

排除FTD的Traceroute故障，即使成功执行ICMP Ping操作也不会显示跳信息

问题

可以看到以下所有症状：

- Traceroute故障：从思科防火墙威胁防御(FTD)设备直接发起的traceroute命令在针对外部IP地址时，始终只返回***所有跃点。
- 成功连接：对同一目标的ICMP ping测试成功，并且访问控制策略中明确允许ICMP流量。

此行为可防止对源自FTD设备的流量的路径跳数的可视性，从而影响网络路径故障排除工作。

示例

对目标执行ping操作成功：

```
<#root>
```

```
firepower#
```

```
ping 192.168.203.89
```

```
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 192.168.203.89, timeout is 2 seconds:
```

```
!!!!!
```

```
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/10 ms
```

但traceroute不是：

```
<#root>
```

```
firepower#
```

```
traceroute 192.168.203.89
```

```
Type escape sequence to abort.
```

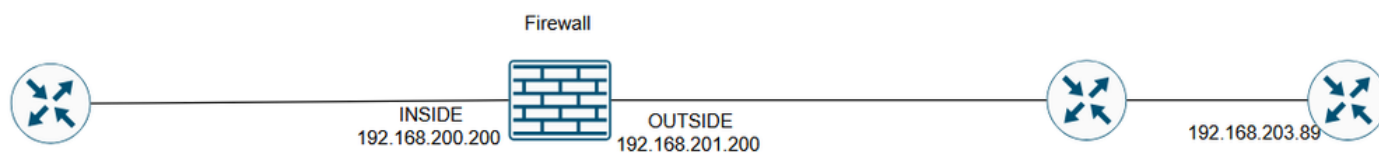
```
Tracing the route to 192.168.203.89
```

```
 1*  *  *  
 2*  *  *  
 3*  *  *  
...  
30*  *  *  
firepower#
```

环境

- 思科安全防火墙威胁防御(FTD)。
- 第一次观察时间：7.4、7.4.2.3、7.6.2。其他版本也可能受到影响。
- 用于管理的思科安全防火墙管理中心(FMC/cdFMC/FDM)。
- 使用的静态NAT规则，包括双向配置。
- 从FTD CLI (Lina模式) 执行的traceroute命令。
- 访问控制策略中允许ICMP。

拓扑



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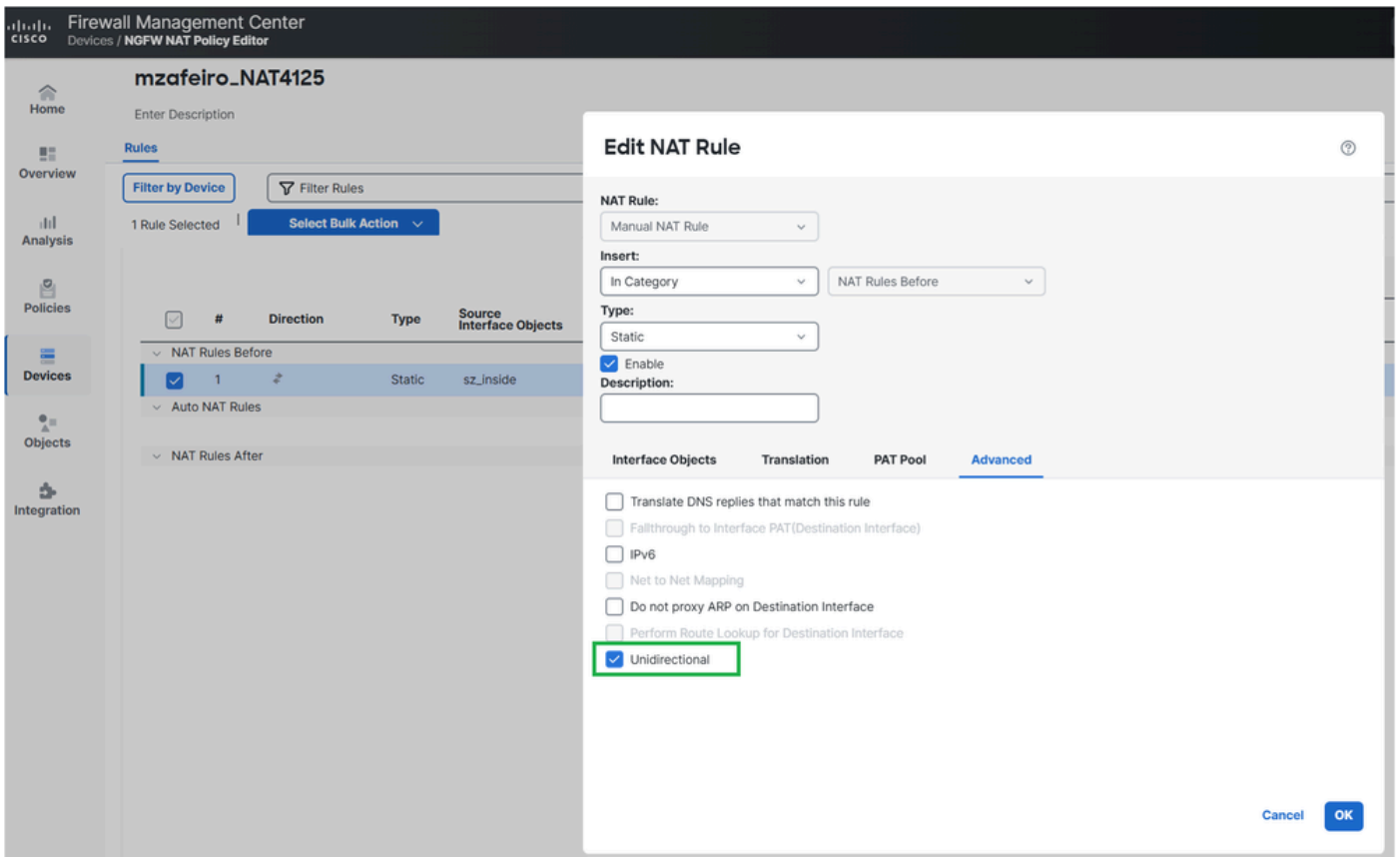
分辨率

可能的解决方案取决于配置的NAT规则的用途。

解决方案 1

如果目标是仅为出站访问转换内部服务器IP，则可以将NAT规则配置为单向规则。

在FMC上，可以通过NAT规则Advanced选项完成此操作：



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部署的NAT配置：

```
<#root>
```

```
firepower#
```

```
show run nat
```

```
nat (INSIDE,OUTSIDE) source static server_host interface unidirectional  
firepower#
```

确认

```
<#root>
```

```
firepower#
```

```
traceroute 192.168.203.89
```

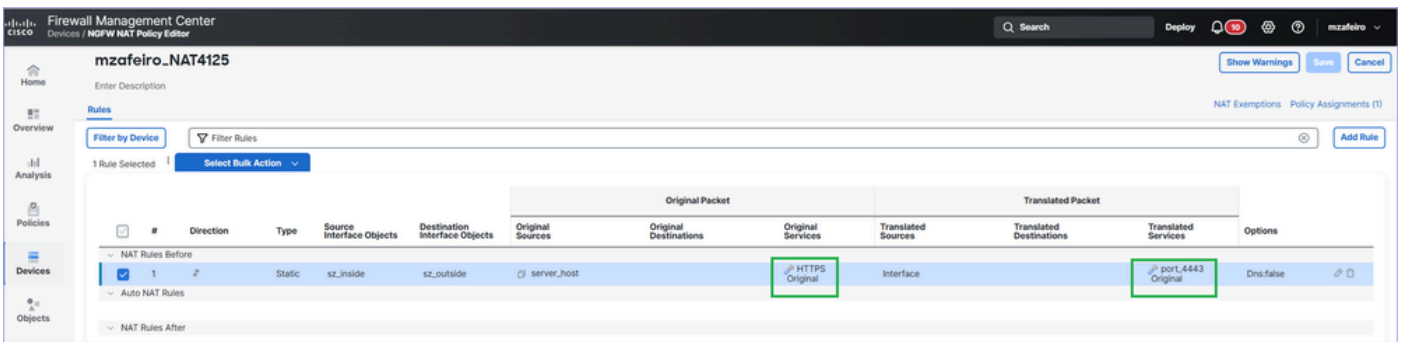
Type escape sequence to abort.

Tracing the route to 192.168.203.89

```
1 192.168.201.88 2 msec 2 msec 2 msec
2 192.168.203.89 1 msec * 1 msec
```

解决方案 2

如果目标是从外部访问内部服务器，则可以通过配置端口转发使NAT规则更加具体：



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部署的NAT配置：

```
<#root>
```

```
firepower#
```

```
show run nat
```

```
nat (INSIDE,OUTSIDE) source static server_host interface service SVC_25769850586 SVC_25769850587
```

确认

```
<#root>
```

```
firepower#
```

```
traceroute 192.168.203.89
```

```
Type escape sequence to abort.  
Tracing the route to 192.168.203.89  
 1 192.168.201.88 2 msec 2 msec 2 msec  
 2 192.168.203.89 1 msec * 1 msec
```

运行原理

工作原理

ping

1. 防火墙发送回应请求 (ICMP类型8代码0) 消息。
2. 为ICMP创建新的防火墙连接。
3. 防火墙收到应答 (ICMP类型0代码0) 消息。
4. 该消息与步骤2中创建的连接匹配。
5. 回应应答消息被防火墙占用。

Traceroute

1. 防火墙将三个UDP数据包从端口33434、33435和33436发往使用TTL 1的目的地。
2. 为UDP创建了新的防火墙连接。
3. 防火墙接收传输过程中超出的ICMP TTL (类型11代码0) 或无法到达的ICMP端口 (类型3代码3) 。
4. 一旦ICMP数据包到达防火墙，它们将被视为不同于步骤2中的UDP数据包的连接。

这在Wireshark中可以看到：

No.	Time	Delta	Source	Destination	Protocol	Length	Total Length	Identification	Source Port	Destination Port	Info
1	2026/033 13:08:35.429177	0.000000	192.168.201.200	192.168.203.89	ICMP	118	100	0x4f8d (20365)			Echo (ping) request id=0xf825, seq=39095/47000, ttl=255 (reply in 2)
2	2026/033 13:08:35.429680	0.000503	192.168.203.89	192.168.201.200	ICMP	118	100	0x4f8d (20365)			Echo (ping) reply id=0xf825, seq=39095/47000, ttl=254 (request in 1)
3	2026/033 13:08:35.429909	0.000229	192.168.201.200	192.168.203.89	ICMP	118	100	0x0542 (1346)			Echo (ping) request id=0xf826, seq=39095/47000, ttl=255 (reply in 4)
4	2026/033 13:08:35.430275	0.000366	192.168.203.89	192.168.201.200	ICMP	118	100	0x0542 (1346)			Echo (ping) reply id=0xf826, seq=39095/47000, ttl=254 (request in 3)
5	2026/033 13:08:35.430489	0.000214	192.168.201.200	192.168.203.89	ICMP	118	100	0x0953 (2387)			Echo (ping) request id=0xf827, seq=39095/47000, ttl=255 (reply in 6)
6	2026/033 13:08:35.430840	0.000351	192.168.203.89	192.168.201.200	ICMP	118	100	0x0953 (2387)			Echo (ping) reply id=0xf827, seq=39095/47000, ttl=254 (request in 5)
7	2026/033 13:08:35.431038	0.000198	192.168.201.200	192.168.203.89	ICMP	118	100	0x7290 (29328)			Echo (ping) request id=0xf828, seq=39095/47000, ttl=255 (reply in 8)
8	2026/033 13:08:35.431389	0.000351	192.168.203.89	192.168.201.200	ICMP	118	100	0x7290 (29328)			Echo (ping) reply id=0xf828, seq=39095/47000, ttl=254 (request in 7)
9	2026/033 13:08:35.431587	0.000198	192.168.201.200	192.168.203.89	ICMP	118	100	0x5789 (22409)			Echo (ping) request id=0xf829, seq=39095/47000, ttl=255 (reply in 10)
10	2026/033 13:08:35.431938	0.000351	192.168.203.89	192.168.201.200	ICMP	118	100	0x5789 (22409)			Echo (ping) reply id=0xf829, seq=39095/47000, ttl=254 (request in 9)
11	2026/033 13:08:41.221317	5.789379	192.168.201.200	192.168.203.89	UDP	46	28	0x338e (13198)	49166	33434	49166 → 33434 Len=0
12	2026/033 13:08:41.224002	0.002685	192.168.201.88	192.168.201.200	ICMP	74	56	28 0x00c2 (194),0x...	49166	33434	Time-to-live exceeded (Time to live exceeded in transit)
13	2026/033 13:08:44.210331	2.986329	192.168.201.200	192.168.203.89	UDP	46	28	0x67af (26543)	49166	33435	49166 → 33435 Len=0
14	2026/033 13:08:44.212711	0.002380	192.168.201.88	192.168.201.200	ICMP	74	56	28 0x00c3 (195),0x...	49166	33435	Time-to-live exceeded (Time to live exceeded in transit)
15	2026/033 13:08:47.210224	2.997513	192.168.201.200	192.168.203.89	UDP	46	28	0x27bc (10172)	49166	33436	49166 → 33436 Len=0
16	2026/033 13:08:47.212620	0.002396	192.168.201.88	192.168.201.200	ICMP	74	56	28 0x00c4 (196),0x...	49166	33436	Time-to-live exceeded (Time to live exceeded in transit)
17	2026/033 13:08:50.210224	2.997604	192.168.201.200	192.168.203.89	UDP	46	28	0x6345 (25413)	49166	33437	49166 → 33437 Len=0
18	2026/033 13:08:50.210728	0.000504	192.168.203.89	192.168.201.200	ICMP	74	56	28 0x005f (95),0x6...	49166	33437	Destination unreachable (Port unreachable)
19	2026/033 13:08:53.210331	2.999603	192.168.201.200	192.168.203.89	UDP	46	28	0x4fcb (28427)	49166	33438	49166 → 33438 Len=0
20	2026/033 13:08:53.210819	0.000488	192.168.203.89	192.168.201.200	ICMP	74	56	28 0x0060 (96),0x4...	49166	33438	Destination unreachable (Port unreachable)
21	2026/033 13:08:56.210224	2.999405	192.168.201.200	192.168.203.89	UDP	46	28	0x03a8 (936)	49166	33439	49166 → 33439 Len=0
22	2026/033 13:08:56.210712	0.000488	192.168.203.89	192.168.201.200	ICMP	74	56	28 0x0061 (97),0x0...	49166	33439	Destination unreachable (Port unreachable)
23	2026/033 13:08:59.210209	2.999497	192.168.201.200	192.168.203.89	UDP	46	28	0x6ec1 (28353)	49166	33440	49166 → 33440 Len=0
24	2026/033 13:08:59.210667	0.000458	192.168.203.89	192.168.201.200	ICMP	74	56	28 0x0062 (98),0x6...	49166	33440	Destination unreachable (Port unreachable)
25	2026/033 13:09:02.210331	2.999664	192.168.201.200	192.168.203.89	UDP	46	28	0x2666 (9830)	49166	33441	49166 → 33441 Len=0
26	2026/033 13:09:02.225497	0.015166	192.168.203.89	192.168.201.200	ICMP	74	56	28 0x0063 (99),0x2...	49166	33441	Destination unreachable (Port unreachable)
27	2026/033 13:09:05.210224	2.984727	192.168.201.200	192.168.203.89	UDP	46	28	0x1da7 (7591)	49166	33442	49166 → 33442 Len=0
28	2026/033 13:09:05.210728	0.000504	192.168.203.89	192.168.201.200	ICMP	74	56	28 0x0064 (100),0x...	49166	33442	Destination unreachable (Port unreachable)
29	2026/033 13:09:08.210209	2.999481	192.168.201.200	192.168.203.89	UDP	46	28	0x3254 (12884)	49166	33443	49166 → 33443 Len=0
30	2026/033 13:09:08.210712	0.000503	192.168.203.89	192.168.201.200	ICMP	74	56	28 0x0065 (101),0x...	49166	33443	Destination unreachable (Port unreachable)

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故障排除

第 1 步

使用trace在防火墙出口接口上启用数据包捕获，以查看防火墙如何处理入口数据包：

```
<#root>
```

```
firepower#
```

```
capture CAPI trace interface OUTSIDE match ip host 192.168.203.89 host 192.168.201.100
```

步骤 2

使用ping测试：

```
<#root>
```

```
firepower#
```

```
ping 192.168.203.89
```

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.203.89, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
```

然后使用tracert进行测试：

```
<#root>
```

```
firepower#
```

```
tracert 192.168.203.89
```

```
Type escape sequence to abort.
Tracing the route to 192.168.203.89
```

```
 1*  *  *
 2*  *  *
 3*  *  *
 4*  *  *
 5*  *  *
 6*  *  *
 7*  *  *
```

```
...
```

步骤 3

检查捕获内容：

- 数据包1-10与ICMP ping测试相关。
- 数据包11-16与tracert相关。应答来自第一跳。
- 数据包17-28也与tracert相关。应答来自目标端点。

```
<#root>
```

```
firepower#
```

```
show capture CAPI
```

```
190 packets captured
```

```
1: 13:50:27.345471      802.1Q vlan#201 P0 192.168.201.200 > 192.168.203.89 icmp: echo request
2: 13:50:27.345975      802.1Q vlan#201 P0 192.168.203.89 > 192.168.201.200 icmp: echo reply
3: 13:50:27.346219      802.1Q vlan#201 P0 192.168.201.200 > 192.168.203.89 icmp: echo request
4: 13:50:27.346600      802.1Q vlan#201 P0 192.168.203.89 > 192.168.201.200 icmp: echo reply
```

```

5: 13:50:27.346814      802.1Q vlan#201 PO 192.168.201.200 > 192.168.203.89 icmp: echo request
6: 13:50:27.347165      802.1Q vlan#201 PO 192.168.203.89 > 192.168.201.200 icmp: echo reply
7: 13:50:27.347378      802.1Q vlan#201 PO 192.168.201.200 > 192.168.203.89 icmp: echo request
8: 13:50:27.347714      802.1Q vlan#201 PO 192.168.203.89 > 192.168.201.200 icmp: echo reply
9: 13:50:27.347928      802.1Q vlan#201 PO 192.168.201.200 > 192.168.203.89 icmp: echo request
10: 13:50:27.348279     802.1Q vlan#201 PO 192.168.203.89 > 192.168.201.200 icmp: echo reply
11: 13:50:33.229724     802.1Q vlan#201 PO 192.168.201.200.49168 > 192.168.203.89.33434: udp 0
12: 13:50:33.232562     802.1Q vlan#201 PO 192.168.201.88 > 192.168.201.200 icmp: time exceeded in-tr
13: 13:50:36.220279     802.1Q vlan#201 PO 192.168.201.200.49168 > 192.168.203.89.33435: udp 0
14: 13:50:36.222827     802.1Q vlan#201 PO 192.168.201.88 > 192.168.201.200 icmp: time exceeded in-tr
15: 13:50:39.220172     802.1Q vlan#201 PO 192.168.201.200.49168 > 192.168.203.89.33436: udp 0
16: 13:50:39.222675     802.1Q vlan#201 PO 192.168.201.88 > 192.168.201.200 icmp: time exceeded in-tr
17: 13:50:42.220157     802.1Q vlan#201 PO 192.168.201.200.49168 > 192.168.203.89.33437: udp 0
18: 13:50:42.220737     802.1Q vlan#201 PO 192.168.203.89 > 192.168.201.200 icmp: 192.168.203.89 udp
19: 13:50:45.220264     802.1Q vlan#201 PO 192.168.201.200.49168 > 192.168.203.89.33438: udp 0
20: 13:50:45.220752     802.1Q vlan#201 PO 192.168.203.89 > 192.168.201.200 icmp: 192.168.203.89 udp
21: 13:50:48.220157     802.1Q vlan#201 PO 192.168.201.200.49168 > 192.168.203.89.33439: udp 0
22: 13:50:48.220645     802.1Q vlan#201 PO 192.168.203.89 > 192.168.201.200 icmp: 192.168.203.89 udp
23: 13:50:51.220157     802.1Q vlan#201 PO 192.168.201.200.49168 > 192.168.203.89.33440: udp 0
24: 13:50:51.220645     802.1Q vlan#201 PO 192.168.203.89 > 192.168.201.200 icmp: 192.168.203.89 udp
25: 13:50:54.220264     802.1Q vlan#201 PO 192.168.201.200.49168 > 192.168.203.89.33441: udp 0
26: 13:50:54.220752     802.1Q vlan#201 PO 192.168.203.89 > 192.168.201.200 icmp: 192.168.203.89 udp
27: 13:50:57.220157     802.1Q vlan#201 PO 192.168.201.200.49168 > 192.168.203.89.33442: udp 0
28: 13:50:57.220645     802.1Q vlan#201 PO 192.168.203.89 > 192.168.201.200 icmp: 192.168.203.89 udp

```

步骤 4

通过ping测试跟踪入口ICMP数据包。

Packet #2是对Packet Tracer中发送的ICMP ping请求的回#1。

```
<#root>
```

```
firepower#
```

```
show capture CAPI packet-number 2 trace
```

```
190 packets captured
```

```
2: 13:50:27.345975      802.1Q vlan#201 PO 192.168.203.89 > 192.168.201.200 icmp: echo reply
```

```
...
```

```
Phase: 4
```

```
Type: FLOW-LOOKUP
```

```
Subtype:
```

```
Result: ALLOW
```

```
Elapsed time: 488 ns
```

```
Config:
```

```
Additional Information:
```

```
Found flow with id 143799, using existing flow
```

```
...
```

```
Phase: 6
```

```
Type: ADJACENCY-LOOKUP
```

```
Subtype: Resolve Nexthop IP address to MAC
Result: ALLOW
Elapsed time: 1952 ns
Config:
Additional Information:
Found adjacency entry for Next-hop 0.0.0.0 on interface identity
Adjacency :Active
MAC address 0000.0000.0000 hits 483359 reference 2
```

```
Result:
input-interface: OUTSIDE(vrfid:0)
input-status: up
input-line-status: up
output-interface: NP Identity Ifc
Action: allow
Time Taken: 18056 ns
1 packet shown
```

跟踪的关键点包括：

- 数据包与现有流匹配。
- 输出接口是防火墙本身（身份接口）。

步骤 5

跟踪来自traceroute测试的入口ICMP数据包。

数据包#12是来自传输主机的应答：

```
<#root>
```

```
firepower#
```

```
show capture CAPI packet-number 12 trace
```

```
190 packets captured
```

```
12: 13:50:33.232562      802.1Q vlan#201 P0 192.168.201.88 > 192.168.201.200 icmp: time exceeded in-tr
```

```
Phase: 3
```

```
Type: UN-NAT
```

```
Subtype: static
```

```
Result: ALLOW
```

```
Elapsed time: 6344 ns
```

```
Config:
```

```
nat (INSIDE,OUTSIDE) source static server_host interface
```

```
Additional Information:
```

```
NAT divert to egress interface INSIDE(vrfid:0)
```

Untranslate 192.168.201.200/49168 to 192.168.200.50/49168

Phase: 7

Type: ACCESS-LIST

Subtype:

Result: ALLOW

Elapsed time: 97 ns

Config:

access-group CSM_FW_ACL_ global

access-list CSM_FW_ACL_ advanced permit ip any any rule-id 268436480

access-list CSM_FW_ACL_ remark rule-id 268436480: ACCESS POLICY: mzafeiro_empty - Default

access-list CSM_FW_ACL_ remark rule-id 268436480: L4 RULE: DEFAULT ACTION RULE

Additional Information:

This packet will be sent to snort for additional processing where a verdict will be reached

...

Phase: 18

Type: FLOW-CREATION

Subtype:

Result: ALLOW

Elapsed time: 16104 ns

Config:

Additional Information:

New flow created with id 143805, packet dispatched to next module

...

Phase: 20

Type: SNORT

Subtype: identity

Result: ALLOW

Elapsed time: 39496 ns

Config:

Additional Information:

user id: no auth, realm id: 0, device type: 0, auth type: invalid, auth proto: basic, username: none, A

src sgt: 0, src sgt type: unknown, dst sgt: 0, dst sgt type: unknown, abp src: none, abp dst: none, loc

Result:

input-interface: OUTSIDE(vrfid:0)

input-status: up

input-line-status: up

output-interface: INSIDE(vrfid:0)

output-status: up

output-line-status: up

Action: allow

Time Taken: 158341 ns

- 数据包是新连接的一部分（它与现有流不匹配）。
- 数据包需要经过网络地址转换（具体而言，UN-NAT表示目标NAT）。
- 该数据包被视为防火墙中转流量，并受到访问控制策略(ACP)和Snort检测。
- 输出（出口）接口为INSIDE。这是因为NAT转换。

原因

在这种情况下，此静态NAT规则会导致问题：

```
<#root>
```

```
firepower#
```

```
show run nat
```

```
nat (INSIDE,OUTSIDE) source static server_host interface
```

相关内容

- [允许Traceroute通过Firepower威胁防御\(FTD\)](#)
- [思科技术支持和下载](#)

关于此翻译

思科采用人工翻译与机器翻译相结合的方式将此文档翻译成不同语言，希望全球的用户都能通过各自的语言得到支持性的内容。

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