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 Switches forward IP packets across a LAN the same way as routers. Therefore, RIP is also widely deployed on L3 Switches. 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
Configurethe 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 Enabling 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 Configurethe 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 *vlanid* | supervlan-interface *vlanid*}	
Delete passive-interface	**undo key passive-interface** { default | vlan-interface *vlanid* | supervlan-interface *vlanid* }	

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 } *vlan-id*	
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** *metric*	
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
Enter the global configuration mode	**system-view**	
Enter RIP configuration mode	**router rip**	
Configure aggregation address	**aggregate-address** *ip-address/mask-length*	
Delete aggregation address	**Undo aggregate-address** *ip-address/mask-length*	

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 } *vlan-id*	
Configure MD5 authentication	**ip rip authentication mode md5 key-chain** *key-string*	

Configure text authentication	**ip rip authentication mode text passwd** *passwd*	
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	**interface** { vlan-interface |	
Supervlan-interface configuration mode	supervlan-interface } *vlan-id*	
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-interfac } *vlan-id*]	
Delete additional routing metric value for inbound	**undo offset-list** { *ip-acl-name* | *ip-acl-number* } **in** *metric* [{ vlan-interface | supervlan-interfac } *vlan-id*]	
Set additional routing metric value for outbound	**offset-list** { *ip-acl-name* | *ip-acl-number* } **out** *metric* [{ vlan-interface | supervlan-interfac } *vlan-id*]	
Delete additional routing metric value for outbound	**undo offset-list** { *ip-acl-name* | *ip-acl-number* } **out** *metric* [{ vlan-interface | supervlan-interfac } *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 Switch 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 Switch, 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** *route-map*	
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 Switch 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** { ip-acl-name | ip-acl-number | prefix *prefix-list* } **in** [{ vlan-interface | supervlan-interfac } *vlan-id*]	
Delete distribute-list for inbound	**undo distribute-list** { ip-acl-name | ip-acl-number | prefix *prefix-list* } **in** [{ vlan-interface | supervlan-interfac } *vlan-id*]	
Set distribute-list for outband	**distribute-list** { ip-acl-name | ip-acl-number | prefix *prefix-list* } **out** [{ vlan-interface | supervlan-interfac } *vlan-id*]	
Delete distribute-list for outband	**undo distribute-list** { ip-acl-name | ip-acl-number | prefix *prefix-list* } **out** [{ vlan-interface | supervlan-interfac } *vlan-id*]	

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**	