IEEE 802.5 Station Source Routing MIB using SMIv2

Status of this Memo

   This document specifies an Internet standards track protocol for the
   Internet community, and requests discussion and suggestions for
   improvements. Please refer to the current edition of the "Internet
   Official Protocol Standards" (STD 1) for the standardization state
   and status of this protocol. Distribution of this memo is unlimited.

Table of Contents

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 describes managed objects used by IEEE 802.5 end-
   stations for managing source routes on a Token Ring network where
   IEEE source-routing is in use. IEEE source-routing is described in
   802.5 Token Ring Access Method and Physical Layer Specifications [8]
   and related ISO publications [9, 10, 11].

   This memo is an incremental update to RFC 1748 [6]. It is documented
   separately from the RFC 1748 solely due to the latter's maturity
   within the Internet standardization process.

2. The SNMPv2 Network Management Framework

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

       o   RFC 1442 [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 1445 [3] which defines the administrative and other
             architectural aspects of the framework.

       o   RFC 1448 [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.
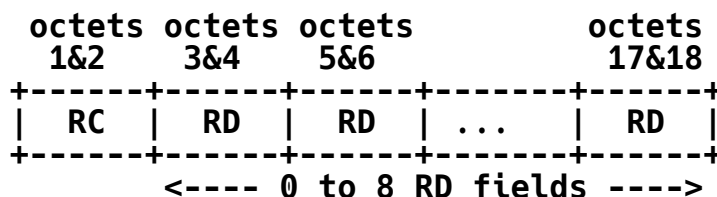
2.1. Object Definitions

   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 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

   This memo defines a single table: the 802.5 Station Source Routing
   Table, which contains the source routes known by a end-station on an
   IEEE 802.5 Token Ring network in which IEEE source-routing is in use.

3.1. Source Routing

   Source routing extends the 802.5 protocol [8] by assigning a unique
   ring number to each ring within the extended LAN, and a bridge number
   to each source routing bridge's connection to a ring. A Routing
   Information Field (RIF) must be included in frames which need to
   traverse multiple rings. The format of the RIF is:

```
                 octets octets octets         octets
                  1&2    3&4    5&6            17&18
                 +------+------+------+-------+------+
                 | RC   | RD   | RD   | ...   | RD   |
                 +------+------+------+-------+------+
                      <---- 0 to 8 RD fields ---->
```
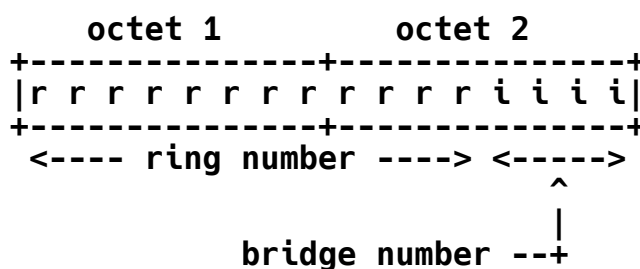
The format of the Routing Control (RC) field is:

```
                     octet 1           octet 2
              +---------------+---------------+
              |b b b l l l l l|d f f f 0 0 0 0|
              +---------------+---------------+
                   ^       ^       ^   ^
                   |       |       |   |
  Explorer indicator --+   |       |   +-- Max frame length*
          Length of RIF field --+   +-- Direction to use RDs
```
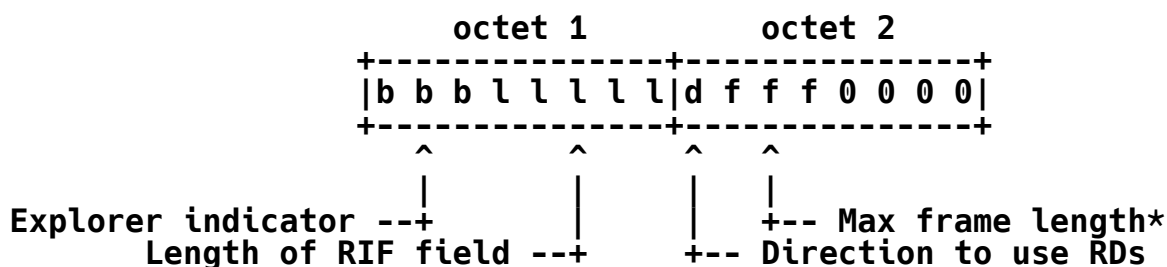
   * Note that the length of the Maximum frame length subfield
     has recently been extended to 6 bits.

The format of each Routing Descriptor (RD) field is:

```
                  octet 1           octet 2
              +---------------+---------------+
              |r r r r r r r r r r r r i i i i|
              +---------------+---------------+
               <---- ring number ----> <----->
                                          ^
                                          |
                          bridge number --+
```

3.2. Relationship to RFC 1748

   RFC 1748 [6], the IEEE 802.5 MIB, defines managed objects used for
   interfaces to IEEE 802.5 Token Ring subnetworks. This memo is an
   incremental update to RFC 1748, and is documented independently
   solely due to the maturity of the definitions contained within RFC
   1748.

3.3. Relationship to RFC 1525

   RFC 1525 [7] defines the MIB objects specific to source-routing for
   source-routing and SRT bridges. This memo defines the MIB objects
   specific to source-routing for source-routing end-stations.

3.4. Static Source Routes

It is unclear how many, if any, existing systems allow the creation
or deletion of "static" 802.5 source routes by network management.
However, SNMPv2 SMI defines that the MAX-ACCESS clause as specifying
the maximal level of access which makes "protocol sense". Thus, this
memo provides support for static source routes through the
dot5SrRouteStatus object, but the conformance statements allow for
stations which do not support static source routes, by requiring that
compliant agents only need provide read-access to dot5SrRouteStatus.

3.5. Destinations on the Local Ring

Entries should be included in the dot5SrRouteTable for destination
MAC addresses which are on the same ring as the instrumented 802.5
interface. For such entries, dot5SrRouteDescr has the value of the
zero-length string, and dot5SrRouteControl has the corresponding
value.

4. Definitions

```
TOKENRING-STATION-SR-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE
                                        FROM SNMPv2-SMI
    TEXTUAL-CONVENTION, RowStatus, MacAddress
                                        FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP     FROM SNMPv2-CONF
    mib-2, ifIndex                      FROM RFC1213-MIB;

dot5SrMIB MODULE-IDENTITY
    LAST-UPDATED "9412161000Z"
    ORGANIZATION "IETF Interfaces MIB Working Group"
    CONTACT-INFO
            "      Keith McCloghrie
           Postal: Cisco Systems, Inc.
                   170 West Tasman Drive
                   San Jose, CA  95134-1706
                   US

            Phone: +1 408 526 5260
            Email: kzm@cisco.com"
    DESCRIPTION
            "The MIB module for managing source routes in
            end-stations on IEEE 802.5 Token Ring networks."
    ::= { mib-2 42 }
```

```
dot5SrMIBObjects OBJECT IDENTIFIER ::= { dot5SrMIB 1 }

SourceRoute ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "1x:"
    STATUS      current
    DESCRIPTION
                "Represents a Source Route, containing an
                embedded sequence of bridge and ring ID's,
                as used by 802.5 Source Routing."
    REFERENCE   "Annex C of ISO/IEC 10038: 1993,
                [ANSI/IEEE Std 802.1D, 1993]"
    SYNTAX      OCTET STRING (SIZE(0..30))


--          The 802.5 Station Source Route Table
--

dot5SrRouteTable   OBJECT-TYPE
    SYNTAX      SEQUENCE OF Dot5SrRouteEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
                "The table of source-routing routes.
                This represents the 802.5 RIF database."
    ::= { dot5SrMIBObjects 1 }

dot5SrRouteEntry  OBJECT-TYPE
    SYNTAX      Dot5SrRouteEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
                "Information on a specific route.

                An entry is created whenever a 'Single Path
                Explorer' or an 'All Paths Explorer' discovers
                a route to a neighbor not currently in the table,
                or whenever an 'All Paths Explorer' discovers a
                better (e.g., shorter) route than the route currently
                stored in the table.  This is done on behalf of
                any network layer client.

                The ifIndex value in the INDEX clause refers to
                the value of MIB-II's ifIndex object for the
                interface on which the route is in effect."
    INDEX  { ifIndex, dot5SrRouteDestination }
    ::= { dot5SrRouteTable 1 }

Dot5SrRouteEntry ::= SEQUENCE {
```

```
    dot5SrRouteDestination    MacAddress,
    dot5SrRouteControl        OCTET STRING,
    dot5SrRouteDescr          SourceRoute,
    dot5SrRouteStatus         RowStatus
}

dot5SrRouteDestination  OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
              "The destination of this route."
    ::= { dot5SrRouteEntry 2 }

dot5SrRouteControl  OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE(2))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
              "The value of Routing Control field for this
              route."
    REFERENCE   "Annex C of ISO/IEC 10038: 1993,
              [ANSI/IEEE Std 802.1D, 1993]"
    ::= { dot5SrRouteEntry 3 }

dot5SrRouteDescr  OBJECT-TYPE
    SYNTAX      SourceRoute
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
              "The embedded sequence of bridge and ring ID's
              for this route.  For destinations on the
              local ring, the value of this object is
              the zero-length string."
    REFERENCE   "Annex C of ISO/IEC 10038: 1993,
              [ANSI/IEEE Std 802.1D, 1993]"
    ::= { dot5SrRouteEntry 4 }

dot5SrRouteStatus  OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
              "The status of this row.  Values of the instances
              of dot5SrRouteControl and dot5SrRouteDescr can be
              modified while the row's status is 'active."
    ::= { dot5SrRouteEntry 5 }
```

-- conformance information

dot5SrConformance OBJECT IDENTIFIER ::= { dot5SrMIB 2 }

dot5SrGroups   OBJECT IDENTIFIER ::= { dot5SrConformance 1 }
dot5SrCompliances OBJECT IDENTIFIER ::= { dot5SrConformance 2 }

-- compliance statements

dot5SrCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for SNMPv2 entities
        which implement the IEEE 802.5 Station Source Route
        MIB."

    MODULE -- this module
        MANDATORY-GROUPS { dot5SrRouteGroup }

        OBJECT   dot5SrRouteStatus
        SYNTAX   INTEGER { active(1) }   -- subset of values
        MIN-ACCESS read-only
        DESCRIPTION
            "Write access is not required, and only the 'active'
            value need be supported."

        OBJECT   dot5SrRouteControl
        MIN-ACCESS read-only
        DESCRIPTION
            "Write access is not required."

        OBJECT   dot5SrRouteDescr
        MIN-ACCESS read-only
        DESCRIPTION
            "Write access is not required."

    ::= { dot5SrCompliances 1 }

-- units of conformance

dot5SrRouteGroup OBJECT-GROUP
    OBJECTS   { dot5SrRouteControl,
                dot5SrRouteDescr,
                dot5SrRouteStatus
              }
    STATUS   current

```
    DESCRIPTION
        "A collection of objects providing for the management of
        source routes in stations on IEEE 802.5 source-routing
        networks."
     ::= { dot5SrGroups 1 }
```

END

5. Acknowledgements

The need for this MIB module was agreed upon by the members of the
IETF Interfaces Working Group, and the definitions were derived from
experience with enterprise-specific MIBs presented to the Working
Group.

6. References

[1] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Structure
    of Management Information for version 2 of the Simple Network
    Management Protocol (SNMPv2)", RFC 1442, SNMP Research,Inc.,
    Hughes LAN Systems, Dover Beach Consulting, Inc., Carnegie Mellon
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[2] McCloghrie, K., and M. Rose, Editors, "Management Information
    Base for Network Management of TCP/IP-based internets: MIB- II",
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    International, March 1991.

[3] Galvin, J., and K. McCloghrie, "Administrative Model for version
    2 of the Simple Network Management Protocol (SNMPv2)", RFC 1445,
    Trusted Information Systems, Hughes LAN Systems, April 1993.

[4] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Protocol
    Operations for version 2 of the Simple Network Management
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    Systems, Dover Beach Consulting, Inc., Carnegie Mellon
    University, April 1993.

[5] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Textual
    Conventions for version 2 of the Simple Network Management
    Protocol (SNMPv2)", RFC 1443, SNMP Research Inc., Hughes LAN
    Systems, Dover Beach Consulting, Inc., Carnegie Mellon
    University, April 1993.

[6] McCloghrie, K., and E. Decker, "IEEE 802.5 Token Ring MIB using
    SMIv2", RFC 1748 cisco Systems, Inc., December 1994.

[7] McCloghrie, K., Decker, E., Langville, P., and A. Rijsinghani,
    "Definitions of Managed Objects for Source Routing Bridges", RFC
    1525, Hughes LAN Systems, cisco Systems, Inc., Digital Equipment
    Corporation, September 1993.

[8] "Token Ring Access Method and Physical Layer Specifications",
    IEEE Standard 802.5-1989, 1989.

[9] "Information technology - Local and metropolitan area networks -
    Part 5: Token ring access method and physical layer
    specifications", ISO/IEC 8802-5, 1992.

[10] "Information technology - Telecommunications and information
     exchange between systems - Local area networks - Media access
     control (MAC) bridges", ISO/IEC 10038, 1993 [ANSI/IEEE Std
     802.1D, 1993 Edition].

[11] "Source Routing Operation by End Systems", ISO/IEC 8802-2 PDAM5.3
     (6N7721).

7. Security Considerations

    Security issues are not discussed in this memo.

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