Definitions of Managed Objects for Bridges

Status of this Memo

   This document is an Internet-Draft and is subject to all provisions
   of Section 10 of RFC2026.

   Internet-Drafts are working documents of the Internet Engineering
   Task Force (IETF), its areas, and its working groups. Note that
   other groups may also distribute working documents as Internet-
   Drafts.

   Internet-Drafts are draft documents valid for a maximum of six months
   and may be updated, replaced, or obsoleted by other documents at any
   time. It is inappropriate to use Internet- Drafts as reference
   material or to cite them other than as "work in progress."

   The list of current Internet-Drafts can be accessed at
   http://www.ietf.org/1id-abstracts.html

   The list of Internet-Draft Shadow Directories can be accessed at
   http://www.ietf.org/shadow.html

Copyright Notice

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 objects for managing MAC bridges based on
   the IEEE 802.1D-1998 standard between Local Area Network (LAN)
   segments. 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.

   The MIB presented in this memo is a direct translation of the BRIDGE
   MIB defined in [RFC1493], to the SMIv2 syntax required for current
   IETF MIB standards. This memo obsoletes RFC 1493.

Table of Contents

1. The SNMP Management Framework

The SNMP Management Framework presently consists of five major
components:

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

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

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

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

   o   A set of fundamental applications described in RFC 2573

[RFC2573] and the view-based access control mechanism described
in RFC 2575 [RFC2575].

A more detailed introduction to the current SNMP Management Framework

can be found in RFC 2570 [RFC2570].

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

This memo specifies a MIB module that is compliant to the SMIv2. A
MIB conforming to the SMIv1 can be produced through the appropriate
translations. The resulting translated MIB must be semantically
equivalent, except where objects or events are omitted because no
translation is possible (use of Counter64). Some machine readable
information in SMIv2 will be converted into textual descriptions in
SMIv1 during the translation process. However, this loss of machine
readable information is not considered to change the semantics of the
MIB.

2. Overview

A common device present in many networks is the Bridge. This device
is used to connect Local Area Network segments below the network
layer.

There are two major modes defined for this bridging; transparent and
source route. The transparent method of bridging is defined in the
IEEE 802.1D specification [IEEE8021D]. This memo defines those
objects needed for the management of a bridging entity operating in
the transparent mode, as well as some objects applicable to all types
of bridges.

To be consistent with IAB directives and good engineering practice,
an explicit attempt was made to keep this MIB as simple as possible.
This was accomplished by applying the following criteria to objects
proposed for inclusion:

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

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

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

(4) Limit the total of objects.

(5) Exclude objects which 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.

2.1. Structure of MIB

   Objects in this MIB are arranged into groups. Each group is

organized as a set of related objects. The overall structure and
assignment of objects to their groups is shown below. Where
appropriate the corresponding IEEE 802.1D [IEEE8021D] management
object name is also included.

```
     Bridge MIB Name                 IEEE 802.1D Name

     dot1dBridge
       dot1dBase
         BridgeAddress               Bridge.BridgeAddress
         NumPorts                    Bridge.NumberOfPorts
         Type
         PortTable
           Port                      BridgePort.PortNumber
           IfIndex
           Circuit
           DelayExceededDiscards       .DiscardTransitDelay
           MtuExceededDiscards         .DiscardOnError
       dot1dStp
         ProtocolSpecification
         Priority                    SpanningTreeProtocol
                                       .BridgePriority
         TimeSinceTopologyChange       .TimeSinceTopologyChange
         TopChanges                    .TopologyChangeCount
         DesignatedRoot                .DesignatedRoot
         RootCost                      .RootCost
         RootPort                      .RootPort
         MaxAge                        .MaxAge
         HelloTime                     .HelloTime
         HoldTime                      .HoldTime
         ForwardDelay                  .ForwardDelay
         BridgeMaxAge                  .BridgeMaxAge
         BridgeHelloTime               .BridgeHelloTime
         BridgeForwardDelay            .BridgeForwardDelay
         PortTable
           Port                      SpanningTreeProtocolPort
                                       .PortNumber
           Priority                    .PortPriority
           State                       .SpanningTreeState
           Enable
           PathCost                    .PortPathCost
           DesignatedRoot              .DesignatedRoot
           DesignatedCost              .DesignatedCost
           DesignatedBridge            .DesignatedBridge
           DesignatedPort              .DesignatedPort
           ForwardTransitions
       dot1dTp
         LearnedEntryDiscards        BridgeFilter.DatabaseSize
                                       .NumDynamic,NumStatic
```

AgingTime   BridgeFilter.AgingTime
            FdbTable
              Address
              Port
              Status

```
            PortTable
               Port
               MaxInfo
               InFrames                      BridgePort.FramesReceived
               OutFrames                        .ForwardOutbound
               InDiscards                       .DiscardInbound
         dot1dStatic
            StaticTable
               Address
               ReceivePort
               AllowedToGoTo
               Status
```

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


```
      IEEE 802.1D Object              Disposition

      Bridge.BridgeName               Same as sysDescr (MIB II)
      Bridge.BridgeUpTime             Same as sysUpTime (MIB II)
      Bridge.PortAddresses            Same as ifPhysAddress (MIB II)
      BridgePort.PortName             Same as ifDescr (MIB II)
      BridgePort.PortType             Same as ifType (MIB II)
      BridgePort.RoutingType          Derivable from the implemented
                                      groups

      SpanningTreeProtocol
           .BridgeIdentifier          Combination of dot1dStpPriority
                                      and dot1dBaseBridgeAddress
           .TopologyChange            Since this is transitory, it
                                      is not considered useful.
      SpanningTreeProtocolPort
           .Uptime                    Same as ifLastChange (MIB II)
           .PortIdentifier            Combination of dot1dStpPort
                                      and dot1dStpPortPriority
           .TopologyChangeAcknowledged Since this is transitory, it
                                      is not considered useful.
           .DiscardLackOfBuffers      Redundant

      Transmission Priority           These objects are not required
                                      as per the Pics Proforma and
                                      not considered useful.
           .TransmissionPriorityName
           .OutboundUserPriority
           .OutboundAccessPriority
```

2.1.1. The dot1dBase Group

This mandatory group contains the objects which are applicable to all types of bridges.

2.1.2. **The dot1dStp Group**

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

2.1.3. The dot1dSr Group

This group contains the objects that describe the entity's state with
respect to source route bridging. If source routing is not supported
this group will not be implemented. This group is applicable to
source route only, and SRT bridges. This group will be described in
a separate document applicable only to source route bridging.

2.1.4. The dot1dTp Group

This group contains objects that describe the entity's state with
respect to transparent bridging. If transparent bridging is not
supported this group will not be implemented. This group is
applicable to transparent only and SRT bridges.

2.1.5. The dot1dStatic Group

This group contains objects that describe the entity's state with
respect to destination-address filtering. If destination-address
filtering is not supported this group will not be implemented. This
group is applicable to any type of bridge which performs destination-
address filtering.

2.2. Relationship to Other MIBs

As described above, some IEEE 802.1D management objects have not been
included in this MIB because they overlap with objects in other MIBs
applicable to a bridge implementing this MIB. In particular, it is
assumed that a bridge implementing this MIB will also implement (at
least) the 'system' group and the 'interfaces' group defined in MIB-
II [RFC1213].

2.2.1. Relationship to the 'system' group

In MIB-II [RFC1907], the 'system' group is defined as being mandatory
for all systems such that each managed entity contains one instance
of each object in the 'system' group. Thus, those objects apply to
the entity as a whole irrespective of whether the entity's sole
functionality is bridging, or whether bridging is only a subset of
the entity's functionality.

2.2.2. Relationship to the 'interfaces' group

In the Interfaces Group MIB [RFC2863], the 'interfaces' group is

defined as being mandatory for all systems and contains information
on an entity's interfaces, where each interface is thought of as
being 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.

Implicit in this Bridge MIB is the notion of ports on a bridge. Each of these ports is associated with one interface of the 'interfaces' group, 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 to be delineated according to a set of protocols, with some protocols being bridged, and other protocols not being bridged. For example, in an entity which exclusively performed bridging, all protocols would be considered as being bridged, whereas in an entity which performed IP routing on IP datagrams and only bridged other protocols, only the non-IP data would be considered as being bridged.

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

2.3. Textual Conventions

The datatypes, MacAddress, BridgeId and Timeout, are used as textual conventions in this document. Objects defined using these conventions are always encoded by means of the rules that define their primitive type. Hence, no changes to the SMI or the SNMP are necessary to accommodate these textual conventions which are adopted merely for the convenience of readers.

3. Definitions

BRIDGE-MIB DEFINITIONS ::= BEGIN

```
-- ---------------------------------------------------------- --
-- MIB for IEEE 802.1D devices
-- ---------------------------------------------------------- --
IMPORTS
```

```
    MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,
    Counter32, Integer32, TimeTicks, mib-2
        FROM SNMPv2-SMI
    TEXTUAL-CONVENTION, MacAddress
        FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
        FROM SNMPv2-CONF
    InterfaceIndex FROM IF-MIB
    ;

bridgeMIB MODULE-IDENTITY
    LAST-UPDATED "200307240000Z"
    ORGANIZATION "IETF Bridge MIB Working Group"
    CONTACT-INFO
        "Email: Bridge-mib@ietf.org

                K.C. Norseth
                L-3 Communications
           Tel: +1 801-594-2809
         Email: kenyon.c.norseth@L-3com.com
        Postal: 640 N. 2200 West.
                Salt Lake City, Utah 84116-0850

                Les Bell
                3Com Europe Limited
         Phone: +44 1442 438025
         Email: Les_Bell@3Com.com
        Postal: 3Com Centre, Boundary Way
                Hemel Hempstead
                Herts.  HP2 7YU
                UK

         Send comments to <bridge-mib@ietf.org>"
    DESCRIPTION
        "The Bridge MIB module for managing devices that support
        IEEE 802.1D.

        Copyright (C) The Internet Society (2003). This version of
        this MIB module is part of RFC xxxx; see the RFC itself for
        full legal notices."
    REVISION     "200307240000Z"
    DESCRIPTION
        "Translation of RFC 1493 to SMIv2."
    REVISION     "199307310000Z"
    DESCRIPTION
        "RFC 1493: SMIv1 version."
    ::= { dot1dBridge 8 }
```

```
dot1dNotification  OBJECT IDENTIFIER ::= { dot1dBridge 0 }


-- ------------------------------------------------------------ --
-- Textual Conventions
-- ------------------------------------------------------------ --
```

-- All representations of MAC addresses in this MIB Module use,
-- as a textual convention (i.e. this convention does not affect
-- their encoding), the data type MacAddress, defined in
-- SNMPv2-TC.

-- Similarly, all representations of Bridge-Id in this MIB
-- Module use, as a textual convention (i.e. this convention
-- does not affect their encoding), the data type:

```
BridgeId ::= TEXTUAL-CONVENTION
    STATUS      current
    DESCRIPTION
        "The Bridge-Identifier as used in the Spanning Tree
        Protocol to uniquely identify a bridge.  Its first two
        octets (in network byte order) contain a priority value
        and its last 6 octets contain the MAC address used to
        refer to a bridge in a unique fashion (typically, the
        numerically smallest MAC address of all ports on the
        bridge)."
    SYNTAX      OCTET STRING (SIZE (8))
```

-- Several objects in this MIB module represent values of timers
-- used by the Spanning Tree Protocol. In this MIB, these
-- timers have values in units of hundreths of a second (i.e.
-- 1/100 secs).
-- These timers, when stored in a Spanning Tree Protocol's BPDU,
-- are in units of 1/256 seconds. Note, however, that
-- 802.1D-1998 specifies a settable granularity of no more
-- than 1 second for these timers. To avoid ambiguity, a data
-- type is defined here as a textual convention and all
-- representation of these timers in this MIB module are defined
-- using this data type. An algorithm is also defined for
-- converting between the different units, to ensure a timer's
-- value is not distorted by multiple conversions.
-- The data type is:

```
Timeout ::= TEXTUAL-CONVENTION
    STATUS      current
    DESCRIPTION
        "A STP timer in units of 1/100 seconds.
        To convert a Timeout value into a value in units of
        1/256 seconds, the following algorithm should be used:

            b = floor( (n * 256) / 100)

        where:
            floor   =  quotient [ignore remainder]
            n is the value in 1/100 second units
```

b is the value in 1/256 second units

To convert the value from 1/256 second units back to
1/100 seconds, the following algorithm should be used:

```
            n = ceiling( (b * 100) / 256)

        where:
            ceiling = quotient [if remainder is 0], or
                      quotient + 1 [if remainder is non-zero]
            n is the value in 1/100 second units
            b is the value in 1/256 second units

        Note: it is important that the arithmetic operations are
        done in the order specified (i.e., multiply first,
        divide second)."
    SYNTAX        Integer32


-- ----------------------------------------------------------- --

dot1dBridge     OBJECT IDENTIFIER ::= { mib-2 17 }

-- ----------------------------------------------------------- --
-- groups in the Bridge MIB
-- ----------------------------------------------------------- --

dot1dBase       OBJECT IDENTIFIER ::= { dot1dBridge 1 }
dot1dStp        OBJECT IDENTIFIER ::= { dot1dBridge 2 }

dot1dSr         OBJECT IDENTIFIER ::= { dot1dBridge 3 }
-- separately documented

dot1dTp         OBJECT IDENTIFIER ::= { dot1dBridge 4 }
dot1dStatic     OBJECT IDENTIFIER ::= { dot1dBridge 5 }

-- Groups defined in the Bridge Mib Extensions:
--      pBridgeMIB MODULE-IDENTITY ::= { dot1dBridge 6 }
--      qBridgeMIB MODULE-IDENTITY ::= { dot1dBridge 7 }

-- The MODULE-IDENTITY for this MIB has been defined above as:
--      bridgeMIB MODULE-IDENTITY ::= { dot1dBridge 8 }

-- The MODULE-IDENTITY for the Source Routing MIB has been
-- defined in that MIB as:
--      srMIB MODULE-IDENTITY ::= { dot1dBridge 9 }

-- Groups defined in the Source Routing MIB:
--      dot1dPortPair OBJECT IDENTIFIER ::= { dot1dBridge 10 }

dot1dConformance        OBJECT IDENTIFIER ::= { bridgeMIB 1 }


-- ----------------------------------------------------------- --
-- the dot1dBase group
-- ----------------------------------------------------------- --
-- Implementation of the dot1dBase group is mandatory for all
```

```
-- bridges.
-- ------------------------------------------------------------- --

dot1dBaseBridgeAddress OBJECT-TYPE
```

```
    SYNTAX      MacAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The MAC address used by this bridge when it must be
        referred to in a unique fashion.   It is recommended
        that this be the numerically smallest MAC address of all
        ports that belong to this bridge.  However it is only
        required to be unique.  When concatenated with
        dot1dStpPriority a unique BridgeIdentifier is formed
        which is used in the Spanning Tree Protocol."
    REFERENCE
        "IEEE 802.1D-1998: clauses 14.4.1.1.3 and 7.12.5"
    ::= { dot1dBase 1 }

dot1dBaseNumPorts OBJECT-TYPE
    SYNTAX      Integer32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of ports controlled by this bridging
        entity."
    REFERENCE
        "IEEE 802.1D-1998: clause 14.4.1.1.3"
    ::= { dot1dBase 2 }

dot1dBaseType OBJECT-TYPE
    SYNTAX      INTEGER {
                    unknown(1),
                    transparentOnly(2),
                    sourcerouteOnly(3),
                    srt(4)
                }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Indicates what type of bridging this bridge can
        perform.  If a bridge is actually performing a
        certain type of bridging this will be indicated by
        entries in the port table for the given type."
    ::= { dot1dBase 3 }

-- ------------------------------------------------------------ --
-- The Generic Bridge Port Table
-- ------------------------------------------------------------ --
dot1dBasePortTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1dBasePortEntry
    MAX-ACCESS  not-accessible
    STATUS      current
```

```
    DESCRIPTION
        "A table that contains generic information about every
        port that is associated with this bridge.  Transparent,
        source-route, and srt ports are included."
    ::= { dot1dBase 4 }
```

```
dot1dBasePortEntry OBJECT-TYPE
    SYNTAX        Dot1dBasePortEntry
    MAX-ACCESS    not-accessible
    STATUS        current
    DESCRIPTION
        "A list of information for each port of the bridge."
    REFERENCE
        "IEEE 802.1D-1998: clause 14.4.2, 14.6.1"
    INDEX   { dot1dBasePort }
    ::= { dot1dBasePortTable 1 }

Dot1dBasePortEntry ::=
    SEQUENCE {
        dot1dBasePort
            Integer32,
        dot1dBasePortIfIndex
            InterfaceIndex,
        dot1dBasePortCircuit
            OBJECT IDENTIFIER,
        dot1dBasePortDelayExceededDiscards
            Counter32,
        dot1dBasePortMtuExceededDiscards
            Counter32
    }

dot1dBasePort OBJECT-TYPE
    SYNTAX        Integer32 (1..65535)
    MAX-ACCESS    read-only
    STATUS        current
    DESCRIPTION
        "The port number of the port for which this entry
        contains bridge management information."
    ::= { dot1dBasePortEntry 1 }

dot1dBasePortIfIndex OBJECT-TYPE
    SYNTAX        InterfaceIndex
    MAX-ACCESS    read-only
    STATUS        current
    DESCRIPTION
        "The value of the instance of the ifIndex object,
        defined in IF-MIB, for the interface corresponding
        to this port."
    ::= { dot1dBasePortEntry 2 }

dot1dBasePortCircuit OBJECT-TYPE
    SYNTAX        OBJECT IDENTIFIER
    MAX-ACCESS    read-only
    STATUS        current
```

DESCRIPTION
        "For a port which (potentially) has the same value of
        dot1dBasePortIfIndex as another port on the same bridge,
        this object contains the name of an object instance
        unique to this port. For example, in the case where

        multiple ports correspond one- to-one with multiple X.25
        virtual circuits, this value might identify an (e.g.,
        the first) object instance associated with the X.25
        virtual circuit corresponding to this port.

        For a port which has a unique value of
        dot1dBasePortIfIndex, this object can have the value
        { 0 0 }."
    ::= { dot1dBasePortEntry 3 }

dot1dBasePortDelayExceededDiscards OBJECT-TYPE
    SYNTAX   Counter32
    MAX-ACCESS read-only
    STATUS   current
    DESCRIPTION
        "The number of frames discarded by this port due
        to excessive transit delay through the bridge. It
        is incremented by both transparent and source
        route bridges."
    REFERENCE
        "IEEE 802.1D-1998: clause 14.6.1.1.3"
    ::= { dot1dBasePortEntry 4 }

dot1dBasePortMtuExceededDiscards OBJECT-TYPE
    SYNTAX   Counter32
    MAX-ACCESS read-only
    STATUS   current
    DESCRIPTION
        "The number of frames discarded by this port due
        to an excessive size. It is incremented by both
        transparent and source route bridges."
    REFERENCE
        "IEEE 802.1D-1998: clause 14.6.1.1.3"
    ::= { dot1dBasePortEntry 5 }

-- -- --
-- the dot1dStp group
-- -- --
-- Implementation of the dot1dStp group is optional. It is
-- implemented by those bridges that support the Spanning Tree
-- Protocol.
-- -- --

dot1dStpProtocolSpecification OBJECT-TYPE
    SYNTAX   INTEGER {
                  unknown(1),
                  decLb100(2),
                  ieee8021d(3)
              }

```
     MAX-ACCESS   read-only
     STATUS       current
     DESCRIPTION
         "An indication of what version of the Spanning Tree
         Protocol is being run.  The value 'decLb100(2)'
```

```
        indicates the DEC LANbridge 100 Spanning Tree protocol.
        IEEE 802.1D implementations will return 'ieee8021d(3)'.
        If future versions of the IEEE Spanning Tree Protocol
        are released that are incompatible with the current
        version a new value will be defined."
    ::= { dot1dStp 1 }


dot1dStpPriority OBJECT-TYPE
    SYNTAX      Integer32 (0..65535)
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The value of the write-able portion of the Bridge ID,
        i.e., the first two octets of the (8 octet long) Bridge
        ID.  The other (last) 6 octets of the Bridge ID are
        given by the value of dot1dBaseBridgeAddress.
        On bridges supporting IEEE 802.1t or IEEE 802.1w,
        permissible values are 0-61440, in steps of 4096."
    REFERENCE
        "IEEE 802.1D-1998 clause 8.10.2, Table 8-4,
        IEEE 802.1t clause 8.10.2, Table 8-4, clause 14.3."
    ::= { dot1dStp 2 }


dot1dStpTimeSinceTopologyChange OBJECT-TYPE
    SYNTAX      TimeTicks
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The time (in hundredths of a second) since the
        last time a topology change was detected by the
        bridge entity.
        For RSTP, this reports the time since the tcWhile
        timer for any port on this Bridge was non-zero."
    REFERENCE
        "IEEE 802.1D-1998 clause 14.8.1.1.,
        IEEE 802.1w clause 14.8.1.1."
    ::= { dot1dStp 3 }


dot1dStpTopChanges OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The total number of topology changes detected by
        this bridge since the management entity was last
        reset or initialized."
    REFERENCE
        "IEEE 802.1D-1998 clause 14.8.1.1."
    ::= { dot1dStp 4 }
```

```
dot1dStpDesignatedRoot OBJECT-TYPE
    SYNTAX      BridgeId
    MAX-ACCESS  read-only
    STATUS      current
```

     DESCRIPTION
         "The bridge identifier of the root of the spanning
         tree as determined by the Spanning Tree Protocol
         as executed by this node. This value is used as
         the Root Identifier parameter in all Configuration
         Bridge PDUs originated by this node."
     REFERENCE
         "IEEE 802.1D-1998: clause 8.5.3.1"
     ::= { dot1dStp 5 }

dot1dStpRootCost OBJECT-TYPE
     SYNTAX   Integer32
     MAX-ACCESS read-only
     STATUS   current
     DESCRIPTION
         "The cost of the path to the root as seen from
         this bridge."
     REFERENCE
         "IEEE 802.1D-1998: clause 8.5.3.2"
     ::= { dot1dStp 6 }

dot1dStpRootPort OBJECT-TYPE
     SYNTAX   Integer32
     MAX-ACCESS read-only
     STATUS   current
     DESCRIPTION
         "The port number of the port which offers the lowest
         cost path from this bridge to the root bridge."
     REFERENCE
         "IEEE 802.1D-1998: clause 8.5.3.3"
     ::= { dot1dStp 7 }

dot1dStpMaxAge OBJECT-TYPE
     SYNTAX   Timeout
     MAX-ACCESS read-only
     STATUS   current
     DESCRIPTION
         "The maximum age of Spanning Tree Protocol information
         learned from the network on any port before it is
         discarded, in units of hundredths of a second. This is
         the actual value that this bridge is currently using."
     REFERENCE
         "IEEE 802.1D-1998: clause 8.5.3.4"
     ::= { dot1dStp 8 }

dot1dStpHelloTime OBJECT-TYPE
     SYNTAX   Timeout
     MAX-ACCESS read-only
     STATUS   current

DESCRIPTION
     "The amount of time between the transmission of
     Configuration bridge PDUs by this node on any port when
     it is the root of the spanning tree or trying to become
     so, in units of hundredths of a second. This is the

          actual value that this bridge is currently using."
    REFERENCE
        "IEEE 802.1D-1998: clause 8.5.3.5"
    ::= { dot1dStp 9 }

dot1dStpHoldTime OBJECT-TYPE
    SYNTAX   Integer32
    MAX-ACCESS read-only
    STATUS   current
    DESCRIPTION
        "This time value determines the interval length
        during which no more than two Configuration bridge
        PDUs shall be transmitted by this node, in units
        of hundredths of a second."
    REFERENCE
        "IEEE 802.1D-1998: clause 8.5.3.14"
    ::= { dot1dStp 10 }

dot1dStpForwardDelay OBJECT-TYPE
    SYNTAX   Timeout
    MAX-ACCESS read-only
    STATUS   current
    DESCRIPTION
        "This time value, measured in units of hundredths of a
        second, controls how fast a port changes its spanning
        state when moving towards the Forwarding state. The
        value determines how long the port stays in each of the
        Listening and Learning states, which precede the
        Forwarding state. This value is also used, when a
        topology change has been detected and is underway, to
        age all dynamic entries in the Forwarding Database.
        [Note that this value is the one that this bridge is
        currently using, in contrast to
        dot1dStpBridgeForwardDelay which is the value that this
        bridge and all others would start using if/when this
        bridge were to become the root.]"
    REFERENCE
        "IEEE 802.1D-1998: clause 8.5.3.6"
    ::= { dot1dStp 11 }

dot1dStpBridgeMaxAge OBJECT-TYPE
    SYNTAX   Timeout (600..4000)
    MAX-ACCESS read-write
    STATUS   current
    DESCRIPTION
        "The value that all bridges use for MaxAge when this
        bridge is acting as the root. Note that 802.1D-1998
        specifies that the range for this parameter is related
        to the value of dot1dStpBridgeHelloTime. The

granularity of this timer is specified by 802.1D-1998 to
be 1 second. An agent may return a badValue error if a
set is attempted to a value which is not a whole number
of seconds."
REFERENCE

         "IEEE 802.1D-1998: clause 8.5.3.8"
    ::= { dot1dStp 12 }

dot1dStpBridgeHelloTime OBJECT-TYPE
    SYNTAX   Timeout (100..1000)
    MAX-ACCESS read-write
    STATUS   current
    DESCRIPTION
        "The value that all bridges use for HelloTime when this
        bridge is acting as the root. The granularity of this
        timer is specified by 802.1D-1998 to be 1 second. An
        agent may return a badValue error if a set is attempted
        to a value which is not a whole number of seconds."
    REFERENCE
        "IEEE 802.1D-1998: clause 8.5.3.9"
    ::= { dot1dStp 13 }

dot1dStpBridgeForwardDelay OBJECT-TYPE
    SYNTAX   Timeout (400..3000)
    MAX-ACCESS read-write
    STATUS   current
    DESCRIPTION
        "The value that all bridges use for ForwardDelay when
        this bridge is acting as the root. Note that
        802.1D-1998 specifies that the range for this parameter
        is related to the value of dot1dStpBridgeMaxAge. The
        granularity of this timer is specified by 802.1D-1998 to
        be 1 second. An agent may return a badValue error if a
        set is attempted to a value which is not a whole number
        of seconds."
    REFERENCE
        "IEEE 802.1D-1998: clause 8.5.3.10"
    ::= { dot1dStp 14 }

-- --- --
-- The Spanning Tree Port Table
-- --- --

dot1dStpPortTable OBJECT-TYPE
    SYNTAX   SEQUENCE OF Dot1dStpPortEntry
    MAX-ACCESS not-accessible
    STATUS   current
    DESCRIPTION
        "A table that contains port-specific information
        for the Spanning Tree Protocol."
    ::= { dot1dStp 15 }

dot1dStpPortEntry OBJECT-TYPE
    SYNTAX   Dot1dStpPortEntry

```
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A list of information maintained by every port about
        the Spanning Tree Protocol state for that port."
```

```
     INDEX   { dot1dStpPort }
     ::= { dot1dStpPortTable 1 }

Dot1dStpPortEntry ::=
     SEQUENCE {
         dot1dStpPort
             Integer32,
         dot1dStpPortPriority
             Integer32,
         dot1dStpPortState
             INTEGER,
         dot1dStpPortEnable
             INTEGER,
         dot1dStpPortPathCost
             INTEGER,
         dot1dStpPortDesignatedRoot
             BridgeId,
         dot1dStpPortDesignatedCost
             Integer32,
         dot1dStpPortDesignatedBridge
             BridgeId,
         dot1dStpPortDesignatedPort
             OCTET STRING,
         dot1dStpPortForwardTransitions
             Counter32,
         dot1dStpPortPathCost32
             Integer32
     }

dot1dStpPort OBJECT-TYPE
     SYNTAX       Integer32 (1..65535)
     MAX-ACCESS  read-only
     STATUS       current
     DESCRIPTION
         "The port number of the port for which this entry
         contains Spanning Tree Protocol management information."
     REFERENCE
         "IEEE 802.1D-1998: clause 14.8.2.1.2"
     ::= { dot1dStpPortEntry 1 }

dot1dStpPortPriority OBJECT-TYPE
     SYNTAX Integer32 (0.. 255)
     MAX-ACCESS  read-write
     STATUS       current
     DESCRIPTION
         "The value of the priority field which is contained in
         the first (in network byte order) octet of the (2 octet
         long) Port ID.  The other octet of the Port ID is given
         by the value of dot1dStpPort.
```

On bridges supporting IEEE 802.1t or IEEE 802.1w,
                permissible values are 0-240, in steps of 16."
           REFERENCE
                "IEEE 802.1D-1998 clause 8.10.2, Table 8-4,
                IEEE 802.1t clause 8.10.2, Table 8-4, clause 14.3."

```
    ::= { dot1dStpPortEntry 2 }

dot1dStpPortState OBJECT-TYPE
    SYNTAX        INTEGER {
                    disabled(1),
                    blocking(2),
                    listening(3),
                    learning(4),
                    forwarding(5),
                    broken(6)
                }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The port's current state as defined by application of
        the Spanning Tree Protocol.  This state controls what
        action a port takes on reception of a frame.  If the
        bridge has detected a port that is malfunctioning it
        will place that port into the broken(6) state.  For
        ports which are disabled (see dot1dStpPortEnable), this
        object will have a value of disabled(1)."
    REFERENCE
        "IEEE 802.1D-1998: clause 8.5.5.2"
    ::= { dot1dStpPortEntry 3 }

dot1dStpPortEnable OBJECT-TYPE
    SYNTAX        INTEGER {
                    enabled(1),
                    disabled(2)
                }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The enabled/disabled status of the port."
    REFERENCE
        "IEEE 802.1D-1998: clause 8.5.5.2"
    ::= { dot1dStpPortEntry 4 }

dot1dStpPortPathCost OBJECT-TYPE
    SYNTAX  INTEGER (1..65535)
    MAX-ACCESS  read-write
    STATUS  deprecated
    DESCRIPTION
            "The contribution of this port to the path cost of
            paths towards the spanning tree root which include
            this port.  802.1D-1998 recommends that the
            default value of this parameter be in inverse
            proportion to the speed of the attached LAN.
```

```
        New implementations should use dot1dStpPortPathCost32"
   REFERENCE
      "IEEE 802.1D-1998: clause 8.5.5.3"
   ::= { dot1dStpPortEntry 5 }
```

```
dot1dStpPortDesignatedRoot OBJECT-TYPE
    SYNTAX      BridgeId
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The unique Bridge Identifier of the Bridge
        recorded as the Root in the Configuration BPDUs
        transmitted by the Designated Bridge for the
        segment to which the port is attached."
    REFERENCE
        "IEEE 802.1D-1998: clause 8.5.5.4"
    ::= { dot1dStpPortEntry 6 }

dot1dStpPortDesignatedCost OBJECT-TYPE
    SYNTAX      Integer32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The path cost of the Designated Port of the segment
        connected to this port.  This value is compared to the
        Root Path Cost field in received bridge PDUs."
    REFERENCE
        "IEEE 802.1D-1998: clause 8.5.5.5"
    ::= { dot1dStpPortEntry 7 }

dot1dStpPortDesignatedBridge OBJECT-TYPE
    SYNTAX      BridgeId
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The Bridge Identifier of the bridge which this
        port considers to be the Designated Bridge for
        this port's segment."
    REFERENCE
        "IEEE 802.1D-1998: clause 8.5.5.6"
    ::= { dot1dStpPortEntry 8 }

dot1dStpPortDesignatedPort OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (2))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The Port Identifier of the port on the Designated
        Bridge for this port's segment."
    REFERENCE
        "IEEE 802.1D-1998: clause 8.5.5.7"
    ::= { dot1dStpPortEntry 9 }

dot1dStpPortForwardTransitions OBJECT-TYPE
```

```
SYNTAX       Counter32
MAX-ACCESS  read-only
STATUS       current
DESCRIPTION
    "The number of times this port has transitioned
```

          from the Learning state to the Forwarding state."
     ::= { dot1dStpPortEntry 10 }

dot1dStpPortPathCost32 OBJECT-TYPE
     SYNTAX   Integer32 (1..200000000)
     MAX-ACCESS read-write
     STATUS   current
     DESCRIPTION
         "The contribution of this port to the path cost of
         paths towards the spanning tree root which include
         this port. 802.1D-1998 recommends that the
         default value of this parameter be in inverse
         proportion to the speed of the attached LAN.

         Replacement for deprecated object dot1dStpPortPathCost."
     REFERENCE
         "IEEE 802.1t clause 8.10.2, Table 8-5."
     ::= { dot1dStpPortEntry 11 }

-- -- --
-- the dot1dTp group
-- -- --
-- Implementation of the dot1dTp group is optional. It is
-- implemented by those bridges that support the transparent
-- bridging mode. A transparent or SRT bridge will implement
-- this group.
-- -- --

dot1dTpLearnedEntryDiscards OBJECT-TYPE
     SYNTAX   Counter32
     MAX-ACCESS read-only
     STATUS   current
     DESCRIPTION
         "The total number of Forwarding Database entries, which
         have been or would have been learnt, but have been
         discarded due to a lack of space to store them in the
         Forwarding Database. If this counter is increasing, it
         indicates that the Forwarding Database is regularly
         becoming full (a condition which has unpleasant
         performance effects on the subnetwork). If this counter
         has a significant value but is not presently increasing,
         it indicates that the problem has been occurring but is
         not persistent."
     REFERENCE
         "IEEE 802.1D-1998: clause 14.7.1.1.3"
     ::= { dot1dTp 1 }

dot1dTpAgingTime OBJECT-TYPE
     SYNTAX   Integer32 (10..1000000)

```
MAX-ACCESS    read-write
STATUS        current
DESCRIPTION
    "The timeout period in seconds for aging out
    dynamically learned forwarding information.
```

```
        802.1D-1998 recommends a default of 300 seconds."
    REFERENCE
        "IEEE 802.1D-1998: clause 14.7.1.1.3"
    ::= { dot1dTp 2 }


-- ------------------------------------------------------------ --
--  The Forwarding Database for Transparent Bridges
-- ------------------------------------------------------------ --

dot1dTpFdbTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1dTpFdbEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table that contains information about unicast
        entries for which the bridge has forwarding and/or
        filtering information.  This information is used
        by the transparent bridging function in
        determining how to propagate a received frame."
    ::= { dot1dTp 3 }

dot1dTpFdbEntry OBJECT-TYPE
    SYNTAX      Dot1dTpFdbEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Information about a specific unicast MAC address
        for which the bridge has some forwarding and/or
        filtering information."
    INDEX   { dot1dTpFdbAddress }
    ::= { dot1dTpFdbTable 1 }

Dot1dTpFdbEntry ::=
    SEQUENCE {
        dot1dTpFdbAddress
            MacAddress,
        dot1dTpFdbPort
            Integer32,
        dot1dTpFdbStatus
            INTEGER
    }

dot1dTpFdbAddress OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "A unicast MAC address for which the bridge has
        forwarding and/or filtering information."
```

```
    REFERENCE
        "IEEE 802.1D-1998: clause 7.9.1, 7.9.2"
    ::= { dot1dTpFdbEntry 1 }

dot1dTpFdbPort OBJECT-TYPE
```

```
    SYNTAX        Integer32
    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 dot1dTpFdbAddress has
        been seen.  A value of '0' indicates that the port
        number has not been learned but that the bridge does
        have some forwarding/filtering information about this
        address (e.g. in the dot1dStaticTable).  Implementors
        are encouraged to assign the port value to this object
        whenever it is learned even for addresses for which the
        corresponding value of dot1dTpFdbStatus is not
        learned(3)."
    ::= { dot1dTpFdbEntry 2 }

dot1dTpFdbStatus 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 would
                include the case where some other MIB object
                (not the corresponding instance of
                dot1dTpFdbPort, nor an entry in the
                dot1dStaticTable) is being used to determine if
                and how frames addressed to the value of the
                corresponding instance of dot1dTpFdbAddress are
                being forwarded.
            invalid(2) - this entry is not 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 dot1dTpFdbPort was learned, and is being
                used.
            self(4) - the value of the corresponding instance of
                dot1dTpFdbAddress represents one of the bridge's
                addresses.  The corresponding instance of
                dot1dTpFdbPort indicates which of the bridge's
                ports has this address.
```

```
      mgmt(5) - the value of the corresponding instance of
            dot1dTpFdbAddress is also the value of an
            existing instance of dot1dStaticAddress."
   ::= { dot1dTpFdbEntry 3 }
```

```
-- ------------------------------------------------------------ --
--  Port Table for Transparent Bridges
-- ------------------------------------------------------------ --

dot1dTpPortTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1dTpPortEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table that contains information about every port that
        is associated with this transparent bridge."
    ::= { dot1dTp 4 }

dot1dTpPortEntry OBJECT-TYPE
    SYNTAX      Dot1dTpPortEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A list of information for each port of a transparent
        bridge."
    INDEX   { dot1dTpPort }
    ::= { dot1dTpPortTable 1 }

Dot1dTpPortEntry ::=
    SEQUENCE {
        dot1dTpPort
            Integer32,
        dot1dTpPortMaxInfo
            Integer32,
        dot1dTpPortInFrames
            Counter32,
        dot1dTpPortOutFrames
            Counter32,
        dot1dTpPortInDiscards
            Counter32
    }

dot1dTpPort OBJECT-TYPE
    SYNTAX      Integer32 (1..65535)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The port number of the port for which this entry
        contains Transparent bridging management information."
    ::= { dot1dTpPortEntry 1 }

-- It would be nice if we could use ifMtu as the size of the
-- largest INFO field, but we can't because ifMtu is defined
-- to be the size that the (inter-)network layer can use which
```

```
-- can differ from the MAC layer (especially if several layers
-- of encapsulation are used).

dot1dTpPortMaxInfo OBJECT-TYPE
    SYNTAX       Integer32
```

```
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
         "The maximum size of the INFO (non-MAC) field that
         this port will receive or transmit."
     ::= { dot1dTpPortEntry 2 }

dot1dTpPortInFrames OBJECT-TYPE
     SYNTAX      Counter32
     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
         "IEEE 802.1D-1998: clause 14.6.1.1.3"
     ::= { dot1dTpPortEntry 3 }

dot1dTpPortOutFrames OBJECT-TYPE
     SYNTAX      Counter32
     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
         "IEEE 802.1D-1998: clause 14.6.1.1.3"
     ::= { dot1dTpPortEntry 4 }

dot1dTpPortInDiscards OBJECT-TYPE
     SYNTAX       Counter32
     MAX-ACCESS   read-only
     STATUS       current
     DESCRIPTION
         "Count of valid frames received which were discarded
         (i.e., filtered) by the Forwarding Process."
     REFERENCE
         "IEEE 802.1D-1998: clause 14.6.1.1.3"
     ::= { dot1dTpPortEntry 5 }

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

```
-- The Static (Destination-Address Filtering) Database
-- ------------------------------------------------------------ --
-- Implementation of this group is optional.
-- ------------------------------------------------------------ --
```

```
dot1dStaticTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot1dStaticEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table containing filtering information configured
        into the bridge by (local or network) management
        specifying the set of ports to which frames received
        from specific ports and containing specific destination
        addresses are allowed to be forwarded.  The 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 and for
        group/broadcast addresses."
    REFERENCE
        "IEEE 802.1D-1998: clause 14.7.2"
    ::= { dot1dStatic 1 }

dot1dStaticEntry OBJECT-TYPE
    SYNTAX      Dot1dStaticEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Filtering information configured into the bridge by
        (local or network) management specifying the set of
        ports to which frames received from a specific port and
        containing a specific destination address are allowed to
        be forwarded."
    REFERENCE
        "IEEE 802.1D-1998: clause 14.7.2"
    INDEX   { dot1dStaticAddress, dot1dStaticReceivePort }
    ::= { dot1dStaticTable 1 }

Dot1dStaticEntry ::=
    SEQUENCE {
        dot1dStaticAddress      MacAddress,
        dot1dStaticReceivePort  Integer32,
        dot1dStaticAllowedToGoTo OCTET STRING,
        dot1dStaticStatus       INTEGER
    }

dot1dStaticAddress OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The destination MAC address in a frame to which this
```

```
        entry's filtering information applies.  This object can
        take the value of a unicast address, a group address or
        the broadcast address."
    REFERENCE
        "IEEE 802.1D-1998: clause 7.9.1, 7.9.2"
```

```
    ::= { dot1dStaticEntry 1 }

dot1dStaticReceivePort OBJECT-TYPE
    SYNTAX      Integer32 (0..65535)
    MAX-ACCESS  read-create
    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
        bridge for which there is no other applicable entry."
    ::= { dot1dStaticEntry 2 }

dot1dStaticAllowedToGoTo OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (0..512))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The set of ports to which frames received from a
        specific port and destined for a specific MAC address,
        are allowed to be forwarded.  Each octet within the
        value of this object 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'.  (Note
        that the setting of the bit corresponding to the port
        from which a frame is received is irrelevant.)  The
        default value of this object is a string of ones of
        appropriate length.

        This exceeds the minimum required SNMP packet size
        supported.  This is sufficient to allow the maximum
        4096 ports now supported."
    ::= { dot1dStaticEntry 3 }

dot1dStaticStatus OBJECT-TYPE
    SYNTAX      INTEGER {
                    other(1),
                    invalid(2),
                    permanent(3),
                    deleteOnReset(4),
                    deleteOnTimeout(5)
```

```
            }
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object indicates the status of this entry.
```

            The default value is permanent(3).
                other(1) - this entry is currently in use but the
                    conditions under which it will remain so are
                    different from each of 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."
        ::= { dot1dStaticEntry 4 }

-- --- --
-- Notifications for use by Bridges
-- --- --
-- Notifications for the Spanning Tree Protocol
-- --- --

newRoot NOTIFICATION-TYPE
    -- OBJECTS   { }
    STATUS   current
    DESCRIPTION
        "The newRoot trap indicates that the sending agent has
        become the new root of the Spanning Tree; the trap is
        sent by a bridge soon after its election as the new
        root, e.g., upon expiration of the Topology Change Timer
        immediately subsequent to its election. Implementation
        of this trap is optional."
    ::= { dot1dNotification 1 }

topologyChange NOTIFICATION-TYPE
    -- OBJECTS   { }
    STATUS   current
    DESCRIPTION
        "A topologyChange trap is sent by a bridge when any of
        its configured ports transitions from the Learning state
        to the Forwarding state, or from the Forwarding state to
        the Blocking state. The trap is not sent if a newRoot
        trap is sent for the same transition. Implementation of
        this trap is optional."
    ::= { dot1dNotification 2 }

-- --- --
-- IEEE 802.1D MIB - Conformance Information
-- --- --

```
dot1dGroups         OBJECT IDENTIFIER ::= { dot1dConformance 1 }
dot1dCompliances    OBJECT IDENTIFIER ::= { dot1dConformance 2 }
```

-- -- --

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


-- ------------------------------------------------------------ --
-- the dot1dBase group
-- ------------------------------------------------------------ --

dot1dBaseBridgeGroup OBJECT-GROUP
    OBJECTS {
        dot1dBaseBridgeAddress,
        dot1dBaseNumPorts,
        dot1dBaseType
    }
    STATUS      current
    DESCRIPTION
        "Bridge level information for this device."
    ::= { dot1dGroups 1 }

dot1dBasePortGroup OBJECT-GROUP
    OBJECTS {
        dot1dBasePort,
        dot1dBasePortIfIndex,
        dot1dBasePortCircuit,
        dot1dBasePortDelayExceededDiscards,
        dot1dBasePortMtuExceededDiscards
    }
    STATUS      current
    DESCRIPTION
        "Information for each port on this device."
    ::= { dot1dGroups 2 }

-- ------------------------------------------------------------ --
-- the dot1dStp group
-- ------------------------------------------------------------ --

dot1dStpBridgeGroup OBJECT-GROUP
    OBJECTS {
        dot1dStpProtocolSpecification,
        dot1dStpPriority,
        dot1dStpTimeSinceTopologyChange,
        dot1dStpTopChanges,
        dot1dStpDesignatedRoot,
        dot1dStpRootCost,
        dot1dStpRootPort,
        dot1dStpMaxAge,
        dot1dStpHelloTime,
        dot1dStpHoldTime,
        dot1dStpForwardDelay,
        dot1dStpBridgeMaxAge,
```

```
            dot1dStpBridgeHelloTime,
            dot1dStpBridgeForwardDelay
      }
      STATUS      current
      DESCRIPTION
```

```
        "Bridge level Spanning Tree data for this device."
    ::= { dot1dGroups 3 }


dot1dStpPortGroup OBJECT-GROUP
    OBJECTS {
        dot1dStpPort,
        dot1dStpPortPriority,
        dot1dStpPortState,
        dot1dStpPortEnable,
        dot1dStpPortPathCost,
        dot1dStpPortDesignatedRoot,
        dot1dStpPortDesignatedCost,
        dot1dStpPortDesignatedBridge,
        dot1dStpPortDesignatedPort,
        dot1dStpPortForwardTransitions
    }
    STATUS      deprecated
    DESCRIPTION
        "Spanning Tree data for each port on this device."
    ::= { dot1dGroups 4 }

dot1dStpPortGroup2 OBJECT-GROUP
    OBJECTS {
        dot1dStpPort,
        dot1dStpPortPriority,
        dot1dStpPortState,
        dot1dStpPortEnable,
        dot1dStpPortDesignatedRoot,
        dot1dStpPortDesignatedCost,
        dot1dStpPortDesignatedBridge,
        dot1dStpPortDesignatedPort,
        dot1dStpPortForwardTransitions,
        dot1dStpPortPathCost32
    }
    STATUS      current
    DESCRIPTION
        "Spanning Tree data for each port on this device."
    ::= { dot1dGroups 5 }

-- ------------------------------------------------------------ --
-- the dot1dTp group
-- ------------------------------------------------------------ --

dot1dTpBridgeGroup OBJECT-GROUP
    OBJECTS {
        dot1dTpLearnedEntryDiscards,
        dot1dTpAgingTime
    }
    STATUS      current
```

```
    DESCRIPTION
        "Bridge level Transparent Bridging data."
    ::= { dot1dGroups 6 }

dot1dTpFdbGroup OBJECT-GROUP
```

```
    OBJECTS {
        dot1dTpFdbAddress,
        dot1dTpFdbPort,
        dot1dTpFdbStatus
    }
    STATUS      current
    DESCRIPTION
        "Filtering Database information for the Bridge."
    ::= { dot1dGroups 7 }

dot1dTpGroup OBJECT-GROUP
    OBJECTS {
        dot1dTpPort,
        dot1dTpPortMaxInfo,
        dot1dTpPortInFrames,
        dot1dTpPortOutFrames,
        dot1dTpPortInDiscards
    }
    STATUS      current
    DESCRIPTION
        "Dynamic Filtering Database information for each port of
        the Bridge."
    ::= { dot1dGroups 8 }

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

dot1dStaticGroup OBJECT-GROUP
    OBJECTS {
        dot1dStaticAddress,
        dot1dStaticReceivePort,
        dot1dStaticAllowedToGoTo,
        dot1dStaticStatus
    }
    STATUS      current
    DESCRIPTION
        "Static Filtering Database information for each port of
        the Bridge."
    ::= { dot1dGroups 9 }

-- ------------------------------------------------------------- --
-- The Trap Notfication Group
-- ------------------------------------------------------------- --

dot1dNotificationGroup NOTIFICATION-GROUP
    NOTIFICATIONS {
        newRoot,
        topologyChange
```

```
        }
    STATUS      current
    DESCRIPTION
        "Group of objects describing notifications (traps)."
    ::= { dot1dGroups 10 }
```

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

bridgeCompliance MODULE-COMPLIANCE
    STATUS      deprecated
    DESCRIPTION
        "The compliance statement for device support of bridging
        services.  As per RFC1493"

    MODULE
        MANDATORY-GROUPS {
            dot1dBaseBridgeGroup,
            dot1dBasePortGroup
        }

    GROUP   dot1dStpBridgeGroup
    DESCRIPTION
        "Implementation of this group is mandatory for bridges
        that support the Spanning Tree Protocol."

    GROUP   dot1dStpPortGroup
    DESCRIPTION
        "Implementation of this group is mandatory for bridges
        that support the Spanning Tree Protocol."

    GROUP   dot1dTpBridgeGroup
    DESCRIPTION
        "Implementation of this group is mandatory for bridges
        that support the transparent bridging mode.  A
        transparent or SRT bridge will implement this group."

    GROUP   dot1dTpFdbGroup
    DESCRIPTION
        "Implementation of this group is mandatory for bridges
        that support the transparent bridging mode.  A
        transparent or SRT bridge will implement this group."

    GROUP   dot1dTpGroup
    DESCRIPTION
        "Implementation of this group is mandatory for bridges
        that support the transparent bridging mode.  A
        transparent or SRT bridge will implement this group."

    GROUP   dot1dStaticGroup
    DESCRIPTION
        "Implementation of this group is optional."

    GROUP dot1dNotificationGroup
```

```
    DESCRIPTION
        "Implementation of this group is optional."
    ::= { dot1dCompliances 1 }
```

bridgeCompliance2 MODULE-COMPLIANCE
    STATUS   current
    DESCRIPTION
        "The compliance statement for device support of bridging
        services. This supports 32-bit Path Cost values and the
        more restricted bridge and port priorities, as per IEEE
        802.1t."

    MODULE
        MANDATORY-GROUPS {
            dot1dBaseBridgeGroup,
            dot1dBasePortGroup
        }

    GROUP   dot1dStpBridgeGroup
    DESCRIPTION
        "Implementation of this group is mandatory for
        bridges that support the Spanning Tree Protocol."

    OBJECT dot1dStpPriority
    SYNTAX Integer32 (0|4096|8192|12288|16384|20480|24576
                    |28672|32768|36864|40960|45056|49152
                    |53248|57344|61440)
    DESCRIPTION
        "All possible values as per IEEE 802.1t."

    GROUP   dot1dStpPortGroup2
    DESCRIPTION
        "Implementation of this group is mandatory for
        bridges that support the Spanning Tree Protocol."

    OBJECT dot1dStpPortPriority
    SYNTAX Integer32 (0|16|32|48|64|80|96|112|128
                    |144|160|176|192|208|224|240)
    DESCRIPTION
        "All possible values as per IEEE 802.1t."

    GROUP   dot1dTpBridgeGroup
    DESCRIPTION
        "Implementation of this group is mandatory for
        bridges that support the transparent bridging
        mode. A transparent or SRT bridge will implement
        this group."

    GROUP   dot1dTpFdbGroup
    DESCRIPTION
        "Implementation of this group is mandatory for
        bridges that support the transparent bridging
        mode. A transparent or SRT bridge will implement

this group."

        GROUP   dot1dTpGroup
        DESCRIPTION
                "Implementation of this group is mandatory for

            bridges that support the transparent bridging
            mode. A transparent or SRT bridge will implement
            this group."

      GROUP   dot1dStaticGroup
      DESCRIPTION
          "Implementation of this group is optional."

      GROUP dot1dNotificationGroup
      DESCRIPTION
          "Implementation of this group is optional."

      ::= { dot1dCompliances 2 }

END

4. Security Considerations

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

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

   It is recommended that the implementers consider the security
   features as provided by the SNMPv3 framework. Specifically, the use
   of the User-based Security Model RFC 2574 [RFC2574] and the View-
   based Access Control Model RFC 2575 [RFC2575] is recommended.

   It is then a customer/user responsibility to ensure that the SNMP
   entity giving access to an instance of this MIB, 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.

5. Acknowledgments

   The MIB presented in this memo is a direct translation of the BRIDGE
   MIB defined in [RFC1493], to the SMIv2 syntax required for current
   IETF MIB standards.

   The original authors were E. Decker, P. Langille, A Rijsinghani and

K. McCloghrie. Further acknowledgement is given to the members of
the original Bridge Working Group in [RFC1493].

This document was produced on behalf of the Bridge MIB Working Group

in the Operations and Management area of the Internet Engineering
Task Force.

The authors wish to thank the members of the Bridge MIB Working Group
, especially Mike MacFadden and Bert Visscher for their many comments
and suggestions which improved this effort.

6. Normative References

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

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

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

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

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

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

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

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

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

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

[IEEE8021D] ANSI/IEEE Standard 802.1D-1998 MAC Bridges, IEEE Project 802

Local and Metropolitan Area Networks, (March 8, 1998).

[ISO8021D]   ISO DIS 10038 MAC Bridges.

7. Informative References

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

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

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

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

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

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

[RFC1907]   Case, J., McCloghrie, K., Rose, M. and S. Waldbusser,
             "Management Information Base for Version 2 of the Simple
             Network Management Protocol (SNMPv2)", RFC 1907, January
             1996.

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

8. Changes from RFC 1493

The following changes have been made from RFC 1493.

(1)   Translated the MIB definition to use SMIv2.

(2)   Updated the SNMP Framework and references to comply with the
       current IETF guidelines.

(3)   Updated the Security section to comply with current IETF
       guidelines.

   The following chnages have been made from
        draft-ietf-bridge-bridgemib-smiv2-00.txt

(1)   Misc. description refernces to IEEE 802.1d documents

(2)   dot1dNotificationGroup changed from dot1dTrapGroup

     (3)   Misc. additions to some descriptions

   The following chnages have been made from
        draft-ietf-bridge-bridgemib-smiv2-01.txt

 (1)   corrections to objects that were made not-accessible in the
        draft-00 version that were read /read-write in rfc 1493

 (2)   Misc. additions to some descriptions

   The following chnages have been made from
        draft-ietf-bridge-bridgemib-smiv2-02.txt

 (1)   Updated references of IEEE 802.1d draft from
        1990 document to 1998 document.

   The following chnages have been made from
        draft-ietf-bridge-bridgemib-smiv2-03.txt

  (1) Adapted the current conformance statement.

9. Authors' Addresses

   K.C. Norseth
   L-3 Communications
   640 N. 2200 West.
   Salt Lake City, Utah 84116-0850
   Email: kenyon.c.norseth@L-3com.com
          kcn@norseth.com

   Les Bell
   3Com Europe Limited
   3Com Centre, Boundary Way
   Hemel Hempstead
   Herts. HP2 7YU
   UK

   Phone: +44 1442 438025
   Email: Les_Bell@3Com.com

10. Full Copyright Statement