Chapter 5
Configuring RIPng

Routing Information Protocol (RIP) is an IP route exchange protocol that uses a distance vector (a number representing a distance) to measure the cost of a given route. RIP uses a hop count as its cost or metric.

IPv6 RIP, known as Routing Information Protocol Next Generation or RIPng, functions similarly to IPv4 RIP version 2. RIPng supports IPv6 addresses and prefixes.

In addition, HP implements some new commands that are specific to RIPng. This chapter describes the commands that are specific to RIPng. This section does not describe commands that apply to both IPv4 RIP and RIPng. For more information about these commands, see the Advanced Configuration and Management Guide for ProCurve 9300/9400 Series Routing Switches.

RIPng maintains a Routing Information Database (RIB), which is a local route table. The local RIB contains the lowest-cost IPv6 routes learned from other RIP routers. In turn, RIPng attempts to add routes from its local RIB into the main IPv6 route table.

This chapter describes the following:
- How to configure RIPng.
- How to clear RIPng information from the RIPng route table.
- How to display RIPng information and statistics.

Configuring RIPng
To configure RIPng, you must do the following:
- Enable RIPng globally on the HP device and on individual router interfaces.

The following configuration tasks are optional:
- Change the default settings of RIPng timers.
- Configure how the HP device learns and advertises routes.
- Configure which routes are redistributed into RIPng from other sources.
- Configure how the HP device distributes routes via RIPng.
- Configure poison reverse parameters.

Enabling RIPng
Before configuring the HP device to run RIPng, you must do the following:
- Enable the forwarding of IPv6 traffic on the HP device using the ipv6 unicast-routing command.
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- Enable IPv6 on each interface over which you plan to enable RIPng. You enable IPv6 on an interface by configuring an IPv6 address or explicitly enabling IPv6 on that interface.

For more information about performing these configuration tasks, see “Configuring Basic IPv6 Connectivity” on page 3-1.

By default, RIPng is disabled. To enable RIPng, you must enable it globally on the HP device and also on individual router interfaces.

**NOTE:** Enabling RIPng globally on the HP device does not enable it on individual router interfaces.

To enable RIPng globally, enter the following command:

```
ProCurveRS(config-rip-router)#ipv6 router rip
ProCurveRS(config-ripng-router)#
```

After you enter this command, the HP device enters the RIPng configuration level, where you can access several commands that allow you to configure RIPng.

**Syntax:** [:no:] ipv6 router rip

To disable RIPng globally, use the **no** form of this command.

After enabling RIPng globally, you must enable it on individual router interfaces. You can enable it on physical as well as virtual routing interfaces. For example, to enable RIPng on Ethernet interface 3/1, enter the following commands:

```
ProCurveRS(config)# interface ethernet 3/1
ProCurveRS(config-if-e100-3/1)# ipv6 rip enable
```

**Syntax:** [no] ipv6 rip enable

To disable RIPng on an individual router interface, use the **no** form of this command.

**Configuring RIPng Timers**

Table 5.1 describes the RIPng timers and provides their defaults.

<table>
<thead>
<tr>
<th>Timer</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update</td>
<td>Amount of time (in seconds) between RIPng routing updates.</td>
<td>30 seconds.</td>
</tr>
<tr>
<td>Timeout</td>
<td>Amount of time (in seconds) after which a route is considered unreachable.</td>
<td>180 seconds.</td>
</tr>
<tr>
<td>Hold-down</td>
<td>Amount of time (in seconds) during which information about other paths is ignored.</td>
<td>180 seconds.</td>
</tr>
<tr>
<td>Garbage-collection</td>
<td>Amount of time (in seconds) after which a route is removed from the routing table.</td>
<td>120 seconds.</td>
</tr>
</tbody>
</table>

You can adjust these timers for RIPng. Before doing so, keep the following caveats in mind:

- If you adjust these RIPng timers, HP strongly recommends setting the same timer values for all Routing Switches and access servers in the network.
- Setting the update timer to a shorter interval can cause the Routing Switches to spend excessive time updating the IPv6 route table.
- HP recommends setting the timeout timer value to at least three times the value of the update timer.
- HP recommends a shorter hold-down timer interval, because a longer interval can cause delays in RIPng convergence.
The following example sets updates to be broadcast every 45 seconds. If a route is not heard from in 135 seconds, the route is declared unusable. Further information is suppressed for an additional 10 seconds. Assuming no updates, the route is flushed from the routing table 20 seconds after the end of the hold-down period.

ProCurveRS(config)# ipv6 router rip
ProCurveRS(config-ripng-router)# timers 45 135 10 20

**Syntax:** [no] timers <update-timer> <timeout-timer> <hold-down-timer> <garbage-collection-timer>

Possible values for the timers are as follows:

- **Update timer:** 3 – 65535 seconds.
- **Timeout timer:** 9 – 65535 seconds.
- **Hold-down timer:** 9 – 65535 seconds.
- **Garbage-collection timer:** 9 – 65535 seconds.

**NOTE:** You must enter a value for each timer, even if you want to retain the current setting of a particular timer.

To return to the default values of the RIPng timers, use the **no** form of this command.

**Configuring Route Learning and Advertising Parameters**

You can configure the following learning and advertising parameters:

- Learning and advertising of RIPng default routes.
- Advertising of IPv6 address summaries.
- Metric of routes learned and advertised on a router interface.

**Configuring Default Route Learning and Advertising**

By default, the HP device does not learn IPv6 default routes (::/0). You can originate default routes into RIPng, which causes individual router interfaces to include the default routes in their updates. When configuring the origination of the default routes, you can also do the following:

- Suppress all other routes from the updates.
- Include all other routes in the updates.

For example, to originate default routes in RIPng and suppress all other routes in updates sent from Ethernet interface 3/1, enter the following commands:

ProCurveRS(config)# interface ethernet 3/1
ProCurveRS(config-if-eth3-3/1)# ipv6 rip default-information only

To originate IPv6 default routes and include all other routes in updates sent from Ethernet interface 3/1, enter the following commands:

ProCurveRS(config)# interface ethernet 3/1
ProCurveRS(config-if-eth3-3/1)# ipv6 rip default-information originate

**Syntax:** [no] ipv6 rip default-information only | originate

The **only** keyword originates the default routes and suppresses all other routes from the updates.

The **originate** keyword originates the default routes and includes all other routes in the updates.

To remove the explicit default routes from RIPng and suppress advertisement of these routes, use the **no** form of this command.

**Advertising IPv6 Address Summaries**

You can configure RIPng to advertise a summary of IPv6 addresses from a router interface and to specify an IPv6 prefix that summarizes the routes.
If a route's prefix length matches the value specified in the **ipv6 rip summary-address** command, RIPng advertises the prefix specified in the **ipv6 rip summary-address** command instead of the original route.

For example, to advertise the summarized prefix 2001:469e::/36 instead of the IPv6 address 2001:469e:0:adff:8935:e838:78:e0ff with a prefix length of 64 bits from Ethernet interface 3/1, enter the following commands:

```plaintext
ProCurveRS(config)# interface ethernet 3/1
ProCurveRS(config-if-e100-3/1)# ipv6 address 2001:469e:0:adff:8935:e838:78:e0ff /64
ProCurveRS(config-if-e100-3/1)# ipv6 rip summary-address 2001:469e::/36
```

**Syntax:** [no] ipv6 rip summary-address <ipv6-prefix>/<prefix-length>

You must specify the `<ipv6-prefix>` parameter in hexadecimal using 16-bit values between colons as documented in RFC 2373.

You must specify the `<prefix-length>` parameter as a decimal value. A slash mark (/) must follow the `<ipv6-prefix>` parameter and precede the `<prefix-length>` parameter.

To stop the advertising of the summarized IPv6 prefix, use the **no** form of this command.

### Changing the Metric of Routes Learned and Advertised on an Interface

A router interface increases the metric of an incoming RIPng route it learns by an offset (the default is one). The HP device then places the route in the route table. When the HP device sends an update, it advertises the route with the metric plus the default offset of zero in an outgoing update message.

You can change the metric offset an individual interface adds to a route learned by the interface or advertised by the interface. For example, to change the metric offset for incoming routes learned by Ethernet interface 3/1 to one and the metric offset for outgoing routes advertised by the interface to three, enter the following commands:

```plaintext
ProCurveRS(config)# interface ethernet 3/1
ProCurveRS(config-if-e100-3/1)# ipv6 rip metric-offset 1
ProCurveRS(config-if-e100-3/1)# ipv6 rip metric-offset out 3
```

In this example, if Ethernet interface 3/1 learns about an incoming route, it will increase the incoming metric by two (the default offset of 1 and the additional offset of 1 as specified in this example). If Ethernet interface 3/1 advertises an outgoing route, it will increase the metric by 3 as specified in this example.

**Syntax:** [no] ipv6 rip metric-offset [out] <1 – 16>

To return the metric offset to its default value, use the **no** form of this command.

### Redistributing Routes Into RIPng

You can configure the HP device to redistribute routes from the following sources into RIPng:

- IPv6 static routes.
- Directly connected IPv6 networks.
- BGP4+.
- OSPFv3.

When you redistribute a route from BGP4+ or OSPFv3 into RIPng, the HP device can use RIPng to advertise the route to its RIPng neighbors.

When configuring the HP device to redistribute routes, such as BGP4+ routes, you can optionally specify a metric for the redistributed routes. If you do not explicitly configure a metric, the default metric value of one is used.

For example, to redistribute OSPFv3 routes into RIPng, enter the following command:

```plaintext
ProCurveRS(config)# ipv6 router rip
ProCurveRS(config-ripng-router)# redistribute ospf
```

**Syntax:** redistribute bgp | connected | ospf | static [metric <number>]

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For the metric, specify a numerical value that is consistent with RIPng.

**Controlling Distribution of Routes Via RIPng**

You can create a prefix list and then apply it to RIPng routing updates that are received or sent on a router interface. Performing this task allows you to control the distribution of routes via RIPng.

For example, to permit the inclusion of routes with the prefix 2001::/16 in RIPng routing updates sent from Ethernet interface 3/1, enter the following commands:

```bash
ProCurveRS(config)# ipv6 prefix-list routesfor2001 permit 2001::/16
ProCurveRS(config)# ipv6 router rip
ProCurveRS(config-ripng-router)# distribute-list prefix-list routesfor2001 out ethernet 3/1
```

To deny prefix lengths greater than 64 bits in routes that have the prefix 3EE0:A99::/64 and allow all other routes received on tunnel interface 3/1, enter the following commands:

```bash
ProCurveRS(config)# ipv6 prefix-list 3ee0routes deny 3ee0:a99::/64 le 128
ProCurveRS(config)# ipv6 prefix-list 3ee0routes permit ::/0 ge 0 le 128
ProCurveRS(config)# ipv6 router rip
ProCurveRS(config-ripng-router)# distribute-list prefix-list 3ee0routes in tunnel 1
```

For information about prefix lists, including the syntax of the `ipv6 prefix-list` command, see “Configuring an IPv6 Prefix List” on page 10-1.

**Syntax:** `[no] prefix-list <name> in | out <interface> <port>

The `<name>` parameter indicates the name of the prefix list generated using the `ipv6 prefix-list` command.

The `in` keyword indicates that the prefix list is applied to incoming routing updates on the specified interface.

The `out` keyword indicates that the prefix list is applied to outgoing routing updates on the specified interface.

For the `<interface>` parameter, you can specify the `ethernet`, `loopback`, `ve`, or `tunnel` keywords. If you specify an Ethernet interface, also specify the port number associated with the interface. If you specify a VE or tunnel interface, also specify the VE or tunnel number.

To remove the distribution list, use the `no` form of this command.

**Configuring Poison Reverse Parameters**

By default, poison reverse is disabled on a RIPng router. If poison reverse is enabled, RIPng advertises routes it learns from a particular interface over that same interface with a metric of 16, which means that the route is unreachable.

If poison reverse is enabled on the RIPng router, it takes precedence over split horizon (if it is also enabled).

To enable poison reverse on the RIPng router, enter the following commands:

```bash
ProCurveRS(config)# ipv6 router rip
ProCurveRS(config-ripng-router)# poison-reverse
```

**Syntax:** `[no] poison-reverse

To disable poison-reverse, use the `no` version of this command.

By default, if a RIPng interface goes down, the HP device does not send a triggered update for the interface’s IPv6 networks.

To better handle this situation, you can configure a RIPng router to send a triggered update containing the local routes of the disabled interface with an unreachable metric of 16 to the other RIPng routers in the routing domain. You can enable the sending of a triggered update by entering the following commands:

```bash
ProCurveRS(config)# ipv6 router rip
ProCurveRS(config-ripng-router)# poison-local-routes
```
**Syntax:** [no] poison-local-routes

To disable the sending of a triggered update, use the no version of this command.

### Clearing RIPng Routes from IPv6 Route Table

To clear all RIPng routes from the RIPng route table and the IPv6 main route table and reset the routes, enter the following command at the Privileged EXEC level or any of the Config levels of the CLI:

```
ProCurveRS# clear ipv6 rip routes
```

**Syntax:** clear ipv6 rip routes

### Displaying RIPng Information

You can display the following RIPng information:

- RIPng configuration.
- RIPng routing table.

### Displaying RIPng Configuration

To display RIPng configuration information, enter the following command at any CLI level:

```
ProCurveRS# show ipv6 rip
IPv6 rip enabled, port 521
  Administrative distance is 120
  Updates every 30 seconds, expire after 180
  Hold down lasts 180 seconds, garbage collect after 120
  Split horizon is on; poison reverse is off
  Default routes are not generated
  Periodic updates 0, trigger updates 0
  Distribute List, Inbound : Not set
  Distribute List, Outbound : Not set
  Distribute: CONNECTED
```

**Syntax:** show ipv6 rip

This display shows the following information:

<table>
<thead>
<tr>
<th>This Field</th>
<th>Displays</th>
</tr>
</thead>
</table>
| IPv6 RIP status/port                | The status of RIPng on the HP device. Possible status is “enabled” or “disabled.”  
  |                                   | The UDP port number over which RIPng is enabled.  
| Administrative distance             | The setting of the administrative distance for RIPng.      |
| Updates/expiration                  | The settings of the RIPng update and timeout timers.       |
| Hold down/garbage collection        | The settings of the RIPng hold-down and garbage-collection timers. |
| Split horizon/poison reverse        | The status of the RIPng split horizon and poison reverse features.  
  |                                   | Possible status is “on” or “off.”  
| Default routes                      | The status of RIPng default routes.                        |
### Table 5.2: RIPng configuration fields

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodic updates/trigger updates</td>
<td>The number of periodic updates and triggered updates sent by the RIPng router.</td>
</tr>
<tr>
<td>Distribution lists</td>
<td>The inbound and outbound distribution lists applied to RIPng.</td>
</tr>
<tr>
<td>Redistribution</td>
<td>The types of IPv6 routes redistributed into RIPng. The types can include the following:</td>
</tr>
<tr>
<td></td>
<td>• STATIC – IPv6 static routes are redistributed into RIPng.</td>
</tr>
<tr>
<td></td>
<td>• CONNECTED – Directly connected IPv6 networks are redistributed into RIPng.</td>
</tr>
<tr>
<td></td>
<td>• BGP – BGP4+ routes are redistributed into RIPng.</td>
</tr>
<tr>
<td></td>
<td>• OSPF – OSPFv3 routes are redistributed into RIPng.</td>
</tr>
</tbody>
</table>

### Displaying RIPng Routing Table

To display the RIPng routing table, enter the following command at any CLI level:

```
ProCurveRS# show ipv6 rip route
IPv6 RIP Routing Table - 4 entries:
2000:4::/64, from ::, null (0)
   CONNECTED, metric 1, tag 0, timers: none
2002:c0a8:46a::/64, from ::, null (1)
   CONNECTED, metric 1, tag 0, timers: none
2999::1/128, from ::, null (2)
   CONNECTED, metric 1, tag 0, timers: none
5000:2::/64, from ::, null (3)
   CONNECTED, metric 1, tag 0, timers: none
```

**Syntax:** `show ipv6 rip route [<ipv6-prefix>/<prefix-length> | <ipv6-address>]`

The `<ipv6-prefix>/<prefix-length>` parameters restrict the display to the entries for the specified IPv6 prefix. You must specify the `<ipv6-prefix>` parameter in hexadecimal using 16-bit values between colons as documented in RFC 2373. You must specify the `<prefix-length>` parameter as a decimal value. A slash mark (`/`) must follow the `<ipv6-prefix>` parameter and precede the `<prefix-length>` parameter.

The `<ipv6-address>` parameter restricts the display to the entries for the specified IPv6 address. You must specify this parameter in hexadecimal using 16-bit values between colons as documented in RFC 2373.

This display shows the following information:

### Table 5.3: RIPng routing table fields

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIPng Routing Table entries</td>
<td>The total number of entries in the RIPng routing table.</td>
</tr>
<tr>
<td><code>&lt;ipv6-prefix&gt;/&lt;prefix-length&gt;</code></td>
<td>The IPv6 prefix and prefix length.</td>
</tr>
<tr>
<td><code>&lt;ipv6-address&gt;</code></td>
<td>The IPv6 address.</td>
</tr>
<tr>
<td>Next-hop router</td>
<td>The next-hop router for this HP device. If :: appears, the route is originated locally.</td>
</tr>
</tbody>
</table>
### Table 5.3: RIPng routing table fields

<table>
<thead>
<tr>
<th>This Field...</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>The interface name. If “null” appears, the interface is originated locally.</td>
</tr>
</tbody>
</table>
| Source of route | The source of the route information. The source can be one of the following:  
  • RIP – routes learned by RIPng.  
  • CONNECTED – IPv6 routes redistributed from directly connected networks.  
  • STATIC – IPv6 static routes are redistributed into RIPng.  
  • BGP – BGP4+ routes are redistributed into RIPng.  
  • OSPF – OSPFv3 routes are redistributed into RIPng. |
| Metric <number> | The cost of the route. The <number> parameter indicates the number of hops to the destination. |
| Tag <number>   | The tag value of the route. |
| Timers:        | Indicates if the hold-down timer or the garbage-collection timer is set. |