExceeded,
                mplsLdpPathVectorLimitMismatch,
                mplsLdpSessionUp,
                mplsLdpSessionDown
                }
STATUS    current
DESCRIPTION
    "The notification for an MPLS LDP implementation."

```

```
::= { mplsLdpGroups 3 }
```

END

[4.1.](#) The MPLS-LDP-ATM-STD-MIB Module

This MIB Module MUST be supported if LDP uses ATM as the Layer 2 medium. There are three tables in this MIB Module. Two tables are for configuring LDP to use ATM. These tables are the mplsLdpEntityAtmTable and the mplsLdpEntityAtmLRTable. The third table is the mplsLdpAtmSessionTable which is a read-only table.

[4.1.1.](#) The LDP Entity ATM Table

The mplsLdpEntityAtmTable provides a way to configure information which would be contained in the "Optional Parameter" portion of an LDP PDU Initialization Message.

[4.1.2.](#) The LDP Entity ATM Label Range Table

The mplsLdpEntityAtmLRTable provides a way to configure information which would be contained in the "ATM Label Range Components" portion of an LDP PDU Initialization Message, see [\[RFC3035\]](#) and [\[RFC3036\]](#).

[4.1.3.](#) The LDP ATM Session Table

The MPLS LDP ATM Session Table is a read-only table which contains session information specific to ATM.

```
MPLS-LDP-ATM-STD-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    OBJECT-TYPE, MODULE-IDENTITY,  
    Unsigned32  
        FROM SNMPv2-SMI  
    MODULE-COMPLIANCE, OBJECT-GROUP  
        FROM SNMPv2-CONF
```

```
RowStatus,
StorageType
    FROM SNMPv2-TC

InterfaceIndexOrZero
    FROM IF-MIB

AtmVpIdentifier
    FROM ATM-TC-MIB

mplsStdMIB,
MplsAtmVcIdentifier
    FROM MPLS-TC-STD-MIB

mplsLdpEntityLdpId,
mplsLdpEntityIndex,
mplsLdpPeerLdpId
    FROM MPLS-LDP-STD-MIB

;
```

```
mplsLdpAtmStdMIB MODULE-IDENTITY
    LAST-UPDATED "200311181200Z" -- 18 November 2003
    ORGANIZATION "Multiprotocol Label Switching (mpls)
        Working Group"
    CONTACT-INFO
        "Joan Cucchiara (jcucchiara@artel.com)
        Artel

        Hans Sjostrand (hans@ipunplugged.com)
        ipUnplugged

        James V. Luciani (james_luciani@mindspring.com)
        Marconi Communications, Inc.

        Working Group Chairs:
        George Swallow,    email: swallow@cisco.com
        Loa Andersson,    email: loa@pi.se

        MPLS Working Group, email: mpls@uu.net
"
```

DESCRIPTION

"Copyright (C) The Internet Society (2003). This version of this MIB module is part of RFCXXX; see the RFC itself for full legal notices.

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This MIB contains managed object definitions for configuring and monitoring the Multiprotocol Label Switching (MPLS), Label Distribution Protocol (LDP), utilizing Asynchronous Transfer Mode (ATM) as the Layer 2 media."

REVISION "200311181200Z" -- 18 November 2003

DESCRIPTION

"Initial version published as part of RFC XXXX."

-- Please see the IANA Considerations Section

-- the suggested mplsStdMIB subId is 5, e.g.

-- ::= { mplsStdMIB 5 }

::= { mplsStdMIB XXX } -- to be assigned by IANA

```
mplsLdpAtmObjects      OBJECT IDENTIFIER
                        ::= { mplsLdpAtmStdMIB 1 }
mplsLdpAtmConformance OBJECT IDENTIFIER
                        ::= { mplsLdpAtmStdMIB 2 }
```

-- MPLS LDP ATM Objects

--

-- Ldp Entity Objects for ATM

--

```
mplsLdpEntityAtmObjects OBJECT IDENTIFIER ::=
                        { mplsLdpAtmObjects 1 }
```

```
mplsLdpEntityAtmTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF MplsLdpEntityAtmEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This table contains ATM specific information
        which could be used in the
        'Optional Parameters' and other ATM specific
        information."
```

This table 'sparse augments' the mplsLdpEntityTable when ATM is the Layer 2 medium."

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```
::= { mplsLdpEntityAtmObjects 1 }
```

mplsLdpEntityAtmEntry OBJECT-TYPE

SYNTAX MplsLdpEntityAtmEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in this table represents the ATM parameters and ATM information for this LDP entity."

INDEX { mplsLdpEntityLdpId,
mplsLdpEntityIndex
}

```
::= { mplsLdpEntityAtmTable 1 }
```

MplsLdpEntityAtmEntry ::= SEQUENCE {

mplsLdpEntityAtmIfIndexOrZero	InterfaceIndexOrZero,
mplsLdpEntityAtmMergeCap	INTEGER,
mplsLdpEntityAtmLRComponents	Unsigned32,
mplsLdpEntityAtmVcDirectionality	INTEGER,
mplsLdpEntityAtmLsrConnectivity	INTEGER,
mplsLdpEntityAtmDefaultControlVpi	AtmVpIdentifier,
mplsLdpEntityAtmDefaultControlVci	MplsAtmVcIdentifier,
mplsLdpEntityAtmUnlabTrafVpi	AtmVpIdentifier,
mplsLdpEntityAtmUnlabTrafVci	MplsAtmVcIdentifier,
mplsLdpEntityAtmStorageType	StorageType,
mplsLdpEntityAtmRowStatus	RowStatus

}

mplsLdpEntityAtmIfIndexOrZero OBJECT-TYPE

SYNTAX InterfaceIndexOrZero

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This value represents either the InterfaceIndex or 0 (zero). The value of zero means that the InterfaceIndex is not known."

However, if the InterfaceIndex is known, then it must be represented by this value.

If an InterfaceIndex becomes known, then the network management entity (e.g. SNMP agent) responsible for this object MUST change the value from 0 (zero) to the value of the InterfaceIndex. If an ATM Label is

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being used in forwarding data, then the value of this object MUST be the InterfaceIndex."
 ::= { mplsLdpEntityAtmEntry 1 }

mplsLdpEntityAtmMergeCap OBJECT-TYPE

SYNTAX INTEGER {
notSupported(0),
vpMerge(1),
vcMerge(2),
vpAndVcMerge(3)
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Denotes the Merge Capability of this Entity.
This is the EXACT value for the ATM Session
Parameter, field M (for ATM Merge Capabilities).
The ATM Session Parameter is an optional
parameter in the Initialization Message.

The description from [rfc3036](#).txt is:

'M, ATM Merge Capabilities

Specifies the merge capabilities of an ATM switch. The following values are supported in this version of the specification:

Value	Meaning
0	Merge not supported
1	VP Merge supported
2	VC Merge supported
3	VP & VC Merge supported

- If the merge capabilities of the LSRs differ, then:
- Non-merge and VC-merge LSRs may freely interoperate.
 - The interoperability of VP-merge-capable switches with non-VP-merge-capable switches is a subject for future study. When the LSRs differ on the use of VP-merge, the session is established, but VP merge is not used.'

Please refer to the following reference for a complete description of this feature."

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REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.3](#)
Initialization Message."

::= { mplsLdpEntityAtmEntry 2 }

mplsLdpEntityAtmLRComponents OBJECT-TYPE

SYNTAX Unsigned32 (1..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of Label Range Components in the Initialization message. This also represents the number of entries in the mplsLdpEntityAtmLRTable which correspond to this entry.

This is the EXACT value for the ATM Session Parameter, field N (for Number of label range components). The ATM Session Parameter is an optional parameter in the Initialization Message.

The description from [rfc3036.txt](#) is:

'N, Number of label range components
Specifies the number of ATM Label Range
Components included in the TLV.'

Please refer to the following reference for a complete description of this feature."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.3](#)
Initialization Message."

::= { mplsLdpEntityAtmEntry 3 }

mplsLdpEntityAtmVcDirectionality OBJECT-TYPE

SYNTAX INTEGER {
bidirectional(0),
unidirectional(1)
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"If the value of this object is 'bidirectional(0)',
a given VCI, within a given VPI, is used as a
label for both directions independently.

If the value of this object is 'unidirectional(1)',

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a given VCI within a VPI designates one direction.

This is the EXACT value for the ATM Session Parameter,
field D (for VC Directionality). The ATM Session
Parameter is an optional parameter in the
Initialization Message.

The description from [rfc3036](#).txt is:

'D, VC Directionality

A value of 0 specifies bidirectional VC capability,
meaning the LSR can (within a given VPI) support
the use of a given VCI as a label for both link
directions independently. A value of 1
specifies unidirectional VC capability, meaning
(within a given VPI) a given VCI may appear in
a label mapping for one direction on the link
only. When either or both of the peers
specifies unidirectional VC capability, both
LSRs use unidirectional VC label assignment for
the link as follows. The LSRs compare their
LDP Identifiers as unsigned integers. The LSR
with the larger LDP Identifier may assign
only odd-numbered VCIs in the VPI/VCI
range as labels. The system with the smaller
LDP Identifier may assign only even-numbered

VCIs in the VPI/VCI range as labels.'

Please refer to the following reference
for a complete description of this feature."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.3](#)
Initialization Message."

::= { mplsLdpEntityAtmEntry 4 }

mplsLdpEntityAtmLsrConnectivity OBJECT-TYPE

SYNTAX INTEGER {
direct(1),
indirect(2)
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The peer LSR may be connected indirectly by means
of an ATM VP so that the VPI values may be different

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on either endpoint so the label MUST be encoded
entirely within the VCI field."

DEFVAL { direct }

::= { mplsLdpEntityAtmEntry 5 }

mplsLdpEntityAtmDefaultControlVpi OBJECT-TYPE

SYNTAX AtmVpIdentifier

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The default VPI value for the non-MPLS connection. The
default value of this is 0 (zero) but other values may
be configured. This object allows a different value
to be configured."

DEFVAL { 0 }

::= { mplsLdpEntityAtmEntry 6 }

mplsLdpEntityAtmDefaultControlVci OBJECT-TYPE

SYNTAX MplsAtmVcIdentifier

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The Default VCI value for a non-MPLS connection. The

default value of this is 32 but other values may be configured. This object allows a different value to be configured."

DEFVAL { 32 }

::= { mplsLdpEntityAtmEntry 7 }

mplsLdpEntityAtmUnlabTrafVpi OBJECT-TYPE

SYNTAX AtmVpIdentifier

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"VPI value of the VCC supporting unlabeled traffic. This non-MPLS connection is used to carry unlabeled (IP) packets. The default value is the same as the default value of the 'mplsLdpEntityAtmDefaultControlVpi', however another value may be configured."

DEFVAL { 0 }

::= { mplsLdpEntityAtmEntry 8 }

mplsLdpEntityAtmUnlabTrafVci OBJECT-TYPE

SYNTAX MplsAtmVcIdentifier

MAX-ACCESS read-create

STATUS current

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DESCRIPTION

"VCI value of the VCC supporting unlabeled traffic. This non-MPLS connection is used to carry unlabeled (IP) packets. The default value is the same as the default value of the 'mplsLdpEntityAtmDefaultControlVci', however another value may be configured."

DEFVAL { 32 }

::= { mplsLdpEntityAtmEntry 9 }

mplsLdpEntityAtmStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The storage type for this conceptual row. Conceptual rows having the value 'permanent(4)' need not allow write-access to any columnar objects in the row."

DEFVAL { nonVolatile }

```

 ::= { mplsLdpEntityAtmEntry 10 }

mplsLdpEntityAtmRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The status of this conceptual row. All writable
        objects in this row may be modified at any time,
        however, as described in detail in the section
        entitled, 'Changing Values After Session
        Establishment', and again described in the
        DESCRIPTION clause of the mplsLdpEntityAdminStatus
        object, if a session has been initiated with a Peer,
        changing objects in this table will wreak havoc
        with the session and interrupt traffic. To repeat again:
        the recommended procedure is to set the
        mplsLdpEntityAdminStatus to down, thereby explicitly
        causing a session to be torn down. Then,
        change objects in this entry, then set the
        mplsLdpEntityAdminStatus to enable
        which enables a new session to be initiated."
 ::= { mplsLdpEntityAtmEntry 11 }

--
-- The MPLS LDP Entity ATM Label Range Table
--

```

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```

mplsLdpEntityAtmLRTable OBJECT-TYPE
    SYNTAX SEQUENCE OF MplsLdpEntityAtmLREntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "The MPLS LDP Entity ATM Label Range (LR) Table.
        The purpose of this table is to provide a mechanism
        for configuring a contiguous range of vpi's
        with a contiguous range of vci's, or a 'label range'
        for LDP Entities.

        LDP Entities which use ATM must have at least one
        entry in this table.

        There must exist at least one entry in this

```


table for every LDP Entity that has
'mplsLdpEntityOptionalParameters' object with
a value of 'atmSessionParameters'."
::= { mplsLdpEntityAtmObjects 2 }

mplsLdpEntityAtmLREntry OBJECT-TYPE

SYNTAX MplsLdpEntityAtmLREntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A row in the LDP Entity ATM Label
Range Table. One entry in this table contains
information on a single range of labels
represented by the configured Upper and Lower
Bounds VPI/VCi pairs. These are the same
data used in the Initialization Message.

NOTE: The ranges for a specific LDP Entity
are UNIQUE and non-overlapping. For example,
for a specific LDP Entity index, there could
be one entry having LowerBound vpi/vci == 0/32, and
UpperBound vpi/vci == 0/100, and a second entry
for this same interface with LowerBound
vpi/vci == 0/101 and UpperBound vpi/vci == 0/200.
However, there could not be a third entry with
LowerBound vpi/vci == 0/200 and
UpperBound vpi/vci == 0/300 because this label
range overlaps with the second entry (i.e. both
entries now have 0/200).

A row will not become active unless a unique and

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non-overlapping range is specified.

At least one label range entry for a
specific LDP Entity MUST
include the default VPI/VCi values denoted
in the LDP Entity Table.

A request to create a row with an overlapping
range should result in an inconsistentValue
error."

INDEX { mplsLdpEntityLdpId,

```

        mplsLdpEntityIndex,
        mplsLdpEntityAtmLRMinVpi,
        mplsLdpEntityAtmLRMinVci
    }
    ::= { mplsLdpEntityAtmLRTable 1 }

MplsLdpEntityAtmLREntry ::= SEQUENCE {
    mplsLdpEntityAtmLRMinVpi      AtmVpIdentifier,
    mplsLdpEntityAtmLRMinVci      MplsAtmVcIdentifier,
    mplsLdpEntityAtmLRMaxVpi      AtmVpIdentifier,
    mplsLdpEntityAtmLRMaxVci      MplsAtmVcIdentifier,
    mplsLdpEntityAtmLRStorageType StorageType,
    mplsLdpEntityAtmLRRowStatus   RowStatus
}

mplsLdpEntityAtmLRMinVpi OBJECT-TYPE
    SYNTAX AtmVpIdentifier
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "The minimum VPI number configured for this range.
        The value of zero is a valid value for the VPI portion
        of the label."
    ::= { mplsLdpEntityAtmLREntry 1 }

mplsLdpEntityAtmLRMinVci OBJECT-TYPE
    SYNTAX MplsAtmVcIdentifier
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "The minimum VCI number configured for this range."
    ::= { mplsLdpEntityAtmLREntry 2 }

mplsLdpEntityAtmLRMaxVpi OBJECT-TYPE
    SYNTAX AtmVpIdentifier

```

```

    MAX-ACCESS read-create
    STATUS current
    DESCRIPTION
        "The maximum VPI number configured for this range."
    ::= { mplsLdpEntityAtmLREntry 3 }

mplsLdpEntityAtmLRMaxVci OBJECT-TYPE

```

SYNTAX MplsAtmVcIdentifier

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The maximum VCI number configured for this range."

::= { mplsLdpEntityAtmLREntry 4 }

mplsLdpEntityAtmLRStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The storage type for this conceptual row.

Conceptual rows having the value 'permanent(4)' need not allow write-access to any columnar objects in the row."

DEFVAL { nonVolatile }

::= { mplsLdpEntityAtmLREntry 5 }

mplsLdpEntityAtmLRRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of this conceptual row. All writable objects in this row may be modified at any time, however, as described in detail in the section entitled, 'Changing Values After Session Establishment', and again described in the DESCRIPTION clause of the mplsLdpEntityAdminStatus object, if a session has been initiated with a Peer, changing objects in this table will wreak havoc with the session and interrupt traffic. To repeat again: the recommended procedure is to set the mplsLdpEntityAdminStatus to down, thereby explicitly causing a session to be torn down. Then, change objects in this entry, then set the mplsLdpEntityAdminStatus

to enable which enables a new session to be initiated."

::= { mplsLdpEntityAtmLREntry 6 }

```

--
-- MPLS LDP ATM Session Information
--

mplsLdpAtmSessionObjects OBJECT IDENTIFIER ::=
    { mplsLdpAtmObjects 2 }

mplsLdpAtmSessionTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF MplsLdpAtmSessionEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table which relates sessions in the
        'mplsLdpSessionTable' and their label
        range intersections. There could be one
        or more label range intersections between an
        LDP Entity and LDP Peer using ATM as the
        underlying media. Each row represents
        a single label range intersection.

        This table cannot use the 'AUGMENTS'
        clause because there is not necessarily
        a one-to-one mapping between this table
        and the mplsLdpSessionTable."
    ::= { mplsLdpAtmSessionObjects 1 }

mplsLdpAtmSessionEntry OBJECT-TYPE
    SYNTAX      MplsLdpAtmSessionEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry in this table represents information on a
        single label range intersection between an LDP Entity
        and LDP Peer.

        The information contained in a row is read-only."
    INDEX      { mplsLdpEntityLdpId,
                  mplsLdpEntityIndex,
                  mplsLdpPeerLdpId,
                  mplsLdpSessionAtmLRLowerBoundVpi,
                  mplsLdpSessionAtmLRLowerBoundVci

```

```

    }
    ::= { mplsLdpAtmSessionTable 1 }

MplsLdpAtmSessionEntry ::= SEQUENCE {
    mplsLdpSessionAtmLRLowerBoundVpi      AtmVpIdentifier,
    mplsLdpSessionAtmLRLowerBoundVci      MplsAtmVcIdentifier,
    mplsLdpSessionAtmLRUpperBoundVpi      AtmVpIdentifier,
    mplsLdpSessionAtmLRUpperBoundVci      MplsAtmVcIdentifier
}

mplsLdpSessionAtmLRLowerBoundVpi OBJECT-TYPE
    SYNTAX AtmVpIdentifier
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "The minimum VPI number for this range."
    ::= { mplsLdpAtmSessionEntry 1 }

mplsLdpSessionAtmLRLowerBoundVci OBJECT-TYPE
    SYNTAX MplsAtmVcIdentifier
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "The minimum VCI number for this range."
    ::= { mplsLdpAtmSessionEntry 2 }

mplsLdpSessionAtmLRUpperBoundVpi OBJECT-TYPE
    SYNTAX AtmVpIdentifier
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The maximum VPI number for this range."
    ::= { mplsLdpAtmSessionEntry 3 }

mplsLdpSessionAtmLRUpperBoundVci OBJECT-TYPE
    SYNTAX MplsAtmVcIdentifier
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The maximum VCI number for this range."
    ::= { mplsLdpAtmSessionEntry 4 }

--*****
-- Module Conformance Statement
--*****

```

```
mplsLdpAtmGroups
    OBJECT IDENTIFIER ::= { mplsLdpAtmConformance 1 }

mplsLdpAtmCompliances
    OBJECT IDENTIFIER ::= { mplsLdpAtmConformance 2 }

--
-- Full Compliance
--

mplsLdpAtmModuleFullCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The Module is implemented with support for
        read-create and read-write.  In other words,
        both monitoring and configuration
        are available when using this MODULE-COMPLIANCE."
    MODULE -- this module
    MANDATORY-GROUPS {
        mplsLdpAtmGroup
    }

    OBJECT      mplsLdpEntityAtmRowStatus
    SYNTAX      RowStatus { active(1) }
    WRITE-SYNTAX RowStatus { createAndGo(4), destroy(6) }
    DESCRIPTION
        "Support for createAndWait and notInService is not required."

    OBJECT      mplsLdpEntityAtmLRRowStatus
    SYNTAX      RowStatus { active(1) }
    WRITE-SYNTAX RowStatus { createAndGo(4), destroy(6) }
    DESCRIPTION
        "Support for createAndWait and notInService is not required."

    ::= { mplsLdpAtmCompliances 1 }

--
-- Read-Only Compliance
--

mplsLdpAtmModuleReadOnlyCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
```

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"The Module is implemented with support for read-only. In other words, only monitoring is available by implementing this MODULE-COMPLIANCE."

```
MODULE -- this module
MANDATORY-GROUPS {
    mplsLdpAtmGroup
}
```

```
OBJECT      mplsLdpEntityAtmIfIndexOrZero
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."
```

```
OBJECT      mplsLdpEntityAtmMergeCap
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."
```

```
OBJECT      mplsLdpEntityAtmVcDirectionality
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."
```

```
OBJECT      mplsLdpEntityAtmLsrConnectivity
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."
```

```
OBJECT      mplsLdpEntityAtmDefaultControlVpi
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."
```

```
OBJECT      mplsLdpEntityAtmDefaultControlVci
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."
```

```
OBJECT      mplsLdpEntityAtmUnlabTrafVpi
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."
```

OBJECT mplsLdpEntityAtmUnlabTrafVci
MIN-ACCESS read-only
DESCRIPTION

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"Write access is not required."

OBJECT mplsLdpEntityAtmStorageType
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT mplsLdpEntityAtmRowStatus
SYNTAX RowStatus { active(1) }
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required, and active is the
only status that needs to be supported."

OBJECT mplsLdpEntityAtmLRMaxVpi
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT mplsLdpEntityAtmLRMaxVci
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT mplsLdpEntityAtmLRStorageType
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT mplsLdpEntityAtmLRRowStatus
SYNTAX RowStatus { active(1) }
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required, and active is the
only status that needs to be supported."

::= { mplsLdpAtmCompliances 2 }


```
--  
-- units of conformance  
--
```

```
mplsLdpAtmGroup OBJECT-GROUP  
    OBJECTS {  
        mplsLdpEntityAtmIfIndexOrZero,
```

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```
mplsLdpEntityAtmMergeCap,  
mplsLdpEntityAtmLRComponents,  
mplsLdpEntityAtmVcDirectionality,  
mplsLdpEntityAtmLsrConnectivity,  
mplsLdpEntityAtmDefaultControlVpi,  
mplsLdpEntityAtmDefaultControlVci,  
mplsLdpEntityAtmUnlabTrafVpi,  
mplsLdpEntityAtmUnlabTrafVci,  
mplsLdpEntityAtmStorageType,  
mplsLdpEntityAtmRowStatus,  
mplsLdpEntityAtmLRMaxVpi,  
mplsLdpEntityAtmLRMaxVci,  
mplsLdpEntityAtmLRStorageType,  
mplsLdpEntityAtmLRRowStatus,  
mplsLdpSessionAtmLRUpperBoundVpi,  
mplsLdpSessionAtmLRUpperBoundVci  
  
}  
STATUS      current  
DESCRIPTION  
    "Objects that apply to all MPLS LDP implementations  
    using ATM as the Layer 2."  
 ::= { mplsLdpAtmGroups 1 }
```

END

[4.2.](#) The MPLS-LDP-FRAME-RELAY-STD-MIB Module

This MIB Module MUST be supported if LDP uses FRAME RELAY as the Layer 2 medium. There are three tables in this MIB Module. Two tables are to configure LDP for using Frame Relay. These tables are the mplsLdpEntityFrameRelayTable and the

mplsLdpEntityFrameRelayLRTTable. The third table, mplsLdpFrameRelaySessionTable, is a read-only table.

[4.2.1.](#) The LDP Entity Frame Relay Table

The mplsLdpEntityFrameRelayTable provides a way to configure information which would be contained in the "Optional Parameter" portion of an LDP PDU Initialization Message.

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[4.2.2.](#) The LDP Entity Frame Relay Label Range Table

The mplsLdpEntityFrameRelayLRTTable provides a way to configure information which would be contained in the "Frame Relay Label Range Components" portion of an LDP PDU Initialization Message, see [\[RFC3034\]](#) and [\[RFC3036\]](#).

[4.2.3.](#) The LDP Frame Relay Session Table

The MPLS LDP Frame Relay Session Table is a read-only table which contains session information specific to Frame Relay.

MPLS-LDP-FRAME-RELAY-STD-MIB DEFINITIONS ::= BEGIN

IMPORTS

 OBJECT-TYPE,
 MODULE-IDENTITY,
 Unsigned32
 FROM SNMPv2-SMI
 MODULE-COMPLIANCE,
 OBJECT-GROUP
 FROM SNMPv2-CONF

 RowStatus,
 StorageType
 FROM SNMPv2-TC

DLCI
FROM FRAME-RELAY-DTE-MIB

InterfaceIndexOrZero
FROM IF-MIB

mplsStdMIB
FROM MPLS-TC-STD-MIB

mplsLdpEntityLdpId,
mplsLdpEntityIndex,
mplsLdpPeerLdpId
FROM MPLS-LDP-STD-MIB
;

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mplsLdpFrameRelayStdMIB MODULE-IDENTITY
LAST-UPDATED "200311181200Z" -- 18 November 2003
ORGANIZATION "Multiprotocol Label Switching (mpls)
Working Group"
CONTACT-INFO
"Joan Cucchiara (jcucchiara@artel.com)
Artel

Hans Sjostrand (hans@ipunplugged.com)
ipUnplugged

James V. Luciani (james_luciani@mindspring.com)
Marconi Communications, Inc.

Working Group Chairs:
George Swallow, email: swallow@cisco.com
Loa Andersson, email: loa@pi.se

MPLS Working Group, email: mpls@uu.net
"

DESCRIPTION

"Copyright (C) The Internet Society (2003). This version of this MIB module is part of RFCXXX; see the RFC itself for full legal notices.

This MIB contains managed object definitions for configuring and monitoring the Multiprotocol Label

Switching (MPLS), Label Distribution Protocol (LDP),
utilizing Frame Relay as the Layer 2 media."

REVISION "200311181200Z" -- 18 November 2003

DESCRIPTION

"Initial version published as part of RFC XXXX."

-- Please see the IANA Considerations Section.

-- The requested mplsStdMIB subId is 6, e.g.

-- ::= { mplsStdMIB 6 }

::= { mplsStdMIB XXX } -- to be assigned by IANA

--*****

mplsLdpFrameRelayObjects OBJECT IDENTIFIER

::= { mplsLdpFrameRelayStdMIB 1 }

mplsLdpFrameRelayConformance OBJECT IDENTIFIER

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::= { mplsLdpFrameRelayStdMIB 2 }

--*****

-- MPLS LDP Frame Relay Objects

--*****

--

-- Ldp Entity Objects for Frame Relay

--

mplsLdpEntityFrameRelayObjects OBJECT IDENTIFIER ::=

{ mplsLdpFrameRelayObjects 1 }

mplsLdpEntityFrameRelayTable OBJECT-TYPE

SYNTAX SEQUENCE OF MplsLdpEntityFrameRelayEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains Frame Relay specific
information which could be used in the
'Optional Parameters' and other Frame Relay
Relay specific information."

This table 'sparse augments' the mplsLdpEntityTable when Frame Relay is the Layer 2 medium."
 ::= { mplsLdpEntityFrameRelayObjects 1 }

mplsLdpEntityFrameRelayEntry OBJECT-TYPE
 SYNTAX MplsLdpEntityFrameRelayEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "An entry in this table represents the Frame Relay optional parameters associated with the LDP entity."
 INDEX { mplsLdpEntityLdpId,
 mplsLdpEntityIndex
 }
 ::= { mplsLdpEntityFrameRelayTable 1 }

MplsLdpEntityFrameRelayEntry ::= SEQUENCE {
 mplsLdpEntityFrameRelayIfIndexOrZero InterfaceIndexOrZero,
 mplsLdpEntityFrameRelayMergeCap INTEGER,
 mplsLdpEntityFrameRelayLRComponents Unsigned32,
 mplsLdpEntityFrameRelayVcDirectionality INTEGER,
 mplsLdpEntityFrameRelayStorageType StorageType,

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mplsLdpEntityFrameRelayRowStatus RowStatus
 }

mplsLdpEntityFrameRelayIfIndexOrZero OBJECT-TYPE
 SYNTAX InterfaceIndexOrZero
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "This value represents either the InterfaceIndex of the 'ifLayer' where the Frame Relay Labels 'owned' by this entry were created, or 0 (zero). The value of zero means that the InterfaceIndex is not known. For example, if the InterfaceIndex is created subsequent to the Frame Relay Label's creation, then it would not be known. However, if the InterfaceIndex is known, then it must be represented by this value.

If an InterfaceIndex becomes known, then the network management entity (e.g. SNMP agent) responsible

for this object MUST change the value from 0 (zero) to the value of the InterfaceIndex. If an Frame Relay Label is being used in forwarding data, then the value of this object MUST be the InterfaceIndex."

::= { mplsLdpEntityFrameRelayEntry 1 }

mplsLdpEntityFrameRelayMergeCap OBJECT-TYPE

SYNTAX INTEGER {
notSupported(0),
supported(1)
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This represents whether or not the Frame Relay merge capability is supported. This is the EXACT value for the Frame Relay Session Parameter, field M (for Frame Relay Merge Capabilities). The Frame Relay Session Parameter is an optional parameter in the Initialization Message.

The description from [rfc3036](#).txt is:

'M, Frame Relay Merge Capabilities
Specifies the merge capabilities of a Frame Relay switch. The following values are supported in this version of the specification:

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Value	Meaning
0	Merge not supported
1	Merge supported

Non-merge and merge Frame Relay LSRs may freely interoperate.'

Please refer to the following reference for a complete description of this feature."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.3](#)
Initialization Message."

::= { mplsLdpEntityFrameRelayEntry 2 }

mplsLdpEntityFrameRelayLRComponents OBJECT-TYPE

SYNTAX Unsigned32 (1..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of Label Range Components in the Initialization message. This also represents the number of entries in the mplsLdpEntityFrameRelayLRTable which correspond to this entry.

This is the EXACT value for the Frame Relay Session Parameter, field N (for Number of label range components). The Frame Relay Session Parameter is an optional parameter in the Initialization Message.

The description from [rfc3036](#).txt is:

'N, Number of label range components
Specifies the number of Frame Relay Label
Range Components included in the TLV.'

Please refer to the following reference for a complete description of this feature."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.3](#)
Initialization Message."

::= { mplsLdpEntityFrameRelayEntry 3 }

mplsLdpEntityFrameRelayVcDirectionality OBJECT-TYPE

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SYNTAX INTEGER {
bidirectional(0),
unidirectional(1)
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"If the value of this object is 'bidirectional(0)', then the LSR supports the use of a given DLCI as a label for both directions independently. If the value of this object is 'unidirectional(1)', then the LSR

uses the given DLCI as a label in only one direction.

This is the EXACT value for the Frame Relay Session Parameter, field D (for VC Directionality). The Frame Relay Session Parameter is an optional parameter in the Initialization Message.

The description from [rfc3036](#).txt is:

'D, VC Directionality

A value of 0 specifies bidirectional VC capability, meaning the LSR can support the use of a given DLCI as a label for both link directions independently. A value of 1 specifies unidirectional VC capability, meaning a given DLCI may appear in a label mapping for one direction on the link only. When either or both of the peers specifies unidirectional VC capability, both LSRs use unidirectional VC label assignment for the link as follows. The LSRs compare their LDP Identifiers as unsigned integers. The LSR with the larger LDP Identifier may assign only odd-numbered DLCIs in the range as labels. The system with the smaller LDP Identifier may assign only even-numbered DLCIs in the range as labels.'

Please refer to the following reference for a complete description of this feature."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.3](#) Initialization Message."

::= { mplsLdpEntityFrameRelayEntry 4 }

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mplsLdpEntityFrameRelayStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The storage type for this conceptual row.

Conceptual rows having the value 'permanent(4)'

need not allow write-access to any columnar
objects in the row."
DEFVAL { nonVolatile }
::= { mplsLdpEntityFrameRelayEntry 5 }

mplsLdpEntityFrameRelayRowStatus OBJECT-TYPE

SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION

"The status of this conceptual row. All writable
objects in this row may be modified at any time,
however, as described in detail in the section
entitled, 'Changing Values After Session
Establishment', and again described in the
DESCRIPTION clause of the
mplsLdpEntityAdminStatus object,
if a session has been initiated with a Peer,
changing objects in this table will
wreak havoc with the session and interrupt
traffic. To repeat again:
the recommended procedure is to set the
mplsLdpEntityAdminStatus to
down, thereby explicitly causing a
session to be torn down. Then,
change objects in this entry, then set
the mplsLdpEntityAdminStatus
to enable which enables a new session
to be initiated."

::= { mplsLdpEntityFrameRelayEntry 6 }

--
-- Frame Relay Label Range Components
--

mplsLdpEntityFrameRelayLRTTable OBJECT-TYPE

SYNTAX SEQUENCE OF MplsLdpEntityFrameRelayLREntry

MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

"This table contains information about the Optional Parameters for the Frame Relay Session in the LDP Initialization Message, specifically it contains information about the Frame Relay Label Range Components.

If the value of the object 'mplsLdpEntityOptionalParameters' contains the value of 'frameRelaySessionParameters(3)' then there must be at least one corresponding entry in this table."

::= { mplsLdpEntityFrameRelayObjects 2 }

mplsLdpEntityFrameRelayLREntry OBJECT-TYPE

SYNTAX MplsLdpEntityFrameRelayLREntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in this table represents the Frame Relay Label Range Component associated with the LDP entity."

INDEX { mplsLdpEntityLdpId,
mplsLdpEntityIndex,
mplsLdpEntityFrameRelayLRMinDlci
}

::= { mplsLdpEntityFrameRelayLRTable 1 }

MplsLdpEntityFrameRelayLREntry ::= SEQUENCE {

mplsLdpEntityFrameRelayLRMinDlci	DLCI,
mplsLdpEntityFrameRelayLRMaxDlci	DLCI,
mplsLdpEntityFrameRelayLRLen	INTEGER,
mplsLdpEntityFrameRelayLRStorageType	StorageType,
mplsLdpEntityFrameRelayLRRowStatus	RowStatus

}

mplsLdpEntityFrameRelayLRMinDlci OBJECT-TYPE

SYNTAX DLCI

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The lower bound which is supported. This value should be the same as that in the Frame Relay Label Range Component's Minimum DLCI field. The value of zero is valid for the minimum DLCI field of

the label."

REFERENCE

"[RFC3034](#), Use of Label Switching on Frame Relay Networks Specification."

::= { mplsLdpEntityFrameRelayLREntry 1 }

mplsLdpEntityFrameRelayLRMaxDlci OBJECT-TYPE

SYNTAX DLCI

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The upper bound which is supported. This value should be the same as that in the Frame Relay Label Range Component's Maximum DLCI field."

::= { mplsLdpEntityFrameRelayLREntry 2 }

mplsLdpEntityFrameRelayLRLen OBJECT-TYPE

SYNTAX INTEGER {
 tenDlciBits(0),
 twentyThreeDlciBits(2)
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object specifies the length of the DLCI bits.

This is the EXACT value for the Len field of the Frame Relay Label Range Component.

The description from [rfc3036](#).txt is:

'Len

This field specifies the number of bits of the DLCI.
The following values are supported:

Len	DLCI bits
0	10
2	23

Len values 1 and 3 are reserved.'

Please refer to the following reference for a complete description of this feature."

REFERENCE

"[RFC3036](#), LDP Specification, [Section 3.5.3](#)

```
Initialization Message."
 ::= { mplsLdpEntityFrameRelayLREntry 3 }
```

```
mplsLdpEntityFrameRelayLRStorageType OBJECT-TYPE
    SYNTAX      StorageType
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The storage type for this conceptual row.
        Conceptual rows having the value 'permanent(4)'
        need not allow write-access to any columnar
        objects in the row."
    DEFVAL { nonVolatile }
    ::= { mplsLdpEntityFrameRelayLREntry 4 }
```

```
mplsLdpEntityFrameRelayLRRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The status of this conceptual row. All writable
        objects in this row may be modified at any time,
        however, as described in detail in the section
        entitled, 'Changing Values After Session
        Establishment', and again described in the
        DESCRIPTION clause of the
        mplsLdpEntityAdminStatus object,
        if a session has been initiated with a Peer,
        changing objects in this table will
        wreak havoc with the session and interrupt
        traffic. To repeat again:
        the recommended procedure is to set the
        mplsLdpEntityAdminStatus to down, thereby
        explicitly causing a session to be torn down. Then,
        change objects in this entry, then set the
        mplsLdpEntityAdminStatus to enable which enables
        a new session to be initiated."
    ::= { mplsLdpEntityFrameRelayLREntry 5 }
```

```
--
-- MPLS LDP Frame Relay Session Information
--
```

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```
mplsLdpFrameRelaySessionObjects OBJECT IDENTIFIER ::=
    { mplsLdpFrameRelayObjects 2 }
```

```
mplsLdpFrameRelaySessionTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF MplsLdpFrameRelaySessionEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table of Frame Relay label range intersections
        between the LDP Entities and LDP Peers.
        Each row represents a single label range intersection.

        NOTE: this table cannot use the 'AUGMENTS'
        clause because there is not necessarily a one-to-one
        mapping between this table and the
        mplsLdpSessionTable."
    ::= { mplsLdpFrameRelaySessionObjects 1 }
```

```
mplsLdpFrameRelaySessionEntry OBJECT-TYPE
    SYNTAX      MplsLdpFrameRelaySessionEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry in this table represents information on a
        single label range intersection between an
        LDP Entity and LDP Peer.

        The information contained in a row is read-only."
    INDEX      { mplsLdpEntityLdpId,
                  mplsLdpEntityIndex,
                  mplsLdpPeerLdpId,
                  mplsLdpFrameRelaySessionMinDlci
                }
    ::= { mplsLdpFrameRelaySessionTable 1 }
```

```
MplsLdpFrameRelaySessionEntry ::= SEQUENCE {
    mplsLdpFrameRelaySessionMinDlci    DLCI,
    mplsLdpFrameRelaySessionMaxDlci    DLCI,
    mplsLdpFrameRelaySessionLen        INTEGER
}
```

mplsLdpFrameRelaySessionMinDlci OBJECT-TYPE
SYNTAX DLCI
MAX-ACCESS not-accessible

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STATUS current

DESCRIPTION

"The lower bound of DLCIs which are supported.
The value of zero is a valid value for the
minimum DLCI field of the label."

REFERENCE

"[RFC3034](#), Use of Label Switching on Frame Relay
Networks Specification."

::= { mplsLdpFrameRelaySessionEntry 1 }

mplsLdpFrameRelaySessionMaxDlci OBJECT-TYPE

SYNTAX DLCI

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The upper bound of DLCIs which are supported."

::= { mplsLdpFrameRelaySessionEntry 2 }

mplsLdpFrameRelaySessionLen OBJECT-TYPE

SYNTAX INTEGER {
 tenDlciBits(0),
 twentyThreeDlciBits(2)
 }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the DLCI bits."

::= { mplsLdpFrameRelaySessionEntry 3 }

--*****
-- Module Conformance Statement
--*****

mplsLdpFrameRelayGroups

OBJECT IDENTIFIER ::= { mplsLdpFrameRelayConformance 1 }

mplsLdpFrameRelayCompliances

```
OBJECT IDENTIFIER ::= { mplsLdpFrameRelayConformance 2 }

--
-- Full Compliance
--
```

```
mplsLdpFrameRelayModuleFullCompliance MODULE-COMPLIANCE
```

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```
STATUS current
```

```
DESCRIPTION
```

```
    "The Module is implemented with support for
    read-create and read-write.  In other words,
    both monitoring and configuration
    are available when using this MODULE-COMPLIANCE."
```

```
MODULE -- this module
```

```
    MANDATORY-GROUPS    {
                            mplsLdpFrameRelayGroup
                        }

```

```
OBJECT      mplsLdpEntityFrameRelayRowStatus
```

```
SYNTAX      RowStatus { active(1) }
```

```
WRITE-SYNTAX RowStatus { createAndGo(4), destroy(6) }
```

```
DESCRIPTION
```

```
    "Support for createAndWait and notInService is not required."
```

```
OBJECT      mplsLdpEntityFrameRelayLRRowStatus
```

```
SYNTAX      RowStatus { active(1) }
```

```
WRITE-SYNTAX RowStatus { createAndGo(4), destroy(6) }
```

```
DESCRIPTION
```

```
    "Support for createAndWait and notInService is not required."
```

```
::= { mplsLdpFrameRelayCompliances 1 }
```

```
--
-- Read-Only Compliance
--
```

```
mplsLdpFrameRelayModuleReadOnlyCompliance MODULE-COMPLIANCE
```

```
STATUS current
```

```
DESCRIPTION
```

```
    "The Module is implemented with support for
    read-only.  In other words, only monitoring
    is available by implementing this MODULE-COMPLIANCE."
```

```

MODULE -- this module
    MANDATORY-GROUPS {
        mplsLdpFrameRelayGroup
    }

OBJECT      mplsLdpEntityFrameRelayIfIndexOrZero
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

OBJECT      mplsLdpEntityFrameRelayMergeCap

```

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```

MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

OBJECT      mplsLdpEntityFrameRelayVcDirectionality
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

OBJECT      mplsLdpEntityFrameRelayStorageType
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

OBJECT      mplsLdpEntityFrameRelayRowStatus
SYNTAX      RowStatus { active(1) }
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required, and active is the
    only status that needs to be supported."

OBJECT      mplsLdpEntityFrameRelayLRMaxDlci
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

OBJECT      mplsLdpEntityFrameRelayLRLen
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

```


OBJECT mplsLdpEntityFrameRelayLRStorageType
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT mplsLdpEntityFrameRelayLRRowStatus
SYNTAX RowStatus { active(1) }
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required, and active is the
only status that needs to be supported."
::= { mplsLdpFrameRelayCompliances 2 }

--
-- units of conformance

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--

mplsLdpFrameRelayGroup OBJECT-GROUP
OBJECTS {
mplsLdpEntityFrameRelayIfIndexOrZero,
mplsLdpEntityFrameRelayMergeCap,
mplsLdpEntityFrameRelayLRComponents,
mplsLdpEntityFrameRelayVcDirectionality,
mplsLdpEntityFrameRelayStorageType,
mplsLdpEntityFrameRelayRowStatus,
mplsLdpEntityFrameRelayLRMaxDlci,
mplsLdpEntityFrameRelayLRLen,
mplsLdpEntityFrameRelayLRStorageType,
mplsLdpEntityFrameRelayLRRowStatus,
mplsLdpFrameRelaySessionMaxDlci,
mplsLdpFrameRelaySessionLen
}
STATUS current
DESCRIPTION
"Objects that apply to all MPLS LDP implementations
using Frame Relay as the Layer 2."
::= { mplsLdpFrameRelayGroups 1 }

END

[4.3.](#) The MPLS-LDP-GENERIC-STD-MIB Module

This MIB Module MUST be supported if LDP uses a Per Platform Label Space. This MIB Module contains a Label Range (LR) table for configuring MPLS Generic Label Ranges. This table is mplsLdpEntityGenericLRTable. Although the LDP Specification does not provide a way for configuring Label Ranges for Generic Labels, the MIB does provide a way to reserve a range of generic labels because this was thought to be useful by the working group.

MPLS-LDP-GENERIC-STD-MIB DEFINITIONS ::= BEGIN

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```
OBJECT-TYPE,
MODULE-IDENTITY,
Unsigned32
    FROM SNMPv2-SMI

MODULE-COMPLIANCE,
OBJECT-GROUP
    FROM SNMPv2-CONF

RowStatus,
StorageType
    FROM SNMPv2-TC

InterfaceIndexOrZero
    FROM IF-MIB

mplsStdMIB
    FROM MPLS-TC-STD-MIB

mplsLdpEntityLdpId,
mplsLdpEntityIndex
    FROM MPLS-LDP-STD-MIB
;
```

mplsLdpGenericStdMIB MODULE-IDENTITY

LAST-UPDATED "200311181200Z" -- 18 November 2003
ORGANIZATION "Multiprotocol Label Switching (mpls)
Working Group"

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MPLS Working Group, email: mpls@uu.net

"

DESCRIPTION

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"Copyright (C) The Internet Society (2003). This
version of this MIB module is part of RFCXXX; see
the RFC itself for full legal notices.

This MIB contains managed object definitions for
configuring and monitoring the Multiprotocol Label
Switching (MPLS), Label Distribution Protocol (LDP),
utilizing ethernet as the Layer 2 media."

REVISION "200311181200Z" -- 18 November 2003

DESCRIPTION

"Initial version published as part of RFC XXXX."

-- Please see the IANA Considerations Section.
-- The requested mplsStdMIB subId is 7, e.g.
-- ::= { mplsStdMIB 7 }

::= { mplsStdMIB XXX } -- to be assigned by IANA

--*****

```

mplsLdpGenericObjects
    OBJECT IDENTIFIER ::= { mplsLdpGenericStdMIB 1 }
mplsLdpGenericConformance
    OBJECT IDENTIFIER ::= { mplsLdpGenericStdMIB 2 }

--*****
-- MPLS LDP GENERIC Objects
--*****

--
-- Ldp Entity Objects for Generic Labels
--

mplsLdpEntityGenericObjects OBJECT IDENTIFIER ::=
    { mplsLdpGenericObjects 1 }

--
-- The MPLS LDP Entity Generic Label Range Table
--

mplsLdpEntityGenericLRTable OBJECT-TYPE
    SYNTAX SEQUENCE OF MplsLdpEntityGenericLREntry

```

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MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The MPLS LDP Entity Generic Label Range (LR)
Table.

The purpose of this table is to provide a mechanism
for configuring a contiguous range of generic labels,
or a 'label range' for LDP Entities.

LDP Entities which use Generic Labels must have at least
one entry in this table. In other words, this table
'extends' the mplsLdpEntityTable for Generic Labels."

::= { mplsLdpEntityGenericObjects 1 }

```

mplsLdpEntityGenericLREntry OBJECT-TYPE
    SYNTAX MplsLdpEntityGenericLREntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "A row in the LDP Entity Generic Label
        Range (LR) Table. One entry in this table contains
        information on a single range of labels
        represented by the configured Upper and Lower
        Bounds pairs. NOTE: there is NO corresponding
        LDP message which relates to the information
        in this table, however, this table does provide
        a way for a user to 'reserve' a generic label
        range.

        NOTE: The ranges for a specific LDP Entity
        are UNIQUE and non-overlapping.

        A row will not be created unless a unique and
        non-overlapping range is specified."
    INDEX      { mplsLdpEntityLdpId,
                  mplsLdpEntityIndex,
                  mplsLdpEntityGenericLRMin,
                  mplsLdpEntityGenericLRMax
                }
    ::= { mplsLdpEntityGenericLRTable 1 }

MplsLdpEntityGenericLREntry ::= SEQUENCE {
    mplsLdpEntityGenericLRMin      Unsigned32,
    mplsLdpEntityGenericLRMax      Unsigned32,
    mplsLdpEntityGenericLabelSpace INTEGER,

```

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```

    mplsLdpEntityGenericIfIndexOrZero      InterfaceIndexOrZero,
    mplsLdpEntityGenericLRStorageType      StorageType,
    mplsLdpEntityGenericLRRowStatus        RowStatus
}

```

```

mplsLdpEntityGenericLRMin OBJECT-TYPE
    SYNTAX      Unsigned32(0..1048575)
    MAX-ACCESS not-accessible
    STATUS      current
    DESCRIPTION
        "The minimum label configured for this range."

```

```

 ::= { mplsLdpEntityGenericLREntry 1 }

mplsLdpEntityGenericLRMax OBJECT-TYPE
    SYNTAX      Unsigned32(0..1048575)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The maximum label configured for this range."
    ::= { mplsLdpEntityGenericLREntry 2 }

mplsLdpEntityGenericLabelSpace OBJECT-TYPE
    SYNTAX      INTEGER {
                                perPlatform(1),
                                perInterface(2)
                            }
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This value of this object is perPlatform(1), then
        this means that the label space type is
        per platform.

        If this object is perInterface(2), then this
        means that the label space type is per Interface."
    REFERENCE
        "RFC3036, LDP Specification, Section 2.2.1,
        Label Spaces."
    DEFVAL { perPlatform }
    ::= { mplsLdpEntityGenericLREntry 3 }

mplsLdpEntityGenericIfIndexOrZero OBJECT-TYPE
    SYNTAX      InterfaceIndexOrZero
    MAX-ACCESS  read-create
    STATUS      current

```

DESCRIPTION

"This value represents either the InterfaceIndex of the 'ifLayer' where these Generic Label would be created, or 0 (zero). The value of zero means that the InterfaceIndex is not known.

However, if the InterfaceIndex is known,

then it must be represented by this value.

If an InterfaceIndex becomes known, then the network management entity (e.g. SNMP agent) responsible for this object MUST change the value from 0 (zero) to the value of the InterfaceIndex."

```
::= { mplsLdpEntityGenericLREntry 4 }
```

mplsLdpEntityGenericLRStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The storage type for this conceptual row.

Conceptual rows having the value 'permanent(4)' need not allow write-access to any columnar objects in the row."

DEFVAL { nonVolatile }

```
::= { mplsLdpEntityGenericLREntry 5 }
```

mplsLdpEntityGenericLRRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of this conceptual row. All writable objects in this row may be modified at any time, however, as described in detail in the section entitled, 'Changing Values After Session Establishment', and again described in the DESCRIPTION clause of the mplsLdpEntityAdminStatus object, if a session has been initiated with a Peer, changing objects in this table will wreak havoc with the session and interrupt traffic. To repeat again: the recommended procedure is to set the mplsLdpEntityAdminStatus to down, thereby explicitly causing a session to be torn down. Then, change objects in this entry, then set the mplsLdpEntityAdminStatus

to enable which enables a new session to be initiated.

There must exist at least one entry in this

```

        table for every LDP Entity that has a
        generic label configured."
 ::= { mplsLdpEntityGenericLREntry 6 }

--*****
-- Module Conformance Statement
--*****

mplsLdpGenericGroups
    OBJECT IDENTIFIER ::= { mplsLdpGenericConformance 1 }

mplsLdpGenericCompliances
    OBJECT IDENTIFIER ::= { mplsLdpGenericConformance 2 }

--
-- Full Compliance
--

mplsLdpGenericModuleFullCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The Module is implemented with support for
        read-create and read-write.  In other words,
        both monitoring and configuration
        are available when using this MODULE-COMPLIANCE."
    MODULE -- this module
        MANDATORY-GROUPS {
            mplsLdpGenericGroup
        }

    OBJECT      mplsLdpEntityGenericLRRowStatus
    SYNTAX      RowStatus { active(1) }
    WRITE-SYNTAX RowStatus { createAndGo(4), destroy(6) }
    DESCRIPTION
        "Support for createAndWait and notInService is not required."

    ::= { mplsLdpGenericCompliances 1 }

--
-- Read-Only Compliance
--

```



```

mplsLdpGenericModuleReadOnlyCompliance MODULE-COMPLIANCE
  STATUS current
  DESCRIPTION
    "The Module is implemented with support for
    read-only. In other words, only monitoring
    is available by implementing this MODULE-COMPLIANCE."
  MODULE -- this module
    MANDATORY-GROUPS {
      mplsLdpGenericGroup
    }

```

```

OBJECT      mplsLdpEntityGenericLabelSpace
MIN-ACCESS  read-only
DESCRIPTION
  "Write access is not required."

```

```

OBJECT      mplsLdpEntityGenericIfIndexOrZero
MIN-ACCESS  read-only
DESCRIPTION
  "Write access is not required."

```

```

OBJECT      mplsLdpEntityGenericLRStorageType
MIN-ACCESS  read-only
DESCRIPTION
  "Write access is not required."

```

```

OBJECT      mplsLdpEntityGenericLRRowStatus
SYNTAX      RowStatus { active(1) }
MIN-ACCESS  read-only
DESCRIPTION
  "Write access is not required, and active is the
  only status that needs to be supported."

```

```

::= { mplsLdpGenericCompliances 2 }

```

```

--
-- units of conformance
--

```

```

mplsLdpGenericGroup OBJECT-GROUP
  OBJECTS {
    mplsLdpEntityGenericLabelSpace,

```

```
mplsLdpEntityGenericIfIndexOrZero,  
mplsLdpEntityGenericLRStorageType,  
mplsLdpEntityGenericLRRowStatus  
}  
STATUS      current  
DESCRIPTION  
    "Objects that apply to all MPLS LDP implementations  
    using Generic Labels as the Layer 2."  
 ::= { mplsLdpGenericGroups 1 }
```

END

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5. Revision History

NOTE TO RFC-Editor: before publishing this document as an RFC, please remove this Revision History (change log) section.

5.1. Changes from <[draft-ietf-mpls-ldp-mib-13.txt](#)>

Fix in the Full Compliance of the MPLS-LDP-STD-MIB module to remove MIN-ACCESS read-only from the mplsFecRowStatus and mplsLdpLspFecRowStatus objects. The DESCRIPTION clauses were also updated accordingly.

5.2. Changes from <[draft-ietf-mpls-ldp-mib-12.txt](#)>

These fixes were from the MIB Doctor Review.

- bottom of page6
s/MPLS-TC-MIB/MPLS-TC-STD-MIB/
- sect 3.6 first para
change [RFC2573](#) into [RFC3413](#)
The citation [[RFC2573](#)] does not occur in the ref section either
Neither doe [RFC3413](#)

Fixed line lengths.

5.3. Changes from <[draft-ietf-mpls-ldp-mib-11.txt](#)>

Updated with comments from the 3rd Last Call for this MIB which took place, Thursday, June 12 to June 24, 2003.

Updated with last call comments from Adrian Farrel posted to the MPLS Working Group email list on June 12, 2003.

Updated the 2 outstanding issues from Bert's email May 9th which was posted to the MPLS Working Group. These issues were not updated for version 10, so were addressed in version 11: 1) updated #3 from that email and 2) reviewed all the InetAddressType and InetAddress objects to make sure that descriptions were per [rfc3291](#).

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[5.4.](#) Changes from <[draft-ietf-mpls-ldp-mib-10.txt](#)>

Renamed the MIB module to include Std and also updated the IANA Considerations Section to use mplsStdMIB.

Updated per Bert's email May 9th, with 2 exceptions: 1) did not yet update #3 from that email and 2) did not yet review all the InetAddressType and InetAddress objects to make sure that descriptions were per [rfc3291](#).

Changed Ses to Session for clarity.

[5.5.](#) Changes from <[draft-ietf-mpls-ldp-mib-09.txt](#)>

Added the new MIB boiler plate and associated MIB reference changes.

Reworked the OID tree structure so that the Modules only have the mplsMIB subid dependency. This was discussed in mpls wg email (discussion was mostly between Bert, Tom and Joan).

Added IANA Considerations section. This contains 4 subsections, one per MIB module.

Updated and added new references as needed.

Changed mplsMIB subid values to agree with the latest "Multiprotocol Label Switching (MPLS) Management Overview" document, [[MPLSMGMT](#)].

Moved MIB modules around so that they would appear in subId order. The Generic MIB module is shown last, since the subid is 7 (which is the last (and largest) subid requested by IANA).

[5.5.1.](#) Changes based on MIB Doctor Review Comments

The following changes are based on comments from the MIB DR Review. The comments are from email to the mpls working group dated, Dec 6,

2002. These comments are quoted and prefaced by "REQ: comment goes here", and then followed by our resolution.

"REQ: - missing IPR section". RSP: it has been added.

"REQ: - Security considerations probably needs more work
Security ADs want you to explain what the vulnerabilities/risks

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are and what to do against them.

Also for read only objects, pls list each (group of) object(s) and explain what sensitivity attributes they have". RSP: Done. We added subsections here since the Security template is MIB Module based and it seemed to us more clear to do a subsection per MIB Module.

"REQ: - pls do the consistency checking for descriptors and all that". RSP: believe this to be done. Changed Gen to Generic everywhere, changed Fr to FrameRelay, changed R0 to ReadOnly. Changed Sessions to Ses everywhere. Reviewed tables to make sure they were prefixed consistently. Added more references, used more TCs and other stuff.

"REQ: - sect 3.5 1st sentence, s/would be/are/ ??". RSP: done.

"REQ: - sect 3.5 2nd para first sentence s/initiation/initiate/ ". RSP: done.

"REQ: - [section 3.5.2](#) s/mpsl/mpsls/". RSP: done.

"REQ: - mplsXxxIndexNext

See my comments on FTN MIB and LSR MIB on these type of objects Best to use something aka [rfc3289](#) ". RSP: We have imported the IndexInteger and IndexIntegerNextFree TCs (from [rfc3289.txt](#)). NOTE: we do not like the names of these TCs because they use the term Integer when the values are Unsigned32. Would prefer new TCs with IndexUnsigned32 and IndexUnsigned32NextFree.

"REQ:- RowStatus and StorageType objects

see my comments about similar objects in LSR MIB

for StorageType might also want to add a DEFVAL ". RSP: Added descriptive text to the RowStatus objects to specify which columns can be changed when row is active. Added descriptive text to the StorageType objects to specify what happens when the StorageType is

permanent. Also added DEFVALs for the StorageType objects.

"REQ: - mplsLdpNotifications ... { mplsLdpMib 2 }
why not { mplsLdpMib 0} so that it is right away the prefix?
I believe LSR MIB does it that way now. You may want to do
it consistently for all notifications.
I can live with either way, but prefer them to be shorter OIDs."

RSP: We changed this to follow what LSR MIB does (i.e.
mplsLdpNotifications 0) for shorter OIDs..PP "REQ: -
mplsXxxLastChange

does that time stamp only get changed if an addition/deletion takes

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place? Not if something gets changed via a SNMP SET command?
I think I'd prefer to also see changes (modifications) via SET.
But in any event, be very explicit about if those are included or
not.". RSP: All Last change object DESCRIPTIONs have been
updated to be very specific.

"REQ:- mplsLdpLspType
All that stuff in the DESCRIPTION clause is just a repeat of the
TC DESCRIPTION clause. Seems not needed to me. What if a value
gets added later... how do you stay in sync?". RSP: This has
been fixed.

"REQ: - mplsFecAddrLength
Should that be of SYNTAX InetAddressPrefixLength as per [RFC3291](#)?".
RSP: yes, fixed.

"REQ: - mplsFecAddrFamily and mplsFecAddr
These are strange. The DESCRIPTIONs are certainly not meeting the
requirements as specified in [RFC3291](#). At other places you do it
correct, so you do understand what is required I think.". RSP:
changed to have a better descriptions. Should note that the TLVs in
the LDP Specification use Address Family Numbers and are still
referring to [RFC1700](#).

"REQ: - mplsLdpLspFecTable claims to be a read-only table.
Yet you have a read-create RowStatus object in it.". RSP: fixed.

"REQ: - mplsLdpSessionUp and mplsLdpSessionDown
Is it not better to just have one notification, namely a
mplsLdpSessionStateChange and then the mplsLdpSesState object will
explain what the change is?". RSP: We prefer to leave it this

way. There are some 3rd Party applications that try to resolve Notifications, so you see one for down, then resolve this by seeing another one for up. Granted, these 3rd party apps could be coded to parse the varbind within the trap, but then this requires coding whereas having 2 distinct notifications is easier on the developer. Granted, this maybe makes the MIB design more cumbersome. If this is a blocking issue, then we will change it.

"REQ:- COMPLIANCE section. I hope that INT ADs are OK with making IPv6

addresses optional. Is that cause current LDP only supports IPv4?

If so you may want to add that as an explanation.". RSP: IPv6 was made mandatory, also supported in MPLS LDP Spec ([rfc3036.txt](#)).

Continue with MIB Dr Comments for the MPLS-LDP-GENERIC-MIB.

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"REQ:- same on mplsXXXIndexNext and RowStatus and SStorageType objects". RSP: These hdescriptions have been updated. It should be noted, that these should be EXACTLY the same as the mplsLdpEntityTable since the Label Range Tables extend the Entity Table. "REQ:- this looks wierd:

::= { mplsMib 6 } -- to be assigned

use cc instead of 6 if you want IANA to assign, and do tell

-- to be assigned by IANA

and write something about it in an IANA Considerations Section if this is what you want.". RSP: Added more comments, and added an

IANA Considerations Section. "REQ:- mplsGenModuleROCompliance

I would call it mplsGenModuleReadOnlyCompliance

You have used ReadOnly and Full in other places/mib modules and it is good to be clear and consistent". RSP: done.

MIB Doctor Review comments for ATM.

"REQ:- s/Moduel/Module/". RSP: done.

"REQ:- same on mplsXXXIndexNext and RowStatus and SStorageType objects". RSP: done.

"REQ:- this looks wierd:

::= { mplsMib 4 } -- to be assigned

use cc instead of 4 if you want IANA to assign, and do tell

-- to be assigned by IANA

and write something about it in an IANA Considerations Section if

this is what you want.". RSP: done.

"REQ:- See earlier remark on Notifications (use zero instead of 2 right away)". RSP:Removed this branch because there aren't any notifications in this MIB module.

"REQ:- There are still some INTEGER enumerations that start with zero It is not a BLOCKING problem... but if acceptable, pls make it start

at 1 (as you have done vor various others of these enumerations)".

RSP: We would rather leave these enums starting with zero. (There are 2 of them in the ATM Module). The reason for leaving them is because the value zero is what the protocol uses. We have added REFERENCES to these objects and more info in the descriptions themselves. We believe it is in the best interest of developers to start enums at zero. The INET-ADDRESS-MIB uses the value zero, and since we are already required to use that MIB, there is precedence for zero in an enum where it makes sense. We believe the value of zero makes sense for where it is being used in this MIB module.

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"REQ:- mplsXxxxROCompliance -> better mplsXxxxReadOnlyCompliance".
RSP: done.

"REQ:- some formatting problems with DEFVAL lines being split on 2 lines?". RSP: fixed.

MIB Doctor Review comments for FrameRelay

"REQ:- consistency in descriptors (FrameRelay vs FR etc)". RSP: done. "REQ:- same on mplsXXXIndexNext and RowStatus and SStorageType objects". RSP: done. "REQ:- this looks wierd:

::= { mplsMib 5 } -- to be assigned

use cc instead of 5 if you want IANA to assign, and do tell

-- to be assigned by IANA

and write something about it in an IANA Considerations Section if this is what you want.". RSP: done. "REQ:- See earlier remark on Notifications (use zero instead of 2 right away)". RSP:Removed this branch because there aren't any notifications in this MIB module.

"REQ:- There are still some INTEGER enumerations that start with zero It is not a BLOCKING problem... but if acceptable, pls make it start

at 1 (as you have done vor various others of these enumerations)".
RSP: We would rather leave these enums starting with zero. (There are 4 of them in the Frame Relay Module). The reason for leaving them is because the value zero is what the protocol uses. We have added REFERENCES to these objects and more info in the descriptions themselves. We believe it is in the best interest of developers to start enums at zero. The INET-ADDRESS-MIB uses the value zero, and since we are already required to use that MIB, there is precedence for zero in an enum where it makes sense. We believe the value of zero makes sense for where it is being used in this MIB module.

```
"REQ:-      mplsLdpEntityFrLRComponents OBJECT-TYPE
            SYNTAX      Unsigned32 (1..65535)
            MAX-ACCESS   read-create
            STATUS       current
            DESCRIPTION
                "Number of Label Range Components in the Initialization
                message. This also represents the number of entries
                in the mplsLdpEntityConfFrLRTable which correspond
                to this entry."
```

Where is this mplsLdpEntityConfFrLRTable ??". RSP: fixed.

"REQ:- I see the xxxDlci index objects start at zero.

Pls add to DESCRIPTION clauses why zero must be an index.". RSP:

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Since we are using DLCI and the value of zero is valid for a DLCI. A statement was added about this. Also, used the DLCI TC from [rfc2115.txt](#) to make this more clear. NOTE: the MPLS-LDP-ATM-MIB module uses an index of the VP which can also take on the value of zero. A statement was added to this Index also. "REQ:- mplsXxxxROCompliance -> better mplsXxxxReadOnlyCompliance". RSP: done.

[5.6.](#) Changes from <[draft-ietf-mpls-ldp-mib-08.txt](#)>

The following changes are from the IESG MIB review.

Changed "Label Switch Router" to "Label Switching Router".

Spelling errors fixed (unlabelled, atttempt, subsytem).

Changed some of the enums to start at 1, instead of zero:

mplsLdpPeerLoopDetectionForPV and mplsLdpEntityOperStatus.

Added REFERENCE clauses.

Added a timestamp object for mplsLdpSesState changes.

Changed NMS to command generator as defined in [RFC2571](#).

Added a lastChange objects: mplsLdpEntityLastChange and mplsLdpPeerLastChange.

Added TEXTUAL-CONVENTIONS for MplsLabelDistributionMethod and MplsRetentionMode. These TCs have been incorporated into [draft-ietf-mpls-tc-mib-04.txt](#).

Divided up the one MIB MODULE into 3 additional modules for a total of 4 MIB MODULES: 1) mplsLdpMIB, 2) mplsLdpGenericMIB which includes objects pertaining to Ethernet as the L2, 3) mplsLdpAtmMIB which includes objects pertaining to ATM as the L2, and 4) mplsLdpFrameRelayMIB which includes objects pertaining to Frame Relay as the L2.

Also, reduced the number of objects by creating the mplsLdpLspTable and removing the Mapping tables.

In [section 3.1](#) changed "where each row in the table initiates" to "where each row in the table represents".

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Updated Reference Section and divided them into Normative vs. Informative.

Removed the MplsGenAddress TC and used the INET-ADDRESS-MIB's InetAddress TC. Objects using this TC are: mplsLdpEntityTargetPeerAddr, mplsFecAddr, and mplsLdpSesPeerNextHopAddr and are noted in the conformance statements supporting: unknown(0), ipv4(1), and ipv6(2).

Removed AddressFamilyNumbers TC and used InetAddressType TC from the INET-ADDRESS-MIB. One of the MIB compilers as a warning because apparently one is expected to use InetAddressType and InetAddress together (although, think this restriction is too restrictive). Also, removed the reference for the Address Family Numbers MIB.

Changed the name TargPeer to TargetPeer.

Removed the Enable/Disable trap objects: mplsLdpEntityPVLMisTrapEnable, and mplsLdpSesUpDownTrapEnable. [RFC 3413](#) should be used to enable/disable traps.

Removed the import for "transmission" and instead, imported "mplsMIB from the MPLS-TC-STD-MIB".

Changed mplsLdpEntityPVL to mplsLdpEntityPathVectorLimit and updated the DESCRIPTION clause. Also, the PVL abbreviation was expanded to PathVectorLimit for other objects.

Combined the objects: mplsLdpPeerLoopDectionForPV and mplsLdpPeerPVL into one object: mplsLdpPeerPathVectorLimit and updated the DESCRIPTION clause.

mplsLdpEntityTcpDscPort uses InetPortNumber TC from the INET-ADDRESS-MIB. Likewise, mplsLdpEntityUdpDscPort uses the InetPortNumber TC from the INET-ADDRESS-MIB. Also a REFERENCE clause was added.

The mplsLdpEntityMaxPduLength object has the SYNTAX range changed to start at 256. Also the DESCRIPTION clause was updated.

The mplsLdpSesMaxPduLen object's name was changed to mplsLdpSesMaxPduLength and a UNITS clause was added, and the DESCRIPTION clause was updated. This object is related to the mplsLdpEntityMaxPduLength object.

The mplsLdpEntityKeepAliveHoldTimer and mplsLdpEntityHelloHoldTimer DESCRIPTION clause was changed from "The two octet value" to "The

16-bit integer value".

The mplsLdpEntityHelloHoldTimer object's DESCRIPTION clause was updated.

A range of Integer32(0..100) was added to the SYNTAX clause of the mplsLdpEntityInitSesThreshold object. Also, the DESCRIPTION clause of this object was updated.

The mplsLdpEntityOptionalParameters object was renamed to mplsLdpEntityLabelType.

Updated the `mplsLdpEntityAdminStatus` and `mplsLdpEntityRowStatus` objects. `RowStatus` now reflects the status of the row, and `Admin` status controls enabling/disabling the entry.

Updated the `DESCRIPTION` clauses for the objects in the `mplsLdpEntityStatsTable` to refer to the `mplsLdpEntityDiscontinuityTime` object.

Changed `StorType` to `StorageType`.

[5.7](#). Changes from [<draft-ietf-mpls-ldp-mib-07.txt>](#)

There were three types of changes: the first change was that all the MPLS Textual Conventions from this MIB, the LSR and MPLS-TE MIBs were moved into a new document [[MPLSTCMIB](#)], "[draft-ietf-mpls-tc-mib-00.txt](#)". The Textual Conventions are now IMPORTED from [[MPLSTCMIB](#)]. The second type of change was updates based on comments from the IESG. These changes will be discussed below. The third type of changes were based on minor editorial changes from the co-authors.

The "Introduction" and "Structure of the MIB" sections were reworded since they were repetitive.

The "Overview" was rearranged.

References were added to "The LDP Entity ATM Objects" and "The LDP Entity Frame Relay Objects" Sections.

The Working Group mailing list and Chairs were added to the CONTACT-INFO.

Updated the `DESCRIPTION` clause for the "`mplsLdpEntityLdpId`" object.

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Updated the `mplsLdpEntityProtocolVersion` to include a range (1..65535).

Updated the "References" Section.

Running the MIB through the `smilint` MIB compiler showed that some object names were longer than 32 characters, these were shortened to

32 characters or fewer.

The following changes were from the co-authors.

Other minor editorial changes such as fixing typographical errors, and removing MIB comments which are no longer meaningful.

Page 17 (also page 46) the description was enhanced to describe the version field in the LDP header from [RFC3036](#).

Removed WellKnown from the tcp and upd port names. It's the ports that get set, and the default value is the well known (actually the registered) port number.

mplsLdpEntityInitSesTrapEnable object is useless and was removed since setting mplsLdpEntityInitSesThreshold=0 achieves the same thing. Also removed it from the descriptive text in [section 3](#).

Page 47, mplsLdpSessionDiscontinuityTime The initial value of this was changed to be sysUpTime instead of zero. sysUpTime for when the session starts is more meaningful and was added to the Session Up/Down Traps also. Also, added the Session specific stats to the up/down traps.

[5.8](#). Changes from <[draft-ietf-mpls-ldp-mib-06.txt](#)>

All changes were from the second last call which took place Thursday, July 20th, until Thursday, July 27th, 2000 and are described in the remainder of this section.

Remove the reference to the MPLS framework document.

Add an mplsFecIndexNext type of object.

Change the conformance of the FEC table objects to be part of the mplsLdpGeneralGroup.

The mplsLdpEntityConfGenericTable is no longer needed because the

functionality has been absorbed by the mplsLdpEntityConfGenericLabelRangeTable. The mplsLdpEntityConfGenericTable has been removed and the front section

was updated accordingly.

Other editorial issues, updating references, typos and so forth.

5.9. Changes from <[draft-ietf-mpls-ldp-mib-05.txt](#)>

The majority of changes in this revision are based on Last Call comments which were received during the last call from Thursday, March 9, 2000 to Friday, March 17, 2000, or slightly thereafter. Also, changes were made to agree with the latest specifications. These changes are described in this section.

Changes due to [draft-ietf-mpls-ldp-07.txt](#) and [draft-ietf-mpls-ldp-08.txt](#). Specifically, removing references to IPv4/IP and using router id, as appropriate.

Removed vpMerge and vpAndVcMerge choices from the object, mplsLdpEntityAtmMergeCap. VP Merge is not described in [[RFC3036](#)].

The LIB Table was removed and replaced by mapping tables to map LDP LSPs created by LDP sessions to the mplsInSegment, mplsOutSegment and mplsXC tables in the LSR MIB. The conformance section was updated to include a Mapping Group which is to be implemented iff these LSR MIB tables (mplsInSegmentTable, mplsOutSegmentTable and mplsXCTable) are implemented.

The front section was updated to include information on the Generic label table.

Added more in the front section on on Row Creation/adminStatus/OperStatus in the LDP Entity and related tables.

Added a generic label range table. NOTE: there is NO corresponding LDP message which relates to the information in this table, however, this table does provide a way for a user to 'reserve' a generic label range.

A new TEXTUAL-CONVENTION, MplsAtmVcIdentifier was added. This TC has the same upper bounds as AtmVcIdentifier (from [rfc2514](#)) except that the lower bound is 32 (and not 0). The lower bound is 32 since this value is specified by [[RFC3035](#)].

Removed the scalar object `mplsLsrLabelRetentionMode` and added `mplsLdpEntityLabelRetentionMode`. The change was made to allow configuring the retention mode on a per LDP Entity basis, as opposed for the entire LSR.

Typo in [section 3.5.2](#) was fixed.

Typo in the `mplsLdpSessionUp` notification description was fixed.

Section 'LDP Notifications' was expanded to cover both the '`mplsLdpSessionUp`' and '`mplsLdpSessionDown`' traps. Also, the objects which enable and disable these traps have been described in this Section:

The '`mplsLdpEntityHopCountLoopDetection`' object and the '`mplsLdpEntityHopCount`' object have been combined into the new object, '`mplsLdpEntityHopCountLimit`'.

`MplsLabel` has been updated to reflect the VPI value of 12 bits and not 8.

Added DEFVAL clause to the '`mplsLdpEntityWellKnownDiscoveryPort`' object. The default value is 646.

Added UNITS and DEFVAL clauses to the '`mplsLdpEntityMaxPduLength`' object. The default value is 4096 and the units is octets.

Added DEFVAL clause to '`mplsLdpEntityProtocolVersion`' object. The default value is 1.

Added DEFVAL clause to '`mplsLdpEntityKeepAliveHoldTimer`' of 40 seconds.

Added DEFVAL clause to '`mplsLdpEntityInitSesThreshold`' object. The default value is 8.

The `mplsLdpEntityWellKnownDiscoveryPort` was changed into two objects, one for TCP and one for UDP. The names are

Typo in the description for the

The `mplsLdpEntityPeerTable` was (re-)named `mplsLdpPeerTable`. The `mplsLdpSessionTable` now AUGMENTS the `mplsLdpPeerTable` in order to show that these two tables are related. There has been wording added to the `mplsLdpSessionEntry` description and to the description for the `mplsLdpPeerTable`.

5.10. Changes from <[draft-ietf-mpls-ldp-mib-04.txt](#)>

Editorial changes, fixing typo's, fixing wrapping lines, etc.

Updated references for latest drafts, and added [[RFC3032](#)] and [[RFC3034](#)] to Reference Section.

Added to the Acknowledgements Section.

Changed the SYNTAX and DESCRIPTION of the 'mplsLdpLsrLoopDetectionCapable' object, so that it will also support the loop detection by hop count.

Combined the 'mplsLdpEntityLoopDetectionForPV' and 'mplsLdpEntityPVL' objects. The functionality of the 'mplsLdpEntityLoopDetectionForPV' is now denoted by the value of 0 (zero) in the 'mplsLdpEntityPVL' object. This results in one less object 'mplsLdpEntityLoopDetectionForPV' but does not sacrifice functionality.

Changed 'mplsLdpLibLabelType' into two objects: 'mplsLdpLibInLabelType' and differ from the egress label type. The MIB now reflects this.

The following items were changed as a result of the Frame Relay Forum dropping support for 17-bit DLCIs: the MplsLabel TC description has been modified, and other Frame Relay Object descriptions were also modified (as specified in this section).

The MplsLabel TC was also modified and reference 3. was added to the REFERENCE Clause.

MplsLdpLabelTypes TC was modified to use an enum.

InterfaceIndex support was added to the Entity information. This was specifically requested by several members of the working group. An additional table, mplsLdpEntityConfGenericTable as a way to configure Generic Labels, and an object, 'mplsLdpConfGenericIfIndexOrZero' was added to map the InterfaceIndex used by Generic Labels. Objects were also added to the 'mplsLdpEntityAtmParmsTable' and the and 'mplsLdpEntityFrIfIndex', respectively.

Changed the name of the 'mplsLdpEntityMtu' object to be 'mplsLdpEntityMaxPduLength' which is more consistent with the LDP Specification. Also, the description and SYNTAX were changed.

Changed the SYNTAX of the 'mplsLdpSessionMaxPduLength' to unsigned32

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and changed the Range from (0..65535) to (1..65535).

Added and improved the front section discussion on SNMP Notifications.

Also, modified the DESCRIPTION clause of the

Added objects to enable/disable the sending of traps:

Added an object to enable/disable sending traps for Sessions changing from Up to Down, or Down to Up.

Added notifications to generate traps from session changing from Up to Down, or Down to up.

Added a StorageType object to the Entity and associated tables which are configurable.

Added a Discontinuity Time object to the Entity Table,

Added discussion on row creation in the Entity and other associated Entity tables. This is a new Section in the Front part of the document called:

Removed the 'mplsLdpEntityControlMethod'.

Made 'mplsLdpFecLspId' as part of the INDEX for the FEC table. This is to allow FECs to map to multiple LSPs. Also add a RowPointer to a row in the Session Table.

Added an operation status object, 'mplsLdpLspOperStatus' and a last Change object, 'mplsLdpLspLastChange' to the LIB Table. This will be used to detect whether an LSP has changed its status.

Changed the name of the mplsLdpPeerTable to the mplsLdpEntityPeerTable. This table contains information relevant to Peers which are known to specific Entities. The indexing of this table has also changed to include the Row in the Entity Table that this Peer is known by. The mplsLdpHelloAdjacencyTable and the mplsLdpSessionTable have been moved under this table. Since Hello Adjacencies are related to Entity-Peer information and Sessions are related to Entity-Peer information this was seen as a comprehensive and coherent modelling. Associated descriptions in the front section

and in the tables have been changed to reflect this change.

Moved the 'mplsLdpConfFrLen' object from the

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'mplsLdpEntityConfFrLabelRangeTable' to the 'mplsLdpEntityFrameRelayParmsTable' since the Frame Relay interface/port can only use one header length at a time, i.e. a specific FR interface supports one address length for all VCs on that interface. Also, changed the object so that it only supports 10 and 23 bit DLCI lengths. (The 17 bit length was dropped by the Frame Relay Forum and thus, is no longer required.) The name of this object was changed from 'mplsLdpConfFrLen' to 'mplsLdpEntityFrLen' to fit in with the 'mplsLdpEntityFrameRelayParmsTable'.

Removed the seventeenDlciBits(1) value from the mplsLdpFrSessionLen object. (The 17 bit length was dropped by the Frame Relay Forum and thus, is no longer required.)

Corrected the range of the 'mplsLdpEntityIndexNext' object to include 0 (zero).

5.11. Changes from <[draft-ietf-mpls-ldp-mib-03.txt](#)>

Reworded the description of the mplsLdpAtmSessionTable to clarify that one or MORE label range intersection(s) is/are represented in this table.

Reworded the description of the mplsLdpFrameRelaySessionTable to clarify that one or MORE label range intersection(s) is/are represented in this table.

Added a new index, mplsLdpSessionPeerIndex, to the mplsLdpSessionPeerAddressTable. This new index uniquely identifies the entry within a given session. (Since adding mplsLdpSessionPeerNextHopAddressType, mplsLdpSessionPeerNextHopAddress to the INDEX clause of the mplsLdpSessionPeerAddressTable leaves a table with only indices and no objects, the work around was to add a new index which uniquely differentiates an entry within a given session.)

Quite a few changes to the mplsLdpPeerTable. First, removed the mplsLdpPeerIndex from the mplsLdpPeerTable and other tables. This

index served no purpose, so was removed. Second, removed the objects: mplsLdpPeerInterNetworkAddrType, and mplsLdpPeerInterNetworkAddr. Third, reworded the description of this table to include information which is known during Session Initialization attempts, the specific information has to do with Loop Detection based on Path Vectors. Since [Section 3.5.3](#) of the LDP Spec when describing the PVLim says: "Although knowledge of a peer's path

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vector limit will not change an LSR's behavior, it does enable the LSR to alert an operator to a possible misconfiguration." and the object mplsLdpPeerPVL is sent as a varbind in the mplsLdpPVLMismatch notification.

Removed the mplsLdpPeerIndex from the mplsLdpHelloAdjacencyTable.

Removed the "IANA Address Family Numbers" MIB section.

Updated the boiler.me from the ops web page dated Weds., Dec 22, 1999.

Updated the Security Section from the ops web page.

Added the following objects to the mplsLdpEntityTable: mplsLdpEntityControlMethod, mplsLdpEntityLoopDetectionForPV, and mplsLdpEntityPathVectorLimit.

Removed mplsLdpSessionLabelAdvertisement, mplsLdpSessionLoopDetectionForPV, and mplsLdpSessionPathVectorLimit from the mplsLdpSessionTable.

Changed the mplsLdpPathVectorLimitMismatch Notification to send mplsLdpEntityPathVectorLimit (instead of mplsLdpSessionPathVectorLimit).

Copied the MplsLabel TC from [draft-ietf-mpls-lsr-mib-00.txt](#) and replaced the MplsLdpGenAddr for mplsLdpLibInLabel and mplsLdpLibOutLabel with MplsLabel.

The mplsLdpSessionIndex was removed throughout the MIB. This was replaced by the object mplsLdpSessionDiscontinuityTime. The motivation was to reduce the number of indices.

The descriptions for the objects in the mplsLdpSessionStatsTable,

mplsLdpSessionStatsUnknownMessageTypeErrors and mplsLdpSessionStatsUnknownTlvErrors, have been updated to include a reference to the mplsLdpSessionDiscontinuityTime object.

5.12. Changes from <[draft-ietf-mpls-ldp-mib-02.txt](#)>

Added Scalar Objects: mplsLdpLsrLoopDetectionPresent, and mplsLdpEntityIndexNext.

Added the following objects to the mplsLdpEntityTable:

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mplsLdpEntityProtocolVersion, mplsLdpEntityAdminStatus, mplsLdpEntityOperStatus, mplsLdpEntityTargetedPeer, mplsLdpEntityTargetedPeerAddrType, mplsLdpEntityTargetedPeerAddr, and mplsLdpEntityHelloHoldTimer.

Changed the description of the mplsLdpEntityAtmParmsTable and added the following objects to this table: mplsLdpEntityAtmLsrConnectivity, mplsLdpEntityDefaultControlVpi, mplsLdpEntityDefaultControlVci, mplsLdpEntityUnlabTrafVpi, and mplsLdpEntityUnlabTrafVci. NOTE: the last four objects were in Version 01 of the MIB but were mistakenly omitted from Version 02. Now, they are back.

Changed the indexing of the mplsLdpEntityConfAtmLabelRangeTable to include the minimum VPI/VCI. This is to ensure that indices in this table are unique.

Changed the indexing of the mplsLdpEntityConfFrLabelRangeTable, to include the minimum DLCI value. This is to ensure that indices in this table are unique.

Added [[RFC3036](#)] to Reference Section.

5.13. Changes from <[draft-ietf-mpls-ldp-mib-01.txt](#)>

The MIB was updated to correspond to [draft-ietf-mpls-ldp-06.txt](#) of the LDP Specification [[RFC3036](#)].

The front section was updated.

The MIB was made to be less ATM-centric. Essentially, the ATM

specific objects were removed from the tables and placed in ATM specific Tables. A type was added to the base tables and a row is to be created in the ATM/FR/etc. type table. Apropos compliance statements were added to reflect the separation of ATM and Frame Relay objects into their respective tables.

Objects for Loop Detection were removed from describing the LDP implementation (i.e. the scalars were removed) and Loop Detection objects were added to the Session Table. (Although as the LDP Specification indicates loop detection should be for an LSR within a domain.)

The following tables were added: mplsLdpEntityAtmParmsTable, mplsLdpEntityConfAtmLabelRangeTable, mplsLdpFrameRelayParmsTable, mplsLdpConfFrLabelRangeTable, mplsLdpAtmSessionTable,

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mplsLdpFrameRelaySessionTable, mplsLdpSessionPeerAddressTable, mplsLdpLibTable, and the mplsLdpFecTable.

The following notifications were added: notification for Session removal.

The following objects were removed from the Session Table: mplsLdpSessionRole was removed (this can be determined by comparing LSR Ids and does not need to be explicitly in the MIB.) ATM specific objects (mplsLdpSessionAtmLabelRangeLowerBoundVpi, mplsLdpSessionAtmLabelRangeLowerBoundVci, mplsLdpSessionAtmLabelRangeUpperBoundVpi, mplsLdpSessionAtmLabelRangeUpperBoundVci) were removed and put into a separate table. Frame Relay objects were added in a separate table.

Hello Adjacency Table was updated.

The objects, mplsLdpSessionRejectedParamErrors, mplsLdpSessionRejectedNoHelloErrors, mplsLdpBadLdpIdentifierErrors, mplsLdpBadPduLengthErrors, mplsLdpBadMessageLengthErrors, mplsLdpBadTlvLengthErrors, mplsLdpMalformedTlvValueErrors, mplsLdpKeepAliveTimerExpiredErrors, mplsLdpShutdownNotifReceived, and mplsLdpShutdownNotifSent were added to the mplsLdpEntityStatsTable.

The mplsLdpSessionStatsTable was added to count statistics based on a per Session basis.

The `mplLdpPeerConfAtmLabelRangeTable` has been removed. There is no need to configure information for a Peer. All information for a peer is learned, thus peer information is read-only.

(Editorial) References were updated to reflect the documents which this version was based on.

5.14. Changes from [<draft-ietf-mpls-ldp-mib-00.txt>](#)

Textual conventions were added for the LSR Identifier and the LDP Identifier.

Top-level mib structure was added. The LDP MIB falls under a proposed hierarchy of `mpls.mplsProtocols`.

The mib hierarchy within the LDP MIB was also changed. A new branch, under `mpls.mplsProtocols.mplsLdpMIB.mplsLdpObjects` was added. This branch is `mplsLdpLsrObjects`. Currently, this contains several new

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scalar objects: `mplsLdpLsrID`, `mplsLdpLsrLoopDetectionPresent`, `mplsLdpLsrLoopDetectinAdminStatus`, `mplsLdpLsrPathVectorLimit`, `mplsLdpLsrHopCountLimit`, `mplsLdpLsrLoopPreventionPresent`, `mplsLdpLsrLoopPreventionAdminStatus`, and `mplsLdpLsrLabelRetentionMode`.

`mplsLdpEntityTable` is now indexed by `mplsLdpEntityIdentifier`, which is the LDP Identifier used in Session establishment. `mplsLdpEntityLoopDetection` and `mplsLdpEntityLoopPrevention` objects were removed from this table.

The following objects were added to the `mplsLdpEntityTable`: `mplsLdpEntityLabelSpaceType`, `mplsLdpEntityUnlabTrafVpi`, `mplsLdpEntityUnlabTrafVci`, `mplsLdpEntityMergeCapability`, `mplsLdpEntityVcDirectionality`, and `mplsLdpEntityLabelDistributionMethod`.

The following objects were added to the `mplsLdpPeerEntityTable`: `mplsLdpPeerLabelDistributionMethod`.

The following object was removed from the `mplsLdpEntityStatsTable`: `mplsLdpEntityEstablishedSessions`.

References were added and revised.

6. Acknowledgments

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following people: Leigh McLellan, Geetha Brown, Geping Chen and Charlan Zhou from Nortel Networks, and Zoltan Takacs and Bo Augustsson from Ericsson.

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[9.](#) Security Considerations

This Security Considerations section consists of 4 subsections, one for each of the MIB Modules in this document.

[9.1.](#) Security Considerations for MPLS-LDP-STD-MIB

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations. These are the tables and objects and their sensitivity/vulnerability:

- o the `mplsLdpEntityTable` contains objects to provision potential LDP sessions on the Label Switching Router (LSR) or Label Edge Router (LER). The `mplsLdpLspFecTable` contains objects which associate an LSP with a FEC. Unauthorized access to objects in these tables, could result in disruption of traffic on the network. This is especially true if an LDP session has been established. The use of stronger mechanisms such as SNMPv3 security should be considered where possible. Specifically, SNMPv3 VACM and USM MUST be used with any v3 agent which implements this MIB. Administrators should consider whether read access to these objects should be allowed, since read access may be undesirable under certain circumstances.

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 the `mplsLdpEntityTable`, `mplsLdpPeerTable`, `mplsLdpSesTable` and `mplsLdpSesStatsTable` collectively show the LDP LSP network topology. If an Administrator does not want to reveal the LDP LSP topology of the network, then these tables should be considered sensitive/vulnerable.

[9.2.](#) Security Considerations for MPLS-LDP-ATM-STD-MIB

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations. These are the tables and objects and their sensitivity/vulnerability:

- o the `mplsLdpEntityAtmTable` and `mplsLdpEntityAtmLRTTable` contain objects to provision potential LDP sessions on the Label Switching Router (LSR) or Label Edge Router (LER) over Layer 2 of ATM. These tables extend the `mplsLdpEntityTable` in the MPLS-LDP-MIB. Unauthorized access to objects in these tables, could result in disruption of traffic on the network. This is especially true if an LDP session has been established. The use of stronger mechanisms such as SNMPv3 security should be considered where possible. Specifically, SNMPv3 VACM and USM MUST be used with any v3 agent which implements this MIB. Administrators should consider whether read access to these objects should be allowed, since read access may be undesirable under certain circumstances.

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 the `mplsLdpEntityAtmTable` and `mplsLdpEntityAtmLRTTable` show the Label Ranges for ATM. If an Administrator does not want to reveal this information then these tables should be considered sensitive/vulnerable and treated accordingly.

9.3. Security Considerations for MPLS-LDP-FRAME-RELAY-STD-MIB

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations. These are the tables and objects and their sensitivity/vulnerability:

- o the `mplsLdpEntityFrameRelayTable` and `mplsLdpEntityFrameRelayLRTTable` contain objects to provision potential LDP sessions on the Label Switching Router (LSR) or Label Edge Router (LER) over Layer 2 of Frame Relay. These tables extend the `mplsLdpEntityTable` in the MPLS-LDP-MIB. Unauthorized access to objects in these tables, could result in disruption of traffic on the network. This is especially true if an LDP session has been established. The use of stronger mechanisms such as SNMPv3 security should be considered where possible. Specifically, SNMPv3 VACM and USM MUST be used with any v3 agent which implements this MIB. Administrators should consider whether read access to these objects should be allowed, since read access may be undesirable under certain circumstances.

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 the `mplsLdpEntityFrameRelayTable` and `mplsLdpEntityFrameRelayLRTTable` show the Label Ranges for Frame Relay. If an Administrator does not want to reveal this information then these tables should be considered sensitive/vulnerable and treated accordingly.

9.4. Security Considerations for MPLS-LDP-GENERIC-STD-MIB

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations. These are the tables and objects and their sensitivity/vulnerability:

- o the mplsLdpEntityGenericLRTable contains objects to provision potential LDP sessions on the Label Switching Router (LSR) or Label Edge Router (LER) over Layer 2 of Ethernet. This table extends the mplsLdpEntityTable in the MPLS-LDP-MIB. Unauthorized access to objects in these tables, could result in disruption of traffic on the network. This is especially true if an LDP session has been established. The use of stronger mechanisms such as SNMPv3 security should be considered where possible. Specifically, SNMPv3 VACM and USM MUST be used with any v3 agent which implements this MIB. Administrators should consider whether read access to these objects should be allowed, since read access may be undesirable under certain circumstances.

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 the mplsLdpEntityGenericLRTable shows the Label Ranges for ethernet. If an Administrator does not want to reveal this information then these tables should be considered sensitive/vulnerable and treated accordingly.

9.5. Additional Security Considerations

The following paragraphs describe additional security considerations which are applicable to all 4 of the MIB Modules in this document.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure "for example by using IPsec", even then, there is no control as to who on the secure network is

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allowed to access and GET/SET "read/change/create/delete" the objects in this MIB module.

It is RECOMMENDED that implementers consider the security features as provided by the SNMPv3 framework "see [\[RFC3410\]](#), [section 8](#)", including full support for the SNMPv3 cryptographic mechanisms "for authentication and privacy".

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.

[10.](#) IANA Considerations

As described in [\[MPLSMGMT\]](#) and as requested in the MPLS-TC-STD-MIB [\[MPLSTCMIB\]](#), MPLS related standards track MIB modules should be rooted under the mplsStdMIB subtree. There are 4 MPLS MIB Modules contained in this document, each of the following "IANA Considerations" subsections requests IANA for a new assignment under the mplsStdMIB subtree. New assignments can only be made via a Standards Action as specified in [\[RFC2434\]](#).

[10.1.](#) IANA Considerations for MPLS-LDP-STD-MIB

The IANA is requested to assign { mplsStdMIB 4 } to the MPLS-LDP-STD-MIB module specified in this document.

[10.2.](#) IANA Considerations for MPLS-LDP-ATM-STD-MIB

The IANA is requested to assign { mplsStdMIB 5 } to the MPLS-LDP-ATM-STD-MIB module specified in this document.

[10.3.](#) IANA Considerations for MPLS-LDP-FRAME-RELAY-STD-MIB

The IANA is requested to assign { mplsStdMIB 6 } to the MPLS-LDP-FRAME-RELAY-STD-MIB module specified in this document.

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[10.4.](#) IANA Considerations for MPLS-LDP-GENERIC-STD-MIB

The IANA is requested to assign { mplsStdMIB 7 } to the MPLS-LDP-GENERIC-STD-MIB module specified in this document.

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