Internet Engineering Task Force (IETF)
Request for Comments: 6850
Category: Standards Track
ISSN: 2070-1721

A. Rijhsinghani
Hewlett-Packard
K. Zebrose
HW Embedded

January 2013

Definitions of Managed Objects for Routing Bridges (RBridges)

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 a Routing Bridge (RBridge), also known as a TRILL Switch, based on the IETF TRILL (Transparent Interconnection of Lots of Links) protocol.

Status of This Memo

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in Section 2 of RFC 5741.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at http://www.rfc-editor.org/info/rfc6850.

Table of Contents

1. Introduction

This document describes a model for managing Routing Bridges (RBridges), 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 that 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, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [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 module [RFC4188] and to the P-BRIDGE-MIB and Q-BRIDGE-MIB modules [RFC4363].

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 the 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 End-Station Address Distribution Information (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 the 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 working 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 Interfaces MIB [RFC2863] requires that any MIB module that is an adjunct of the Interfaces MIB clarify specific areas within the Interfaces MIB module. These areas were intentionally left vague in the Interfaces MIB module to avoid over-constraining the MIB, thereby precluding management of certain media types. Section 4 of [RFC2863] enumerates several areas that 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.

- dot1dBase
- dot1dTp
- 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.

- dot1dExtBase
- dot1dPriority
- dot1dGarp
- dot1dGmrp
- dot1dTpHCPortTable
- 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 the IEEE8021-Q-BRIDGE-MIB.

- dot1qBase
- dot1qTp
- dot1qStatic

- dot1qVlan
- 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.

- ieee8021BridgeBase
- ieee8021BridgeTp
- ieee8021BridgePriority
- ieee8021BridgeMrp
- ieee8021BridgeMmrp
- ieee8021BridgeInternalLan
- 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.

- ieee8021QBridgeBase
- ieee8021QBridgeTp
- ieee8021QBridgeStatic
- ieee8021QBridgeVlan
- ieee8021QBridgeProtocol

6.7. Relationship to ISIS-MIB

"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]:

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

Accordingly, tables that report IP address reachability and tables that 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 the SNMPv2-SMI [RFC2578], SNMPv2-TC [RFC2579], SNMPv2-CONF [RFC2580], IF-MIB [RFC2863], INET-ADDRESS-MIB [RFC4001], BRIDGE-MIB [RFC4188], and Q-BRIDGE-MIB [RFC4363]. (The IEEE Bridge MIB modules import similar TCs.)

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 "201301070000Z"
ORGANIZATION "IETF TRILL Working Group"
CONTACT-INFO
     "http://datatracker.ietf.org/wg/trill/charter/
     Email: trill@ietf.org

            Anil Rijhsinghani
            Hewlett-Packard
       Tel: +1 508 323 1251
     Email: anil@charter.net

            Kate Zebrose
            HW Embedded
       Tel: +1 617 840 9673
     Email: zebrose@alum.mit.edu"

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

REVISION     "201301070000Z"
```

```
   DESCRIPTION
        "Initial version, published as RFC 6850.

        Copyright (c) 2013 IETF Trust and the persons identified as
        authors of the code.  All rights reserved.

        Redistribution and use in source and binary forms, with or
        without modification, is permitted pursuant to, and subject to
        the license terms contained in, the Simplified BSD License set
        forth in Section 4.c of the IETF Trust's Legal Provisions
        Relating to IETF Documents
        (http://trustee.ietf.org/license-info)."

        ::= { mib-2 214 }


   -- ------------------------------------------------------------ --
   -- 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 Media Access Control (MAC) address used by an RBridge
           port.  This may match the RBridge IS-IS 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
           0xFFC0 through 0xFFFE 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
            re-initializations 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
            re-initializations 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 multi-destination TRILL multipathing.
            It is enabled when true.

            The value of this object MUST be retained across
            re-initializations 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, when the value
            of this object is 'true'.
```

```
            The value of this object MUST be retained across
            re-initializations 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.  This value represents the maximum
            number of entries in rbridgeBaseNicknameTable.

            The value of this object MUST be retained across
            re-initializations 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
            configured by an operator or learned dynamically
            by 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.  When the nickname is configured, the most
           significant bit (0x80) must be set and the bottom 7 bits
           have the default value of 0x40, so 0x80 + 0x40 == 0xC0,
           which is 192 decimal.  Additionally, the bottom 7 bits
           could be configured to a value other than 0x40.

           The value of this object MUST be retained across
           re-initializations 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
           re-initializations 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 5.3"
       ::= { 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 5.3"
       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 5.3"
        ::= { 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 the IF-MIB, for the interface corresponding
            to this port.  The RBridge port sits on top of
            this interface."
        ::= { 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
            re-initializations 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
            re-initializations of the management system."
        REFERENCE
            "RFC 6325, Section 4.9.1"
        DEFVAL      { false }
        ::= { rbridgeBasePortEntry 4 }

    rbridgeBasePortAccessPort OBJECT-TYPE
        SYNTAX      TruthValue
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "TRILL traffic disable (access port) bit.  If this bit is
            set, the goal is to avoid sending any TRILL frames, except
            TRILL-Hello frames, on the port, since it is intended only
            for native end-station traffic.  This ensures that the link
            is not on the shortest path for any destination.  Default
            value is 'false'.

            The value of this object MUST be retained across
            re-initializations of the management system."
        REFERENCE
            "RFC 6325, Section 4.9.1"
        DEFVAL      { false }
        ::= { rbridgeBasePortEntry 5 }

    rbridgeBasePortP2pHellos OBJECT-TYPE
        SYNTAX      TruthValue
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "Use point-to-point (P2P) Hellos bit.  If this bit is set,
            Hellos sent on this port are IS-IS P2P Hellos, not the
```

```
            default TRILL-Hellos.  In addition, the IS-IS P2P three-way
            handshake is used on P2P RBridge links.  Default value is
            'false'.

            The value of this object MUST be retained across
            re-initializations of the management system."
        REFERENCE
            "RFC 6325, Section 4.9.1"
        DEFVAL      { false }
        ::= { rbridgeBasePortEntry 6 }

    rbridgeBasePortState OBJECT-TYPE
        SYNTAX      INTEGER {
                              uninhibited(1),
                              portInhibited(2),
                              vlanInhibited(3),
                              disabled(4),
                              broken(5)
                            }
        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
            rbridgeVlanPortTable 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
            re-initializations 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
            re-initializations 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 Designated RBridge (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
            re-initializations 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 Bridge PDU (BPDU) received on this port.
           For the Multiple Spanning Tree Protocol (MSTP), this is
           the root bridge of the Common and Internal Spanning Tree
           (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.  This counter
           should be synchronized with ifCounterDiscontinuityTime.

           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 the 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
           re-initializations of the management system."
```

```
        REFERENCE
            "RFC 6325, Appendix 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.  This is applicable to
            all RBridge ports.

            The value of this object MUST be retained across
            re-initializations 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.
            This is applicable to all RBridge ports.

            The value of this object MUST be retained across
            re-initializations of the management system."
        REFERENCE
            "RFC 6325, 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
            re-initializations 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 rbridgeUniFdbAddr
            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 that is placed in the egress
            nickname field of a TRILL frame sent to this
            rbridgeFdbAddress in this rbridgeFdbId."
        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 Forwarding Information Base (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 Equal-Cost Multipath (ECMP) is implemented,
            there are as many entries for a nickname as there are 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 there
            are 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,
           rbridgeVlanForwarderLosts
               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 }

   rbridgeVlanForwarderLosts 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 4.8.3"
        ::= { 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
            re-initializations 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(4)."
        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, when the value of this object is 'true'."
       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, when the value of this object is 'true'."
        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, when the value of this object
            is 'true'.

            The value of this object MUST be retained across
            re-initializations 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, when the value of this object is 'true'."
        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 Port Out Frames counters of the Bridge MIB.
    -- These total bridge frame 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 that 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 multi-destination frame was
           dropped on this port because the Reverse Path Forwarding
           (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 the
            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 the
            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 the
            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 the
            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 the
            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
           re-initializations 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 instance.  The default is 16.
```

```
            The value of this object MUST be retained across
            re-initializations 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 the
            DRB for this ESADI instance.

            The value of this object MUST be retained across
            re-initializations 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
            re-initializations 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 for a
            VLAN."
        INDEX   { rbridgeBasePort, rbridgeVlanIndex }
        ::= { rbridgeSnoopingPortTable 1 }

    RbridgeSnoopingPortEntry ::=
        SEQUENCE {
            rbridgeSnoopingPortAddrType
                INTEGER
        }

    rbridgeSnoopingPortAddrType OBJECT-TYPE
        SYNTAX      INTEGER {
                        ipv4(1),
                        ipv6(2),
                        ipv4v6(3)
                    }
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The IP address type of an IP multicast router detected
```

```
            on this port and VLAN.  If only IPv4 router(s)
            are detected, the value returned is 'ipv4'.  If only
            IPv6 routers are detected, the value returned is
            'ipv6'.  If both IPv4 and IPv6 routers are detected on
            this port and VLAN, the value returned is 'ipv4v6'."
        REFERENCE
            "RFC 6325, Section 4.7"
        ::= { rbridgeSnoopingPortEntry 1 }

    -- ------------------------------------------------------- --
    -- 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.  Hence,
            the index will not exceed the OID size limit."
        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
            re-initializations 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
            re-initializations 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
            re-initializations 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 transition to/from
            the VLAN-x designated forwarder.  The notification is not
            sent if an rbridgeBaseNewDrb notification is sent for the
            same transition."
        ::= { rbridgeNotifications 2 }
```

```
   -- Compliance and Group sections

   rbridgeCompliances    OBJECT IDENTIFIER ::= { rbridgeConformance 1 }

   rbridgeGroup          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 {
            rbridgeVlanForwarderLosts,
            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,
            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 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 }

   rbridgeReadOnlyCompliance MODULE-COMPLIANCE
          STATUS      current
          DESCRIPTION
              "When this MIB is implemented in read-only mode, then
              the implementation can claim read-only compliance.
              In that case, RBridge objects can be monitored but
              cannot be configured with this implementation."
```

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

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

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

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

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

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

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

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

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

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

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

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

        OBJECT  rbridgeBasePortP2pHellos
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required."

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

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

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

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

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

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

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

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

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

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

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

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

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

        OBJECT  rbridgeEsadiRowStatus
        SYNTAX  INTEGER { active(1) }
        MIN-ACCESS  read-only
```

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

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

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

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

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

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

- rbridgeBaseUniMultipathEnable affects the ability of the RBridge to route unicast traffic over multiple paths, and rbridgeBaseMultiMultipathEnable affects the ability of the RBridge to route multi-destination traffic over multiple paths.

- 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.

- 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.

- rbridgeDtreePriority can affect computation of distribution trees within an RBridge campus, thereby affecting the forwarding of multi-destination traffic.

- 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.

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

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

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-2 214 }

10. Contributors

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

11. References

11.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC2578] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.

[RFC2579] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.

[RFC2580] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Conformance Statements for SMIv2", STD 58, RFC 2580, April 1999.

[RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", RFC 2863, June 2000.

[RFC3414] Blumenthal, U. and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", STD 62, RFC 3414, December 2002.

[RFC3826] Blumenthal, U., Maino, F., and K. McCloghrie, "The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model", RFC 3826, June 2004.

[RFC4001] Daniele, M., Haberman, B., Routhier, S., and J. Schoenwaelder, "Textual Conventions for Internet Network Addresses", RFC 4001, February 2005.

[RFC4188] Norseth, K., Ed., and E. Bell, Ed., "Definitions of Managed Objects for Bridges", RFC 4188, September 2005.

[RFC4363] Levi, D. and D. Harrington, "Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering, and Virtual LAN Extensions", RFC 4363, January 2006.

[RFC4444] Parker, J., Ed., "Management Information Base for Intermediate System to Intermediate System (IS-IS)", RFC 4444, April 2006.

[RFC5591] Harrington, D. and W. Hardaker, "Transport Security Model for the Simple Network Management Protocol (SNMP)", RFC 5591, June 2009.

[RFC5592] Harrington, D., Salowey, J., and W. Hardaker, "Secure Shell Transport Model for the Simple Network Management Protocol (SNMP)", RFC 5592, June 2009.

[RFC6325] Perlman, R., Eastlake 3rd, D., Dutt, D., Gai, S., and A. Ghanwani, "Routing Bridges (RBridges): Base Protocol Specification", RFC 6325, July 2011.

[RFC6353] Hardaker, W., "Transport Layer Security (TLS) Transport Model for the Simple Network Management Protocol (SNMP)", RFC 6353, July 2011.

11.2. Informative References

[RFC3410] Case, J., Mundy, R., Partain, D., and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", RFC 3410, December 2002.

[RFC4663] Harrington, D., "Transferring MIB Work from IETF Bridge MIB WG to IEEE 802.1 WG", RFC 4663, September 2006.

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

Authors' Addresses

Anil Rijhsinghani
Hewlett-Packard
153 Taylor St.
Littleton, MA
USA

Phone: +1 508 323 1251
EMail: anil@charter.net

Kate Zebrose
HW Embedded
26 Josephine Ave.
Somerville, MA
USA

Phone: +1 617 840 9673
EMail: zebrose@alum.mit.edu