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**MPLS-TP Operations, Administration, and Management (OAM) Identifiers
Management Information Base (MIB)
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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes Operations, Administration, and Management (OAM) identifiers related managed objects for Multiprotocol Label Switching (MPLS) based Transport Profile (TP).

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1 Introduction

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 modeling a Multiprotocol Label Switching (MPLS) [[RFC3031](#)] based transport profile.

This MIB module should be used for performing the OAM operations for MPLS LSPs, Pseudowires and Sections.

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 RFC3410](#) [[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, [RFC2578](#), STD 58, [RFC2579](#) and STD58, [RFC2580](#).

3. Overview

3.1 Conventions used in this document

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

3.2 Terminology

This document uses terminology from the Multiprotocol Label Switching Architecture [[RFC3031](#)], Multiprotocol Label Switching (MPLS) Traffic Engineering (TE) Management Information Base (MIB) [[RFC3812](#)], Multiprotocol Label Switching (MPLS) Label Switching Router (LSR) Management Information Base (MIB) [[RFC3813](#)], Operations, Administration, and Maintenance Framework for MPLS-Based Transport Networks [[RFC6371](#)], MPLS Transport Profile (MPLS-TP) Identifiers [[RFC6370](#)], MPLS-TP Identifiers Following ITU-T Conventions [[RFC6923](#)], and OAM in MPLS Transport Networks [[RFC5860](#)].

3.3 Acronyms

ICC: ITU Carrier Code
IP: Internet Protocol

LSP: Label Switching Path
LSR: Label Switching Router
MIB: Management Information Base
ME: Maintenance Entity
MEG: Maintenance Entity Group
MEP: Maintenance Entity Group End Point
MIP: Maintenance Entity Group Intermediate Point
MPLS: Multi-Protocol Label Switching
MPLS-TP: MPLS Transport Profile
PW: Pseudowire
TE: Traffic Engineering
TP: Transport Profile

4. Feature List

The MPLS transport profile OAM identifiers MIB module is designed to satisfy the following requirements and constraints:

- The MIB module supports configuration of OAM identifiers for point-to-point, co-routed bidirectional, associated bidirectional MPLS tunnels and MPLS Pseudowires.

5. Brief description of MIB Objects

The objects described in this section support the functionality described in documents [[RFC5654](#)] and [[RFC6370](#)]. The tables support both IP compatible and ICC based OAM identifiers configurations for MPLS Tunnels and Pseudowires.

5.1. mplsOamIdMegTable

The mplsOamIdMegTable is used to manage one or more Maintenance Entities (MEs) that belongs to the same transport path.

When a new entry is created with mplsOamIdMegOperatorType set to ipCompatible (1), then as per [[RFC6370](#)] (MEG_ID for LSP is LSP_ID and MEG_ID for PW is PW_Path_ID), MEP_ID can be automatically formed.

For ICC based transport path, the user is expected to configure the ICC identifier explicitly in this table for MPLS tunnels and pseudowires.

5.2. mplsOamIdMeTable

The mplsOamIdMeTable defines a relationship between two points (source and sink) of a transport path to which maintenance and monitoring operations apply. The two points that define a maintenance entity are called Maintenance Entity Group End Points (MEPs).

In between MEPs, there are zero or more intermediate points, called Maintenance Entity Group Intermediate Points (MIPs). MEPs and MIPs are associated with the MEG and can be shared by more than one ME in a MEG.

6. MPLS OAM identifier configuration for MPLS tunnel example

In this section, we provide an example of the OAM identifier configuration for an MPLS co-routed bidirectional tunnel.

This example provides usage of a MEG and ME tables for management and monitoring operations of an MPLS tunnel.

This example considers the OAM identifiers configuration on a head-end LSR to manage and monitor a MPLS tunnel. Only relevant objects which are applicable for IP based OAM identifiers of co-routed MPLS tunnel are illustrated here.

In mplsOamIdMegTable:

```
{
  -- MEG index (Index to the table)
  mplsOamIdMegIndex          = 1,
  mplsOamIdMegName           = "MEG1",
  mplsOamIdMegOperatorType   = ipCompatible (1),
  mplsOamIdMegServicePointerType = lsp (1),
  mplsOamIdMegMpLocation     = perNode(1),
  -- Mandatory parameters needed to activate the row go here
  mplsOamIdMegRowStatus      = createAndGo (4),
  mplsOamIdMegPathFlow
                              = coRoutedBidirectionalPointToPoint (2)
}
```

This will create an entry in the mplsOamIdMegTable to manage and monitor the MPLS tunnel.

The following ME table is used to associate the path information to a MEG.

In mplsOamIdMeTable:

```
{
-- ME index (Index to the table)
  mplsOamIdMeIndex          = 1,

-- MP index (Index to the table)
  mplsOamIdMeMpIndex       = 1,
  mplsOamIdMeName          = "ME1",
  mplsOamIdMeMpIfIndex     = 0,
  -- Source MEP id is derived from the IP compatible MPLS tunnel
  mplsOamIdMeSourceMepIndex = 0,
  -- Source MEP id is derived from the IP compatible MPLS tunnel
  mplsOamIdMeSinkMepIndex  = 0,
  mplsOamIdMeMpType        = mep (1),
  mplsOamIdMeMepDirection = down (2),
  mplsOamIdMeProactiveOamPhbTCValue = 0,
  mplsOamIdMeOnDemandOamPhbTCValue = 0,
  -- RowPointer MUST point to the first accessible column of an
  -- MPLS tunnel
  mplsOamIdMeServicePointer = mplsTunnelName.1.1.10.20,
  -- Mandatory parameters needed to activate the row go here
  mplsOamIdMeRowStatus      = createAndGo (4)
}
```

7. MPLS OAM Identifiers MIB definitions

MPLS-OAM-ID-STD-MIB DEFINITIONS ::= BEGIN

```
IMPORTS
  MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,
  Unsigned32, zeroDotZero
  FROM SNMPv2-SMI
  -- [RFC2578]
  MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
  FROM SNMPv2-CONF
  -- [RFC2580]
  RowStatus, RowPointer, StorageType,
  TEXTUAL-CONVENTION
  FROM SNMPv2-TC
  -- [RFC2579]
  SnmpAdminString
  FROM SNMP-FRAMEWORK-MIB
  -- [RFC3411]
  IndexIntegerNextFree
  FROM DIFFSERV-MIB
  -- [RFC3289]
  mplsStdMIB
  FROM MPLS-TC-STD-MIB
  -- [RFC3811]
  InterfaceIndexOrZero, ifGeneralInformationGroup,
  ifCounterDiscontinuityGroup
  FROM IF-MIB;
  -- [RFC2863]
```


mplsOamIdStdMIB MODULE-IDENTITY

LAST-UPDATED

"201306180000Z" -- June 18, 2013

ORGANIZATION

"Multiprotocol Label Switching (MPLS) Working Group"

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DESCRIPTION

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This MIB module contains generic object definitions for

MPLS OAM maintenance identifiers."

-- Revision history.

REVISION

"201306180000Z" -- June 18, 2013

DESCRIPTION

"MPLS OAM Identifiers MIB objects for LSPs and
Pseudowires"

::= { mplsStdMIB xxx } -- xxx to be replaced with the correct
-- OID value assigned by
-- IANA (see [section 9](#)).

-- TEXTUAL-CONVENTIONS

MplsOamPhbTCValue ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This is the Per-hop Behavior (PHB) traffic class

values

for the MPLS OAM operations."

SYNTAX INTEGER {
be (1),
af1 (2),
af2 (3),
af3 (4),
af4 (5),
ef (6),
cs6 (7),
cs7 (8)
}

-- Top level components of this MIB module.

-- notifications

mplsOamIdNotifications

OBJECT IDENTIFIER ::= { mplsOamIdStdMIB 0 }

-- tables, scalars

mplsOamIdObjects OBJECT IDENTIFIER ::= { mplsOamIdStdMIB 1 }

-- conformance

mplsOamIdConformance

OBJECT IDENTIFIER ::= { mplsOamIdStdMIB 2 }

-- Start of MPLS Transport Profile MEG table

mplsOamIdMegIndexNext OBJECT-TYPE

SYNTAX IndexIntegerNextFree (0..4294967295)

MAX-ACCESS read-only


```
STATUS          current
DESCRIPTION
    "This object contains an unused value for
    mplsOamIdMegIndex, or a zero to indicate
    that none exist. Negative values are not allowed,
    as they do not correspond to valid values of
    mplsOamIdMegIndex."
::= { mplsOamIdObjects 1 }
mplsOamIdMegTable OBJECT-TYPE
SYNTAX          SEQUENCE OF MplsOamIdMegEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "This table contains information about the Maintenance
    Entity Groups (MEG).

    MEG as mentioned in MPLS-TP OAM framework defines a set
    of one or more maintenance entities (ME).
    Maintenance Entities define a relationship between any
    two points of a transport path in an OAM domain to which
    maintenance and monitoring operations apply."
::= { mplsOamIdObjects 2 }

mplsOamIdMegEntry OBJECT-TYPE
SYNTAX          MplsOamIdMegEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "An entry in this table represents MPLS-TP MEG.
    An entry can be created by a network administrator
    or by an SNMP agent as instructed by an MPLS-TP OAM
    Framework.

    When a new entry is created with
    mplsOamIdMegOperatorType set to ipCompatible (1),
    then as per [RFC6370] (MEG_ID for LSP is LSP_ID and
    MEG_ID for PW is PW_Path_ID), MEP_ID can be
    automatically formed.

    For co-routed bidirectional LSP, MEG_ID is
    A1- {Global_ID::Node_ID::Tunnel_Num}::Z9- {Global_ID::
    Node_ID::Tunnel_Num}::LSP_Num.

    For associated bidirectional LSP, MEG_ID is A1-
    {Global_ID::Node_ID::Tunnel_Num::LSP_Num}:: Z9-
    {Global_ID::Node_ID::Tunnel_Num::LSP_Num}

    For LSP, MEP_ID is formed using,
```


Global_ID::Node_ID::Tunnel_Num::LSP_Num

For PW, MEG_ID is formed using AGI::A1-
{Global_ID::Node_ID::AC_ID}:: Z9-
{Global_ID::Node_ID::AC_ID}.

For PW, MEP_ID is formed using
AGI::Global_ID::Node_ID::AC_ID

MEP_ID is retrieved from the mplsOamIdMegServicePointer
object based on the mplsOamIdMegServicePointerType
value.

ICC MEG_ID for LSP and PW is formed using the objects
mplsOamIdMegIdIcc and mplsOamIdMegIdUmc.

MEP_ID can be formed using MEG_ID::MEP_Index."

REFERENCE

1. [RFC5860](#), Requirements for OAM in MPLS Transport Networks, May 2010.
2. [RFC6371](#), Operations, Administration, and Maintenance Framework for MPLS-Based Transport Networks, September 2011 [Section 3](#).
3. [RFC6370](#), MPLS Transport Profile (MPLS-TP) Identifiers.
4. [RFC6923](#), MPLS Transport Profile (MPLS-TP) Identifiers Following ITU-T Conventions."

INDEX { mplsOamIdMegIndex }
 ::= { mplsOamIdMegTable 1 }

```
MplsOamIdMegEntry ::= SEQUENCE {
    mplsOamIdMegIndex      Unsigned32,
    mplsOamIdMegName       SnmpAdminString,
    mplsOamIdMegOperatorType  INTEGER,
    mplsOamIdMegIdCc       SnmpAdminString,
    mplsOamIdMegIdIcc      SnmpAdminString,
    mplsOamIdMegIdUmc      SnmpAdminString,
    mplsOamIdMegServicePointerType  INTEGER,
    mplsOamIdMegMpLocation  INTEGER,
    mplsOamIdMegPathFlow   INTEGER,
    mplsOamIdMegOperStatus  INTEGER,
    mplsOamIdMegSubOperStatus  BITS,
    mplsOamIdMegRowStatus   RowStatus,
    mplsOamIdMegStorageType StorageType
}
```

```
mplsOamIdMegIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
```


row "Index for the conceptual row identifying a MEG within this MEG table. Managers should obtain new values for

creation in this table by reading
mplsOamIdMegIndexNext."
::= { mplsOamIdMegEntry 1 }

mplsOamIdMegName OBJECT-TYPE
SYNTAX SnmpAdminString (SIZE(0..48))
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Each Maintenance Entity Group has unique name amongst all those used or available to a service provider or operator. It facilitates easy identification of administrative responsibility for each MEG."
::= { mplsOamIdMegEntry 2 }

mplsOamIdMegOperatorType OBJECT-TYPE
SYNTAX INTEGER {
ipCompatible (1),
iccBased (2)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Indicates the operator type for MEG. Conceptual rows having 'iccBased' as operator type, MUST have valid values for the objects mplsOamIdMegIdIcc and mplsOamIdMegIdUmc when the row status is active."
REFERENCE
"1. [RFC6370](#), MPLS Transport Profile (MPLS-TP) Identifiers.
2. [RFC6923](#), MPLS Transport Profile (MPLS-TP) Identifiers Following ITU-T Conventions. [Section 3.1](#)"
DEFVAL { ipCompatible }
::= { mplsOamIdMegEntry 3 }

mplsOamIdMegIdCc OBJECT-TYPE
SYNTAX SnmpAdminString (SIZE(0..2))
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Global uniqueness is assured by concatenating the ICC with a Country Code (CC). The Country Code (alpha-2) is a string of two alphabetic characters represented with upper case letters (i.e., A-Z).

This object MUST contain a non-null ICC value if the MplsOamIdMegOperatorType value is iccBased(2), otherwise a null ICC value with octet size 0 should be assigned."

REFERENCE

"[RFC6923](#), MPLS Transport Profile (MPLS-TP) Identifiers Following ITU-T Conventions. [Section 3.](#)"

DEFVAL {""}

::= { mplsOamIdMegEntry 4 }

mplsOamIdMegIdIcc OBJECT-TYPE

SYNTAX SnmpAdminString (SIZE(0..6))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Unique code assigned to Network Operator or Service Provider maintained by ITU-T. The ITU Carrier Code used to form MEGID.

This object MUST contain a non-null ICC value if the MplsOamIdMegOperatorType value is iccBased(2), otherwise a null ICC value with octet size 0 should be assigned."

REFERENCE

"[RFC6923](#), MPLS Transport Profile (MPLS-TP) Identifiers Following ITU-T Conventions. [Section 3.1.](#)"

DEFVAL {""}

::= { mplsOamIdMegEntry 5 }

mplsOamIdMegIdUmc OBJECT-TYPE

SYNTAX SnmpAdminString (SIZE(0..7))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Unique code assigned by Network Operator or Service Provider and is appended to mplsOamIdMegIdIcc to form the MEGID.

This object MUST contain a non-null ICC value if the MplsOamIdMegOperatorType value is iccBased(2), otherwise a null ICC value with octet size 0 should be assigned."

REFERENCE

"[RFC6923](#), MPLS Transport Profile (MPLS-TP) Identifiers Following ITU-T Conventions. [Section 7.1.](#)"

DEFVAL {""}

::= { mplsOamIdMegEntry 6 }

mplsOamIdMegServicePointerType OBJECT-TYPE

```
SYNTAX          INTEGER {
                    lsp (1),
                    pseudowire (2),
                    section (3)
                }
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION     "Indicates the service type for the MEG.
                If the service type indicates lsp, the service pointer
                in mplsOamIdMeTable points to an entry in
                the mplsTunnelTable [RFC3812].

                If the value is pseudowire service type, the service
                pointer in mplsOamIdMeTable points to an entry in
                the pwTable [RFC5601].

                If the value is section service type, the service
                pointer in mplsOamIdMeTable points to an entry in
                the mplsTunnelTable [RFC3812]."
```

REFERENCE

1. Multiprotocol Label Switching (MPLS) Traffic Engineering (TE) Management Information Base (MIB), Srinivasan, et al, [RFC 3812](#), June 2004
2. Pseudowire (PW) Management Information Base (MIB), Nadeau & Zelig, [RFC 5601](#), July 2009."

```
DEFVAL { lsp }
 ::= { mplsOamIdMegEntry 7 }
```

mplsOamIdMegMpLocation OBJECT-TYPE

```
SYNTAX          INTEGER {
                    perNode (1),
                    perInterface (2)
                }
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION     "Indicates the MP location type for this MEG.

                If the value is perNode, then the MEG in the LSR supports
                only perNode MEP/MIP, i.e., only one MEP/MIP in an LSR.

                If the value is perInterface, then the MEG in the LSR
                supports perInterface MEPs/MIPs, i.e., two MEPs/MIPs in
                an LSR."
```


REFERENCE

"[RFC 6371](#), Operations, Administration, and Maintenance Framework for MPLS-Based Transport Networks, September 2011."

DEFVAL { perNode }
::= { mplsOamIdMegEntry 8 }

mplsOamIdMegPathFlow OBJECT-TYPE

SYNTAX INTEGER {
 unidirectionalPointToPoint (1),
 coRoutedBidirectionalPointToPoint (2),
 associatedBidirectionalPointToPoint (3),
 unidirectionalPointToMultiPoint (4)
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Indicates the transport path flow for this MEG.

In case of a unidirectional point-to-point transport path, a single unidirectional Maintenance Entity is defined to monitor it.

In case of associated bidirectional point-to-point transport paths, two independent unidirectional Maintenance Entities

are

defined to independently monitor each direction.

In case of co-routed bidirectional point-to-point transport paths, a single bidirectional Maintenance Entity is defined

to

monitor both directions congruently.

In case of unidirectional point-to-multipoint transport

paths,

a single unidirectional Maintenance Entity for each leaf is defined to monitor the transport path from the root to that leaf."

REFERENCE

"[RFC 6371](#), Operations, Administration, and Maintenance Framework for MPLS-Based Transport Networks, September 2011."

DEFVAL { coRoutedBidirectionalPointToPoint }
::= { mplsOamIdMegEntry 9 }

mplsOamIdMegOperStatus OBJECT-TYPE

SYNTAX INTEGER {
 up (1),
 down (2)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the operational status of the Maintenance Entity Group (MEG). This object is used to

send the notification to the SNMP manager about the MEG.

monitored

The value up (1) indicates that the MEG and its path are operationally up. The value down (2) indicates that the MEG is operationally down.

When the value of mplsOamIdMegOperStatus is up(1), all the bits of mplsOamIdMegSubOperStatus must be cleared. When the value of mplsOamIdMegOperStatus is down(2), at least one bit of mplsOamIdMegSubOperStatus must be set."

::= { mplsOamIdMegEntry 10 }

mplsOamIdMegSubOperStatus OBJECT-TYPE

SYNTAX BITS {
 megDown (0),
 meDown (1),
 oamAppDown (2),
 pathDown (3)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the reason why the MEG operational status as mentioned by the object mplsOamIdMegOperStatus is down. This object is used to send the notification to the SNMP manager about the MEG.

The bit 0 (megDown) indicates the MEG is down.

The bit 1 (meDown) indicates the ME table is down.

The bit 2 (oamAppDown) indicates that the OAM application has notified that the entity (LSP or PW) monitored by this MEG is down. Currently, BFD is the only supported OAM application.

The bit 3 (pathDown) indicates that the underlying LSP or PW is down."

::= { mplsOamIdMegEntry 11 }

mplsOamIdMegRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This variable is used to create, modify, and/or delete a row in this table. When a row in this table is in active(1) state, no objects in that row can be modified


```
        by the agent except mplsOamIdMegRowStatus."
 ::= { mplsOamIdMegEntry 12 }

mplsOamIdMegStorageType OBJECT-TYPE
    SYNTAX      StorageType
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This variable indicates the storage type for this
        object.
        Conceptual rows having the value 'permanent'
        need not allow write-access to any columnar
        objects in the row."
    DEFVAL { volatile }
    ::= { mplsOamIdMegEntry 13 }

-- End of MPLS Transport Profile MEG table

-- Start of MPLS Transport Profile ME table

mplsOamIdMeIndexNext OBJECT-TYPE
    SYNTAX      IndexIntegerNextFree (0..4294967295)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object contains an unused value for
        mplsOamIdMeIndex, or a zero to indicate
        that none exist. Negative values are not allowed,
        as they do not correspond to valid values of
        mplsOamIdMeIndex."
    ::= { mplsOamIdObjects 3 }

mplsOamIdMeMpIndexNext OBJECT-TYPE
    SYNTAX      IndexIntegerNextFree (0..4294967295)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object contains an unused value for
        mplsOamIdMeMpIndex, or a zero to indicate
        that none exist. Negative values are not allowed,
        as they do not correspond to valid values of
        mplsOamIdMeMpIndex."
    ::= { mplsOamIdObjects 4 }

mplsOamIdMeTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF MplsOamIdMeEntry
    MAX-ACCESS  not-accessible
```


STATUS current

DESCRIPTION

"This table contains MPLS-TP maintenance entity information.

ME is some portion of a transport path that requires management bounded by two points (called MEPs), and the relationship between those points to which maintenance and monitoring operations apply.

This table is generic enough to handle MEPs and MIPs information within a MEG."

::= { mplsOamIdObjects 5 }

mplsOamIdMeEntry OBJECT-TYPE

SYNTAX MplsOamIdMeEntry

MAX-ACCESS not-accessible STATUS current

DESCRIPTION

"An entry in this table represents MPLS-TP maintenance entity. This entry represents the ME if the source and sink MEPs are defined.

A ME is a p2p entity. One ME has two such MEPs.

A MEG is a group of one or more MEs. One MEG can have two or more MEPs.

For P2P LSP, one MEG has one ME and this ME is associated two MEPs (source and sink MEPs) within a MEG. Each mplsOamIdMeIndex value denotes the ME within a MEG.

In case of unidirectional point-to-point transport paths, a single unidirectional Maintenance Entity is defined to monitor it and mplsOamIdMeServicePointer points to unidirectional point-to-point path.

In case of associated bidirectional point-to-point transport paths, two independent unidirectional Maintenance Entities are defined to independently monitor each direction and each mplsOamIdMeServicePointer MIB object points to unique unidirectional transport path. This has implications for transactions that terminate at or query a MIP, as a return path from MIP to source MEP does not necessarily exist within the MEG.

In case of co-routed bidirectional point-to-point transport paths, a single bidirectional Maintenance

Entity

is defined to monitor both directions congruently and mplsOamIdMeServicePointer MIB object points to co-routed

bidirectional point-to-point transport path.

In case of unidirectional point-to-multipoint transport paths, a single unidirectional Maintenance entity for

each

leaf is defined to monitor the transport path from the root to that leaf and each leaf has different transport path information in mplsOamIdMeServicePointer MIB object. Note that the MplsOamIdMeEntry should be created manually once the MEG is configured for OAM operations."

```
INDEX { mplsOamIdMegIndex,  
        mplsOamIdMeIndex,  
        mplsOamIdMeMpIndex  
      }  
 ::= { mplsOamIdMeTable 1 }
```

```
MplsOamIdMeEntry ::= SEQUENCE {  
    mplsOamIdMeIndex           Unsigned32,  
    mplsOamIdMeMpIndex        Unsigned32,  
    mplsOamIdMeName           SnmpAdminString,  
    mplsOamIdMeMpIfIndex      InterfaceIndexOrZero,  
    mplsOamIdMeSourceMepIndex Unsigned32,  
    mplsOamIdMeSinkMepIndex   Unsigned32,  
    mplsOamIdMeMpType         INTEGER,  
    mplsOamIdMeMepDirection   INTEGER,  
    mplsOamIdMeProactiveOamPhbTCValue MplsOamPhbTCValue,  
    mplsOamIdMeOnDemandOamPhbTCValue MplsOamPhbTCValue,  
    mplsOamIdMeServicePointer  RowPointer,  
    mplsOamIdMeRowStatus       RowStatus,  
    mplsOamIdMeStorageType     StorageType  
}
```

```
mplsOamIdMeIndex OBJECT-TYPE  
    SYNTAX      Unsigned32 (1..4294967295)  
    MAX-ACCESS  not-accessible  
    STATUS      current  
    DESCRIPTION  
        "Uniquely identifies a maintenance entity index within  
        a MEG. Managers should obtain new values for row  
        creation in this table by reading  
        mplsOamIdMeIndexNext."  
    ::= { mplsOamIdMeEntry 1 }
```

```
mplsOamIdMeMpIndex OBJECT-TYPE  
  
    SYNTAX      Unsigned32 (1..4294967295)  
    MAX-ACCESS  not-accessible  
    STATUS      current  
    DESCRIPTION
```


"Indicates the maintenance point index, used to create multiple MEPs in a node of single ME. The value of this object can be MEP index or MIP index. Managers should obtain new values for row creation in this table by

reading

```
mplsOamIdMeMpIndexNext."  
 ::= { mplsOamIdMeEntry 2 }
```

```
mplsOamIdMeName OBJECT-TYPE  
SYNTAX SnmpAdminString (SIZE(1..48))  
MAX-ACCESS read-create  
STATUS current  
DESCRIPTION  
 "This object denotes the ME name, each  
 Maintenance Entity has unique name within MEG."  
 ::= { mplsOamIdMeEntry 3 }
```

```
mplsOamIdMeMpIfIndex OBJECT-TYPE  
SYNTAX InterfaceIndexOrZero  
MAX-ACCESS read-create  
STATUS current  
DESCRIPTION  
 "Indicates the maintenance point interface.  
 If the mplsOamIdMegMpLocation object value  
 is perNode (1), the MP interface index should point  
 to incoming interface or outgoing interface or  
 zero (indicates the MP OAM packets are initiated  
 from forwarding engine).  
  
 If the mplsOamIdMegMpLocation object value is  
 perInterface (2), the MP interface index should point to  
 incoming interface or outgoing interface."
```

REFERENCE

"[RFC 6371](#), Operations, Administration, and Maintenance Framework for MPLS-Based Transport Networks, September 2011.
[RFC 2863](#) - The Interfaces Group MIB, McCloghrie, K., and F. Kastenholz, June 2000."

```
DEFVAL { 0 }  
 ::= { mplsOamIdMeEntry 4 }
```

```
mplsOamIdMeSourceMepIndex OBJECT-TYPE  
SYNTAX Unsigned32  
MAX-ACCESS read-create  
STATUS current  
DESCRIPTION  
 "Indicates the source MEP Index of the ME. This object  
 should be configured if mplsOamIdMegOperatorType object  
 in the mplsOamIdMegEntry is configured as iccBased (2)."
```


If the MEG is configured for IP based operator,
the value of this object should be set zero and the MEP
ID will be automatically derived from the service
Identifiers(MPLS-TP LSP/PW Identifier)."
DEFVAL { 0 }
 ::= { mplsOamIdMeEntry 5 }

mplsOamIdMeSinkMepIndex OBJECT-TYPE

SYNTAX Unsigned32
MAX-ACCESS read-create
STATUS current
DESCRIPTION

"Indicates the sink MEP Index of the ME. This object
should be configured if mplsOamIdMegOperatorType object
in the mplsOamIdMegEntry is configured as iccBased (2).
If the MEG is configured for IP based operator,
the value of this object should be set zero and the MEP
ID will be automatically derived from the service
Identifiers(MPLS-TP LSP/PW Identifier)."
DEFVAL { 0 }
 ::= { mplsOamIdMeEntry 6 }

mplsOamIdMeMpType OBJECT-TYPE

SYNTAX INTEGER {
 mep (1),
 mip (2)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION

"Indicates the maintenance point type within the MEG.

The object should have the value mep (1), only in the
Ingress or Egress nodes of the transport path.

The object can have the value mip (2),
in the intermediate nodes and possibly in the end nodes
of the transport path."
DEFVAL { mep }
 ::= { mplsOamIdMeEntry 7 }

mplsOamIdMeMepDirection OBJECT-TYPE

SYNTAX INTEGER {
 up (1),
 down (2),
 notApplicable (3)
}

MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Indicates the direction of the MEP. This object
should be configured if mplsOamIdMeMpType is

configured as mep (1) else notApplicable (3) is set."
DEFVAL { down }
::= { mplsOamIdMeEntry 8 }

mplsOamIdMeProactiveOamPhbTCValue OBJECT-TYPE
SYNTAX MplsOamPhbTCValue
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Indicates the Per-hop Behavior (PHB) value for this source
MEP generated proactive traffic."
DEFVAL { ef }
::= { mplsOamIdMeEntry 9 }

mplsOamIdMeOnDemandOamPhbTCValue OBJECT-TYPE
SYNTAX MplsOamPhbTCValue
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Indicates the Per-hop Behavior (PHB) value for this
source MEP generated on-demand traffic."
DEFVAL { ef }

::= { mplsOamIdMeEntry 10 }

mplsOamIdMeServicePointer OBJECT-TYPE

SYNTAX RowPointer
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This variable represents a pointer to the MPLS-TP
transport path. This value MUST point at an entry in the
mplsTunnelEntry if mplsOamIdMegServicePointerType
is configured as lsp (1) or at an entry in the pwEntry if
mplsOamIdMegServicePointerType is configured
as pseudowire (2).

Note: This service pointer object, is placed in ME table
instead of MEG table, since it will be useful in case of
point-to-multipoint, where each ME will point to different
branches of a P2MP tree."


```
 ::= { mplsOamIdMeEntry 11 }

mplsOamIdMeRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This variable is used to create, modify, and/or
        delete a row in this table.  When a row in this
        table is in active(1) state, no objects in that row
        can be modified by the agent except
        mplsOamIdMeRowStatus."
 ::= { mplsOamIdMeEntry 12 }

mplsOamIdMeStorageType OBJECT-TYPE
    SYNTAX      StorageType
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This variable indicates the storage type for this
        object.
        Conceptual rows having the value 'permanent'
        need not allow write-access to any columnar
        objects in the row."
    DEFVAL { volatile }
 ::= { mplsOamIdMeEntry 13 }

-- End of MPLS Transport Profile ME table

-- End of MPLS-TP OAM Tables

-- Notification Definitions of MPLS-TP identifiers

mplsOamIdDefectCondition NOTIFICATION-TYPE
    OBJECTS      {
        mplsOamIdMegName,
        mplsOamIdMeName,
        mplsOamIdMegOperStatus,
        mplsOamIdMegSubOperStatus
    }
    STATUS      current
    DESCRIPTION
        "This notification is sent whenever the operational
        status of MEG is changed."
 ::= { mplsOamIdNotifications 1 }

-- End of Notifications.
```


-- Module Compliance.

```
mplsOamIdCompliances
  OBJECT IDENTIFIER ::= { mplsOamIdConformance 1 }
```

```
mplsOamIdGroups
  OBJECT IDENTIFIER ::= { mplsOamIdConformance 2 }
```

-- Compliance requirement for fully compliant implementations.

```
mplsOamIdModuleFullCompliance MODULE-COMPLIANCE
  STATUS          current
  DESCRIPTION     "Compliance statement for agents that provide full
                  support for MPLS-TP-OAM-STD-MIB. Such devices can
                  then be monitored and also be configured using
                  this MIB module."
```

MODULE IF-MIB -- The Interfaces Group MIB, [RFC 2863](#).

```
MANDATORY-GROUPS {
  ifGeneralInformationGroup,
  ifCounterDiscontinuityGroup
}
```

MODULE -- This module.

```
MANDATORY-GROUPS {
  mplsOamIdMegGroup,
  mplsOamIdMeGroup
}
```

```
GROUP          mplsOamIdNotificationObjectsGroup
DESCRIPTION    "This group is only mandatory for those
                implementations which can efficiently implement
                the notifications contained in this group."
```

```
GROUP          mplsOamIdNotificationGroup
DESCRIPTION    "This group is only mandatory for those
                implementations which can efficiently implement
                the notifications contained in this group."
```

```
::= { mplsOamIdCompliances 1 }
```

-- Units of conformance.

```
mplsOamIdMegGroup OBJECT-GROUP
  OBJECTS {
    mplsOamIdMegIndexNext,
    mplsOamIdMegName,
```



```
    mplsOamIdMegOperatorType,  
    mplsOamIdMegIdCc,  
    mplsOamIdMegIdIcc,  
    mplsOamIdMegIdUmc,  
    mplsOamIdMegServicePointerType,  
    mplsOamIdMegMpLocation,  
    mplsOamIdMegOperStatus,  
    mplsOamIdMegSubOperStatus,  
    mplsOamIdMegPathFlow,  
    mplsOamIdMegRowStatus,  
    mplsOamIdMegStorageType  
}
```

STATUS current

DESCRIPTION

"Collection of objects needed for MPLS MEG information."

::= { mplsOamIdGroups 1 }

mplsOamIdMeGroup OBJECT-GROUP

OBJECTS {

```
    mplsOamIdMeIndexNext,  
    mplsOamIdMeMpIndexNext,  
    mplsOamIdMeName,  
    mplsOamIdMeMpIfIndex,  
    mplsOamIdMeSourceMepIndex,  
    mplsOamIdMeSinkMepIndex,  
    mplsOamIdMeMpType,  
    mplsOamIdMeMepDirection,  
    mplsOamIdMeProactiveOamPhbTCValue,  
    mplsOamIdMeOnDemandOamPhbTCValue,  
    mplsOamIdMeServicePointer,  
    mplsOamIdMeRowStatus,  
    mplsOamIdMeStorageType
```

}

STATUS current

DESCRIPTION

"Collection of objects needed for MPLS ME information."

::= { mplsOamIdGroups 2 }

mplsOamIdNotificationObjectsGroup OBJECT-GROUP

OBJECTS {

```
    mplsOamIdMegOperStatus,  
  
    mplsOamIdMegSubOperStatus
```

}

STATUS current

DESCRIPTION


```
        "Collection of objects needed to implement notifications."  
 ::= { mplsOamIdGroups 3 }
```

```
mplsOamIdNotificationGroup NOTIFICATION-GROUP  
  NOTIFICATIONS {  
    mplsOamIdDefectCondition  
  }  
  STATUS current  
  DESCRIPTION  
    "Set of notifications implemented in this module."  
 ::= { mplsOamIdGroups 4 }
```

END

8. Security Consideration

There is a number of management objects defined in this MIB module that has a MAX-ACCESS clause of 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.

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:

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 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 supports 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 principles (users) that have legitimate

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

9. IANA Considerations

IANA is requested to assign an OID for the MIB module from the "MIB Transmission Group - MPLS STD" sub-registry of the "Internet-standard

MIB - Transmission Group" registry for the MPLS-TP OAM ID MIB module specified in this document.

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11. Acknowledgments

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INTERNET DRAFT
2013

MPLS-TP OAM ID MIB

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