

Definitions of Managed Objects for
Source Routing Bridges in the SNMPv2 SMI

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1. Introduction

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it defines managed objects used for managing source routing and source routing transparent bridges. These bridges are also required to implement relevant groups in the Bridge MIB [[8](#)].

The MIB module contained in this memo is updated to be defined using the SNMPv2 SMI [[1](#)], but is otherwise identical to that contained in [[18](#)].

2. The SNMPv2 Network Management Framework

The SNMPv2 Network Management Framework consists of three major components. They are:

- o [RFC 1902](#) [[1](#)] which defines the SMI, the mechanisms used for describing and naming objects for the purpose of management.
- o STD 17, [RFC 1213](#) [[2](#)] defines MIB-II, the core set of managed objects for the Internet suite of protocols.
- o [RFC 1157](#) [[3](#)] and/or [RFC 1905](#) [[4](#)] which defines the protocol used for network access to managed objects.

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

2.1. Object Definitions

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) defined in the SMI. In particular, each object object type is named by an OBJECT IDENTIFIER, an administratively assigned name. 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 descriptor, to refer to the object type.

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 MAC Bridge specification [11]. Source route bridging has been defined by I.B.M. and is described in the Token Ring Architecture Reference[12], as well as the IEEE 802.5M SRT Bridge Operations Addendum [14] to 802.1d. This memo defines objects needed for management of a source routing bridge, and is an extension to the SNMP Bridge MIB [8].

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.

3.1. 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 management object name found in IEEE 802.1d[11] and IEEE 802.5M [14] is also included.

SR Bridge MIB Name	IEEE Name
dot1dSr	
PortTable	
Port	SourceRoutingPort
HopCount	
LocalSegment	.SegmentNumber
BridgeNum	.BridgeNumber
TargetSegment	
LargestFrame	.LargestFrameSize
STESpanMode	.LimitedBroadcastMode
SpecInFrames	BridgePort
	.ValidSRFramesReceived
SpecOutFrames	.ValidSRForwardedOutbound
ApeInFrames	
ApeOutFrames	.BroadcastFramesForwarded
SteInFrames	
SteOutFrames	.BroadcastFramesForwarded
SegmentMismatchDiscards	.DiscardInvalidRI
DuplicateSegmentDiscards	.LanIdMismatch
HopCountExceededDiscards	.FramesDiscardedHopCountExceeded

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

IEEE Object	Disposition
SourceRoutingPort	The following objects were NOT included in this MIB because they are redundant or not considered useful.
.LimitedBroadcastEnable	
.DiscardLackOfBuffers	
.DiscardErrorDetails	
.DiscardTargetLANInoperable	
.ValidSRDiscardedInbound	
.BroadcastBytesForwarded	
.NonBroadcastBytesForwarded	
.FramesNotReceivedDueToCongestion	
.FramesDiscardedDueToInternalError	

3.1.1. The dot1dSr Group

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

3.1.2. The dot1dPortPair Group

Implementation of this group is optional. This group is implemented by those bridges that support the port-pair multiport model of the source route bridging mode as defined in the IEEE 802.5M SRT Addendum to 802.1d.

3.2. 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 Bridge MIB [8] and the 'system' group [16] and the 'interfaces' group [17].

3.2.1. Relationship to the Bridge MIB

The Bridge MIB [8] must be implemented by all bridges, including transparent, SR and SRT bridges. The SR bridge MIB is an extension to the Bridge MIB.

3.2.2. Relationship to the 'system' group

In [16], 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.

3.2.3. Relationship to the 'interfaces' group

In [17], 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.

Implicit in this 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.

Some entities provide other services in addition to bridging with respect to the data sent and received by 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 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. Changes from [RFC 1525](#)

- (1) Removed dot1dSrPortLanIdMismatches, as it is redundant with dot1dSrPortSegmentMismatchDiscards.

- (2) Replaced the words "explorer frames" in the definition of dot1dSrPortSegmentMismatchDiscards with the words "ARE and STE explorer frames" for clarification.
- (3) Revised definition of dot1dSrPortHopCount.

5. Definitions

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

```
IMPORTS
```

```
    MODULE-IDENTITY, OBJECT-TYPE,
    Integer32, Counter32, Gauge32          FROM SNMPv2-SMI
    dot1dBridge, dot1dBridge                FROM BRIDGE-MIB
    MODULE-COMPLIANCE, OBJECT-GROUP        FROM SNMPv2-TC;
```

```
-- groups in the SR MIB
```

```
-- dot1dSr is imported from the Bridge MIB
```

```
dot1dSr          MODULE-IDENTITY
    LAST-UPDATED "9202201328Z"
    ORGANIZATION "IETF Bridge MIB Working Group"
    CONTACT-INFO
        "          Anil Rijsinghani
          Postal: Digital Equipment Corporation
                550 King St
                Littleton, MA 01460.

          Email: anil@netcad.enet.dec.com"
    DESCRIPTION
        "The MIB module for 802.1d Source Routing Bridges."
    ::= { dot1dBridge 3 }

dot1dPortPair    OBJECT IDENTIFIER ::= { dot1dBridge 10 }
                -- use 10, to be safe
```


-- the dot1dSr group

-- this group is implemented by those bridges that
 -- support the source route bridging mode, including Source
 -- Routing and SRT bridges.

dot1dSrPortTable OBJECT-TYPE

SYNTAX SEQUENCE OF Dot1dSrPortEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table that contains information about every
 port that is associated with this source route
 bridge."

::= { dot1dSr 1 }

dot1dSrPortEntry OBJECT-TYPE

SYNTAX Dot1dSrPortEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A list of information for each port of a source
 route bridge."

INDEX { dot1dSrPort }

::= { dot1dSrPortTable 1 }

Dot1dSrPortEntry ::=

SEQUENCE {

dot1dSrPort	INTEGER,
dot1dSrPortHopCount	Integer32,
dot1dSrPortLocalSegment	Integer32,
dot1dSrPortBridgeNum	Integer32,
dot1dSrPortTargetSegment	Integer32,
dot1dSrPortLargestFrame	Integer32,
dot1dSrPortSTESpanMode	INTEGER,
dot1dSrPortSpecInFrames	Counter32,
dot1dSrPortSpecOutFrames	Counter32,
dot1dSrPortApeInFrames	Counter32,
dot1dSrPortApeOutFrames	Counter32,
dot1dSrPortSteInFrames	Counter32,
dot1dSrPortSteOutFrames	Counter32,
dot1dSrPortSegmentMismatchDiscards	Counter32,
dot1dSrPortDuplicateSegmentDiscards	Counter32,
dot1dSrPortHopCountExceededDiscards	Counter32,


```
        dot1dSrPortDupLanIdOrTreeErrors      Counter32
    }
```

dot1dSrPort OBJECT-TYPE

SYNTAX INTEGER (1..65535)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The port number of the port for which this entry contains Source Route management information."

::= { dot1dSrPortEntry 1 }

dot1dSrPortHopCount OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The maximum number of route descriptors allowed in All Routes Explorer frames transmitted on this port."

::= { dot1dSrPortEntry 2 }

dot1dSrPortLocalSegment OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-write

STATUS current

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. (The value 0 is used by some management applications for special test cases.) A value of 65535 signifies that no segment number is assigned to this port."

::= { dot1dSrPortEntry 3 }

dot1dSrPortBridgeNum OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-write

STATUS current

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 Integer32
MAX-ACCESS read-write
STATUS current
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.
(The value 0 is used by some management
applications for special test cases.) 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 Integer32
MAX-ACCESS read-write
STATUS current
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.

64 valid values are defined by the IEEE 802.5M SRT
Addendum: 516, 635, 754, 873, 993, 1112, 1231,
1350, 1470, 1542, 1615, 1688, 1761, 1833, 1906,
1979, 2052, 2345, 2638, 2932, 3225, 3518, 3812,
4105, 4399, 4865, 5331, 5798, 6264, 6730, 7197,
7663, 8130, 8539, 8949, 9358, 9768, 10178, 10587,

10997, 11407, 12199, 12992, 13785, 14578, 15370,
16163, 16956, 17749, 20730, 23711, 26693, 29674,
32655, 35637, 38618, 41600, 44591, 47583, 50575,
53567, 56559, 59551, and 65535.

An illegal value will not be accepted by the
bridge."

::= { dot1dSrPortEntry 6 }

dot1dSrPortSTESpanMode OBJECT-TYPE

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

MAX-ACCESS read-write

STATUS current

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 Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of Specifically Routed frames, also referred to as Source Routed Frames, that have been received from this port's segment."

::= { dot1dSrPortEntry 8 }

dot1dSrPortSpecOutFrames OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of Specifically Routed frames, also referred to as Source Routed Frames, that this port has transmitted on its segment."

::= { dot1dSrPortEntry 9 }

dot1dSrPortApeInFrames OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of All Paths Explorer frames, also referred to as All Routes Explorer frames, that have been received by this port from its segment."

::= { dot1dSrPortEntry 10 }

dot1dSrPortApeOutFrames OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of all Paths Explorer Frames, also referred to as All Routes Explorer frames, that have been transmitted by this port on its segment."

::= { dot1dSrPortEntry 11 }

dot1dSrPortSteInFrames OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { dot1dSrPortEntry 12 }

dot1dSrPortSteOutFrames OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { dot1dSrPortEntry 13 }

dot1dSrPortSegmentMismatchDiscards OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of ARE and STE 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 Counter32

MAX-ACCESS read-only

STATUS current

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 Counter32

MAX-ACCESS read-only

STATUS current

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 }

dot1dSrPortDupLanIdOrTreeErrors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of duplicate LAN IDs or Tree errors.
This helps in detection of problems in networks
containing older IBM Source Routing Bridges."

::= { dot1dSrPortEntry 17 }

-- scalar object in dot1dSr

dot1dSrBridgeLfMode OBJECT-TYPE

SYNTAX INTEGER {
mode3(1),
mode6(2)
}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Indicates whether the bridge operates using older
3 bit length negotiation fields or the newer 6 bit
length field in its RIF."

::= { dot1dSr 2 }

-- The Port-Pair Database

-- Implementation of this group is optional.

-- This group is implemented by those bridges that support the
-- direct multiport model of the source route bridging mode as
-- defined in the IEEE 802.5 SRT Addendum to 802.1d.

-- Bridges implementing this group may report 65535 for
-- dot1dSrPortBridgeNumber and dot1dSrPortTargetSegment, indicating
-- that those objects are not applicable.

dot1dPortPairTableSize OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of entries in the Bridge Port
Pair Database."

::= { dot1dPortPair 1 }

-- the Bridge Port-Pair table

-- this table represents port pairs within a bridge forming
-- a unique bridge path, as defined in the IEEE 802.5M SRT
-- Addendum.

dot1dPortPairTable OBJECT-TYPE

SYNTAX SEQUENCE OF Dot1dPortPairEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table that contains information about every
port pair database entity associated with this
source routing bridge."

::= { dot1dPortPair 2 }

dot1dPortPairEntry OBJECT-TYPE

SYNTAX Dot1dPortPairEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A list of information for each port pair entity
of a bridge."


```
INDEX    { dot1dPortPairLowPort, dot1dPortPairHighPort }
::= { dot1dPortPairTable 1 }
```

```
Dot1dPortPairEntry ::=
```

```
SEQUENCE {
    dot1dPortPairLowPort      INTEGER,
    dot1dPortPairHighPort    INTEGER,
    dot1dPortPairBridgeNum    Integer32,
    dot1dPortPairBridgeState  INTEGER
}
```

```
dot1dPortPairLowPort OBJECT-TYPE
```

```
SYNTAX      INTEGER (1..65535)
```

```
MAX-ACCESS  read-write
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The port number of the lower numbered port for
    which this entry contains port pair database
    information."
```

```
::= { dot1dPortPairEntry 1 }
```

```
dot1dPortPairHighPort OBJECT-TYPE
```

```
SYNTAX      INTEGER (1..65535)
```

```
MAX-ACCESS  read-write
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The port number of the higher numbered port for
    which this entry contains port pair database
    information."
```

```
::= { dot1dPortPairEntry 2 }
```

```
dot1dPortPairBridgeNum OBJECT-TYPE
```

```
SYNTAX      Integer32
```

```
MAX-ACCESS  read-write
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "A bridge number that uniquely identifies the path
    provided by this source routing bridge between the
    segments connected to dot1dPortPairLowPort and
    dot1dPortPairHighPort. The purpose of bridge
    number is to disambiguate between multiple paths
    connecting the same two LANs."
```

```
::= { dot1dPortPairEntry 3 }
```

```
dot1dPortPairBridgeState OBJECT-TYPE
```



```
SYNTAX      INTEGER {
                enabled(1),
                disabled(2),
                invalid(3)
            }
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "The state of dot1dPortPairBridgeNum.  Writing
    'invalid(3)' to this object removes the
    corresponding entry."
 ::= { dot1dPortPairEntry 4 }
```

```
-- conformance information
```

```
srBridgeConformance OBJECT IDENTIFIER ::= { dot1dBridge 11 }
```

```
srBridgeGroups      OBJECT IDENTIFIER ::= { srBridgeConformance 1 }
```

```
srBridgeCompliances OBJECT IDENTIFIER ::= { srBridgeConformance 2 }
```

```
-- compliance statements
```

```
srBridgeCompliance MODULE-COMPLIANCE
```

```
    STATUS current
```

```
    DESCRIPTION
```

```
        "The compliance statement for SNMPv2 entities which  
        implement the SR Bridge MIB."
```

```
    MODULE -- this module
```

```
        MANDATORY-GROUPS { dot1dSr }
```

```
    ::= { srBridgeCompliances 1 }
```

```
-- units of conformance
```

```
dot1dSr OBJECT-GROUP
```

```
    OBJECTS { dot1dSrPort, dot1dSrPortHopCount,  
              dot1dSrPortLocalSegment, dot1dSrPortBridgeNum,  
              dot1dSrPortTargetSegment, dot1dSrPortLargestFrame,  
              dot1dSrPortSTESpanMode, dot1dSrPortSpecInFrames,  
              dot1dSrPortSpecOutFrames, dot1dSrPortApeInFrames,  
              dot1dSrPortApeOutFrames, dot1dSrPortSteInFrames,  
              dot1dSrPortSteOutFrames,  
              dot1dSrPortSegmentMismatchDiscards,  
              dot1dSrPortDuplicateSegmentDiscards,  
              dot1dSrPortHopCountExceededDiscards,  
              dot1dSrPortDupLanIdOrTreeErrors }
```

```
    STATUS current
```

```
    DESCRIPTION
```

```
        "A collection of objects providing management  
        information for source route bridges."
```

```
    ::= { dot1dBridge 3 }
```

```
dot1dPortPair OBJECT-GROUP
```

```
    OBJECTS { dot1dPortPairLowPort, dot1dPortPairHighPort  
              dot1dPortPairBridgeNum, dot1dPortPairBridgeState }
```


STATUS current

DESCRIPTION

"A collection of objects implemented by those SR
bridges that support the direct multiport model of the
source route bridging mode as defined in the IEEE SRT
specification."

::= { dot1dBridge 10 }

END

6. Acknowledgments

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The authors wish to thank the members of the Bridge MIB Working Group for their many comments and suggestions which improved this effort.

7. References

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8. Security Considerations

Security issues are not discussed in this memo.

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