



## IPv6 Routing: RIP for IPv6

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IPv6 Routing Information Protocol (RIP) functions the same and offers the same benefits as IPv4 RIP. RIP enhancements for IPv6, detailed in RFC 2080, include support for IPv6 addresses and prefixes and the use of the all-RIP-devices multicast group address, FF02::9, as the destination address for RIP update messages.

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### Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see [Bug Search Tool](#) and 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 module.

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](http://www.cisco.com/go/cfn). An account on Cisco.com is not required.

### Information About RIP for IPv6

#### RIP for IPv6

IPv6 RIP functions the same and offers the same benefits as RIP in IPv4. RIP enhancements for IPv6, detailed in RFC 2080, include support for IPv6 addresses and prefixes, and the use of the all-RIP-devices multicast group address FF02::9 as the destination address for RIP update messages.

In the Cisco software implementation of IPv6 RIP, each IPv6 RIP process maintains a local routing table, referred to as a Routing Information Database (RIB). The IPv6 RIP RIB contains a set of best-cost IPv6 RIP

routes learned from all its neighboring networking devices. If IPv6 RIP learns the same route from two different neighbors, but with different costs, it will store only the lowest cost route in the local RIB. The RIB also stores any expired routes that the RIP process is advertising to its neighbors running RIP. IPv6 RIP will try to insert every non-expired route from its local RIB into the master IPv6 RIB. If the same route has been learned from a different routing protocol with a better administrative distance than IPv6 RIP, the RIP route will not be added to the IPv6 RIB but the RIP route will still exist in the IPv6 RIP RIB.

## Nonstop Forwarding for IPv6 RIP

Cisco nonstop forwarding (NSF) continues forwarding packets while routing protocols converge, therefore avoiding a route flap on switchover. When an RP failover occurs, the Forwarding Information Base (FIB) marks installed paths as stale by setting a new epoch. Subsequently, the routing protocols reconverge and populate the RIB and FIB. Once all NSF routing protocols converge, any stale routes held in the FIB are removed. A failsafe timer is required to delete stale routes, in case of routing protocol failure to repopulate the RIB and FIB.

RIP registers as an IPv6 NSF client. Doing so has the benefit of using RIP routes installed in the Cisco Express Forwarding table until RIP has converged on the standby.

## How to Configure RIP for IPv6

### Enabling the IPv6 RIP Process

#### Before You Begin

Before configuring the device to run IPv6 RIP, globally enable IPv6 using the **ipv6 unicast-routing** command in global configuration mode, and enable IPv6 on any interfaces on which IPv6 RIP is to be enabled.

If you want to set or change a global value, follow steps 1 and 2, and then use the optional **ipv6 router rip** command in global configuration mode.

#### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 unicast-routing**
4. **interface** *type number*
5. **ipv6 enable**
6. **ipv6 rip** *name* **enable**

#### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>	Enables privileged EXEC mode.

	Command or Action	Purpose
	<b>Example:</b> Device> enable	<ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<b>configure terminal</b>  <b>Example:</b> Device# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>ipv6 unicast-routing</b>  <b>Example:</b> Device(config)# ipv6 unicast-routing	Enables the forwarding of IPv6 unicast datagrams.
<b>Step 4</b>	<b>interface type number</b>  <b>Example:</b> Device(config)# interface Ethernet 0/0	Specifies the interface type and number, and enters interface configuration mode.
<b>Step 5</b>	<b>ipv6 enable</b>  <b>Example:</b> Device(config-if)# ipv6 enable	Enables IPv6 processing on an interface that has not been configured with an explicit IPv6 address.
<b>Step 6</b>	<b>ipv6 rip name enable</b>  <b>Example:</b> Device(config-if)# ipv6 rip process1 enable	Enables the specified IPv6 RIP routing process on an interface.

## Customizing IPv6 RIP

Perform this optional task to customize IPv6 RIP by configuring the maximum numbers of equal-cost paths that IPv6 RIP will support, adjusting the IPv6 RIP timers, and originating a default IPv6 route.

## SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 router rip** *word*
4. **maximum-paths** *number-paths*
5. **exit**
6. **interface** *type number*
7. **ipv6 rip** *name* **default-information** {**only** | **originate**} [**metric** *metric-value*]

## DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b>  <b>Example:</b> Device> enable	Enables privileged EXEC mode.  • Enter your password if prompted.
<b>Step 2</b>	<b>configure terminal</b>  <b>Example:</b> Device# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>ipv6 router rip</b> <i>word</i>  <b>Example:</b> Device(config)# ipv6 router rip process1	Configures an IPv6 RIP routing process and enters router configuration mode for the IPv6 RIP routing process.  • Use the <i>word</i> argument to identify a specific IPv6 RIP routing process.
<b>Step 4</b>	<b>maximum-paths</b> <i>number-paths</i>  <b>Example:</b> Device(config-router)# maximum-paths 1	(Optional) Defines the maximum number of equal-cost routes that IPv6 RIP can support.  • The <i>number-paths</i> argument is an integer from 1 to 64. The default for RIP is four paths.
<b>Step 5</b>	<b>exit</b>  <b>Example:</b> Device(config-if)# exit	Exits interface configuration mode and enters global configuration mode.
<b>Step 6</b>	<b>interface</b> <i>type number</i>  <b>Example:</b> Device(config)# interface Ethernet 0/0	Specifies the interface type and number, and enters interface configuration mode.

	Command or Action	Purpose
<b>Step 7</b>	<p><b>ipv6 rip</b> <i>name</i> <b>default-information</b> {<b>only</b>   <b>originate</b>} [<b>metric</b> <i>metric-value</i>]</p> <p><b>Example:</b></p> <pre>Device(config-if)# ipv6 rip process1 default-information originate</pre>	<p>(Optional) Originates the IPv6 default route (::/0) into the specified RIP routing process updates sent out of the specified interface.</p> <p><b>Note</b> To avoid routing loops after the IPv6 default route (::/0) is originated out of any interface, the routing process ignores all default routes received on any interface.</p> <ul style="list-style-type: none"> <li>• Specifying the <b>only</b> keyword originates the default route (::/0) but suppresses all other routes in the updates sent on this interface.</li> <li>• Specifying the <b>originate</b> keyword originates the default route (::/0) in addition to all other routes in the updates sent on this interface.</li> </ul>

## Verifying IPv6 RIP Configuration and Operation

### SUMMARY STEPS

1. **show ipv6 rip** [*name*][**database**| **next-hops**]
2. **show ipv6 route** [*ipv6-address*| *ipv6-prefix/prefix-length*| *protocol* | *interface-type interface-number*]
3. **enable**
4. **debug ipv6 rip** [*interface-type interface-number*]

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<p><b>show ipv6 rip</b> [<i>name</i>][<b>database</b>  <b>next-hops</b>]</p> <p><b>Example:</b></p> <pre>Device&gt; show ipv6 rip process1 database</pre>	<p>(Optional) Displays information about current IPv6 RIP processes.</p> <ul style="list-style-type: none"> <li>• In this example, IPv6 RIP process database information is displayed for the specified IPv6 RIP process.</li> </ul>
<b>Step 2</b>	<p><b>show ipv6 route</b> [<i>ipv6-address</i>  <i>ipv6-prefix/prefix-length</i>  <i>protocol</i>   <i>interface-type interface-number</i>]</p> <p><b>Example:</b></p> <pre>Device&gt; show ipv6 route rip</pre>	<p>(Optional) Displays the current contents of the IPv6 routing table.</p> <ul style="list-style-type: none"> <li>• In this example, only IPv6 RIP routes are displayed.</li> </ul>
<b>Step 3</b>	<b>enable</b>	Enables higher privilege levels, such as privileged EXEC mode.

	Command or Action	Purpose
	<b>Example:</b> Device> enable	<ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<b>Step 4</b>	<b>debug ipv6 rip</b> [ <i>interface-type interface-number</i> ]  <b>Example:</b> Device# debug ipv6 rip	(Optional) Displays debugging messages for IPv6 RIP routing transactions.

## Configuration Examples for RIP for IPv6

### Example: Enabling the RIP for IPv6 Process

In the following example, the IPv6 RIP process named process1 is enabled on the device and on Ethernet interface 0/0. The IPv6 default route (::/0) is advertised in addition to all other routes in device updates sent on Ethernet interface 0/0. Additionally, BGP routes are redistributed into the RIP process named process1 according to a route map where routes that match a prefix list are also tagged. The number of parallel paths is set to one to allow the route tagging, and the IPv6 RIP timers are adjusted. A prefix list named eth0/0-in-flt filters inbound routing updates on Ethernet interface 0/0.

```

ipv6 router rip process1
 maximum-paths 1
 redistribute bgp 65001 route-map bgp-to-rip
 distribute-list prefix-list eth0/0-in-flt in Ethernet0/0
!
interface Ethernet0/0
 ipv6 address 2001:DB8::/64 eui-64
 ipv6 rip process1 enable
 ipv6 rip process1 default-information originate
!
ipv6 prefix-list bgp-to-rip-flt seq 10 deny 2001:DB8:3::/16 le 128
ipv6 prefix-list bgp-to-rip-flt seq 20 permit 2001:DB8:1::/8 le 128
!
ipv6 prefix-list eth0/0-in-flt seq 10 deny ::/0
ipv6 prefix-list eth0/0-in-flt seq 15 permit ::/0 le 128
!
route-map bgp-to-rip permit 10
 match ipv6 address prefix-list bgp-to-rip-flt
 set tag 4

```

In the following example, output information about all current IPv6 RIP processes is displayed using the **show ipv6 rip** command:

```

Device> show ipv6 rip

RIP process "process1", port 521, multicast-group FF02::9, pid 62
  Administrative distance is 120. Maximum paths is 1
  Updates every 5 seconds, expire after 15
  Holddown lasts 10 seconds, garbage collect after 30
  Split horizon is on; poison reverse is off
  Default routes are generated
  Periodic updates 223, trigger updates 1

```

```

Interfaces:
  Ethernet0/0
Redistribution:
  Redistributing protocol bgp 65001 route-map bgp-to-rip

```

In the following example, output information about a specified IPv6 RIP process database is displayed using the **show ipv6 rip** command with the *name* argument and the **database** keyword. In the following output for the IPv6 RIP process named process1, timer information is displayed, and route 2001:DB8::16/64 has a route tag set:

```
Device> show ipv6 rip process1 database
```

```

RIP process "process1", local RIB
2001:DB8::/64, metric 2
  Ethernet0/0/FE80::A8BB:CCFF:FE00:B00, expires in 13 secs
2001:DB8::/16, metric 2 tag 4, installed
  Ethernet0/0/FE80::A8BB:CCFF:FE00:B00, expires in 13 secs
2001:DB8:1::/16, metric 2 tag 4, installed
  Ethernet0/0/FE80::A8BB:CCFF:FE00:B00, expires in 13 secs
2001:DB8:2::/16, metric 2 tag 4, installed
  Ethernet0/0/FE80::A8BB:CCFF:FE00:B00, expires in 13 secs
::/0, metric 2, installed
  Ethernet0/0/FE80::A8BB:CCFF:FE00:B00, expires in 13 secs

```

In the following example, output information for a specified IPv6 RIP process is displayed using the **show ipv6 rip** command with the *name* argument and the **next-hops** keyword:

```
Device> show ipv6 rip process1 next-hops
```

```

RIP process "process1", Next Hops
  FE80::A8BB:CCFF:FE00:A00/Ethernet0/0 [4 paths]

```

## Additional References

### Related Documents

Related Topic	Document Title
IPv6 addressing and connectivity	<i>IPv6 Configuration Guide</i>
Configuring Routing Information Protocol	<i>Cisco IOS IP Routing: RIP Configuration Guide</i>
Cisco IOS commands	<a href="#">Cisco IOS Master Commands List, All Releases</a>
IPv6 commands	<a href="#">Cisco IOS IPv6 Command Reference</a>
Cisco IOS IPv6 features	<i>Cisco IOS IPv6 Feature Mapping</i>

### Standards and RFCs

Standard/RFC	Title
RFCs for IPv6	<i>IPv6 RFCs</i>

**MIBs**

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

**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.	<a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a>

## Feature Information for RIP for IPv6

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 1: Feature Information for RIP for IPv6**

Feature Name	Releases	Feature Information
IPv6 Routing: RIP for IPv6 (RIPng)	12.2(2)T 12.2(17a)SX1 12.2(25)SEA 12.2(25)SG 12.2(33)SRA 12.3 15.0(2)SG Cisco IOS XE Release 2.1 Cisco IOS XE Release 3.2.0SG	RIP enhancements for IPv6 include support for IPv6 addresses and prefixes, and the use of the all-RIP-devices multicast group address FF02::9 as the destination address for RIP update messages.  The following commands were introduced or modified: <b>debug ipv6 rip, ipv6 rip default-information, ipv6 rip enable, ipv6 router rip, ipv6 unicast-routing, maximum-paths, show ipv6 rip, show ipv6 route.</b>
IPv6: RIPng Nonstop Forwarding	12.2(33)SRE 15.0(1)S 15.0(1)SY Cisco IOS XE Release 2.1	The IPv6 RIPng nonstop forwarding feature is supported.

