IP-PBR Configuration

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IP-PBR realizes software PBR functions through the hardware of switch chip.

PBR stands for Policy Based Routing. PBR enables users to rely on a certain policy not on routing protocol for routing. Software based PBR supports multiple policies and rules and also load balance. You can designate the next hop's IP address or port for those packets that are in line with policy. PBR supports load balance and applies multiple next-hop IP addresses or ports on those policy-supported packets.

Only when the next-hop egress ARP designated by route map is already learned can IP-PBR regard that this egress is valid and then the corresponding rule is effective. When a packet satisfies IP-PBR policy, the hardware directly forwards this packet to the next-hop egress that the rule specifies. This process is finished by the hardware without the operation of CPU. The packets forwarded by IP-PBR have the highest priority and only those packets unmatched with IP-PBR rule are forwarded to CPU.

The current IP-PBR supports the IP ACL policy and the next-hop IP address policy. When multiple next hops are configured, the first effect next hop is chosen. IP-PBR also supports equivalent routing that is realized by the switch chip. Hardware equivalent routing needs no extra configuration.

IP-PBR supports the following policy routing commands:

route-map *WORD*

match ip address *WORD*

set ip next-hop *X.X.X.X* [**load-balance**]

ip policy route-map *WORD*

IP-PBR is a little different from router's policy routing. IP-PBR chooses an effective next hop as the egress and drops packets if no valid next hop available, while router's policy routing selects an effective next hop but packet loss happens if this next hop has not learned ARP. Once multiple sequences are set, one difference between IP-PBR and software policy routing must be noted. Software policy routing always chooses high-priority sequence routes no matter whether IP address matched by high-priority sequences overlaps with that matched by low-priority sequences and whether these routes are effective, while IP-PBR chooses low-priority sequence routes when high-priority sequence routes invalidate.

1.1.1 Enabling or Disabling IP-PBR Globally

Run the following commands in global configuration mode.

Command	Purpose

ip pbr	The IP-PBR function is disabled by default.
no ip pbr	Resumes the default settings.

IP-PBR is disabled by default.

1.1.2 ISIS Configuration Task List

To configure IP-PBR, do as follows:

Create ACL;

Create a route map;

Apply the route map on a port;

To create an ACL, run the following command globally:

Command	Remarks
ip access-list standard *net1*	Enters the ACL configuration mode and defines ACL.

To create a route map, run the following commands globally:

Command	Remarks
route-map *pbr*	Enters the route map configuration mode.
match ip address *access-list*	Configures the match-up policy.
set ip next-hop *A.B.C.D*	Configures the next-hop address of IP packet.

To apply policy routing on an IP-receiving port, run the following commands:

Command	Remarks
interface *interface_name*	Enters the interface configuration mode.
ip policy route-map *route-map_name*	Applies policy routing on the port.

1.1.3 Monitoring and Maintaining MVC

Run the following commands in EXEC mode:

Command	Operation
show ip pbr	It is used to display the information about RIP

	configuration.
show ip policy	Shows the port on which IP-PBR is applied.
show ip pbr policy	It is used to display the information about IP-PBR equivalent routing.
debug ip pbr	It is used to enable or disable the debugging switch of IP-PBR.

The information that IP-PBR is not running is shown:

```
switch#show ip pbr

IP policy based route state: disabled


No pbr apply item

No equiv exf apply item
```

All data related about IP-PBR running are shown below:

```
switch#show ip pbr
IP policy based route state: enabled

No equiv exf apply item

VLAN3 use route-map ddd, and has 1 entry active.
------------------
Entry sequence 10, permit
   Match ip access-list:
      ac1
   Set Outgoing nexthop
      90.0.0.3
```

The IP-PBR policy routing information is shown below:

```
switch#show ip pbr policy
IP policy based route state: enabled

VLAN3 use route-map ddd, and has 1 entry active.
------------------
Entry sequence 10, permit
   Match ip access-list:
      ac1
   Set Outgoing nexthop
      90.0.0.3
```

The equivalent routing information is shown below:

```
switch#show ip pbr exf
IP policy based route state: enabled
```

```
Equiv EXF has 1 entry active.
-----------------
Entry sequence 1, handle c1f95b0
   Dest ip: 1.1.0.0/16
      90.0.0.3
      192.168.213.161
```

1.1.4 IP-PBR Configuration Example

Switch configuration:

```
!
ip pbr
!
interface vlan1
ip address 10.1.1.3 255.255.255.0
no ip directed-broadcast
ip policy route-map pbr
!
ip access-list standard ac1
permit 10.1.1.21 255.255.255.255
!
ip access-list standard ac2
permit 10.1.1.2 255.255.255.255
!
route-map pbr 10 permit
match ip address ac1
set ip next-hop 13.1.1.99
!
route-map pbr 20 permit
match ip address ac2
set ip next-hop 13.1.1.99 14.1.1.99 load-balance
!
```

Configuration Description

The switch is to apply policy routing on the packets that are received from VLAN1.As to the packets whose source IPs are 10.1.1.21, their next hop is 13.1.1.99.As to the packets whose source IPs are 10.1.1.2, they are applied on **route-map pbr 20**; because **set ip next-hop** has the **load-balance** parameter, the switch chip will automatically choose 13.1.1.99 or 14.1.1.99 as the egress according to destination IP address.