RIPv2 Monitoring with SNMP Using the RFC 1724 MIB Extensions

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This document describes the Cisco IOS implementation of RFC 1724, *RIP Version 2 MIB Extensions* . RFC 1724 defines Management Information Base (MIB) objects that allow you to monitor RIPv2 using Simple Network Management Protocol (SNMP).

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the Feature Information for RIPv2 RFC 1724 MIB Extensions, page 11.

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Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information

about the features documented in this module, and to see a list of the releases in which each feature is supported, see the Feature Information Table at the end of this document.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisites for RIPv2 Monitoring with SNMP Using the RFC 1724 MIB Extensions

- RIPv2 must be configured on the router.
- Your SNMP Network Management Station (NMS) must have the RFC 1724 RIPv2 MIB installed.
- Your SNMP NMS must have the following MIBs installed because RFC 1724 imports data types and object Identifiers (OIDs) from them:

  ◦ SNMPv2-SMI
  ◦ SNMPv2-TC
  ◦ SNMPv2-CONF
  ◦ RFC1213-MIB

Restrictions for RIPv2 Monitoring with SNMP Using the RFC 1724 MIB Extensions

This implementation of the RIPv2 MIB does not track any data associated with a RIP Virtual Routing and Forwarding (VRF) instance. Only interfaces that are assigned IP addresses in the IP address space configured by the **network** *network-address* command in RIP router configuration mode are tracked. Global data is tracked only for changes to the main routing table.

Information About RIPv2 Monitoring with SNMP Using the RFC 1724 MIB Extensions

The following sections contain information about MIB objects standardized as part of RFC 1724, and benefits of the RFC 1724 MIB.

RIPv2 MIB

This section describes the MIB objects that are provided by RFC 1724 definitions. The RIPv2 MIB consists of the following managed objects:

- Global counters--Used to keep track of changing routes or neighbor changes.
- Interface status table--Defines objects that are used to keep track of statistics specific to interfaces.

- Interface configuration table--Defines objects that are used to keep track of interface configuration statistics.
- Peer table--Defined to monitor neighbor relationships. This object is not implemented in Cisco IOS Software.

The tables below show the objects that are provided by RFC 1724 RIPv2 MIB definitions. The objects are listed in the order in which they appear within the RFC 1724 RIPv2 MIB, per the tables that describe them. The statistics for all of the objects in the global counters can be obtained by querying the rip2Globals object identifier (OID) using **snmpwalk**, or a similar SNMP toolset command on your NMS.

The table below shows the RFC 1724 RIPv2 MIB global counter objects.

Table 1   *RFC 1724 RIPv2 MIB Global Counters Objects*

Global Counter	Object	Description
rip2Globals	rip2GlobalRouteChanges	Number of route changes made to the IP route database by RIP. Number is incremented when a route is modified.
	rip2GlobalQueries	Number of responses sent to RIP queries from other systems. Number is incremented when RIP responds to a query from another system.

The objects in the RFC 1724 RIPv2 MIB interface table track information on a per interface basis. All object in the RFC 1724 RIPv2 MIB interface table, except for the rip2IfStatAddress object, represent newly tracked data within RIP. There are no equivalent **show** commands for these objects. All objects in the RIPv2 MIB interface table are implemented read-only.

The table below shows the RFC 1724 RIPv2 MIB interface table objects. The statistics for all objects in the interface table can be obtained by querying the sequence name Rip2IfStatEntry using **snmpwalk** or a similar SNMP toolset command on your NMS.

Table 2   *RFC 1724 RIPv2 MIB Interface Table Objects*

Sequence Name	Object	Description
Rip2IfStatEntry	rip2IfStatAddress	The IP address of this system on the indicated subnet. For unnumbered interfaces, the value of 0.0.0.N, where the least significant 24 bits (N) are the ifIndex for the IP interface in network byte order.

Sequence Name	Object	Description
	rip2IfStatRcvBadPackets	The number of RIP response packets received by the RIP process that were subsequently discarded for any reason. For example, a version 0 packet or an unknown command type.
	rip2IfStatRcvBadRoutes	The number of routes, in valid RIP packets, that were ignored for any reason. This is incremented when: • The address family identifier does not equal AF_INET. • If a RIP v2 update is received and the class D and greater. • If a RIP v2 update is received and the address is a martian address.
	rip2IfStatSentUpdates	The number of triggered RIP updates actually sent on this interface. This explicitly does *not* include full updates sent containing new information.
	rip2IfStatStatus	This value is always set to 1.

The objects in the RFC 1724 RIPv2 MIB interface configuration table track information on a per interface basis. Except for the Rip2IfConfAuthType object, the data for the objects in the RFC 1724 RIPv2 MIB interface configuration table can also be gathered with the **show ip protocol** commands. All objects in the RIPv2 MIB interface table are implemented read-only.

The table below shows the RIPv2 MIB interface configuration table objects. The statistics for all objects in the configuration table can be obtained by querying the sequence name rip2IfConfEntry using **snmpwalk** or a similar SNMP toolset command on your NMS.

Table 3   *RFC 1724 RIPv2 MIB Interface Configuration Table Object Types*

Sequence Name	Object Type	Description
rip2IfConfEntry	rip2IfConfAddress	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) are the ifIndex for the IP interface in network byte order.
	rip2IfConfDomain	This value is always equal to "".

Sequence Name	Object Type	Description
	rip2IfConfAuthType	The type of authentication used on this interface.
	rip2IfConfAuthKey	The value to be used as the authentication key whenever the corresponding instance of rip2IfConfAuthType has a value other than no authentication.
	rip2IfConfSend	The version of RIP updates that are sent on this interface.
	rip2IfConfReceive	The version of RIP updates that are accepted on this interface.
	rip2IfConfDefaultMetric	This variable indicates the metric that is used for the default route entry in RIP updates originated on this interface.
	rip2IfConfStatus	This value is always set to 1.
	rip2IfConfSrcAddress	The IP address that 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.

Benefits of the RIPv2 MIB

The RFC 1724 RIPv2 MIB extensions allow network managers to monitor the RIPv2 routing protocol using SNMP through the addition of new global counters and table objects that previously were not supported by the RFC 1389 RIPv2 MIB. The new global counters and table objects are intended to facilitate quickly changing routes or failing neighbors.

How to Enable RIPv2 Monitoring with SNMP Using the RIPv2 RFC124 MIB Extensions

Enabling SNMP Read-Only Access on the Router

There are no router configuration tasks required for the RIPv2: RFC124 MIB Extensions feature itself. SNMP read-only access to the objects in the RFC 1724 RIPv2 MIB is enabled when you configure the SNMP server read-only community string on the router.

Note   When you configure an SNMP server read-only community string on the router, you are granting SNMP read-only access to the objects that support read-only access in all MIBs that are available in the version of Cisco IOS that is running on the router.

Perform this task to configure the SNMP server read-only community string on the router to enable SNMP read-only access to MIB objects (including the RFC 1724 RIPv2 MIB extensions) on the router.

Routers can have multiple read-only SNMP community strings. When you configure an SNMP read-only community string for the **snmp-server** command on the router, an existing SNMP **snmp-server** read-only community string is not overwritten. For example, if you enter the **snmp-server community** *string1* **ro** and **snmp-server community** *string2* **ro commands** on the router,the router will have two valid read-only community strings--*string1* and *string2*. If this is not the behavior that you desire, use the **no snmp-server community** *string* **ro** command to remove an existing SNMP read-only community string.

Timesaver   If you already have an SNMP read-only community string configured on your router you do not need to perform this task. After you load Cisco IOS Release 12.4(6)T or a later release on your router, you can use SNMP commands on your NMS to query the RFC 1724 RIPv2 MIB on your router.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **snmp-server community** *string1* **ro**
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.

Command or Action	Purpose

Step 3 **snmp-server community** *string1* **ro**
 	
Example:
 	
`Router(config)# snmp-server community`
`T8vCx3 ro`
	Enables SNMP read-only access to the objects in the MIBs that are included in the version of Cisco IOS software that is running on the router.
	
	Note For security purposes, do not use the standard default value of *public* for your read-only community string. Use a combination of uppercase and lowercase letters and numbers for the password.

Step 4 **end** **Example:** `Router(config)# end`	Ends your configuration session and returns to privileged EXEC mode.

Verifying the Status of the RIPv2 RFC124 MIB Extensions on the Router and Your Network Management Station

Perform this optional task on your NMS to verify the status of the RFC 1724 RIPv2 MIB extensions on the router and on your NMS.

Note This task uses the NET-SNMP toolset that is available in the public domain. The step that is documented uses a terminal session on an NMS that is running Linux. Substitute the SNMP command from the SNMP toolset on your NMS as appropriate when you perform this task.

- Prerequisites, page 7

Prerequisites

Your NMS must have the RFC 1724 MIB installed.

SUMMARY STEPS

1. **snmpwalk -m all -v2c** *ip-address* **-c** *read-only-community-string* **rip2Globals**

DETAILED STEPS

snmpwalk -m all -v2c *ip-address* **-c** *read-only-community-string* **rip2Globals**
Use the **snmpwalk** command for the **rip2Globals** object in the RFC 1724 RIPv2 MIB to display the data for the objects associated with this object. This step verifies that the NMS is configured to send queries for objects in the RFC 1724 RIPv2 MIB and that the router is configured to respond to the queries.

Example:

```
$ snmpwalk -m all -v2c 10.0.0.253 -c T8vCx3 rip2Globals
```

```
RIPv2-MIB::rip2GlobalRouteChanges.0 = Counter32: 5
RIPv2-MIB::rip2GlobalQueries.0 = Counter32: 1
$
```

Configuration Examples for RIPv2 Monitoring with SNMP Using the RIPv2 RFC124 MIB Extensions

This section contains the following examples:

Querying the RIP Interface Status Table Objects Example

The following example shows how to send an SNMP query to obtain data for all objects in the RIP interface status table using the **snmpwalk** command.

```
$ snmpwalk -m all -v2c 10.0.0.253 -c T8vCx3 Rip2IfStatEntry
RIPv2-MIB::rip2IfStatAddress.10.0.0.253 = IpAddress: 10.0.0.253
RIPv2-MIB::rip2IfStatAddress.172.16.1.1 = IpAddress: 172.16.1.1
RIPv2-MIB::rip2IfStatAddress.172.16.2.1 = IpAddress: 172.16.2.1
RIPv2-MIB::rip2IfStatAddress.172.17.1.1 = IpAddress: 172.17.1.1
RIPv2-MIB::rip2IfStatAddress.172.17.2.1 = IpAddress: 172.17.2.1
RIPv2-MIB::rip2IfStatRcvBadPackets.10.0.0.253 = Counter32: 0
RIPv2-MIB::rip2IfStatRcvBadPackets.172.16.1.1 = Counter32: 1654
RIPv2-MIB::rip2IfStatRcvBadPackets.172.16.2.1 = Counter32: 1652
RIPv2-MIB::rip2IfStatRcvBadPackets.172.17.1.1 = Counter32: 1648
RIPv2-MIB::rip2IfStatRcvBadPackets.172.17.2.1 = Counter32: 1649
RIPv2-MIB::rip2IfStatRcvBadRoutes.10.0.0.253 = Counter32: 0
RIPv2-MIB::rip2IfStatRcvBadRoutes.172.16.1.1 = Counter32: 0
RIPv2-MIB::rip2IfStatRcvBadRoutes.172.16.2.1 = Counter32: 0
RIPv2-MIB::rip2IfStatRcvBadRoutes.172.17.1.1 = Counter32: 0
RIPv2-MIB::rip2IfStatRcvBadRoutes.172.17.2.1 = Counter32: 0
RIPv2-MIB::rip2IfStatSentUpdates.10.0.0.253 = Counter32: 0
RIPv2-MIB::rip2IfStatSentUpdates.172.16.1.1 = Counter32: 0
RIPv2-MIB::rip2IfStatSentUpdates.172.16.2.1 = Counter32: 0
RIPv2-MIB::rip2IfStatSentUpdates.172.17.1.1 = Counter32: 0
RIPv2-MIB::rip2IfStatSentUpdates.172.17.2.1 = Counter32: 0
RIPv2-MIB::rip2IfStatStatus.10.0.0.253 = INTEGER: active(1)
RIPv2-MIB::rip2IfStatStatus.172.16.1.1 = INTEGER: active(1)
RIPv2-MIB::rip2IfStatStatus.172.16.2.1 = INTEGER: active(1)
RIPv2-MIB::rip2IfStatStatus.172.17.1.1 = INTEGER: active(1)
RIPv2-MIB::rip2IfStatStatus.172.17.2.1 = INTEGER: active(1)
```

The following example shows how to send an SNMP query to obtain data for the rip2IfStatStatus object for all of the interfaces in the RIP interface status table using the **snmpwalk** command.

```
$ snmpwalk -m all -v2c 10.0.0.253 -c T8vCx3 rip2IfStatStatus
RIPv2-MIB::rip2IfStatStatus.10.0.0.253 = INTEGER: active(1)
RIPv2-MIB::rip2IfStatStatus.172.16.1.1 = INTEGER: active(1)
RIPv2-MIB::rip2IfStatStatus.172.16.2.1 = INTEGER: active(1)
RIPv2-MIB::rip2IfStatStatus.172.17.1.1 = INTEGER: active(1)
RIPv2-MIB::rip2IfStatStatus.172.17.2.1 = INTEGER: active(1)
$
```

The following example shows how to send an SNMP query to obtain data for the rip2IfStatStatus object for a specific interface IP address in the RIP interface status table using the **snmpget** command.

```
$ snmpget -m all -v2c 10.0.0.253 -c T8vCx3 rip2IfStatStatus.10.0.0.253
RIPv2-MIB::rip2IfStatStatus.10.0.0.253 = INTEGER: active(1)
$
```

Querying the RIP Interface Configuration Table Objects Example

The following example shows how to send an SNMP query to obtain data for all objects in the RIP interface configuration table using the **snmpwalk** command.

```
$ snmpwalk -m all -v2c 10.0.0.253 -c T8vCx3 rip2IfConfEntry
RIPv2-MIB::rip2IfConfAddress.10.0.0.253 = IpAddress: 10.0.0.253
RIPv2-MIB::rip2IfConfAddress.172.16.1.1 = IpAddress: 172.16.1.1
RIPv2-MIB::rip2IfConfAddress.172.16.2.1 = IpAddress: 172.16.2.1
RIPv2-MIB::rip2IfConfAddress.172.17.1.1 = IpAddress: 172.17.1.1
RIPv2-MIB::rip2IfConfAddress.172.17.2.1 = IpAddress: 172.17.2.1
RIPv2-MIB::rip2IfConfDomain.10.0.0.253 = ""
RIPv2-MIB::rip2IfConfDomain.172.16.1.1 = ""
RIPv2-MIB::rip2IfConfDomain.172.16.2.1 = ""
RIPv2-MIB::rip2IfConfDomain.172.17.1.1 = ""
RIPv2-MIB::rip2IfConfDomain.172.17.2.1 = ""
RIPv2-MIB::rip2IfConfAuthType.10.0.0.253 = INTEGER: noAuthentication(1)
RIPv2-MIB::rip2IfConfAuthType.172.16.1.1 = INTEGER: noAuthentication(1)
RIPv2-MIB::rip2IfConfAuthType.172.16.2.1 = INTEGER: noAuthentication(1)
RIPv2-MIB::rip2IfConfAuthType.172.17.1.1 = INTEGER: noAuthentication(1)
RIPv2-MIB::rip2IfConfAuthType.172.17.2.1 = INTEGER: noAuthentication(1)
RIPv2-MIB::rip2IfConfAuthKey.10.0.0.253 = ""
RIPv2-MIB::rip2IfConfAuthKey.172.16.1.1 = ""
RIPv2-MIB::rip2IfConfAuthKey.172.16.2.1 = ""
RIPv2-MIB::rip2IfConfAuthKey.172.17.1.1 = ""
RIPv2-MIB::rip2IfConfAuthKey.172.17.2.1 = ""
RIPv2-MIB::rip2IfConfSend.10.0.0.253 = INTEGER: ripVersion2(4)
RIPv2-MIB::rip2IfConfSend.172.16.1.1 = INTEGER: ripVersion2(4)
RIPv2-MIB::rip2IfConfSend.172.16.2.1 = INTEGER: ripVersion2(4)
RIPv2-MIB::rip2IfConfSend.172.17.1.1 = INTEGER: ripVersion2(4)
RIPv2-MIB::rip2IfConfSend.172.17.2.1 = INTEGER: ripVersion2(4)
RIPv2-MIB::rip2IfConfReceive.10.0.0.253 = INTEGER: rip2(2)
RIPv2-MIB::rip2IfConfReceive.172.16.1.1 = INTEGER: rip2(2)
RIPv2-MIB::rip2IfConfReceive.172.16.2.1 = INTEGER: rip2(2)
RIPv2-MIB::rip2IfConfReceive.172.17.1.1 = INTEGER: rip2(2)
RIPv2-MIB::rip2IfConfReceive.172.17.2.1 = INTEGER: rip2(2)
RIPv2-MIB::rip2IfConfDefaultMetric.10.0.0.253 = INTEGER: 1
RIPv2-MIB::rip2IfConfDefaultMetric.172.16.1.1 = INTEGER: 1
RIPv2-MIB::rip2IfConfDefaultMetric.172.16.2.1 = INTEGER: 1
RIPv2-MIB::rip2IfConfDefaultMetric.172.17.1.1 = INTEGER: 1
RIPv2-MIB::rip2IfConfDefaultMetric.172.17.2.1 = INTEGER: 1
RIPv2-MIB::rip2IfConfStatus.10.0.0.253 = INTEGER: active(1)
RIPv2-MIB::rip2IfConfStatus.172.16.1.1 = INTEGER: active(1)
RIPv2-MIB::rip2IfConfStatus.172.16.2.1 = INTEGER: active(1)
RIPv2-MIB::rip2IfConfStatus.172.17.1.1 = INTEGER: active(1)
RIPv2-MIB::rip2IfConfStatus.172.17.2.1 = INTEGER: active(1)
RIPv2-MIB::rip2IfConfSrcAddress.10.0.0.253 = IpAddress: 10.0.0.253
RIPv2-MIB::rip2IfConfSrcAddress.172.16.1.1 = IpAddress: 172.16.1.1
RIPv2-MIB::rip2IfConfSrcAddress.172.16.2.1 = IpAddress: 172.16.2.1
RIPv2-MIB::rip2IfConfSrcAddress.172.17.1.1 = IpAddress: 172.17.1.1
RIPv2-MIB::rip2IfConfSrcAddress.172.17.2.1 = IpAddress: 172.17.2.1
$
```

The following example shows how to send an SNMP query to obtain data for the rip2IfConfAddress object for all interfaces in the RIP interface configuration table using the **snmpwalk** command.

```
$ snmpwalk -m all -v2c 10.0.0.253 -c T8vCx3 rip2IfConfAddress
RIPv2-MIB::rip2IfConfAddress.10.0.0.253 = IpAddress: 10.0.0.253
RIPv2-MIB::rip2IfConfAddress.172.16.1.1 = IpAddress: 172.16.1.1
RIPv2-MIB::rip2IfConfAddress.172.16.2.1 = IpAddress: 172.16.2.1
RIPv2-MIB::rip2IfConfAddress.172.17.1.1 = IpAddress: 172.17.1.1
```

```
RIPv2-MIB::rip2IfConfAddress.172.17.2.1 = IpAddress: 172.17.2.1
$
```

Where to Go Next

For more information about SNMP and SNMP operations, see the "Configuring SNMP Support" chapter of the Cisco IOS Network Management Configuration Guide, Release 12.4.

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
RIP configuration	*Cisco IOS IP Routing Protocols Configuration Guide , Release* 12.4
RIP commands	*Cisco IOS IP Routing Protocols Configuration Guide , Release* 12.4T
SNMP configuration	*Cisco IOS Network Management Configuration Guide , Release* 12.4
SNMP commands	*Cisco IOS Network Management Command Reference*, Release 12.4T

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	--

MIBs

MIB	MIBs Link
RIPv2 MIB	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
RFC 1724	*RIP Version 2 MIB Extensions*

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for RIPv2 RFC 1724 MIB Extensions

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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Table 4   Feature Information for RIPv2: RFC 1724 MIB Extensions

Feature Name	Releases	Feature Information
RIPv2: RFC 1724 MIB Extension	12.4(6)T	This feature introduces the Cisco IOS implementation of RFC 1724, *RIP Version 2 MIB Extensions* . RFC 1724 defines MIB objects that allow the management and limited control of RIPv2 using SNMP.

Glossary

OID --object identifier, A managed object within the object tree.

SNMP --Simple Network Management Protocol, a protocol used to monitor and manage networking devices.

snmpwalk --An SNMP command to query statistics from a branch in the MIB.

snmpget --An SNMP command to query statistics from a specific OID in the MIB.

Note See *Internetworking Terms and Acronyms* for terms not included in this glossary.

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