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.

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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 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 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 configuration 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 compliant with RFC 1058. rip1Compatible implies broadcasting RIP-2 updates using RFC 1058 route subsumption rules. ripVersion2 implies multicasting 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 packets."
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 originated on this interface. A value of zero indicates that no default route should be originated; 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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Engineering Task Force (IETF).

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

8. References

[1] Cerf, V., "IAB Recommendations for the Development of Internet

   Group", RFC 1109, IAB, August 1989.

   Management Information for TCP/IP-based internets", STD 16, RFC
   1990.

   Network Management of TCP/IP-based internets", RFC 1156, Hughes

   Network Management Protocol", STD 15, RFC 1157, SNMP Research,
   Performance Systems International, Performance Systems


7. Security Considerations

Security issues are not discussed in this memo.

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