

为FMC管理的FTD配置双ISP故障切换

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简介

本文档介绍如何在由FMC管理的FTD上使用PBR和IP SLA配置双ISP故障切换。

先决条件

要求

Cisco 建议您了解以下主题：

- 策略型路由 (PBR)
- Internet协议服务级别协议(IP SLA)
- Firepower Management Center (FMC)
- Firepower Threat Defense (FTD)

使用的组件

本文档中的信息基于以下软件和硬件版本：

- FMCv 7.3.0
- FTDv 7.3.0

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您的网络处于活动状态，请确保您了解所有命令的潜在影响。

背景信息

静态路由跟踪功能概述

静态路由跟踪功能允许FTD在主租用线路不可用时使用到辅助ISP的连接。为了实现此冗余，FTD将静态路由与您定义的监控目标关联。SSLA操作使用定期ICMP回应请求监控目标。

如果未收到回应应答，则会将该对象视为关闭，并从路由表中删除关联的路由。并用以前配置的备份路由代替所删除的路由。当使用备份路由时，SLA监控操作会继续尝试访问监控目标。

目标再次可用后，将替换路由表中的第一个路由，并删除备份路由。

现在，您可以同时配置多个下一跳和基于策略的路由转发操作。当流量与路由标准匹配时，系统将尝试按照您指定的顺序将流量转发到IP地址，直到成功为止。

此功能在运行版本7.1及更高版本，由FMC 7.3及更高版本管理的FTD设备上可用。

配置

网络图

下图为网络图示例。

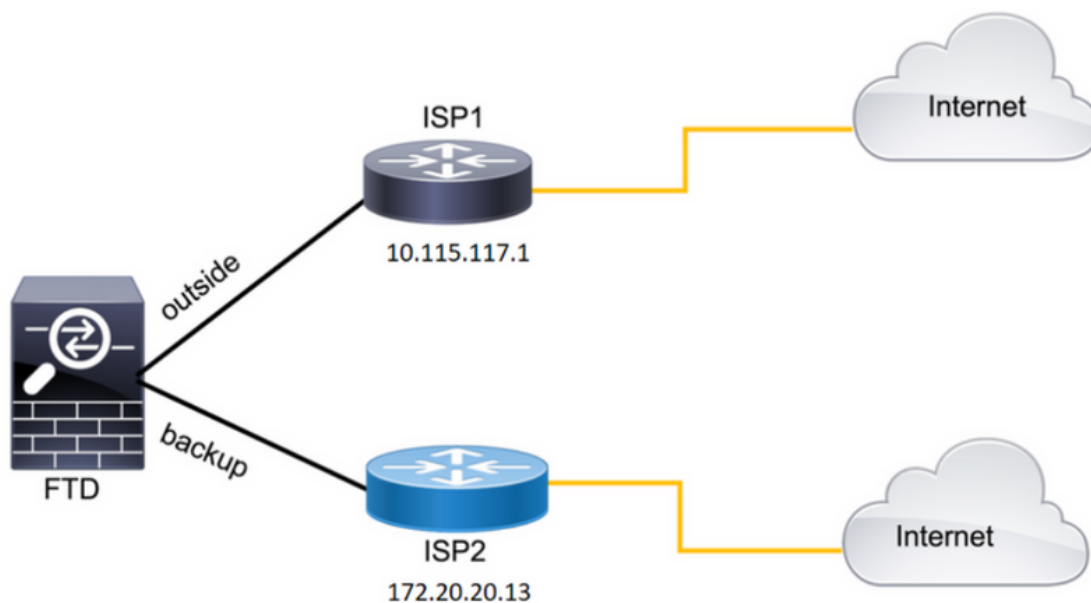


图1.图示例。

ISP1 = 10.115.117.1

ISP2 = 172.20.20.13

配置

步骤1:配置SLA监控器对象。

在FMC上，导航至 `Object > Object Management > SLA Monitor > Add SLA Monitor` 并为ISP IP地址添加SLA监控器对

象。

主默认网关(ISP1)的SLA监控。

Edit SLA Monitor Object ?

| | |
|--|---|
| Name: <input type="text" value="SAL1"/> | Description: <input type="text"/> |
| Frequency (seconds): <input type="text" value="60"/> <small>(1-604800)</small> | SLA Monitor ID*: <input type="text" value="1"/> |
| Threshold (milliseconds): <input type="text" value="5000"/> <small>(0-60000)</small> | Timeout (milliseconds): <input type="text" value="5000"/> <small>(0-604800000)</small> |
| Data Size (bytes): <input type="text" value="28"/> <small>(0-16384)</small> | ToS: <input type="text" value="0"/> |
| Number of Packets: <input type="text" value="1"/> | Monitor Address*: <input type="text" value="10.115.117.1"/> |
| Available Zones ↻ <input type="text" value="Search"/> Backbone Backup new Outside VLAN2816 | Selected Zones/Interfaces Outside |

图2.SLA1监控配置窗口。

辅助默认网关(ISP2)的SLA监控器。

Edit SLA Monitor Object ?

| | |
|---|---|
| Name: <input type="text" value="SLA2"/> | Description: <input type="text"/> |
| Frequency (seconds): <input type="text" value="60"/> <small>(1-604800)</small> | SLA Monitor ID*: <input type="text" value="2"/> |
| Threshold (milliseconds): <input type="text" value="5000"/> <small>(0-60000)</small> | Timeout (milliseconds): <input type="text" value="5000"/> <small>(0-604800000)</small> |
| Data Size (bytes): <input type="text" value="28"/> <small>(0-16384)</small> | ToS: <input type="text" value="0"/> |
| Number of Packets: <input type="text" value="1"/> | Monitor Address*: <input type="text" value="172.20.20.13"/> |
| Available Zones ↻ <input type="text" value="Search"/> Backbone Add Backup new Outside VLAN2816 | Selected Zones/Interfaces Backup 🗑 |

图3.SLA2监控配置窗口。

第二步：使用路由跟踪配置静态路由。

在FMC上，导航至 `Device > Device Management > Edit the desired FTD > Routing > Static Routes`，并使用正确的SLA监控器添加静态路由。


SLA监控器必须是监控默认网关的监控器。


主默认网关的静态路由：

Edit Static Route Configuration ?

Type: IPv4 IPv6


Interface*

(Interface starting with this icon  signifies it is available for route leak)

Available Network  +

- 10.10.10.1
- 10.117.0.250
- 10.34.24.91
- 172.16.0.20
- 172.20.20.13
- 192.168.1.20

Selected Network

- any-ipv4 

Ensure that egress virtualrouter has route to that destination

Gateway
 +

Metric:

(1 - 254)

Tunneled: (Used only for default Route)

Route Tracking:
 +


图4. 外部接口的静态路由配置窗口。

辅助默认网关的静态路由。

Edit Static Route Configuration ?

Type: IPv4 IPv6

Interface*

(Interface starting with this icon  signifies it is available for route leak)

Available Network ↻ +

10.10.10.1

10.117.0.250

10.34.24.91

172.16.0.20

172.20.20.13

192.168.1.20

Selected Network

any-ipv4 🗑

Add

Ensure that egress virtualrouter has route to that destination

Gateway
 +

Metric:

(1 - 254)

Tunneled: (Used only for default Route)

Route Tracking:
 +

图5.备份接口的静态路由配置窗口。

第三步：配置策略基本路由。

导航至 Device > Device Management > Edit the desired FTD > Routing > Policy Based Routing, 添加PBR，并选择入口接口

。

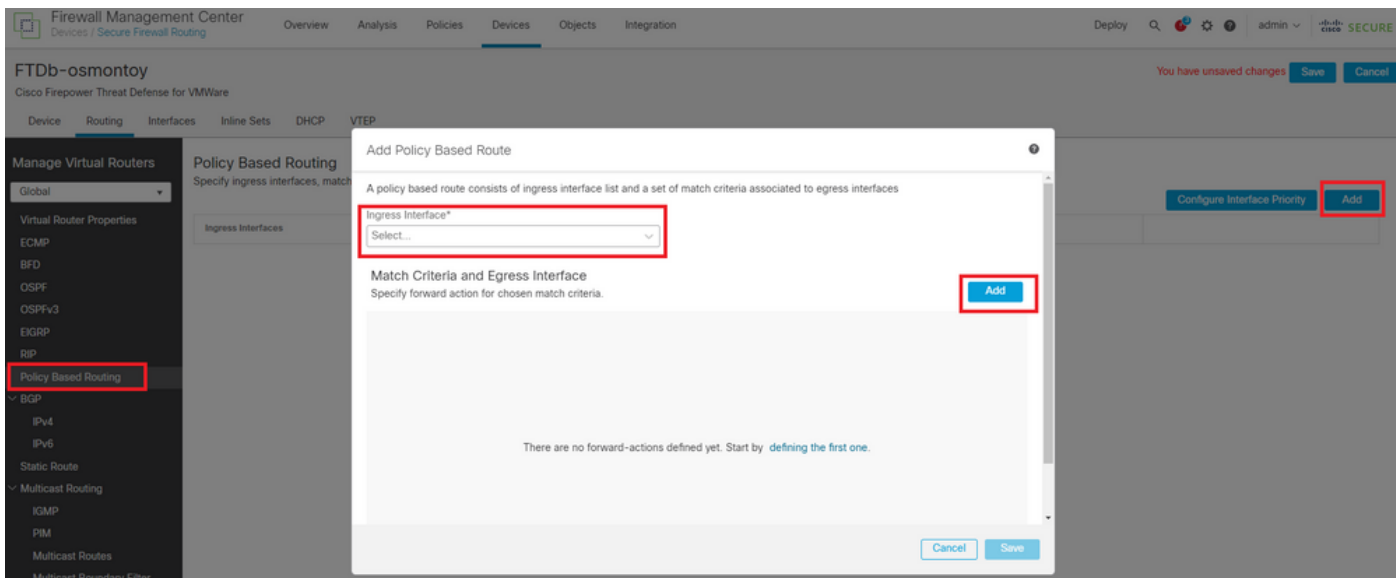


图6.PBR配置窗口。

配置转发操作。

- 选择或添加要匹配的新访问控制列表。
- 选择IP Address 从 Send to 选项。
- 在本示例中，10.115.117.234是FTD内部IP地址。

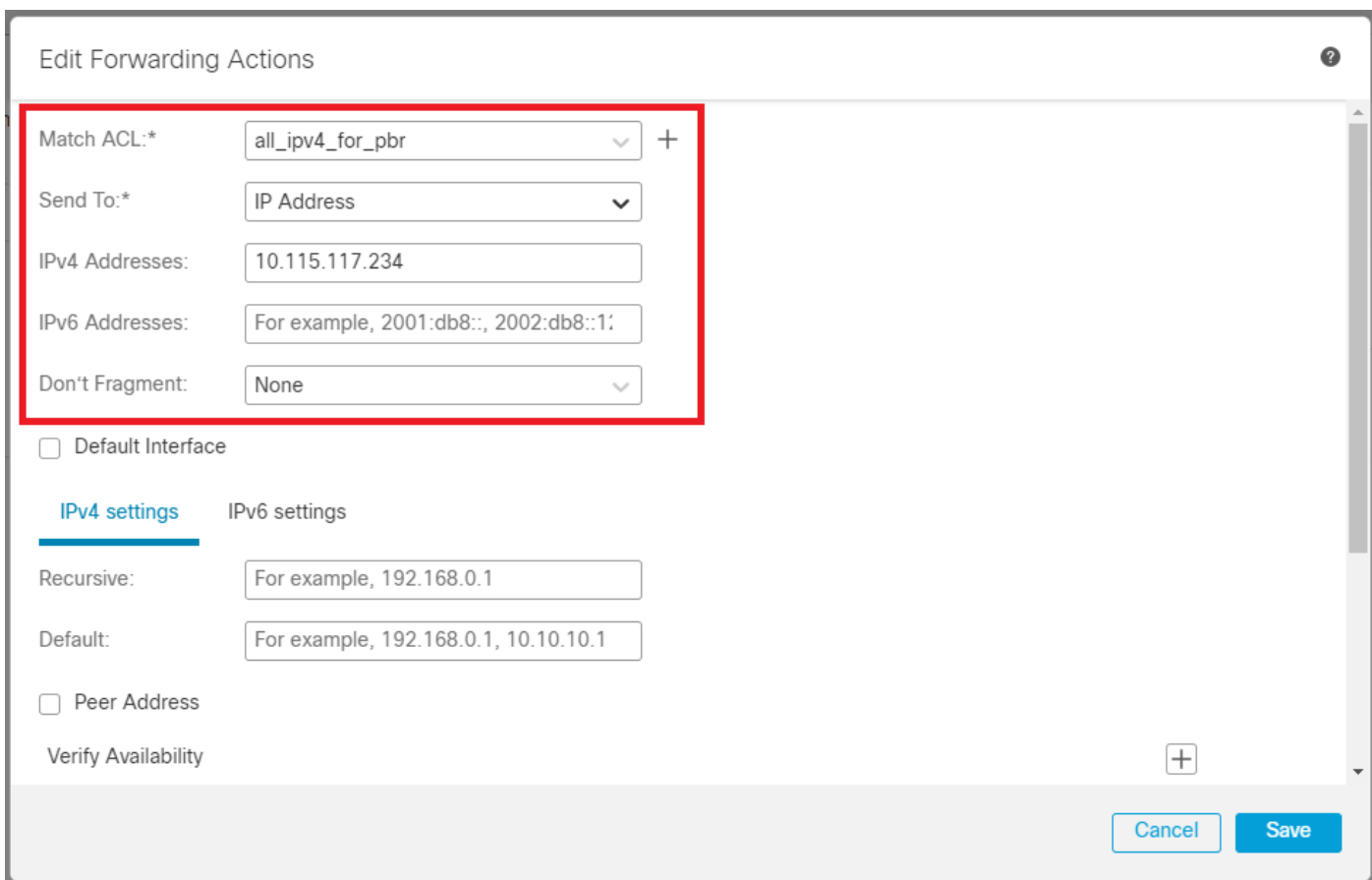


图7.Forwarding Actions配置窗口。

向下滚动并添加 **Verify Availability** 值。

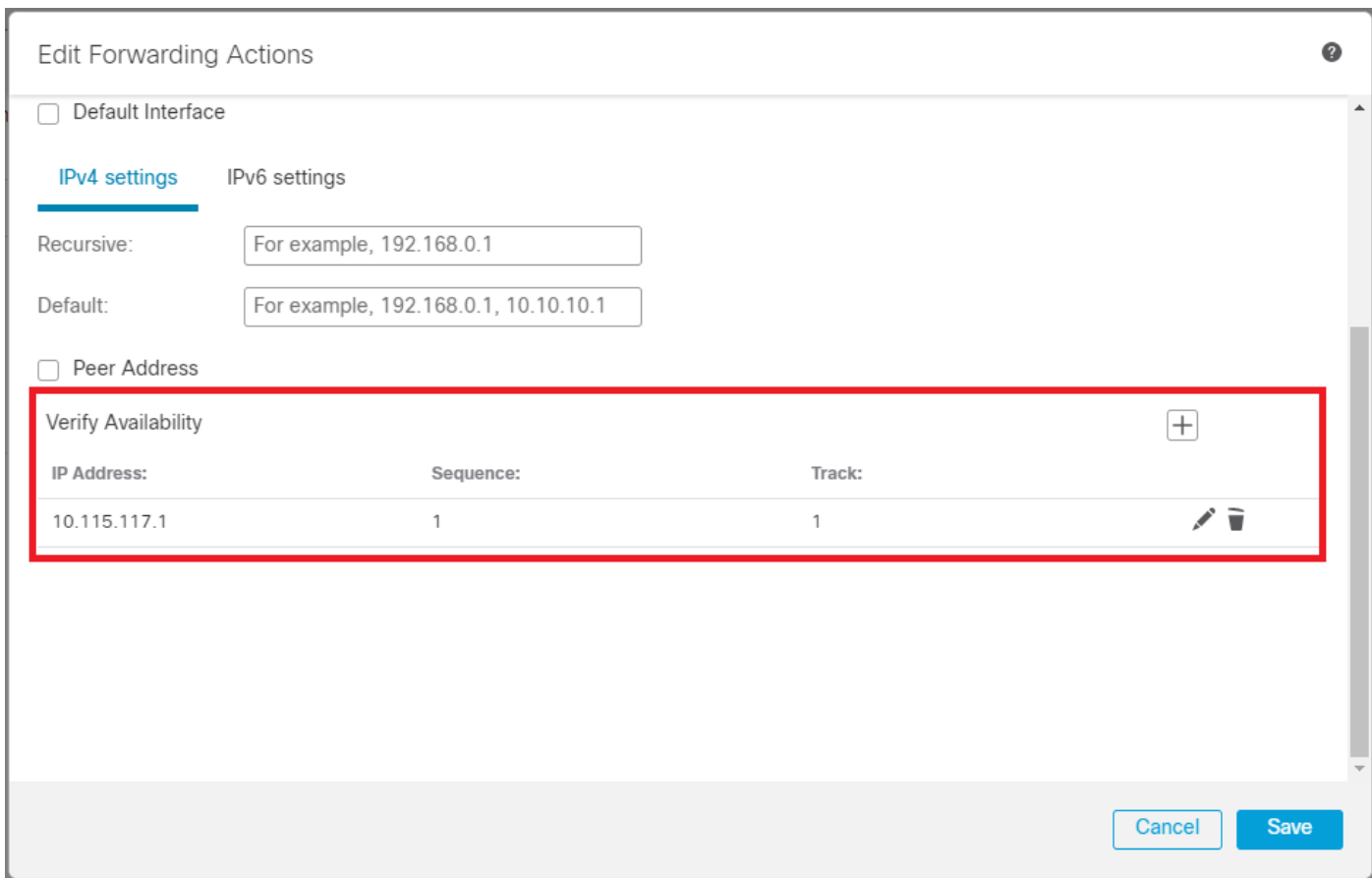


图8.Forwarding Actions配置窗口。

对备份接口重复相同的过程。但是，请确保使用不同的访问控制列表对象。

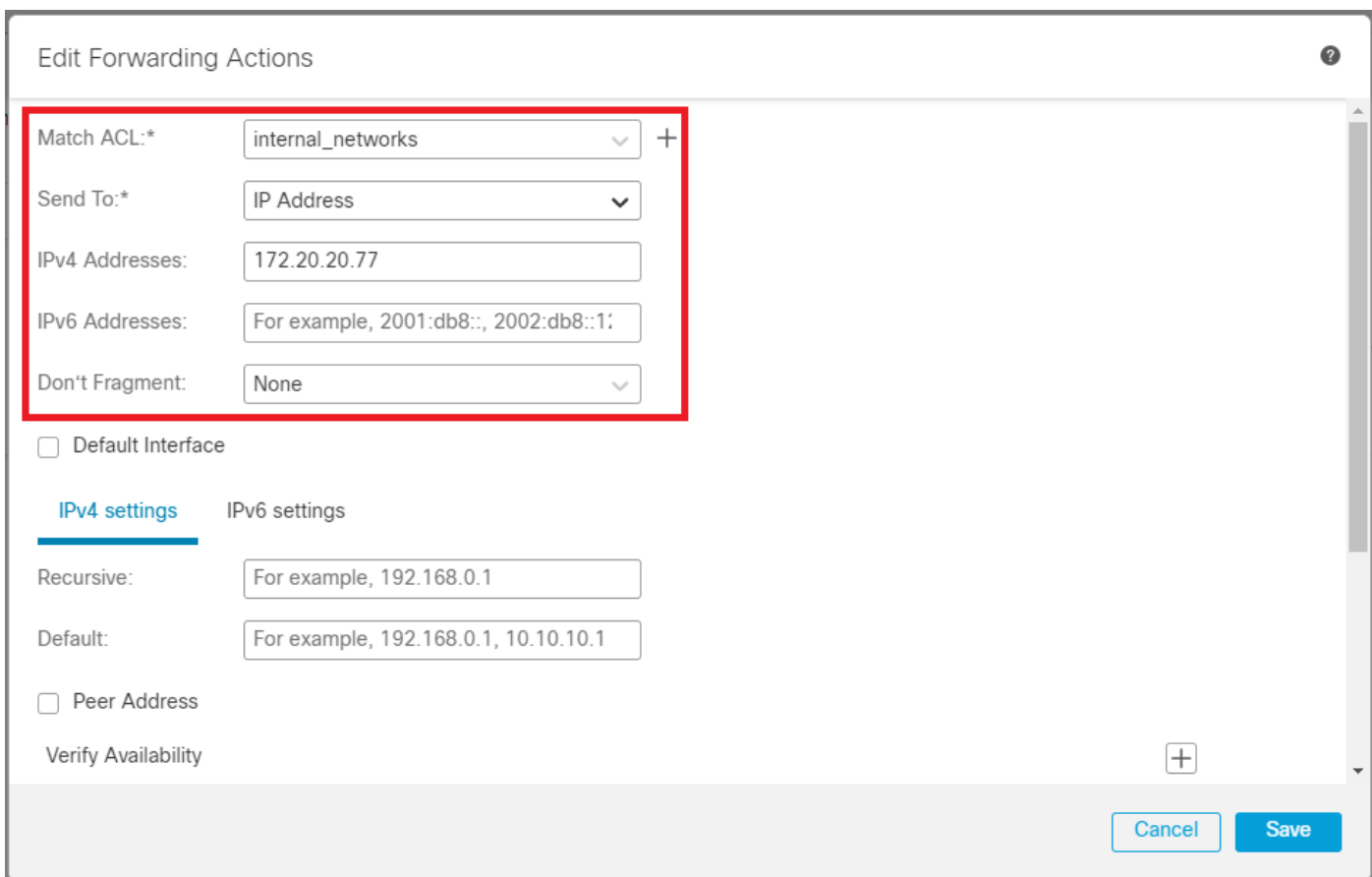
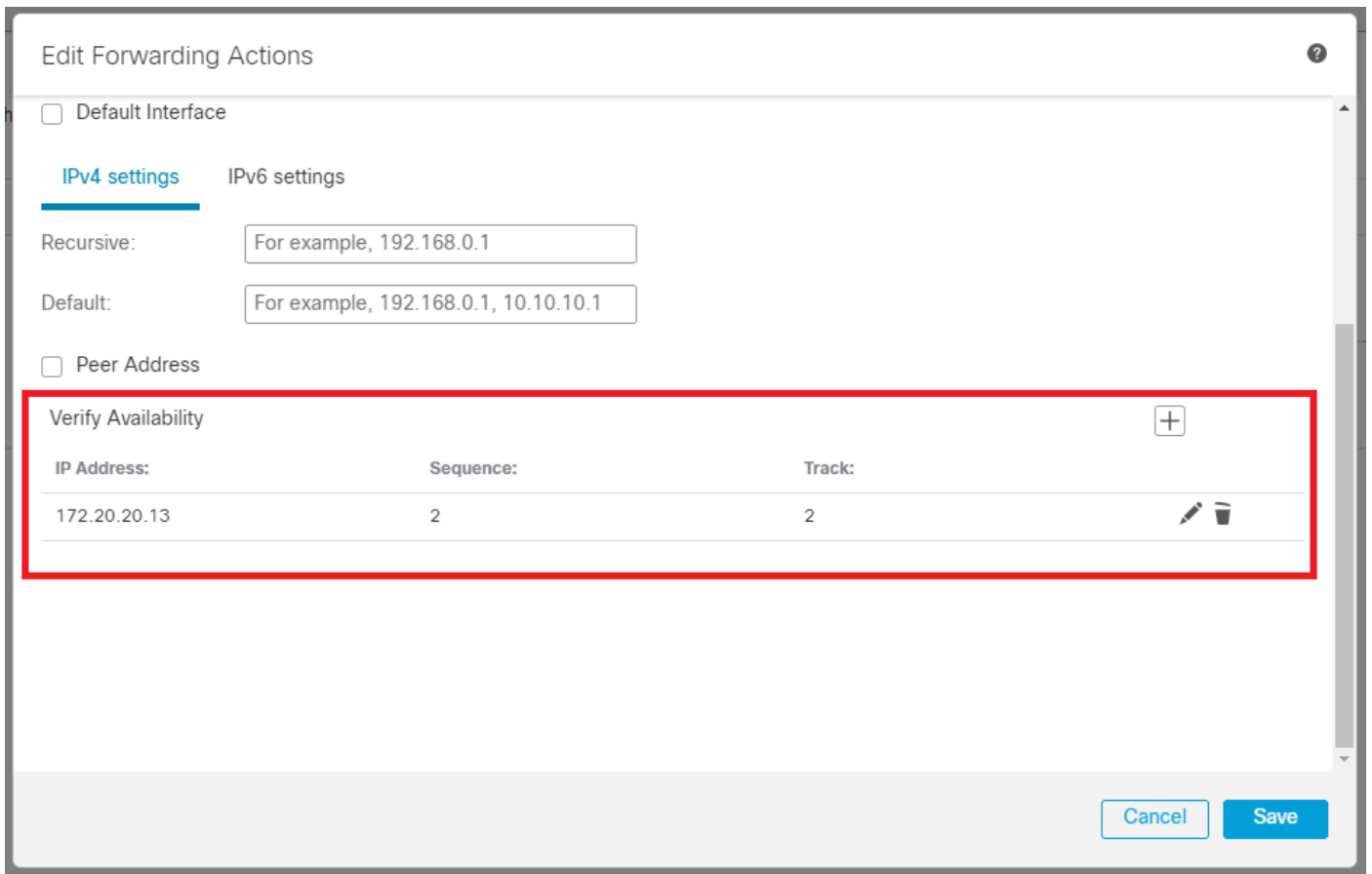


图9.Forwarding Actions配置窗口

对重复相同的过程Verify Availability配置，但现在已配置了ISP2。



映像10.检验可用性配置。

验证您的配置。

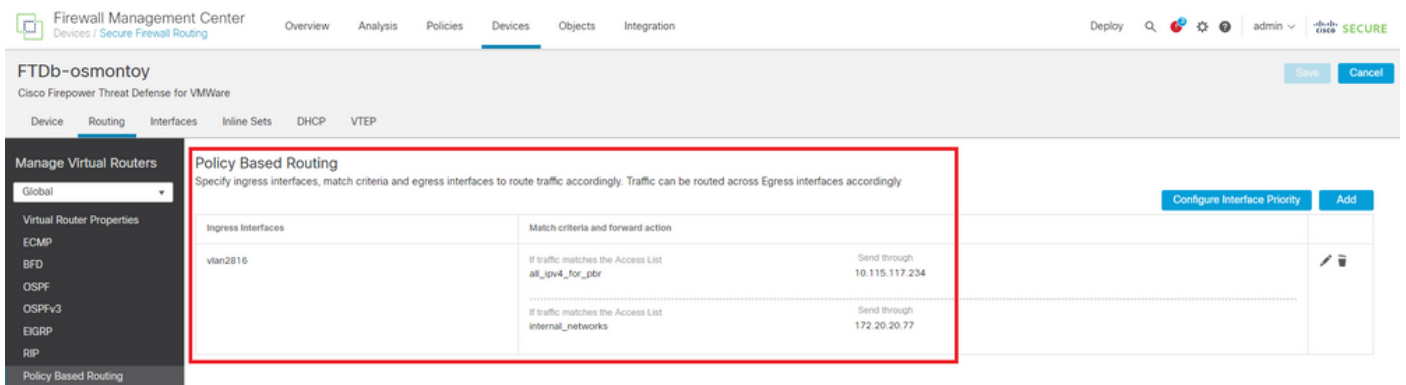


图11.PBR配置。

验证

通过安全外壳(SSH)访问FTD并使用命令 `system support disagnotics-cli` 并运行以下命令：

- `show route-map`：此命令显示路由映射配置。

```
<#root>
```

```
firepower#
```

```
show route-map
```

```
route-map FMC_GENERATED_PBR_1679065711925
```

```
, permit, sequence 5
```

```
Match clauses:
```

```
ip address (access-lists): internal_networks
```

```
Set clauses:
```

```
ip next-hop verify-availability 10.115.117.1 1
```

```
track 1 [up]
```

```
ip next-hop 10.115.117.234
```

```
route-map FMC_GENERATED_PBR_1679065711925, permit, sequence 10
```

```
Match clauses:
```

```
ip address (access-lists): all_ipv4_for_pbr
```

```
Set clauses:
```

```
ip next-hop verify-availability 172.20.20.13 2
```

```
track 2 [up]
```

```
ip next-hop 172.20.20.77
```

```
firepower#
```

- show running-config sla monitor : 此命令显示SLA配置。

```
<#root>
```

```
firepower#
```

```
show running-config sla monitor
```

```
sla monitor 1
```

```
type echo protocol ipIcmpEcho 10.115.117.1 interface outside
```

```
sla monitor schedule 1 life forever start-time now
```

```
sla monitor 2
```

```
type echo protocol ipIcmpEcho 172.20.20.13 interface backup
```

```
sla monitor schedule 2 life forever start-time now
```

```
firepower#
```

- show sla monitor configuration : 此命令显示SLA配置值。

<#root>

firepower#

show sla monitor configuration

SA Agent, Infrastructure Engine-II
Entry number:

1

Owner:
Tag:
Type of operation to perform: echo

Target address: 10.115.117.1

Interface: outside
Number of packets: 1
Request size (ARR data portion): 28
Operation timeout (milliseconds): 5000
Type Of Service parameters: 0x0
Verify data: No
Operation frequency (seconds): 60
Next Scheduled Start Time: Start Time already passed
Group Scheduled : FALSE
Life (seconds): Forever
Entry Ageout (seconds): never
Recurring (Starting Everyday): FALSE
Status of entry (SNMP RowStatus): Active
Enhanced History:

Entry number:

2

Owner:
Tag:
Type of operation to perform: echo

Target address: 172.20.20.13

Interface: backup
Number of packets: 1
Request size (ARR data portion): 28
Operation timeout (milliseconds): 5000
Type Of Service parameters: 0x0
Verify data: No
Operation frequency (seconds): 60
Next Scheduled Start Time: Start Time already passed
Group Scheduled : FALSE
Life (seconds): Forever
Entry Ageout (seconds): never
Recurring (Starting Everyday): FALSE
Status of entry (SNMP RowStatus): Active
Enhanced History:

- show sla monitor operational-state : 此命令显示SLA操作的运行状态。

<#root>

firepower#

show sla monitor operational-state

Entry number: 1

Modification time: 15:48:04.332 UTC Fri Mar 17 2023

Number of Octets Used by this Entry: 2056

Number of operations attempted: 74

Number of operations skipped: 0

Current seconds left in Life: Forever

Operational state of entry: Active

Last time this entry was reset: Never

Connection loss occurred: FALSE

Timeout occurred: FALSE

Over thresholds occurred: FALSE

Latest RTT (milliseconds): 1

Latest operation start time: 17:01:04.334 UTC Fri Mar 17 2023

Latest operation return code: OK

RTT Values:

RTTAvg: 1 RTTMin: 1 RTTMax: 1

NumOfRTT: 1 RTTSum: 1 RTTSum2: 1

Entry number: 2

Modification time: 15:48:04.335 UTC Fri Mar 17 2023

Number of Octets Used by this Entry: 2056

Number of operations attempted: 74

Number of operations skipped: 0

Current seconds left in Life: Forever

Operational state of entry: Active

Last time this entry was reset: Never

Connection loss occurred: FALSE

Timeout occurred: FALSE

Over thresholds occurred: FALSE

Latest RTT (milliseconds): 1

Latest operation start time: 17:01:04.337 UTC Fri Mar 17 2023

Latest operation return code: OK

RTT Values:

RTTAvg: 1 RTTMin: 1 RTTMax: 1

NumOfRTT: 1 RTTSum: 1 RTTSum2: 1

- show track : 此命令显示有关SLA跟踪进程跟踪的对象的信息。

```
<#root>
```

```
firepower#
```

```
show track
```

```
Track 1
```

```
Response Time Reporter 1 reachability
```

```
Reachability is Up
```

```
4 changes, last change 00:53:42  
Latest operation return code: OK  
Latest RTT (milliseconds) 1  
Tracked by:  
ROUTE-MAP 0  
STATIC-IP-ROUTING 0
```

```
Track 2
```

```
Response Time Reporter 2 reachability
```

```
Reachability is Up
```

```
2 changes, last change 01:13:41  
Latest operation return code: OK  
Latest RTT (milliseconds) 1  
Tracked by:  
ROUTE-MAP 0  
STATIC-IP-ROUTING 0
```

- show running-config route : 此命令显示当前路由配置。

```
<#root>
```

```
firepower#
```

```
show running-config route
```

```
route
```

```
outside
```

```
0.0.0.0 0.0.0.0 10.115.117.1 1
```

```
track 1
```

```
route
```

```
backup
```

```
0.0.0.0 0.0.0.0 172.20.20.13 254
```

```
track 2
```

```
route v1an2816 10.42.0.37 255.255.255.255 10.43.0.1 254
firepower#
```

- show route : 此命令显示数据接口的路由表。

```
<#root>
```

```
firepower#
```

```
show route
```

```
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, V - VPN
i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
ia - IS-IS inter area, * - candidate default, U - per-user static route
o - ODR, P - periodic downloaded static route, + - replicated route
SI - Static InterVRF, BI - BGP InterVRF
Gateway of last resort is 10.115.117.1 to network 0.0.0.0
```

```
S* 0.0.0.0 0.0.0.0 [1/0] via 10.115.117.1, outside
```

```
S 10.0.0.0 255.0.0.0 [1/0] via 10.88.243.1, backbone
C 10.88.243.0 255.255.255.0 is directly connected, backbone
L 10.88.243.67 255.255.255.255 is directly connected, backbone
C 10.115.117.0 255.255.255.0 is directly connected, outside
L 10.115.117.234 255.255.255.255 is directly connected, outside
C 10.42.0.0 255.255.255.0 is directly connected, v1an2816
L 10.42.0.1 255.255.255.255 is directly connected, v1an2816
S 10.42.0.37 255.255.255.255 [254/0] via 10.43.0.1, v1an2816
C 172.20.20.0 255.255.255.0 is directly connected, backup
L 172.20.20.77 255.255.255.255 is directly connected, backup
```

当主链路发生故障时：

- show route-map : 此命令在链路发生故障时显示路由映射配置。

```
<#root>
```

```
firepower#
```

```
show route-map FMC_GENERATED_PBR_1679065711925
```

```
route-map FMC_GENERATED_PBR_1679065711925, permit, sequence 5
Match clauses:
```



```
ip address (access-lists): internal_networks
```

```
Set clauses:
```

```
ip next-hop verify-availability 10.115.117.1 1
```

```
track 1 [down]
```

```
ip next-hop 10.115.117.234
```

```
route-map FMC_GENERATED_PBR_1679065711925, permit, sequence 10
```

```
Match clauses:
```

```
ip address (access-lists): all_ipv4_for_pbr
```

```
Set clauses:
```

```
ip next-hop verify-availability 172.20.20.13 2
```

```
track 2 [up]
```

```
ip next-hop 172.20.20.77
```

```
firepower#
```

- `show route` : 此命令显示每个接口的新路由表。

```
<#root>
```

```
firepower#
```

```
show route
```

```
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP  
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area  
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2  
E1 - OSPF external type 1, E2 - OSPF external type 2, V - VPN  
i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2  
ia - IS-IS inter area, * - candidate default, U - per-user static route  
o - ODR, P - periodic downloaded static route, + - replicated route  
SI - Static InterVRF, BI - BGP InterVRF  
Gateway of last resort is 10.115.117.1 to network 0.0.0.0
```

```
S* 0.0.0.0 0.0.0.0 [1/0] via 172.20.20.13, backup
```

```
S 10.0.0.0 255.0.0.0 [1/0] via 10.88.243.1, backbone  
C 10.88.243.0 255.255.255.0 is directly connected, backbone  
L 10.88.243.67 255.255.255.255 is directly connected, backbone  
C 10.115.117.0 255.255.255.0 is directly connected, outside  
L 10.115.117.234 255.255.255.255 is directly connected, outside  
C 10.42.0.0 255.255.255.0 is directly connected, vlan2816  
L 10.42.0.1 255.255.255.255 is directly connected, vlan2816  
S 10.42.0.37 255.255.255.255 [254/0] via 10.43.0.1, vlan2816  
C 172.20.20.0 255.255.255.0 is directly connected, backup  
L 172.20.20.77 255.255.255.255 is directly connected, backup
```

相关信息

- [思科安全防火墙管理中心管理指南, 7.3](#)
- [技术支持和文档 - Cisco Systems](#)

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