

Chapter 42: RIP



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Chapter 42 RIP

42.1 RIP Overview

Routing Information Protocol (RIP) is a routing protocol based on the Distance-Vector (D-V) algorithm and has seen wide deployment. It exchanges routing information by sending route update packets over the User Datagram Protocol (UDP) every 30 seconds. If having not received a route update packet from the peer router within 180 seconds, the local router marks all the routes from the peer router as unreachable. If no update packet is received from the peer router yet in 120 seconds after a route is marked as unreachable, the local router deletes the route from its routing table.

RIP uses Hop Count as a routing metric to measure the distance from a destination host. In a RIP network, Hop Count is 0 if a router is directly connected with a network and 1 if a route needs to traverse a router before reaching the destination network, and so on. To restrain the route convergence time, RIP stipulates that Hop Count is an integer ranging from 0 to 15.

The distance is considered infinite if Hop Count is larger than or equal to 16. In this case, the destination network or host is unreachable.

RIP has two versions: RIP-1 and RIP-2 (support for plaintext authentication).

To improve routing performance and avoid routing loops, RIP presents the concepts of Split Horizon and Poison Reverse.

Each RIP router manages a routing database, which contains all the destination reachable routing entries on a network. These routing entries include the following information:

Destination address: IP address of a host or network;

Next-hop address: address of a next router on the route to a destination;

Outbound interface: interface from which packets are forwarded;

Metric value: cost of a route from the local router to a destination, which is an integer from 0 to 15.

Timer: time counted from the last modification of a routing entry. The timer is zeroed every time a routing entry is modified.

The RIP startup and operation procedure is described as follows:

Upon RIP startup on a router, the router broadcasts a request packet to its neighboring routers. After receiving the request packet, the neighboring routers (with RIP started) return a response packet which contains the information about their respective local routing tables.

Upon receipt of the response packets, the router that sends the request packet modifies its local routing table.

RIP broadcasts or multicasts the local routing table to its neighboring routers every 30s. The neighboring routers maintain their local routes to select a best route and then broadcast or multicast the modification to their respective neighboring networks, so that the routing update will eventually take effect globally. RIP employs a timeout mechanism to process expired routes, ensuring that the routes are latest and valid. As an interior routing protocol, RIP helps acquaint routers with the network-wide routing information because of these mechanisms.

RIP has been accepted as one of the standards which regulate the route transmission between a router and a host.

L3 GPONs forward IP packets across a LAN the same way as routers. Therefore, RIP is also widely deployed on L3 GPONs. It is applicable to most campus networks and regional networks with a simple structure and good continuity but not recommended in complex large networks.

42.2 Configure RIP

42.2.1 RIP Configuration List

Configuration Task	Description	Detailed Configuration
Enabling RIP	Required	42.2.2
Specifying the IP network segment to run RIP	Required	42.2.3
Configure the Passive interface	Required	42.2.4
Specifying the RIP version for an interface	Required	42.2.5
Configure Default Metric Value	Required	42.2.6
Enabling the Route Aggregation Function	Required	42.2.7
Configure RIP Packet Authentication	Optional	42.2.8
Configure Split Horizon	Optional	42.2.9
Setting an Additional Routing Metric	Optional	42.2.10
Defining a Prefix List	Optional	42.2.11
Configure Route Redistribution	Optional	42.2.12
Configure Route Filtering	Required	42.2.13
Display RIP Configuration	Required	42.2.14

42.2.2 Enable RIP

Operation	Command	Remarks
Enter the global configuration mode	system-view	
Enters the rip configuration mode.	router rip	
Enters the global configuration mode.	undo router rip	

42.2.3 Specifying the IP Network Segment to run RIP

By default, an interface does not send or receive RIP packets until the IP network segment to run RIP is specified by the administrator even if RIP is enabled on the interface.

Operation	Command	Remarks
Enter the global configuration mode	system-view	

Enters the rip configuration mode.	router rip	
Runs the command in RIP configuration mode.	network ip-address	
Runs the command in RIP configuration mode.	undo network ip-address	

42.2.4 Configure the Passive Interface

System support to block RIP on vlan-interface, which can be implemented by passive-interface command, after using this command, the RIP update packets will not be sent out from this interface.

Operation	Command	Remarks
Enter the global configuration mode	system-view	
Enter RIP configuration mode	router rip	
Configure passive-interface	passive-interface { default vlan-interface <i>vlanid</i> supervlan-interface <i>vlanid</i> }	
Delete passive-interface	undo key passive-interface { default vlan-interface <i>vlanid</i> supervlan-interface <i>vlanid</i> }	

42.2.5 Specifying the RIP Version for an Interface

RIP has two versions: RIP-1 and RIP-2. You can specify the version of the RIP packets to be processed by an interface.

RIP-1 packets are transmitted in broadcast mode. RIP-2 packets may be transmitted in either broadcast or multicast mode. The multicast mode is used by default. In RIP-2, the multicast address is 224.0.0.9.

When the multicast mode is used, non-RIP hosts on the same network will not receive RIP broadcast packets and RIP-1 hosts will not receive or process the RIP-2 routes with a subnet mask. A RIP-2 interface can also receive the RIP-1 broadcast packets.

Operation	Command	Remarks
Enter the global configuration mode	system-view	
Enters the rip configuration mode.	router rip	
Runs the command in vlan-interface configuration mode	version { 1 2 }	

Enter the VLAN-interface or Supervlan-interface configuration mode	interface { vlan-interface supervlan-interface } <i>vlan-id</i>	
Configure RIP receive Version	ip rip receive version { 1 2 [bcast mcast] }	By default, Version is 2mcast
Configure RIP default receive Version	undo ip rip receive version	
Configure RIP send Version	ip rip send version { 1 2 [bcast mcast] }	By default, Version is 2mcast
Configure RIP default send Version	undo ip rip send version	

Notes:

A RIP-1 interface can send and receive RIP-1 broadcast packets. A RIP-2 broadcast interface can receive RIP-1 packets and RIP-2 broadcast packets but not RIP-2 multicast packets. A RIP-2 multicast interface can send and receive RIP-2 multicast packets.

42.2.6 Configure Default Metric Value

This function is to set the default RIP Metric Value .

Operation	Command	Remarks
Enter the global configuration mode	system-view	
Enter RIP configuration mode	router rip	
Configure default metric	default-metric <i>metric</i>	
Delete default metric	undo default-metric	

42.2.7 Enabling the Route Aggregation Function

Route aggregation consolidates the routes on different subnets of a natural network segment into one route with a natural mask and sends the route to another network segment. This function minimizes both the number of entries in a routing table and the amount of information that needs to be exchanged.

RIP-1 sends only the routes with a natural mask, that is, aggregate routes. RIP-2 supports the subnet mask. To broadcast all the subnet routes, you should disable the route aggregation function of RIP-2.

Operation	Command	Remarks
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Enter the global configuration mode	system-view	
Enter RIP configuration mode	router rip	
Configure aggregation address	aggregate-address <i>ip-address/mask-length</i>	
Delete aggregation address	undo aggregate-address <i>ip-address/mask-length</i>	

42.2.8 Configure RIP Packet Authentication

RIP-1 does not support packet authentication. A RIP-2 interface, however, can be configured with packet authentication in plaintext or MD5.

Operation	Command	Remarks
Enter the global configuration mode	system-view	
Enter the VLAN-interface or Supervlan-interface configuration mode	interface { vlan-interface supervlan-interface } <i>vlan-id</i>	
Configure MD5 authentication	ip rip authentication mode md5 key-chain <i>key-string</i>	
Configure text authentication	ip rip authentication mode text passwd <i>passwd</i>	
Restores RIP packet authentication.	undo ip rip authentication	

42.2.9 Configure Split Horizon

Split horizon is designed to prevent the routes learned on an interface from being sent through the interface, which avoids routing loops. This function must be disabled in some special situations to ensure correct route advertisement at the cost of advertisement efficiency. By default, split horizon can be enabled on an interface.

Operation	Command	Remarks
Enter the global configuration mode	system-view	
Enter the VLAN-interface or Supervlan-interface configuration mode	interface { vlan-interface supervlan-interface } <i>vlan-id</i>	

Enable split-horizon function	ip rip split-horizon	By default,it is enabled
Enable split-horizon poisoned-reverse function	ip rip split-horizon poisoned-reverse	By default,it is disabled
Disable split-horizon function	undo ip rip split-horizon	
Disable split-horizon poisoned-reverse function	undo ip rip split-horizon poisoned-reverse	

42.2.10 Setting an Additional Routing Metric

The additional routing metric value is added to RIP routes on an inbound or outbound interface. It does not change the routing metric value of routes in the routing table but adds a designated metric value to the routes to be sent or received by an interface.

Operation	Command	Remarks
Enter the global configuration mode	system-view	
Enter the VLAN-interface or Supervlan-interface configuration mode	interface { vlan-interface supervlan-interface } vlan-id	
Set additional routing metric value for inbound	offset-list { ip-acl-name ip-acl-number } in metric [{ vlan-interface supervlan-interface } vlan-id]	
Delete additional routing metric value for inbound	undo offset-list { ip-acl-name ip-acl-number } in metric [{ vlan-interface supervlan-interface } vlan-id]	
Set additional routing metric value for outbound	offset-list { ip-acl-name ip-acl-number } out metric [{ vlan-interface supervlan-interface } vlan-id]	
Delete additional routing metric value for outbound	undo offset-list { ip-acl-name ip-acl-number } out metric [{ vlan-interface supervlan-interface } vlan-id]	

42.2.11 Defining a Prefix List

A prefix list is identified by a prefix list name, and may contain multiple entries, each of which corresponds to a network prefix identified by a sequence number. The sequence number indicates the matching sequence of a network prefix.

During prefix matching, the GPON checks the entries in ascending order of sequence numbers.

If an entry is matched, it is permitted by the current prefix list and will not be matched next time.

Note: By default, if more than one prefix list entry has been defined, at least one permit entry should be available. The deny entries can be defined in advance so that the routes that do not meet the condition are filtered quickly. However, if all the entries are prefixed by deny, no route will be permitted by the address prefix list. You are advised to define an entry permit 0.0.0.0/0 after defining multiple deny entries, so that all the routes meeting the condition are permitted.

Alternatively, you can run the ip prefix-list default command to change the default configuration.

For details, see the description of this command in a command line manual.

Operation	Command	Remarks
Enter the global configuration mode	system-view	
Enter RIP configuration mode	router rip	
Enable sequence-number	ip prefix-list sequence-number	
Disable sequence-number	undo ip prefix-list sequence-number	
Configure prefix-list	ip prefix-list list-name seq sequence-number { deny permit } { any ip-address/mask-length [ge min-prefix-len [le max-prefix-len] }	
Delete prefix-list	undo ip prefix-list list-name [seq sequence-number { deny permit } { any ip-address/mask-length [ge min-prefix-len [le max-prefix-len] }	

42.2.12 Configure Route Redistribution

Routes of protocols other than RIP can be imported into RIP.

In an Ethernet GPON, connected, static, and OSPF routes can be imported into RIP.

Operation	Command	Remarks
Enter the global configuration mode	system-view	
Enter RIP configuration mode	router rip	
Configure Route redistribution	redistribute { babel bgp connected isis kernel ospf rip static } metric metric	

	route-map <i>route-map</i>	
Delete Route redistribution	undo redistribute { babel bgp connected isis kernel ospf rip static }	

42.2.13 Configure Route Filtering

Policies and rules can be configured to filter incoming and outgoing routes based on an address prefix list. In addition, you can configure that only the RIP packets from a specific neighboring Ethernet GPON can be received.

Operation	Command	Remarks
Enter the global configuration mode	system-view	
Enter RIP configuration mode	router rip	
Set distribute-list for inbound	distribute-list { <i>ip-acl-name</i> <i>ip-acl-number</i> prefix <i>prefix-list</i> } in [{ vlan-interface supervlan-interface } <i>vlan-id</i>]	
Delete distribute-list for inbound	undo distribute-list { <i>ip-acl-name</i> <i>ip-acl-number</i> prefix <i>prefix-list</i> } in [{ vlan-interface supervlan-interface } <i>vlan-id</i>]	
Set distribute-list for outband	distribute-list { <i>ip-acl-name</i> <i>ip-acl-number</i> prefix <i>prefix-list</i> } out [{ vlan-interface supervlan-interface } <i>vlan-id</i>]	
Delete distribute-list for outband	undo distribute-list { <i>ip-acl-name</i>	
	<i>ip-acl-number</i> prefix <i>prefix-list</i> } out [{ vlan-interface supervlan-interface } <i>vlan-id</i>]	

42.2.14 Display RIP Configuration

Operation	Command	Remarks
Displays the RIP packet statistics information.	display ip rip	

Displays the RIP interface configuration, such as the version and authentication information.	display ip rip interface	
Displays RIP routing tables.	display ip route rip	