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## RIP Version 2 MIB Extension

### 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.

### 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.

### Acknowledgements

The authors would like to thank the IETF ripv2 Working Group for their help in improving the RIP-2 MIB extension.

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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 type is RouteTag. The RouteTag type represents the contents of the Route Domain 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; two "interfaces" tables, which contains interface-specific statistics and configuration information; and an optional "peer" 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.

### 3.3 Modifications from RFC 1389

The RIP-2 MIB was originally published in RFC 1389. It encoded the concept of a Routing Domain, and did not address unnumbered interfaces.

In the current version of the protocol, Route Domains are deprecated; therefore, they are deprecated in the MIB as well. This means that the object rip2IfConfDomain is deprecated, and the object rip2PeerDomain (which cannot be deprecated, being an instance object)

must always be zero.

Unnumbered interfaces are supported in this version. Since the IP Address that the neighbor uses may be unknown to the system, a pseudo-address is used to identify these interfaces. The pseudo-address is in the class A network 0.0.0.0, and the host number (the least significant 24 bits of the address) are the ifIndex value of the relevant IP Interface. This is an additional new meaning of the objects rip2IfStatAddress and rip2IfConfAddress, backward compatible with the RFC 1389 usage. The object rip2IfConfSrcAddress is added, to permit the configuration of the source address on an unnumbered interface, and the meaning of the object rip2PeerAddress is broadened to remain relevant on unnumbered interfaces.

rip2IfConfSend is augmented with two values for the use of Demand RIP under RIP-I and RIP-II rules. This avoids the necessity of a Demand RIP MIB.

MD5 Authentication is supported.

## 4. Definitions

```

RIPv2-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, Counter32,
    TimeTicks, IpAddress                FROM SNMPv2-SMI
    TEXTUAL-CONVENTION, RowStatus        FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP     FROM SNMPv2-CONF
    mib-2                                FROM RFC1213-MIB;

-- This MIB module uses the extended OBJECT-TYPE macro as
-- defined in [9].

rip2 MODULE-IDENTITY
    LAST-UPDATED "9407272253Z"          -- Wed Jul 27 22:53:04 PDT 1994
    ORGANIZATION "IETF RIP-II Working Group"
    CONTACT-INFO
        "      Fred Baker
    Postal: Cisco Systems
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            Santa Barbara, California 93111
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            Xylogics, Inc.
            53 Third Avenue
            Burlington, MA 01803

        Phone: (617) 272-8140
        EMail: gmalkin@Xylogics.COM"
    DESCRIPTION
        "The MIB module to describe the RIP2 Version 2 Protocol"
    ::= { mib-2 23 }

-- RIP-2 Management Information Base

-- the RouteTag type represents the contents of the
-- Route Domain field in the packet header or route entry.
-- The use of the Route Domain is deprecated.

RouteTag ::= TEXTUAL-CONVENTION
    STATUS      current
    DESCRIPTION
        "the RouteTag type represents the contents of the Route Domain
        field in the packet header or route entry"
    SYNTAX      OCTET STRING (SIZE (2))

```

#### --4.1 Global Counters

-- The RIP-2 Globals Group.  
-- Implementation of this group is mandatory for systems  
-- which implement RIP-2.  
  
-- These counters are intended to facilitate debugging quickly  
-- changing routes or failing neighbors

rip2Globals OBJECT IDENTIFIER ::= { rip2 1 }

rip2GlobalRouteChanges OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of route changes made to the IP Route  
Database by RIP. This does not include the refresh  
of a route's age."

::= { rip2Globals 1 }

rip2GlobalQueries OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of responses sent to RIP queries  
from other systems."

::= { rip2Globals 2 }

#### --4.2 RIP Interface Tables

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

-- The RIP Interface Status Table.

rip2IfStatTable OBJECT-TYPE

SYNTAX SEQUENCE OF Rip2IfStatEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A list of subnets which require separate  
status monitoring in RIP."

::= { rip2 2 }

rip2IfStatEntry OBJECT-TYPE

```

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

```

```

Rip2IfStatEntry ::=
SEQUENCE {
    rip2IfStatAddress
        IPAddress,
    rip2IfStatRcvBadPackets
        Counter32,
    rip2IfStatRcvBadRoutes
        Counter32,
    rip2IfStatSentUpdates
        Counter32,
    rip2IfStatStatus
        RowStatus
}

```

```

rip2IfStatAddress OBJECT-TYPE
SYNTAX    IPAddress
MAX-ACCESS read-only
STATUS    current
DESCRIPTION
    "The IP Address of this system on the indicated
    subnet. For unnumbered interfaces, the value 0.0.0.N,
    where the least significant 24 bits (N) is the ifIndex
    for the IP Interface in network byte order."
 ::= { rip2IfStatEntry 1 }

```

```

rip2IfStatRcvBadPackets OBJECT-TYPE
SYNTAX    Counter32
MAX-ACCESS read-only
STATUS    current
DESCRIPTION
    "The number of RIP response packets received by
    the RIP process which were subsequently discarded
    for any reason (e.g. a version 0 packet, or an
    unknown command type)."
 ::= { rip2IfStatEntry 2 }

```

```

rip2IfStatRcvBadRoutes OBJECT-TYPE
SYNTAX    Counter32
MAX-ACCESS read-only
STATUS    current

```

## 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 Counter32

MAX-ACCESS read-only

STATUS current

## 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 RowStatus

MAX-ACCESS read-create

STATUS current

## DESCRIPTION

"Writing invalid has the effect of deleting this interface."

```
::= { rip2IfStatEntry 5 }
```

-- The RIP Interface Configuration Table.

## rip2IfConfTable OBJECT-TYPE

SYNTAX SEQUENCE OF Rip2IfConfEntry

MAX-ACCESS not-accessible

STATUS current

## DESCRIPTION

"A list of subnets which require separate configuration in RIP."

```
::= { rip2 3 }
```

## rip2IfConfEntry OBJECT-TYPE

SYNTAX Rip2IfConfEntry

MAX-ACCESS not-accessible

STATUS current

## 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
        RowStatus,
    rip2IfConfSrcAddress
        IPAddress
}

rip2IfConfAddress OBJECT-TYPE
    SYNTAX      IPAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The IP Address of this system on the indicated
        subnet.  For unnumbered interfaces, the value 0.0.0.N,
        where the least significant 24 bits (N) is the ifIndex
        for the IP Interface in network byte order."
    ::= { rip2IfConfEntry 1 }

rip2IfConfDomain OBJECT-TYPE
    SYNTAX      RouteTag
    MAX-ACCESS  read-create
    STATUS      obsolete
    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),
        md5 (3)
    }
    MAX-ACCESS  read-create

```

```

STATUS    current
DESCRIPTION
    "The type of Authentication used on this
    interface."
DEFVAL { noAuthentication }
 ::= { rip2IfConfEntry 3 }

```

```

rip2IfConfAuthKey OBJECT-TYPE
SYNTAX    OCTET STRING (SIZE(0..16))
MAX-ACCESS read-create
STATUS    current
DESCRIPTION
    "The value to be used as the Authentication Key
    whenever the corresponding instance of
    rip2IfConfAuthType has a value other than
    noAuthentication. A modification of the corresponding
    instance 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 octets, 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),
                ripV1Demand (5),
                ripV2Demand (6)
            }
MAX-ACCESS read-create
STATUS    current
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. ripV1Demand indicates
    the use of Demand RIP on a WAN interface under RIP
    Version 1 rules. ripV2Demand indicates the use of

```

Demand RIP on a WAN interface under Version 2 rules."  
 DEFVAL { rip1Compatible }  
 ::= { rip2IfConfEntry 5 }

rip2IfConfReceive OBJECT-TYPE

SYNTAX INTEGER {  
     rip1 (1),  
     rip2 (2),  
     rip1OrRip2 (3),  
     doNotRecieve (4)  
 }

MAX-ACCESS read-create

STATUS current

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 )

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This variable indicates the metric that is to be used for the default route entry 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 RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Writing invalid has the effect of deleting this interface."

::= { rip2IfConfEntry 8 }

rip2IfConfSrcAddress OBJECT-TYPE

SYNTAX IpAddress

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The IP Address this system will use as a source address on this interface. If it is a numbered interface, this MUST be the same value as rip2IfConfAddress. On unnumbered interfaces, it must be the value of rip2IfConfAddress for some interface on the system."

```
::= { rip2IfConfEntry 9 }
```

#### --4.3 Peer Table

##### -- 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. An
-- active peer is a router from which a valid RIP
-- updated has been heard in the last 180 seconds.
```

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

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

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

```

        Counter32,
    rip2PeerRcvBadRoutes
        Counter32
    }

```

rip2PeerAddress OBJECT-TYPE

SYNTAX IpAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The IP Address that the peer is using as its source address. Note that on an unnumbered link, this may not be a member of any subnet on the system."

::= { rip2PeerEntry 1 }

rip2PeerDomain OBJECT-TYPE

SYNTAX RouteTag

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value in the Routing Domain field in RIP packets received from the peer. As domain support is deprecated, this must be zero."

::= { rip2PeerEntry 2 }

rip2PeerLastUpdate OBJECT-TYPE

SYNTAX TimeTicks

MAX-ACCESS read-only

STATUS current

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 )

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The RIP version number in the header of the last RIP packet received."

::= { rip2PeerEntry 4 }

rip2PeerRcvBadPackets OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

```
rip2PeerRcvBadRoutes OBJECT-TYPE
```

```
SYNTAX Counter32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
    "The number of routes from this peer that were
    ignored because the entry format was invalid."
```

```
 ::= { rip2PeerEntry 6 }
```

```
-- conformance information

rip2Conformance OBJECT IDENTIFIER ::= { rip2 5 }

rip2Groups      OBJECT IDENTIFIER ::= { rip2Conformance 1 }
rip2Compliances OBJECT IDENTIFIER ::= { rip2Conformance 2 }

-- compliance statements
rip2Compliance MODULE-COMPLIANCE
  STATUS current
  DESCRIPTION
    "The compliance statement "
  MODULE -- this module
  MANDATORY-GROUPS {
    rip2GlobalGroup,
    rip2IfStatGroup,
    rip2IfConfGroup,
    rip2PeerGroup
  }
  GROUP rip2GlobalGroup
  DESCRIPTION
    "This group defines global controls for RIP-II systems."
  GROUP rip2IfStatGroup
  DESCRIPTION
    "This group defines interface statistics for RIP-II systems."
  GROUP rip2IfConfGroup
  DESCRIPTION
    "This group defines interface configuration for RIP-II systems."
  GROUP rip2PeerGroup
  DESCRIPTION
    "This group defines peer information for RIP-II systems."
  ::= { rip2Compliances 1 }
```

```
-- units of conformance

rip2GlobalGroup      OBJECT-GROUP
  OBJECTS {
    rip2GlobalRouteChanges,
    rip2GlobalQueries
  }
  STATUS current
  DESCRIPTION
    "This group defines global controls for RIP-II systems."
    ::= { rip2Groups 1 }
rip2IfStatGroup      OBJECT-GROUP
  OBJECTS {
    rip2IfStatAddress,
    rip2IfStatRcvBadPackets,
    rip2IfStatRcvBadRoutes,
    rip2IfStatSentUpdates,
    rip2IfStatStatus
  }
  STATUS current
  DESCRIPTION
    "This group defines interface statistics for RIP-II systems."
    ::= { rip2Groups 2 }
rip2IfConfGroup      OBJECT-GROUP
  OBJECTS {
    rip2IfConfAddress,
    rip2IfConfAuthType,
    rip2IfConfAuthKey,
    rip2IfConfSend,
    rip2IfConfReceive,
    rip2IfConfDefaultMetric,
    rip2IfConfStatus,
    rip2IfConfSrcAddress
  }
  STATUS current
  DESCRIPTION
    "This group defines interface configuration for RIP-II systems."
    ::= { rip2Groups 3 }
rip2PeerGroup        OBJECT-GROUP
  OBJECTS {
    rip2PeerAddress,
    rip2PeerDomain,
    rip2PeerLastUpdate,
    rip2PeerVersion,
    rip2PeerRcvBadPackets,
    rip2PeerRcvBadRoutes
  }
  STATUS current
```

## DESCRIPTION

"This group defines peer information for RIP-II systems."

```
::= { rip2Groups 4 }
```

END

## 5. References

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- [10] Malkin, G., "RIP Version 2 - Carrying Additional Information", RFC 1723, Xylogics, Inc., November 1994.

- [11] Malkin, G., "RIP Version 2 Protocol Analysis", RFC 1721, Xylogics, Inc., November 1994.
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## 6. Security Considerations

Security issues are not discussed in this memo.

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