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RIP Version 2 MIB Extension

Status of this Memo

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.

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 RIP Version 2.

Table of Contents

1. The Network Management Framework

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

STD 16/RFC 1155 which defines the SMI, the mechanisms used for describing and naming objects for the purpose of management. STD 16/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. STD 17/RFC 1213 defines MIB-II, an evolution of MIB-I based on implementation experience and new operational requirements.

STD 15/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.

2. 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.

2.1 Format of Definitions

Section 4 contains 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].

3. Overview

3.1 Textual Conventions

Several new data types are introduced as a textual convention in this MIB document. These textual conventions enhance the readability of the specification and can ease comparison with other specifications if appropriate. It should be noted that the introduction of the these textual conventions has no effect on either the syntax nor the semantics of any managed objects. The use of these is merely an artifact of the explanatory method used. Objects defined in terms of one of these methods are always encoded by means of the rules that define the 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 and writers in pursuit of the elusive goal of clear, concise, and unambiguous MIB documents.

The new data types are: Validation (the standard "set to invalid causes deletion" type), and RouteTag. The RouteTag type represents the contents of the Route Tag field in the packet header or route entry.

3.2 Structure of MIB

The RIP-2 MIB contains global counters useful for detecting the deleterious effects of RIP incompatibilities, an "interfaces" table which contains interface-specific statistics and configuration information, and an optional "neighbor" table containing information that may be helpful in debugging neighbor relationships. Like the protocol itself, this MIB takes great care to preserve compatibility with RIP-1 systems, and controls for monitoring and controlling system interactions.

4. Definitions

```
RFC1389-MIB DEFINITIONS ::= BEGIN

IMPORTS
        Counter, TimeTicks, IpAddress
                FROM RFC1155-SMI
        mib-2
                FROM RFC1213-MIB
        OBJECT-TYPE
                FROM RFC-1212;

--  RIP-2 Management Information Base

  rip2 OBJECT IDENTIFIER ::= { mib-2 23 }
```

```
   -- the RouteTag type represents the contents of the
   -- Route Tag field in the packet header or route entry.

   RouteTag ::= OCTET STRING (SIZE (2))

   -- the Validation type is used for the variable that deletes
   -- an entry from a table, and ALWAYS takes at least these values:

   Validation ::= INTEGER { valid (1), invalid (2) }


   --      The RIP-2 Globals Group.
   --      Implementation of this group is mandatory for systems that
   --           implement RIP-2.

   -- These counters are intended to facilitate debugging quickly
   -- changing routes or failing neighbors

   rip2GlobalGroup OBJECT IDENTIFIER ::= { rip2 1 }


       rip2GlobalRouteChanges OBJECT-TYPE
           SYNTAX   Counter
           ACCESS   read-only
           STATUS   mandatory
           DESCRIPTION
              "The number of changes made to the IP Route Da-
              tabase by RIP."
          ::= { rip2GlobalGroup 1 }


       rip2GlobalQueries OBJECT-TYPE
           SYNTAX   Counter
           ACCESS   read-only
           STATUS   mandatory
           DESCRIPTION
              "The number of responses sent  to  RIP  queries
              from other systems."
          ::= { rip2GlobalGroup 2 }


   --  RIP Interfaces Groups
   --  Implementation of these Groups is mandatory for systems that
   --       implement RIP-2.

   -- Since RIP versions 1 and 2 do not deal with addressless links,
   -- it is assumed that RIP "interfaces" are subnets within a
   -- routing domain.
```

```
   -- The RIP Interface Status Table.

       rip2IfStatTable OBJECT-TYPE
           SYNTAX   SEQUENCE OF Rip2IfStatEntry
           ACCESS   not-accessible
           STATUS   mandatory
           DESCRIPTION
              "A  list  of  subnets  which  require  separate
              status monitoring in RIP."
          ::= { rip2 2 }

      rip2IfStatEntry OBJECT-TYPE
          SYNTAX   Rip2IfStatEntry
          ACCESS   not-accessible
          STATUS   mandatory
          DESCRIPTION
             "A Single Routing Domain in a single Subnet."
        INDEX { rip2IfStatAddress }
        ::= { rip2IfStatTable 1 }


       Rip2IfStatEntry ::=
           SEQUENCE {
               rip2IfStatAddress
                   IpAddress,
               rip2IfStatRcvBadPackets
                   Counter,
               rip2IfStatRcvBadRoutes
                   Counter,
               rip2IfStatSentUpdates
                   Counter,
               rip2IfStatStatus
                   Validation
       }

       rip2IfStatAddress OBJECT-TYPE
           SYNTAX   IpAddress
           ACCESS   read-only
           STATUS   mandatory
           DESCRIPTION
              "The IP Address of this system on the indicated
              subnet."
          ::= { rip2IfStatEntry 1 }


       rip2IfStatRcvBadPackets OBJECT-TYPE
           SYNTAX   Counter
           ACCESS   read-only
```

```
            STATUS   mandatory
            DESCRIPTION
               "The number of RIP response packets received by
               the  RIP  process  which were subsequently dis-
               carded for any reason (e.g. a version 0 packet,
               or an unknown command type)."
           ::= { rip2IfStatEntry 2 }


        rip2IfStatRcvBadRoutes OBJECT-TYPE
            SYNTAX   Counter
            ACCESS   read-only
            STATUS   mandatory
            DESCRIPTION
               "The number of routes, in  valid  RIP  packets,
               which were ignored for any reason (e.g. unknown
               address family, or invalid metric)."
           ::= { rip2IfStatEntry 3 }


        rip2IfStatSentUpdates OBJECT-TYPE
            SYNTAX   Counter
            ACCESS   read-only
            STATUS   mandatory
            DESCRIPTION
               "The number of triggered RIP  updates  actually
               sent  on  this interface.  This explicitly does
               NOT include full updates  sent  containing  new
               information."
           ::= { rip2IfStatEntry 4 }

        rip2IfStatStatus OBJECT-TYPE
            SYNTAX   Validation
            ACCESS   read-write
            STATUS   mandatory
            DESCRIPTION
               "Writing invalid has  the  effect  of  deleting
               this interface."
           DEFVAL { valid }
           ::= { rip2IfStatEntry 5 }


    -- The RIP Interface Configuration Table.


        rip2IfConfTable OBJECT-TYPE
            SYNTAX   SEQUENCE OF Rip2IfConfEntry
            ACCESS   not-accessible
```

```
            STATUS   mandatory
            DESCRIPTION
               "A list of subnets which require separate  con-
               figuration in RIP."
           ::= { rip2 3 }

       rip2IfConfEntry OBJECT-TYPE
           SYNTAX   Rip2IfConfEntry
           ACCESS   not-accessible
           STATUS   mandatory
           DESCRIPTION
              "A Single Routing Domain in a single Subnet."
         INDEX { rip2IfConfAddress }
         ::= { rip2IfConfTable 1 }


        Rip2IfConfEntry ::=
           SEQUENCE {
               rip2IfConfAddress
                   IpAddress,
               rip2IfConfDomain
                   RouteTag,
               rip2IfConfAuthType
                   INTEGER,
               rip2IfConfAuthKey
                   OCTET STRING (SIZE(0..16)),
               rip2IfConfSend
                   INTEGER,
               rip2IfConfReceive
                   INTEGER,
               rip2IfConfDefaultMetric
                   INTEGER,
               rip2IfConfStatus
                   Validation
        }

        rip2IfConfAddress OBJECT-TYPE
           SYNTAX   IpAddress
           ACCESS   read-only
           STATUS   mandatory
           DESCRIPTION
              "The IP Address of this system on the indicated
              subnet."
           ::= { rip2IfConfEntry 1 }


        rip2IfConfDomain OBJECT-TYPE
           SYNTAX   RouteTag
```

```
        ACCESS   read-write
        STATUS   mandatory
        DESCRIPTION
           "Value inserted into the Routing  Domain  field
           of all RIP packets sent on this interface."
       DEFVAL { '0000'h }
       ::= { rip2IfConfEntry 2 }


    rip2IfConfAuthType OBJECT-TYPE
        SYNTAX   INTEGER {
                    noAuthentication (1),
                    simplePassword (2)
                 }
        ACCESS   read-write
        STATUS   mandatory
        DESCRIPTION
           "The type of Authentication used on this inter-
           face."
       DEFVAL { noAuthentication }
       ::= { rip2IfConfEntry 3 }


    rip2IfConfAuthKey OBJECT-TYPE
        SYNTAX   OCTET STRING (SIZE(0..16))
        ACCESS   read-write
        STATUS   mandatory
        DESCRIPTION
           "The value to be used as the Authentication Key
           whenever    the   corresponding   instance   of
           rip2IfConfAuthType has  the  value  simplePass-
           word.   A modification of the corresponding in-
           stance of rip2IfConfAuthType  does  not  modify
           the rip2IfConfAuthKey value.

           If a string shorter than 16 octets is supplied,
           it  will be left-justified and padded to 16 oc-
           tets, on the right, with nulls (0x00).

           Reading this object always results in an  OCTET
           STRING  of  length zero; authentication may not
           be bypassed by reading the MIB object."
       DEFVAL { ''h }
       ::= { rip2IfConfEntry 4 }


    rip2IfConfSend OBJECT-TYPE
        SYNTAX   INTEGER {
```

```
                    doNotSend (1),
                    ripVersion1 (2),
                    rip1Compatible (3),
                    ripVersion2 (4)
                }
    ACCESS   read-write
    STATUS   mandatory
    DESCRIPTION
       "What  the  router  sends  on  this  interface.
       ripVersion1 implies sending RIP updates compli-
       ant  with  RFC  1058.   rip1Compatible  implies
       broadcasting RIP-2 updates using RFC 1058 route
       subsumption rules.  ripVersion2 implies  multi-
       casting RIP-2 updates."
   DEFVAL { rip1Compatible }
   ::= { rip2IfConfEntry 5 }


rip2IfConfReceive OBJECT-TYPE
    SYNTAX   INTEGER {
                    rip1 (1),
                    rip2 (2),
                    rip1OrRip2 (3)
                }
    ACCESS   read-write
    STATUS   mandatory
    DESCRIPTION
       "This indicates which version  of  RIP  updates
       are   to  be  accepted.   Note  that  rip2  and
       rip1OrRip2 implies reception of multicast pack-
       ets."
   DEFVAL { rip1OrRip2 }
   ::= { rip2IfConfEntry 6 }


rip2IfConfDefaultMetric OBJECT-TYPE
    SYNTAX   INTEGER ( 0..15 )
    ACCESS   read-write
    STATUS   mandatory
    DESCRIPTION
       "This variable indicates what metric is  to  be
       used  as  a  default  route in RIP updates ori-
       ginated on this interface.  A value of zero in-
       dicates  that  no  default route should be ori-
       ginated; in this  case,  a  default  route  via
       another router may be propagated."
   ::= { rip2IfConfEntry 7 }
```

```
        rip2IfConfStatus OBJECT-TYPE
            SYNTAX   Validation
            ACCESS   read-write
            STATUS   mandatory
            DESCRIPTION
               "Writing invalid has  the  effect  of  deleting
               this interface."
           DEFVAL { valid }
           ::= { rip2IfConfEntry 8 }


    --  Peer Table

    --      The RIP Peer Group
    --      Implementation of this Group is Optional

    --      This group provides information about active peer
    --      relationships intended to assist in debugging.

        rip2PeerTable OBJECT-TYPE
            SYNTAX   SEQUENCE OF Rip2PeerEntry
            ACCESS   not-accessible
            STATUS   mandatory
            DESCRIPTION
               "A list of RIP Peers."
           ::= { rip2 4 }

       rip2PeerEntry OBJECT-TYPE
           SYNTAX   Rip2PeerEntry
           ACCESS   not-accessible
           STATUS   mandatory
           DESCRIPTION
              "Information regarding a single routing peer."
         INDEX { rip2PeerAddress, rip2PeerDomain }
         ::= { rip2PeerTable 1 }


        Rip2PeerEntry ::=
            SEQUENCE {
                rip2PeerAddress
                    IpAddress,
                rip2PeerDomain
                    RouteTag,
                rip2PeerLastUpdate
                    TimeTicks,
                rip2PeerVersion
                    INTEGER,
                rip2PeerRcvBadPackets
```

```
            Counter,
        rip2PeerRcvBadRoutes
            Counter
        }


    rip2PeerAddress OBJECT-TYPE
        SYNTAX   IpAddress
        ACCESS   read-only
        STATUS   mandatory
        DESCRIPTION
           "The IP Address of the Peer System."
       ::= { rip2PeerEntry 1 }


    rip2PeerDomain OBJECT-TYPE
        SYNTAX   RouteTag
        ACCESS   read-only
        STATUS   mandatory
        DESCRIPTION
           "The value in the Routing Domain field  in  RIP
           packets received from the peer."
       ::= { rip2PeerEntry 2 }


    rip2PeerLastUpdate OBJECT-TYPE
        SYNTAX   TimeTicks
        ACCESS   read-only
        STATUS   mandatory
        DESCRIPTION
           "The value of sysUpTime when  the  most  recent
           RIP update was received from this system."
       ::= { rip2PeerEntry 3 }


    rip2PeerVersion OBJECT-TYPE
        SYNTAX   INTEGER ( 0..255 )
        ACCESS   read-only
        STATUS   mandatory
        DESCRIPTION
           "The RIP version number in the  header  of  the
           last RIP packet received."
       ::= { rip2PeerEntry 4 }


    rip2PeerRcvBadPackets OBJECT-TYPE
        SYNTAX   Counter
        ACCESS   read-only
```

```
            STATUS   mandatory
            DESCRIPTION
               "The number of RIP response packets  from  this
               peer discarded as invalid."
            ::= { rip2PeerEntry 5 }


        rip2PeerRcvBadRoutes OBJECT-TYPE
            SYNTAX   Counter
            ACCESS   read-only
            STATUS   mandatory
            DESCRIPTION
               "The number of routes from this peer that  were
               ignored because the entry format was invalid."
            ::= { rip2PeerEntry 6 }


    END
```

5. Acknowledgements

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In addition, the comments of the following individuals are also acknowledged: Keith McCloghrie and Frank Kastenholz.

8. References

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[10] Malkin, G., "RIP Version 2 - Carrying Additional Information", RFC 1388, Xylogics, Inc., January 1993.

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7. Security Considerations

Security issues are not discussed in this memo.

8. Authors' Addresses

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