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TRILL OAM MIB
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Abstract

This document specifies the Management Information Base (MIB) for the IETF TRILL (Transparent Interconnection of Lots of Links) OAM (Operations, Administration, and Maintenance) objects.

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[1.](#) Introduction

Overall, TRILL OAM is intended to meet the requirements given in [\[RFC6905\]](#). The general framework for TRILL OAM is specified in [\[RFC7174\]](#). The details of the Fault Management (FM) solution, conforming to that framework, are presented in [RFC 7455](#). The solution leverages the message format defined in Ethernet Connectivity Fault Management (CFM) [\[802.1Q\]](#) as the basis for the TRILL OAM message channel.

This document uses the CFM MIB modules defined in [[802.1Q](#)] as the basis for TRILL OAM MIB, and augments the existing tables to add new TRILL managed objects required by TRILL. This document further specifies a new table with associated managed objects for TRILL OAM specific capabilities.

2. The Internet-Standard Management Framework

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

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

3. Overview

The TRILL-OAM-MIB module is intended to provide an overall framework for managing TRILL OAM. It leverages the IEEE8021-CFM-MIB and IEEE8021-CFM-V2-MIB modules defined in [[802.1Q](#)], and augments the Maintenance End Point(MEP) and MEP Db entries. It also adds a new table for TRILL OAM specific messages.

4. Conventions

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](#)].

Acronyms used in the document include the following:

MTVM - Multi-destination Tree Verification Message [[RFC7455](#)]

MTVR - Multi-destination Tree Verification Reply [[RFC7455](#)]

PTM - Path Trace Message [[RFC7455](#)]

PTR - Path Trace Reply [[RFC7455](#)]

MEP - Maintenance End Point [[RFC7174](#)] [[802.1Q](#)]

MIP - Maintenance Intermediate Point [[RFC7174](#)] [[802.1Q](#)]
MP - Maintenance Point [[RFC7174](#)]
CCM - Continuity Check Message [[802.1Q](#)]
FGL - Fine-Grained Label
LBM - Loopback Message [[802.1Q](#)]
LBR - Loopback Reply [[802.1Q](#)]
TRILL - Transparent Interconnection of Lots of Links [[RFC6325](#)]

[5. Structure of the MIB module](#)

Objects in this MIB module are arranged into subtrees. Each subtree is organized as a set of related objects. The various subtrees are shown below, supplemented with the required elements of the IEEE8021-CFM-MIB module.

[5.1. Textual Conventions](#)

Textual conventions are defined to represent object types relevant to the TRILL OAM MIB.

[5.2. TRILL-OAM-MIB relationship to IEEE8021-TC-MIB](#)

In TRILL, traffic labeling can be done using either a 12-bit VLAN or a 24-bit fine grain label [[RFC7172](#)].

The IEEE8021-TC-MIB definition of IEEE8021ServiceSelectorType includes the two values:

- 1 representing a vlanId, and
- 2 representing a 24 bit isid

We have chosen to use value 2 for TRILL's fine grain label. As such, TRILL-OAM-MIB will import IEEE8021ServiceSelectorType, IEEE8021ServiceSelectorValueOrNone, and IEEE8021ServiceSelectorValue from IEEE8021-TC-MIB.

5.3. TRILL OAM MIB Tree

TRILL-OAM MIB Tree describe below consists of trilloamNotifications (Traps) and trilloamMibObjects. trilloamNotifications are sent to management entity whenever a MEP loses/restores contact with its peer Flow MEPs.

The TRILL OAM MIB Per MEP Objects are defined in the trilloamMepTable. The trilloamMepTable augments the dot1agCfmMepEntry (please see [section 6.1](#)) defined in IEEE8021-CFM-MIB. It includes objects that are locally defined for an individual MEP and its associated Flow.

TRILL-OAM-MIB

```
|--trilloamNotifications          (trilloamMib 0)

  |--trilloamFaultAlarm

|--trilloamMibObjects             {trilloamMib 1}

  |--trilloamMep                  {trilloamMibObjects 1}

    |--trilloamMepTable           {trilloamMep 1} - Local TRILL config

    |--trilloamMepFlowCfgTable

    |--trilloamPtrTable

    |--trilloamMtvrTable

    |--trilloamMepDbTable
```

5.3.1. TRILL OAM MIB Notifications

Notifications (fault alarm) are sent to the management entity with the OID of the MEP that has detected the fault. Notifications are generated whenever MEP loses/restores contact with its peer Flow MEPs.

5.3.2. TRILL OAM MIB Per MEP Objects

The TRILL OAM MIB Per MEP Objects are defined in the trilloamMepTable. The trilloamMepTable augments the dot1agCfmMepEntry (please see [section 6.1](#)) defined in IEEE8021-CFM-MIB. It includes objects that are locally defined for an individual MEP and its associated Flow.

5.3.2.1. trilloamMepTable Objects

This table is an extension of the dot1agCfmMepTable and rows are automatically added or deleted from this table based upon row creation and destruction of the dot1agCfmMepTable.

This table represents the local MEP TRILL OAM configuration table. The primary purpose of this table is provide local parameters for the TRILL OAM function found in [RFC 7455](#) and instantiated at a MEP.

5.3.2.2. trillOamMepFlowCfgTable Objects

Each row in this table represents a Flow Configuration Entry for the associated MEP. This table uses four indices. The first three indices are the indices of the Maintenance Domain, MaNet, and MEP tables. The fourth index is the specific Flow Configuration Entry on the selected MEP. Some write-able objects in this table are only applicable in certain cases (as described under each object below), and attempts to write values for them in other cases will be ignored.

5.3.2.3. trillOamPtrTable Objects

Each row in this table represents a Path Trace reply Entry for the Defined MEP and Transaction. This table uses four indices. The first three indices identify the MEP and the fourth index specifies the transaction identifier. This transaction identifier uniquely identifies the response for a MEP which can have multiple flow.

5.3.2.4. trillOamMtvrTable Objects

This table includes managed objects for the Multi-Destination Reply. Each row in the table represents a Multi-destination Reply Entry for the defined MEP and Transaction. This table uses the following five indices: 1) Maintenance Domain, 2) MANET, 3) MEP tables, 4) Transaction identifier of selected MEP, and 5) receive order of Multi-destination replies.

Some write-able objects in this table are only applicable in certain cases (as described under each object below), and attempts to write a value for them in other cases will be ignored.

5.3.2.5. trillOamMepDbTable Objects

This table is an augmentation of the dot1agCfmMepDbTable, and rows are automatically added or deleted from this table based upon row creation and destruction of the dot1agCfmMepDbTable.

6. Relationship to other MIB module

The IEEE8021-CFM-MIB, and LLDP-MIB contain objects relevant to TRILL OAM MIB. Management objects contained in these modules are not duplicated here, to reduce overlap to the extent possible. From IEEE8021-CFM-MIB following objects are imported

- o dot1agCfmMdIndex
- o dot1agCfmMaIndex
- o dot1agCfmMepIdentifier
- o dot1agCfmMepEntry
- o dot1agCfmMepDbEntry
- o Dot1agCfmIngressActionFieldValue
- o Dot1agCfmEgressActionFieldValue
- o Dot1agCfmRemoteMepState

From LLDP-MIB following objects are imported

- o LldpChassisId
- o LldpChassisIdSubtype
- o LldpPortId

6.1. Relationship to IEEE8021-CFM-MIB

trillOamMepTable Augments dot1agCfmMepEntry. Implementation of IEEE8021-CFM-MIB is required as we are Augmenting the IEEE-CFM-MIB Table. Objects/Tables that are not applicable to a TRILL implementation have to be handled by the TRILL implementation back end and appropriate default values as described in IEEE8021-CFM-MIB have to be returned.

TRILL Implementation doesn't support Link Trace Message and Link Trace Reply as [RFC7455](#) substituted it with Path Trace Message and Reply for unicast traffic and Multi-destination Tree verification Message and Reply for multicast traffic, and statistics with respect of these message should be default as per IEEE8021-CFM-MIB.

6.2. MIB modules required for IMPORTS

The following MIB module IMPORTS objects from SNMPv2-SMI [[RFC2578](#)], SNMPv2-TC [[RFC2579](#)], SNMPv2-CONF [[RFC2580](#)], IEEE-8021-CFM-MIB, LLDP-MIB.

7. Definition of the TRILL OAM MIB module

```
TRILL-OAM-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    MODULE-IDENTITY,
    OBJECT-TYPE,
    Counter32,
    Unsigned32,
    Integer32,
    mib-2,
    NOTIFICATION-TYPE
        FROM SNMPv2-SMI
    RowStatus,
    TruthValue,
    TimeStamp,
    MacAddress
        FROM SNMPv2-TC
    OBJECT-GROUP,
    NOTIFICATION-GROUP,
    MODULE-COMPLIANCE
        FROM SNMPv2-CONF
    dot1agCfmMdIndex,
    dot1agCfmMaIndex,
    dot1agCfmMepIdentifier,
    dot1agCfmMepEntry,
    dot1agCfmMepDbEntry,
    Dot1agCfmIngressActionFieldValue,
    Dot1agCfmEgressActionFieldValue,
    Dot1agCfmRemoteMepState
        FROM IEEE8021-CFM-MIB
    LldpChassisId,
    LldpChassisIdSubtype,
    LldpPortId,
    LldpPortIdSubtype
        FROM LLDP-MIB;
```

```
trilloamMib MODULE-IDENTITY
```

```
    LAST-UPDATED      "201508231200Z"
    ORGANIZATION      "IETF TRILL WG"
    CONTACT-INFO
```


"E-mail: trill@ietf.org"

DESCRIPTION

"This MIB module contains the management objects for the management of Trill Services Operations, Administration and Maintenance.

Initial version. Published as RFC xxxx.

Reference Overview

A number of base documents have been used to create the Textual Conventions MIB. The following are the abbreviations for the baseline documents:

[CFM] refers to 'Connectivity Fault Management',
IEEE 802.1Q-2014, December 2014

[Q.840.1] refers to 'ITU-T Requirements and analysis for NMS-EMS management interface of Ethernet over Transport and Metro Ethernet Network (EoT/MEN)', March 2007

[Y.1731] refers to ITU-T Y.1731 'OAM functions and mechanisms for Ethernet based networks', February 2011

Abbreviations Used

Term	Definition
CCM	Continuity Check Message
CFM	Connectivity Fault Management
CoS	Class of Service
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
ITU-T	International Telecommunication Union - Telecommunication Standardization Bureau
MAC	Media Access Control
MA	Maintenance Association (equivalent to a MEG)
MD	Maintenance Domain (equivalent to a OAM Domain in MEF 17)
MD Level	Maintenance Domain Level (equivalent to a MEG level)
ME	Maintenance Entity
MEG	Maintenance Entity Group (equivalent to a MA)
MEG Level	Maintenance Entity Group Level (equivalent to MD Level)
MEP	Maintenance Association End Point or MEG End Point
MIB	Management Information Base

MIP Maintenance Domain Intermediate Point or
 MEG Intermediate Point
 MP Maintenance Point. One of either a MEP or a MIP
 OAM Operations, Administration, and Maintenance
 On-Demand OAM actions that are initiated via
 manual intervention for a limited time to carry
 out diagnostics. On-Demand OAM can result in
 singular or periodic OAM actions during the
 diagnostic time interval
 PDU Protocol Data Unit
 RFC Request for Comment
 SNMP Simple Network Management Protocol
 SNMP Agent An SNMP entity containing one or more command
 responder and/or notification originator
 applications(along with their associated SNMP
 engine). Typically implemented in Network
 Element.
 SNMP Manager An SNMP entity containing one or more command
 generator and/or notification receiver
 applications (along with their associated SNMP
 engine). Typically implemented in an
 EMS or NMS.
 TLV Type Length Value, a method of encoding Objects
 UTC Coordinated Universal Time
 UNI User-to-Network Interface
 VLAN Virtual LAN
 PTR Path Trace Reply
 PTM Path Trace Message
 MTRV Multi-destination Tree Verification Reply
 MTVM Multi-destination Tree Verification Message"

REVISION "201508231200Z"

DESCRIPTION

"Initial version. Published as RFC xxxx."

::= { mib-2 12000 }

-- RFC Ed.: assigned by IANA, see [section 9](#) for details

--

-- *****

-- Object definitions in the TRILL OAM MIB Module

-- *****

trillOamNotifications OBJECT IDENTIFIER

::= { trillOamMib 0 }

trillOamMibObjects OBJECT IDENTIFIER

::= { trillOamMib 1 }

trillOamMibConformance OBJECT IDENTIFIER

:= { trillOamMib 2 }

-- *****

-- Groups in the TRILL OAM MIB Module

-- *****

trillOamMep OBJECT IDENTIFIER

:= { trillOamMibObjects 1 }

-- *****

-- TRILL OAM MEP Configuration

-- *****

trillOamMepTable OBJECT-TYPE

SYNTAX SEQUENCE OF TrillOamMepEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table is an extension of the dot1agCfmMepTable and rows are automatically added or deleted from this table based upon row creation and destruction of the dot1agCfmMepTable.

This table represents the local MEP TRILL OAM configuration table. The primary purpose of this table is provide local parameters for the TRILL OAM function found in [RFC 7455](#) and instantiated at a MEP."

REFERENCE "[RFC 7455](#)"

:= { trillOamMep 1 }

trillOamMepEntry OBJECT-TYPE

SYNTAX TrillOamMepEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The conceptual row of trillOamMepTable."

AUGMENTS { dot1agCfmMepEntry }

:= { trillOamMepTable 1 }

TrillOamMepEntry ::= SEQUENCE {

trillOamMepRName	Unsigned32,
trillOamMepNextPtmTid	Counter32,
trillOamMepNextMtmTid	Counter32,
trillOamMepPtrIn	Counter32,
trillOamMepPtrInOutOfOrder	Counter32,
trillOamMepPtrOut	Counter32,


```

    trillOamMepMtvrIn          Counter32,
    trillOamMepMtvrInOutofOrder Counter32,
    trillOamMepMtvrOut        Counter32,
    trillOamMepTxLbmDestRName Unsigned32,
    trillOamMepTxLbmHC        Unsigned32,
    trillOamMepTxLbmReplyModeOob TruthValue,
    trillOamMepTransmitLbmReplyIp OCTET STRING,
    trillOamMepTxLbmFlowEntropy OCTET STRING,
    trillOamMepTxPtmDestRName Unsigned32,
    trillOamMepTxPtmHC        Unsigned32,
    trillOamMepTxPtmReplyModeOob TruthValue,
    trillOamMepTransmitPtmReplyIp OCTET STRING,
    trillOamMepTxPtmFlowEntropy OCTET STRING,
    trillOamMepTxPtmStatus    TruthValue,
    trillOamMepTxPtmResultOK  TruthValue,
    trillOamMepTxPtmSeqNumber Unsigned32,
    trillOamMepTxPtmMessages  Integer32,
    trillOamMepTxMtvMTree     Unsigned32,
    trillOamMepTxMtvMHC       Unsigned32,
    trillOamMepTxMtvMReplyModeOob TruthValue,
    trillOamMepTransmitMtvMReplyIp OCTET STRING,
    trillOamMepTxMtvMFlowEntropy OCTET STRING,
    trillOamMepTxMtvMStatus    TruthValue,
    trillOamMepTxMtvMResultOK  TruthValue,
    trillOamMepTxMtvMMessages  Integer32,
    trillOamMepTxMtvMSeqNumber Unsigned32,
    trillOamMepTxMtvMScopeList OCTET STRING,
    trillOamMepDiscontinuityTime TimeStamp
}

trillOamMepRName OBJECT-TYPE
    SYNTAX      Unsigned32 (0..65471)
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "This object contains Rbridge NickName of TRILL Rbridge as
        defined in RFC 6325 section 3.7."
    REFERENCE   "RFC 7455 and RFC 6325 section 3.7"
    ::= { trillOamMepEntry 1 }

trillOamMepNextPtmTid OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "Next sequence number/transaction identifier to be sent in a
        Multi-destination message. This sequence number can be zero
        because it wraps around. Implementation of this identifier

```


should be should provide a unique code value in order to
identify Transaction Id for a MEP with multiple flows."

REFERENCE "[RFC 7455](#) 10.1.1"

::= { trillOamMepEntry 2 }

trillOamMepNextMtmTid OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Next sequence number/transaction identifier to be sent in a
Multi-destination message. This sequence number can be zero
because it wraps around. Implementation should be unique to
identify Transaction Id for a MEP with multiple flows."

REFERENCE "[RFC 7455](#) 11.2.1"

::= { trillOamMepEntry 3 }

trillOamMepPtrIn OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Total number of valid, in-order Path Trace Replies
received."

REFERENCE "[RFC 7455 section 10](#)"

::= { trillOamMepEntry 4 }

trillOamMepPtrInOutOfOrder OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Total number of valid, out-of-order Path Trace Replies
received."

REFERENCE "[RFC 7455 section 10](#)"

::= { trillOamMepEntry 5 }

trillOamMepPtrOut OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Total number of valid, Path Trace Replies
transmitted."

REFERENCE "[RFC 7455 section 10](#)"

::= { trillOamMepEntry 6 }

trillOamMepMtrIn OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Total number of valid, in-order Multi-destination
Replies received."
REFERENCE "[RFC 7455 section 11](#)"
::= { trillOamMepEntry 7 }

trillOamMepMtvrInOutOfOrder OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Total number of valid, out-of-order Multi-destination
Replies received."
REFERENCE "[RFC 7455 section 11](#)"
::= { trillOamMepEntry 8 }

trillOamMepMtvrOut OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Total number of valid, Multi-destination Replies
transmitted."
REFERENCE "[RFC 7455 section 11](#)"
::= { trillOamMepEntry 9 }

trillOamMepTxLbmDestRName OBJECT-TYPE

SYNTAX Unsigned32 (0..65471)
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The Target Destination Rbridge NickName Field as
defined in [RFC 6325 section 3.7](#) to be transmitted."
REFERENCE "[RFC 7455](#) and [RFC6325 section 3.7](#)"
::= { trillOamMepEntry 10 }

trillOamMepTxLbmHC OBJECT-TYPE

SYNTAX Unsigned32(1..63)
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The Hop Count to be transmitted."
"
REFERENCE "[RFC 7455 section 9](#) and 3"
::= { trillOamMepEntry 11 }

trillOamMepTxLbmReplyModeOob OBJECT-TYPE

SYNTAX TruthValue
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"True Indicates that Reply of Lbm is out of band and out of band IP Address TLV is to be transmitted.

False indicates that In band reply is transmitted."

REFERENCE "[RFC 7455](#) 9.2.1"

::= { trillOamMepEntry 12 }

trillOamMepTransmitLbmReplyIp OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (4..16))
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"IP address for out of band IP Address TLV is to be transmitted, Maximum length for IPv6 is 16 OCTET and IPv4 is 4 OCTET."

REFERENCE "[RFC 7455 section 3](#)"

::= { trillOamMepEntry 13 }

trillOamMepTxLbmFlowEntropy OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (96))
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"96 Byte Flow Entropy as defined in [RFC 7455](#) to be transmitted."

REFERENCE "[RFC 7455 section 3](#)"

::= { trillOamMepEntry 14 }

trillOamMepTxPtmDestRName OBJECT-TYPE

SYNTAX Unsigned32 (0..65471)
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"The Target Destination Rbridge NickName Field as defined in [RFC 6325 section 3.7](#) to be transmitted."

REFERENCE "[RFC 7455](#) and [RFC6325 section 3.7](#)"

::= { trillOamMepEntry 15 }

trillOamMepTxPtmHC OBJECT-TYPE

SYNTAX Unsigned32 (1..63)
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"The Hop Count field to be transmitted."

REFERENCE "[RFC 7455 section 3](#)"

::= { trillOamMepEntry 16 }

trillOamMepTxPtmReplyModeOob OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"True Indicates that Reply of Ptm will be made out of band and out of band IP Address TLV is to be transmitted. False indicates that In band reply is transmitted."

REFERENCE "[RFC 7455 section 10](#)"

DEFVAL { false }

::= { trillOamMepEntry 17 }

trillOamMepTransmitPtmReplyIp OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (4..16))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"IP address for out of band IP Address TLV is to be Transmitted. The maximum length for IPv6 address is 16 Octets. The maximum length for an IPv4 address is 4 octets."

REFERENCE "[RFC 7455 section 3](#) and 10"

::= { trillOamMepEntry 18 }

trillOamMepTxPtmFlowEntropy OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (96))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"96 Byte Flow Entropy as defined in [RFC 7455](#) to be transmitted."

REFERENCE "[RFC 7455 section 3](#)"

::= { trillOamMepEntry 19 }

trillOamMepTxPtmStatus OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"A Boolean flag set to true by the MEP Path Trace Initiator State Machine or an MIB manager to indicate that another PTM is being transmitted. This is Reset to false by the MEP Initiator

State Machine.

The PTM managed objects in the MEP table are used in a manner similar to that described for LBM transmission in dot1agCfmMepTable. As per [RFC7455 section 10](#), Operation of the Path Trace Message is identical to the Loopback Message except that it is first transmitted with a TRILL Header Hop count field value of 1 and then retransmitted with incrementing Hop count until a response is received from the destination RBridge, or the Hop Count reaches a configured maximum value.

trillOamMepTxPtmStatus Status is reset to FALSE by initiator when last PTM is transmitted."

REFERENCE "[RFC 7455 section 10](#)"

DEFVAL { false }

::= { trillOamMepEntry 20 }

trillOamMepTxPtmResultOK OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Indicates the following results of the operation:

- true The Path Trace Message(s) will be (or has been) sent.
- false The Path Trace Message(s) will not be sent."

REFERENCE "[RFC 7455 section 10](#)"

DEFVAL { true }

::= { trillOamMepEntry 21 }

trillOamMepTxPtmSeqNumber OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The Path Trace Transaction Identifier of the first PTM (to be) sent. The value returned is undefined if trillOamMepTxPtmResultOK is false."

REFERENCE "[RFC 7455 section 10](#)"

::= { trillOamMepEntry 22 }

trillOamMepTxPtmMessages OBJECT-TYPE

SYNTAX Integer32 (1..1024)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The number of Path Trace messages to be transmitted.
As per RFC [section 10](#) first Path Trace Messages

is transmitted with Hop count 1 and An RBridge may continue to retransmit the request at periodic interval until response is received from destination Rbridge, or the Hop Count reaches a configured maximum value. The event of the Destination response being received or the Hop count reaching its maximum is treated as single Counter increment of this object, and above process is repeated starting Hop count 1 till maximum PTM transmission is reached. It's treated as Repeat Counter for above described operation."

REFERENCE "[RFC 7455 section 10](#)"

::= { trillOamMepEntry 23 }

trillOamMepTxMtmTree OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The Multi-destination Tree is identifier for tree as defined in [RFC6325](#)."

::= { trillOamMepEntry 24 }

trillOamMepTxMtmHC OBJECT-TYPE

SYNTAX Unsigned32(1..63)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The Hop Count field to be transmitted.
"

REFERENCE "[RFC 7455 section 3](#), [RFC 6325 section 3](#)"

::= { trillOamMepEntry 25 }

trillOamMepTxMtmReplyModeOob OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"A True Indicates that Reply of Mtm is out of band and out of band IP Address TLV is to be transmitted.

A False indicates that In band reply is transmitted."

REFERENCE "[RFC 7455 section 11](#)"

::= { trillOamMepEntry 26 }

trillOamMepTransmitMtmReplyIp OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (4..16))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"IP address for out of band IP Address TLV is to be transmitted. The Maximum length for IPv6 is 16 OCTET and IPv4 is 4 OCTET."

REFERENCE "[RFC 7455 section 11](#)"

::= { trillOamMepEntry 27 }

trillOamMepTxMtmFlowEntropy OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (96))

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"96 Byte Flow Entropy as defined in [RFC 7455](#) to be transmitted."

REFERENCE "[RFC 7455 section 3](#)"

::= { trillOamMepEntry 28 }

trillOamMepTxMtmStatus OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"A Boolean flag set to true by the MEP Multi Destination Initiator State Machine or an MIB manager to indicate that another Mtm is being transmitted.

Reset to false by the MEP Initiator State Machine.

The Mtm managed objects in the MEP table are used in a manner similar to that described for LBM

transmission in dot1agCfmMepTable. As per [RFC7455](#)

[section 11](#), Operation of the Mtm Message is identical to the Loopback Message except that it is first transmitted with a TRILL Header Hop count

field value of 1 and it is retransmitted incrementing Hop count until a response is received from the destination RBridge, or the Hop Count reaches a configured maximum value. trillOamMepTxMtmStatus Status is reset to FALSE by initiator when last Mtm is transmitted."

REFERENCE "[RFC 7455 section 11](#)"

DEFVAL { false }

::= { trillOamMepEntry 29 }

trillOamMepTxMtmResultOK OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Indicates the result of the operation in the following way:

- true The Multi-destination Message(s) will be (or has been) sent.
- false The Multi-destination Message(s) will not be sent."

REFERENCE "[RFC 7455 section 11](#)"

DEFVAL { true }

::= { trillOamMepEntry 30 }

trillOamMepTxMtmMessages OBJECT-TYPE

SYNTAX Integer32 (1..1024)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The number of Multi Destination messages to be transmitted. Rbridge retransmit the Multi Destination message incrementing the session Identification Number at periodic interval until either retransmission count expires."

REFERENCE "[RFC 7455 section 11](#)"

::= { trillOamMepEntry 31 }

trillOamMepTxMtmSeqNumber OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The Multi-destination Transaction Identifier of the first MTVM (to be) sent. The value returned is undefined if trillOamMepTxMtmResultOK is false."

REFERENCE "[RFC 7455 section 11](#)"

::= { trillOamMepEntry 32 }

trillOamMepTxMtmScopeList OBJECT-TYPE

SYNTAX OCTET STRING

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The Multi-destination Rbridge Scope list which requires 2 octets per Rbridge."

REFERENCE "[RFC 7455 section 11](#)"

::= { trillOamMepEntry 33 }

trillOamMepDiscontinuityTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Snapshot of the value of the sysUpTime object at the beginning of the latest period of continuity of the statistical counters associated with this MEP."
 ::= { trillOamMepEntry 34 }

```
-- *****
-- TRILL OAM Tx Measurement Configuration Table
-- *****
```

trillOamMepFlowCfgTable OBJECT-TYPE

SYNTAX SEQUENCE OF TrillOamMepFlowCfgEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"This table includes configuration objects and operations for the Trill OAM [RFC 7455](#).

Each row in the table represents a Flow configuration Entry for the defined MEP. This table uses four indices. The first three indices are the indices of the Maintenance Domain, MaNet, and MEP tables. The fourth index is the specific flow configuration Entry on the selected MEP.

Some writable objects in this table are only applicable in certain cases (as described under each object), and attempts to write values for them in other cases will be ignored."

REFERENCE "[RFC 7455](#)"

::= { trillOamMep 2 }

trillOamMepFlowCfgEntry OBJECT-TYPE

SYNTAX TrillOamMepFlowCfgEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION

"The conceptual row of trillOamMepFlowCfgTable."

INDEX {
 dot1agCfmMdIndex,
 dot1agCfmMaIndex,
 dot1agCfmMepIdentifier,
 trillOamMepFlowCfgIndex
 }

::= { trillOamMepFlowCfgTable 1 }

TrillOamMepFlowCfgEntry ::= SEQUENCE {
 trillOamMepFlowCfgIndex Unsigned32,
 trillOamMepFlowCfgFlowEntropy OCTET STRING,


```
trillOamMepFlowCfgDestRName Unsigned32,
trillOamMepFlowCfgFlowHC    Unsigned32,
trillOamMepFlowCfgRowStatus RowStatus
}
```

trillOamMepFlowCfgIndex OBJECT-TYPE

```
SYNTAX      Unsigned32 (1..65535)
MAX-ACCESS   not-accessible
STATUS       current
```

DESCRIPTION

"An index to the Trill OAM MEP Flow Configuration table which indicates the specific Flow for the MEP.

The index is never reused for other flow sessions on the same

MEP while this session is active. The index value keeps increasing until it wraps to 0. This value can also be used in Flow-identifier TLV [RFC 7455](#)."

REFERENCE "[RFC 7455](#)"

::= { trillOamMepFlowCfgEntry 1 }

trillOamMepFlowCfgFlowEntropy OBJECT-TYPE

```
SYNTAX      OCTET STRING (SIZE (96))
MAX-ACCESS   read-create
STATUS       current
```

DESCRIPTION

"This is 96 byte of Flow Entropy as described in TRILL OAM [RFC 7455](#)."

REFERENCE "[RFC 7455 section 3](#)"

::= { trillOamMepFlowCfgEntry 2 }

trillOamMepFlowCfgDestRName OBJECT-TYPE

```
SYNTAX      Unsigned32 (0..65471)
MAX-ACCESS   read-create
STATUS       current
```

DESCRIPTION

"The Target Destination Rbridge NickName Field as defined in [RFC 6325 section 3.7](#) to be transmitted."

REFERENCE "[RFC 7455 section 3](#) and [RFC 6325 section 3.7](#)"

::= { trillOamMepFlowCfgEntry 3 }

trillOamMepFlowCfgFlowHC OBJECT-TYPE

```
SYNTAX      Unsigned32 (1..63)
MAX-ACCESS   read-create
STATUS       current
```

DESCRIPTION

"The Time to Live field to be transmitted.
to be transmitted."

REFERENCE "[RFC 7455 section 3](#) and [RFC 6325 section 3.7](#)"

::= { trillOamMepFlowCfgEntry 4 }

trillOamMepFlowCfgRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of the row.

The writable columns in a row cannot be changed if the row is active. All columns MUST have a valid value before a row can be activated."

::= { trillOamMepFlowCfgEntry 5 }

-- *****
-- TRILL OAM Path Trace Reply Table
-- *****

trillOamPtrTable OBJECT-TYPE

SYNTAX SEQUENCE OF TrillOamPtrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table includes Path Trace Reply objects and operations for the Trill OAM [RFC 7455](#).

Each row in the table represents a Path Trace Reply Entry for the defined MEP and Transaction.

This table uses four indices.

The first three indices are the indices of the Maintenance Domain, MaNet, and MEP tables. The fourth index is the specific Transaction Identifier on the selected MEP.

Some writable objects in this table are only applicable in certain cases (as described under each object), and attempts to write values for them in other cases will be ignored."

REFERENCE "[RFC 7455](#)"

::= { trillOamMep 3 }

trillOamPtrEntry OBJECT-TYPE

SYNTAX TrillOamPtrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION


```

    "The conceptual row of trillOamPtrTable."
INDEX      {
            dot1agCfmMdIndex,
            dot1agCfmMaIndex,
            dot1agCfmMepIdentifier,
            trillOamMepPtrTransactionId
            }
 ::= { trillOamPtrTable 1 }

TrillOamPtrEntry ::= SEQUENCE {
    trillOamMepPtrTransactionId      Unsigned32,
    trillOamMepPtrHC                 Unsigned32,
    trillOamMepPtrFlag               Unsigned32,
    trillOamMepPtrErrorCode           Unsigned32,
    trillOamMepPtrTerminalMep        TruthValue,
    trillOamMepPtrLastEgressId       Unsigned32,
    trillOamMepPtrIngress             Dot1agCfmIngressActionFieldValue,
    trillOamMepPtrIngressMac          MacAddress,
    trillOamMepPtrIngressPortIdSubtype LldpPortIdSubtype,
    trillOamMepPtrIngressPortId      LldpPortId,
    trillOamMepPtrEgress              Dot1agCfmEgressActionFieldValue,
    trillOamMepPtrEgressMac           MacAddress,
    trillOamMepPtrEgressPortIdSubtype LldpPortIdSubtype,
    trillOamMepPtrEgressPortId       LldpPortId,
    trillOamMepPtrChassisIdSubtype    LldpChassisIdSubtype,
    trillOamMepPtrChassisId          LldpChassisId,
    trillOamMepPtrOrganizationSpecificTlv OCTET STRING,
    trillOamMepPtrNextHopNicknames   OCTET STRING
}

trillOamMepPtrTransactionId OBJECT-TYPE
    SYNTAX      Unsigned32 (0..4294967295)
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "Transaction identifier/sequence number returned by a
         previous transmit path trace message command,
         indicating which PTM's response is going to be returned."
    REFERENCE    "RFC 7455 section 10"
    ::= { trillOamPtrEntry 1 }

trillOamMepPtrHC OBJECT-TYPE
    SYNTAX      Unsigned32 (1..63)
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "Hop Count field value for a returned PTR."
    REFERENCE    "RFC 7455"

```



```
::= { trillOamPtrEntry 2 }
```

trillOamMepPtrFlag OBJECT-TYPE

SYNTAX Unsigned32 (0..15)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"FCOI (TRILL OAM Message TLV) field value for a
returned PTR."

REFERENCE ["RFC 7455"](#), 8.4.3"

```
::= { trillOamPtrEntry 3 }
```

trillOamMepPtrErrorCode OBJECT-TYPE

SYNTAX Unsigned32 (0..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Return Code and Return Sub code value for a returned PTR."

REFERENCE ["RFC 7455"](#), 8.4.3"

```
::= { trillOamPtrEntry 4 }
```

trillOamMepPtrTerminalMep OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A boolean value stating whether the forwarded PTM reached a
MEP enclosing its MA, as returned in the Terminal MEP flag of
the Flags field."

REFERENCE ["RFC 7455"](#)

```
::= { trillOamPtrEntry 5 }
```

trillOamMepPtrLastEgressId OBJECT-TYPE

SYNTAX Unsigned32 (0..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"An Integer field holding the Last Egress Identifier returned
in the PTR Upstream Rbridge nickname TLV of the PTR.

The Last Egress Identifier identifies the Upstream Nickname."

REFERENCE ["RFC 7455"](#) 8.4.1"

```
::= { trillOamPtrEntry 6 }
```

trillOamMepPtrIngress OBJECT-TYPE

SYNTAX Dot1agCfmIngressActionFieldValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value returned in the Ingress Action Field of the PTR.
The value ingNoTlv(0) indicates that no Reply Ingress TLV was
returned in the PTM."

REFERENCE "[RFC 7455](#) 8.4.1"

::= { trillOamPtrEntry 7 }

trillOamMepPtrIngressMac OBJECT-TYPE

SYNTAX MacAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"MAC address returned in the ingress MAC address field."

REFERENCE "[RFC 7455](#) 8.4.1"

::= { trillOamPtrEntry 8 }

trillOamMepPtrIngressPortIdSubtype OBJECT-TYPE

SYNTAX LldpPortIdSubtype

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Ingress Port ID. The format of this object is determined by
the value of the trillOamMepPtrIngressPortIdSubtype object."

REFERENCE "[RFC 7455](#) 8.4.1"

::= { trillOamPtrEntry 9 }

trillOamMepPtrIngressPortId OBJECT-TYPE

SYNTAX LldpPortId

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Ingress Port ID. The format of this object is determined by
the value of the trillOamMepPtrIngressPortId object."

REFERENCE "[RFC 7455](#) 8.4.1"

::= { trillOamPtrEntry 10 }

trillOamMepPtrEgress OBJECT-TYPE

SYNTAX Dot1agCfmEgressActionFieldValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value returned in the Egress Action Field of the PTR.
The value ingNoTlv(0) indicates that no Reply Egress TLV was
returned in the PTM."

REFERENCE "[RFC 7455](#) 8.4.1"

::= { trillOamPtrEntry 11 }

trillOamMepPtrEgressMac OBJECT-TYPE

SYNTAX MacAddress

MAX-ACCESS read-only
STATUS current
DESCRIPTION
"MAC address returned in the egress MAC address field."
REFERENCE "RFC 7455 8.4.1"
::= { trillOamPtrEntry 12 }

trillOamMepPtrEgressPortIdSubtype OBJECT-TYPE

SYNTAX LldpPortIdSubtype
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Egress Port ID. The format of this object is determined by
the value of the trillOamMepPtrEgressPortIdSubtype object."
REFERENCE "RFC 7455 8.4.1"
::= { trillOamPtrEntry 13 }

trillOamMepPtrEgressPortId OBJECT-TYPE

SYNTAX LldpPortId
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Egress Port ID. The format of this object is determined by
the value of the trillOamMepPtrEgressPortId object."
REFERENCE "RFC 7455 8.4.1"
::= { trillOamPtrEntry 14 }

trillOamMepPtrChassisIdSubtype OBJECT-TYPE

SYNTAX LldpChassisIdSubtype
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object specifies the format of the Chassis ID returned
in the Sender ID TLV of the PTR, if any. This value is
meaningless if the trillOamMepPtrChassisId
has a length of 0."
REFERENCE "RFC 7455 8.4.1"
::= { trillOamPtrEntry 15 }

trillOamMepPtrChassisId OBJECT-TYPE

SYNTAX LldpChassisId
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The Chassis ID returned in the Sender ID TLV of the PTR, if
any. The format of this object is determined by the
value of the trillOamMepPtrChassisIdSubtype object."
REFERENCE "RFC 7455 8.4.1"


```
 ::= { trillOamPtrEntry 16 }
```

trillOamMepPtrOrganizationSpecificTlv OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0 | 4..1500))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"All Organization specific TLVs returned in the PTR, if any. Includes all octets including and following the TLV Length field of each TLV, concatenated together."

REFERENCE ["RFC 7455 8.4.1"](#)

```
 ::= { trillOamPtrEntry 17 }
```

trillOamMepPtrNextHopNicknames OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0 | 4..1500))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Next hop Rbridge List TLV returned in the PTR, if any. Includes all octets including and following the TLV Length field of each TLV, concatenated together."

REFERENCE ["RFC 7455 8.4.1"](#)

```
 ::= { trillOamPtrEntry 18 }
```

```
-- *****
-- TRILL OAM Multi Destination Reply Table
-- *****
```

trillOamMtvrTable OBJECT-TYPE

SYNTAX SEQUENCE OF TrillOamMtvrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table includes Multi-destination Reply objects and operations for the Trill OAM [RFC 7455](#).

Each row in the table represents a Multi-destination Reply Entry for the defined MEP and Transaction.

This table uses five indices.

The first three indices are the indices of the Maintenance Domain,

MaNet, and MEP tables. The fourth index is the specific Transaction Identifier on the selected MEP.

The fifth index is the receive order of Multi-destination replies.

Some writable objects in this table are only applicable in

certain cases (as described under each object),
 and attempts to
 write values for them in other cases will be ignored."

REFERENCE ["RFC 7455"](#)

::= { trillOamMep 4 }

trillOamMtvrEntry OBJECT-TYPE

SYNTAX TrillOamMtvrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The conceptual row of trillOamMtvrTable."

INDEX {
 dot1agCfmMdIndex,
 dot1agCfmMaIndex,
 dot1agCfmMepIdentifier,
 trillOamMepPtrTransactionId,
 trillOamMepMtvrReceiveOrder
 }

::= { trillOamMtvrTable 1 }

TrillOamMtvrEntry ::= SEQUENCE {

trillOamMepMtvrTransactionId	Unsigned32,
trillOamMepMtvrReceiveOrder	Unsigned32,
trillOamMepMtvrFlag	Unsigned32,
trillOamMepMtvrErrorCode	Unsigned32,
trillOamMepMtvrLastEgressId	Unsigned32,
trillOamMepMtvrIngress	Dot1agCfmIngressActionFieldValue,
trillOamMepMtvrIngressMac	MacAddress,
trillOamMepMtvrIngressPortIdSubtype	LldpPortIdSubtype,
trillOamMepMtvrIngressPortId	LldpPortId,
trillOamMepMtvrEgress	Dot1agCfmEgressActionFieldValue,
trillOamMepMtvrEgressMac	MacAddress,
trillOamMepMtvrEgressPortIdSubtype	LldpPortIdSubtype,
trillOamMepMtvrEgressPortId	LldpPortId,
trillOamMepMtvrChassisIdSubtype	LldpChassisIdSubtype,
trillOamMepMtvrChassisId	LldpChassisId,
trillOamMepMtvrOrganizationSpecificTlv	OCTET STRING,
trillOamMepMtvrNextHopNicknames	OCTET STRING,
trillOamMepMtvrReceiverAvailability	TruthValue,
trillOamMepMtvrReceiverCount	TruthValue

}

trillOamMepMtvrTransactionId OBJECT-TYPE

SYNTAX Unsigned32 (0..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Transaction identifier/sequence number returned by a previous transmit Multi-destination message command, indicating which MTVM's response is going to be returned."

REFERENCE ["RFC 7455 section 11"](#)

::= { trillOamMtvrEntry 1 }

trillOamMepMtvrReceiveOrder OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An index to distinguish among multiple MTVR with same MTVR Transaction Identifier field value.

trillOamMepMtvrReceiveOrder are assigned sequentially from 1,

in the order that the Multi-destination Tree Initiator received the MTVRs."

REFERENCE ["RFC 7455 section 11"](#)

::= { trillOamMtvrEntry 2 }

trillOamMepMtvrFlag OBJECT-TYPE

SYNTAX Unsigned32 (0..15)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"FCOI (TRILL OAM Message TLV) field value for a returned MTVR."

REFERENCE ["RFC 7455, 8.4.2"](#)

::= { trillOamMtvrEntry 3 }

trillOamMepMtvrErrorCode OBJECT-TYPE

SYNTAX Unsigned32 (0..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Return Code and Return Sub code value for a returned MTVR."

REFERENCE ["RFC 7455, 8.4.2"](#)

::= { trillOamMtvrEntry 4 }

trillOamMepMtvrLastEgressId OBJECT-TYPE

SYNTAX Unsigned32 (0..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"An Integer field holding the Last Egress Identifier returned in the MTVR Upstream Rbridge Nickname TLV of the MTVR."

The Last Egress Identifier identifies the Upstream Nickname."

REFERENCE "[RFC 7455](#) 8.4.1"
::= { trillOamMtvEntry 5 }

trillOamMepMtvrIngress OBJECT-TYPE

SYNTAX Dot1agCfmIngressActionFieldValue
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"The value returned in the Ingress Action Field of the MTVR.

The value ingNoTlv(0) indicates that no Reply Ingress TLV was returned in the MTVM."

REFERENCE "[RFC 7455](#) 11.2.3"
::= { trillOamMtvEntry 6 }

trillOamMepMtvrIngressMac OBJECT-TYPE

SYNTAX MacAddress
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"MAC address returned in the ingress MAC address field."

REFERENCE "[RFC 7455](#) 8.4.1"
::= { trillOamMtvEntry 7 }

trillOamMepMtvrIngressPortIdSubtype OBJECT-TYPE

SYNTAX LldpPortIdSubtype
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"Ingress Port ID. The format of this object is determined by the value of the trillOamMepMtvrIngressPortIdSubtype object."

REFERENCE "[RFC 7455](#) 8.4.1"
::= { trillOamMtvEntry 8 }

trillOamMepMtvrIngressPortId OBJECT-TYPE

SYNTAX LldpPortId
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"Ingress Port ID. The format of this object is determined by the value of the trillOamMepMtvrIngressPortId object."

REFERENCE "[RFC 7455](#) 8.4.1"
::= { trillOamMtvEntry 9 }

trillOamMepMtvrEgress OBJECT-TYPE

SYNTAX Dot1agCfmEgressActionFieldValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value returned in the Egress Action Field of the MTVR.
The value ingNoTlv(0) indicates that no Reply Egress TLV was
returned in the MTVR."

REFERENCE ["RFC 7455 8.4.1"](#)

::= { trillOamMtvrEntry 10 }

trillOamMepMtvrEgressMac OBJECT-TYPE

SYNTAX MacAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"MAC address returned in the egress MAC address field."

REFERENCE ["RFC 7455 8.4.1"](#)

::= { trillOamMtvrEntry 11 }

trillOamMepMtvrEgressPortIdSubtype OBJECT-TYPE

SYNTAX LldpPortIdSubtype

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Egress Port ID. The format of this object is determined by
the value of the trillOamMepMtvrEgressPortIdSubtype object."

REFERENCE ["RFC 7455 8.4.1"](#)

::= { trillOamMtvrEntry 12 }

trillOamMepMtvrEgressPortId OBJECT-TYPE

SYNTAX LldpPortId

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Egress Port ID. The format of this object is determined by
the value of the trillOamMepMtvrEgressPortId object."

REFERENCE ["RFC 7455 8.4.1"](#)

::= { trillOamMtvrEntry 13 }

trillOamMepMtvrChassisIdSubtype OBJECT-TYPE

SYNTAX LldpChassisIdSubtype

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the format of the Chassis ID returned
in the Sender ID TLV of the MTVR, if any. This value is
meaningless if the trillOamMepMtvrChassisId has a

length of 0."

REFERENCE "[RFC 7455](#) 8.4.1"

::= { trillOamMtvrEntry 14 }

trillOamMepMtvrChassisId OBJECT-TYPE

SYNTAX LldpChassisId

MAX-ACCESS read-only

STATUS current

DESCRIPTION

 "The Chassis ID returned in the Sender ID TLV of the MTVR, if any. The format of this object is determined by the value of the trillOamMepMtvrChassisIdSubtype object."

REFERENCE "[RFC 7455](#) 8.4.1"

::= { trillOamMtvrEntry 15 }

trillOamMepMtvrOrganizationSpecificTlv OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0 | 4..1500))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

 "All Organization specific TLVs returned in the MTVR, if any. Includes all octets including and following the TLV Length field of each TLV, concatenated together."

REFERENCE "[RFC 7455](#) 8.4.1"

::= { trillOamMtvrEntry 16 }

trillOamMepMtvrNextHopNicknames OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0 | 4..1500))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

 "Next hop Rbridge List TLV returned in the PTR, if any. Includes all octets including and following the TLV Length field of each TLV, concatenated together."

REFERENCE "[RFC 7455](#) 8.4.3"

::= { trillOamMtvrEntry 17 }

trillOamMepMtvrReceiverAvailability OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

 "True value indicates that MTVR response contained Multicast receiver availability TLV."

REFERENCE "[RFC 7455](#) 8.4.10"

::= { trillOamMtvrEntry 18 }

trillOamMepMtvrReceiverCount OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates the number of Multicast receivers available on responding RBridge on the VLAN specified by the diagnostic VLAN."

REFERENCE "RFC 7455 8.4.10"

::= { trillOamMtvEntry 19 }

```
-- *****
-- TRILL OAM MEP Database Table
-- *****
```

trillOamMepDbTable OBJECT-TYPE

SYNTAX SEQUENCE OF TrillOamMepDbEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table is an extension of the dot1agCfmMepDbTable and rows are automatically added to or deleted from this table based upon row creation and destruction of the dot1agCfmMepDbTable."

REFERENCE

"RFC 7455"

::= { trillOamMep 5 }

trillOamMepDbEntry OBJECT-TYPE

SYNTAX TrillOamMepDbEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The conceptual row of trillOamMepDbTable."

AUGMENTS {
dot1agCfmMepDbEntry
}

::= { trillOamMepDbTable 1 }

TrillOamMepDbEntry ::= SEQUENCE {

trillOamMepDbFlowIndex	Unsigned32,
trillOamMepDbFlowEntropy	OCTET STRING,
trillOamMepDbFlowState	Dot1agCfmRemoteMepState,
trillOamMepDbFlowFailedOkTime	TimeStamp,
trillOamMepDbRbridgeName	Unsigned32,
trillOamMepDbLastGoodSeqNum	Counter32

}

trillOamMepDbFlowIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object identifies the Flow. If Flow Identifier TLV is received than index received can also be used."

REFERENCE "[RFC 7455](#)"

::= {trillOamMepDbEntry 1 }

trillOamMepDbFlowEntropy OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (96))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"96 byte Flow Entropy."

REFERENCE "[RFC 7455 section 3](#)."

::= {trillOamMepDbEntry 2 }

trillOamMepDbFlowState OBJECT-TYPE

SYNTAX Dot1agCfmRemoteMepState

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The operational state of the remote MEP (flow based) IFF State machines. State Machine is running now per flow."

REFERENCE "[RFC 7455](#)"

::= {trillOamMepDbEntry 3 }

trillOamMepDbFlowFailedOkTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The Time (sysUpTime) at which the Remote MEP Flow state machine last entered either the RMEP_FAILED or RMEP_OK state."

REFERENCE "[RFC 7455](#)"

::= {trillOamMepDbEntry 4 }

trillOamMepDbRbridgeName OBJECT-TYPE

SYNTAX Unsigned32(0..65471)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Remote MEP Rbridge Nickname."

REFERENCE "[RFC 7455](#) RFC 6325 [section 3](#)"
 ::= {trillOamMepDbEntry 5 }

trillOamMepDbLastGoodSeqNum OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Last Sequence Number received."

REFERENCE "[RFC 7455](#) 13.1"

::= {trillOamMepDbEntry 6}

```
-- *****
-- TRILL OAM MIB NOTIFICATIONS (TRAPS)
-- This notification is sent to management entity whenever a
-- MEP loses/restores
-- contact with its peer Flow Meps
-- *****
```

trillOamFaultAlarm NOTIFICATION-TYPE

OBJECTS { trillOamMepDbFlowState }

STATUS current

DESCRIPTION

"A MEP Flow has a persistent defect condition.

A notification (fault alarm) is sent to the management entity with the OID of the Flow that has detected the fault.

The management entity receiving the notification can identify the system from the network source address of the notification, and can identify the Flow reporting the defect by the indices in the OID of the trillOamMepFlowIndex, and trillOamFlowDefect variable in the notification:

dot1agCfmMdIndex - Also the index of the MEP's Maintenance Domain table entry (dot1agCfmMdTable).

dot1agCfmMaIndex - Also an index (with the MD table index) of the MEP's Maintenance Association network table entry (dot1agCfmMaNetTable), and (with the MD table index and component ID) of the MEP's MA component table entry (dot1agCfmMaCompTable).

dot1agCfmMepIdentifier - MEP Identifier and final index into the MEP table (dot1agCfmMepTable).

trillOamMepFlowCfgIndex - Index identifies indicates the specific Flow for the MEP"


```

REFERENCE      "RFC 7455"
::= { trillOamNotifications 1 }

-- *****
-- TRILL OAM MIB Module - Conformance Information
-- *****

trillOamMibCompliances OBJECT IDENTIFIER
    ::= { trillOamMibConformance 1 }

trillOamMibGroups OBJECT IDENTIFIER
    ::= { trillOamMibConformance 2 }

-- *****
-- TRILL OAM MIB Units of conformance
-- *****

trillOamMepMandatoryGroup OBJECT-GROUP
    OBJECTS      {
        trillOamMepRName,
        trillOamMepNextPtmTid,
        trillOamMepNextMtmTid,
        trillOamMepPtrIn,
        trillOamMepPtrInOutOfOrder,
        trillOamMepPtrOut,
        trillOamMepMtvrIn,
        trillOamMepMtvrInOutOfOrder,
        trillOamMepMtvrOut,
        trillOamMepTxLbmDestRName,
        trillOamMepTxLbmHC,
        trillOamMepTxLbmReplyModeOob,
        trillOamMepTransmitLbmReplyIp,
        trillOamMepTxLbmFlowEntropy,
        trillOamMepTxPtmDestRName,
        trillOamMepTxPtmHC,
        trillOamMepTxPtmReplyModeOob,
        trillOamMepTransmitPtmReplyIp,
        trillOamMepTxPtmFlowEntropy,
        trillOamMepTxPtmStatus,
        trillOamMepTxPtmResultOK,
        trillOamMepTxPtmMessages,
        trillOamMepTxPtmSeqNumber,
        trillOamMepTxMtmTree,
        trillOamMepTxMtmHC,
        trillOamMepTxMtmReplyModeOob,
        trillOamMepTransmitMtmReplyIp,
        trillOamMepTxMtmFlowEntropy,
    }

```



```
        trillOamMepTxMtmStatus,
        trillOamMepTxMtmResultOK,
        trillOamMepTxMtmMessages,
        trillOamMepTxMtmSeqNumber,
        trillOamMepTxMtmScopeList,
        trillOamMepDiscontinuityTime
    }
    STATUS          current
    DESCRIPTION
        "Mandatory objects for the TRILL OAM MEP group."
    ::= { trillOamMibGroups 1 }

trillOamMepFlowCfgTableGroup OBJECT-GROUP
    OBJECTS          {
        trillOamMepFlowCfgFlowEntropy,
        trillOamMepFlowCfgDestRName,
        trillOamMepFlowCfgFlowHC,
        trillOamMepFlowCfgRowStatus
    }
    STATUS          current
    DESCRIPTION
        "Trill OAM MEP Flow Configuration objects group."
    ::= { trillOamMibGroups 2 }

trillOamPtrTableGroup OBJECT-GROUP
    OBJECTS          {
        trillOamMepPtrHC,
        trillOamMepPtrFlag,
        trillOamMepPtrErrorCode,
        trillOamMepPtrTerminalMep,
        trillOamMepPtrLastEgressId,
        trillOamMepPtrIngress,
        trillOamMepPtrIngressMac,
        trillOamMepPtrIngressPortIdSubtype,
        trillOamMepPtrIngressPortId,
        trillOamMepPtrEgress,
        trillOamMepPtrEgressMac,
        trillOamMepPtrEgressPortIdSubtype,
        trillOamMepPtrEgressPortId,
        trillOamMepPtrChassisIdSubtype,
        trillOamMepPtrChassisId,
        trillOamMepPtrOrganizationSpecificTlv,
        trillOamMepPtrNextHopNicknames
    }
    STATUS          current
    DESCRIPTION
        "Trill OAM MEP PTR objects group."
    ::= { trillOamMibGroups 3 }
```


trillOamMtvtrTableGroup OBJECT-GROUP

```
OBJECTS      {
    trillOamMepMtvtrFlag,
    trillOamMepMtvtrErrorCode,
    trillOamMepMtvtrLastEgressId,
    trillOamMepMtvtrIngress,
    trillOamMepMtvtrIngressMac,
    trillOamMepMtvtrIngressPortIdSubtype,
    trillOamMepMtvtrIngressPortId,
    trillOamMepMtvtrEgress,
    trillOamMepMtvtrEgressMac,
    trillOamMepMtvtrEgressPortIdSubtype,
    trillOamMepMtvtrEgressPortId,
    trillOamMepMtvtrChassisIdSubtype,
    trillOamMepMtvtrChassisId,
    trillOamMepMtvtrOrganizationSpecificTlv,
    trillOamMepMtvtrNextHopNicknames,
    trillOamMepMtvtrReceiverAvailability,
    trillOamMepMtvtrReceiverCount
}
```

STATUS current

DESCRIPTION

"Trill OAM MEP MTVR objects group."
::= { trillOamMibGroups 4 }

trillOamMepDbGroup OBJECT-GROUP

```
OBJECTS      {
    trillOamMepDbFlowIndex,
    trillOamMepDbFlowEntropy,
    trillOamMepDbFlowState,
    trillOamMepDbFlowFailedOkTime,
    trillOamMepDbRbridgeName,
    trillOamMepDbLastGoodSeqNum
}
```

STATUS current

DESCRIPTION

"Trill OAM MEP DB objects group."
::= { trillOamMibGroups 5 }

trillOamNotificationGroup NOTIFICATION-GROUP

NOTIFICATIONS { trillOamFaultAlarm }

STATUS current

DESCRIPTION

"A collection of objects describing notifications(traps)."
::= { trillOamMibGroups 6 }

-- *****


```
-- TRILL OAM MIB Module Compliance statements
-- *****

trillOamMibCompliance MODULE-COMPLIANCE
    STATUS          current
    DESCRIPTION
        "The compliance statement for the TRILL OAM MIB."
    MODULE          -- this module
    MANDATORY-GROUPS {
        trillOamMepMandatoryGroup,
        trillOamMepFlowCfgTableGroup,
        trillOamPtrTableGroup,
        trillOamMtvrTableGroup,
        trillOamMepDbGroup,
        trillOamNotificationGroup
    }
    ::= { trillOamMibCompliances 1 }

-- Compliance requirement for read-only implementation.

trillOamMibReadOnlyCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "Compliance requirement for implementation that only
        provide read-only support for TRILL-OAM-MIB.
        Such devices can be monitored but cannot be configured
        using this MIB module."
    MODULE -- this module
    MANDATORY-GROUPS {
        trillOamMepMandatoryGroup,
        trillOamMepFlowCfgTableGroup,
        trillOamPtrTableGroup,
        trillOamMtvrTableGroup,
        trillOamMepDbGroup,
        trillOamNotificationGroup
    }
    -- trillOamMepTable

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

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


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

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

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

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

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

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

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

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

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

OBJECT trillOamMepTxPtmResultOK
MIN-ACCESS read-only
DESCRIPTION

"Write access is not required."

OBJECT trillOamMepTxPtmMessages

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT trillOamMepTxPtmSeqNumber

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT trillOamMepTxMtvMTree

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT trillOamMepTxMtvMHC

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT trillOamMepTxMtvMReplyModeOob

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT trillOamMepTransmitMtvMReplyIp

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT trillOamMepTxMtvMFlowEntropy

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT trillOamMepTxMtvMStatus

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT trillOamMepTxMtvMResultOK

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT trillOamMepTxMtvMMessages


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

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

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

-- trillOamMepFlowCfgTable

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

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

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

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

 ::= { trillOamMibCompliances 2 }
```

END

8. Security Considerations

This MIB relates to a system that will provide network connectivity

and packet forwarding services. As such, improper manipulation of the objects represented by this MIB may result in denial of service to a large number of end-users.

There are number of management objects defined in this MIB module with 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 negative effect on sensitivity/vulnerability:

The following table and objects in the TRILL-OAM-MIB can be manipulated to to interfere with the operation of RBridges by causing cpu spike:

- o trillOamMepTransmitLbmReplyIp allows reply of Loopback message to be transmitted to Ip address in the TLV and thus allowing replies to be sent to any system or single single system to cause Denial of Service.

- o trillOamMepTransmitPtmReplyIp allows reply of Path Trace message to be transmitted to Ip address in the TLV and thus allowing replies to be sent to any system or single single system to cause Denial of Service.

- o trillOamMepTxPtmMessages allows generation of Ptm Messages and can be used to generate lots of cpu driven traffic.

- o trillOamMepTransmitMtmReplyIp allows reply of Mtm message to be transmitted to Ip address in the TLV and thus allowing replies to be sent to any system or single single system to cause Denial of Service.

- o trillOamMepTxMtmMessages allows generation of Mtm Messages and can be used to generate lots of cpu driven traffic.

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 GET and/or NOTIFY access to these objects and possibly to encrypt the values of these objects when sending them over the network via SNMP. For example, Path trace message expose unicast topology of network and Multi-destination Tree verification message expose multicast tree topology of network and this information should not be available to all users of the network.

SNMP version prior to SNMPv3 did not include adequate security. Even if the network itself is secure(for example by using IPsec), there is no control as to who on the secure network is allowed to access and

GET/SET (read/change/create/delete) the objects in this MIB module.

Implementation should provide the security features described by SNMPv3 framework (see [[RFC3410](#)]), and implementations claiming compliance to the SNMPv3 standard MUST include full support for authentication and privacy via the User-based Security Model (USM)[[RFC3414](#)] with the AES cipher algorithm [[RFC3826](#)]. Implementations MAY also provide support for the Transport Security Model (TSM) [[RFC5591](#)] in combination with a secure transport such as SSH [[RFC5592](#)] or TLS/DTLS [[RFC6353](#)].

Further, deployment of SNMP version prior to SNMPv3 is NOT RECOMMENDED. Instead, deployment of SNMPv3 with cryptographic security enabled is RECOMMENDED. 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 only those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them access to the objects.

9. IANA Considerations

The MIB module in this document uses the following IANA-assigned OBJECT IDENTIFIER value recorded in the SMI Numbers registry:

Descriptor	OBJECT	IDENTIFIER	value

trillOamMIB	{	mib-2 xxx }	

Editor's Note (to be removed prior to publication): the IANA is requested to assign a value for "xxx" under the 'mib-2' subtree and to record the assignment in the SMI Numbers registry. When the assignment has been made, the RFC Editor is asked to replace "XXX" (here and in the MIB module) with the assigned value and to remove this note.

10. References

10.1. Normative References

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10.2. Informative References

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[RFC7174] Salam, S., Senevirathne, T., Aldrin, S., and D. Eastlake 3rd, "Transparent Interconnection of Lots of Links (TRILL) Operations, Administration, and Maintenance (OAM) Framework", [RFC 7174](#), May 2014.

11. Acknowledgments

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