Internet Draft   Editor of this version:
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                                                 February 2002

Definitions of Managed Objects for Bridges

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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 objects for managing MAC bridges based on

the IEEE 802.1D-1990 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.

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 "200201310000Z"
          ORGANIZATION "IETF Bridge MIB Working Group"
          CONTACT-INFO
              "Email: Bridge-mib@ietf.org"
          DESCRIPTION
              "The Bridge MIB module for managing devices that support
              IEEE 802.1D."
          REVISION   "200106260000Z"
          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-1990 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-1990: Sections 6.4.1.1.3 and 3.12.5"
        ::= { 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-1990: Section 6.4.1.1.3"
        ::= { 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-1990: Section 6.4.2, 6.6.1"
    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-1990: Section 6.6.1.1.3"
```

```
         ::= { 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-1990: Section 6.6.1.1.3"
        ::= { 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.
            Permissible values are 0-61440, in steps of 4096."
        REFERENCE
            " 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 802.1w 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 802.1w 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-1990: Section 4.5.3.1"
         ::= { 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-1990: Section 4.5.3.2"
         ::= { 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-1990: Section 4.5.3.3"
         ::= { 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-1990: Section 4.5.3.4"
         ::= { 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-1990: Section 4.5.3.5"
         ::= { 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-1990: Section 4.5.3.14"
         ::= { 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-1990: Section 4.5.3.6"
    ::= { 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-1990
         specifies that the range for this parameter is related
         to the value of dot1dStpBridgeHelloTime. The
         granularity of this timer is specified by 802.1D-1990 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-1990: Section 4.5.3.8"
    ::= { 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- 1990 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-1990: Section 4.5.3.9"
    ::= { 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-1990 specifies that the range for this parameter
is related to the value of dot1dStpBridgeMaxAge. The
granularity of this timer is specified by 802.1D-1990 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-1990: Section 4.5.3.10"
         ::= { 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 not-accessible
         STATUS   current
         DESCRIPTION
             "The port number of the port for which this entry
             contains Spanning Tree Protocol management information."
         REFERENCE
             "IEEE 802.1D-1990: Section 6.8.2.1.2"
         ::= { 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 newer bridges, permissible values are
             0-240, in steps of 16."
         REFERENCE
             " 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-1990: Section 4.5.5.2"
        ::= { 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-1990: Section 4.5.5.2"
    ::= { 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-1990 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-1990: Section 4.5.5.3"
    ::= { 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-1990: Section 4.5.5.4"
    ::= { 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-1990: Section 4.5.5.5"
        ::= { 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-1990: Section 4.5.5.6"
     ::= { 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-1990: Section 4.5.5.7"
     ::= { 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-1990 recommends that the
         default value of this parameter be in inverse
         proportion to the speed of the attached LAN.
         The permissible values must be extended to 1-200,000,000.

         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-1990: Section 6.7.1.1.3"
         ::= { 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-1990 recommends a default of 300 seconds."
         REFERENCE
             "IEEE 802.1D-1990: Section 6.7.1.1.3"
         ::= { 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-1990: Section 3.9.1, 3.9.2"
        ::= { 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  not-accessible
        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-1990: Section 6.6.1.1.3"
        ::= { 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-1990: Section 6.6.1.1.3"
        ::= { 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-1990: Section 6.6.1.1.3"
        ::= { 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-1990: Section 6.7.2"
        ::= { 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-1990: Section 6.7.2"
        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-1990: Section 3.9.1, 3.9.2"
        ::= { 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 {
            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 {
            dot1dStpPortPriority,
            dot1dStpPortState,
            dot1dStpPortEnable,
            dot1dStpPortPathCost,
            dot1dStpPortDesignatedRoot,
            dot1dStpPortDesignatedCost,
            dot1dStpPortDesignatedBridge,
            dot1dStpPortDesignatedPort,
            dot1dStpPortForwardTransitions
        }
        STATUS      current
        DESCRIPTION
```

```
        "Spanning Tree data for each port on this device."
    ::= { dot1dGroups 4 }


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

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

     dot1dTpBridgeGroup OBJECT-GROUP
         OBJECTS {
             dot1dTpLearnedEntryDiscards,
             dot1dTpAgingTime
         }
         STATUS      current
         DESCRIPTION
             "Bridge level Transparent Bridging data."
         ::= { dot1dGroups 5 }

     dot1dTpFdbGroup OBJECT-GROUP
         OBJECTS {
             dot1dTpFdbPort,
             dot1dTpFdbStatus
         }
         STATUS      current
         DESCRIPTION
             "Filtering Database information for the Bridge."
         ::= { dot1dGroups 6 }

     dot1dTpGroup OBJECT-GROUP
         OBJECTS {
             dot1dTpPortMaxInfo,
             dot1dTpPortInFrames,
             dot1dTpPortOutFrames,
             dot1dTpPortInDiscards
         }
         STATUS      current
         DESCRIPTION
             "Dynamic Filtering Database information for each port of
             the Bridge."
         ::= { dot1dGroups 7 }

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

     dot1dStaticGroup OBJECT-GROUP
         OBJECTS {
             dot1dStaticAllowedToGoTo,
             dot1dStaticStatus
         }
         STATUS      current
         DESCRIPTION
             "Static Filtering Database information for each port of
             the Bridge."
         ::= { dot1dGroups 8 }
```

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

```
dot1dNotificationGroup NOTIFICATION-GROUP
    NOTIFICATIONS {
        newRoot,
        topologyChange
    }
    STATUS      current
    DESCRIPTION
        "Group of objects describing notifications (traps)."
    ::= { dot1dGroups 9 }


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

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

    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 }

       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
   for their many comments and suggestions which improved this effort.

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7. 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

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