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Definitions of Managed Objects for RBridges (Routing Bridges)
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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols. In particular it defines objects for managing an RBridge (Routing Bridge), also known as a TRILL Switch, based on the IETF TRILL (Transparent Interconnection of Lots of Links) protocol.

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1. Introduction

This document describes a model for managing RBridges (Routing Bridges), also known as TRILL Switches, as defined in [\[RFC6325\]](#). RBridges provide optimal pair-wise forwarding without configuration using IS-IS routing and encapsulation of traffic. RBridges are compatible with previous IEEE 802.1 customer bridges as well as IPv4 and IPv6 routers and end nodes. They are as invisible to current IP routers as bridges are and, like routers, they terminate the bridge spanning tree protocol. In creating an RBridge management model the device is viewed primarily as a customer bridge. For a discussion of the problem addressed by TRILL (Transparent Interconnection of Lots of Links) see [\[RFC5556\]](#).

RBridges support features specified for transparent bridges in IEEE 802.1, and the corresponding MIB modules are used to manage those features. For IS-IS purposes, the corresponding MIB module is used to manage the protocol. This MIB module specifies those objects which are TRILL-specific and hence not available in other MIB modules.

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, which consists of [\[RFC2578\]](#), [\[RFC2579\]](#) and [\[RFC2580\]](#).

3. Overview

The RBridge MIB module is intended as an overall framework for managing RBridges, also known as TRILL Switches. Where possible the MIB references existing MIB definitions in order to maximize reuse. This results in a considerable emphasis on the relationship with other MIB modules.

Starting with the physical interfaces, there are requirements for certain elements of the IF-MIB to be implemented. These elements are required in order to connect the per-port parameters to higher level functions of the physical device.

Transparent bridging, VLANs, Traffic classes and Multicast Filtering

are supported by the TRILL protocol, and the corresponding management is expected to conform to the BRIDGE-MIB [[RFC4188](#)], P-BRIDGE-MIB and Q-BRIDGE-MIB [[RFC4363](#)] modules.

The IS-IS routing protocol is used in order to determine the optimum pair-wise forwarding path. This protocol is managed using the IS-IS MIB module defined in [[RFC4444](#)]. Since the TRILL protocol specifies use of a single level and a fixed area address of zero, some IS-IS MIB objects are not applicable. Some IS-IS MIB objects are used in the TRILL protocol.

[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](#)].

[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. These are supplemented with required elements of the IF-MIB, ISIS-MIB, BRIDGE-MIB, P-BRIDGE-MIB, Q-BRIDGE-MIB and IEEE Bridge MIB modules.

[5.1 Textual Conventions](#)

Textual conventions are defined to represent object types relevant to TRILL.

[5.2 The rbridgeBase Subtree](#)

This subtree contains system and port specific objects applicable to all RBridges.

[5.3 The rbridgeFdb Subtree](#)

This subtree contains objects applicable to the Forwarding database used by the RBridge in making packet forwarding decisions. Because it contains additional information used by the TRILL protocol not applicable to 802.1D/Q bridges, it is a superset of the corresponding subtrees defined in the BRIDGE-MIB and Q-BRIDGE-MIB.

[5.4 The rbridgeVlan subtree](#)

This subtree describes objects applicable to VLANs configured on the RBridge.

5.5 The rbridgeEsadi subtree

This subtree describes objects relevant to RBridges that support the optional ESADI protocol.

5.6 The rbridgeCounters subtree

This subtree contains statistics maintained by RBridges that can aid in monitoring and troubleshooting networks connected by them.

5.7 The rbridgeSnooping subtree

This subtree describes objects applicable to RBridges capable of snooping IPv4 and/or IPv6 Multicast control frames and pruning IP multicast traffic based on detection of IP multicast routers and listeners.

5.8 The rbridgeDtree subtree

This subtree contains objects relevant to Distribution Trees computed by RBridges for the forwarding of multi-destination frames.

5.9 The rbridgeTrill subtree

This subtree contains objects applicable to the TRILL IS-IS protocol, beyond what is available in ISIS-MIB.

5.10 The Notifications Subtree

The defined notifications are focused on the TRILL protocol functionality. Notifications are defined for changes in the Designated RBridge status and the topology.

6. Relationship to Other MIB Modules

The IF-MIB, BRIDGE-MIB, P-BRIDGE-MIB, Q-BRIDGE-MIB, IEEE8021-BRIDGE-MIB, IEEE8021-Q-BRIDGE-MIB and ISIS-MIB modules all contain objects relevant to the RBridge MIB. Management objects contained in these modules are not duplicated here, to reduce overlap to the extent possible.

The Bridge MIB modules were originally written in the IETF, and implemented by many vendors. Per [[RFC4663](#)], this has recently been transferred to the IEEE 802.1 group. As vendors may have implemented either the IETF or IEEE Bridge MIB modules, this RBridge MIB module is designed to work with either one.

[6.1](#) Relationship to IF-MIB

The port identification elements MUST be implemented in order to allow them to be cross referenced. The Interface MIB [[RFC2863](#)] requires that any MIB module which is an adjunct of the Interface MIB clarify specific areas within the Interface MIB module. These areas were intentionally left vague in the Interface MIB module to avoid over-constraining the MIB, thereby precluding management of certain media types. [Section 4 of \[RFC2863\]](#) enumerates several areas which a media-specific MIB module must clarify. The implementor is referred to [[RFC2863](#)] in order to understand the general intent of these areas.

[6.2](#) Relationship to BRIDGE-MIB

The following subtrees in the BRIDGE-MIB [[RFC4188](#)] contain information relevant to RBridges when the corresponding functionality is implemented.

- o dot1dBase
- o dot1dTp
- o dot1dStatic

[6.3](#) Relationship to P-BRIDGE-MIB

The following subtrees in the P-BRIDGE-MIB [[RFC4363](#)] contain information relevant to RBridges when the corresponding functionality is implemented.

- o dot1dExtBase
- o dot1dPriority
- o dot1dGarp
- o dot1dGmrp
- o dot1dTpHCPortTable
- o dot1dTpPortOverflowTable

[6.4](#) Relationship to Q-BRIDGE-MIB

The following groups in the Q-BRIDGE-MIB [[RFC4363](#)] contain information relevant to RBridges when the corresponding functionality is implemented. This functionality is also contained in IEEE8021-Q-BRIDGE-MIB.

- o dot1qBase
- o dot1qTp
- o dot1qStatic
- o dot1qVlan
- o dot1vProtocol

6.5 Relationship to IEEE8021-BRIDGE-MIB

The following subtrees in the IEEE8021-BRIDGE-MIB contain information relevant to RBridges when the corresponding functionality is implemented.

- o ieee8021BridgeBase
- o ieee8021BridgeTp
- o ieee8021BridgePriority
- o ieee8021BridgeMrp
- o ieee8021BridgeMmrp
- o ieee8021BridgeInternalLan
- o ieee8021BridgeDot1d

6.6 Relationship to IEEE8021-Q-BRIDGE-MIB

The following subtrees in the IEEE8021-Q-BRIDGE-MIB contain information relevant to RBridges when the corresponding functionality is implemented.

- o ieee8021QBridgeBase
- o ieee8021QBridgeTp
- o ieee8021QBridgeStatic
- o ieee8021QBridgeVlan
- o ieee8021QBridgeProtocol

6.7 Relationship to ISIS-MIB

The Management Information Base for Intermediate System to Intermediate System (IS-IS) [[RFC4444](#)] defines a MIB module for the IS-IS Routing protocol when it is used to construct routing tables for IP networks. While most of these objects are applicable to the TRILL layer 2 implementation, note the IS-IS constraints for the current version of TRILL [[RFC6325](#)]:

- o The TRILL IS-IS instance uses a single Level 1 IS-IS area.
- o The TRILL Level 1 IS-IS area uses the fixed area address zero.
- o The TRILL IS-IS instance is not used for IP address advertisement.
- o The TRILL IS-IS instance is used for only a single protocol: TRILL.

Accordingly, tables which report IP address reachability and tables which allow configuration or reporting of multiple IS-IS areas, multiple IS-IS levels or multiple protocols, will be empty in the ISIS-MIB module for the current version of TRILL.

Note also that when more than one instance of the IS-IS protocol is running on a device, as in the case of a device performing both RBridge and IS-IS IP router functions, multiple instances of the ISIS-MIB module can be distinguished by the use of SNMPv3 contexts or SNMPv1 communities.

6.8 MIB modules required for IMPORTS

The following MIB module IMPORTS objects from SNMPv2-SMI [[RFC2578](#)], SNMPv2-TC [[RFC2579](#)], SNMPv2-CONF [[RFC2580](#)], IF-MIB [[RFC2863](#)] and INET-ADDRESS-MIB [[RFC4001](#)].

7. Definition of the RBridge MIB module

```
RBRIDGE-MIB DEFINITIONS ::= BEGIN
```

```
-- -----  
-- MIB for RBRIDGE devices, also known as TRILL Switches  
-- -----
```

```
IMPORTS
```

```
    MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,  
    Counter32, Counter64, Unsigned32, mib-2  
        FROM SNMPv2-SMI                -- RFC2578  
    TEXTUAL-CONVENTION, TruthValue, MacAddress, RowStatus  
        FROM SNMPv2-TC                -- RFC2579  
    MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP  
        FROM SNMPv2-CONF                -- RFC2580  
    VlanId, PortList  
        FROM Q-BRIDGE-MIB                -- RFC4363  
    InetAddress, InetAddressType  
        FROM INET-ADDRESS-MIB            -- RFC4001  
    BridgeId  
        FROM BRIDGE-MIB                  -- RFC4188  
    InterfaceIndex  
        FROM IF-MIB                      -- RFC2863  
    ;
```

```
rbridgeMIB MODULE-IDENTITY
```

```
    LAST-UPDATED "201201250000Z"
```

```
    ORGANIZATION "IETF TRILL Working Group"
```

```
    CONTACT-INFO
```

```
        "http://www.ietf.org/dyn/wg/charter/trill-charter.html"
```

```
        Email: rbridge@postel.org
```

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DESCRIPTION

"The RBridge MIB module for managing switches that support the TRILL protocol."

REVISION "201201250000Z"

DESCRIPTION

"Initial version, published as RFC yyyy"

-- RFC Ed.: replace yyyy with actual RFC number & remove this note

::= { mib-2 xxx }

-- RFC Ed.: replace xxx with IANA-assigned number & remove this note

-- -----
 -- subtrees in the RBridge MIB
 -- -----

rbridgeNotifications OBJECT IDENTIFIER ::= { rbridgeMIB 0 }
 rbridgeObjects OBJECT IDENTIFIER ::= { rbridgeMIB 1 }
 rbridgeConformance OBJECT IDENTIFIER ::= { rbridgeMIB 2 }

rbridgeBase OBJECT IDENTIFIER ::= { rbridgeObjects 1 }
 rbridgeFdb OBJECT IDENTIFIER ::= { rbridgeObjects 2 }
 rbridgeVlan OBJECT IDENTIFIER ::= { rbridgeObjects 3 }
 rbridgeEsadi OBJECT IDENTIFIER ::= { rbridgeObjects 4 }
 rbridgeCounter OBJECT IDENTIFIER ::= { rbridgeObjects 5 }
 rbridgeSnooping OBJECT IDENTIFIER ::= { rbridgeObjects 6 }
 rbridgeDtree OBJECT IDENTIFIER ::= { rbridgeObjects 7 }
 rbridgeTrill OBJECT IDENTIFIER ::= { rbridgeObjects 8 }

-- -----
 -- type definitions
 -- -----

RbridgeAddress ::= TEXTUAL-CONVENTION

DISPLAY-HINT "1x:"

STATUS current

DESCRIPTION

"The MAC address used by an RBridge port. This may match the RBridge ISIS SystemID."

SYNTAX OCTET STRING (SIZE (6))

RbridgeNickname ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

"The 16-bit identifier used in TRILL as an abbreviation for the RBridge's 48-bit IS-IS System ID. The value 0 means a nickname is not specified, the values 0xffco through 0xffffe are reserved for future allocation, and the value 0xffff is permanently reserved."

REFERENCE

["RFC 6325 section 3.7"](#)

SYNTAX Unsigned32 (0..65471)

--

-- the rbridgeBase subtree

--

-- Implementation of the rbridgeBase subtree is mandatory for all
-- RBridges.

--

rbridgeBaseTrillVersion OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The maximum TRILL version number that this Rbridge supports."

REFERENCE

["RFC 6325 section 3.2"](#)

::= { rbridgeBase 1 }

rbridgeBaseNumPorts OBJECT-TYPE

SYNTAX Unsigned32

UNITS "ports"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of ports controlled by this RBridge."

REFERENCE

["RFC 6325 section 2.6.1"](#)

::= { rbridgeBase 2 }

rbridgeBaseForwardDelay OBJECT-TYPE

SYNTAX Unsigned32 (4..30)

UNITS "seconds"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Modified aging time for address entries after an appointed forwarder change.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 4.8.3"](#)

::= { rbridgeBase 3 }

rbridgeBaseUniMultipathEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The enabled status of unicast TRILL multipathing. It is enabled when true.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 Appendix C"](#)

::= { rbridgeBase 4 }

rbridgeBaseMultiMultipathEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The enabled status of multidestination TRILL multipathing. It is enabled when true.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 Appendix C"](#)

::= { rbridgeBase 5 }

rbridgeBaseAcceptEncapNonadj OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Accept TRILL-encapsulated frames from a neighbor with which this RBridge does not have an IS-IS adjacency.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 4.6.2"](#)
 ::= { rbridgeBase 6 }

rbridgeBaseNicknameNumber OBJECT-TYPE

SYNTAX Unsigned32 (1..256)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The number of nicknames this RBridge should acquire.
These can be acquired dynamically or configured
statically.

The value of this object MUST be retained across
reinitializations of the management system."

REFERENCE

["RFC 6325 section 3.7.3"](#)
 ::= { rbridgeBase 7 }

-- -----
-- The RBridge Base Nickname Table
-- -----

rbridgeBaseNicknameTable OBJECT-TYPE

SYNTAX SEQUENCE OF RbridgeBaseNicknameEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table that contains information about nicknames
associated with this RBridge."

REFERENCE

["RFC 6325 section 3.7"](#)
 ::= { rbridgeBase 8 }

rbridgeBaseNicknameEntry OBJECT-TYPE

SYNTAX RbridgeBaseNicknameEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A list of information for each nickname of the RBridge."

REFERENCE

["RFC 6325 section 3.7"](#)
 INDEX { rbridgeBaseNicknameName }
 ::= { rbridgeBaseNicknameTable 1 }

RbridgeBaseNicknameEntry ::=

SEQUENCE {
 rbridgeBaseNicknameName
 RbridgeNickname,


```
    rbridgeBaseNicknamePriority
        Unsigned32,
    rbridgeBaseNicknameDtrPriority
        Unsigned32,
    rbridgeBaseNicknameType
        INTEGER,
    rbridgeBaseNicknameRowStatus
        RowStatus
}
```

rbridgeBaseNicknameName OBJECT-TYPE

SYNTAX RbridgeNickname

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Nicknames are 16-bit quantities that act as abbreviations for RBridge's 48-bit IS-IS System ID to achieve a more compact encoding."

REFERENCE

["RFC 6325 section 3.7"](#)

::= { rbridgeBaseNicknameEntry 1 }

rbridgeBaseNicknamePriority OBJECT-TYPE

SYNTAX Unsigned32 (0..255)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This RBridge's priority to hold this nickname. When the nickname is configured, the default value of this object is 192.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 3.7"](#)

DEFVAL { 192 }

::= { rbridgeBaseNicknameEntry 2 }

rbridgeBaseNicknameDtrPriority OBJECT-TYPE

SYNTAX Unsigned32 (1..65535)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The Distribution tree root priority for this nickname. The default value of this object is 32768.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 4.5"](#)

DEFVAL { 32768 }

::= { rbridgeBaseNicknameEntry 3 }

rbridgeBaseNicknameType OBJECT-TYPE

SYNTAX INTEGER {
static(1),
dynamic(2)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object indicates the status of the entry. The default value is static(1).

static(1) - this entry has been configured and will remain after the next reset of the RBridge.

dynamic(2) - this entry has been acquired by the RBridge nickname acquisition protocol."

REFERENCE

["RFC 6325 section 3.7"](#)

DEFVAL { static }

::= { rbridgeBaseNicknameEntry 4 }

rbridgeBaseNicknameRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object indicates the status of the entry."

::= { rbridgeBaseNicknameEntry 5 }

-- The RBridge Port Table

rbridgeBasePortTable OBJECT-TYPE

SYNTAX SEQUENCE OF RbridgeBasePortEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table that contains generic information about every port that is associated with this RBridge."

REFERENCE

["RFC 6325 section 5.2"](#)

::= { rbridgeBase 9 }


```
rbridgeBasePortEntry OBJECT-TYPE
    SYNTAX      RbridgeBasePortEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A list of information for each port of the bridge."
    REFERENCE
        "RFC 6325 section 5.2"
    INDEX { rbridgeBasePort }
    ::= { rbridgeBasePortTable 1 }
```

```
RbridgeBasePortEntry ::=
    SEQUENCE {
        rbridgeBasePort
            Unsigned32,
        rbridgeBasePortIfIndex
            InterfaceIndex,
        rbridgeBasePortDisable
            TruthValue,
        rbridgeBasePortTrunkPort
            TruthValue,
        rbridgeBasePortAccessPort
            TruthValue,
        rbridgeBasePortP2pHellos
            TruthValue,
        rbridgeBasePortState
            INTEGER,
        rbridgeBasePortInhibitionTime
            Unsigned32,
        rbridgeBasePortDisableLearning
            TruthValue,
        rbridgeBasePortDesiredDesigVlan
            VlanId,
        rbridgeBasePortDesigVlan
            VlanId,
        rbridgeBasePortStpRoot
            BridgeId,
        rbridgeBasePortStpRootChanges
            Counter32,
        rbridgeBasePortStpWiringCloset
            BridgeId
    }
```

```
rbridgeBasePort OBJECT-TYPE
    SYNTAX      Unsigned32 (1..65535)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
```


"The port number of the port for which this entry contains RBridge management information."

REFERENCE

["RFC 6325 section 5.2"](#)

::= { rbridgeBasePortEntry 1 }

rbridgeBasePortIfIndex OBJECT-TYPE

SYNTAX InterfaceIndex

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of the instance of the ifIndex object, defined in IF-MIB, for the interface corresponding to this port."

::= { rbridgeBasePortEntry 2 }

rbridgeBasePortDisable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Disable port bit. When this bit is set (true), all frames received or to be transmitted are discarded, with the possible exception of some layer 2 control frames that may be generated and transmitted or received and processed locally. Default value is false.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 4.9.1"](#)

DEFVAL { false }

::= { rbridgeBasePortEntry 3 }

rbridgeBasePortTrunkPort OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"End station service disable (trunk port) bit. When this bit is set (true), all native frames received on the port and all native frames that would have been sent on the port are discarded. Default value is false.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 4.9.1"](#)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The port's current state. If the entire port is inhibited, its state is portInhibited(2). If specific VLANs are inhibited, the state is vlanInhibited(3) and rbridgeVlanTable will tell which VLANs are inhibited. For ports that are disabled (see rbridgeBasePortDisable), this object will have a value of disabled(4). If the RBridge has detected a port that is malfunctioning, it will place that port into the broken(5) state."

REFERENCE

["RFC 6325 section 4.2.4.3"](#)

::= { rbridgeBasePortEntry 7 }

rbridgeBasePortInhibitionTime OBJECT-TYPE

SYNTAX Unsigned32

UNITS "seconds"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Time in seconds that this RBridge will inhibit forwarding on this port after it observes a spanning tree root bridge change on a link, or receives conflicting VLAN forwarder information. The default value is 30.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 4.2.4.3"](#)

DEFVAL { 30 }

::= { rbridgeBasePortEntry 8 }

rbridgeBasePortDisableLearning OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Disable learning of MAC addresses seen on this port. To disable learning, the value of this object must be set to 'true'. The default is 'false'.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 4.8"](#)

DEFVAL { false }

::= { rbridgeBasePortEntry 9 }

rbridgeBasePortDesiredDesigVlan OBJECT-TYPE

SYNTAX VlanId

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The VLAN that a DRB will specify in its TRILL-Hellos as the VLAN to be used by all RBridges on the link for TRILL frames. This VLAN must be enabled on this port.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 4.4.3"](#)

::= { rbridgeBasePortEntry 10 }

rbridgeBasePortDesigVlan OBJECT-TYPE

SYNTAX VlanId

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The VLAN being used on this link for TRILL frames."

REFERENCE

["RFC 6325 section 4.4.3"](#)

::= { rbridgeBasePortEntry 11 }

rbridgeBasePortStpRoot OBJECT-TYPE

SYNTAX BridgeId

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The bridge identifier of the root of the spanning tree, as learned from a BPDU received on this port. For MSTP, this is the root bridge of the CIST. If no BPDU has been heard, the value returned is a string of zeros."

REFERENCE

["RFC 6325 section 4.2.4.3"](#)

::= { rbridgeBasePortEntry 12 }

rbridgeBasePortStpRootChanges OBJECT-TYPE

SYNTAX Counter32

UNITS "changes"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times a change in the root bridge is seen from spanning tree BPDUs received on this port, indicating a change in bridged LAN topology. Each such change may cause the port to be inhibited for a period of time.

Discontinuities in the value of this counter can occur at re-initialization of the management system."

REFERENCE

["RFC 6325 section 4.9.3.2"](#)

::= { rbridgeBasePortEntry 13 }

rbridgeBasePortStpWiringCloset OBJECT-TYPE

SYNTAX BridgeId

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The Bridge ID to be used as Spanning Tree root in BPDUs sent for the Wiring Closet topology solution described in [\[RFC6325\]](#). Note that the same value of this object must be set on all RBridge ports participating in this solution. The default value is all 0s. A non-zero value configured into this object indicates that this solution is in use.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section A.3.3"](#)

::= { rbridgeBasePortEntry 14 }

-- -----
-- RBridge Forwarding Database
-- -----

rbridgeConfidenceNative OBJECT-TYPE

SYNTAX Unsigned32 (0..255)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The confidence level associated with MAC addresses learned from native frames. The default value is 32.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 4.8.1"](#)

::= { rbridgeFdb 1 }

rbridgeConfidenceDecap OBJECT-TYPE

SYNTAX Unsigned32 (0..255)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The confidence level associated with inner MAC addresses

learned after decapsulation of a TRILL data frame.
The default value is 32.

The value of this object MUST be retained across
reinitializations of the management system."

REFERENCE

"[RFC 6325](#) Appendix [section 4.8.1](#)"

::= { rbridgeFdb 2 }

rbridgeConfidenceStatic OBJECT-TYPE

SYNTAX Unsigned32 (0..255)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The confidence level associated with MAC addresses that
are statically configured. The default value is 255.

The value of this object MUST be retained across
reinitializations of the management system."

REFERENCE

"[RFC 6325 section 4.8.2](#)"

DEFVAL { 255 }

::= { rbridgeFdb 3 }

-- -----
-- Multiple Forwarding Databases for RBridges
--
-- This allows for an instance per FdbId, as defined in the
-- Bridge MIB.
--
-- Each VLAN may have an independent Fdb, or multiple VLANs may
-- share one.
-- -----

rbridgeUniFdbTable OBJECT-TYPE

SYNTAX SEQUENCE OF RbridgeUniFdbEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table that contains information about unicast entries
for which the device has forwarding and/or filtering
information. This information is used by the
transparent bridging function in determining how to
propagate a received frame."

REFERENCE

"[RFC 6325 section 4.8](#)"


```
::= { rbridgeFdb 4 }
```

rbridgeUniFdbEntry OBJECT-TYPE

SYNTAX RbridgeUniFdbEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Information about a specific unicast MAC address for which the rbridge has some forwarding and/or filtering information."

INDEX { rbridgeFdbId, rbridgeUniFdbAddr }

```
::= { rbridgeUniFdbTable 1 }
```

RbridgeUniFdbEntry ::=

SEQUENCE {

 rbridgeFdbId

 Unsigned32,

 rbridgeUniFdbAddr

 MacAddress,

 rbridgeUniFdbPort

 Unsigned32,

 rbridgeUniFdbNickname

 RbridgeNickname,

 rbridgeUniFdbConfidence

 Unsigned32,

 rbridgeUniFdbStatus

 INTEGER

}

rbridgeFdbId OBJECT-TYPE

SYNTAX Unsigned32 (0..4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The identity of this Filtering Database."

```
::= { rbridgeUniFdbEntry 1 }
```

rbridgeUniFdbAddr OBJECT-TYPE

SYNTAX MacAddress

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A unicast MAC address for which the device has forwarding information."

```
::= { rbridgeUniFdbEntry 2 }
```

rbridgeUniFdbPort OBJECT-TYPE

SYNTAX Unsigned32 (0..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Either the value '0', or the Rbridge port number of the port on which a frame having a source address equal to the value of the corresponding instance of rbridgeUniFdbAddress has been seen. A value of '0' indicates that the port number has not been learned but that the device does have some information about this MAC address.

Implementors are encouraged to assign the port value to this object whenever it is available, even for addresses for which the corresponding value of rbridgeUniFdbStatus is not learned(3)."

::= { rbridgeUniFdbEntry 3 }

rbridgeUniFdbNickname OBJECT-TYPE

SYNTAX RbridgeNickname

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The RBridge nickname which is placed in the Egress Nickname field of a TRILL frame sent to this rbridgeFdbAddress in this FdbId."

REFERENCE

["RFC 6325 section 4.8.1"](#)

::= { rbridgeUniFdbEntry 4 }

rbridgeUniFdbConfidence OBJECT-TYPE

SYNTAX Unsigned32 (0..255)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The confidence level associated with this entry."

REFERENCE

["RFC 6325 section 4.8.1"](#)

::= { rbridgeUniFdbEntry 5 }

rbridgeUniFdbStatus OBJECT-TYPE

SYNTAX INTEGER {
 other(1),
 invalid(2),
 learned(3),
 self(4),
 mgmt(5),
 esadi(6)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The status of this entry. The meanings of the values are:

other(1) - none of the following.

invalid(2) - this entry is no longer valid (e.g., it was learned but has since aged out), but has not yet been flushed from the table.

learned(3) - the information in this entry was learned and is being used.

self(4) - the value of the corresponding instance of rbridgeFdbAddress represents one of the device's addresses. The corresponding instance of rbridgeFdbPort indicates which of the device's ports has this address.

mgmt(5) - the value of the corresponding instance of rbridgeFdbAddress was configured by management.

esadi(6) - the value of the corresponding instance of rbridgeFdbAddress was learned from ESADI."

::= { rbridgeUniFdbEntry 6 }

-- -----
-- RBridge FIB
-- -----

rbridgeUniFibTable OBJECT-TYPE

SYNTAX SEQUENCE OF RbridgeUniFibEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table that contains information about nicknames known by the RBridge. If ECMP is implemented, there are as many entries for a nickname as ECMP paths available for it."

::= { rbridgeFdb 5 }

rbridgeUniFibEntry OBJECT-TYPE

SYNTAX RbridgeUniFibEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A list of information about nicknames known by the RBridge. If ECMP is implemented, there are as many entries as ECMP paths available for a given nickname."

INDEX { rbridgeUniFibNickname, rbridgeUniFibPort,
rbridgeUniFibNextHop }

::= { rbridgeUniFibTable 1 }

RbridgeUniFibEntry ::=

```
SEQUENCE {  
    rbridgeUniFibNickname  
        RbridgeNickname,  
    rbridgeUniFibPort  
        Unsigned32,  
    rbridgeUniFibNextHop  
        RbridgeNickname,  
    rbridgeUniFibHopCount  
        Unsigned32  
}
```

rbridgeUniFibNickname OBJECT-TYPE

```
SYNTAX      RbridgeNickname  
MAX-ACCESS  not-accessible  
STATUS      current  
DESCRIPTION  
    "An RBridge nickname for which this RBridge has  
    forwarding information."  
::= { rbridgeUniFibEntry 1 }
```

rbridgeUniFibPort OBJECT-TYPE

```
SYNTAX      Unsigned32 (0..65535)  
MAX-ACCESS  not-accessible  
STATUS      current  
DESCRIPTION  
    "The Rbridge port number of the port attached to the  
    next-hop RBridge for the path towards the RBridge whose  
    nickname is specified in this entry."  
::= { rbridgeUniFibEntry 2 }
```

rbridgeUniFibNextHop OBJECT-TYPE

```
SYNTAX      RbridgeNickname  
MAX-ACCESS  not-accessible  
STATUS      current  
DESCRIPTION  
    "The nickname of the next-hop RBridge for the path  
    towards the RBridge whose nickname is specified in this  
    entry."  
::= { rbridgeUniFibEntry 3 }
```

rbridgeUniFibHopCount OBJECT-TYPE

```
SYNTAX      Unsigned32  
MAX-ACCESS  read-only  
STATUS      current  
DESCRIPTION  
    "The hop count from this ingress Rbridge to the egress  
    RBridge whose nickname is specified in
```



```
    rbridgeUniFibNickname."
 ::= { rbridgeUniFibEntry 4 }

rbridgeMultiFibTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RbridgeMultiFibEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table that contains information about egress nicknames
        used for multi-destination frame forwarding by this
        RBridge."
    ::= { rbridgeFdb 6 }

rbridgeMultiFibEntry OBJECT-TYPE
    SYNTAX      RbridgeMultiFibEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A list of information about egress nicknames used for
        multi-destination frame forwarding by this RBridge."
    INDEX      { rbridgeMultiFibNickname }
    ::= { rbridgeMultiFibTable 1 }

RbridgeMultiFibEntry ::=
    SEQUENCE {
        rbridgeMultiFibNickname
            RbridgeNickname,
        rbridgeMultiFibPorts
            PortList
    }

rbridgeMultiFibNickname OBJECT-TYPE
    SYNTAX      RbridgeNickname
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The nickname of the multicast distribution tree."
    ::= { rbridgeMultiFibEntry 1 }

rbridgeMultiFibPorts OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The list of ports to which a frame destined to this
        multicast distribution tree is flooded. This may be pruned
        further based on other forwarding information."
    ::= { rbridgeMultiFibEntry 2 }
```



```
-- -----  
-- The RBridge VLAN Table  
-- -----
```

```
rbridgeVlanTable OBJECT-TYPE  
    SYNTAX      SEQUENCE OF RbridgeVlanEntry  
    MAX-ACCESS  not-accessible  
    STATUS      current  
    DESCRIPTION  
        "A table that contains information about VLANs on the  
        RBridge."  
    ::= { rbridgeVlan 1 }
```

```
rbridgeVlanEntry OBJECT-TYPE  
    SYNTAX      RbridgeVlanEntry  
    MAX-ACCESS  not-accessible  
    STATUS      current  
    DESCRIPTION  
        "A list of information about VLANs on the RBridge."  
    INDEX      { rbridgeVlanIndex }  
    ::= { rbridgeVlanTable 1 }
```

```
RbridgeVlanEntry ::=  
    SEQUENCE {  
        rbridgeVlanIndex  
            Unsigned32,  
        rbridgeVlanForwarderLosses  
            Counter32,  
        rbridgeVlanDisableLearning  
            TruthValue,  
        rbridgeVlanSnooping  
            INTEGER  
    }
```

```
rbridgeVlanIndex OBJECT-TYPE  
    SYNTAX      Unsigned32 (1..4094|4096..4294967295)  
    MAX-ACCESS  not-accessible  
    STATUS      current  
    DESCRIPTION  
        "The VLAN-ID referring to this VLAN."  
    ::= { rbridgeVlanEntry 1 }
```

```
rbridgeVlanForwarderLosses OBJECT-TYPE  
    SYNTAX      Counter32  
    UNITS       "times"  
    MAX-ACCESS  read-only  
    STATUS      current  
    DESCRIPTION
```


"The number of times this RBridge has lost appointed forwarder status for this VLAN on any of its ports.

Discontinuities in the value of this counter can occur at re-initialization of the management system."

REFERENCE

["RFC 6325 section 4.8.2"](#)

::= { rbridgeVlanEntry 2 }

rbridgeVlanDisableLearning OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Disable learning of MAC addresses seen in this VLAN. One application of this may be to restrict learning to ESADI. To disable learning, the value of this object should be set to true. The default is false.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 4.8"](#)

DEFVAL { false }

::= { rbridgeVlanEntry 3 }

rbridgeVlanSnooping OBJECT-TYPE

SYNTAX INTEGER {
notSupported(1),
ipv4(2),
ipv6(3),
ipv4v6(4)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"IP Multicast Snooping on this VLAN. For RBridges performing both IPv4 and IPv6 IP Multicast Snooping, the value returned is ipv4v6(3)."

REFERENCE

["RFC 6325 section 4.7"](#)

::= { rbridgeVlanEntry 4 }

-- -----
-- The RBridge VLAN Port Table
-- -----

rbridgeVlanPortTable OBJECT-TYPE

SYNTAX SEQUENCE OF RbridgeVlanPortEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "A table that contains information about VLANs on an RBridge
 port."
::= { rbridgeVlan 2 }

rbridgeVlanPortEntry OBJECT-TYPE
SYNTAX RbridgeVlanPortEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "A list of information about VLANs on the RBridge port."
INDEX { rbridgeBasePort, rbridgeVlanIndex }
::= { rbridgeVlanPortTable 1 }

RbridgeVlanPortEntry ::=

```
SEQUENCE {
    rbridgeVlanPortInhibited
        TruthValue,
    rbridgeVlanPortForwarder
        TruthValue,
    rbridgeVlanPortAnnouncing
        TruthValue,
    rbridgeVlanPortDetectedVlanMapping
        TruthValue
}
```

rbridgeVlanPortInhibited OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "This VLAN has been inhibited by the RBridge due to
 conflicting Forwarder information received from another
 RBridge."
REFERENCE
 "[RFC 6325 section 4.2.4.3](#)"
::= { rbridgeVlanPortEntry 1 }

rbridgeVlanPortForwarder OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "This RBridge is an Appointed Forwarder for this VLAN on
 this port."

REFERENCE

["RFC 6325 section 4.2.4.3"](#)
::= { rbridgeVlanPortEntry 2 }

rbridgeVlanPortAnnouncing OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"TRILL-Hellos tagged with this VLAN can be sent by this RBridge on this port. Defaults to true for enabled VLANs.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 4.4.3"](#)
DEFVAL { true }
::= { rbridgeVlanPortEntry 3 }

rbridgeVlanPortDetectedVlanMapping OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"VLAN mapping has been detected on the link attached to this port."

REFERENCE

["RFC 6325 section 4.4.5"](#)
::= { rbridgeVlanPortEntry 4 }

-- -----
-- The RBridge Port Counter Table
--
-- These counters supplement counters in the Bridge MIB.
--
-- For example, total frames received by a bridge port and total
-- frames transmitted by a bridge port are reported in the
-- Port In Frames and Ports Out Frames counters of the Bridge MIB.
-- These total bridge frames counters include native as well as
-- encapsulated frames.
--
-- As another example, frames discarded due to excessive frame
-- size are reported in the port counter MTU Exceeded Discards
-- in the Bridge MIB.
-- -----

rbridgePortCounterTable OBJECT-TYPE
SYNTAX SEQUENCE OF RbridgePortCounterEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A table contains per-port counters for this RBridge."
::= { rbridgeCounter 1 }

rbridgePortCounterEntry OBJECT-TYPE
SYNTAX RbridgePortCounterEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"Counters for a port on this RBridge."
INDEX { rbridgeBasePort }
::= { rbridgePortCounterTable 1 }

RbridgePortCounterEntry ::=

```
SEQUENCE {
    rbridgePortRpfCheckFails
        Counter32,
    rbridgePortHopCountExceeds
        Counter32,
    rbridgePortOptionDrops
        Counter32,
    rbridgePortTrillInFrames
        Counter64,
    rbridgePortTrillOutFrames
        Counter64
}
```

rbridgePortRpfCheckFails OBJECT-TYPE
SYNTAX Counter32
UNITS "frames"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of times a multidestination frame was
dropped on this port because the RPF check failed.

Discontinuities in the value of this counter can occur
at re-initialization of the management system, and at
other times as indicated by the value of
ifCounterDiscontinuityTime object of the associated
interface."
REFERENCE
"[RFC 6325 section 4.5.2](#)"
::= { rbridgePortCounterEntry 1 }

rbridgePortHopCountExceeds OBJECT-TYPE

SYNTAX Counter32

UNITS "frames"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times a frame was dropped on this port because its hop count was zero.

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

REFERENCE

["RFC 6325 section 3.6"](#)

::= { rbridgePortCounterEntry 2 }

rbridgePortOptionDrops OBJECT-TYPE

SYNTAX Counter32

UNITS "frames"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times a frame was dropped on this port because it contained unsupported options.

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

REFERENCE

["RFC 6325 section 3.5"](#)

::= { rbridgePortCounterEntry 3 }

rbridgePortTrillInFrames OBJECT-TYPE

SYNTAX Counter64

UNITS "frames"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of TRILL-encapsulated frames that have been received by this port from its attached link, including management frames.

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

other times as indicated by the value of
ifCounterDiscontinuityTime object of the associated
interface."

REFERENCE

["RFC 6325 section 2.3"](#)

::= { rbridgePortCounterEntry 4 }

rbridgePortTrillOutFrames OBJECT-TYPE

SYNTAX Counter64

UNITS "frames"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of TRILL-encapsulated frames that have been
transmitted by this port to its attached link, including
management frames.

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

REFERENCE

["RFC 6325 section 2.3"](#)

::= { rbridgePortCounterEntry 5 }

-- -----
-- The RBridge VLAN ESADI Table
-- -----

rbridgeEsadiTable OBJECT-TYPE

SYNTAX SEQUENCE OF RbridgeEsadiEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table that contains information about ESADI instances on
VLANs, if available."

REFERENCE

["RFC 6325 section 4.2.5"](#)

::= { rbridgeEsadi 1 }

rbridgeEsadiEntry OBJECT-TYPE

SYNTAX RbridgeEsadiEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Information about an ESADI instance on a VLAN."

INDEX { rbridgeVlanIndex }


```
::= { rbridgeEsadiTable 1 }
```

```
RbridgeEsadiEntry ::=
```

```
SEQUENCE {  
    rbridgeEsadiEnable  
        TruthValue,  
    rbridgeEsadiConfidence  
        Unsigned32,  
    rbridgeEsadiDrbPriority  
        Unsigned32,  
    rbridgeEsadiDrb  
        RbridgeAddress,  
    rbridgeEsadiDrbHoldingTime  
        Unsigned32,  
    rbridgeEsadiRowStatus  
        RowStatus  
}
```

```
rbridgeEsadiEnable OBJECT-TYPE
```

```
SYNTAX      TruthValue
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

"If the RBridge is participating in an ESADI instance for this VLAN, the value of this object is 'true'. To disable participation, set it to 'false'.

The value of this object MUST be retained across reinitializations of the management system."

```
REFERENCE
```

["RFC 6325 section 4.2.5"](#)

```
DEFVAL      { true }
```

```
::= { rbridgeEsadiEntry 1 }
```

```
rbridgeEsadiConfidence OBJECT-TYPE
```

```
SYNTAX      Unsigned32 (0..255)
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

"Confidence level of address entries sent by this ESADI. The default is 16.

The value of this object MUST be retained across reinitializations of the management system."

```
REFERENCE
```

["RFC 6325 section 4.2.5"](#)

```
DEFVAL      { 16 }
```

```
::= { rbridgeEsadiEntry 2 }
```


rbridgeEsadiDrbPriority OBJECT-TYPE

SYNTAX Unsigned32 (0..127)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The priority of this RBridge for being selected as DRB for this ESADI instance.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 4.2.5"](#)

::= { rbridgeEsadiEntry 3 }

rbridgeEsadiDrb OBJECT-TYPE

SYNTAX RbridgeAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The DRB on this ESADI instance's virtual link."

REFERENCE

["RFC 6325 section 4.2.5"](#)

::= { rbridgeEsadiEntry 4 }

rbridgeEsadiDrbHoldingTime OBJECT-TYPE

SYNTAX Unsigned32 (0..127)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The holding time for this ESADI instance.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 4.2.5"](#)

::= { rbridgeEsadiEntry 5 }

rbridgeEsadiRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object indicates the status of the entry."

::= { rbridgeEsadiEntry 6 }

--
-- The RBridge IP Multicast Snooping Port Table

rbridgeSnoopingPortTable OBJECT-TYPE

SYNTAX SEQUENCE OF RbridgeSnoopingPortEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"For Rbridges implementing IP Multicast Snooping,
information about ports on which the presence of IPv4
or IPv6 Multicast Routers has been detected."

REFERENCE

["RFC 6325 section 4.7"](#)

::= { rbridgeSnooping 1 }

rbridgeSnoopingPortEntry OBJECT-TYPE

SYNTAX RbridgeSnoopingPortEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Information about ports on which the presence of IPv4
or IPv6 Multicast Routers has been detected."

INDEX { rbridgeBasePort }

::= { rbridgeSnoopingPortTable 1 }

RbridgeSnoopingPortEntry ::=

SEQUENCE {

rbridgeSnoopingPortAddrType

InetAddressType,

rbridgeSnoopingPortAddr

InetAddress

}

rbridgeSnoopingPortAddrType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The IP address type of an IP multicast router detected
on this port. This MIB requires support for only
IPv4 and IPv6 address types."

REFERENCE

["RFC 6325 section 4.7"](#)

::= { rbridgeSnoopingPortEntry 1 }

rbridgeSnoopingPortAddr OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The IP address of an IP multicast router detected on this port, in the context of rbridgeSnoopingPortAddrType. This MIB requires support for only global IPv4 and IPv6 addresses, so the length of the object can be either 4 or 16 bytes."

REFERENCE

["RFC 6325 section 4.7"](#)

::= { rbridgeSnoopingPortEntry 2 }

-- -----
-- The RBridge IP Multicast Snooping Address Table
-- -----

rbridgeSnoopingAddrTable OBJECT-TYPE

SYNTAX SEQUENCE OF RbridgeSnoopingAddrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"For Rbridges implementing IP Multicast Snooping, information about IP Multicast addresses being snooped."

REFERENCE

["RFC 6325 section 4.8"](#)

::= { rbridgeSnooping 2 }

rbridgeSnoopingAddrEntry OBJECT-TYPE

SYNTAX RbridgeSnoopingAddrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Information about IP Multicast addresses being snooped."

INDEX { rbridgeVlanIndex, rbridgeSnoopingAddrType,
rbridgeSnoopingAddr }

::= { rbridgeSnoopingAddrTable 1 }

RbridgeSnoopingAddrEntry ::=

```
SEQUENCE {  
    rbridgeSnoopingAddrType  
        InetAddressType,  
    rbridgeSnoopingAddr  
        InetAddress,  
    rbridgeSnoopingAddrPorts  
        PortList  
}
```

rbridgeSnoopingAddrType OBJECT-TYPE

SYNTAX InetAddressType
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The IP multicast address type for which a listener has been
 detected by this RBridge. This MIB requires support for only
 IPv4 and IPv6 address types."
REFERENCE
 "[RFC 6325 section 4.7](#)"
::= { rbridgeSnoopingAddrEntry 1 }

rbridgeSnoopingAddr OBJECT-TYPE

SYNTAX InetAddress
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The IP multicast address for which a listener has been
 detected by this RBridge. The address type of this object
 is specified in rbridgeSnoopingAddrType. This MIB requires
 support for only global IPv4 and IPv6 addresses, so the
 length of the object can be either 4 or 16 bytes."
REFERENCE
 "[RFC 6325 section 4.7](#)"
::= { rbridgeSnoopingAddrEntry 2 }

rbridgeSnoopingAddrPorts OBJECT-TYPE

SYNTAX PortList
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The set of ports on which a listener has been detected
 for this IP multicast address."
REFERENCE
 "[RFC 6325 section 4.7](#)"
::= { rbridgeSnoopingAddrEntry 3 }

-- -----
-- Distribution Trees
-- -----

rbridgeDtreePriority OBJECT-TYPE

SYNTAX Unsigned32 (1..65535)
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "The Distribution tree root priority for this Rbridge.
 The default value of this object is 32768.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 4.5"](#)

::= { rbridgeDtree 1 }

rbridgeDtreeActiveTrees OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of trees being computed by all Rbridges in the campus."

REFERENCE

["RFC 6325 section 4.5"](#)

::= { rbridgeDtree 2 }

rbridgeDtreeMaxTrees OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The maximum number of trees this Rbridge can compute."

REFERENCE

["RFC 6325 section 4.5"](#)

::= { rbridgeDtree 3 }

rbridgeDtreeDesiredUseTrees OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The maximum number of trees this Rbridge would like to use for transmission of ingress multi-destination frames."

REFERENCE

["RFC 6325 section 4.5"](#)

::= { rbridgeDtree 4 }

rbridgeDtreeTable OBJECT-TYPE

SYNTAX SEQUENCE OF RbridgeDtreeEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Information about Distribution Trees being computed by this Rbridge."

REFERENCE

["RFC 6325 section 4.5"](#)

::= { rbridgeDtree 5 }

rbridgeDtreeEntry OBJECT-TYPE
SYNTAX RbridgeDtreeEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"List of information about Distribution Trees being computed
by this Rbridge."
INDEX { rbridgeDtreeNumber }
::= { rbridgeDtreeTable 1 }

RbridgeDtreeEntry ::=

```
SEQUENCE {  
    rbridgeDtreeNumber  
        Unsigned32,  
    rbridgeDtreeNickname  
        RbridgeNickname,  
    rbridgeDtreeIngress  
        TruthValue  
}
```

rbridgeDtreeNumber OBJECT-TYPE
SYNTAX Unsigned32 (0..65535)
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The tree number of a distribution tree being computed by
this RBridge."
REFERENCE
["RFC 6325 section 4.5"](#)
::= { rbridgeDtreeEntry 1 }

rbridgeDtreeNickname OBJECT-TYPE
SYNTAX RbridgeNickname
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The nickname of the distribution tree."
REFERENCE
["RFC 6325 section 4.5"](#)
::= { rbridgeDtreeEntry 2 }

rbridgeDtreeIngress OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Indicates whether this RBridge might choose this
distribution tree to ingress a multi-destination frame."

REFERENCE

["RFC 6325 section 4.5"](#)
::= { rbridgeDtreeEntry 3 }

-- TRILL neighbor list

rbridgeTrillMinMtuDesired OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The desired minimum acceptable inter-RBridge link MTU for the campus, that is, originatingLSPBufferSize.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 4.3"](#)
::= { rbridgeTrill 1 }

rbridgeTrillSz OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The minimum acceptable inter-Rbridge link size for the campus for the proper operation of TRILL IS-IS."

REFERENCE

["RFC 6325 section 4.3"](#)
::= { rbridgeTrill 2 }

rbridgeTrillMaxMtuProbes OBJECT-TYPE

SYNTAX Unsigned32 (1..255)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The number of failed MTU-probes before the RBridge concludes that a particular MTU is not supported by a neighbor.

The value of this object MUST be retained across reinitializations of the management system."

REFERENCE

["RFC 6325 section 4.3"](#)
::= { rbridgeTrill 3 }

rbridgeTrillNbrTable OBJECT-TYPE

SYNTAX SEQUENCE OF RbridgeTrillNbrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Information about this Rbridge's TRILL neighbors."

REFERENCE

["RFC 6325 section 4.4.2.1"](#)

::= { rbridgeTrill 4 }

rbridgeTrillNbrEntry OBJECT-TYPE

SYNTAX RbridgeTrillNbrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"List of information about this Rbridge's TRILL neighbors."

INDEX { rbridgeTrillNbrMacAddr }

::= { rbridgeTrillNbrTable 1 }

RbridgeTrillNbrEntry ::=

SEQUENCE {

rbridgeTrillNbrMacAddr

MacAddress,

rbridgeTrillNbrMtu

Unsigned32,

rbridgeTrillNbrFailedMtuTest

TruthValue

}

rbridgeTrillNbrMacAddr OBJECT-TYPE

SYNTAX MacAddress

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The MAC address of a neighbor of this RBridge."

REFERENCE

["RFC 6325 section 4.4.2.1"](#)

::= { rbridgeTrillNbrEntry 1 }

rbridgeTrillNbrMtu OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"MTU size for this neighbor for IS-IS communication purposes."

REFERENCE

["RFC 6325 section 4.3.2"](#)

::= { rbridgeTrillNbrEntry 2 }

rbridgeTrillNbrFailedMtuTest OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"If true, indicates that the neighbor's tested MTU is less than the minimum acceptable inter-bridge link MTU for the campus (1470)."

REFERENCE

["RFC 6325 section 4.3.1"](#)

::= { rbridgeTrillNbrEntry 3 }

--
-- Notifications for use by RBridges
--

rbridgeBaseNewDrb NOTIFICATION-TYPE

-- OBJECTS { }

STATUS current

DESCRIPTION

"The RBridgeBaseNewDrb notification indicates that the sending agent has become the new Designated RBridge; the notification is sent by an RBridge soon after its election as the new DRB root, e.g., upon expiration of the Topology Change Timer, immediately subsequent to its election."

::= { rbridgeNotifications 1 }

rbridgeBaseTopologyChange NOTIFICATION-TYPE

-- OBJECTS { }

STATUS current

DESCRIPTION

"The RBridgeBaseTopologyChange notification is sent by an RBridge when any of its configured ports transitions to/from Vlan-x designated forwarder. The notification is not sent if a newDrb trap is sent for the same transition."

::= { rbridgeNotifications 2 }

-- Compliance and Group sections

rbridgeGroup OBJECT IDENTIFIER ::= { rbridgeConformance 1 }

rbridgeCompliances OBJECT IDENTIFIER ::= { rbridgeConformance 2 }

--
-- Units of Conformance
--


```
rbridgeBaseGroup OBJECT-GROUP
  OBJECTS {
    rbridgeBaseTrillVersion,
    rbridgeBaseNumPorts,
    rbridgeBaseForwardDelay,
    rbridgeBaseUniMultipathEnable,
    rbridgeBaseMultiMultipathEnable,
    rbridgeBaseAcceptEncapNonadj,
    rbridgeBaseNicknameNumber
  }
  STATUS      current
  DESCRIPTION
    "A collection of objects providing basic control
    and status information for the RBridge."
  ::= { rbridgeGroup 1 }
```

```
rbridgeBaseNicknameGroup OBJECT-GROUP
  OBJECTS {
    rbridgeBaseNicknamePriority,
    rbridgeBaseNicknameDtrPriority,
    rbridgeBaseNicknameType,
    rbridgeBaseNicknameRowStatus
  }
  STATUS      current
  DESCRIPTION
    "A collection of objects providing basic control
    and status information for RBridge nicknames."
  ::= { rbridgeGroup 2 }
```

```
rbridgeBasePortGroup OBJECT-GROUP
  OBJECTS {
    rbridgeBasePortIfIndex,
    rbridgeBasePortDisable,
    rbridgeBasePortTrunkPort,
    rbridgeBasePortAccessPort,
    rbridgeBasePortP2pHellos,
    rbridgeBasePortState,
    rbridgeBasePortDesiredDesigVlan,
    rbridgeBasePortDesigVlan,
    rbridgeBasePortInhibitionTime,
    rbridgeBasePortDisableLearning,
    rbridgeBasePortStpRoot,
    rbridgeBasePortStpRootChanges,
    rbridgeBasePortStpWiringCloset
  }
  STATUS      current
  DESCRIPTION
    "A collection of objects providing basic control
```


and status information for RBridge ports."
::= { rbridgeGroup 3 }

rbridgeFdbGroup OBJECT-GROUP
OBJECTS {
 rbridgeConfidenceNative,
 rbridgeConfidenceDecap,
 rbridgeConfidenceStatic,
 rbridgeUniFdbPort,
 rbridgeUniFdbNickname,
 rbridgeUniFdbConfidence,
 rbridgeUniFdbStatus
}
STATUS current
DESCRIPTION
 "A collection of objects providing information
 about the Unicast Address Database."
::= { rbridgeGroup 4 }

rbridgeFibGroup OBJECT-GROUP
OBJECTS {
 rbridgeUniFibHopCount,
 rbridgeMultiFibPorts
}
STATUS current
DESCRIPTION
 "A collection of objects providing information
 about the Unicast and Multicast FIBs."
::= { rbridgeGroup 5 }

rbridgeVlanGroup OBJECT-GROUP
OBJECTS {
 rbridgeVlanForwarderLosses,
 rbridgeVlanDisableLearning,
 rbridgeVlanSnooping,
 rbridgeVlanPortInhibited,
 rbridgeVlanPortForwarder,
 rbridgeVlanPortAnnouncing,
 rbridgeVlanPortDetectedVlanMapping
}
STATUS current
DESCRIPTION
 "A collection of objects providing information
 about VLANs on the RBridge."
::= { rbridgeGroup 6 }

rbridgePortCounterGroup OBJECT-GROUP
OBJECTS {


```
        rbridgePortRpfCheckFails,
        rbridgePortHopCountExceeds,
        rbridgePortOptionDrops,
        rbridgePortTrillInFrames,
        rbridgePortTrillOutFrames
    }
    STATUS          current
    DESCRIPTION
        "A collection of objects providing per-port
        counters for the RBridge."
    ::= { rbridgeGroup 7 }

rbridgeEsadiGroup OBJECT-GROUP
    OBJECTS {
        rbridgeEsadiEnable,
        rbridgeEsadiConfidence,
        rbridgeEsadiDrbPriority,
        rbridgeEsadiDrb,
        rbridgeEsadiDrbHoldingTime,
        rbridgeEsadiRowStatus
    }
    STATUS          current
    DESCRIPTION
        "A collection of objects providing information
        about ESADI instances on the RBridge."
    ::= { rbridgeGroup 8 }

rbridgeSnoopingGroup OBJECT-GROUP
    OBJECTS {
        rbridgeSnoopingPortAddrType,
        rbridgeSnoopingPortAddr,
        rbridgeSnoopingAddrPorts
    }
    STATUS          current
    DESCRIPTION
        "A collection of objects providing information
        about IP Multicast Snooping. This MIB requires
        support for only global IPv4 and IPv6 address
        types in rbridgeSnoopingPortAddrType and
        rbridgeSnoopingAddrType, so the length of
        rbridgeSnoopingPortAddr and rbridgeSnoopingAddr
        can be either 4 or 16 bytes."
    ::= { rbridgeGroup 9 }

rbridgeDtreeGroup OBJECT-GROUP
    OBJECTS {
        rbridgeDtreePriority,
        rbridgeDtreeActiveTrees,
```



```
        rbridgeDtreeMaxTrees,
        rbridgeDtreeDesiredUseTrees,
        rbridgeDtreeNickname,
        rbridgeDtreeIngress
    }
    STATUS          current
    DESCRIPTION
        "A collection of objects providing information
        about Distribution Trees."
    ::= { rbridgeGroup 10 }

rbridgeTrillGroup OBJECT-GROUP
    OBJECTS {
        rbridgeTrillMinMtuDesired,
        rbridgeTrillSz,
        rbridgeTrillMaxMtuProbes,
        rbridgeTrillNbrMtu,
        rbridgeTrillNbrFailedMtuTest
    }
    STATUS          current
    DESCRIPTION
        "A collection of objects providing information
        about TRILL neighbors."
    ::= { rbridgeGroup 11 }

rbridgeNotificationGroup NOTIFICATION-GROUP
    NOTIFICATIONS {
        rbridgeBaseNewDrb,
        rbridgeBaseTopologyChange
    }
    STATUS          current
    DESCRIPTION
        "A collection of objects describing notifications (traps)."
    ::= { rbridgeGroup 12 }

-- -----
-- Compliance Statement
-- -----

rbridgeCompliance MODULE-COMPLIANCE
    STATUS          current
    DESCRIPTION
        "The compliance statement for support of RBridge
        services."

    MODULE
```



```
MANDATORY-GROUPS {
    rbridgeBaseGroup,
    rbridgeBaseNicknameGroup,
    rbridgeBasePortGroup,
    rbridgeFdbGroup,
    rbridgeFibGroup,
    rbridgeVlanGroup,
    rbridgeDtreeGroup,
    rbridgeTrillGroup,
    rbridgeNotificationGroup
}

GROUP    rbridgePortCounterGroup
DESCRIPTION
    "Implementation of this group is optional."

GROUP    rbridgeEsadiGroup
DESCRIPTION
    "Implementation of this group is optional."

GROUP    rbridgeSnoopingGroup
DESCRIPTION
    "Implementation of this group is optional."

::= { rbridgeCompliances 1 }
```

END

8. Security Considerations

This MIB relates to a system which 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 a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations. These tables and objects and their sensitivity/vulnerability are described below.

The following tables and objects in the RBRIDGE-MIB can be manipulated to interfere with the operation of RBridges:

o `rbridgeBaseUniMultipathEnable` affects the ability of the RBridge to multipath unicast traffic, and `rbridgeBaseMultiMultipathEnable` affects the ability of the Rbridge to multipath multi-destination traffic.

o `rbridgeBasePortTable` contains a number of objects that may affect network connectivity. Actions that may be triggered by manipulating objects in this table include disabling of an RBridge port; discarding of native packets; disabling learning and others.

o `rbridgeEsadiTable` contains objects that affect the operation of the ESADI protocol used for learning, and manipulation of the objects contained therein can be used to confuse the learning ability of Rbridges.

o `rbridgeDtreePriority` can affect computation of distribution trees within an Rbridge campus, thereby affecting forwarding of multi-destination traffic.

o `rbridgeTrillMinMtuDesired` can affect the size of packets being used to exchange information between RBridges.

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. For example, access to network topology and Rbridge attributes can reveal information that should not be available to all users of the network.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPsec), there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB module.

It is RECOMMENDED that implementers consider the security features as provided by the SNMPv3 framework (see [\[RFC3410\]](#), [section 8](#)), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate

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

For other RBridge security considerations see [[RFC6325](#)].

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

```
rbridgeMIB { 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. Contributors

The authors would like to acknowledge the contributions of Donald Eastlake, Radia Perlman, Anoop Ghanwani, Dan Romascanu, Mahesh Akula and Joan Cucchiara.

11. References

11.1 Normative References

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11.2 Informative References

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- [RFC5556] Touch, J. and R. Perlman, "Transparent Interconnection of Lots of Links (TRILL): Problem and Applicability Statement", [RFC 5556](#), May 2009.
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Appendix A. Change Log

Note to RFC Editor: Please remove this appendix before publication as an RFC.

Changes from -06 to -07 (incorporating further IETF and IESG feedback):

1. Changed RBridgeBasePortEntry to RbridgeBasePortEntry
2. rbridgeSnoopingAddrType, rbridgeSnoopingAddr, rbridgeSnoopingPortAddrType, rbridgeSnoopingPortAddr: Added text in Description as well as corresponding compliance statement saying that only IPv4 and IPv6 addresses are supported, thus limiting the length of the address to 4 or 16. This allows the INDEX of to be of a legal length.
3. Changed IMPORT from [RFC2233](#) to [RFC2863](#).
4. Moved scalar rbridgeBaseNicknameNumber definition to just above the rbridgeBaseNicknameTable. Also clarified further the meaning of rbridgeBaseNicknameNumber.
5. rbridgeVlanDisableLearning: Added text in DESCRIPTION clarifying what true and false mean.
6. rbridgeEsadiEnable: Added text in DESCRIPTION clarifying what true and false mean.
7. rbridgeEsadiConfidence: Extended range to 255.
8. Changed some references to IS-IS MIB to ISIS-MIB.
9. Updated all REFERENCE clauses to refer to [RFC 6325](#) instead of RBridge.
10. rbridgeBaseForwardDelay: Specified range
11. rbridgeUniFdbPort, rbridgeUniFibPort, rbridgeDtreePriority: Changed SYNTAX to Unsigned32 (from Integer32)
12. rbridgeUniFdbNick: Changed to rbridgeUniFdbNickname
13. rbridgeUniFdbNick: Changed to rbridgeUniFdbNickname
14. rbridgeDtreeNick: Changed to rbridgeDtreeNickname
15. rbridgeUniFdbConfidence: Extended range to 255.
16. Changed any counter name that did not end with "s" to end with "s"
17. Added text to counter table re-stating that it extends relevant counters in Bridge MIB
18. rbridgeVlanPortTable: Changed indexing to port, VLAN (instead of VLAN, port)
19. Removed text in description of notifications saying that their implementation is optional.

Changes from -07 to -08:

1. Updated [section 6.7](#) to provide guidance on ISIS-MIB implementation for TRILL switches without the use of MUST language.

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