Network Working Group
Request for Comments: 4363
Obsoletes: 2674
Category: Standards Track

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January 2006

Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering, and Virtual LAN Extensions

Status of This Memo

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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 two MIB modules for managing the capabilities of MAC bridges defined by the IEEE 802.1D-1998 (TM) MAC Bridges and the IEEE 802.1Q-2003 (TM) Virtual LAN (VLAN) standards for bridging between Local Area Network (LAN) segments. One MIB module defines objects for managing the 'Traffic Classes' and 'Enhanced Multicast Filtering' components of IEEE 802.1D-1998 and P802.1t-2001 (TM). The other MIB module defines objects for managing VLANs, as specified in IEEE 802.1Q-2003, P802.1u (TM), and P802.1v (TM).

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 supplements RFC 4188 and obsoletes RFC 2674.

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1. 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].

2. Overview

A common device present in many networks is 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'.

The transparent method of bridging is defined by IEEE 802.1D-1998 [802.1D]. Managed objects for transparent bridging are defined in the BRIDGE-MIB [BRIDGE-MIB].

The original IEEE 802.1D is augmented by IEEE 802.1Q-2003 [802.1Q] to provide support for 'virtual bridged LANs' where a single bridged physical LAN network may be used to support multiple logical bridged LANs, each of which offers a service approximately the same as that defined by IEEE 802.1D. Such virtual LANs (VLANs) are an integral feature of switched LAN networks. A VLAN can be viewed as a group of end-stations on multiple LAN segments and can communicate as if they were on a single LAN. IEEE 802.1Q defines port-based Virtual LANs where membership is determined by the bridge port on which data frames are received, and port-and-protocol-based Virtual LANs where membership is determined by the bridge port on which frames are received and the protocol identifier of the frame. This memo defines the objects needed for the management of port-based VLANs in bridge entities.

This memo supplements RFC 4188 [BRIDGE-MIB] and obsoletes RFC 2674 [RFC2674].

2.1. Scope

The MIB modules defined in this document include a comprehensive set of managed objects that attempts to match the set defined in IEEE 802.1D and IEEE 802.1Q. However, to be consistent with the spirit of

the SNMP Framework, a subjective judgement was made to omit the objects from those standards most 'costly' to implement in an agent and least 'essential' for fault and configuration management. The omissions are described in Section 3 below.

Historical note:

The original BRIDGE-MIB [RFC1493] used the following principles for determining inclusion of an object in the BRIDGE-MIB module:

(1) Start with a small set of essential objects and add only as further objects are needed.

(2) Require that objects be essential for either fault or configuration management.

(3) Consider evidence of current use and/or utility.

(4) Limit the total number of objects.

(5) Exclude objects that are simply derivable from others in this or other MIBs.

(6) Avoid causing critical sections to be heavily instrumented. The guideline that was followed is one counter per critical section per layer.

3. Structure of MIBs

This document defines objects that supplement those in the BRIDGE-MIB module [BRIDGE-MIB]. Section 3.4.3 of the present document contains some recommendations regarding usage of objects in the BRIDGE-MIB by devices implementing the enhancements defined here.

An extended bridge MIB module P-BRIDGE-MIB defines managed objects for the traffic class and multicast filtering enhancements defined by IEEE 802.1D-1998 [802.1D], including the Restricted Group Registration control defined by IEEE P802.1t [802.1t].

A virtual bridge MIB module Q-BRIDGE-MIB defines managed objects for the Virtual LAN bridging enhancements defined by IEEE 802.1Q-2003 [802.1Q], including the Restricted VLAN Registration control, defined by IEEE P802.1u [802.1u], and the VLAN Classification by Protocol and Port enhancement, defined by IEEE P802.1v [802.1v].

3.1. Structure of Extended Bridge MIB Module

Objects in this MIB are arranged into subtrees. Each subtree is organized as a set of related objects. The overall structure and assignment of objects to their subtrees is shown below.

3.1.1. Relationship to IEEE 802.1D-1998 Manageable Objects

This section contains a cross-reference to the objects defined in IEEE 802.1D-1998 [802.1D]. It also details those objects that are not considered necessary in this MIB module.

Some objects defined by IEEE 802.1D-1998 have been included in the virtual bridge MIB module rather than this one: entries in dot1qTpGroupTable, dot1qForwardAllTable, and dot1qForwardUnregisteredTable are required for virtual bridged LANs with additional indexing (e.g., per-VLAN, per-Filtering-Database (per-FDB)) and so are not defined here. Instead, devices that do not implement virtual bridged LANs but do implement the Extended Forwarding Services defined by IEEE 802.1D (i.e., dynamic learning of multicast group addresses and group service requirements in the filtering database) should implement these tables with a fixed value for dot1qFdbId (the value 1 is recommended) or dot1qVlanIndex (the value 1 is recommended). Devices that support Extended Filtering Services should support dot1qTpGroupTable, dot1qForwardAllTable, and dot1qForwardUnregisteredTable.

Extended Bridge MIB Name	IEEE 802.1D-1998 Name
dot1dExtBase	Bridge
dot1dDeviceCapabilities	
dot1dExtendedFilteringServices	
dot1dTrafficClasses	
dot1dTrafficClassesEnabled	
dot1dGmrpStatus	.ApplicantAdministrativeControl
dot1dPriority	
dot1dPortPriorityTable	
dot1dPortDefaultUserPriority	.UserPriority
dot1dPortNumTrafficClasses	
dot1dUserPriorityRegenTable	.UserPriorityRegenerationTable
dot1dUserPriority	
dot1dRegenUserPriority	
dot1dTrafficClassTable	.TrafficClassTable
dot1dTrafficClassPriority	
dot1dTrafficClass	
dot1dPortOutboundAccessPriorityTable	.OutboundAccessPriorityTable
dot1dPortOutboundAccessPriority	

```
dot1dGarp
  dot1dPortGarpTable
    dot1dPortGarpJoinTime            .JoinTime
    dot1dPortGarpLeaveTime           .LeaveTime
    dot1dPortGarpLeaveAllTime        .LeaveAllTime
dot1dGmrp
  dot1dPortGmrpTable
    dot1dPortGmrpStatus             .ApplicantAdministrativeControl
    dot1dPortGmrpFailedRegistrations .FailedRegistrations
    dot1dPortGmrpLastPduOrigin       .OriginatorOfLastPDU
    dot1dPortRestrictedGroupRegistration
                                     Restricted Group Registration
                                     (Ref. IEEE 802.1t 10.3.2.3)
dot1dTp
  dot1dTpHCPortTable
    dot1dTpHCPortInFrames            .BridgePort.FramesReceived
    dot1dTpHCPortOutFrames             .ForwardOutBound
    dot1dTpHCPortInDiscards            .DiscardInbound
  dot1dTpPortOverflowTable
    dot1dTpPortInOverflowFrames      .BridgePort.FramesReceived
    dot1dTpPortOutOverflowFrames       .ForwardOutBound
    dot1dTpPortInOverflowDiscards      .DiscardInbound
```

The following IEEE 802.1D-1998 management objects have not been included in the Bridge MIB for the indicated reasons.

IEEE 802.1D-1998 Object	Disposition
Bridge.StateValue	not considered useful
Bridge.ApplicantAdministrativeControl	not provided per-attribute (e.g., per-VLAN, per-Group). Only per-{device,port,application} control is provided in this MIB.
notify group registration failure (IEEE 802.1t 14.10.1.2)	not considered useful

3.1.2. Relationship to IEEE 802.1Q Manageable Objects

This section contains section number cross-references to manageable objects defined in IEEE 802.1Q-2003 [802.1Q]. These objects have been included in this MIB as they provide a natural fit with the IEEE 802.1D objects with which they are co-located.

```
Extended Bridge MIB Name            IEEE 802.1Q-2003 Section and Name

dot1dExtBase                        Bridge
  dot1dDeviceCapabilities
    dot1qStaticEntryIndividualPort   5.2 implementation options
    dot1qIVLCapable
    dot1qSVLCapable
    dot1qHybridCapable
    dot1qConfigurablePvidTagging     12.10.1.1 read bridge vlan
                                               config
    dot1dLocalVlanCapable
  dot1dPortCapabilitiesTable
    dot1dPortCapabilities
      dot1qDot1qTagging              5.2 implementation options
      dot1qConfigurableAcceptableFrameTypes
                                     5.2 implementation options
      dot1qIngressFiltering          5.2 implementation options
```

3.1.3. The dot1dExtBase Subtree

This subtree contains the objects that are applicable to all bridges implementing the traffic class and multicast filtering features of IEEE 802.1D-1998 [802.1D]. It includes per-device configuration of Generic Attribute Registration Protocol (GARP) and GARP Multicast Registration Protocol (GMRP) protocols.

3.1.4. The dot1dPriority Subtree

This subtree contains the objects for configuring and reporting status of priority-based queuing mechanisms in a bridge. This includes per-port user_priority treatment, mapping of user_priority in frames into internal traffic classes, and outbound user_priority and access_priority.

3.1.5. The dot1dGarp Subtree

This subtree contains the objects for configuring and reporting on operation of the Generic Attribute Registration Protocol (GARP).

3.1.6. The dot1dGmrp Subtree

This subtree contains the objects for configuring and reporting on operation of the GARP Multicast Registration Protocol (GMRP).

3.1.7. The dot1dTpHCPortTable

This table extends the dot1dTp subtree from the BRIDGE-MIB [BRIDGE-MIB] and contains the objects for reporting port-bridging statistics for high-capacity network interfaces.

3.1.8. The dot1dTpPortOverflowTable

This table extends the dot1dTp subtree from the BRIDGE-MIB [BRIDGE-MIB] and contains the objects for reporting the upper bits of port-bridging statistics for high-capacity network interfaces for when 32-bit counters are inadequate.

3.2. Structure of Virtual Bridge MIB module

Objects in this MIB are arranged into subtrees. Each subtree is organized as a set of related objects. The overall structure and assignment of objects to their subtrees is shown below. Some manageable objects defined in the BRIDGE-MIB [BRIDGE-MIB] need to be indexed differently when they are used in a VLAN bridging environment: these objects are, therefore, effectively duplicated by new objects with different indexing, which are defined in the Virtual Bridge MIB.

3.2.1. Relationship to IEEE 802.1Q Manageable Objects

This section contains section-number cross-references to manageable objects defined in clause 12 of IEEE 802.1Q-2003 [802.1Q]. It also details those objects that are not considered necessary in this MIB module.

Note: Unlike IEEE 802.1D-1998, IEEE 802.1Q-2003 [802.1Q] did not define exact syntax for a set of managed objects. The following cross-references indicate the section numbering of the descriptions of management operations from clause 12 in the latter document.

Virtual Bridge MIB object	IEEE 802.1Q-2003 Reference
dot1qBase	
dot1qVlanVersionNumber	12.10.1.1 read bridge vlan config
dot1qMaxVlanId	12.10.1.1 read bridge vlan config
dot1qMaxSupportedVlans	12.10.1.1 read bridge vlan config
dot1qNumVlans	
dot1qGvrpStatus	12.9.2.1/2 read/set garp applicant controls
dot1qTp	
dot1qFdbTable	
dot1qFdbId	

```
      dot1qFdbDynamicCount          12.7.1.1.3 read filtering d/base
    dot1qTpFdbTable
      dot1qTpFdbAddress
      dot1qTpFdbPort
      dot1qTpFdbStatus
    dot1qTpGroupTable               12.7.7.1 read filtering entry
      dot1qTpGroupAddress
      dot1qTpGroupEgressPorts
      dot1qTpGroupLearnt
    dot1qForwardAllTable            12.7.7.1 read filtering entry
      dot1qForwardAllPorts
      dot1qForwardAllStaticPorts
      dot1qForwardAllForbiddenPorts
    dot1qForwardUnregisteredTable   12.7.7.1 read filtering entry
      dot1qForwardUnregisteredPorts
      dot1qForwardUnregisteredStaticPorts
      dot1qForwardUnregisteredForbiddenPorts
  dot1qStatic
    dot1qStaticUnicastTable         12.7.7.1 create/delete/read
                                             filtering entry
                                    12.7.6.1 read permanent database
      dot1qStaticUnicastAddress
      dot1qStaticUnicastReceivePort
      dot1qStaticUnicastAllowedToGoTo
      dot1qStaticUnicastStatus
    dot1qStaticMulticastTable       12.7.7.1 create/delete/read
                                             filtering entry
                                    12.7.6.1 read permanent database
      dot1qStaticMulticastAddress
      dot1qStaticMulticastReceivePort
      dot1qStaticMulticastStaticEgressPorts
      dot1qStaticMulticastForbiddenEgressPorts
      dot1qStaticMulticastStatus
  dot1qVlan
    dot1qVlanNumDeletes
    dot1qVlanCurrentTable           12.10.2.1 read vlan configuration
                                    12.10.3.5 read VID to FID
                                              allocations
                                    12.10.3.6 read FID allocated to
                                              VID
                                    12.10.3.7 read VIDs allocated to
                                              FID
      dot1qVlanTimeMark
      dot1qVlanIndex
      dot1qVlanFdbId
      dot1qVlanCurrentEgressPorts
      dot1qVlanCurrentUntaggedPorts
      dot1qVlanStatus
```

```
      dot1qVlanCreationTime
    dot1qVlanStaticTable            12.7.7.1/2/3 create/delete/read
                                                 filtering entry
                                    12.7.6.1 read permanent database
                                    12.10.2.2 create vlan config
                                    12.10.2.3 delete vlan config
      dot1qVlanStaticName           12.4.1.3 set bridge name
      dot1qVlanStaticEgressPorts
      dot1qVlanForbiddenEgressPorts
      dot1qVlanStaticUntaggedPorts
      dot1qVlanStaticRowStatus
    dot1qNextFreeLocalVlanIndex
    dot1qPortVlanTable              12.10.1.1 read bridge vlan
                                              configuration
      dot1qPvid                     12.10.1.2 configure PVID values
      dot1qPortAcceptableFrameTypes 12.10.1.3 configure acceptable
                                              frame types parameter
      dot1qPortIngressFiltering     12.10.1.4 configure ingress
                                              filtering parameters
      dot1qPortGvrpStatus           12.9.2.2 read/set garp applicant
                                              controls
      dot1qPortGvrpFailedRegistrations
      dot1qPortGvrpLastPduOrigin
      dot1qPortRestrictedVlanRegistration
                                    IEEE 802.1u 11.2.3.2.3
                                         Restricted VLAN Registration
    dot1qPortVlanStatisticsTable    12.6.1.1 read forwarding port
                                              counters
      dot1qTpVlanPortInFrames
      dot1qTpVlanPortOutFrames
      dot1qTpVlanPortInDiscards
      dot1qTpVlanPortInOverflowFrames
      dot1qTpVlanPortOutOverflowFrames
      dot1qTpVlanPortInOverflowDiscards
    dot1qPortVlanHCStatisticsTable  12.6.1.1 read forwarding port
                                              counters
      dot1qTpVlanPortHCInFrames
      dot1qTpVlanPortHCOutFrames
      dot1qTpVlanPortHCInDiscards
    dot1qLearningConstraintsTable   12.10.3.1/3/4 read/set/delete
                                            vlan learning constraints
                                    12.10.3.2 read vlan learning
                                            constraints for VID
      dot1qConstraintVlan
      dot1qConstraintSet
      dot1qConstraintType
      dot1qConstraintStatus
    dot1qConstraintSetDefault
```

```
    dot1qConstraintTypeDefault

  dot1vProtocol                       IEEE 802.1v Reference:
    dot1vProtocolGroupTable             8.6.4 Protocol Group Database,
                                        8.6.2 Protocol Template
      dot1vProtocolTemplateFrameType
      dot1vProtocolTemplateProtocolValue
      dot1vProtocolGroupId              8.6.3 Protocol Group Identifier
      dot1vProtocolGroupRowStatus
    dot1vProtocolPortTable              8.4.4 VID Set for each Port
      dot1vProtocolPortGroupId
      dot1vProtocolGroupVid
      dot1vProtocolPortRowStatus
```

The following IEEE 802.1Q management objects have not been included in the Bridge MIB for the indicated reasons.

IEEE 802.1Q-2003 Operation	Disposition
reset bridge (12.4.1.4)	not considered useful
reset vlan bridge (12.10.1.5)	not considered useful
read forwarding port counters (12.6.1.1)	
discard on error details	not considered useful
read permanent database (12.7.6.1)	
permanent database size	not considered useful
number of static filtering entries	count rows in dot1qStaticUnicastTable + dot1qStaticMulticastTable
number of static VLAN registration entries	count rows in dot1qVlanStaticTable
read filtering entry range (12.7.7.4)	use GetNext operation.
read filtering database (12.7.1.1)	
filtering database size	not considered useful
number of dynamic group address entries (12.7.1.3)	count rows applicable to each FDB in dot1dTpGroupTable
read garp state (12.9.3.1)	not considered useful
notify vlan registration failure (12.10.1.6)	not considered useful

notify learning constraint violation (12.10.3.10)	not considered useful

3.2.2. The dot1qBase Subtree

This subtree contains the objects that are applicable to all bridges implementing IEEE 802.1Q virtual LANs.

3.2.3. The dot1qTp Subtree

This subtree contains objects that control the operation and report the status of transparent bridging. This includes management of the dynamic Filtering Databases for both unicast and multicast forwarding. This subtree will be implemented by all bridges that perform destination-address filtering.

3.2.4. The dot1qStatic Subtree

This subtree contains objects that control static configuration information for transparent bridging. This includes management of the static entries in the Filtering Databases for both unicast and multicast forwarding.

3.2.5. The dot1qVlan Subtree

This subtree contains objects that control configuration and report status of the Virtual LANs known to a bridge. This includes management of the statically configured VLANs as well as reporting VLANs discovered by other means (e.g., GARP VLAN Registration Protocol (GVRP)). It also controls configuration and reports status of per-port objects relating to VLANs and reports traffic statistics. It also provides for management of the VLAN Learning Constraints.

3.3. Textual Conventions

Various Working Groups have defined standards-track MIB documents (for example, [RFC2613] and [RFC3318]), that contain objects and Textual Conventions to represent a Virtual Local Area Network Identifier (VLAN-ID) [802.1Q]. New definitions are showing up in various documents (for example, [RFC4323] and [RFC4149]). Unfortunately, the result is a set of different definitions for the same piece of management information. This may lead to confusion and unnecessary complexity. In order to address this situation, three new textual conventions are defined in the Q-BRIDGE-MIB, called VlanIdOrAny, VlanIdOrNone, and VlanIdOrAnyOrNone. These new textual conventions should be (re)used in MIB modules so that they all represent a VLAN-ID in the same way.

These textual conventions provide a means to specify MIB objects that refer to a specific VLAN, to any VLAN, or to no VLAN. For an example of how these textual conventions might be used, consider a MIB object, with SYNTAX of VlanIdOrAnyOrNone, that specifies the VLAN on which to accept incoming packets of a particular protocol. Such an object would allow the device to be configured to accept packets of this protocol received with a specific 802.1q tag value, with any 802.1q tag value, or with no 802.1q tag. Note that a MIB object that is defined using one of these textual conventions should clarify the meaning of 'any VLAN' and/or 'no VLAN' in its DESCRIPTION clause.

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 module.

3.4.1. Relationship to the SNMPv2-MIB

The SNMPv2-MIB [RFC3418] defines objects that are generally applicable to managed devices. These objects apply to the device as a whole, irrespective of whether bridging is the device's sole functionality or only a subset of the device's functionality.

Full support for the 802.1D management objects requires that the SNMPv2-MIB objects sysDescr and sysUpTime be implemented. Note that compliance to the current SNMPv2-MIB module requires additional objects and notifications to be implemented as specified in RFC 3418 [RFC3418].

3.4.2. Relationship to the IF-MIB

The IF-MIB, [RFC2863], requires that any MIB that is an adjunct of the IF-MIB clarify specific areas within the IF-MIB. These areas were intentionally left vague in the IF-MIB in order to avoid over-constraining the MIB, thereby precluding management of certain media-types.

The IF-MIB enumerates several areas that a media-specific MIB must clarify. Each of these areas is addressed in a following subsection. The implementor is referred to the IF-MIB in order to understand the general intent of these areas.

The IF-MIB [RFC2863] defines managed objects for managing network interfaces. A network interface is considered attached to a 'subnetwork'. (Note that this term is not to be confused with 'subnet', which refers to an addressing partitioning scheme used in the Internet suite of protocols.) The term 'segment' is used in this

memo to refer to such a subnetwork, whether it be an Ethernet segment, a 'ring', a WAN link, or even an X.25 virtual circuit.

Full support for the 802.1D management objects requires that the IF-MIB objects ifIndex, ifType, ifDescr, ifPhysAddress, and ifLastChange are implemented. Note that compliance to the current IF-MIB module requires additional objects and notifications to be implemented as specified in RFC 2863 [RFC2863].

Implicit in this Extended Bridge MIB is the notion of ports on a bridge. Each of these ports is associated with one interface of the 'interfaces' subtree (one row in ifTable), and, in most situations, each port is associated with a different interface. However, there are situations in which multiple ports are associated with the same interface. An example of such a situation would be several ports each corresponding one-to-one with several X.25 virtual circuits but all on the same interface.

Each port is uniquely identified by a port number. A port number has no mandatory relationship to an interface number, but in the simple case a port number will have the same value as the corresponding interface's interface number. Port numbers are in the range (1..dot1dBaseNumPorts).

Some entities perform other functionality as well as bridging through the sending and receiving of data on their interfaces. In such situations, only a subset of the data sent/received on an interface is within the domain of the entity's bridging functionality. This subset is considered delineated according to a set of protocols, with some protocols being bridged, and other protocols not being bridged. For example, in an entity that exclusively performed bridging, all protocols would be considered bridged, whereas in an entity that performed IP routing on IP datagrams and only bridged other protocols, only the non-IP data would be considered bridged.

Thus, this Extended Bridge MIB (and in particular, its counters) is applicable only to that subset of the data on an entity's interfaces that is sent/received for a protocol being bridged. All such data is sent/received via the ports of the bridge.

3.4.2.1. Layering Model

This memo assumes the interpretation of the Interfaces Subtree to be in accordance with the IF-MIB [RFC2863], which states that the interfaces table (ifTable) contains information on the managed resource's interfaces and that each sub-layer below the internetwork layer of a network interface is considered an interface.

This document does not make any assumption that within an entity, VLANs that are instantiated as an entry in dot1qVlanCurrentTable by either management configuration through dot1qVlanStaticTable or by dynamic means (e.g., through GVRP) are also represented by an entry in ifTable.

Where an entity contains higher-layer protocol entities (e.g., IP-layer interfaces that transmit and receive traffic to/from a VLAN), these should be represented in the ifTable as interfaces of type propVirtual(53). Protocol-specific types such as l3ipxvlan(137) should not be used here, since there is no implication that the bridge will perform any protocol filtering before delivering up to these virtual interfaces.

3.4.2.2. ifStackTable

In addition, the IF-MIB [RFC2863] defines a table 'ifStackTable' for describing the relationship between logical interfaces within an entity. It is anticipated that implementors will use this table to describe the binding of (for example) IP interfaces to physical ports, although the presence of VLANs makes the representation less than perfect for showing connectivity. The ifStackTable cannot represent the full capability of the IEEE 802.1Q VLAN bridging standard, since that makes a distinction between VLAN bindings on 'ingress' to and 'egress' from a port: these relationships may or may not be symmetrical whereas Interface MIB Evolution assumes a symmetrical binding for transmit and receive. This makes it necessary to define other manageable objects for configuring which ports are members of which VLANs.

3.4.2.3. ifRcvAddressTable

This table contains all MAC addresses, unicast, multicast, and broadcast, for which an interface will receive packets and forward them up to a higher-layer entity for local consumption. Note that this does not include addresses for data-link layer control protocols such as Spanning-Tree, GMRP, or GVRP. The format of the address, contained in ifRcvAddressAddress, is the same as for ifPhysAddress.

This table does not include unicast or multicast addresses that are accepted for possible forwarding out some other port. This table is explicitly not intended to provide a bridge address filtering mechanism.

3.4.3. Relationship to the BRIDGE-MIB

This section defines how objects in the BRIDGE-MIB module [BRIDGE-MIB] should be represented for devices that implement the extensions: some of the old objects are less useful in such devices but must still be implemented for reasons of backwards compatibility.

3.4.3.1. The dot1dBase Subtree

This subtree contains objects that are applicable to all types of bridges. Interpretation of this subtree is unchanged.

3.4.3.2. The dot1dStp Subtree

This subtree contains the objects that denote the bridge's state with respect to the Spanning Tree Protocol. Interpretation of this subtree is unchanged.

3.4.3.3. The dot1dTp Subtree

This subtree contains objects that describe the entity's state with respect to transparent bridging.

In a device operating with a single Filtering Database, interpretation of this subtree is unchanged.

In a device supporting multiple Filtering Databases, this subtree is interpreted as follows:

dot1dTpLearnedEntryDiscards

The number of times that *any* of the FDBs became full.

dot1dTpAgingTime

This applies to all Filtering Databases.

dot1dTpFdbTable

Report MAC addresses learned on each port, regardless of which Filtering Database they have been learned in. If an address has been learned in multiple databases on a single port, report it only once. If an address has been learned in multiple databases on more than one port, report the entry on any one of the valid ports.

dot1dTpPortTable

This table is port-based and is not affected by multiple Filtering Databases or multiple VLANs. The counters should include frames received or transmitted for all VLANs. Note that equivalent 64-bit port statistics counters, as well as other objects to represent the upper 32 bits of these counters, are defined in this document for high-capacity network interfaces. These have conformance statements to indicate for which speeds of interface they are required.

3.4.3.4. The dot1dStatic Subtree

This optional subtree contains objects that describe the configuration of destination-address filtering.

In a device operating with a single Filtering Database, interpretation of this subtree is unchanged.

In a device supporting multiple Filtering Databases, this subtree is interpreted as follows:

dot1dStaticTable

Entries read from this table include all static entries from all of the Filtering Databases. Entries for the same MAC address and receive port in more than one Filtering Database must appear only once, since these are the indices of this table. This table should be implemented as read-only in devices that support multiple Forwarding Databases. Instead, write access should be provided through dot1qStaticUnicastTable and dot1qStaticMulticastTable, as defined in this document.

3.4.3.5. Additions to the BRIDGE-MIB

To supplement the BRIDGE-MIB [BRIDGE-MIB], this module contains:

(1) support for multiple traffic classes and dynamic multicast filtering as per IEEE 802.1D-1998 [802.1D].

(2) support for bridged Virtual LANs as per IEEE 802.1Q-2003 [802.1Q].

(3) support for 64-bit versions of BRIDGE-MIB [BRIDGE-MIB] port counters.

4. Definitions for Extended Bridge MIB

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

-- ------------------------------------------------------------
-- MIB for IEEE 802.1p devices
-- ------------------------------------------------------------

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, Counter32, Integer32, Counter64
        FROM SNMPv2-SMI
    TruthValue, TimeInterval, MacAddress, TEXTUAL-CONVENTION
        FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP
        FROM SNMPv2-CONF
    dot1dTp, dot1dTpPort, dot1dBridge,
    dot1dBasePortEntry, dot1dBasePort
        FROM BRIDGE-MIB;

pBridgeMIB MODULE-IDENTITY
    LAST-UPDATED "200601090000Z"
    ORGANIZATION "IETF Bridge MIB Working Group"
    CONTACT-INFO
        "Email:  bridge-mib@ietf.org
                 ietfmibs@ops.ietf.org

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                 Santa Clara, CA 95054
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                 Phone: +1 865 686 0432
                 Email: dlevi@nortel.com

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```

```
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         Postal: Accton Technology Corporation
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                 Marlboro, MA 01752
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          Phone:
          Email: anil@accton.com

                 Keith McCloghrie
         Postal: Cisco Systems, Inc.
                 170 West Tasman Drive
                 San Jose, CA 95134-1706
                 USA
          Phone: +1 408 526 5260
          Email: kzm@cisco.com"
    DESCRIPTION
        "The Bridge MIB Extension module for managing Priority
        and Multicast Filtering, defined by IEEE 802.1D-1998,
        including Restricted Group Registration defined by
        IEEE 802.1t-2001.

        Copyright (C) The Internet Society (2006).  This version of
        this MIB module is part of RFC 4363; See the RFC itself for
        full legal notices."
    REVISION     "200601090000Z"
    DESCRIPTION
         "Added dot1dPortRestrictedGroupRegistration.
          Deprecated pBridgePortGmrpGroup and pBridgeCompliance
          and added pBridgePortGmrpGroup2 and pBridgeCompliance2."
```

```
    REVISION     "199908250000Z"
    DESCRIPTION
         "The Bridge MIB Extension module for managing Priority
          and Multicast Filtering, defined by IEEE 802.1D-1998.

          Initial version, published as RFC 2674."

    ::= { dot1dBridge 6 }

pBridgeMIBObjects OBJECT IDENTIFIER ::= { pBridgeMIB 1 }

-- ------------------------------------------------------------
-- Textual Conventions
-- ------------------------------------------------------------

EnabledStatus ::= TEXTUAL-CONVENTION
    STATUS      current
    DESCRIPTION
        "A simple status value for the object."
    SYNTAX      INTEGER { enabled(1), disabled(2) }

-- ------------------------------------------------------------
-- subtrees in the P-BRIDGE MIB
-- ------------------------------------------------------------

dot1dExtBase    OBJECT IDENTIFIER ::= { pBridgeMIBObjects 1 }
dot1dPriority   OBJECT IDENTIFIER ::= { pBridgeMIBObjects 2 }
dot1dGarp       OBJECT IDENTIFIER ::= { pBridgeMIBObjects 3 }
dot1dGmrp       OBJECT IDENTIFIER ::= { pBridgeMIBObjects 4 }

-- ------------------------------------------------------------
-- the dot1dExtBase subtree
-- ------------------------------------------------------------

dot1dDeviceCapabilities OBJECT-TYPE
    SYNTAX      BITS {
        dot1dExtendedFilteringServices(0),
        dot1dTrafficClasses(1),
        dot1qStaticEntryIndividualPort(2),
        dot1qIVLCapable(3),
        dot1qSVLCapable(4),
        dot1qHybridCapable(5),
        dot1qConfigurablePvidTagging(6),
        dot1dLocalVlanCapable(7)
    }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
```

```
        "Indicates the optional parts of IEEE 802.1D and 802.1Q
        that are implemented by this device and are manageable
        through this MIB.  Capabilities that are allowed on a
        per-port basis are indicated in dot1dPortCapabilities.

        dot1dExtendedFilteringServices(0),
                             -- can perform filtering of
                             -- individual multicast addresses
                             -- controlled by GMRP.
        dot1dTrafficClasses(1),
                             -- can map user priority to
                             -- multiple traffic classes.
        dot1qStaticEntryIndividualPort(2),
                             -- dot1qStaticUnicastReceivePort &
                             -- dot1qStaticMulticastReceivePort
                             -- can represent non-zero entries.
        dot1qIVLCapable(3),  -- Independent VLAN Learning (IVL).
        dot1qSVLCapable(4),  -- Shared VLAN Learning (SVL).
        dot1qHybridCapable(5),
                             -- both IVL & SVL simultaneously.
        dot1qConfigurablePvidTagging(6),
                             -- whether the implementation
                             -- supports the ability to
                             -- override the default PVID
                             -- setting and its egress status
                             -- (VLAN-Tagged or Untagged) on
                             -- each port.
        dot1dLocalVlanCapable(7)
                             -- can support multiple local
                             -- bridges, outside of the scope
                             -- of 802.1Q defined VLANs."
    REFERENCE
        "ISO/IEC 15802-3 Section 5.2,
        IEEE 802.1Q/D11 Section 5.2, 12.10.1.1.3/b/2"
    ::= { dot1dExtBase 1 }

dot1dTrafficClassesEnabled OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The value true(1) indicates that Traffic Classes are
        enabled on this bridge.  When false(2), the bridge
        operates with a single priority level for all traffic.

        The value of this object MUST be retained across
        reinitializations of the management system."
    DEFVAL      { true }
```

```
    ::= { dot1dExtBase 2 }

dot1dGmrpStatus OBJECT-TYPE
    SYNTAX      EnabledStatus
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The administrative status requested by management for
        GMRP.  The value enabled(1) indicates that GMRP should
        be enabled on this device, in all VLANs, on all ports
        for which it has not been specifically disabled.  When
        disabled(2), GMRP is disabled, in all VLANs and on all
        ports, and all GMRP packets will be forwarded
        transparently.  This object affects both Applicant and
        Registrar state machines.  A transition from disabled(2)
        to enabled(1) will cause a reset of all GMRP state
        machines on all ports.

        The value of this object MUST be retained across
        reinitializations of the management system."
    DEFVAL      { enabled }
    ::= { dot1dExtBase 3 }

-- ------------------------------------------------------------
-- Port Capabilities Table
-- ------------------------------------------------------------

dot1dPortCapabilitiesTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1dPortCapabilitiesEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table that contains capabilities information about
        every port that is associated with this bridge."
    ::= { dot1dExtBase 4 }

dot1dPortCapabilitiesEntry OBJECT-TYPE
    SYNTAX      Dot1dPortCapabilitiesEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A set of capabilities information about this port
        indexed by dot1dBasePort."
    AUGMENTS { dot1dBasePortEntry }
    ::= { dot1dPortCapabilitiesTable 1 }

Dot1dPortCapabilitiesEntry ::=
    SEQUENCE {
```

```
        dot1dPortCapabilities
            BITS
    }

dot1dPortCapabilities OBJECT-TYPE
    SYNTAX      BITS {
        dot1qDot1qTagging(0),
        dot1qConfigurableAcceptableFrameTypes(1),
        dot1qIngressFiltering(2)
    }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Indicates the parts of IEEE 802.1D and 802.1Q that are
        optional on a per-port basis, that are implemented by
        this device, and that are manageable through this MIB.

        dot1qDot1qTagging(0), -- supports 802.1Q VLAN tagging of
                              -- frames and GVRP.
        dot1qConfigurableAcceptableFrameTypes(1),
                              -- allows modified values of
                              -- dot1qPortAcceptableFrameTypes.
        dot1qIngressFiltering(2)
                              -- supports the discarding of any
                              -- frame received on a Port whose
                              -- VLAN classification does not
                              -- include that Port in its Member
                              -- set."
    REFERENCE
        "ISO/IEC 15802-3 Section 5.2,
        IEEE 802.1Q/D11 Section 5.2"
    ::= { dot1dPortCapabilitiesEntry 1 }

-- ------------------------------------------------------------
-- the dot1dPriority subtree
-- ------------------------------------------------------------

-- ------------------------------------------------------------
-- Port Priority Table
-- ------------------------------------------------------------

dot1dPortPriorityTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1dPortPriorityEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table that contains information about every port that
        is associated with this transparent bridge."
```

```
    ::= { dot1dPriority 1 }

dot1dPortPriorityEntry OBJECT-TYPE
    SYNTAX      Dot1dPortPriorityEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A list of Default User Priorities for each port of a
        transparent bridge.  This is indexed by dot1dBasePort."
    AUGMENTS { dot1dBasePortEntry }
    ::= { dot1dPortPriorityTable 1 }

Dot1dPortPriorityEntry ::=
    SEQUENCE {
        dot1dPortDefaultUserPriority
            Integer32,
        dot1dPortNumTrafficClasses
            Integer32
    }

dot1dPortDefaultUserPriority OBJECT-TYPE
    SYNTAX      Integer32 (0..7)
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The default ingress User Priority for this port.  This
        only has effect on media, such as Ethernet, that do not
        support native User Priority.

        The value of this object MUST be retained across
        reinitializations of the management system."
    ::= { dot1dPortPriorityEntry 1 }

dot1dPortNumTrafficClasses OBJECT-TYPE
    SYNTAX      Integer32 (1..8)
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The number of egress traffic classes supported on this
        port.  This object may optionally be read-only.

        The value of this object MUST be retained across
        reinitializations of the management system."
    ::= { dot1dPortPriorityEntry 2 }

-- ------------------------------------------------------------
-- User Priority Regeneration Table
-- ------------------------------------------------------------
```

```
dot1dUserPriorityRegenTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1dUserPriorityRegenEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A list of Regenerated User Priorities for each received
        User Priority on each port of a bridge.  The Regenerated
        User Priority value may be used to index the Traffic
        Class Table for each input port.  This only has effect
        on media that support native User Priority.  The default
        values for Regenerated User Priorities are the same as
        the User Priorities."
    REFERENCE
        "ISO/IEC 15802-3 Section 6.4"
    ::= { dot1dPriority 2 }

dot1dUserPriorityRegenEntry OBJECT-TYPE
    SYNTAX      Dot1dUserPriorityRegenEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A mapping of incoming User Priority to a Regenerated
        User Priority."
    INDEX   { dot1dBasePort, dot1dUserPriority }
    ::= { dot1dUserPriorityRegenTable 1 }

Dot1dUserPriorityRegenEntry ::=
    SEQUENCE {
        dot1dUserPriority
            Integer32,
        dot1dRegenUserPriority
            Integer32
    }

dot1dUserPriority OBJECT-TYPE
    SYNTAX      Integer32 (0..7)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The User Priority for a frame received on this port."
    ::= { dot1dUserPriorityRegenEntry 1 }

dot1dRegenUserPriority OBJECT-TYPE
    SYNTAX      Integer32 (0..7)
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The Regenerated User Priority that the incoming User
```

```
        Priority is mapped to for this port.

        The value of this object MUST be retained across
        reinitializations of the management system."
    ::= { dot1dUserPriorityRegenEntry 2 }

-- ------------------------------------------------------------
-- Traffic Class Table
-- ------------------------------------------------------------

dot1dTrafficClassTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1dTrafficClassEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table mapping evaluated User Priority to Traffic
        Class, for forwarding by the bridge.  Traffic class is a
        number in the range (0..(dot1dPortNumTrafficClasses-1))."
    REFERENCE
        "ISO/IEC 15802-3 Table 7-2"
    ::= { dot1dPriority 3 }

dot1dTrafficClassEntry OBJECT-TYPE
    SYNTAX      Dot1dTrafficClassEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "User Priority to Traffic Class mapping."
    INDEX   { dot1dBasePort, dot1dTrafficClassPriority }
    ::= { dot1dTrafficClassTable 1 }

Dot1dTrafficClassEntry ::=
    SEQUENCE {
        dot1dTrafficClassPriority
            Integer32,
        dot1dTrafficClass
            Integer32
    }

dot1dTrafficClassPriority OBJECT-TYPE
    SYNTAX      Integer32 (0..7)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Priority value determined for the received frame.
        This value is equivalent to the priority indicated in
        the tagged frame received, or one of the evaluated
        priorities, determined according to the media-type.
```

```
        For untagged frames received from Ethernet media, this
        value is equal to the dot1dPortDefaultUserPriority value
        for the ingress port.

        For untagged frames received from non-Ethernet media,
        this value is equal to the dot1dRegenUserPriority value
        for the ingress port and media-specific user priority."
    ::= { dot1dTrafficClassEntry 1 }

dot1dTrafficClass OBJECT-TYPE
    SYNTAX      Integer32 (0..7)
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The Traffic Class the received frame is mapped to.

        The value of this object MUST be retained across
        reinitializations of the management system."
    ::= { dot1dTrafficClassEntry 2 }

-- ------------------------------------------------------------
-- Outbound Access Priority Table
-- ------------------------------------------------------------

dot1dPortOutboundAccessPriorityTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1dPortOutboundAccessPriorityEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table mapping Regenerated User Priority to Outbound
        Access Priority.  This is a fixed mapping for all port
        types, with two options for 802.5 Token Ring."
    REFERENCE
        "ISO/IEC 15802-3 Table 7-3"
    ::= { dot1dPriority 4 }

dot1dPortOutboundAccessPriorityEntry OBJECT-TYPE
    SYNTAX      Dot1dPortOutboundAccessPriorityEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Regenerated User Priority to Outbound Access Priority
        mapping."
    INDEX   { dot1dBasePort, dot1dRegenUserPriority }
    ::= { dot1dPortOutboundAccessPriorityTable 1 }

Dot1dPortOutboundAccessPriorityEntry ::=
    SEQUENCE {
```

```
        dot1dPortOutboundAccessPriority
            Integer32
    }

dot1dPortOutboundAccessPriority OBJECT-TYPE
    SYNTAX      Integer32 (0..7)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The Outbound Access Priority the received frame is
        mapped to."
    ::= { dot1dPortOutboundAccessPriorityEntry 1 }

-- ------------------------------------------------------------
-- the dot1dGarp subtree
-- ------------------------------------------------------------

-- ------------------------------------------------------------
-- The GARP Port Table
-- ------------------------------------------------------------

dot1dPortGarpTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1dPortGarpEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table of GARP control information about every bridge
        port.  This is indexed by dot1dBasePort."
    ::= { dot1dGarp 1 }

dot1dPortGarpEntry OBJECT-TYPE
    SYNTAX      Dot1dPortGarpEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "GARP control information for a bridge port."
    AUGMENTS { dot1dBasePortEntry }
    ::= { dot1dPortGarpTable 1 }

Dot1dPortGarpEntry ::=
    SEQUENCE {
        dot1dPortGarpJoinTime
            TimeInterval,
        dot1dPortGarpLeaveTime
            TimeInterval,
        dot1dPortGarpLeaveAllTime
            TimeInterval
    }
```

```
dot1dPortGarpJoinTime OBJECT-TYPE
    SYNTAX      TimeInterval
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The GARP Join time, in centiseconds.

        The value of this object MUST be retained across
        reinitializations of the management system."
    DEFVAL      { 20 }
    ::= { dot1dPortGarpEntry 1 }

dot1dPortGarpLeaveTime OBJECT-TYPE
    SYNTAX      TimeInterval
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The GARP Leave time, in centiseconds.

        The value of this object MUST be retained across
        reinitializations of the management system."
    DEFVAL      { 60 }
    ::= { dot1dPortGarpEntry 2 }

dot1dPortGarpLeaveAllTime OBJECT-TYPE
    SYNTAX      TimeInterval
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The GARP LeaveAll time, in centiseconds.

        The value of this object MUST be retained across
        reinitializations of the management system."
    DEFVAL      { 1000 }
    ::= { dot1dPortGarpEntry 3 }

-- ------------------------------------------------------------
-- The GMRP Port Configuration and Status Table
-- ------------------------------------------------------------

dot1dPortGmrpTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1dPortGmrpEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table of GMRP control and status information about
        every bridge port.  Augments the dot1dBasePortTable."
    ::= { dot1dGmrp 1 }
```

```
dot1dPortGmrpEntry OBJECT-TYPE
    SYNTAX      Dot1dPortGmrpEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "GMRP control and status information for a bridge port."
    AUGMENTS { dot1dBasePortEntry }
    ::= { dot1dPortGmrpTable 1 }

Dot1dPortGmrpEntry ::=
    SEQUENCE {
        dot1dPortGmrpStatus
            EnabledStatus,
        dot1dPortGmrpFailedRegistrations
            Counter32,
        dot1dPortGmrpLastPduOrigin
            MacAddress,
        dot1dPortRestrictedGroupRegistration
            TruthValue
    }

dot1dPortGmrpStatus OBJECT-TYPE
    SYNTAX      EnabledStatus
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The administrative state of GMRP operation on this port.  The
        value enabled(1) indicates that GMRP is enabled on this port
        in all VLANs as long as dot1dGmrpStatus is also enabled(1).
        A value of disabled(2) indicates that GMRP is disabled on
        this port in all VLANs: any GMRP packets received will
        be silently discarded, and no GMRP registrations will be
        propagated from other ports.  Setting this to a value of
        enabled(1) will be stored by the agent but will only take
        effect on the GMRP protocol operation if dot1dGmrpStatus
        also indicates the value enabled(1).  This object affects
        all GMRP Applicant and Registrar state machines on this
        port.  A transition from disabled(2) to enabled(1) will
        cause a reset of all GMRP state machines on this port.

        The value of this object MUST be retained across
        reinitializations of the management system."
    DEFVAL      { enabled }
    ::= { dot1dPortGmrpEntry 1 }

dot1dPortGmrpFailedRegistrations OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
```

```
    STATUS      current
    DESCRIPTION
        "The total number of failed GMRP registrations, for any
        reason, in all VLANs, on this port."
    ::= { dot1dPortGmrpEntry 2 }

dot1dPortGmrpLastPduOrigin OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The Source MAC Address of the last GMRP message
        received on this port."
    ::= { dot1dPortGmrpEntry 3 }

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.

        The value of this object MUST be retained across
        reinitializations of the management system."
    REFERENCE
        "IEEE 802.1t clause 10.3.2.3, 14.10.1.3."
    DEFVAL      { false }
    ::= { dot1dPortGmrpEntry 4 }

-- ------------------------------------------------------------
--  High-Capacity Port Table for Transparent Bridges
-- ------------------------------------------------------------

dot1dTpHCPortTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1dTpHCPortEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table that contains information about every high-
        capacity port that is associated with this transparent
        bridge."
    ::= { dot1dTp 5 }
```

```
dot1dTpHCPortEntry OBJECT-TYPE
    SYNTAX      Dot1dTpHCPortEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Statistics information for each high-capacity port of a
        transparent bridge."
    INDEX   { dot1dTpPort }
    ::= { dot1dTpHCPortTable 1 }

Dot1dTpHCPortEntry ::=
    SEQUENCE {
        dot1dTpHCPortInFrames
            Counter64,
        dot1dTpHCPortOutFrames
            Counter64,
        dot1dTpHCPortInDiscards
            Counter64
    }

dot1dTpHCPortInFrames OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of frames that have been received by this
        port from its segment.  Note that a frame received on
        the interface corresponding to this port is only counted
        by this object if and only if it is for a protocol being
        processed by the local bridging function, including
        bridge management frames."
    REFERENCE
        "ISO/IEC 15802-3 Section 14.6.1.1.3"
    ::= { dot1dTpHCPortEntry 1 }

dot1dTpHCPortOutFrames OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of frames that have been transmitted by this
        port to its segment.  Note that a frame transmitted on
        the interface corresponding to this port is only counted
        by this object if and only if it is for a protocol being
        processed by the local bridging function, including
        bridge management frames."
    REFERENCE
        "ISO/IEC 15802-3 Section 14.6.1.1.3"
```

```
    ::= { dot1dTpHCPortEntry 2 }

dot1dTpHCPortInDiscards OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Count of valid frames that have been received by this
        port from its segment that were discarded (i.e.,
        filtered) by the Forwarding Process."
    REFERENCE
        "ISO/IEC 15802-3 Section 14.6.1.1.3"
    ::= { dot1dTpHCPortEntry 3 }

-- ----------------------------------------------------
--  Upper part of High-Capacity Port Table for Transparent Bridges
-- ----------------------------------------------------

dot1dTpPortOverflowTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1dTpPortOverflowEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table that contains the most-significant bits of
        statistics counters for ports that are associated with this
        transparent bridge that are on high-capacity interfaces, as
        defined in the conformance clauses for this table.  This table
        is provided as a way to read 64-bit counters for agents that
        support only SNMPv1.

        Note that the reporting of most-significant and
        least-significant counter bits separately runs the risk of
        missing an overflow of the lower bits in the interval between
        sampling.  The manager must be aware of this possibility, even
        within the same varbindlist, when interpreting the results of
        a request or asynchronous notification."
    ::= { dot1dTp 6 }

dot1dTpPortOverflowEntry OBJECT-TYPE
    SYNTAX      Dot1dTpPortOverflowEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The most significant bits of statistics counters for a high-
        capacity interface of a transparent bridge.  Each object is
        associated with a corresponding object in dot1dTpPortTable
        that indicates the least significant bits of the counter."
    INDEX   { dot1dTpPort }
```

```
    ::= { dot1dTpPortOverflowTable 1 }

Dot1dTpPortOverflowEntry ::=
    SEQUENCE {
        dot1dTpPortInOverflowFrames
            Counter32,
        dot1dTpPortOutOverflowFrames
            Counter32,
        dot1dTpPortInOverflowDiscards
            Counter32
    }

dot1dTpPortInOverflowFrames OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of times the associated dot1dTpPortInFrames
        counter has overflowed."
    REFERENCE
        "ISO/IEC 15802-3 Section 14.6.1.1.3"
    ::= { dot1dTpPortOverflowEntry 1 }

dot1dTpPortOutOverflowFrames OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of times the associated dot1dTpPortOutFrames
        counter has overflowed."
    REFERENCE
        "ISO/IEC 15802-3 Section 14.6.1.1.3"
    ::= { dot1dTpPortOverflowEntry 2 }

dot1dTpPortInOverflowDiscards OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of times the associated
        dot1dTpPortInDiscards counter has overflowed."
    REFERENCE
        "ISO/IEC 15802-3 Section 14.6.1.1.3"
    ::= { dot1dTpPortOverflowEntry 3 }

-- ------------------------------------------------------------
-- IEEE 802.1p MIB - Conformance Information
-- ------------------------------------------------------------
```

```
pBridgeConformance OBJECT IDENTIFIER ::= { pBridgeMIB 2 }

pBridgeGroups OBJECT IDENTIFIER ::= { pBridgeConformance 1 }

pBridgeCompliances OBJECT IDENTIFIER
    ::= { pBridgeConformance 2 }

-- ------------------------------------------------------------
-- units of conformance
-- ------------------------------------------------------------

pBridgeExtCapGroup OBJECT-GROUP
    OBJECTS {
        dot1dDeviceCapabilities,
        dot1dPortCapabilities
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects indicating the optional
        capabilities of the device."
    ::= { pBridgeGroups 1 }

pBridgeDeviceGmrpGroup OBJECT-GROUP
    OBJECTS {
        dot1dGmrpStatus
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing device-level control
        for the Multicast Filtering extended bridge services."
    ::= { pBridgeGroups 2 }

pBridgeDevicePriorityGroup OBJECT-GROUP
    OBJECTS {
        dot1dTrafficClassesEnabled
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing device-level control
        for the Priority services."
    ::= { pBridgeGroups 3 }

pBridgeDefaultPriorityGroup OBJECT-GROUP
    OBJECTS {
        dot1dPortDefaultUserPriority
    }
    STATUS      current
    DESCRIPTION
```

```
        "A collection of objects defining the User Priority
        applicable to each port for media that do not support
        native User Priority."
    ::= { pBridgeGroups 4 }

pBridgeRegenPriorityGroup OBJECT-GROUP
    OBJECTS {
        dot1dRegenUserPriority
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects defining the User Priorities
        applicable to each port for media that support native
        User Priority."
    ::= { pBridgeGroups 5 }

pBridgePriorityGroup OBJECT-GROUP
    OBJECTS {
        dot1dPortNumTrafficClasses,
        dot1dTrafficClass
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects defining the traffic classes
        within a bridge for each evaluated User Priority."
    ::= { pBridgeGroups 6 }

pBridgeAccessPriorityGroup OBJECT-GROUP
    OBJECTS {
        dot1dPortOutboundAccessPriority
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects defining the media-dependent
        outbound access level for each priority."
    ::= { pBridgeGroups 7 }

pBridgePortGarpGroup OBJECT-GROUP
    OBJECTS {
        dot1dPortGarpJoinTime,
        dot1dPortGarpLeaveTime,
        dot1dPortGarpLeaveAllTime
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing port level control
        and status information for GARP operation."
    ::= { pBridgeGroups 8 }
```

```
pBridgePortGmrpGroup OBJECT-GROUP
    OBJECTS {
        dot1dPortGmrpStatus,
        dot1dPortGmrpFailedRegistrations,
        dot1dPortGmrpLastPduOrigin
    }
    STATUS      deprecated
    DESCRIPTION
        "A collection of objects providing port level control
        and status information for GMRP operation."
    ::= { pBridgeGroups 9 }

pBridgeHCPortGroup OBJECT-GROUP
    OBJECTS {
        dot1dTpHCPortInFrames,
        dot1dTpHCPortOutFrames,
        dot1dTpHCPortInDiscards
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing 64-bit statistics
         counters for high-capacity bridge ports."
    ::= { pBridgeGroups 10 }

pBridgePortOverflowGroup OBJECT-GROUP
    OBJECTS {
        dot1dTpPortInOverflowFrames,
        dot1dTpPortOutOverflowFrames,
        dot1dTpPortInOverflowDiscards
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing overflow statistics
        counters for high-capacity bridge ports."
    ::= { pBridgeGroups 11 }

pBridgePortGmrpGroup2 OBJECT-GROUP
    OBJECTS {
        dot1dPortGmrpStatus,
        dot1dPortGmrpFailedRegistrations,
        dot1dPortGmrpLastPduOrigin,
        dot1dPortRestrictedGroupRegistration
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing port level control
        and status information for GMRP operation."
    ::= { pBridgeGroups 12 }
```

```
-- ------------------------------------------------------------
-- compliance statements
-- ------------------------------------------------------------

pBridgeCompliance MODULE-COMPLIANCE
    STATUS  deprecated
    DESCRIPTION
        "The compliance statement for device support of Priority
        and Multicast Filtering extended bridging services."

    MODULE
        MANDATORY-GROUPS { pBridgeExtCapGroup }

        GROUP       pBridgeDeviceGmrpGroup
        DESCRIPTION
            "This group is mandatory for devices supporting the GMRP
            application, defined by IEEE 802.1D Extended Filtering
            Services."

        GROUP       pBridgeDevicePriorityGroup
        DESCRIPTION
            "This group is mandatory only for devices supporting
            the priority forwarding operations defined by IEEE
            802.1D."

        GROUP       pBridgeDefaultPriorityGroup
        DESCRIPTION
            "This group is mandatory only for devices supporting
            the priority forwarding operations defined by the
            extended bridge services with media types, such as
            Ethernet, that do not support native User Priority."

        GROUP       pBridgeRegenPriorityGroup
        DESCRIPTION
            "This group is mandatory only for devices supporting
            the priority forwarding operations defined by IEEE 802.1D
            and that have interface media types that support
            native User Priority, e.g., IEEE 802.5."

        GROUP       pBridgePriorityGroup
        DESCRIPTION
            "This group is mandatory only for devices supporting
            the priority forwarding operations defined by IEEE 802.1D."

        GROUP       pBridgeAccessPriorityGroup
        DESCRIPTION
            "This group is optional and is relevant only for devices
            supporting the priority forwarding operations defined by
```

```
            IEEE 802.1D and that have interface media types that
            support native Access Priority, e.g., IEEE 802.5."

        GROUP       pBridgePortGarpGroup
        DESCRIPTION
            "This group is mandatory for devices supporting any
            of the GARP applications: e.g., GMRP, defined by the
            extended filtering services of 802.1D; or GVRP,
            defined by 802.1Q (refer to the Q-BRIDGE-MIB for
            conformance statements for GVRP)."

        GROUP       pBridgePortGmrpGroup
        DESCRIPTION
            "This group is mandatory for devices supporting the
            GMRP application, as defined by IEEE 802.1D Extended
            Filtering Services."

        GROUP       pBridgeHCPortGroup
        DESCRIPTION
            "Support for this group in a device is mandatory for those
            bridge ports that map to network interfaces that have the
            value of the corresponding instance of ifSpeed
            greater than 650,000,000 bits/second."

        GROUP       pBridgePortOverflowGroup
        DESCRIPTION
            "Support for this group in a device is mandatory for those
            bridge ports that map to network interfaces that have the
            value of the corresponding instance of ifSpeed
            greater than 650,000,000 bits/second."

        OBJECT      dot1dPortNumTrafficClasses
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required."

        OBJECT      dot1dTrafficClass
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required."

        OBJECT      dot1dRegenUserPriority
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required."

       ::= { pBridgeCompliances 1 }
```

```
pBridgeCompliance2 MODULE-COMPLIANCE
    STATUS  current
    DESCRIPTION
        "The compliance statement for device support of Priority
        and Multicast Filtering extended bridging services."

    MODULE
        MANDATORY-GROUPS { pBridgeExtCapGroup }

        GROUP       pBridgeDeviceGmrpGroup
        DESCRIPTION
            "This group is mandatory for devices supporting the GMRP
            application, defined by IEEE 802.1D Extended Filtering
            Services."

        GROUP       pBridgeDevicePriorityGroup
        DESCRIPTION
            "This group is mandatory only for devices supporting
            the priority forwarding operations defined by IEEE
            802.1D."

        GROUP       pBridgeDefaultPriorityGroup
        DESCRIPTION
            "This group is mandatory only for devices supporting
            the priority forwarding operations defined by the
            extended bridge services with media types, such as
            Ethernet, that do not support native User Priority."

        GROUP       pBridgeRegenPriorityGroup
        DESCRIPTION
            "This group is mandatory only for devices supporting
            the priority forwarding operations defined by IEEE 802.1D
            and that have interface media types that support
            native User Priority, e.g., IEEE 802.5."

        GROUP       pBridgePriorityGroup
        DESCRIPTION
            "This group is mandatory only for devices supporting
            the priority forwarding operations defined by IEEE 802.1D."

        GROUP       pBridgeAccessPriorityGroup
        DESCRIPTION
            "This group is optional and is relevant only for devices
            supporting the priority forwarding operations defined by
            IEEE 802.1D and that have interface media types that
            support native Access Priority, e.g., IEEE 802.5."

        GROUP       pBridgePortGarpGroup
```

```
        DESCRIPTION
            "This group is mandatory for devices supporting any
            of the GARP applications: e.g., GMRP, defined by the
            extended filtering services of 802.1D; or GVRP,
            defined by 802.1Q (refer to the Q-BRIDGE-MIB for
            conformance statements for GVRP)."

        GROUP       pBridgePortGmrpGroup2
        DESCRIPTION
            "This group is mandatory for devices supporting the
            GMRP application, as defined by IEEE 802.1D Extended
            Filtering Services."

        GROUP       pBridgeHCPortGroup
        DESCRIPTION
            "Support for this group in a device is mandatory for those
            bridge ports that map to network interfaces that have the
            value of the corresponding instance of ifSpeed
            greater than 650,000,000 bits/second."

        GROUP       pBridgePortOverflowGroup
        DESCRIPTION
            "Support for this group in a device is mandatory for those
            bridge ports that map to network interfaces that have the
            value of the corresponding instance of ifSpeed
            greater than 650,000,000 bits/second."

        OBJECT      dot1dPortNumTrafficClasses
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required."

        OBJECT      dot1dTrafficClass
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required."

        OBJECT      dot1dRegenUserPriority
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required."

       ::= { pBridgeCompliances 2 }

END
```

5. Definitions for Virtual Bridge MIB

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

-- ------------------------------------------------------------
-- MIB for IEEE 802.1Q Devices
-- ------------------------------------------------------------

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE,
    Counter32, Counter64, Unsigned32, TimeTicks, Integer32
        FROM SNMPv2-SMI
    RowStatus, TruthValue, TEXTUAL-CONVENTION, MacAddress
        FROM SNMPv2-TC
    SnmpAdminString
        FROM SNMP-FRAMEWORK-MIB
    MODULE-COMPLIANCE, OBJECT-GROUP
        FROM SNMPv2-CONF
    dot1dBridge, dot1dBasePortEntry, dot1dBasePort
        FROM BRIDGE-MIB
    EnabledStatus
        FROM P-BRIDGE-MIB
    TimeFilter
        FROM RMON2-MIB;

qBridgeMIB MODULE-IDENTITY
    LAST-UPDATED "200601090000Z"
    ORGANIZATION "IETF Bridge MIB Working Group"
    CONTACT-INFO
        "Email:  Bridge-mib@ietf.org
                 ietfmibs@ops.ietf.org

                 David Levi
         Postal: Nortel Networks
                 4655 Great America Parkway
                 Santa Clara, CA 95054
                 USA
         Phone:  +1 865 686 0432
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                 50 Harding Rd.
                 Portsmouth, NH 03801
                 USA
         Phone:  +1 603 436 8634
         Email:  ietfdbh@comcast.net
```

```
                Les Bell
             Postal: Hemel Hempstead, Herts. HP2 7YU
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              Phone: +1 978 691 4665
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                     Marlboro, MA 01752
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              Email: anil@accton.com

                Keith McCloghrie
             Postal: Cisco Systems, Inc.
                     170 West Tasman Drive
                     San Jose, CA 95134-1706
                     USA
              Phone: +1 408 526 5260
              Email: kzm@cisco.com"
    DESCRIPTION
        "The VLAN Bridge MIB module for managing Virtual Bridged
        Local Area Networks, as defined by IEEE 802.1Q-2003,
        including Restricted Vlan Registration defined by
        IEEE 802.1u-2001 and Vlan Classification defined by
        IEEE 802.1v-2001.

        Copyright (C) The Internet Society (2006).  This version of
        this MIB module is part of RFC 4363; See the RFC itself for
        full legal notices."
    REVISION     "200601090000Z"
```

```
    DESCRIPTION
         "Added Vlan TEXTUAL-CONVENTIONs,
          dot1qPortRestrictedVlanRegistration, dot1vProtocol subtree,
          qBridgeClassificationDeviceGroup, qBridgePortGroup2,
          qBridgeClassificationPortGroup, and qBridgeCompliance2.
          Clarified dot1qForwardAllStaticPorts,
          qPortAcceptableFrameTypes, and qBridgeCompliance.
          Deprecated qBridgePortGroup and qBridgeCompliance."

    REVISION     "199908250000Z"
    DESCRIPTION
         "The VLAN Bridge MIB module for managing Virtual Bridged
        Local Area Networks, as defined by IEEE 802.1Q-1998.

        Initial version, published as RFC 2674."

    ::= { dot1dBridge 7 }

qBridgeMIBObjects OBJECT IDENTIFIER ::= { qBridgeMIB 1 }

-- ------------------------------------------------------------
-- Textual Conventions
-- ------------------------------------------------------------

PortList ::= TEXTUAL-CONVENTION
    STATUS      current
    DESCRIPTION
        "Each octet within this value specifies a set of eight
        ports, with the first octet specifying ports 1 through
        8, the second octet specifying ports 9 through 16, etc.
        Within each octet, the most significant bit represents
        the lowest numbered port, and the least significant bit
        represents the highest numbered port.  Thus, each port
        of the bridge is represented by a single bit within the
        value of this object.  If that bit has a value of '1',
        then that port is included in the set of ports; the port
        is not included if its bit has a value of '0'."
    SYNTAX      OCTET STRING

VlanIndex ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "d"
    STATUS      current
    DESCRIPTION
        "A value used to index per-VLAN tables: values of 0 and
        4095 are not permitted.  If the value is between 1 and
        4094 inclusive, it represents an IEEE 802.1Q VLAN-ID with
        global scope within a given bridged domain (see VlanId
        textual convention).  If the value is greater than 4095,
```

```
        then it represents a VLAN with scope local to the
        particular agent, i.e., one without a global VLAN-ID
        assigned to it.  Such VLANs are outside the scope of
        IEEE 802.1Q, but it is convenient to be able to manage them
        in the same way using this MIB."
    SYNTAX      Unsigned32

VlanId ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "d"
    STATUS      current
    DESCRIPTION
        "The VLAN-ID that uniquely identifies a VLAN.  This
        is the 12-bit VLAN-ID used in the VLAN Tag header.
        The range is defined by the REFERENCEd specification."
    REFERENCE
        "IEEE Std 802.1Q 2003 Edition, Virtual Bridged
        Local Area Networks."
    SYNTAX      Integer32 (1..4094)

VlanIdOrAny ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "d"
    STATUS       current
    DESCRIPTION
        "The VLAN-ID that uniquely identifies a specific VLAN,
        or any VLAN.  The special value of 4095 is used to
        indicate a wildcard, i.e., any VLAN.  This can be used
        in any situation where an object or table entry must
        refer either to a specific VLAN or to any VLAN.

        Note that a MIB object that is defined using this
        TEXTUAL-CONVENTION should clarify the meaning of
        'any VLAN' (i.e., the special value 4095)."
    SYNTAX       Integer32 (1..4094 | 4095)

VlanIdOrNone ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "d"
    STATUS       current
    DESCRIPTION
        "The VLAN-ID that uniquely identifies a specific VLAN,
        or no VLAN.  The special value of zero is used to
        indicate that no VLAN-ID is present or used.  This can
        be used in any situation where an object or a table entry
        must refer either to a specific VLAN, or to no VLAN.

        Note that a MIB object that is defined using this
        TEXTUAL-CONVENTION should clarify the meaning of
        'no VLAN' (i.e., the special value 0)."
    SYNTAX       Integer32 (0 | 1..4094)
```

```
VlanIdOrAnyOrNone ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "d"
    STATUS       current
    DESCRIPTION
        "The VLAN-ID that uniquely identifies a specific VLAN,
        any VLAN, or no VLAN.  The special values 0 and 4095
        have the same meaning as described in the VlanIdOrAny
        and VlanIdOrNone TEXTUAL-CONVENTIONs.

        Note that a MIB object that is defined using this
        TEXTUAL-CONVENTION should clarify the meaning of
        'any VLAN' and 'no VLAN' (i.e., the special values
        0 and 4095)."
    SYNTAX       Integer32 (0 | 1..4094 | 4095)

-- ------------------------------------------------------------
-- subtrees in the Q-BRIDGE MIB
-- ------------------------------------------------------------

dot1qBase       OBJECT IDENTIFIER ::= { qBridgeMIBObjects 1 }
dot1qTp         OBJECT IDENTIFIER ::= { qBridgeMIBObjects 2 }
dot1qStatic     OBJECT IDENTIFIER ::= { qBridgeMIBObjects 3 }
dot1qVlan       OBJECT IDENTIFIER ::= { qBridgeMIBObjects 4 }
dot1vProtocol   OBJECT IDENTIFIER ::= { qBridgeMIBObjects 5 }

-- ------------------------------------------------------------
-- dot1qBase subtree
-- ------------------------------------------------------------

dot1qVlanVersionNumber OBJECT-TYPE
    SYNTAX      INTEGER {
                    version1(1)
                }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The version number of IEEE 802.1Q that this device
        supports."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.10.1.1"
    ::= { dot1qBase 1 }

dot1qMaxVlanId OBJECT-TYPE
    SYNTAX      VlanId
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The maximum IEEE 802.1Q VLAN-ID that this device
```

```
        supports."
    REFERENCE
        "IEEE 802.1Q/D11 Section 9.3.2.3"
    ::= { dot1qBase 2 }

dot1qMaxSupportedVlans OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The maximum number of IEEE 802.1Q VLANs that this
        device supports."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.10.1.1"
    ::= { dot1qBase 3 }

dot1qNumVlans OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The current number of IEEE 802.1Q VLANs that are
        configured in this device."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.7.1.1"
    ::= { dot1qBase 4 }

dot1qGvrpStatus OBJECT-TYPE
    SYNTAX      EnabledStatus
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The administrative status requested by management for
        GVRP.  The value enabled(1) indicates that GVRP should
        be enabled on this device, on all ports for which it has
        not been specifically disabled.  When disabled(2), GVRP
        is disabled on all ports, and all GVRP packets will be
        forwarded transparently.  This object affects all GVRP
        Applicant and Registrar state machines.  A transition
        from disabled(2) to enabled(1) will cause a reset of all
        GVRP state machines on all ports.

        The value of this object MUST be retained across
        reinitializations of the management system."
    DEFVAL      { enabled }
    ::= { dot1qBase 5 }

-- ------------------------------------------------------------
```

```
-- the dot1qTp subtree
-- ----------------------------------------------------------

-- ----------------------------------------------------------
-- the current Filtering Database Table
-- ----------------------------------------------------------

dot1qFdbTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1qFdbEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table that contains configuration and control
        information for each Filtering Database currently
        operating on this device.  Entries in this table appear
        automatically when VLANs are assigned FDB IDs in the
        dot1qVlanCurrentTable."
    ::= { dot1qTp 1 }

dot1qFdbEntry OBJECT-TYPE
    SYNTAX      Dot1qFdbEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Information about a specific Filtering Database."
    INDEX   { dot1qFdbId }
    ::= { dot1qFdbTable 1 }

Dot1qFdbEntry ::=
    SEQUENCE {
        dot1qFdbId
            Unsigned32,
        dot1qFdbDynamicCount
            Counter32
    }

dot1qFdbId OBJECT-TYPE
    SYNTAX       Unsigned32
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "The identity of this Filtering Database."
    ::= { dot1qFdbEntry 1 }

dot1qFdbDynamicCount OBJECT-TYPE
    SYNTAX       Counter32
    MAX-ACCESS   read-only
    STATUS       current
```

```
    DESCRIPTION
        "The current number of dynamic entries in this
        Filtering Database."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.7.1.1.3"
    ::= { dot1qFdbEntry 2 }

-- ------------------------------------------------------------
-- Multiple Forwarding Databases for 802.1Q Transparent Devices
-- This table is an alternative to the dot1dTpFdbTable,
-- previously defined for 802.1D devices that only support a
-- single Forwarding Database.
-- ------------------------------------------------------------

dot1qTpFdbTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1qTpFdbEntry
    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
        "IEEE 802.1Q/D11 Section 12.7.7"
    ::= { dot1qTp 2 }

dot1qTpFdbEntry OBJECT-TYPE
    SYNTAX      Dot1qTpFdbEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Information about a specific unicast MAC address for
        which the device has some forwarding and/or filtering
        information."
    INDEX   { dot1qFdbId, dot1qTpFdbAddress }
    ::= { dot1qTpFdbTable 1 }

Dot1qTpFdbEntry ::=
    SEQUENCE {
        dot1qTpFdbAddress
            MacAddress,
        dot1qTpFdbPort
            Integer32,
        dot1qTpFdbStatus
            INTEGER
    }
```

```
dot1qTpFdbAddress OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A unicast MAC address for which the device has
        forwarding and/or filtering information."
    ::= { dot1qTpFdbEntry 1 }

dot1qTpFdbPort OBJECT-TYPE
    SYNTAX      Integer32 (0..65535)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Either the value '0', or the port number of the port on
        which a frame having a source address equal to the value
        of the corresponding instance of dot1qTpFdbAddress has
        been seen.  A value of '0' indicates that the port
        number has not been learned but that the device does
        have some forwarding/filtering information about this
        address (e.g., in the dot1qStaticUnicastTable).
        Implementors are encouraged to assign the port value to
        this object whenever it is learned, even for addresses
        for which the corresponding value of dot1qTpFdbStatus is
        not learned(3)."
    ::= { dot1qTpFdbEntry 2 }

dot1qTpFdbStatus OBJECT-TYPE
    SYNTAX      INTEGER {
                    other(1),
                    invalid(2),
                    learned(3),
                    self(4),
                    mgmt(5)
                }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The status of this entry.  The meanings of the values
        are:
            other(1) - none of the following.  This may include
                the case where some other MIB object (not the
                corresponding instance of dot1qTpFdbPort, nor an
                entry in the dot1qStaticUnicastTable) is being
                used to determine if and how frames addressed to
                the value of the corresponding instance of
                dot1qTpFdbAddress are being forwarded.
            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 value of the corresponding instance
                of dot1qTpFdbPort was learned and is being used.
            self(4) - the value of the corresponding instance of
                dot1qTpFdbAddress represents one of the device's
                addresses.  The corresponding instance of
                dot1qTpFdbPort indicates which of the device's
                ports has this address.
            mgmt(5) - the value of the corresponding instance of
                dot1qTpFdbAddress is also the value of an
                existing instance of dot1qStaticAddress."
    ::= { dot1qTpFdbEntry 3 }

-- ------------------------------------------------------------
-- Dynamic Group Registration Table
-- ------------------------------------------------------------

dot1qTpGroupTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1qTpGroupEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table containing filtering information for VLANs
        configured into the bridge by (local or network)
        management, or learned dynamically, specifying the set of
        ports to which frames received on a VLAN for this FDB
        and containing a specific Group destination address are
        allowed to be forwarded."
    ::= { dot1qTp 3 }

dot1qTpGroupEntry OBJECT-TYPE
    SYNTAX      Dot1qTpGroupEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Filtering information configured into the bridge by
        management, or learned dynamically, specifying the set of
        ports to which frames received on a VLAN and containing
        a specific Group destination address are allowed to be
        forwarded.  The subset of these ports learned dynamically
        is also provided."
    INDEX   { dot1qVlanIndex, dot1qTpGroupAddress }
    ::= { dot1qTpGroupTable 1 }

Dot1qTpGroupEntry ::=
    SEQUENCE {
        dot1qTpGroupAddress
```

```
            MacAddress,
        dot1qTpGroupEgressPorts
            PortList,
        dot1qTpGroupLearnt
            PortList
    }

dot1qTpGroupAddress OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The destination Group MAC address in a frame to which
        this entry's filtering information applies."
    ::= { dot1qTpGroupEntry 1 }

dot1qTpGroupEgressPorts OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The complete set of ports, in this VLAN, to which
        frames destined for this Group MAC address are currently
        being explicitly forwarded.  This does not include ports
        for which this address is only implicitly forwarded, in
        the dot1qForwardAllPorts list."
    ::= { dot1qTpGroupEntry 2 }

dot1qTpGroupLearnt OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The subset of ports in dot1qTpGroupEgressPorts that
        were learned by GMRP or some other dynamic mechanism, in
        this Filtering database."
    ::= { dot1qTpGroupEntry 3 }

-- ------------------------------------------------------------
-- Service Requirements subtree
-- ------------------------------------------------------------

dot1qForwardAllTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1qForwardAllEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table containing forwarding information for each
```

```
        VLAN, specifying the set of ports to which forwarding of
        all multicasts applies, configured statically by
        management or dynamically by GMRP.  An entry appears in
        this table for all VLANs that are currently
        instantiated."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.7.2, 12.7.7"
    ::= { dot1qTp 4 }

dot1qForwardAllEntry OBJECT-TYPE
    SYNTAX      Dot1qForwardAllEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Forwarding information for a VLAN, specifying the set
        of ports to which all multicasts should be forwarded,
        configured statically by management or dynamically by
        GMRP."
    INDEX   { dot1qVlanIndex }
    ::= { dot1qForwardAllTable 1 }

Dot1qForwardAllEntry ::=
    SEQUENCE {
        dot1qForwardAllPorts
            PortList,
        dot1qForwardAllStaticPorts
            PortList,
        dot1qForwardAllForbiddenPorts
            PortList
    }

dot1qForwardAllPorts OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The complete set of ports in this VLAN to which all
        multicast group-addressed frames are to be forwarded.
        This includes ports for which this need has been
        determined dynamically by GMRP, or configured statically
        by management."
    ::= { dot1qForwardAllEntry 1 }

dot1qForwardAllStaticPorts OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
```

```
        "The set of ports configured by management in this VLAN
        to which all multicast group-addressed frames are to be
        forwarded.  Ports entered in this list will also appear
        in the complete set shown by dot1qForwardAllPorts.  This
        value will be restored after the device is reset.  This
        only applies to ports that are members of the VLAN,
        defined by dot1qVlanCurrentEgressPorts.  A port may not
        be added in this set if it is already a member of the
        set of ports in dot1qForwardAllForbiddenPorts.  The
        default value is a string of ones of appropriate length,
        to indicate the standard behaviour of using basic
        filtering services, i.e., forward all multicasts to all
        ports.

        The value of this object MUST be retained across
        reinitializations of the management system."
    ::= { dot1qForwardAllEntry 2 }

dot1qForwardAllForbiddenPorts OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The set of ports configured by management in this VLAN
        for which the Service Requirement attribute Forward All
        Multicast Groups may not be dynamically registered by
        GMRP.  This value will be restored after the device is
        reset.  A port may not be added in this set if it is
        already a member of the set of ports in
        dot1qForwardAllStaticPorts.  The default value is a
        string of zeros of appropriate length.

        The value of this object MUST be retained across
        reinitializations of the management system."
    ::= { dot1qForwardAllEntry 3 }

dot1qForwardUnregisteredTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1qForwardUnregisteredEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table containing forwarding information for each
        VLAN, specifying the set of ports to which forwarding of
        multicast group-addressed frames for which no
        more specific forwarding information applies.  This is
        configured statically by management and determined
        dynamically by GMRP.  An entry appears in this table for
        all VLANs that are currently instantiated."
```

```
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.7.2, 12.7.7"
    ::= { dot1qTp 5 }

dot1qForwardUnregisteredEntry OBJECT-TYPE
    SYNTAX      Dot1qForwardUnregisteredEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Forwarding information for a VLAN, specifying the set
        of ports to which all multicasts for which there is no
        more specific forwarding information shall be forwarded.
        This is configured statically by management or
        dynamically by GMRP."
    INDEX   { dot1qVlanIndex }
    ::= { dot1qForwardUnregisteredTable 1 }

Dot1qForwardUnregisteredEntry ::=
    SEQUENCE {
        dot1qForwardUnregisteredPorts
            PortList,
        dot1qForwardUnregisteredStaticPorts
            PortList,
        dot1qForwardUnregisteredForbiddenPorts
            PortList
    }

dot1qForwardUnregisteredPorts OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The complete set of ports in this VLAN to which
        multicast group-addressed frames for which there is no
        more specific forwarding information will be forwarded.
        This includes ports for which this need has been
        determined dynamically by GMRP, or configured statically
        by management."
    ::= { dot1qForwardUnregisteredEntry 1 }

dot1qForwardUnregisteredStaticPorts OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The set of ports configured by management, in this
        VLAN, to which multicast group-addressed frames for
        which there is no more specific forwarding information
```

```
        are to be forwarded.  Ports entered in this list will
        also appear in the complete set shown by
        dot1qForwardUnregisteredPorts.  This value will be
        restored after the device is reset.  A port may not be
        added in this set if it is already a member of the set
        of ports in dot1qForwardUnregisteredForbiddenPorts.  The
        default value is a string of zeros of appropriate
        length, although this has no effect with the default
        value of dot1qForwardAllStaticPorts.

        The value of this object MUST be retained across
        reinitializations of the management system."
    ::= { dot1qForwardUnregisteredEntry 2 }

dot1qForwardUnregisteredForbiddenPorts OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The set of ports configured by management in this VLAN
        for which the Service Requirement attribute Forward
        Unregistered Multicast Groups may not be dynamically
        registered by GMRP.  This value will be restored after
        the device is reset.  A port may not be added in this
        set if it is already a member of the set of ports in
        dot1qForwardUnregisteredStaticPorts.  The default value
        is a string of zeros of appropriate length.

        The value of this object MUST be retained across
        reinitializations of the management system."
    ::= { dot1qForwardUnregisteredEntry 3 }

-- ------------------------------------------------------------
-- The Static (Destination-Address Filtering) Database
-- ------------------------------------------------------------

dot1qStaticUnicastTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1qStaticUnicastEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table containing filtering information for Unicast
        MAC addresses for each Filtering Database, configured
        into the device by (local or network) management
        specifying the set of ports to which frames received
        from specific ports and containing specific unicast
        destination addresses are allowed to be forwarded.  A
        value of zero in this table (as the port number from
```

```
        which frames with a specific destination address are
        received) is used to specify all ports for which there
        is no specific entry in this table for that particular
        destination address.  Entries are valid for unicast
        addresses only."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.7.7,
        ISO/IEC 15802-3 Section 7.9.1"
    ::= { dot1qStatic 1 }

dot1qStaticUnicastEntry OBJECT-TYPE
    SYNTAX      Dot1qStaticUnicastEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Filtering information configured into the device by
        (local or network) management specifying the set of
        ports to which frames received from a specific port and
        containing a specific unicast destination address are
        allowed to be forwarded."
    INDEX   {
        dot1qFdbId,
        dot1qStaticUnicastAddress,
        dot1qStaticUnicastReceivePort
    }
    ::= { dot1qStaticUnicastTable 1 }

Dot1qStaticUnicastEntry ::=
    SEQUENCE {
        dot1qStaticUnicastAddress
            MacAddress,
        dot1qStaticUnicastReceivePort
            Integer32,
        dot1qStaticUnicastAllowedToGoTo
            PortList,
        dot1qStaticUnicastStatus
            INTEGER
    }

dot1qStaticUnicastAddress OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The destination MAC address in a frame to which this
        entry's filtering information applies.  This object must
        take the value of a unicast address."
    ::= { dot1qStaticUnicastEntry 1 }
```

```
dot1qStaticUnicastReceivePort OBJECT-TYPE
    SYNTAX      Integer32 (0..65535)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Either the value '0' or the port number of the port
        from which a frame must be received in order for this
        entry's filtering information to apply.  A value of zero
        indicates that this entry applies on all ports of the
        device for which there is no other applicable entry."
    ::= { dot1qStaticUnicastEntry 2 }

dot1qStaticUnicastAllowedToGoTo OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The set of ports for which a frame with a specific
        unicast address will be flooded in the event that it
        has not been learned.  It also specifies the set of
        ports on which a specific unicast address may be dynamically
        learned.  The dot1qTpFdbTable will have an equivalent
        entry with a dot1qTpFdbPort value of '0' until this
        address has been learned, at which point it will be updated
        with the port the address has been seen on.  This only
        applies to ports that are members of the VLAN, defined
        by dot1qVlanCurrentEgressPorts.  The default value of
        this object is a string of ones of appropriate length.

        The value of this object MUST be retained across
        reinitializations of the management system."
    REFERENCE
        "IEEE 802.1Q/D11 Table 8-5, ISO/IEC 15802-3 Table 7-5"
    ::= { dot1qStaticUnicastEntry 3 }

dot1qStaticUnicastStatus OBJECT-TYPE
    SYNTAX      INTEGER {
                    other(1),
                    invalid(2),
                    permanent(3),
                    deleteOnReset(4),
                    deleteOnTimeout(5)
                }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object indicates the status of this entry.
            other(1) - this entry is currently in use, but
```

```
                the conditions under which it will remain
                so differ from the following values.
            invalid(2) - writing this value to the object
                removes the corresponding entry.
            permanent(3) - this entry is currently in use
                and will remain so after the next reset of
                the bridge.
            deleteOnReset(4) - this entry is currently in
                use and will remain so until the next
                reset of the bridge.
            deleteOnTimeout(5) - this entry is currently in
                use and will remain so until it is aged out.

        The value of this object MUST be retained across
        reinitializations of the management system."
    DEFVAL      { permanent }
    ::= { dot1qStaticUnicastEntry 4 }

dot1qStaticMulticastTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1qStaticMulticastEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table containing filtering information for Multicast
        and Broadcast MAC addresses for each VLAN, configured
        into the device by (local or network) management
        specifying the set of ports to which frames received
        from specific ports and containing specific Multicast
        and Broadcast destination addresses are allowed to be
        forwarded.  A value of zero in this table (as the port
        number from which frames with a specific destination
        address are received) is used to specify all ports for
        which there is no specific entry in this table for that
        particular destination address.  Entries are valid for
        Multicast and Broadcast addresses only."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.7.7,
        ISO/IEC 15802-3 Section 7.9.1"
    ::= { dot1qStatic 2 }

dot1qStaticMulticastEntry OBJECT-TYPE
    SYNTAX      Dot1qStaticMulticastEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Filtering information configured into the device by
        (local or network) management specifying the set of
        ports to which frames received from this specific port
```

```
        for this VLAN and containing this Multicast or Broadcast
        destination address are allowed to be forwarded."
    INDEX   {
        dot1qVlanIndex,
        dot1qStaticMulticastAddress,
        dot1qStaticMulticastReceivePort
    }
    ::= { dot1qStaticMulticastTable 1 }

Dot1qStaticMulticastEntry ::=
    SEQUENCE {
        dot1qStaticMulticastAddress
            MacAddress,
        dot1qStaticMulticastReceivePort
            Integer32,
        dot1qStaticMulticastStaticEgressPorts
            PortList,
        dot1qStaticMulticastForbiddenEgressPorts
            PortList,
        dot1qStaticMulticastStatus
            INTEGER
    }

dot1qStaticMulticastAddress OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The destination MAC address in a frame to which this
        entry's filtering information applies.  This object must
        take the value of a Multicast or Broadcast address."
    ::= { dot1qStaticMulticastEntry 1 }

dot1qStaticMulticastReceivePort OBJECT-TYPE
    SYNTAX      Integer32 (0..65535)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Either the value '0' or the port number of the port
        from which a frame must be received in order for this
        entry's filtering information to apply.  A value of zero
        indicates that this entry applies on all ports of the
        device for which there is no other applicable entry."
    ::= { dot1qStaticMulticastEntry 2 }

dot1qStaticMulticastStaticEgressPorts OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-write
```

```
    STATUS      current
    DESCRIPTION
        "The set of ports to which frames received from a
        specific port and destined for a specific Multicast or
        Broadcast MAC address must be forwarded, regardless of
        any dynamic information, e.g., from GMRP.  A port may not
        be added in this set if it is already a member of the
        set of ports in dot1qStaticMulticastForbiddenEgressPorts.
        The default value of this object is a string of ones of
        appropriate length.

        The value of this object MUST be retained across
        reinitializations of the management system."
    ::= { dot1qStaticMulticastEntry 3 }

dot1qStaticMulticastForbiddenEgressPorts OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The set of ports to which frames received from a
        specific port and destined for a specific Multicast or
        Broadcast MAC address must not be forwarded, regardless
        of any dynamic information, e.g., from GMRP.  A port may
        not be added in this set if it is already a member of the
        set of ports in dot1qStaticMulticastStaticEgressPorts.
        The default value of this object is a string of zeros of
        appropriate length.

        The value of this object MUST be retained across
        reinitializations of the management system."
    ::= { dot1qStaticMulticastEntry 4 }

dot1qStaticMulticastStatus OBJECT-TYPE
    SYNTAX      INTEGER {
                    other(1),
                    invalid(2),
                    permanent(3),
                    deleteOnReset(4),
                    deleteOnTimeout(5)
                }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object indicates the status of this entry.
            other(1) - this entry is currently in use, but
                the conditions under which it will remain
                so differ from the following values.
```

```
            invalid(2) - writing this value to the object
                removes the corresponding entry.
            permanent(3) - this entry is currently in use
                and will remain so after the next reset of
                the bridge.
            deleteOnReset(4) - this entry is currently in
                use and will remain so until the next
                reset of the bridge.
            deleteOnTimeout(5) - this entry is currently in
                use and will remain so until it is aged out.

        The value of this object MUST be retained across
        reinitializations of the management system."
    DEFVAL      { permanent }
    ::= { dot1qStaticMulticastEntry 5 }

-- ------------------------------------------------------------
-- The Current VLAN Database
-- ------------------------------------------------------------

dot1qVlanNumDeletes OBJECT-TYPE
    SYNTAX     Counter32
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
        "The number of times a VLAN entry has been deleted from
        the dot1qVlanCurrentTable (for any reason).  If an entry
        is deleted, then inserted, and then deleted, this
        counter will be incremented by 2."
    ::= { dot1qVlan 1 }

dot1qVlanCurrentTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1qVlanCurrentEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table containing current configuration information
        for each VLAN currently configured into the device by
        (local or network) management, or dynamically created
        as a result of GVRP requests received."
    ::= { dot1qVlan 2 }

dot1qVlanCurrentEntry OBJECT-TYPE
    SYNTAX      Dot1qVlanCurrentEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Information for a VLAN configured into the device by
```

```
        (local or network) management, or dynamically created
        as a result of GVRP requests received."
    INDEX   { dot1qVlanTimeMark, dot1qVlanIndex }
    ::= { dot1qVlanCurrentTable 1 }

Dot1qVlanCurrentEntry ::=
    SEQUENCE {
        dot1qVlanTimeMark
            TimeFilter,
        dot1qVlanIndex
            VlanIndex,
        dot1qVlanFdbId
            Unsigned32,
        dot1qVlanCurrentEgressPorts
            PortList,
        dot1qVlanCurrentUntaggedPorts
            PortList,
        dot1qVlanStatus
            INTEGER,
        dot1qVlanCreationTime
            TimeTicks
    }

dot1qVlanTimeMark OBJECT-TYPE
    SYNTAX      TimeFilter
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A TimeFilter for this entry.  See the TimeFilter
        textual convention to see how this works."
    ::= { dot1qVlanCurrentEntry 1 }

dot1qVlanIndex OBJECT-TYPE
    SYNTAX      VlanIndex
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The VLAN-ID or other identifier referring to this VLAN."
    ::= { dot1qVlanCurrentEntry 2 }

dot1qVlanFdbId OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The Filtering Database used by this VLAN.  This is one
        of the dot1qFdbId values in the dot1qFdbTable.  This
        value is allocated automatically by the device whenever
```

```
        the VLAN is created: either dynamically by GVRP, or by
        management, in dot1qVlanStaticTable.  Allocation of this
        value follows the learning constraints defined for this
        VLAN in dot1qLearningConstraintsTable."
    ::= { dot1qVlanCurrentEntry 3 }

dot1qVlanCurrentEgressPorts OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The set of ports that are transmitting traffic for
        this VLAN as either tagged or untagged frames."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.10.2.1"
    ::= { dot1qVlanCurrentEntry 4 }

dot1qVlanCurrentUntaggedPorts OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The set of ports that are transmitting traffic for
        this VLAN as untagged frames."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.10.2.1"
    ::= { dot1qVlanCurrentEntry 5 }

dot1qVlanStatus OBJECT-TYPE
    SYNTAX      INTEGER {
                    other(1),
                    permanent(2),
                    dynamicGvrp(3)
                }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object indicates the status of this entry.
            other(1) - this entry is currently in use, but the
                conditions under which it will remain so differ
                from the following values.
            permanent(2) - this entry, corresponding to an entry
                in dot1qVlanStaticTable, is currently in use and
                will remain so after the next reset of the
                device.  The port lists for this entry include
                ports from the equivalent dot1qVlanStaticTable
                entry and ports learned dynamically.
            dynamicGvrp(3) - this entry is currently in use
```

```
                and will remain so until removed by GVRP.  There
                is no static entry for this VLAN, and it will be
                removed when the last port leaves the VLAN."
    ::= { dot1qVlanCurrentEntry 6 }

dot1qVlanCreationTime OBJECT-TYPE
    SYNTAX      TimeTicks
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The value of sysUpTime when this VLAN was created."
    ::= { dot1qVlanCurrentEntry 7 }

-- ------------------------------------------------------------
-- The Static VLAN Database
-- ------------------------------------------------------------

dot1qVlanStaticTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1qVlanStaticEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table containing static configuration information for
        each VLAN configured into the device by (local or
        network) management.  All entries are permanent and will
        be restored after the device is reset."
    ::= { dot1qVlan 3 }

dot1qVlanStaticEntry OBJECT-TYPE
    SYNTAX      Dot1qVlanStaticEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Static information for a VLAN configured into the
        device by (local or network) management."
    INDEX   { dot1qVlanIndex }
    ::= { dot1qVlanStaticTable 1 }

Dot1qVlanStaticEntry ::=
    SEQUENCE {
        dot1qVlanStaticName
            SnmpAdminString,
        dot1qVlanStaticEgressPorts
            PortList,
        dot1qVlanForbiddenEgressPorts
            PortList,
        dot1qVlanStaticUntaggedPorts
            PortList,
```

```
        dot1qVlanStaticRowStatus
            RowStatus
    }

dot1qVlanStaticName OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE (0..32))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "An administratively assigned string, which may be used
        to identify the VLAN."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.10.2.1"
    ::= { dot1qVlanStaticEntry 1 }

dot1qVlanStaticEgressPorts OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The set of ports that are permanently assigned to the
        egress list for this VLAN by management.  Changes to a
        bit in this object affect the per-port, per-VLAN
        Registrar control for Registration Fixed for the
        relevant GVRP state machine on each port.  A port may
        not be added in this set if it is already a member of
        the set of ports in dot1qVlanForbiddenEgressPorts.  The
        default value of this object is a string of zeros of
        appropriate length, indicating not fixed."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.7.7.3, 11.2.3.2.3"
    ::= { dot1qVlanStaticEntry 2 }

dot1qVlanForbiddenEgressPorts OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The set of ports that are prohibited by management
        from being included in the egress list for this VLAN.
        Changes to this object that cause a port to be included
        or excluded affect the per-port, per-VLAN Registrar
        control for Registration Forbidden for the relevant GVRP
        state machine on each port.  A port may not be added in
        this set if it is already a member of the set of ports
        in dot1qVlanStaticEgressPorts.  The default value of
        this object is a string of zeros of appropriate length,
        excluding all ports from the forbidden set."
```

```
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.7.7.3, 11.2.3.2.3"
    ::= { dot1qVlanStaticEntry 3 }

dot1qVlanStaticUntaggedPorts OBJECT-TYPE
    SYNTAX      PortList
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The set of ports that should transmit egress packets
        for this VLAN as untagged.  The default value of this
        object for the default VLAN (dot1qVlanIndex = 1) is a string
        of appropriate length including all ports.  There is no
        specified default for other VLANs.  If a device agent cannot
        support the set of ports being set, then it will reject the
        set operation with an error.  For example, a
        manager might attempt to set more than one VLAN to be untagged
        on egress where the device does not support this IEEE 802.1Q
        option."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.10.2.1"
    ::= { dot1qVlanStaticEntry 4 }

dot1qVlanStaticRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object indicates the status of this entry."
    ::= { dot1qVlanStaticEntry 5 }

dot1qNextFreeLocalVlanIndex OBJECT-TYPE
    SYNTAX      Integer32 (0|4096..2147483647)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The next available value for dot1qVlanIndex of a local
        VLAN entry in dot1qVlanStaticTable.  This will report
        values >=4096 if a new Local VLAN may be created or else
        the value 0 if this is not possible.

        A row creation operation in this table for an entry with a local
        VlanIndex value may fail if the current value of this object
        is not used as the index.  Even if the value read is used,
        there is no guarantee that it will still be the valid index
        when the create operation is attempted; another manager may
        have already got in during the intervening time interval.
        In this case, dot1qNextFreeLocalVlanIndex should be re-read
```

```
        and the creation re-tried with the new value.

        This value will automatically change when the current value is
        used to create a new row."
    ::= { dot1qVlan 4 }

-- ------------------------------------------------------------
-- The VLAN Port Configuration Table
-- ------------------------------------------------------------

dot1qPortVlanTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1qPortVlanEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table containing per-port control and status
        information for VLAN configuration in the device."
    ::= { dot1qVlan 5 }

dot1qPortVlanEntry OBJECT-TYPE
    SYNTAX      Dot1qPortVlanEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Information controlling VLAN configuration for a port
        on the device.  This is indexed by dot1dBasePort."
    AUGMENTS { dot1dBasePortEntry }
    ::= { dot1qPortVlanTable 1 }

Dot1qPortVlanEntry ::=
    SEQUENCE {
        dot1qPvid
            VlanIndex,
        dot1qPortAcceptableFrameTypes
            INTEGER,
        dot1qPortIngressFiltering
            TruthValue,
        dot1qPortGvrpStatus
            EnabledStatus,
        dot1qPortGvrpFailedRegistrations
            Counter32,
        dot1qPortGvrpLastPduOrigin
            MacAddress,
        dot1qPortRestrictedVlanRegistration
            TruthValue
    }

dot1qPvid OBJECT-TYPE
```

```
    SYNTAX      VlanIndex
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The PVID, the VLAN-ID assigned to untagged frames or
        Priority-Tagged frames received on this port.

        The value of this object MUST be retained across
        reinitializations of the management system."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.10.1.1"
    DEFVAL      { 1 }
    ::= { dot1qPortVlanEntry 1 }

dot1qPortAcceptableFrameTypes OBJECT-TYPE
    SYNTAX      INTEGER {
                    admitAll(1),
                    admitOnlyVlanTagged(2)
                }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "When this is admitOnlyVlanTagged(2), the device will
        discard untagged frames or Priority-Tagged frames
        received on this port.  When admitAll(1), untagged
        frames or Priority-Tagged frames received on this port
        will be accepted and assigned to a VID based on the
        PVID and VID Set for this port.

        This control does not affect VLAN-independent Bridge
        Protocol Data Unit (BPDU) frames, such as GVRP and
        Spanning Tree Protocol (STP).  It does affect VLAN-
        dependent BPDU frames, such as GMRP.

        The value of this object MUST be retained across
        reinitializations of the management system."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.10.1.3"
    DEFVAL      { admitAll }
    ::= { dot1qPortVlanEntry 2 }

dot1qPortIngressFiltering OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "When this is true(1), the device will discard incoming
        frames for VLANs that do not include this Port in its
```

```
        Member set.  When false(2), the port will accept all
        incoming frames.

        This control does not affect VLAN-independent BPDU
        frames, such as GVRP and STP.  It does affect VLAN-
        dependent BPDU frames, such as GMRP.

        The value of this object MUST be retained across
        reinitializations of the management system."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.10.1.4"
    DEFVAL      { false }
    ::= { dot1qPortVlanEntry 3 }

dot1qPortGvrpStatus OBJECT-TYPE
    SYNTAX      EnabledStatus
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The state of GVRP operation on this port.  The value
        enabled(1) indicates that GVRP is enabled on this port,
        as long as dot1qGvrpStatus is also enabled for this
        device.  When disabled(2) but dot1qGvrpStatus is still
        enabled for the device, GVRP is disabled on this port:
        any GVRP packets received will be silently discarded, and
        no GVRP registrations will be propagated from other
        ports.  This object affects all GVRP Applicant and
        Registrar state machines on this port.  A transition
        from disabled(2) to enabled(1) will cause a reset of all
        GVRP state machines on this port.

        The value of this object MUST be retained across
        reinitializations of the management system."
    DEFVAL      { enabled }
    ::= { dot1qPortVlanEntry 4 }

dot1qPortGvrpFailedRegistrations OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The total number of failed GVRP registrations, for any
        reason, on this port."
    ::= { dot1qPortVlanEntry 5 }

dot1qPortGvrpLastPduOrigin OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS  read-only
```

```
    STATUS      current
    DESCRIPTION
        "The Source MAC Address of the last GVRP message
        received on this port."
    ::= { dot1qPortVlanEntry 6 }

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.

        The value of this object MUST be retained across
        reinitializations of the management system."
    REFERENCE
        "IEEE 802.1u clause 11.2.3.2.3, 12.10.1.7."
    DEFVAL      { false }
    ::= { dot1qPortVlanEntry 7 }

-- ------------------------------------------------------------
-- Per port VLAN Statistics Table
-- ------------------------------------------------------------

dot1qPortVlanStatisticsTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1qPortVlanStatisticsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table containing per-port, per-VLAN statistics for
        traffic received.  Separate objects are provided for both the
        most-significant and least-significant bits of statistics
        counters for ports that are associated with this transparent
        bridge.  The most-significant bit objects are only required on
        high-capacity interfaces, as defined in the conformance clauses
        for these objects.  This mechanism is provided as a way to read
        64-bit counters for agents that support only SNMPv1.

        Note that the reporting of most-significant and least-
        significant counter bits separately runs the risk of missing
        an overflow of the lower bits in the interval between sampling.
        The manager must be aware of this possibility, even within the
        same varbindlist, when interpreting the results of a request or
```

```
        asynchronous notification."
    ::= { dot1qVlan 6 }

dot1qPortVlanStatisticsEntry OBJECT-TYPE
    SYNTAX      Dot1qPortVlanStatisticsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Traffic statistics for a VLAN on an interface."
    INDEX   { dot1dBasePort, dot1qVlanIndex }
    ::= { dot1qPortVlanStatisticsTable 1 }

Dot1qPortVlanStatisticsEntry ::=
    SEQUENCE {
        dot1qTpVlanPortInFrames
            Counter32,
        dot1qTpVlanPortOutFrames
            Counter32,
        dot1qTpVlanPortInDiscards
            Counter32,
        dot1qTpVlanPortInOverflowFrames
            Counter32,
        dot1qTpVlanPortOutOverflowFrames
            Counter32,
        dot1qTpVlanPortInOverflowDiscards
            Counter32
    }

dot1qTpVlanPortInFrames OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of valid frames received by this port from
        its segment that were classified as belonging to this
        VLAN.  Note that a frame received on this port is
        counted by this object if and only if it is for a
        protocol being processed by the local forwarding process
        for this VLAN.  This object includes received bridge
        management frames classified as belonging to this VLAN
        (e.g., GMRP, but not GVRP or STP."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.6.1.1.3(a)"
    ::= { dot1qPortVlanStatisticsEntry 1 }

dot1qTpVlanPortOutFrames OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
```

```
    STATUS      current
    DESCRIPTION
        "The number of valid frames transmitted by this port to
        its segment from the local forwarding process for this
        VLAN.  This includes bridge management frames originated
        by this device that are classified as belonging to this
        VLAN (e.g., GMRP, but not GVRP or STP)."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.6.1.1.3(d)"
    ::= { dot1qPortVlanStatisticsEntry 2 }

dot1qTpVlanPortInDiscards OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of valid frames received by this port from
        its segment that were classified as belonging to this
        VLAN and that were discarded due to VLAN-related reasons.
        Specifically, the IEEE 802.1Q counters for Discard
        Inbound and Discard on Ingress Filtering."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.6.1.1.3"
    ::= { dot1qPortVlanStatisticsEntry 3 }

dot1qTpVlanPortInOverflowFrames OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of times the associated
        dot1qTpVlanPortInFrames counter has overflowed."
    REFERENCE
        "ISO/IEC 15802-3 Section 14.6.1.1.3"
    ::= { dot1qPortVlanStatisticsEntry 4 }

dot1qTpVlanPortOutOverflowFrames OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of times the associated
        dot1qTpVlanPortOutFrames counter has overflowed."
    REFERENCE
        "ISO/IEC 15802-3 Section 14.6.1.1.3"
    ::= { dot1qPortVlanStatisticsEntry 5 }

dot1qTpVlanPortInOverflowDiscards OBJECT-TYPE
```

```
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of times the associated
        dot1qTpVlanPortInDiscards counter has overflowed."
    REFERENCE
        "ISO/IEC 15802-3 Section 14.6.1.1.3"
    ::= { dot1qPortVlanStatisticsEntry 6 }

dot1qPortVlanHCStatisticsTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1qPortVlanHCStatisticsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table containing per-port, per-VLAN statistics for
        traffic on high-capacity interfaces."
    ::= { dot1qVlan 7 }

dot1qPortVlanHCStatisticsEntry OBJECT-TYPE
    SYNTAX      Dot1qPortVlanHCStatisticsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Traffic statistics for a VLAN on a high-capacity
        interface."
    INDEX   { dot1dBasePort, dot1qVlanIndex }
    ::= { dot1qPortVlanHCStatisticsTable 1 }

Dot1qPortVlanHCStatisticsEntry ::=
    SEQUENCE {
        dot1qTpVlanPortHCInFrames
            Counter64,
        dot1qTpVlanPortHCOutFrames
            Counter64,
        dot1qTpVlanPortHCInDiscards
            Counter64
    }

dot1qTpVlanPortHCInFrames OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of valid frames received by this port from
        its segment that were classified as belonging to this
        VLAN.  Note that a frame received on this port is
        counted by this object if and only if it is for a
```

```
        protocol being processed by the local forwarding process
        for this VLAN.  This object includes received bridge
        management frames classified as belonging to this VLAN
        (e.g., GMRP, but not GVRP or STP)."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.6.1.1.3(a)"
    ::= { dot1qPortVlanHCStatisticsEntry 1 }

dot1qTpVlanPortHCOutFrames OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of valid frames transmitted by this port to
        its segment from the local forwarding process for this
        VLAN.  This includes bridge management frames originated
        by this device that are classified as belonging to this
        VLAN (e.g., GMRP, but not GVRP or STP)."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.6.1.1.3(d)"
    ::= { dot1qPortVlanHCStatisticsEntry 2 }

dot1qTpVlanPortHCInDiscards OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of valid frames received by this port from
        its segment that were classified as belonging to this
        VLAN and that were discarded due to VLAN-related reasons.
        Specifically, the IEEE 802.1Q counters for Discard
        Inbound and Discard on Ingress Filtering."
    REFERENCE
        "IEEE 802.1Q/D11 Section 12.6.1.1.3"
    ::= { dot1qPortVlanHCStatisticsEntry 3 }

-- ------------------------------------------------------------
-- The VLAN Learning Constraints Table
-- ------------------------------------------------------------

dot1qLearningConstraintsTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1qLearningConstraintsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table containing learning constraints for sets of
        Shared and Independent VLANs."
    REFERENCE
```

```
        "IEEE 802.1Q/D11 Section 12.10.3.1"
    ::= { dot1qVlan 8 }

dot1qLearningConstraintsEntry OBJECT-TYPE
    SYNTAX      Dot1qLearningConstraintsEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A learning constraint defined for a VLAN."
    INDEX   { dot1qConstraintVlan, dot1qConstraintSet }
    ::= { dot1qLearningConstraintsTable 1 }

Dot1qLearningConstraintsEntry ::=
    SEQUENCE {
        dot1qConstraintVlan
            VlanIndex,
        dot1qConstraintSet
            Integer32,
        dot1qConstraintType
            INTEGER,
        dot1qConstraintStatus
            RowStatus
    }

dot1qConstraintVlan OBJECT-TYPE
    SYNTAX      VlanIndex
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The index of the row in dot1qVlanCurrentTable for the
        VLAN constrained by this entry."
    ::= { dot1qLearningConstraintsEntry 1 }

dot1qConstraintSet OBJECT-TYPE
    SYNTAX      Integer32 (0..65535)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The identity of the constraint set to which
        dot1qConstraintVlan belongs.  These values may be chosen
        by the management station."
    ::= { dot1qLearningConstraintsEntry 2 }

dot1qConstraintType OBJECT-TYPE
    SYNTAX      INTEGER {
                    independent(1),
                    shared(2)
                }
```

```
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The type of constraint this entry defines.
            independent(1) - the VLAN, dot1qConstraintVlan,
                uses a filtering database independent from all
                other VLANs in the same set, defined by
                dot1qConstraintSet.
            shared(2) - the VLAN, dot1qConstraintVlan, shares
                the same filtering database as all other VLANs
                in the same set, defined by dot1qConstraintSet."
    ::= { dot1qLearningConstraintsEntry 3 }

dot1qConstraintStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The status of this entry."
    ::= { dot1qLearningConstraintsEntry 4 }

dot1qConstraintSetDefault OBJECT-TYPE
    SYNTAX      Integer32 (0..65535)
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The identity of the constraint set to which a VLAN
        belongs, if there is not an explicit entry for that VLAN
        in dot1qLearningConstraintsTable.

        The value of this object MUST be retained across
        reinitializations of the management system."
    ::= { dot1qVlan 9 }

dot1qConstraintTypeDefault OBJECT-TYPE
    SYNTAX      INTEGER {
                    independent(1),
                    shared(2)
                }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The type of constraint set to which a VLAN belongs, if
        there is not an explicit entry for that VLAN in
        dot1qLearningConstraintsTable.  The types are as defined
        for dot1qConstraintType.

        The value of this object MUST be retained across
```

```
        reinitializations of the management system."
    ::= { dot1qVlan 10 }

-- ------------------------------------------------------------
-- dot1vProtocol subtree
-- ------------------------------------------------------------

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
            Integer32,
        dot1vProtocolGroupRowStatus
            RowStatus
    }

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 Link Service Access
             Point (LSAP) pair: first octet for Destination Service
             Access Point (DSAP) and second octet for Source Service
             Access Point (SSAP)."
    REFERENCE
        "IEEE 802.1v clause 8.6.2"
    ::= { dot1vProtocolGroupEntry 2 }

dot1vProtocolGroupId OBJECT-TYPE
    SYNTAX      Integer32 (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 }

dot1vProtocolGroupRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
```

```
    STATUS      current
    DESCRIPTION
        "This object indicates the status of this entry."
    ::= { dot1vProtocolGroupEntry 4 }

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
            Integer32,
        dot1vProtocolPortGroupVid
            Integer32,
        dot1vProtocolPortRowStatus
            RowStatus
    }

dot1vProtocolPortGroupId OBJECT-TYPE
    SYNTAX      Integer32 (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      Integer32 (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 }

dot1vProtocolPortRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object indicates the status of this entry."
    ::= { dot1vProtocolPortEntry 3 }

-- ------------------------------------------------------------
-- IEEE 802.1Q MIB - Conformance Information
-- ------------------------------------------------------------

qBridgeConformance OBJECT IDENTIFIER ::= { qBridgeMIB 2 }

qBridgeGroups OBJECT IDENTIFIER ::= { qBridgeConformance 1 }

qBridgeCompliances OBJECT IDENTIFIER ::= { qBridgeConformance 2 }

-- ------------------------------------------------------------
-- units of conformance
-- ------------------------------------------------------------

qBridgeBaseGroup OBJECT-GROUP
    OBJECTS {
        dot1qVlanVersionNumber,
        dot1qMaxVlanId,
        dot1qMaxSupportedVlans,
        dot1qNumVlans,
        dot1qGvrpStatus
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing device-level control
        and status information for the Virtual LAN bridge
        services."
    ::= { qBridgeGroups 1 }

qBridgeFdbUnicastGroup OBJECT-GROUP
```

```
    OBJECTS {
        dot1qFdbDynamicCount,
        dot1qTpFdbPort,
        dot1qTpFdbStatus
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing information about all
        unicast addresses, learned dynamically or statically
        configured by management, in each Filtering Database."
    ::= { qBridgeGroups 2 }

qBridgeFdbMulticastGroup OBJECT-GROUP
    OBJECTS {
        dot1qTpGroupEgressPorts,
        dot1qTpGroupLearnt
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing information about all
        multicast addresses, learned dynamically or statically
        configured by management, in each Filtering Database."
    ::= { qBridgeGroups 3 }

qBridgeServiceRequirementsGroup OBJECT-GROUP
    OBJECTS {
        dot1qForwardAllPorts,
        dot1qForwardAllStaticPorts,
        dot1qForwardAllForbiddenPorts,
        dot1qForwardUnregisteredPorts,
        dot1qForwardUnregisteredStaticPorts,
        dot1qForwardUnregisteredForbiddenPorts
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing information about
        service requirements, learned dynamically or statically
        configured by management, in each Filtering Database."
    ::= { qBridgeGroups 4 }

qBridgeFdbStaticGroup OBJECT-GROUP
    OBJECTS {
        dot1qStaticUnicastAllowedToGoTo,
        dot1qStaticUnicastStatus,
        dot1qStaticMulticastStaticEgressPorts,
        dot1qStaticMulticastForbiddenEgressPorts,
        dot1qStaticMulticastStatus
    }
```

```
    STATUS      current
    DESCRIPTION
        "A collection of objects providing information about
        unicast and multicast addresses statically configured by
        management, in each Filtering Database or VLAN."
    ::= { qBridgeGroups 5 }

qBridgeVlanGroup OBJECT-GROUP
    OBJECTS {
        dot1qVlanNumDeletes,
        dot1qVlanFdbId,
        dot1qVlanCurrentEgressPorts,
        dot1qVlanCurrentUntaggedPorts,
        dot1qVlanStatus,
        dot1qVlanCreationTime
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing information about
        all VLANs currently configured on this device."
    ::= { qBridgeGroups 6 }

qBridgeVlanStaticGroup OBJECT-GROUP
    OBJECTS {
        dot1qVlanStaticName,
        dot1qVlanStaticEgressPorts,
        dot1qVlanForbiddenEgressPorts,
        dot1qVlanStaticUntaggedPorts,
        dot1qVlanStaticRowStatus,
        dot1qNextFreeLocalVlanIndex
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing information about
        VLANs statically configured by management."
    ::= { qBridgeGroups 7 }

qBridgePortGroup OBJECT-GROUP
    OBJECTS {
        dot1qPvid,
        dot1qPortAcceptableFrameTypes,
        dot1qPortIngressFiltering,
        dot1qPortGvrpStatus,
        dot1qPortGvrpFailedRegistrations,
        dot1qPortGvrpLastPduOrigin
    }
    STATUS      deprecated
    DESCRIPTION
```

```
        "A collection of objects providing port-level VLAN
        control and status information for all ports."
    ::= { qBridgeGroups 8 }

qBridgeVlanStatisticsGroup OBJECT-GROUP
    OBJECTS {
        dot1qTpVlanPortInFrames,
        dot1qTpVlanPortOutFrames,
        dot1qTpVlanPortInDiscards
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing per-port packet
        statistics for all VLANs currently configured on this
        device."
    ::= { qBridgeGroups 9 }

qBridgeVlanStatisticsOverflowGroup OBJECT-GROUP
    OBJECTS {
        dot1qTpVlanPortInOverflowFrames,
        dot1qTpVlanPortOutOverflowFrames,
        dot1qTpVlanPortInOverflowDiscards
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing overflow counters for
        per-port packet statistics for all VLANs currently configured
        on this device for high-capacity interfaces, defined as those
        that have the value of the corresponding instance of
        ifSpeed greater than 650,000,000 bits/second."
    ::= { qBridgeGroups 10 }

qBridgeVlanHCStatisticsGroup OBJECT-GROUP
    OBJECTS {
        dot1qTpVlanPortHCInFrames,
        dot1qTpVlanPortHCOutFrames,
        dot1qTpVlanPortHCInDiscards
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing per-port packet
        statistics for all VLANs currently configured on this
        device for high-capacity interfaces, defined as those
        that have the value of the corresponding instance of
        ifSpeed greater than 650,000,000 bits/second."
    ::= { qBridgeGroups 11 }

qBridgeLearningConstraintsGroup OBJECT-GROUP
```

```
    OBJECTS {
        dot1qConstraintType,
        dot1qConstraintStatus
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects defining the Filtering Database
        constraints all VLANs have with each other."
    ::= { qBridgeGroups 12 }

qBridgeLearningConstraintDefaultGroup OBJECT-GROUP
    OBJECTS {
        dot1qConstraintSetDefault,
        dot1qConstraintTypeDefault
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects defining the default Filtering
        Database constraints for VLANs that have no specific
        constraints defined."
    ::= { qBridgeGroups 13 }

qBridgeClassificationDeviceGroup OBJECT-GROUP
    OBJECTS {
        dot1vProtocolGroupId,
        dot1vProtocolGroupRowStatus
    }
    STATUS      current
    DESCRIPTION
        "VLAN classification information for the bridge."
    ::= { qBridgeGroups 14 }

qBridgeClassificationPortGroup OBJECT-GROUP
    OBJECTS {
        dot1vProtocolPortGroupVid,
        dot1vProtocolPortRowStatus
    }
    STATUS      current
    DESCRIPTION
        "VLAN classification information for individual ports."
    ::= { qBridgeGroups 15 }

qBridgePortGroup2 OBJECT-GROUP
    OBJECTS {
        dot1qPvid,
        dot1qPortAcceptableFrameTypes,
        dot1qPortIngressFiltering,
        dot1qPortGvrpStatus,
```

```
        dot1qPortGvrpFailedRegistrations,
        dot1qPortGvrpLastPduOrigin,
        dot1qPortRestrictedVlanRegistration
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing port-level VLAN
        control and status information for all ports."
    ::= { qBridgeGroups 16 }

-- ------------------------------------------------------------
-- compliance statements
-- ------------------------------------------------------------

qBridgeCompliance MODULE-COMPLIANCE
    STATUS  deprecated
    DESCRIPTION
        "The compliance statement for device support of Virtual
        LAN Bridge services.

        RFC2674 was silent about the expected persistence of the
        read-write objects in this MIB module.  Applications MUST
        NOT assume that the values of the read-write objects are
        persistent across reinitializations of the management
        system and MUST NOT assume that the values are not
        persistent across reinitializations of the management
        system."

    MODULE
        MANDATORY-GROUPS {
            qBridgeBaseGroup,
            qBridgeVlanGroup,
            qBridgeVlanStaticGroup,
            qBridgePortGroup
        }

        GROUP       qBridgeFdbUnicastGroup
        DESCRIPTION
            "This group is mandatory for bridges that implement
            802.1Q transparent bridging."

        GROUP       qBridgeFdbMulticastGroup
        DESCRIPTION
            "This group is mandatory for bridges that implement
            802.1Q transparent bridging."

        GROUP       qBridgeServiceRequirementsGroup
        DESCRIPTION
```

```
            "This group is mandatory for bridges that implement
            extended filtering services.  All objects must be
            read-write if extended-filtering services are
            enabled."

        GROUP       qBridgeFdbStaticGroup
        DESCRIPTION
            "This group is optional."

        GROUP       qBridgeVlanStatisticsGroup
        DESCRIPTION
            "This group is optional as there may be significant
            implementation cost associated with its support."

        GROUP       qBridgeVlanStatisticsOverflowGroup
        DESCRIPTION
            "This group is optional as there may be significant
            implementation cost associated with its support.  It is most
            relevant for high-capacity interfaces where the SNMP agent
            supports only SNMPv1."

        GROUP       qBridgeVlanHCStatisticsGroup
        DESCRIPTION
            "This group is optional as there may be significant
            implementation cost associated with its support.  It is most
            relevant for high-capacity interfaces."

        GROUP       qBridgeLearningConstraintsGroup
        DESCRIPTION
            "This group is mandatory for devices implementing
             both Independent VLAN Learning (IVL) and Shared
             VLAN Learning (SVL) modes of operation of the
             filtering database, as defined by IEEE 802.1Q."

        GROUP       qBridgeLearningConstraintDefaultGroup
        DESCRIPTION
            "This group is mandatory for devices implementing
             both Independent VLAN Learning (IVL) and Shared
             VLAN Learning (SVL) modes of operation of the
             filtering database, as defined by IEEE 802.1Q."

        OBJECT      dot1qPortAcceptableFrameTypes
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required as this is an optional
            capability in IEEE 802.1Q."

        OBJECT      dot1qPortIngressFiltering
```

```
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required as this is an optional
            capability in IEEE 802.1Q."

        OBJECT      dot1qConstraintSetDefault
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required as this is an optional
            capability in IEEE 802.1Q."

        OBJECT      dot1qConstraintTypeDefault
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required as this is an optional
            capability in IEEE 802.1Q."

       ::= { qBridgeCompliances 1 }

qBridgeCompliance2 MODULE-COMPLIANCE
    STATUS  current
    DESCRIPTION
        "The compliance statement for device support of Virtual
        LAN Bridge services.

        This document clarifies the persistence requirements for
        the read-write objects in this MIB module.  All
        implementations claiming compliance to qBridgeCompliance2
        MUST retain the values of those read-write objects that
        specify this requirement."

    MODULE
        MANDATORY-GROUPS {
            qBridgeBaseGroup,
            qBridgeVlanGroup,
            qBridgeVlanStaticGroup,
            qBridgePortGroup2
        }

        GROUP       qBridgeFdbUnicastGroup
        DESCRIPTION
            "This group is mandatory for bridges that implement
            802.1Q transparent bridging."

        GROUP       qBridgeFdbMulticastGroup
        DESCRIPTION
            "This group is mandatory for bridges that implement
            802.1Q transparent bridging."
```

```
        GROUP       qBridgeServiceRequirementsGroup
        DESCRIPTION
            "This group is mandatory for bridges that implement
            extended filtering services.  All objects must be
            read-write if extended-filtering services are
            enabled."

        GROUP       qBridgeFdbStaticGroup
        DESCRIPTION
            "This group is optional."

        GROUP       qBridgeVlanStatisticsGroup
        DESCRIPTION
            "This group is optional as there may be significant
            implementation cost associated with its support."

        GROUP       qBridgeVlanStatisticsOverflowGroup
        DESCRIPTION
            "This group is optional as there may be significant
            implementation cost associated with its support.  It is most
            relevant for high-capacity interfaces where the SNMP agent
            supports only SNMPv1."

        GROUP       qBridgeVlanHCStatisticsGroup
        DESCRIPTION
            "This group is optional as there may be significant
            implementation cost associated with its support.  It is most
            relevant for high-capacity interfaces."

        GROUP       qBridgeLearningConstraintsGroup
        DESCRIPTION
            "This group is mandatory for devices implementing
             both Independent VLAN Learning (IVL) and Shared
             VLAN Learning (SVL) modes of operation of the
             filtering database, as defined by IEEE 802.1Q."

        GROUP       qBridgeLearningConstraintDefaultGroup
        DESCRIPTION
            "This group is mandatory for devices implementing
             both Independent VLAN Learning (IVL) and Shared
             VLAN Learning (SVL) modes of operation of the
             filtering database, as defined by IEEE 802.1Q."

        GROUP       qBridgeClassificationDeviceGroup
        DESCRIPTION
            "This group is mandatory ONLY for devices implementing
             VLAN Classification as specified in IEEE 802.1v."
```

```
        GROUP       qBridgeClassificationPortGroup
        DESCRIPTION
            "This group is mandatory ONLY for devices implementing
             VLAN Classification as specified in IEEE 802.1v."

        OBJECT      dot1qPortAcceptableFrameTypes
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required as this is an optional
            capability in IEEE 802.1Q."

        OBJECT      dot1qPortIngressFiltering
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required as this is an optional
            capability in IEEE 802.1Q."

        OBJECT      dot1qConstraintSetDefault
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required as this is an optional
            capability in IEEE 802.1Q."

        OBJECT      dot1qConstraintTypeDefault
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required as this is an optional
            capability in IEEE 802.1Q."

        OBJECT      dot1vProtocolGroupId
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required as this is an optional
            capability in IEEE 802.1v."

        OBJECT      dot1vProtocolGroupRowStatus
        MIN-ACCESS  read-only
        DESCRIPTION
            "Write access is not required as this is an optional
            capability in IEEE 802.1v."

        ::= { qBridgeCompliances 2 }

END
```

6. Acknowledgements

Much of the groundwork for this document was performed by the IEEE 802.1 working group during the definition of the IEEE 802.1D updates [802.1D] and IEEE 802.1Q [802.1Q].

The authors wish to thank the members of the Bridge Working Group, and David Harrington, Anders SW Christensen, Andrew Smith, Paul Langille, Anil Rijhsinghani, and Keith McCloghrie in particular for their comments and suggestions, which improved this effort.

Editing for the final version was done by David Levi.

The new textual conventions related to VLAN-IDs were produced as a result of a review of the use of VLAN-ID in several MIB modules. Further investigation found that VLAN-ID objects were defined in a few other MIB modules. The editor would like to thank all who contributed to the discussion that resulted in these new textual conventions. Specifically, Bert Wijnen, Les Bell, Andrew Smith, Mike Heard, Randy Presuhn, Dan Romascanu, Eduardo Cardona, Tom Petch, Juergen Schoenwaelder, Richard Woundy, Tony Jeffree, and William Murwin. We also received input and feedback from IEEE confirming that the values 0 and 4095 are not used for identifying a specific VLAN-ID and so can be used to represent none or a wildcard (see Appendix A).

7. Security Considerations

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

The following tables and objects in the P-BRIDGE-MIB can be manipulated to interfere with the operation of priority classes. This could, for example, be used to force a reinitialization of state machines, thus causing network instability. Another possibility would be for an attacker to override established policy on port priorities, thus giving a user (or an attacker) unauthorized preferential treatment.

```
dot1dTrafficClassesEnabled
dot1dGmrpStatus
dot1dPortPriorityTable
dot1dUserPriorityRegenTable
```

dot1dTrafficClassTable
dot1dPortGarpTable
dot1dPortGmrpTable

The following tables and objects in the Q-BRIDGE-MIB could be manipulated to interfere with the operation of virtual LANs. This could, for example, be used to force a reinitialization of state machines to cause network instability, or changing the forwarding and filtering policies.

dot1qGvrpStatus
dot1qForwardAllTable
dot1qStaticUnicastTable
dot1qStaticMulticastTable
dot1qVlanStaticTable
dot1qPortVlanTable
dot1qLearningConstraintsTable
dot1vProtocolGroupTable
dot1vProtocolPortTable

Some of the readable objects in this MIB module (i.e., objects with a MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments. It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP. These are the tables and objects and their sensitivity/vulnerability.

The objects dot1dDeviceCapabilities and dot1dPortCapabilitiesTable in the P-BRIDGE-MIB could be used by an attacker to determine which attacks might be useful to attempt against a given device.

The following read-only tables and objects in the Q-BRIDGE-MIB could be used by an attacker to determine which attacks might be useful to attempt against a given device, could be used by an attacker to detect whether their attacks are being blocked or filtered, or could be used to understand the logical topology of the network.

dot1qMaxVlanID
dot1qMaxSupportedVlans
dot1qNumVlans
dot1qFdbTable
dot1qTpFdbTable
dot1qTpGroupTable
dot1qVlanCurrentTable
dot1qPortVlanStatisticsTable

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

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

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

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Appendix A. Email from Tony Jeffrey from IEEE

-----Original Message-----
From: Tony Jeffree [mailto:tony@jeffree.co.uk]
Sent: Friday, 6th of June 2003 17:16
To: Wijnen, Bert (Bert) [mailto:bwijnen@lucent.com]
Subject: RE: VLAn ID

Bert et al -

We have concluded that the use of 4095 as a wildcard is acceptable to 802.1, and we will make any necessary changes to 802.1Q in due course to relax the current stated restriction. However, we need to know whether that is all that needs to be done to 802.1Q - i.e., is there any need to change our definitions of the managed objects in the document (Clause 12) to reflect the interpretation of 4095 as a wildcard, or is this simply an issue for the SNMP machinery to handle?

Regards,
Tony

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Acknowledgement

Funding for the RFC Editor function is provided by the IETF Administrative Support Activity (IASA).