基于策略的路由使用set ip default next-hop和set ip next-hop发出命令配置示例

目录

简介

本文档提供使用 **set ip default next-hop** 和 **set ip next-hop** 命令进行的基于策略的路由 (PBR) 的示例配置。

set ip default next-hop 命令验证目标 IP 地址在路由表中是否存在，以及：

- 如果目标 IP 地址存在，则该命令不对数据包进行策略路由，而是基于路由表转发数据包。
- 如果目标 IP 地址不存在，则该命令通过将数据包发送到指定的下一跳对它进行策略路由。

set ip next-hop 命令验证指定的下一跳是否存在，以及：

- 如果下一跳在路由表中存在，则该命令将数据包策略路由到下一跳。
- 如果下一跳在路由表中不存在，则该命令使用普通路由表转发数据包。

先决条件

要求

本文档没有任何特定的要求。

使用的组件

本文档不限于特定的软件和硬件版本；然而，使用的软件必须支持基于策略的路由。使用 Feature Navigator 确定此配置支持的硬件和软件。

规则

有关文档规则的详细信息，请参阅 Cisco 技术提示规则。

配置

本部分提供有关如何配置本文档所述功能的信息。

注意： 要查找本文档所用命令的其他信息，请使用命令查找工具（仅限注册用户）。

网络图

本文档使用以下网络设置：

案例分析 1：使用 set ip default next-hop 命令和动态路由协议 (DRP) 进行的策略路由

本部分使用以下配置：

R1

```
R1# show running-config Building configuration... . ! interface Ethernet0/0 ip address 100.100.100.1 255.255.255.0 ip policy route-map blah ! interface Serial1/0 ip address 10.10.10.1 255.255.255.0 ! interface Serial2/0 ip address 20.20.20.1 255.255.255.0 ! router ospf 1 !--- OSPF is not configured on Serial1/0. log-adjacency-changes network 20.20.20.0 0.0.0.255 area 0 network 100.100.100.0 0.0.0.255 area 0 ! ip classless no ip http server ! access-list 100 permit ip host 100.100.100.3 host 200.200.200.4 ! route-map blah permit 10 match ip address 100 set ip default next-hop 10.10.10.2 . . ! end
```

R2

```
R2# show running-config Building configuration... . ! ! interface Ethernet0/0 ip address 200.200.200.2 255.255.255.0 ip policy route-map blah ! interface Serial1/0 ip address 10.10.10.2 255.255.255.0 fair-queue ! interface Serial2/0 ip address 20.20.20.2 255.255.255.0 ! router ospf 1 !--- OSPF is not configured on Serial1/0. log-adjacency-changes network 20.20.20.0 0.0.0.255 area 0 network 200.200.200.0 0.0.0.255 area 0 ! ip classless no ip http server ! access-list 100 permit ip host 200.200.200.4 host 100.100.100.3 ! route-map blah permit 10 match ip address 100 set ip default next-hop 10.10.10.1 ! end
```

验证案例分析 1

目的路由在路由表中存在时，使用普通转发 - 不对数据包进行策略路由。

```
R1# show ip route 200.200.200.4 Routing entry for 200.200.200.0/24 Known via "ospf 1", distance
110, metric 74, type intra area Last update from 20.20.20.2 on Serial2/0, 00:11:48 ago Routing
Descriptor Blocks: * 20.20.20.2, from 30.30.30.3, 00:11:48 ago, via Serial2/0 Route metric is
74, traffic share count is 1 R1# debug ip policy Policy routing debugging is on *Dec 4
12:50:57.363: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match *Dec 4
12:50:57.363: IP: route map blah, item 10, permit *Dec 4 12:50:57.363: IP: s=100.100.100.3
(Ethernet0/0), d=200.200.200.4 (Serial2/0), len 100, policy rejected -- normal forwarding *Dec 4
12:50:57.431: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match *Dec 4
12:50:57.431: IP: route map blah, item 10, permit *Dec 4 12:50:57.431: IP: s=100.100.100.3
(Ethernet0/0), d=200.200.200.4 (Serial2/0), len 100, policy rejected -- normal forwarding *Dec 4
12:50:57.491: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match *Dec 4
12:50:57.491: IP: route map blah, item 10, permit *Dec 4 12:50:57.491: IP: s=100.100.100.3
(Ethernet0/0), d=200.200.200.4 (Serial2/0), len 100, policy rejected -- normal forwarding R2#
show ip route 100.100.100.3 Routing entry for 100.100.100.0/24 Known via "ospf 1", distance 110,
metric 74, type intra area Last update from 20.20.20.1 on Serial2/0, 00:11:42 ago Routing
Descriptor Blocks: * 20.20.20.1, from 100.100.100.1, 00:11:42 ago, via Serial2/0 Route metric is
74, traffic share count is 1 R2# debug ip policy Policy routing debugging is on *Dec 4
12:50:57.779: IP: s=200.200.200.4 (Ethernet0/0), d=100.100.100.3, len 100, policy match *Dec 4
12:50:57.779: IP: route map blah, item 10, permit *Dec 4 12:50:57.779: IP: s=200.200.200.4
(Ethernet0/0), d=100.100.100.3 (Serial2/0), len 100, policy rejected -- normal forwarding *Dec 4
12:50:57.839: IP: s=200.200.200.4 (Ethernet0/0), d=100.100.100.3, len 100, policy match *Dec 4
12:50:57.839: IP: route map blah, item 10, permit *Dec 4 12:50:57.839: IP: s=200.200.200.4
(Ethernet0/0), d=100.100.100.3 (Serial2/0), len 100, policy rejected -- normal forwarding *Dec 4
12:50:57.911: IP: s=200.200.200.4 (Ethernet0/0), d=100.100.100.3, len 100, policy match *Dec 4
12:50:57.911: IP: route map blah, item 10, permit *Dec 4 12:50:57.911: IP: s=200.200.200.4
(Ethernet0/0), d=100.100.100.3 (Serial2/0), len 100, policy rejected -- normal forwarding
```

Serial 2/0 关闭并且目标地址从路由表消失时，对数据包进行策略路由。

```
R1# show ip route 200.200.200.0 % Network not in table R1# *Dec 5 13:26:27.567: IP:
s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match *Dec 5 13:26:27.567: IP:
route map blah, item 10, permit *Dec 5 13:26:27.567: IP: s=100.100.100.3 (Ethernet0/0),
d=200.200.200.4 (Serial1/0),len 100, policy routed *Dec 5 13:26:27.567: IP: Ethernet0/0 to
Serial1/0 10.10.10.2 *Dec 5 13:26:27.655: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4,
len 100, policy match *Dec 5 13:26:27.655: IP: route map blah, item 10, permit *Dec 5
13:26:27.655: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4 (Serial1/0),len 100, policy
routed *Dec 5 13:26:27.655: IP: Ethernet0/0 to Serial1/0 10.10.10.2 *Dec 5 13:26:27.727: IP:
s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match *Dec 5 13:26:27.727: IP:
route map blah, item 10, permit *Dec 5 13:26:27.727: IP: s=100.100.100.3 (Ethernet0/0),
d=200.200.200.4 (Serial1/0),len 100, policy routed *Dec 5 13:26:27.727: IP: Ethernet0/0 to
Serial1/0 10.10.10.2
```

案例分析 2：使用 set ip next-hop 命令和动态路由协议 (DRP) 进行的策略路由

本部分使用以下配置：

R1

```
R1# show running-config Building configuration... . ! interface Ethernet0/0 ip address 100.100.100.1
255.255.255.0 ip policy route-map blah ! interface Serial1/0 ip address 10.10.10.1 255.255.255.0 !
interface Serial2/0 ip address 20.20.20.1 255.255.255.0 ! router ospf 1 !--- OSPF is not configured on
Serial1/0. log-adjacency-changes network 20.20.20.0 0.0.0.255 area 0 network 100.100.100.0 0.0.0.255 area 0
! ip classless no ip http server ! access-list 100 permit ip host 100.100.100.3 host 200.200.200.4 ! route-
map blah permit 10 match ip address 100 set ip next-hop 10.10.10.2 . . ! end
```

R2

```
R2# show running-config Building configuration... . ! !
interface Ethernet0/0 ip address 200.200.200.2
255.255.255.0 ip policy route-map blah ! interface
Serial1/0 ip address 10.10.10.2 255.255.255.0 fair-queue
! interface Serial2/0 ip address 20.20.20.2
255.255.255.0 ! router ospf 1 !--- OSPF is not
configured on Serial1/0. log-adjacency-changes network
20.20.20.0 0.0.0.255 area 0 network 200.200.200.0
0.0.0.255 area 0 ! ip classless no ip http server ! ! !
access-list 100 permit ip host 200.200.200.4 host
100.100.100.3 ! route-map blah permit 10 match ip
address 100 set ip next-hop 10.10.10.1 ! end
```

验证案例分析 2

验证下一跳 10.10.10.2 在路由表中是否存在。如果目的路由在路由表中存在，则下一跳可访问时对数据包进行策略路由。

```
R1# show ip route 200.200.200.4 Routing entry for 200.200.200.0/24 Known via "ospf 1", distance
110, metric 74, type intra area Last update from 20.20.20.2 on Serial2/0, 00:11:48 ago Routing
Descriptor Blocks: * 20.20.20.2, from 30.30.30.3, 00:11:48 ago, via Serial2/0 Route metric is
74, traffic share count is 1 R1# debug ip policy Policy routing debugging is on *Dec 4
12:53:38.271: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match *Dec 4
12:53:38.271: IP: route map blah, item 10, permit *Dec 4 12:53:38.271: IP: s=100.100.100.3
(Ethernet0/0), d=200.200.200.4 (Serial1/0), len 100, policy routed *Dec 4 12:53:38.271: IP:
Ethernet0/0 to Serial1/0 10.10.10.2 *Dec 4 12:53:38.355: IP: s=100.100.100.3 (Ethernet0/0),
d=200.200.200.4, len 100, policy match *Dec 4 12:53:38.355: IP: route map blah, item 10, permit
*Dec 4 12:53:38.355: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4 (Serial1/0), len 100,
policy routed *Dec 4 12:53:38.355: IP: Ethernet0/0 to Serial1/0 10.10.10.2 *Dec 4 12:53:38.483:
IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match *Dec 4 12:53:38.483:
IP: route map blah, item 10, permit R2# sh ip route 100.100.100.3 Routing entry for
100.100.100.0/24 Known via "ospf 1", distance 110, metric 74, type intra area Last update from
20.20.20.1 on Serial2/0, 00:11:42 ago Routing Descriptor Blocks: * 20.20.20.1, from
100.100.100.1, 00:11:42 ago, via Serial2/0 Route metric is 74, traffic share count is 1 R2#
debug ip policy Policy routing debugging is on *Dec 4 12:53:38.691: IP: s=200.200.200.4
(Ethernet0/0), d=100.100.100.3, len 100, policy match *Dec 4 12:53:38.691: IP: route map blah,
item 10, permit *Dec 4 12:53:38.691: IP: s=200.200.200.4 (Ethernet0/0), d=100.100.100.3
(Serial1/0), len 100, policy routed *Dec 4 12:53:38.691: IP: Ethernet0/0 to Serial1/0 10.10.10.1
*Dec 4 12:53:38.799: IP: s=200.200.200.4 (Ethernet0/0), d=100.100.100.3, len 100, policy match
*Dec 4 12:53:38.799: IP: route map blah, item 10, permit *Dec 4 12:53:38.799: IP:
s=200.200.200.4 (Ethernet0/0), d=100.100.100.3 (Serial1/0), len 100, policy routed *Dec 4
12:53:38.799: IP: Ethernet0/0 to Serial1/0 10.10.10.1 *Dec 4 12:53:38.899: IP: s=200.200.200.4
(Ethernet0/0), d=100.100.100.3, len 100, policy match *Dec 4 12:53:38.899: IP: route map blah,
item 10, permit
```

目标 IP 地址从路由消失时，对数据包进行策略路由。

```
*Dec 5 13:33:23.607: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match
*Dec 5 13:33:23.607: IP: route map blah, item 10, permit
*Dec 5 13:33:23.607: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4 (Serial1/0),len 100,
policy routed
*Dec 5 13:33:23.607: IP: Ethernet0/0 to Serial1/0 10.10.10.2
*Dec 5 13:33:23.707: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match
*Dec 5 13:33:23.707: IP: route map blah, item 10, permit
*Dec 5 13:33:23.707: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4 (Serial1/0),len 100,
policy routed
*Dec 5 13:33:23.707: IP: Ethernet0/0 to Serial1/0 10.10.10.2
*Dec 5 13:33:23.847: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match
*Dec 5 13:33:23.847: IP: route map blah, item 10, permit
```

Serial 1/0 接口关闭时，我们从路由表中松散下一跳 10.10.10.1，并且数据包遵循普通路由表。

```
*Dec 5 13:40:38.887: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match
```

```
*Dec 5 13:40:38.887: IP: route map blah, item 10, permit
*Dec 5 13:40:38.887: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4 (Serial2/0), len 100,
policy rejected -- normal forwarding
*Dec 5 13:40:39.047: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match
*Dec 5 13:40:39.047: IP: route map blah, item 10, permit
*Dec 5 13:40:39.047: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4 (Serial2/0), len 100,
policy rejected -- normal forwarding
*Dec 5 13:40:39.115: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match
*Dec 5 13:40:39.115: IP: route map blah, item 10, permit
*Dec 5 13:40:39.115: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4 (Serial2/0), len 100,
policy rejected -- normal forwarding
```

案例分析 3：使用 set ip default next-hop 和默认路由进行的策略路由

本部分使用以下配置：

R1

R1
R1# **show running-config** Building configuration... . ! interface Ethernet0/0 ip address 100.100.100.1 255.255.255.0 ip policy route-map blah ! interface Serial1/0 ip address 10.10.10.1 255.255.255.0 ! interface Serial2/0 ip address 20.20.20.1 255.255.255.0 ! ip route 0.0.0.0 0.0.0.0 20.20.20.2 ! ip classless no ip http server ! access-list 100 permit ip host 100.100.100.3 host 200.200.200.4 ! route-map blah permit 10 match ip address 100 set ip default next-hop 10.10.10.2 . . ! end

R2

R2# **show running-config** Building configuration... . ! ! interface Ethernet0/0 ip address 200.200.200.2 255.255.255.0 ip policy route-map blah ! interface Serial1/0 ip address 10.10.10.2 255.255.255.0 fair-queue ! interface Serial2/0 ip address 20.20.20.2 255.255.255.0 ! ip route 0.0.0.0 0.0.0.0 20.20.20.1 ! ip classless no ip http server ! ! ! access-list 100 permit ip host 200.200.200.4 host 100.100.100.3 ! route-map blah permit 10 match ip address 100 set ip default next-hop 10.10.10.1 ! end

验证案例分析 3

到目标的唯一路由是默认路由（路由表中该目标没有特定路由）时，对数据包进行策略路由。

R1# **show ip route 200.200.200.4** % Network not in table R1# **show ip route 0.0.0.0** Routing entry for 0.0.0.0/0, supernet Known via "static", distance 1, metric 0, candidate default path Routing Descriptor Blocks: * 20.20.20.2 Route metric is 0, traffic share count is 1 R1# *Dec 4 12:58:55.191: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match *Dec 4 12:58:55.191: IP: route map blah, item 10, permit *Dec 4 12:58:55.191: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4 (Serial1/0), len 100, policy routed *Dec 4 12:58:55.191: IP: Ethernet0/0 to Serial1/0 10.10.10.2 *Dec 4 12:58:55.291: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match *Dec 4 12:58:55.291: IP: route map blah, item 10, permit *Dec 4 12:58:55.291: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4 (Serial1/0), len 100, policy routed *Dec 4 12:58:55.291: IP: Ethernet0/0 to Serial1/0 10.10.10.2 *Dec 4 12:58:55.391: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match *Dec 4 12:58:55.391: IP: route map blah, item 10, permit *Dec 4 12:58:55.391: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4 (Serial1/0), len 100, policy routed *Dec 4 12:58:55.391: IP: Ethernet0/0 to Serial1/0 10.10.10.2 R2# **show ip route 100.100.100.3** % Network not in table R2# **show ip route 0.0.0.0** Routing entry for 0.0.0.0/0, supernet Known via "static", distance 1, metric 0, candidate default path Routing Descriptor Blocks: * 20.20.20.1 Route metric is 0, traffic share

```
count is 1 R2# *Dec 4 12:58:20.819: %SYS-5-CONFIG_I: Configured from console by console *Dec 4
12:58:55.611: IP: s=200.200.200.4 (Ethernet0/0), d=100.100.100.3, len 100, policy match *Dec 4
12:58:55.611: IP: route map blah, item 10, permit *Dec 4 12:58:55.611: IP: s=200.200.200.4
(Ethernet0/0), d=100.100.100.3 (Serial1/0), len 100, policy routed *Dec 4 12:58:55.611: IP:
Ethernet0/0 to Serial1/0 10.10.10.1 *Dec 4 12:58:55.739: IP: s=200.200.200.4 (Ethernet0/0),
d=100.100.100.3, len 100, policy match *Dec 4 12:58:55.739: IP: route map blah, item 10, permit
*Dec 4 12:58:55.739: IP: s=200.200.200.4 (Ethernet0/0), d=100.100.100.3 (Serial1/0), len 100,
policy routed *Dec 4 12:58:55.739: IP: Ethernet0/0 to Serial1/0 10.10.10.1 *Dec 4 12:58:55.799:
IP: s=200.200.200.4 (Ethernet0/0), d=100.100.100.3, len 100, policy match *Dec 4 12:58:55.799:
IP: route map blah, item 10, permit *Dec 4 12:58:55.799: IP: s=200.200.200.4 (Ethernet0/0),
d=100.100.100.3 (Serial1/0), len 100, policy routed *Dec 4 12:58:55.799: IP: Ethernet0/0 to
Serial1/0 10.10.10.1
```

默认路由由于 Serial 2/0 关闭而不存在时，对数据包进行策略路由。

```
R1# show ip route 0.0.0.0 % Network not in table R1# *Dec 5 13:02:31.283: IP: s=100.100.100.3
(Ethernet0/0), d=200.200.200.4, len 100, policy match *Dec 5 13:02:31.283: IP: route map blah,
item 10, permit *Dec 5 13:02:31.283: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4
(Serial1/0),len 100, policy routed *Dec 5 13:02:31.283: IP: Ethernet0/0 to Serial1/0 10.10.10.2
*Dec 5 13:02:31.375: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match
*Dec 5 13:02:31.375: IP: route map blah, item 10, permit *Dec 5 13:02:31.375: IP:
s=100.100.100.3 (Ethernet0/0), d=200.200.200.4 (Serial1/0),len 100, policy routed *Dec 5
13:02:31.375: IP: Ethernet0/0 to Serial1/0 10.10.10.2 *Dec 5 13:02:31.435: IP: s=100.100.100.3
(Ethernet0/0), d=200.200.200.4, len 100, policy match *Dec 5 13:02:31.435: IP: route map blah,
item 10, permit *Dec 5 13:02:31.435: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4
(Serial1/0),len 100, policy routed *Dec 5 13:02:31.435: IP: Ethernet0/0 to Serial1/0 10.10.10.2
```

在 Serial2/0 打开并且 Serial 1/0 关闭的情况下，我们松开下一跳并且数据包遵循普通转发（路由表）- 策略被拒绝。

```
R1# debug ip policy Policy routing debugging is on R1# *Dec 5 12:46:49.543: IP: s=100.100.100.3
(Ethernet0/0), d=200.200.200.4, len 100, policy match *Dec 5 12:46:49.543: IP: route map blah,
item 10, permit *Dec 5 12:46:49.543: IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4
(Serial2/0),len 100, policy rejected -- normal forwarding *Dec 5 12:46:49.623: IP:
s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match *Dec 5 12:46:49.623: IP:
route map blah, item 10, permit *Dec 5 12:46:49.623: IP: s=100.100.100.3 (Ethernet0/0),
d=200.200.200.4 (Serial2/0),len 100, policy rejected -- normal forwarding *Dec 5 12:46:49.691:
IP: s=100.100.100.3 (Ethernet0/0), d=200.200.200.4, len 100, policy match *Dec 5 12:46:49.691:
IP: route map blah, item 10, permit *Dec 5 12:46:49.691: IP: s=100.100.100.3 (Ethernet0/0),
d=200.200.200.4 (Serial2/0),len 100, policy rejected -- normal forwarding
```

故障排除

目前没有针对此配置的故障排除信息。

相关信息

- IP可被路由的协议技术支持
- 技术支持和文档 - Cisco Systems