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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-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

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connected by subnetworks other than LAN segments.

The MIB module presented in this memo is a translation of the BRIDGE-MIB defined in [RFC 1493](#) to the SMIV2 syntax.

This memo obsoletes [RFC 1493](#).

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1. Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL", when they appear in this document, are to be interpreted as described in [BCP 14](#), [RFC 2119](#) [[RFC2119](#)].

2. The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to [section 7 of RFC 3410](#) [[RFC3410](#)].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIV2, which is described in STD 58, [RFC 2578](#) [[RFC2578](#)], STD 58, [RFC 2579](#) [[RFC2579](#)] and STD 58, [RFC 2580](#) [[RFC2580](#)].

3. Overview

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 module 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 number of objects.
5. Exclude objects which are simply derivable from others in this or other MIB modules.

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

[3.1](#) Structure of the MIB Module

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

TimeSinceTopologyChange	.BridgePriority
TopChanges	.TimeSinceTopologyChange
DesignatedRoot	.TopologyChangeCount
RootCost	.DesignatedRoot
RootPort	.RootCost
MaxAge	.RootPort
HelloTime	.MaxAge
HoldTime	.HelloTime
ForwardDelay	.HoldTime
BridgeMaxAge	.ForwardDelay
BridgeHelloTime	.BridgeMaxAge
BridgeForwardDelay	.BridgeHelloTime
PortTable	.BridgeForwardDelay
Port	SpanningTreeProtocolPort
Priority	.PortNumber
State	.PortPriority
Enable	.SpanningTreeState
PathCost	.PortPathCost

DesignatedRoot	.DesignatedRoot
DesignatedCost	.DesignatedCost
DesignatedBridge	.DesignatedBridge
DesignatedPort	.DesignatedPort
ForwardTransitions	
dot1dTp	
LearnedEntryDiscards	BridgeFilter.DatabaseSize
AgingTime	.NumDynamic,NumStatic
FdbTable	BridgeFilter.AgingTime
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 module for the indicated reasons.

IEEE 802.1D Object	Disposition
Bridge.BridgeName	Same as sysDescr (SNMPv2-MIB)
Bridge.BridgeUpTime	Same as sysUpTime (SNMPv2-MIB)
Bridge.PortAddresses	Same as ifPhysAddress (IF-MIB)
BridgePort.PortName	Same as ifDescr (IF-MIB)
BridgePort.PortType	Same as ifType (IF-MIB)
BridgePort.RoutingType	Derivable from the implemented subtrees
SpanningTreeProtocol .BridgeIdentifier	Combination of dot1dStpPriority and dot1dBaseBridgeAddress
.TopologyChange	Since this is transitory, it

SpanningTreeProtocolPort	is not considered useful.
.Uptime	Same as ifLastChange (IF-MIB)
.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	

[3.1.1](#) The dot1dBase Subtree

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

[3.1.2](#) The dot1dStp Subtree

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

[3.1.3](#) The dot1dSr Subtree

This subtree contains the objects that describe the entity's state with respect to source route bridging. This subtree described in [RFC 1525](#) [[RFC1525](#)] is applicable only to source route bridging.

[3.1.4](#) The dot1dTp Subtree

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

[3.1.5](#) The dot1dStatic Subtree

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

[3.2](#) Relationship to Other MIB Modules

As described above, some IEEE 802.1D management objects have not been included in this MIB module because they overlap with objects in other MIB modules applicable to a bridge implementing this MIB module.

[3.2.1](#) Relationship to the SNMPv2-MIB

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

As explained in [Section 3.1](#), full support for the 802.1D management objects requires that the SNMPv2-MIB objects sysDescr and sysUpTime are implemented. Note that compliance to the current SNMPv2-MIB module requires additional objects and notifications to be implemented as specified in [RFC 3418](#) [[RFC3418](#)].

[3.2.2](#) Relationship to the IF-MIB

The IF-MIB [[RFC2863](#)] defines managed objects for managing network interfaces. A network 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.

As explained in [Section 3.1](#), full support for the 802.1D management objects requires that the IF-MIB objects ifIndex, ifType, ifDescr,

ifPhysAddress, and ifLastChange are implemented. Note that compliance to the current IF-MIB module requires additional objects and notifications to be implemented as specified in [RFC 2863](#) [RFC2863].

Implicit in this BRIDGE-MIB is the notion of ports on a bridge. Each of these ports is associated with one interface of the 'interfaces' subtree, 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.

4. 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
```

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```
FROM SNMPv2-TC
MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
FROM SNMPv2-CONF
InterfaceIndex FROM IF-MIB
;
```

```
dot1dBridge MODULE-IDENTITY
LAST-UPDATED "200502100000Z"
ORGANIZATION "IETF Bridge MIB Working Group"
CONTACT-INFO
  "Email: bridge-mib@ietf.org
```

```
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      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 (2005). This version of
this MIB module is part of RFC XXXX; see the RFC itself for
full legal notices."
```

REVISION "200502100000Z"

-- RFC Ed.: replace XXXX with RFC number and remove this note

DESCRIPTION

```
"Third revision, published as part of RFC XXXX.
```

```
The MIB module has been converted to SMIV2 format.
Conformance statements have been added and some
```

description and reference clauses have been updated.

The object dot1dStpPortPathCost32 was added to support IEEE 802.1t and the permissible values of dot1dStpPriority and dot1dStpPortPriority have been

clarified for bridges supporting IEEE 802.1t or IEEE 802.1w.

The interpretation of dot1dStpTimeSinceTopologyChange has been clarified for bridges supporting the rapid spanning tree protocol (RSTP)."

REVISION "199307310000Z"

DESCRIPTION

"Second revision, published as part of [RFC 1493](#)."

REVISION "199112310000Z"

DESCRIPTION

"Initial revision, published as part of [RFC 1286](#)."

::= { mib-2 17 }

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

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))

Timeout ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

"A Spanning Tree Protocol (STP) timer in units of 1/100

seconds. 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 hundredths 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 one second for these timers. To avoid ambiguity, a conversion algorithm is defined below for converting between the different units, to ensure a timer's value is not distorted by multiple conversions.

To convert a Timeout value into a value in units of 1/256 seconds, the following algorithm should be used:

$$b = \text{floor}((n * 256) / 100)$$

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:

$$n = \text{ceiling}((b * 100) / 256)$$

where:

ceiling = quotient [if remainder is 0], or
 quotient + 1 [if remainder is nonzero]
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

-- subtrees in the Bridge MIB

```

dot1dNotifications OBJECT IDENTIFIER ::= { dot1dBridge 0 }

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

dot1dSr             OBJECT IDENTIFIER ::= { dot1dBridge 3 }
-- documented in RFC 1525

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

-- Subtrees used by Bridge MIB Extensions:
--     pBridgeMIB  MODULE-IDENTITY ::= { dot1dBridge 6 }
--     qBridgeMIB  MODULE-IDENTITY ::= { dot1dBridge 7 }
-- Note that the practice of registering related MIB modules
-- below dot1dBridge has been discouraged since there is no
-- robust mechanism to track such registrations.

```

```

dot1dConformance OBJECT IDENTIFIER ::= { dot1dBridge 8 }

-- -----
-- the dot1dBase subtree
-- -----
-- Implementation of the dot1dBase subtree 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

UNITS "ports"

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),
 transparent-only(2),
 sourceroute-only(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 subtree
-- -----
-- Implementation of the dot1dStp subtree 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

UNITS "centi-seconds"

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 nonzero."

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 }

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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

UNITS "centi-seconds"

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

UNITS "centi-seconds"

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
UNITS "centi-seconds"
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
UNITS "centi-seconds"
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)

UNITS "centi-seconds"

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)

UNITS "centi-seconds"

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)

UNITS "centi-seconds"

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
            Integer32,
        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 Integer32 (1..65535)
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.

New implementations should support dot1dStpPortPathCost32. If the port path costs exceeds the maximum value of this object then this object should report the maximum value, namely 65535. Applications should try to read the dot1dStpPortPathCost32 object if this object reports the maximum value."

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

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this port. 802.1D-1998 recommends that the default value of this parameter be in inverse proportion to the speed of the attached LAN.

This object replaces dot1dStpPortPathCost to support IEEE 802.1t."

REFERENCE

"IEEE 802.1t clause 8.10.2, Table 8-5."

::= { dot1dStpPortEntry 11 }

-- the dot1dTp subtree

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

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)

UNITS "seconds"
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

UNITS "bytes"

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

UNITS "frames"

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

UNITS "frames"

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
UNITS "frames"
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 subtree 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

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```
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.

The value of this object may exceed the required minimum maximum message size of some SNMP transport (484 bytes in case of SNMP over UDP, see [RFC 3417 section 3.2](#)). SNMP engines on bridges supporting a large number of ports must support appropriate maximum message sizes."

```
::= { 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."
 ::= { dot1dNotifications 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."
 ::= { dot1dNotifications 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      current
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 }

dot1dStpPortGroup3 OBJECT-GROUP
OBJECTS {
    dot1dStpPortPathCost32
}

```

```

STATUS      current
DESCRIPTION
    "Spanning Tree data for devices supporting 32-bit
    path costs."
 ::= { dot1dGroups 6 }

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

dot1dTpBridgeGroup OBJECT-GROUP
OBJECTS {
    dot1dTpLearnedEntryDiscards,
    dot1dTpAgingTime
}

```

```

    }
    STATUS          current
    DESCRIPTION
        "Bridge level Transparent Bridging data."
    ::= { dot1dGroups 7 }

dot1dTpFdbGroup OBJECT-GROUP
    OBJECTS {
        dot1dTpFdbAddress,
        dot1dTpFdbPort,
        dot1dTpFdbStatus
    }

    STATUS          current
    DESCRIPTION
        "Filtering Database information for the Bridge."
    ::= { dot1dGroups 8 }

dot1dTpGroup OBJECT-GROUP
    OBJECTS {
        dot1dTpPort,
        dot1dTpPortMaxInfo,
        dot1dTpPortInFrames,
        dot1dTpPortOutFrames,
        dot1dTpPortInDiscards
    }
    STATUS          current
    DESCRIPTION
        "Dynamic Filtering Database information for each port of
        the Bridge."
    ::= { dot1dGroups 9 }

```

```

-- -----
-- 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 10 }

-- -----
-- The Trap Notification Group
-- -----

dot1dNotificationGroup NOTIFICATION-GROUP
    NOTIFICATIONS {
        newRoot,
        topologyChange
    }
    STATUS      current
    DESCRIPTION
        "Group of objects describing notifications (traps)."
    ::= { dot1dGroups 11 }

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

bridgeCompliance1493 MODULE-COMPLIANCE
    STATUS      current
    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 }

bridgeComplianceXXXX MODULE-COMPLIANCE

-- RFC Ed.: replace XXXX with RFC number and remove this note

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.

Full support for the 802.1D management objects requires that the SNMPv2-MIB [[RFC3418](#)] objects sysDescr, and sysUpTime as well as the IF-MIB [[RFC2863](#)] objects ifIndex, ifType, ifDescr, ifPhysAddress, and ifLastChange are implemented."

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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."

GROUP dot1dStpPortGroup3

DESCRIPTION

"Implementation of this group is mandatory for bridges that support the Spanning Tree Protocol and 32-bit path costs. This in particular includes devices supporting IEEE 802.1t and IEEE 802.1w."

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

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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

[5.](#) IANA Considerations

The MIB module in this document uses the following IANA-assigned OBJECT IDENTIFIER values recorded in the SMI Numbers registry:

Descriptor	OBJECT IDENTIFIER value
-----	-----
dot1dBridge	{ mib-2 17 }

Editor's Note (to be removed prior to publication): this draft makes no additional requests of the IANA. (XXX)

[6.](#) Security Considerations

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

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

the network via SNMP.

These are the tables and objects and their sensitivity/vulnerability:

- o The writable objects dot1dStpPriority, dot1dStpBridgeMaxAge, dot1dStpBridgeHelloTime, dot1dStpBridgeForwardDelay, dot1dStpPortPriority, dot1dStpPortEnable, dot1dStpPortPathCost, dot1dStpPortPathCost32 influence the spanning tree protocol. Unauthorized write access to these objects can cause the spanning tree protocol to compute other default topologies or it can change the speed in which the spanning tree protocol reacts to failures.
- o The writable object dot1dTpAgingTime controls how fast dynamically learned forwarding information is aged out. Setting this object to a large value may simplify forwarding table overflow attacks.
- o The writable dot1dStaticTable provides a filtering mechanism controlling to which ports frames originating from a specific source may be forwarded. Write access to this table can be used to turn provisioned filtering off or to add filters to prevent rightful use of the network.
- o The readable objects defined in the BRIDGE-MIB module provide information about the topology of a bridged network and the attached active stations. The addresses listed in the dot1dTpFdbTable usually reveal information about the manufacturer of the MAC hardware, which can be useful information for mounting other specific attacks.
- o The two notifications newRoot and topologyChange are emitted during spanning tree computation and may trigger management systems to inspect the status of bridges and to recompute internal topology information. Hence, forged notifications may cause

management systems to perform unnecessary computations and to generate additional SNMP traffic directed to the bridges in a network. Forged notifications therefore may be part of a denial of service attack.

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

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

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator

responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

[7.](#) Acknowledgments

The MIB module presented in this memo is a translation of the BRIDGE-MIB defined in [\[RFC1493\]](#) to the SMIV2 syntax. The original authors of the SMIV1 module were E. Decker, P. Langille, A. Rijssinghani and K. McCloghrie. Further acknowledgement is given to the members of the original Bridge Working Group in [\[RFC1493\]](#).

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9. Changes from [RFC 1493](#)

The following changes have been made from [RFC 1493](#).

1. Translated the MIB definitions to use SMIV2. This includes the introduction of conformance statements. ASN.1 type definitions have been converted into textual-conventions and several units clauses were added.
2. The object dot1dStpPortPathCost32 was added to support IEEE 802.1t.
3. Permissible values for dot1dStpPriority and dot1dStpPortPriority have been clarified for bridges supporting IEEE 802.1t or IEEE 802.1w.
4. Interpretation of dot1dStpTimeSinceTopologyChange has been clarified for bridges supporting the rapid spanning tree protocol (RSTP).
5. Updated the introductory boilerplate text, the security considerations section and the references to comply with the current IETF standards and guidelines.
6. Updated references to point to newer IEEE 802.1d documents.
7. Additions and clarifications in various description clauses.

10. References

10.1 Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
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10.2 Informative References

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

[RFC1493] Decker, E., Langille, P., Rijsinghani, A. and K. McCloghrie, "Definitions of Managed Objects for Bridges", [RFC 1493](#), July 1993.

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