

Network Working Group
Request for Comments: 1286

E. Decker
cisco Systems, Inc.
P. Langille
Digital Equipment Corporation
A. Rijsinghani
Digital Equipment Corporation
K. McCloghrie
Hughes LAN Systems, Inc.
December 1991

Definitions of Managed Objects for Bridges

Status of this Memo

This memo is an extension to the SNMP MIB. This RFC specifies an IAB standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "IAB Official Protocol Standards" for the standardization state and status of this protocol. Distribution of this memo is unlimited.

Table of Contents

1. Abstract	2
2. The Network Management Framework.....	2
3. Objects	2
3.1 Format of Definitions	3
4. Overview	3
4.1 Structure of MIB	4
4.1.1 The dotldBase Group	7
4.1.2 The dotldStp Group	7
4.1.3 The dotldSr Group	7
4.1.4 The dotldTp Group	7
4.1.5 The dotldStatic Group	7
4.2 Relationship to Other MIBs	7
4.2.1 Relationship to the 'system' group	8
4.2.2 Relationship to the 'interfaces' group	8
4.3 Textual Conventions	9
5. Definitions	9
5.1 Groups in the Bridge MIB	11
5.2 The dotldBase Group Definitions	11
5.3 The dotldStp Group Definitions	14
5.4 The dotldSr Group Definitions	22
5.5 The dotldTp Group Definitions	28
5.6 The dotldStatic Group Definitions	34
5.8 Traps for use by Bridges	36
6. Acknowledgments	37

7. References	38
8. Security Considerations.....	39
9. Authors' Addresses.....	40

1. 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 bridges based on the IEEE 802.1d draft standard between Local Area Network (LAN) segments. Provisions are made for support of transparent and source route bridging. Provisions are also made so that these objects apply to bridges connected by subnetworks other than LAN segments.

2. The Network Management Framework

The Internet-standard Network Management Framework consists of three components. They are:

RFC 1155 which defines the SMI, the mechanisms used for describing and naming objects for the purpose of management. RFC 1212 defines a more concise description mechanism, which is wholly consistent with the SMI.

RFC 1156 which defines MIB-I, the core set of managed objects for the Internet suite of protocols. RFC 1213, defines MIB-II, an evolution of MIB-I based on implementation experience and new operational requirements.

RFC 1157 which defines the SNMP, the protocol used for network access to managed objects.

The Framework permits new objects to be defined for the purpose of experimentation and evaluation.

3. Objects

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the subset of Abstract Syntax Notation One (ASN.1) [7] defined in the SMI. In particular, each object has a name, a syntax, and an encoding. The name is an object identifier, an administratively assigned name, which specifies an object type. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, we often use a textual string, termed the OBJECT DESCRIPTOR, to also refer to the object type.

The syntax of an object type defines the abstract data structure corresponding to that object type. The ASN.1 language is used for this purpose. However, the SMI [3] purposely restricts the ASN.1 constructs which may be used. These restrictions are explicitly made for simplicity.

The encoding of an object type is simply how that object type is represented using the object type's syntax. Implicitly tied to the notion of an object type's syntax and encoding is how the object type is represented when being transmitted on the network.

The SMI specifies the use of the basic encoding rules of ASN.1 [8], subject to the additional requirements imposed by the SNMP.

3.1. Format of Definitions

Section 5 contains the specification of all object types contained in this MIB module. The object types are defined using the conventions defined in the SMI, as amended by the extensions specified in [9,10].

4. 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 draft IEEE 802.1d specification [11]. Source route bridging has been defined by I.B.M. and is described in the Token Ring Architecture Reference [12]. IEEE 802.1d is currently working on combining the source route and transparent techniques in a compatible fashion. This memo defines those objects needed for the management of a bridging entity operating in one of these modes.

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.

4.1. 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 [11] 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
	.PortPriority

State	.SpanningTreeState
Enable	
PathCost	.PortPathCost
DesignatedRoot	.DesignatedRoot
DesignatedCost	.DesignatedCost
DesignatedBridge	.DesignatedBridge
DesignatedPort	.DesignatedPort
ForwardTransitions	
dot1dSr	
PortTable	
Port	
HopCount	SourceRoutingPort
	.PortHopCount
LocalSegment	.SegmentNumber
BridgeNum	.BridgeNumber
TargetSegment	
LargestFrame	.LargestFrameSize
STESpanMode	.LimitedBroadcastMode
SpecInFrames	BridgePort
	.ValidSRFramesReceived
	.ValidSRForwardedOutbound
SpecOutFrames	
ApeInFrames	
ApeOutFrames	.BroadcastFramesForwarded
SteInFrames	
SteOutFrames	.BroadcastFramesForwarded
SegmentMismatchDiscards	.DiscardInvalidRI
DuplicateSegmentDiscards	.LanIdMismatch
HopCountExceededDiscards	.FramesDiscardedHopCountExceeded
dot1dTp	
LearnedEntryDiscards	BridgeFilter.DatabaseSize
	.NumDynamic,NumStatic
AgingTime	BridgeFilter.AgingTime
FdbTable	
Address	
Status	
Port	
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 dot1dStpPortNum 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	
SourceRoutingPort	The Source Routing Supplement, at the time of this writing, is not stable. The following objects were NOT included in this MIB because they are redundant or not considered useful.
.LimitedBroadcastEnable	
BridgePort.DupLanIdOrTreeError	
.DiscardLackOfBuffers	
.DiscardErrorDetails	
.DiscardTargetLANInoperable	

- .ValidSRDiscardedInbound
- .BroadcastBytesForwarded
- .NonBroadcastBytesForwarded
- .FramesNotReceivedDueToCongestion
- .FramesDiscardedDueToInternalError

4.1.1. The dotldBase Group

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

4.1.2. The dotldStp Group

This group contains the objects that denote the bridge's state with respect to the Spanning Tree Protocol. If a node does not implement the Spanning Tree Protocol, this group will not be implemented. This group is applicable to any transparent only, source route, or SRT bridge which implements the Spanning Tree Protocol.

4.1.3. The dotldSr 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.

4.1.4. The dotldTp 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.

4.1.5. The dotldStatic 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.

4.2. 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 [6].

4.2.1. Relationship to the 'system' group

In MIB-II, 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.

4.2.2. Relationship to the 'interfaces' group

In MIB-II, 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.

4.3. Textual Conventions

The datatypes, MacAddress, BridgeId and Timeout, are used as textual conventions in this document. These textual conventions have NO effect on either the syntax nor the semantics of any managed object. 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.

5. Definitions

```
RFC1286-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    Counter, Gauge, TimeTicks
        FROM RFC1155-SMI
    mib-2
        FROM RFC1213-MIB
    OBJECT-TYPE
        FROM RFC-1212
    TRAP-TYPE
        FROM RFC-1215;
```

```
-- 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 ::= OCTET STRING (SIZE (6))    -- a 6 octet address in
                                           -- the "canonical" order
-- defined by IEEE 802.1a, i.e., as if it were transmitted least
-- significant bit first, even though 802.5 (in contrast to other
-- 802.x protocols) requires MAC addresses to be transmitted most
-- significant bit first.
--
-- 16-bit addresses, if needed, are represented by setting their
-- upper 4 octets to all 0's, i.e., AAFF would be represented
-- as 00000000AAFF.
```

```
-- 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 ::= OCTET STRING (SIZE (8))    -- 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).
-- 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/D9
-- 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 ::= INTEGER    -- 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).

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

```

-- groups in the Bridge MIB

dotldBase OBJECT IDENTIFIER ::= { dotldBridge 1 }

dotldStp OBJECT IDENTIFIER ::= { dotldBridge 2 }

dotldSr OBJECT IDENTIFIER ::= { dotldBridge 3 }

dotldTp OBJECT IDENTIFIER ::= { dotldBridge 4 }

dotldStatic OBJECT IDENTIFIER ::= { dotldBridge 5 }

-- the dotldBase group

-- Implementation of the dotldBase group is mandatory for all
-- bridges.

dotldBaseBridgeAddress OBJECT-TYPE

SYNTAX MacAddress

ACCESS read-only

STATUS mandatory

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 dotldStpPriority a unique
BridgeIdentifier is formed which is used in the
Spanning Tree Protocol."

REFERENCE

"P802.1d/D9, July 14, 1989: Sections 6.4.1.1.3 and 3.12.5"

::= { dotldBase 1 }

dotldBaseNumPorts OBJECT-TYPE

SYNTAX INTEGER

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of ports controlled by this bridging
entity."

REFERENCE

"P802.1d/D9, July 14, 1989: Section 6.4.1.1.3"

::= { dotldBase 2 }

dotldBaseType OBJECT-TYPE

SYNTAX INTEGER {

```

        unknown(1),
        transparent-only(2),
        sourceroute-only(3),
        srt(4)
    }
ACCESS    read-only
STATUS    mandatory
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
    ACCESS  not-accessible
    STATUS  mandatory
    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
    ACCESS  not-accessible
    STATUS  mandatory
    DESCRIPTION
        "A list of information for each port of the
        bridge."
    REFERENCE
        "P802.1d/D9, July 14, 1989: Section 6.4.2, 6.6.1"
    INDEX   { dot1dBasePort }
    ::= { dot1dBasePortTable 1 }

Dot1dBasePortEntry ::=
    SEQUENCE {
        dot1dBasePort
            INTEGER,
        dot1dBasePortIfIndex
            INTEGER,
        dot1dBasePortCircuit
            OBJECT IDENTIFIER,
        dot1dBasePortDelayExceededDiscards

```

```
        Counter,
        dotldBasePortMtuExceededDiscards
        Counter
    }

dotldBasePort OBJECT-TYPE
    SYNTAX  INTEGER
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION
        "The port number of the port for which this entry
        contains bridge management information."
    ::= { dotldBasePortEntry 1 }

dotldBasePortIfIndex OBJECT-TYPE
    SYNTAX  INTEGER
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION
        "The value of the instance of the ifIndex object,
        defined in [4,6], for the interface corresponding
        to this port."
    ::= { dotldBasePortEntry 2 }

dotldBasePortCircuit OBJECT-TYPE
    SYNTAX  OBJECT IDENTIFIER
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION
        "For a port which (potentially) has the same value
        of dotldBasePortIfIndex 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
        dotldBasePortIfIndex, this object can have the
        value { 0 0 }."
    ::= { dotldBasePortEntry 3 }

dotldBasePortDelayExceededDiscards OBJECT-TYPE
    SYNTAX  Counter
    ACCESS  read-only
    STATUS  mandatory
```

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

"P802.1d/D9, July 14, 1989: Section 6.6.1.1.3"

::= { dotldBasePortEntry 4 }

dotldBasePortMtuExceededDiscards OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

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

"P802.1d/D9, July 14, 1989: Section 6.6.1.1.3"

::= { dotldBasePortEntry 5 }

-- the dotldStp group

-- Implementation of the dotldStp group is optional. It is
 -- implemented by those bridges that support the Spanning Tree
 -- Protocol. Transparent, Source Route, and SRT bridges will
 -- implement this group only if they support the Spanning Tree
 -- Protocol.

dotldStpProtocolSpecification OBJECT-TYPE

SYNTAX INTEGER {
 unknown(1),
 decLb100(2),
 ieee8021d(3)
 }

ACCESS read-only

STATUS mandatory

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 INTEGER (0..65535)

ACCESS read-write

STATUS mandatory

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."

REFERENCE

"P802.1d/D9, July 14, 1989: Section 4.5.3.7"

```
::= { dot1dStp 2 }
```

dot1dStpTimeSinceTopologyChange OBJECT-TYPE

SYNTAX TimeTicks

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The time (in hundredths of a second) since the last time a topology change was detected by the bridge entity."

REFERENCE

"P802.1d/D9, July 14, 1989: Section 6.8.1.1.3"

```
::= { dot1dStp 3 }
```

dot1dStpTopChanges OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The total number of topology changes detected by this bridge since the management entity was last reset or initialized."

REFERENCE

"P802.1d/D9, July 14, 1989: Section 6.8.1.1.3"

```
::= { dot1dStp 4 }
```

dot1dStpDesignatedRoot OBJECT-TYPE

SYNTAX BridgeId

ACCESS read-only

STATUS mandatory

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

"P802.1d/D9, July 14, 1989: Section 4.5.3.1"

::= { dot1dStp 5 }

dot1dStpRootCost OBJECT-TYPE

SYNTAX INTEGER

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The cost of the path to the root as seen from this bridge."

REFERENCE

"P802.1d/D9, July 14, 1989: Section 4.5.3.2"

::= { dot1dStp 6 }

dot1dStpRootPort OBJECT-TYPE

SYNTAX INTEGER

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The port number of the port which offers the lowest cost path from this bridge to the root bridge."

REFERENCE

"P802.1d/D9, July 14, 1989: Section 4.5.3.3"

::= { dot1dStp 7 }

dot1dStpMaxAge OBJECT-TYPE

SYNTAX Timeout

ACCESS read-only

STATUS mandatory

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

"P802.1d/D9, July 14, 1989: Section 4.5.3.4"

::= { dot1dStp 8 }

dot1dStpHelloTime OBJECT-TYPE

SYNTAX Timeout

ACCESS read-only

STATUS mandatory

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

"P802.1d/D9, July 14, 1989: Section 4.5.3.5"

::= { dot1dStp 9 }

dot1dStpHoldTime OBJECT-TYPE

SYNTAX INTEGER

ACCESS read-only

STATUS mandatory

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

"P802.1d/D9, July 14, 1989: Section 4.5.3.14"

::= { dot1dStp 10 }

dot1dStpForwardDelay OBJECT-TYPE

SYNTAX Timeout

ACCESS read-only

STATUS mandatory

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 a particular state before moving to the next state. For example, how long a port stays in the Listening state when moving from Blocking to Learning. 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

"P802.1d/D9, July 14, 1989: Section 4.5.3.6"

::= { dot1dStp 11 }

dot1dStpBridgeMaxAge OBJECT-TYPE

SYNTAX Timeout (600..4000)

ACCESS read-write

STATUS mandatory

DESCRIPTION

"The value that all bridges use for MaxAge when this bridge is acting as the root. Note that 802.1d/D9 specifies that the range for this parameter is related to the value of dot1dStpBridgeHelloTime. The granularity of this timer is specified by 802.1d/D9 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

"P802.1d/D9, July 14, 1989: Section 4.5.3.8"

::= { dot1dStp 12 }

dot1dStpBridgeHelloTime OBJECT-TYPE

SYNTAX Timeout (100..1000)

ACCESS read-write

STATUS mandatory

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/D9 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

"P802.1d/D9, July 14, 1989: Section 4.5.3.9"

::= { dot1dStp 13 }

dot1dStpBridgeForwardDelay OBJECT-TYPE

SYNTAX Timeout (400..3000)

ACCESS read-write

STATUS mandatory

DESCRIPTION

"The value that all bridges use for ForwardDelay when this bridge is acting as the root. Note that 802.1d/D9 specifies that the range for this parameter is related to the value of dot1dStpBridgeMaxAge. The granularity of this timer is specified by 802.1d/D9 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

"P802.1d/D9, July 14, 1989: Section 4.5.3.10"
 ::= { dot1dStp 14 }

-- The Spanning Tree Port Table

dot1dStpPortTable OBJECT-TYPE

SYNTAX SEQUENCE OF Dot1dStpPortEntry

ACCESS not-accessible

STATUS mandatory

DESCRIPTION

"A table that contains port-specific information
 for the Spanning Tree Protocol."

::= { dot1dStp 15 }

dot1dStpPortEntry OBJECT-TYPE

SYNTAX Dot1dStpPortEntry

ACCESS not-accessible

STATUS mandatory

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

INTEGER,

dot1dStpPortPriority

INTEGER,

dot1dStpPortState

INTEGER,

dot1dStpPortEnable

INTEGER,

dot1dStpPortPathCost

INTEGER,

dot1dStpPortDesignatedRoot

BridgeId,

dot1dStpPortDesignatedCost

INTEGER,

dot1dStpPortDesignatedBridge

BridgeId,

dot1dStpPortDesignatedPort

OCTET STRING,

dot1dStpPortForwardTransitions
 Counter

}

dot1dStpPort OBJECT-TYPE

SYNTAX INTEGER

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The port number of the port for which this entry contains Spanning Tree Protocol management information."

REFERENCE

"P802.1d/D9, July 14, 1989: Section 6.8.2.1.2"

::= { dot1dStpPortEntry 1 }

dot1dStpPortPriority OBJECT-TYPE

SYNTAX INTEGER (0..255)

ACCESS read-write

STATUS mandatory

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."

REFERENCE

"P802.1d/D9, July 14, 1989: Section 4.5.5.1"

::= { dot1dStpPortEntry 2 }

dot1dStpPortState OBJECT-TYPE

SYNTAX INTEGER {
disabled(1),
blocking(2),
listening(3),
learning(4),
forwarding(5),
broken(6)
}

ACCESS read-only

STATUS mandatory

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

"P802.1d/D9, July 14, 1989: Section 4.5.5.2"

::= { dot1dStpPortEntry 3 }

dot1dStpPortEnable OBJECT-TYPE

SYNTAX INTEGER {
 enabled(1),
 disabled(2)
}

ACCESS read-write

STATUS mandatory

DESCRIPTION

"The enabled/disabled status of the port."

REFERENCE

"P802.1d/D9, July 14, 1989: Section 4.5.5.2"

::= { dot1dStpPortEntry 4 }

dot1dStpPortPathCost OBJECT-TYPE

SYNTAX INTEGER (1..65535)

ACCESS read-write

STATUS mandatory

DESCRIPTION

"The contribution of this port to the path cost of paths towards the spanning tree root which include this port."

REFERENCE

"P802.1d/D9, July 14, 1989: Section 4.5.5.3"

::= { dot1dStpPortEntry 5 }

dot1dStpPortDesignatedRoot OBJECT-TYPE

SYNTAX BridgeId

ACCESS read-only

STATUS mandatory

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

"P802.1d/D9, July 14, 1989: Section 4.5.5.4"

::= { dot1dStpPortEntry 6 }

dot1dStpPortDesignatedCost OBJECT-TYPE

SYNTAX INTEGER

ACCESS read-only

STATUS mandatory

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

"P802.1d/D9, July 14, 1989: Section 4.5.5.5"

::= { dot1dStpPortEntry 7 }

dot1dStpPortDesignatedBridge OBJECT-TYPE

SYNTAX BridgeId

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The Bridge Identifier of the bridge which this port considers to be the Designated Bridge for this port's segment."

REFERENCE

"P802.1d/D9, July 14, 1989: Section 4.5.5.6"

::= { dot1dStpPortEntry 8 }

dot1dStpPortDesignatedPort OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (2))

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The Port Identifier of the port on the Designated Bridge for this port's segment."

REFERENCE

"P802.1d/D9, July 14, 1989: Section 4.5.5.7"

::= { dot1dStpPortEntry 9 }

dot1dStpPortForwardTransitions OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of times this port has transitioned from the Learning state to the Forwarding state."

::= { dot1dStpPortEntry 10 }

-- the dot1dSr group

-- Implementation of the dot1dSr group is optional. It is
-- implemented by those bridges that support the source route
-- bridging mode, including Source Route and SRT bridges.

```
dotldSrPortTable OBJECT-TYPE
    SYNTAX  SEQUENCE OF DotldSrPortEntry
    ACCESS  not-accessible
    STATUS  mandatory
    DESCRIPTION
        "A table that contains information about every
        port that is associated with this source route
        bridge."
    ::= { dotldSr 1 }

dotldSrPortEntry OBJECT-TYPE
    SYNTAX  DotldSrPortEntry
    ACCESS  not-accessible
    STATUS  mandatory
    DESCRIPTION
        "A list of information for each port of a source
        route bridge."
    INDEX   { dotldSrPort }
    ::= { dotldSrPortTable 1 }

DotldSrPortEntry ::=
    SEQUENCE {
        dotldSrPort
            INTEGER,
        dotldSrPortHopCount
            INTEGER,
        dotldSrPortLocalSegment
            INTEGER,
        dotldSrPortBridgeNum
            INTEGER,
        dotldSrPortTargetSegment
            INTEGER,
        dotldSrPortLargestFrame
            INTEGER,
        dotldSrPortSTESpanMode
            INTEGER,
        dotldSrPortSpecInFrames
            Counter,
        dotldSrPortSpecOutFrames
            Counter,
        dotldSrPortApeInFrames
            Counter,
        dotldSrPortApeOutFrames
            Counter,
        dotldSrPortSteInFrames
            Counter,
        dotldSrPortSteOutFrames
            Counter,
```

```
        dotldSrPortSegmentMismatchDiscards
            Counter,
        dotldSrPortDuplicateSegmentDiscards
            Counter,
        dotldSrPortHopCountExceededDiscards
            Counter
    }

dotldSrPort OBJECT-TYPE
    SYNTAX  INTEGER
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION
        "The port number of the port for which this entry
         contains Source Route management information."
    ::= { dotldSrPortEntry 1 }

dotldSrPortHopCount OBJECT-TYPE
    SYNTAX  INTEGER
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
        "The maximum number of routing descriptors allowed
         in an All Paths or Spanning Tree Explorer frames."
    ::= { dotldSrPortEntry 2 }

dotldSrPortLocalSegment OBJECT-TYPE
    SYNTAX  INTEGER
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
        "The segment number that uniquely identifies the
         segment to which this port is connected. Current
         source routing protocols limit this value to the
         range: 0 through 4095. A value of 65535 signifies
         that no segment number is assigned to this port."
    ::= { dotldSrPortEntry 3 }

dotldSrPortBridgeNum OBJECT-TYPE
    SYNTAX  INTEGER
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
        "A bridge number uniquely identifies a bridge when
         more than one bridge is used to span the same two
         segments. Current source routing protocols limit
         this value to the range: 0 through 15. A value of
         65535 signifies that no bridge number is assigned
```



```

        to this bridge."
 ::= { dot1dSrPortEntry 4 }

```

dot1dSrPortTargetSegment OBJECT-TYPE

SYNTAX INTEGER

ACCESS read-write

STATUS mandatory

DESCRIPTION

"The segment number that corresponds to the target segment this port is considered to be connected to by the bridge. Current source routing protocols limit this value to the range: 0 through 4095. A value of 65535 signifies that no target segment is assigned to this port."

```

 ::= { dot1dSrPortEntry 5 }

```

```

-- It would be nice if we could use ifMtu as the size of the
-- largest frame, 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).

```

dot1dSrPortLargestFrame OBJECT-TYPE

SYNTAX INTEGER {

dot1dSrMtu516 (516),

dot1dSrMtu1500 (1500),

dot1dSrMtu2052 (2052),

dot1dSrMtu4472 (4472),

dot1dSrMtu8144 (8144),

dot1dSrMtu11407 (11407), -- yes this is correct don't

dot1dSrMtu17800 (17800), -- ask me where it came from.

dot1dSrMtu65535 (65535)

}

ACCESS read-write

STATUS mandatory

DESCRIPTION

"The maximum size of the INFO field (LLC and above) that this port can send/receive. It does not include any MAC level (framing) octets. The value of this object is used by this bridge to determine whether a modification of the LargestFrame (LF, see [14]) field of the Routing Control field of the Routing Information Field is necessary. Valid values as defined by the 802.5 source routing bridging specification[14] are 516, 1500, 2052, 4472, 8144, 11407, 17800, and 65535 octets. Behavior of the port when an illegal

value is written is implementation specific. It is recommended that a reasonable legal value be chosen."

::= { dot1dSrPortEntry 6 }

dot1dSrPortSTESpanMode OBJECT-TYPE

SYNTAX INTEGER {
 auto-span(1),
 disabled(2),
 forced(3)
 }

ACCESS read-write

STATUS mandatory

DESCRIPTION

"Determines how this port behaves when presented with a Spanning Tree Explorer frame. The value 'disabled(2)' indicates that the port will not accept or send Spanning Tree Explorer packets; any STE packets received will be silently discarded. The value 'forced(3)' indicates the port will always accept and propagate Spanning Tree Explorer frames. This allows a manually configured Spanning Tree for this class of packet to be configured. Note that unlike transparent bridging this is not catastrophic to the network if there are loops. The value 'auto-span(1)' can only be returned by a bridge that both implements the Spanning Tree Protocol and has use of the protocol enabled on this port. The behavior of the port for Spanning Tree Explorer frames is determined by the state of dot1dStpPortState. If the port is in the 'forwarding' state, the frame will be accepted or propagated. Otherwise it will be silently discarded."

::= { dot1dSrPortEntry 7 }

dot1dSrPortSpecInFrames OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of specifically routed frames that have been received from this port's segment."

::= { dot1dSrPortEntry 8 }

dot1dSrPortSpecOutFrames OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of specifically routed frames that
this port has transmitted on its segment."

::= { dot1dSrPortEntry 9 }

dot1dSrPortApeInFrames OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of all paths explorer frames that have
been received by this port from its segment."

::= { dot1dSrPortEntry 10 }

dot1dSrPortApeOutFrames OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of all paths explorer frames that have
been transmitted by this port on its segment."

::= { dot1dSrPortEntry 11 }

dot1dSrPortSteInFrames OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of spanning tree explorer frames that
have been received by this port from its segment."

::= { dot1dSrPortEntry 12 }

dot1dSrPortSteOutFrames OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The number of spanning tree explorer frames that
have been transmitted by this port on its
segment."

::= { dot1dSrPortEntry 13 }

dot1dSrPortSegmentMismatchDiscards OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

```
        "The number of explorer frames that have been
        discarded by this port because the routing
        descriptor field contained an invalid adjacent
        segment value."
 ::= { dot1dSrPortEntry 14 }

dot1dSrPortDuplicateSegmentDiscards OBJECT-TYPE
    SYNTAX Counter
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The number of frames that have been discarded by
        this port because the routing descriptor field
        contained a duplicate segment identifier."
 ::= { dot1dSrPortEntry 15 }

dot1dSrPortHopCountExceededDiscards OBJECT-TYPE
    SYNTAX Counter
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The number of explorer frames that have been
        discarded by this port because the Routing
        Information Field has exceeded the maximum route
        descriptor length."
 ::= { dot1dSrPortEntry 16 }

-- 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 Counter
    ACCESS read-only
    STATUS mandatory
    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

"P802.1d/D9, July 14, 1989: Section 6.7.1.1.3"

::= { dot1dTp 1 }

dot1dTpAgingTime OBJECT-TYPE

SYNTAX INTEGER

ACCESS read-write

STATUS mandatory

DESCRIPTION

"The timeout period in seconds for aging out dynamically learned forwarding information."

REFERENCE

"P802.1d/D9, July 14, 1989: Section 6.7.1.1.3"

::= { dot1dTp 2 }

-- The Forwarding Database for Transparent Bridges

dot1dTpFdbTable OBJECT-TYPE

SYNTAX SEQUENCE OF Dot1dTpFdbEntry

ACCESS not-accessible

STATUS mandatory

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

ACCESS not-accessible

STATUS mandatory

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
        INTEGER,
    dot1dTpFdbStatus
        INTEGER
    }

dot1dTpFdbAddress OBJECT-TYPE
    SYNTAX  MacAddress
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION
        "A unicast MAC address for which the bridge has
        forwarding and/or filtering information."
    REFERENCE
        "P802.1d/D9, July 14, 1989: Section 3.9.1, 3.9.2"
    ::= { dot1dTpFdbEntry 1 }

dot1dTpFdbPort OBJECT-TYPE
    SYNTAX  INTEGER
    ACCESS  read-only
    STATUS  mandatory
    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)
    }
    ACCESS  read-only
    STATUS  mandatory

```

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

ACCESS not-accessible

STATUS mandatory

DESCRIPTION

"A table that contains information about every port that is associated with this transparent

```
        bridge."
 ::= { dot1dTp 4 }

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

Dot1dTpPortEntry ::=
    SEQUENCE {
        dot1dTpPort
            INTEGER,
        dot1dTpPortMaxInfo
            INTEGER,
        dot1dTpPortInFrames
            Counter,
        dot1dTpPortOutFrames
            Counter,
        dot1dTpPortInDiscards
            Counter
    }

dot1dTpPort OBJECT-TYPE
    SYNTAX  INTEGER
    ACCESS  read-only
    STATUS  mandatory
    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  INTEGER
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION
```


"The maximum size of the INFO (non-MAC) field that this port will receive or transmit."
 ::= { dot1dTpPortEntry 2 }

dot1dTpPortInFrames OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

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."

REFERENCE

"P802.1d/D9, July 14, 1989: Section 6.6.1.1.3"

::= { dot1dTpPortEntry 3 }

dot1dTpPortOutFrames OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

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."

REFERENCE

"P802.1d/D9, July 14, 1989: Section 6.6.1.1.3"

::= { dot1dTpPortEntry 4 }

dot1dTpPortInDiscards OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"Count of valid frames received which were discarded (i.e., filtered) by the Forwarding Process."

REFERENCE

"P802.1d/D9, July 14, 1989: 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

ACCESS not-accessible

STATUS mandatory

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

"P802.1d/D9, July 14, 1989: Section 6.7.2"

::= { dot1dStatic 1 }

dot1dStaticEntry OBJECT-TYPE

SYNTAX Dot1dStaticEntry

ACCESS not-accessible

STATUS mandatory

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

"P802.1d/D9, July 14, 1989: Section 6.7.2"

INDEX { dot1dStaticAddress, dot1dStaticReceivePort }

::= { dot1dStaticTable 1 }

Dot1dStaticEntry ::=

```
SEQUENCE {
    dot1dStaticAddress
        MacAddress,
    dot1dStaticReceivePort
        INTEGER,
    dot1dStaticAllowedToGoTo
```

```
        OCTET STRING,
        dotldStaticStatus
        INTEGER
    }

dotldStaticAddress OBJECT-TYPE
    SYNTAX  MacAddress
    ACCESS  read-write
    STATUS  mandatory
    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
        "P802.1d/D9, July 14, 1989: Section 3.9.1, 3.9.2"
    ::= { dotldStaticEntry 1 }

dotldStaticReceivePort OBJECT-TYPE
    SYNTAX  INTEGER
    ACCESS  read-write
    STATUS  mandatory
    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."
    ::= { dotldStaticEntry 2 }

dotldStaticAllowedToGoTo OBJECT-TYPE
    SYNTAX  OCTET STRING
    ACCESS  read-write
    STATUS  mandatory
    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.)"
 ::= { dot1dStaticEntry 3 }

dot1dStaticStatus OBJECT-TYPE
    SYNTAX  INTEGER {
                other(1),
                invalid(2),
                permanent(3),
                deleteOnReset(4),
                deleteOnTimeout(5)
            }
    ACCESS  read-write
    STATUS  mandatory
    DESCRIPTION
        "This object indicates the status of this entry.
         other(1) - this entry is currently in use but
                   the conditions under which it will
                   remain so 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 }

-- Traps for use by Bridges

-- Traps for the Spanning Tree Protocol

newRoot TRAP-TYPE
    ENTERPRISE dot1dBridge
    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."
 ::= 1

topologyChange TRAP-TYPE
    ENTERPRISE dot1dBridge
    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."
 ::= 2

END
```

6. Acknowledgments

This document was produced on behalf of the Bridge Sub-Working Group of the SNMP Working Group of the Internet Engineering Task Force. Over the course of its deliberations, the working group received four separate documents for consideration as the basis for its work. The first was submitted by Stan Froyd of Advanced Computer Communications; the second by Richard Fox of SynOptics; the third by Eric Decker of cisco Inc. and Keith McCloghrie of Hughes LAN Systems; and the fourth by Paul Langille and Anil Rijsinghani of Digital Equipment Corp. After considering the submissions, the working group chose to proceed with a document formed as a conjunction of the latter two submissions. This document is the result.

The authors wish to thank the members of the Bridge Working Group for their many comments and suggestions which improved this effort. In particular, Fred Baker (chairman of the working group) of ACC, Steve Sherry of Xyplex, and Frank Kastenholz of Clearpoint Research Corp. Others members of the Bridge Working Group who contributed to this effort are:

Bill Anderson, Mitre
Karl Auerbach, Epilogue
Fred Baker, ACC (chair)
Terry Bradley, Wellfleet
Ted Brunner, Bellcore
Jeffrey Buffum, Apollo
Chris ChioTasso, Fibronics
Anthony Chung, HLS
Chuck Davin, MIT-LCS
Andy Davis, Spider
Eric Decker, cisco

Nadya El-Afandi, Network Systems
Gary Ellis, HP/Apollo
Richard Fox, SynOptics
Stan Froyd, ACC
Frank Kastenholz, Clearpoint Research
Shirnshon Kaufman,
Jim Kinder, Fibercom
Cheryl Krupczak, NCR
Paul Langille, Digital
Peter Lin, Vitalink
Keith McCloghrie, HLS
Donna McMaster, SynOptics
Dave Perkins, 3Com
Jim Reinstedler, Ungermann Bass
Anil Rijsinghani, Digital
Mark Schaefer, David Systems
Steve Sherry, Xyplex
Bob Stewart, Xyplex
Emil Sturniolo,
Kevin Synott, Retix
Ian Thomas, Chipcom
Maurice Turcott, Racal
Fei Xu,

7. References

- [1] Cerf, V., "IAB Recommendations for the Development of Internet Network Management Standards", RFC 1052, NRI, April 1988.
- [2] Cerf, V., "Report of the Second Ad Hoc Network Management Review Group", RFC 1109, NRI, August 1989.
- [3] Rose M., and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based internets", RFC 1155, Performance Systems International, Hughes LAN Systems, May 1990.
- [4] McCloghrie K., and M. Rose, "Management Information Base for Network Management of TCP/IP-based internets", RFC 1156, Hughes LAN Systems, Performance Systems International, May 1990.
- [5] Case, J., Fedor, M., Schoffstall, M., and J. Davin, "Simple Network Management Protocol", RFC 1157, SNMP Research, Performance Systems International, Performance Systems International, MIT Laboratory for Computer Science, May 1990.
- [6] McCloghrie K., and M. Rose, Editors, "Management Information Base for Network Management of TCP/IP-based internets", RFC 1213, Performance Systems International, March 1991.

- [7] Information processing systems - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1), International Organization for Standardization, International Standard 8824, December 1987.
- [8] Information processing systems - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Notation One (ASN.1), International Organization for Standardization, International Standard 8825, December 1987.
- [9] Rose, M., and K. McCloghrie, Editors, "Concise MIB Definitions", RFC 1212, Performance Systems International, Hughes LAN Systems, March 1991.
- [10] Rose, M., Editor, "A Convention for Defining Traps for use with the SNMP", RFC 1215, Performance Systems International, March 1991.
- [11] ANSI/IEEE Draft P802.1d/D9 MAC Bridges, "IEEE Project 802 Local and Metropolitan Area Networks", July 14, 1989.
- [12] I.B.M. Token Ring Architecture Reference.
- [13] ISO DIS 10038 MAC Bridges.
- [14] ANSI/IEEE P802.1x/P802.5x, "Proposed Draft Local Area Network Standard -- MAC Bridges, Source Routing Supplement", IEEE Project 802, September 1990.
- [15] ANSI/IEEE 802.1y, "Source Routing Tutorial for End System Operation", September 1990.

8. Security Considerations

Security issues are not discussed in this memo.

9. Authors' Addresses

Eric B. Decker
cisco Systems, Inc.
1525 O'Brien Dr.
Menlo Park, CA 94025

Phone: (415) 326-1941
Email: cire@cisco.com

Paul Langille
Digital Equipment Corporation
Digital Drive, MK02-2/K03
Merrimack, NH 03054

Phone: (603) 884-4045
EMail: langille@edwin.enet.dec.com

Anil Rijsinghani
Digital Equipment Corporation
153 Taylor St.
Littleton, MA 01460

Phone: (508)952-3520
EMail: anil@levers.enet.dec.com

Keith McCloghrie
Hughes LAN Systems
1225 Charleston Road
Mountain View, CA 94043

Phone: (415) 966-7934
EMail: kzm@hls.com