Definitions of Managed Objects for Bridges with Rapid Spanning Tree Protocol and VLAN Classification Extensions

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Abstract

   This memo defines a portion of the Management Information Base (MIB)
   for use with network management protocols in TCP/IP based internets.
   In particular, it defines three MIB modules for managing the new
   capabilities of MAC bridges defined by the IEEE P802.1t [802.1t],
   P802.1u [802.1u], P802.1v [802.1v] and P802.1w [802.1w] amendments to
   IEEE Std 802.1D-1998 for bridging between Local Area Network (LAN)
   segments. One MIB module defines objects for managing Rapid Spanning
   Tree Protocol, one for controlling Restricted VLAN Registration, and
   one for VLAN Classification.

   Provisions are made for support of transparent bridging. Provisions

are also made so that these objects apply to bridges connected by
subnetworks other than LAN segments. This memo also includes several
MIB modules in a manner that is compliant to SMIv2 [RFC2578].

This memo supplements RFC 1493 [BRIDGEMIB] and RFC 2674 [Q-BRIDGE-
MIB].

Table of Contents

1. The SNMP Management Framework

The SNMP Management Framework presently consists of five major
components:

 o   An overall architecture, described in RFC 2571 [RFC2571].

 o   Mechanisms for describing and naming objects and events for the
      purpose of management. The first version of this Structure of
      Management Information (SMI) is called SMIv1 and described in
      STD 16, RFC 1155 [RFC1155], STD 16, RFC 1212 [RFC1212] and RFC
      1215 [RFC1215]. The second version, called SMIv2, is described
      in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and
      STD 58, RFC 2580 [RFC2580].

 o   Message protocols for transferring management information. The
      first version of the SNMP message protocol is called SNMPv1 and
      described in STD 15, RFC 1157 [RFC1157]. A second version of
      the SNMP message protocol, which is not an Internet standards
      track protocol, is called SNMPv2c and described in RFC 1901
      [RFC1901] and RFC 1906 [RFC1906]. The third version of the
      message protocol is called SNMPv3 and described in RFC 1906
      [RFC1906], RFC 2572 [RFC2572] and RFC 2574 [RFC2574].

 o   Protocol operations for accessing management information. The
      first set of protocol operations and associated PDU formats is
      described in STD 15, RFC 1157 [RFC1157]. A second set of
      protocol operations and associated PDU formats is described in
      RFC 1905 [RFC1905].

 o   A set of fundamental applications described in RFC 2573
      [RFC2573] and the view-based access control mechanism described
      in RFC 2575 [RFC2575].

A more detailed introduction to the current SNMP Management Framework
can be found in RFC 2570 [RFC2570].

Managed objects are accessed via a virtual information store, termed
the Management Information Base or MIB. Objects in the MIB are
defined using the mechanisms defined in the SMI.

This memo specifies a MIB module that is compliant to the SMIv2. A
MIB conforming to the SMIv1 can be produced through the appropriate
translations. The resulting translated MIB must be semantically
equivalent, except where objects or events are omitted because no
translation is possible (use of Counter64). Some machine readable
information in SMIv2 will be converted into textual descriptions in
SMIv1 during the translation process. However, this loss of machine

   readable information is not considered to change the semantics of the
   MIB.

2. Overview

   A common device present in many networks in the Bridge. This device
   is used to connect Local Area Network segments below the network
   layer. These devices are often known as 'layer 2 switches'.

   There are two major modes defined for this bridging: Source-Route and
   transparent. Source-Route bridging is described by IEEE 802.5
   [802.5] and is not discussed further in this document.

   The transparent method of bridging is defined by IEEE 802.1D-1998
   [802.1D] Managed objects for that original specification of
   transparent bridging were defined in RFC 1493 [BRIDGEMIB].

2.1. Scope

   This MIB includes a comprehensive set of managed objects which
   attempts to match the set defined in IEEE P802.1t [802.1t], P802.1u
   [802.1u], P802.1v [802.1v] and P802.1w [802.1w].

3. Structure of MIBs

   This document defines additional objects, on top of those existing in
   the original BRIDGE-MIB module defined in [BRIDGEMIB]: that MIB
   module is to be maintained unchanged for backwards compatibility.
   Section 3.4.3 of the present document contains some recommendations
   regarding usage of objects in the original bridge MIB by devices
   implementing the enhancements defined here.

   Three MIB modules are defined here:

   (1)   Managed objects for an extended bridge MIB module RSTP-MIB for
           Rapid Spanning Tree Protocol defined by IEEE P802.1t and IEEE
           P802.1w.

   (2)   Managed Objects for an extended virtual bridge MIB module U-
           BRIDGE-MIB for Restricted VLAN Registration control
           enhancement defined by IEEE P802.1u.

   (3)   Managed Objects for an extended bridge MIB module V-BRIDGE-MIB
           for VLAN classification by Protocol and Port enhancement
           defined by IEEE P802.1v.

3.1. Structure of RSTP-MIB

Objects in this MIB are defined as an addition to the dot1dStp group
in the original bridge MIB [BRIDGE-MIB]. The overall structure is
shown below:

```
Bridge MIB Name                      IEEE P802.1t(t) or 802.1w(w)
                                              Reference

  dot1dStp
    dot1dStpVersion                  (w) 17.6.1    ForceVersion
    dot1dStpTxHoldCount              (w) 17.16.6   TxHoldCount
    dot1dStpPathCostDefault
    dot1dStpExtPortTable
      dot1dStpPortProtocolMigration  (w) 17.18.10 mcheck
      dot1dStpPortAdminEdgePort      (t) 18.3.3 adminEdgePort
      dot1dStpPortOperEdgePort       (t) 18.3.4 operEdgePort
      dot1dStpPortAdminPointToPoint  (w) 6.4.3 adminPointToPointMAC
      dot1dStpPortOperPointToPoint   (w) 6.4.3 operPointToPointMAC
```

3.2. Structure of U-BRIDGE-MIB

Objects in this MIB are defined as an addition to the dot1qVlan group
in the Virtual Bridge MIB [Q-BRIDGE-MIB]. The overall structure is
shown below:

```
Virtual Bridge MIB Name               IEEE P802.1u(u) or
                                      P802.1t(t) Reference

  dot1dGmrp
    dot1dExtPortGmrpTable
      dot1dPortRestrictedGroupRegistration
                                    (t) 10.3.2.3 Restricted
                                        Group Registration
  dot1qVlan
    dot1qExtPortVlanTable
      dot1qPortRestrictedVlanRegistration
                                    (u) 11.2.3.2.3 Restricted
                                        VLAN Registration
  gmrpFailure                       (t) 14.10.1.2 GMRP failure
                                        notification
  gvrpFailure                       (t) 12.10.1.6 GVRP failure
                                        notification
```

[3.3](#). Structure of V-BRIDGE-MIB

   Objects in this MIB are arranged in a single group which is organized
   as a set of related objects. The overall structure and assignment of
   objects to the group is shown below:

   Bridge MIB Name   IEEE P802.1v Reference

      dot1vProtocol
        dot1vProtocolGroupTable   8.6.4 Protocol Group Database,
                                        8.6.2 Protocol Template
          dot1vProtocolTemplateFrameType
          dot1vProtocolTemplateProtocolValue
          dot1vProtocolGroupId   8.6.3 Protocol Group Identifier
        dot1vProtocolPortTable   8.4.4 VID Set for each Port
          dot1vProtocolPortGroupId
          dot1vProtocolGroupVid

[3.3.1](#). The dot1vProtocol Group

   This group contains objects that describe the bridge's state with
   respect VLAN classification by Protocol and Port. If VLAN
   classification is not supported, this group will not be implemented.

[3.4](#). Relationship to Other MIBs

   As described above, some IEEE 802.1D management objects have not been
   included in this MIB because they overlap with objects in other MIBs
   applicable to a bridge implementing this MIB. In particular, it is
   assumed that a bridge implementing this MIB will implement the
   original bridge MIB [[BRIDGEMIB](#)]. If the U-BRIDGE-MIB and V-BRIDGE-
   MIB modules are implemented, a bridge will also implement the P-
   BRIDGE-MIB and the Q-BRIDGE-MIB modules defined in [RFC 2674](#)
   [[RFC2674](#)].

[3.4.1](#). Relation to Original Bridge MIB

   This section defines how objects in the original bridge MIB module
   [[BRIDGEMIB](#)] should be represented for devices which implement all the
   MIB modules described in this memo. Some of the old objects are less
   useful in such devices but must still be implemented for reasons of
   backwards compatibility.

[3.4.1.1](#). The dot1dBase Group

   This mandatory group contains the objects which are applicable to all
   types of bridges. Interpretation of this group is unchanged.

[3.4.1.2](). The dot1dStp Group

This group contains the objects that denote the bridge's state with
respect to the Spanning Tree Protocol. If a node does not implement
the Spanning Tree Protocol, this group will not be implemented.

In a device supporting the Spanning Tree Algorithm and Protocol
defined in IEEE 802.1D-1998 Clause 8, interpretation of this group is
unchanged.

In a device supporting the Rapid Spanning Tree Algorithm and Protocol
defined in IEEE 802.1w Clause 17, the interpretation of objects in
this group is unchanged except for those listed below:

dot1dStpPriority
     Definition remains unchanged, but the permissible values are
     changed to 0-61440, in steps of 4096.

dot1dStpPortPriority
     Definition remains unchanged, but the permissible values are
     changed to 0-240, in steps of 16.

dot1dStpTimeSinceTopologyChange
     The time since the tcWhile timer for any port on this Bridge was
     non-zero.

dot1dStpTopChanges
     The number of times that there have been at least one non-zero
     tcWhile timer on this Bridge.

In a device supporting the 32-bit default Path Costs defined in IEEE
802.1t Table 8-5, the interpretation of objects in this group is
unchanged except for the following:

dot1dStpPortPathCost
     Definition remains unchanged, but the permissible values are
     extended to 1-200,000,000.

[3.4.1.3](). The dot1dTp Group

This group contains objects that describe the entity's state with
respect to transparent bridging. Interpretation for this group is
unchanged.

3.4.1.4. The dot1dStatic Group

   This group contains objects that describe the entity's state with
   respect to destination-address filtering. Interpretation for this
   group is unchanged.

3.4.2. Relation to the P-BRIDGE-MIB module defined in RFC 2674

   The P-BRIDGE-MIB module contains managed objects for the traffic
   class and multicast filtering enhancements defined by IEEE 802.1D-
   1998 [802.1D]. Interpretation for all groups defined in this module
   is unchanged.

3.4.3. Relation to the Q-BRIDGE-MIB module defined in RFC 2674

   The Q-BRIDGE-MIB module contains managed objects for the Virtual LAN
   bridging enhancements defined by IEEE 802.1Q-1998 [802.1Q].
   Interpretation for all groups defined in this module is unchanged.

4. Definitions for RSTP-MIB

RSTP-MIB DEFINITIONS ::= BEGIN

-- --
-- MIB for IEEE 802.1w Rapid Spanning Tree Protocol
-- --

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE
        FROM SNMPv2-SMI
    TruthValue
        FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP
        FROM SNMPv2-CONF
    dot1dBridge, dot1dStp, dot1dStpPortEntry
        FROM BRIDGE-MIB;

rstpMIB MODULE-IDENTITY
    LAST-UPDATED "200111160000Z"
    ORGANIZATION "IETF Bridge MIB Working Group"
    CONTACT-INFO
        "Email: Bridge-mib@ietf.org"
    DESCRIPTION
        "The Bridge MIB Extension module for managing devices
         that support the Rapid Spanning Tree Protocol defined
         by IEEE 802.1w."
    REVISION   "200111160000Z"
    DESCRIPTION

```
          "Draft 1"
     ::= { dot1dBridge 11 }


-- ----------------------------------------------------------------
-- Addition to the dot1dStp group
-- ----------------------------------------------------------------

dot1dStpVersion OBJECT-TYPE
     SYNTAX       INTEGER {
                     stpCompatible(0),
                     rstp(2)
                 }
     MAX-ACCESS   read-write
     STATUS       current
     DESCRIPTION
         "The version of Spanning Tree Protocol the bridge is
          currently running.  The value 'stpCompatible(0)'
          indicates the Spanning Tree Protocol specified in
          IEEE 802.1D and 'rstp(2)' indicates the Rapid Spanning
          Tree Protocol specified in IEEE 802.1w.  New value may
          be defined as future versions of the protocol become
          available."
     REFERENCE
         "IEEE 802.1w clause 14.8.1, 17.12, 17.16.1"
     DEFVAL       { rstp }
     ::= { dot1dStp 16 }

dot1dStpTxHoldCount OBJECT-TYPE
     SYNTAX       INTEGER (1..10)
     MAX-ACCESS   read-write
     STATUS       current
     DESCRIPTION
         "The value used by the Port Transmit state machine to limit
          the maximum transmission rate."
     REFERENCE
         "IEEE 802.1w clause 17.16.6"
     DEFVAL       { 3 }
     ::= { dot1dStp 17 }

dot1dStpPathCostDefault OBJECT-TYPE
     SYNTAX       INTEGER {
                     stp8021d1998(1),
                     stp8021t2001(2)
                 }
     MAX-ACCESS   read-write
     STATUS       current
     DESCRIPTION
         "The version of the Spanning Tree default Path Costs that
```

```
        are to be used by this Bridge.  A value of 8021d1998(1)
        uses the 16-bit default Path Costs from IEEE Std. 802.1D-1998.
        A value of stp8021t2001(2) uses the 32-bit default Path
        Costs from IEEE Std. 802.1t."
    REFERENCE
        "IEEE 802.1D & 802.1t Table 8-5"
    ::= { dot1dStp 18 }

dot1dStpExtPortTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1dStpExtPortEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table that contains port-specific Rapid Spanning Tree
         information."
    ::= { dot1dStp 19 }

dot1dStpExtPortEntry OBJECT-TYPE
    SYNTAX      Dot1dStpExtPortEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A list of Rapid Spanning Tree information maintained by
         each port."
    AUGMENTS    { dot1dStpPortEntry }
    ::= { dot1dStpExtPortTable 1 }

Dot1dStpExtPortEntry ::=
    SEQUENCE {
        dot1dStpPortProtocolMigration
            TruthValue,
        dot1dStpPortAdminEdgePort
            TruthValue,
        dot1dStpPortOperEdgePort
            TruthValue,
        dot1dStpPortAdminPointToPoint
            INTEGER,
        dot1dStpPortOperPointToPoint
            TruthValue
    }

dot1dStpPortProtocolMigration OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "When operating in RSTP (version 2) mode, writing TRUE(1)
         to this object forces this port to transmit RSTP BPDUs.
```

          Any other operation on this object has no effect and
          it always returns FALSE(2) when read."
    REFERENCE
        "IEEE 802.1w clause 14.8.2.4, 17.18.10, 17.26"
    ::= { dot1dStpExtPortEntry 1 }

dot1dStpPortAdminEdgePort OBJECT-TYPE
    SYNTAX   TruthValue
    MAX-ACCESS read-write
    STATUS   current
    DESCRIPTION
        "The administrative value of the Edge Port parameter. A
         value of TRUE(1) indicates that this port should be
         assumed as an edge-port and a value of FALSE(2) indicates
         that this port should be assumed as a non-edge-port."
    REFERENCE
        "IEEE 802.1t clause 14.8.2, 18.3.3"
    ::= { dot1dStpExtPortEntry 2 }

dot1dStpPortOperEdgePort OBJECT-TYPE
    SYNTAX   TruthValue
    MAX-ACCESS read-only
    STATUS   current
    DESCRIPTION
        "The operational value of the Edge Port parameter. The
         object is initialized to the value of
         dot1dStpPortAdminEdgePort and is set FALSE on reception of
         a BPDU."
    REFERENCE
        "IEEE 802.1t clause 14.8.2, 18.3.4"
    ::= { dot1dStpExtPortEntry 3 }

dot1dStpPortAdminPointToPoint OBJECT-TYPE
    SYNTAX   INTEGER {
                    forceTrue(0),
                    forceFalse(1),
                    auto(2)
                 }
    MAX-ACCESS read-write
    STATUS   current
    DESCRIPTION
        "The administrative point-to-point status of the LAN segment
         attached to this port. A value of forceTrue(0) indicates that
         this port should always be treated as if it is connected to
         a point-to-point link. A value of forceFalse(1) indicates
         that this port should be treated as having a shared media
         connection. A value of auto(2) indicates that this port is
         considered to have a point-to-point link if it is an Aggregator

```
          and all of its members are aggregatable, or if the MAC entity
          is configured for full duplex operation, either through
          auto-negotiation or by management means."
    REFERENCE
        "IEEE 802.1w clause 6.4.3, 6.5, 14.8.2"
    ::= { dot1dStpExtPortEntry 4 }

dot1dStpPortOperPointToPoint OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The operational point-to-point status of the LAN segment
         attached to this port.  It indicates whether a port is
         considered to have a point-to-point connection or not.
         The value is determined by management or by auto-detection,
         as described in the dot1dStpPortAdminPointToPoint object."
    REFERENCE
        "IEEE 802.1w clause 6.4.3, 6.5, 14.8.2"
     ::= { dot1dStpExtPortEntry 5 }

-- ----------------------------------------------------------------
-- rstpMIB - Conformance Information
-- ----------------------------------------------------------------

rstpConformance OBJECT IDENTIFIER ::= { rstpMIB 1 }

rstpGroups OBJECT IDENTIFIER ::= { rstpConformance 1 }

rstpCompliances OBJECT IDENTIFIER ::= { rstpConformance 2 }


-- ----------------------------------------------------------------
-- Units of conformance
-- ----------------------------------------------------------------

rstpBridgeGroup OBJECT-GROUP
    OBJECTS {
        dot1dStpVersion,
        dot1dStpTxHoldCount
    }
    STATUS      current
    DESCRIPTION
        "Rapid Spanning Tree information for the bridge."
     ::= { rstpGroups 1 }

rstpDefaultPathCostGroup OBJECT-GROUP
    OBJECTS {
        dot1dStpPathCostDefault
```

```
    }
    STATUS      current
    DESCRIPTION
        "Default Spanning Tree path cost information."
    ::= { rstpGroups 2 }

rstpPortGroup OBJECT-GROUP
    OBJECTS {
        dot1dStpPortProtocolMigration,
        dot1dStpPortAdminEdgePort,
        dot1dStpPortOperEdgePort,
        dot1dStpPortAdminPointToPoint,
        dot1dStpPortOperPointToPoint
    }
    STATUS      current
    DESCRIPTION
        "Rapid Spanning Tree information for individual ports."
    ::= { rstpGroups 3 }

-- ----------------------------------------------------------------
-- Compliance statements
-- ----------------------------------------------------------------

rstpCompliance MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "The compliance statement for device support of bridging
         services."

    MODULE
        MANDATORY-GROUPS {
            rstpBridgeGroup,
            rstpPortGroup
        }

        GROUP rstpDefaultPathCostGroup
            DESCRIPTION
                "Support for this group is mandatory only if
                 both 16-bit and 32-bit Path Costs are supported."
    ::= { rstpCompliances 1 }

END
```

[5](#). **Definitions for U-BRIDGE-MIB**

U-BRIDGE-MIB DEFINITIONS ::= BEGIN

```
-- -----------------------------------------------------------------
-- MIB for IEEE 802.1u Restricted Group Registration
-- -----------------------------------------------------------------

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE
        FROM SNMPv2-SMI
    TruthValue, MacAddress
        FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
        FROM SNMPv2-CONF
    dot1dBridge, dot1dBasePort, dot1dBasePortEntry
        FROM BRIDGE-MIB
    dot1qPvid, dot1qVlan
        FROM Q-BRIDGE-MIB
    dot1dGmrp
        FROM P-BRIDGE-MIB;

uBridgeMIB MODULE-IDENTITY
    LAST-UPDATED "200111160000Z"
    ORGANIZATION "IETF Bridge MIB Working Group"
    CONTACT-INFO
        "Email: Bridge-mib@ietf.org"
    DESCRIPTION
        "The Bridge MIB Extension module for managing devices
         that allow control over dynamic VLAN registration through
         Restricted VLAN Registration as defined by IEEE 802.1u."
    REVISION    "200111160000Z"
    DESCRIPTION
        "Draft 1"
    ::= { dot1dBridge 12 }

-- -----------------------------------------------------------------
-- Augmentation to the dot1dGmrpTable
-- -----------------------------------------------------------------

dot1dExtPortGmrpTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1dExtPortGmrpEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table containing per port Restricted Group Registration
         control information."
    ::= { dot1dGmrp 2 }
```

```
dot1dExtPortGmrpEntry OBJECT-TYPE
    SYNTAX       Dot1dExtPortGmrpEntry
    MAX-ACCESS  not-accessible
    STATUS       current
    DESCRIPTION
        "Information controlling Group Registration for a port
         on the device.  This is indexed by dot1dBasePort."
    AUGMENTS { dot1dBasePortEntry }
    ::= { dot1dExtPortGmrpTable 1 }

Dot1dExtPortGmrpEntry ::=
    SEQUENCE {
        dot1dPortRestrictedGroupRegistration
            TruthValue,
        dot1dPortLastGroupFailed
            MacAddress,
        dot1dPortGmrpFailingReason
            INTEGER
    }

dot1dPortRestrictedGroupRegistration OBJECT-TYPE
    SYNTAX       TruthValue
    MAX-ACCESS  read-write
    STATUS       current
    DESCRIPTION
        "The state of Restricted Group Registration on this port.
         If the value of this control is true(1), then creation
         of a new dynamic entry is permitted only if there is a
         Static Filtering Entry for the VLAN concerned, in which
         the Registrar Administrative Control value is Normal
         Registration."
    REFERENCE
        "IEEE 802.1t clause 10.3.2.3, 14.10.1.3."
    DEFVAL       { false }
    ::= { dot1dExtPortGmrpEntry 1 }

dot1dPortLastGroupFailed OBJECT-TYPE
    SYNTAX       MacAddress
    MAX-ACCESS  accessible-for-notify
    STATUS       current
    DESCRIPTION
        "The MAC address of the Group GMRP failed to register
         on this port.  This object is accessible only through
         gmrpFailure notification."
    REFERENCE
        "IEEE 802.1t clause 14.10.1.2.3a."
    ::= { dot1dExtPortGmrpEntry 2 }
```

dot1dPortGmrpFailingReason OBJECT-TYPE
    SYNTAX   INTEGER {
                    lackOfResources(1),
                    registrationRestricted(2)
                }
    MAX-ACCESS accessible-for-notify
    STATUS   current
    DESCRIPTION
        "The reason for the last registration failure on this
         port. The value 'lackofResources(1)' indicates that
         GMRP failed due to lack of resources in the Filtering
         Database for the creation of a Group Registration
         Entry. The value 'registrationRestricted(2)'
         indicates that GMRP failed because dynamic group is
         restricted. This object is accessible only through
         gmrpFailure notification."
    REFERENCE
        "IEEE 802.1t clause 14.10.1.2.3c."
    ::= { dot1dExtPortGmrpEntry 3 }

-- --
-- Augmentation to the dot1qPortVlanTable
-- --

dot1qExtPortVlanTable OBJECT-TYPE
    SYNTAX   SEQUENCE OF Dot1qExtPortVlanEntry
    MAX-ACCESS not-accessible
    STATUS   current
    DESCRIPTION
        "A table containing per port Restricted VLAN Registration
         control information."
    ::= { dot1qVlan 11 }

dot1qExtPortVlanEntry OBJECT-TYPE
    SYNTAX   Dot1qExtPortVlanEntry
    MAX-ACCESS not-accessible
    STATUS   current
    DESCRIPTION
        "Information controlling VLAN Registration for a port
         on the device. This is indexed by dot1dBasePort."
    AUGMENTS { dot1dBasePortEntry }
    ::= { dot1qExtPortVlanTable 1 }

Dot1qExtPortVlanEntry ::=
    SEQUENCE {
        dot1qPortRestrictedVlanRegistration
            TruthValue,
        dot1qPortGvrpFailingReason

```
              INTEGER
       }

dot1qPortRestrictedVlanRegistration OBJECT-TYPE
     SYNTAX       TruthValue
     MAX-ACCESS   read-write
     STATUS       current
     DESCRIPTION
         "The state of Restricted VLAN Registration on this port.
          If the value of this control is true(1), then creation
          of a new dynamic VLAN entry is permitted only if there
          is a Static VLAN Registration Entry for the VLAN concerned,
          in which the Registrar Administrative Control value for
          this port is Normal Registration."
     REFERENCE
         "IEEE 802.1u clause 11.2.3.2.3, 12.10.1.7."
     DEFVAL       { false }
     ::= { dot1qExtPortVlanEntry 1 }

dot1qPortGvrpFailingReason OBJECT-TYPE
     SYNTAX       INTEGER {
                     lackOfResources(1),
                     registrationRestricted(2),
                     unsupportedVID(3)
                 }
     MAX-ACCESS   accessible-for-notify
     STATUS       current
     DESCRIPTION
         "The reason for the last registration failure on this
          port.  The value 'lackofResources(1)' indicates that
          GVRP failed due to lack of resources in the Filtering
          Database for the creation of a VLAN Registration
          Entry.  The value 'registrationRestricted(2)' indicates
          that GVRP failed because dynamic VLAN registration is
          restricted.  And the value 'unsupportedVID(3)'
          indicates that a registration request for an
          unsupported VID is received."
     REFERENCE
         "IEEE 802.1u clause 12.10.1.6.3c."
      ::= { dot1qExtPortVlanEntry 2 }


-- Traps for Registration Failures

gmrpFailure NOTIFICATION-TYPE
     OBJECTS   { dot1dPortLastGroupFailed,
                 dot1dBasePort,
                 dot1dPortGmrpFailingReason }
```

```
    STATUS      current
    DESCRIPTION
        "The trap that is generated when there is a GMRP
         failure.  dot1dPortLastGroupFailed indicates the
         MAC address of the Group that has failed to be
         registered, dot1dBasePort indicates the port on
         which the registration is received, and
         dot1dPortGmrpFailingReason indicates the reason for
         the failure."
    REFERENCE
        "IEEE 802.1t 14.10.1.2."
    ::= { dot1dBridge 0 3 }

gvrpFailure NOTIFICATION-TYPE
    OBJECTS   { dot1qPvid,
                dot1dBasePort,
                dot1qPortGvrpFailingReason }
    STATUS      current
    DESCRIPTION
        "The trap that is generated when there is a GVRP
         failure.  dot1qPvid indicates the VID of he VLAN
         that GVRP has failed to register, dot1dBasePort
         indicates the port on which the registration is
         received, and dot1qPortGvrpFailingReason indicates
         the reason for the failure."
    REFERENCE
        "IEEE 802.1t 12.10.1.6."
     ::= { dot1dBridge 0 4 }

-- ------------------------------------------------------------------
-- uBridgeMIB - Conformance Information
-- ------------------------------------------------------------------

uBridgeConformance OBJECT IDENTIFIER ::= { uBridgeMIB 1 }

uBridgeGroups OBJECT IDENTIFIER ::= { uBridgeConformance 1 }

uBridgeCompliances OBJECT IDENTIFIER ::= { uBridgeConformance 2 }

-- ------------------------------------------------------------------
-- Units of conformance
-- ------------------------------------------------------------------

uBridgePortVlanGroup OBJECT-GROUP
    OBJECTS {
        dot1qPortRestrictedVlanRegistration,
        dot1qPortGvrpFailingReason
    }
```

```
    STATUS      current
    DESCRIPTION
        "Per-port Restricted VLAN Registration Control parameter"
    ::= { uBridgeGroups 1 }

uBridgePortGmrpGroup OBJECT-GROUP
    OBJECTS {
        dot1dPortRestrictedGroupRegistration,
        dot1dPortLastGroupFailed,
        dot1dPortGmrpFailingReason
    }
    STATUS      current
    DESCRIPTION
        "Per-port Restricted Group Registration Control parameter"
    ::= { uBridgeGroups 2 }

uBridgeTrapGroup NOTIFICATION-GROUP
    NOTIFICATIONS {
        gmrpFailure,
        gvrpFailure
    }
    STATUS      current
    DESCRIPTION
        "GMRP and GVRP notifications"
    ::= { uBridgeGroups 3 }

-- ----------------------------------------------------------------
-- Compliance statements
-- ----------------------------------------------------------------

uBridgeCompliance MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "The compliance statement for device support of bridging
         services."

    MODULE
        GROUP uBridgePortVlanGroup
        DESCRIPTION
            "Support for this object group is optional."

        GROUP uBridgePortGmrpGroup
        DESCRIPTION
            "Support for this object group is optional."

        GROUP uBridgeTrapGroup
        DESCRIPTION
            "Support for this notification group is optional."
```

```
        ::= { uBridgeCompliances 1 }

END
```

[6](#). Definitions for V-BRIDGE-MIB

```
V-BRIDGE-MIB DEFINITIONS ::= BEGIN

-- ------------------------------------------------------------------
-- MIB for IEEE 802.1v VLAN Classification by Protocol and Port
-- ------------------------------------------------------------------

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE
        FROM SNMPv2-SMI
    MODULE-COMPLIANCE, OBJECT-GROUP
        FROM SNMPv2-CONF
    dot1dBridge, dot1dBasePort
        FROM BRIDGE-MIB;

vBridgeMIB MODULE-IDENTITY
    LAST-UPDATED "200106300000Z"
    ORGANIZATION "IETF Bridge MIB Working Group"
    CONTACT-INFO
        "Email: Bridge-mib@ietf.org"
    DESCRIPTION
        "The Bridge MIB Extension module for managing devices
         that support VLAN Classification by Protocol and Port
         defined in IEEE 802.1v."
    REVISION     "200106300000Z"
    DESCRIPTION
         "Draft 0"
    ::= { dot1dBridge 13 }

vBridgeMIBObjects OBJECT IDENTIFIER ::= { vBridgeMIB 1 }

-- ----------------------------------------------------------------
-- group in this MIB
-- ----------------------------------------------------------------

dot1vProtocol OBJECT IDENTIFIER ::= { vBridgeMIBObjects 1 }

-- ----------------------------------------------------------------
-- dot1vProtocol group
-- ----------------------------------------------------------------

dot1vProtocolGroupTable OBJECT-TYPE
```

```
    SYNTAX       SEQUENCE OF Dot1vProtocolGroupEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "A table that contains mappings from Protocol
         Templates to Protocol Group Identifiers used for
         Port-and-Protocol-based VLAN Classification."
    REFERENCE
        "IEEE 802.1v clause 8.6.4"
    ::= { dot1vProtocol 1 }

dot1vProtocolGroupEntry OBJECT-TYPE
    SYNTAX       Dot1vProtocolGroupEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "A mapping from a Protocol Template to a Protocol
         Group Identifier."
    INDEX        { dot1vProtocolTemplateFrameType,
                   dot1vProtocolTemplateProtocolValue }
    ::= { dot1vProtocolGroupTable 1 }

Dot1vProtocolGroupEntry ::=
    SEQUENCE {
        dot1vProtocolTemplateFrameType
            INTEGER,
        dot1vProtocolTemplateProtocolValue
            OCTET STRING,
        dot1vProtocolGroupId
            INTEGER
    }

dot1vProtocolTemplateFrameType OBJECT-TYPE
    SYNTAX       INTEGER {
                    ethernet  (1),
                    rfc1042   (2),
                    snap8021H (3),
                    snapOther (4),
                    llcOther  (5)
                 }
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "The data-link encapsulation format or the
         'detagged_frame_type' in a Protocol Template."
    REFERENCE
        "IEEE 802.1v clause 8.6.2"
    ::= { dot1vProtocolGroupEntry 1 }
```

dot1vProtocolTemplateProtocolValue OBJECT-TYPE
    SYNTAX   OCTET STRING (SIZE (2 | 5))
    MAX-ACCESS not-accessible
    STATUS   current
    DESCRIPTION
        "The identification of the protocol above the data-link
         layer in a Protocol Template. Depending on the
         frame type, the octet string will have one of the
         following values:

         For 'ethernet', 'rfc1042' and 'snap8021H',
             this is the 16-bit (2-octet) IEEE 802.3 Type Field.
         For 'snapOther',
             this is the 40-bit (5-octet) PID.
         For 'llcOther',
             this is the 2-octet IEEE 802.2 LSAP pair:
             first octet for DSAP and second octet for SSAP."
    REFERENCE
        "IEEE 802.1v clause 8.6.2"
    ::= { dot1vProtocolGroupEntry 2 }

dot1vProtocolGroupId OBJECT-TYPE
    SYNTAX   INTEGER (0..2147483647)
    MAX-ACCESS read-create
    STATUS   current
    DESCRIPTION
        "Represents a group of protocols that are associated
         together when assigning a VID to a frame."
    REFERENCE
        "IEEE 802.1v clause 8.6.3, 12.10.2.1"
    ::= { dot1vProtocolGroupEntry 3 }

dot1vProtocolPortTable OBJECT-TYPE
    SYNTAX   SEQUENCE OF Dot1vProtocolPortEntry
    MAX-ACCESS not-accessible
    STATUS   current
    DESCRIPTION
        "A table that contains VID sets used for
         Port-and-Protocol-based VLAN Classification."
    REFERENCE
        "IEEE 802.1v clause 8.4.4"
    ::= { dot1vProtocol 2 }

dot1vProtocolPortEntry OBJECT-TYPE
    SYNTAX   Dot1vProtocolPortEntry
    MAX-ACCESS not-accessible
    STATUS   current
    DESCRIPTION

```
         "A VID set for a port."
    INDEX        { dot1dBasePort,
                   dot1vProtocolPortGroupId }
    ::= { dot1vProtocolPortTable 1 }

Dot1vProtocolPortEntry ::=
    SEQUENCE {
        dot1vProtocolPortGroupId
            INTEGER,
        dot1vProtocolPortGroupVid
            INTEGER
    }

dot1vProtocolPortGroupId OBJECT-TYPE
    SYNTAX        INTEGER (1..2147483647)
    MAX-ACCESS   not-accessible
    STATUS        current
    DESCRIPTION
        "Designates a group of protocols in the Protocol
         Group Database."
    REFERENCE
        "IEEE 802.1v clause 8.6.3, 12.10.1.2"
    ::= { dot1vProtocolPortEntry 1 }

dot1vProtocolPortGroupVid OBJECT-TYPE
    SYNTAX        INTEGER (1..4094)
    MAX-ACCESS   read-create
    STATUS        current
    DESCRIPTION
        "The VID associated with a group of protocols for
         each port."
    REFERENCE
        "IEEE 802.1v clause 8.4.4, 12.10.1.2"
    ::= { dot1vProtocolPortEntry 2 }

-- ----------------------------------------------------------------
-- vBridgeMIB - Conformance Information
-- ----------------------------------------------------------------

vBridgeConformance OBJECT IDENTIFIER ::= { vBridgeMIB 2 }

vBridgeGroups OBJECT IDENTIFIER ::= { vBridgeConformance 1 }

vBridgeCompliances OBJECT IDENTIFIER ::= { vBridgeConformance 2 }

-- ----------------------------------------------------------------
-- Units of conformance
-- ----------------------------------------------------------------
```

vBridgeDeviceGroup OBJECT-GROUP
    OBJECTS {
        dot1vProtocolGroupId
    }
    STATUS   current
    DESCRIPTION
        "VLAN classification information for the bridge."
    ::= { vBridgeGroups 1 }

vBridgePortGroup OBJECT-GROUP
    OBJECTS {
        dot1vProtocolPortGroupVid
    }
    STATUS   current
    DESCRIPTION
        "VLAN classification information for individual ports."
    ::= { vBridgeGroups 2 }

-- --
-- Compliance statements
-- --

vBridgeCompliance MODULE-COMPLIANCE
    STATUS   current
    DESCRIPTION
        "The compliance statement for device support of bridging
         services."

    MODULE
        MANDATORY-GROUPS {
            vBridgeDeviceGroup,
            vBridgePortGroup
        }
    ::= { vBridgeCompliances 1 }

END

7. Acknowledgments

   This document was produced on behalf of the Bridge MIB Working Group
   in the Operations and Management area of the Internet Engineering
   Task Force.

   The authors wish to thank the members of the Bridge MIB Working Group
   and Anders SW Christensen in particular for their comments and
   suggestions which improved this effort.

8. Security Considerations

   There are a number of management objects defined in this MIB that
   have 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.

   SNMPv1 by itself is not a secure environment. Even if the network
   itself is secure (for example by using IPSec), even then, there is no
   control as to who on the secure network is allowed to access and
   GET/SET (read/change/create/delete) the objects in this MIB.

   It is recommended that the implementers consider the security
   features as provided by the SNMPv3 framework. Specifically, the use
   of the User-based Security Model [USM] and the View-based Access
   Control Model [VACM] is recommended.

9. References

[RFC2571]   Harrington, D., Presuhn, R., and B. Wijnen, An Architecture
             for Describing SNMP Management Frameworks, RFC 2571, April
             1999.

[RFC1155]   Rose, M., and K. McCloghrie, Structure and Identification
             of Management Information for TCP/IP-based Internets, STD
             16, RFC 1155, May 1990.

[RFC1212]   Rose, M., and K. McCloghrie, Concise MIB Definitions, STD
             16, RFC 1212, March 1991.

[RFC1215]   M. Rose, A Convention for Defining Traps for use with the
             SNMP, RFC 1215, March 1991.

[RFC2578]   McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J.,
             Rose, M., and S. Waldbusser, Structure of Management
             Information Version 2 (SMIv2), STD 58, RFC 2578, April
             1999.

[RFC2579]   McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J.,
             Rose, M., and S. Waldbusser, Textual Conventions for SMIv2,
             STD 58, RFC 2579, April 1999.

[RFC2580]   McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J.,
             Rose, M., and S. Waldbusser, Conformance Statements for
             SMIv2, STD 58, RFC 2580, April 1999.

[RFC1157]   Case, J., Fedor, M., Schoffstall, M., and J. Davin, Simple
             Network Management Protocol, STD 15, RFC 1157, May 1990.

[RFC1901]   Case, J., McCloghrie, K., Rose, M., and S. Waldbusser,
             Introduction to Community-based SNMPv2, RFC 1901, January
             1996.

[RFC1906]   Case, J., McCloghrie, K., Rose, M., and S. Waldbusser,
             Transport Mappings for Version 2 of the Simple Network
             Management Protocol (SNMPv2), RFC 1906, January 1996.

[RFC2572]   Case, J., Harrington D., Presuhn R., and B. Wijnen, Message
             Processing and Dispatching for the Simple Network
             Management Protocol (SNMP), RFC 2572, April 1999.

[RFC2574]   Blumenthal, U., and B. Wijnen, User-based Security Model
             (USM) for version 3 of the Simple Network Management
             Protocol (SNMPv3), RFC 2574, April 1999.

[RFC1905]   Case, J., McCloghrie, K., Rose, M., and S. Waldbusser,
             Protocol Operations for Version 2 of the Simple Network
             Management Protocol (SNMPv2), RFC 1905, January 1996.

[RFC2573]   Levi, D., Meyer, P., and B. Stewart, SNMPv3 Applications,
             RFC 2573, April 1999.

[RFC2575]   Wijnen, B., Presuhn, R., and K. McCloghrie, View-based
             Access Control Model (VACM) for the Simple Network
             Management Protocol (SNMP), RFC 2575, April 1999.

[RFC2570]   Case, J., Mundy, R., Partain, D., and B. Stewart,
             Introduction to Version 3 of the Internet-standard Network
             Management Framework, RFC 2570, April 1999.

[RFC2674]   Bell, E., Smith, A., Langille, P., Rijhsinghani, A. and
             McCloghrie, "Definitions of Managed Objects for Bridges
             with Traffic Classes, Multicast Filtering and Virtual LAN
             Extensions", RFC 2674, August 1999.

[802.1D]   "Information technology - Telecommunications and
             information exchange between systems - Local and
             metropolitan area networks - Common specifications - Part
             3: Media Access Control (MAC) Bridges: Revision. This is
             a revision of ISO/IEC 10038: 1993, 802.1j-1992 and 802.6k-
             1992. It incorporates P802.11c, P802.1p and P802.12e."
             ISO/IEC 15802-3: 1998.

[802.1Q]   ANSI/IEEE Standard 802.1Q, "IEEE Standards for Local and
             Metropolitan Area Networks: Virtual Bridged Local Area
             Networks", 1998.

[BRIDGEMIB] Decker, E., Langille, P., Rijsinghani, A. and K.
             McCloghrie, "Definitions of Managed Objects for Bridges",
             RFC 1493, July 1993.

[802.1t]   IEEE 802.1t-2001, "(Amendment to IEEE Standard 802.1D) IEEE
             Standard for Information technology - Telecommunications
             and information exchange between systems - Local and
             metropolitan area networks - Common specifications - Part
             3: Media Access Control (MAC) Bridges: Technical and
             Editorial Corrections".

[802.1u]   IEEE 802.1u-2001, "(Amendment to IEEE Standard 802.1Q) IEEE
             Standard for Local and metropolitan area networks - Virtual
             Bridged Local Area Networks - Amendment 1: Technical and
             editorial corrections".

[802.1v]   IEEE 802.1v-2001, "(Amendment to IEEE Standard 802.1Q) IEEE
            Standards for Local and Metropolitan Area Networks: Virtual
            Bridged Local Area Networks--Amendment 2: VLAN
            Classification by Protocol and Port".

[802.1w]   IEEE 802.1w-2001, "(Amendment to IEEE Standard 802.1D) IEEE
            Standard for Information technology--Telecommunications and
            information exchange between systems--Local and
            metropolitan area networks--Common Specifications--Part 3:
            Media Access Control (MAC) Bridges: Rapid Reconfiguation".

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