在内联对模式下配置FTD接口

目录

简介

本文档介绍Firepower威胁防御(FTD)设备上的内联对接口的配置、验证和操作。

先决条件

要求

本文档没有特定要求。

使用的组件

本文档中的信息基于以下软件和硬件版本：

- Firepower 4150 FTD（代码6.1.0.x和6.3.x）
- Firepower管理中心(FMC)（代码6.1.0.x和6.3.x）

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。

相关产品

本文档也可用于以下硬件和软件版本：

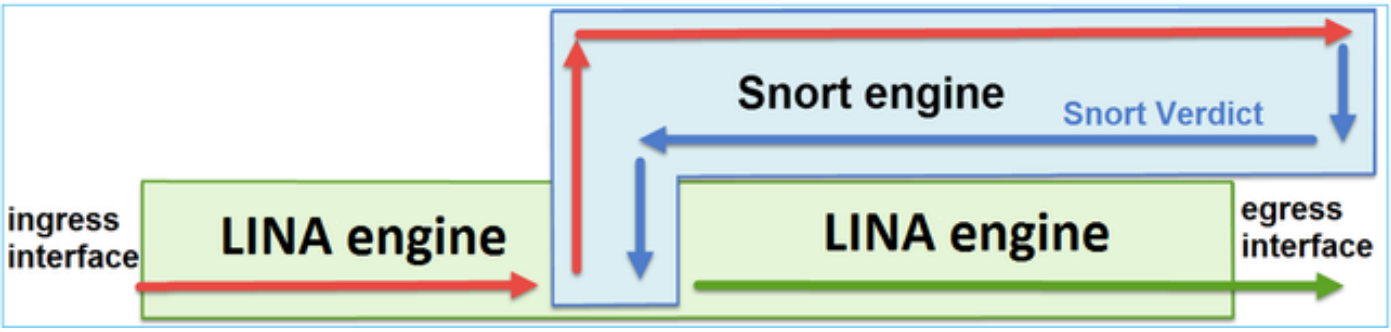
- ASA5506-X、ASA5506W-X、ASA5506H-X、ASA5508-X、ASA5516-X
- ASA5512-X、ASA5515-X、ASA5525-X、ASA5545-X、ASA5555-X
- FPR2100、FPR4100、FPR9300
- VMware (ESXi)、Amazon Web Services (AWS)、基于内核的虚拟机 (KVM)
- FTD软件代码6.2.x及更高版本

背景信息

FTD 是由两个主要引擎组成的统一软件映像：

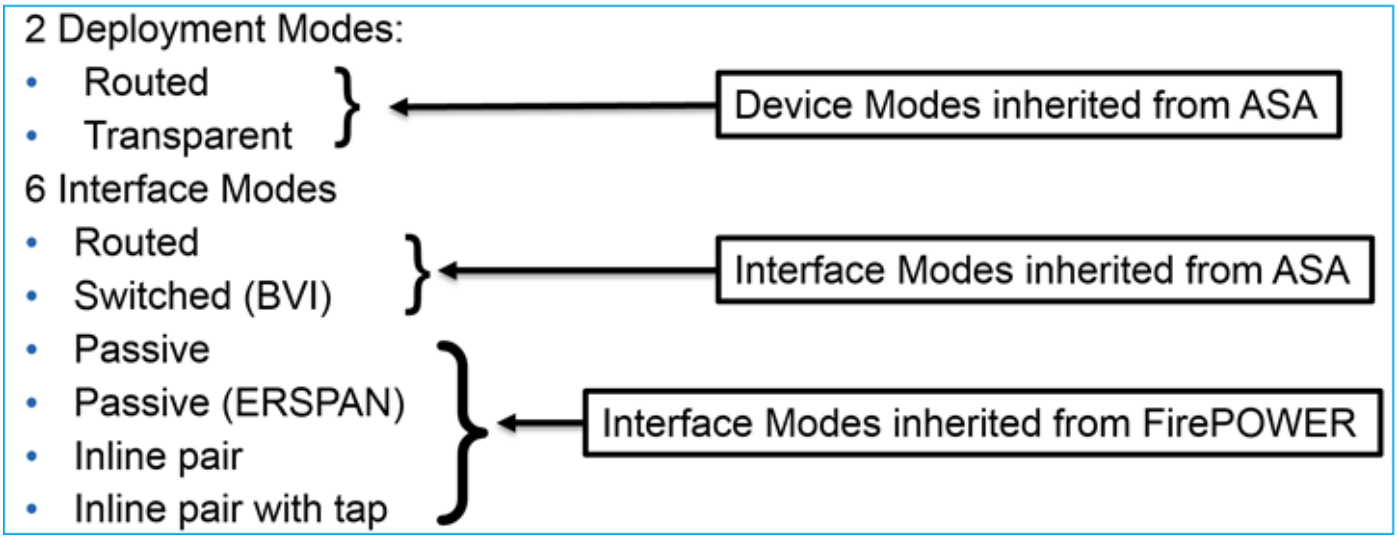
- LINA 引擎
- Snort 引擎

下图显示了这两个引擎的交互方式：



- 数据包进入入口接口并由 LINA 引擎处理
- 如果 FTD 策略要求，数据包将由 Snort 引擎检查
- Snort引擎返回数据包的判定
- LINA 引擎根据 Snort 的判定丢弃或转发数据包

FTD提供两种部署模式和六种接口模式，如图所示：



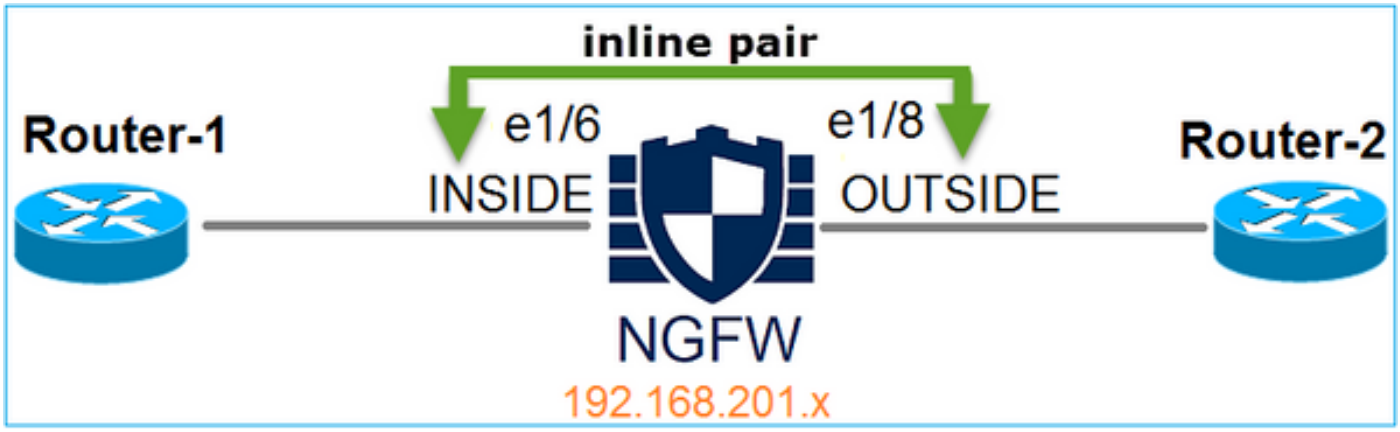
注意：您可以在单个FTD设备上混合接口模式。

以下是各种FTD部署和接口模式的简要概述：

FTD接口模式	FTD部署模式	描述	可以丢弃流量
已路由	已路由	完整的LINA引擎和Snort引擎检查	Yes
交换	透明	完整的LINA引擎和Snort引擎检查	Yes
内联对	路由或透明	部分LINA引擎和完全Snort引擎检查	Yes
带分路器的内联对	路由或透明	部分LINA引擎和完全Snort引擎检查	无
被动	路由或透明	部分LINA引擎和完全Snort引擎检查	无
被动(ERSPAN)	已路由	部分LINA引擎和完全Snort引擎检查	无

在FTD上配置内联对接口

网络图



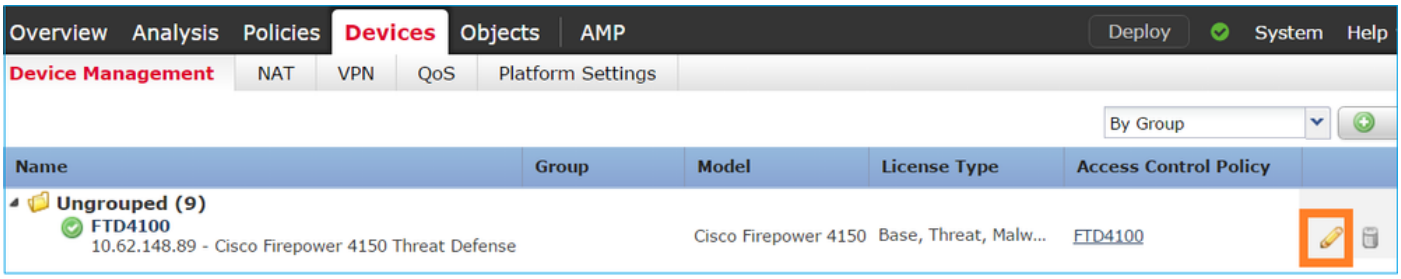
要求

按照以下要求在内联对模式下配置物理接口e1/6和e1/8:

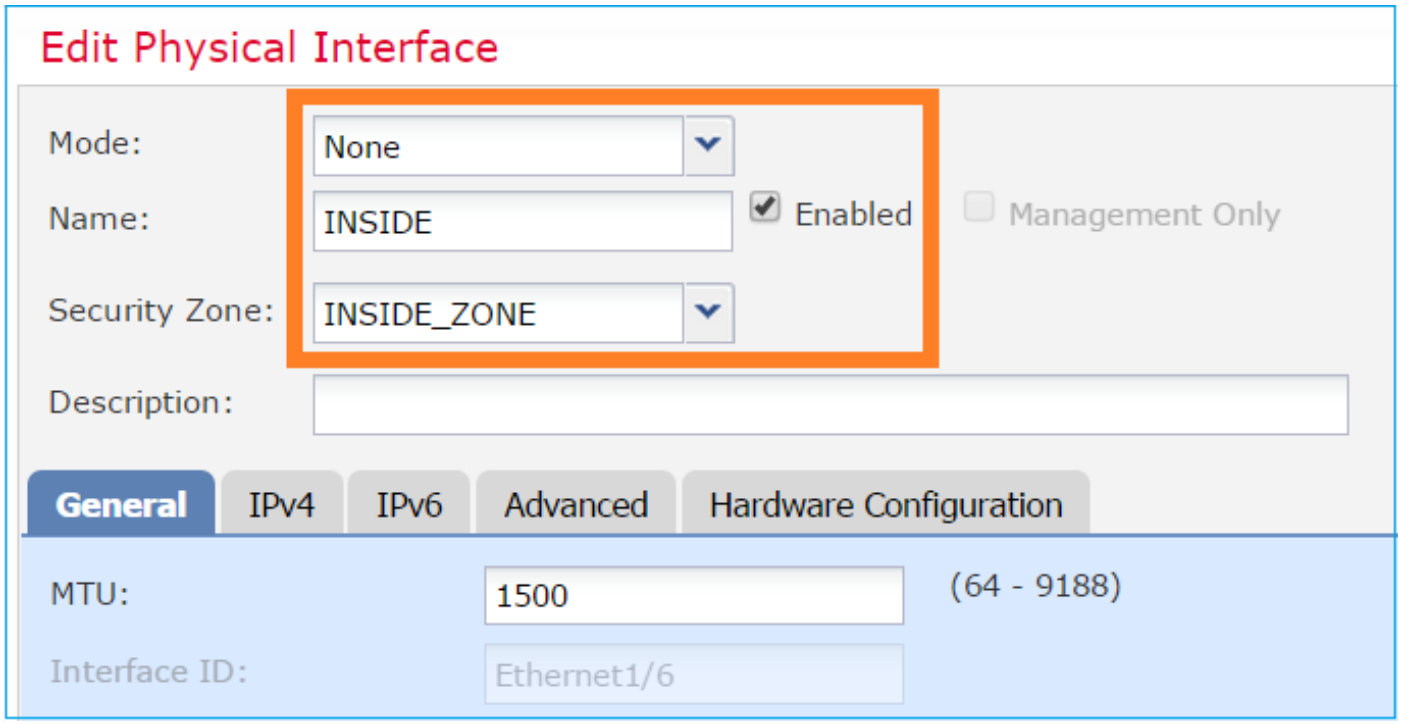
接口	e1/6	e1/8
名称	内部	外部
安全区域	INSIDE_ZONE	OUTSIDE_ZONE
内联集名称	内联对1	
内联集MTU	1500	
FailSafe	启用	
传播链路状态	启用	

解决方案

步骤1:要配置各个接口，请导航到Devices > Device Management，选择适当的设备并选择Edit，如图所示。

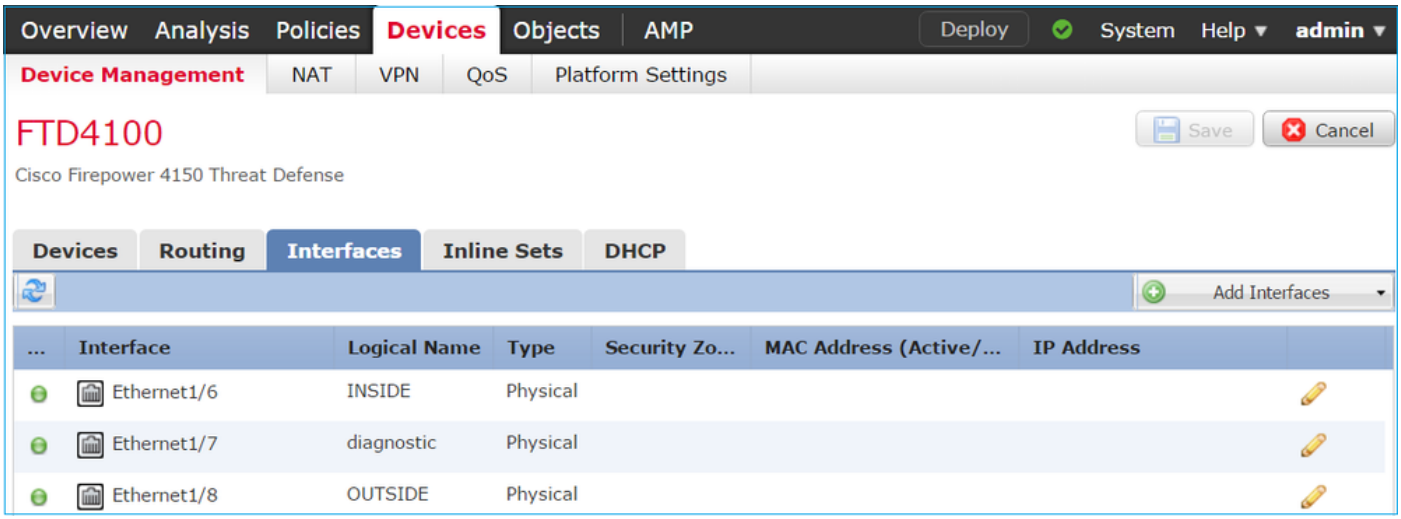


接下来，为接口指定Name和Tick Enabled，如图所示。



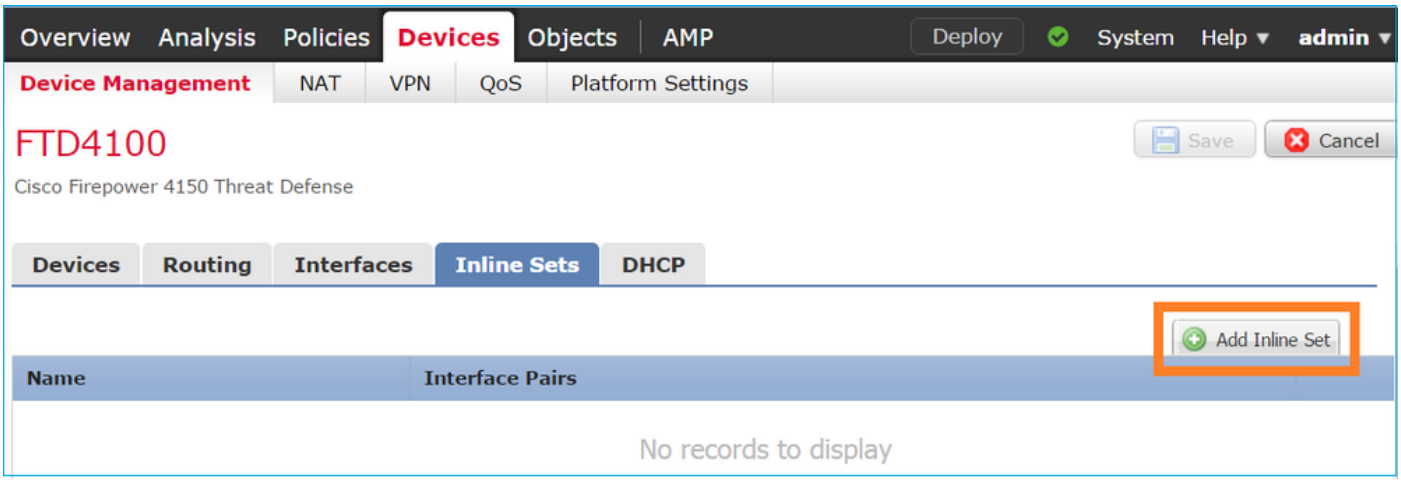
注:Name是接口的名称。

对于接口Ethernet1/8也是类似的。最终结果如图所示。

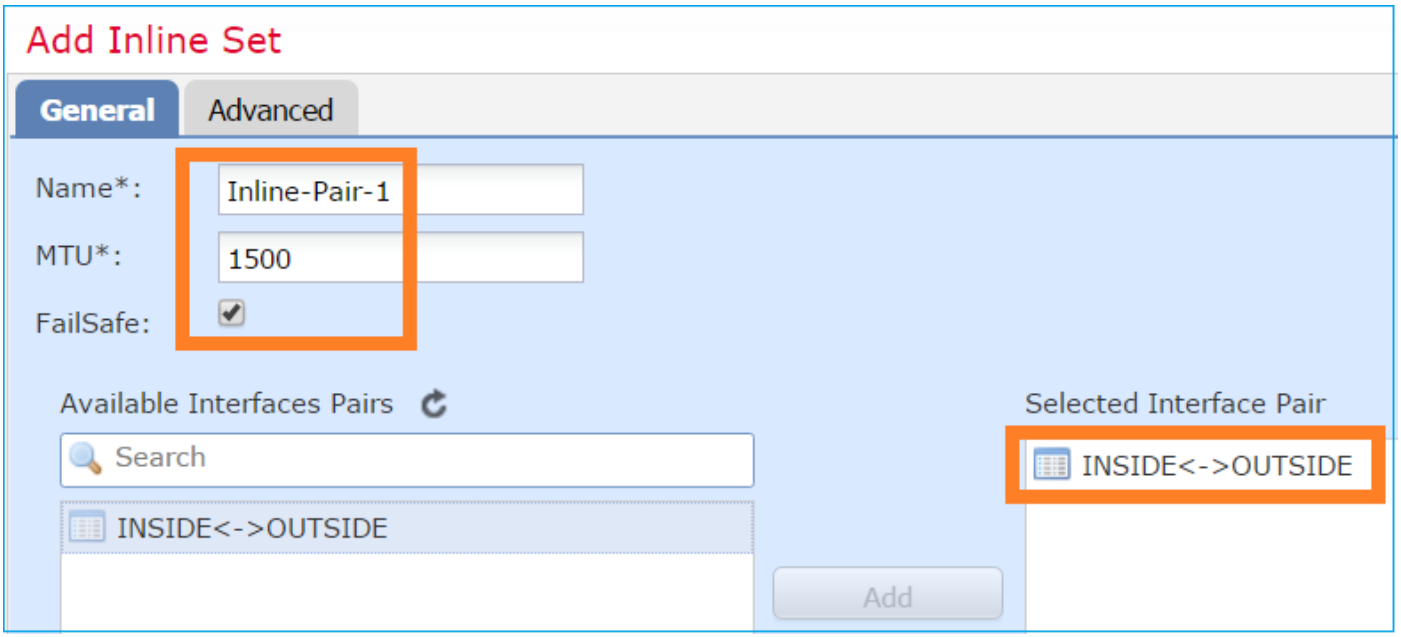


第二步：配置内联对。

导航到内联集>添加内联集，如图所示。

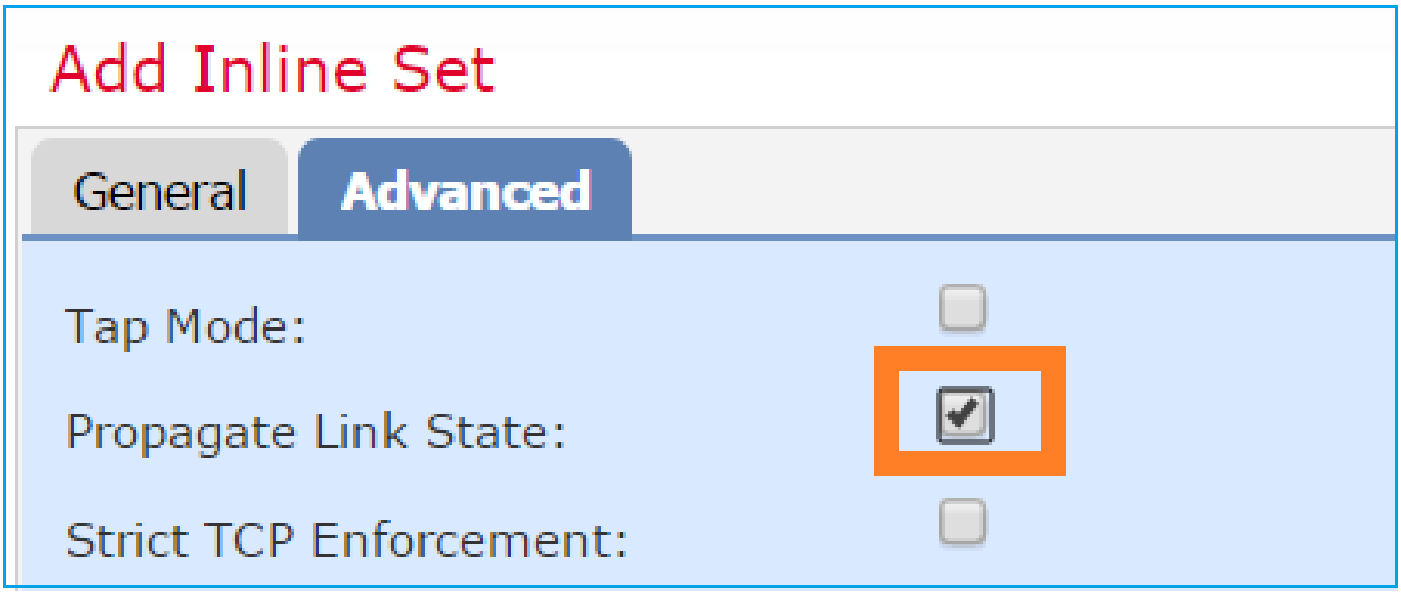


第三步：按照图中所示的要求配置General设置。



注意：Failsafe允许流量未经检查通过内联对，以防接口缓冲区已满（通常在设备过载或Snort引擎过载时看到）。接口缓冲区大小是动态分配的。

第四步：如图所示，在Advanced Settings中启用Propagate Link State选项。



当内联集中的一个接口关闭时，链路状态传播会自动关闭内联接口对中的第二个接口。

第五步：保存更改并部署。

验证

使用本部分可确认配置能否正常运行。

从FTD CLI验证内联对配置。

解决方案

登录到FTD CLI并验证内联对配置：

```
> show inline-set

Inline-set Inline-Pair-1
  Mtu is 1500 bytes
  Failsafe mode is on/activated
  Failsecure mode is off
  Tap mode is off
  Propagate-link-state option is on
  hardware-bypass mode is disabled
  Interface-Pair[1]:
    Interface: Ethernet1/6 "INSIDE"
      Current-Status: UP
    Interface: Ethernet1/8 "OUTSIDE"
      Current-Status: UP
    Bridge Group ID: 509
>
```

注：网桥组ID是一个不同于0的值。如果“分路模式”打开，则值为0

接口和名称信息：

<#root>

```
>
show nameif

Interface                Name                    Security
Ethernet1/6              INSIDE                    0

Ethernet1/7              diagnostic                0
Ethernet1/8              OUTSIDE                   0

>
```

检验接口状态：

<#root>

```
> show interface ip brief

Interface                  IP-Address      OK? Method Status                Protocol
Internal-Data0/0           unassigned      YES unset  up                    up
Internal-Data0/1           unassigned      YES unset  up                    up
Internal-Data0/2           169.254.1.1     YES unset  up                    up

Ethernet1/6                unassigned      YES unset  up                    up
Ethernet1/7                unassigned      YES unset  up                    up

Ethernet1/8                unassigned      YES unset  up                    up
```

检验物理接口信息：

<#root>

```
>
show interface e1/6

Interface Ethernet1/6 "INSIDE", is up, line protocol is up
```

```
  Hardware is EtherSVI, BW 1000 Mbps, DLY 1000 usec
        MAC address 5897.bdb9.770e, MTU 1500


IPS Interface-Mode: inline, Inline-Set: Inline-Pair-1


        IP address unassigned
  Traffic Statistics for "INSIDE":
        468 packets input, 47627 bytes
        12 packets output, 4750 bytes
        1 packets dropped
      1 minute input rate 0 pkts/sec,  200 bytes/sec
      1 minute output rate 0 pkts/sec,  7 bytes/sec
      1 minute drop rate, 0 pkts/sec
      5 minute input rate 0 pkts/sec,  96 bytes/sec
      5 minute output rate 0 pkts/sec,  8 bytes/sec
      5 minute drop rate, 0 pkts/sec
>
show interface e1/8



Interface Ethernet1/8 "OUTSIDE", is up, line protocol is up


  Hardware is EtherSVI, BW 1000 Mbps, DLY 1000 usec
        MAC address 5897.bdb9.774d, MTU 1500


IPS Interface-Mode: inline, Inline-Set: Inline-Pair-1


        IP address unassigned
  Traffic Statistics for "OUTSIDE":
        12 packets input, 4486 bytes
        470 packets output, 54089 bytes
        0 packets dropped
      1 minute input rate 0 pkts/sec,  7 bytes/sec
      1 minute output rate 0 pkts/sec,  212 bytes/sec
      1 minute drop rate, 0 pkts/sec
      5 minute input rate 0 pkts/sec,  7 bytes/sec
      5 minute output rate 0 pkts/sec,  106 bytes/sec
      5 minute drop rate, 0 pkts/sec
>
```

检验FTD内联对接口操作

本节介绍以下验证检查以验证内联对操作：

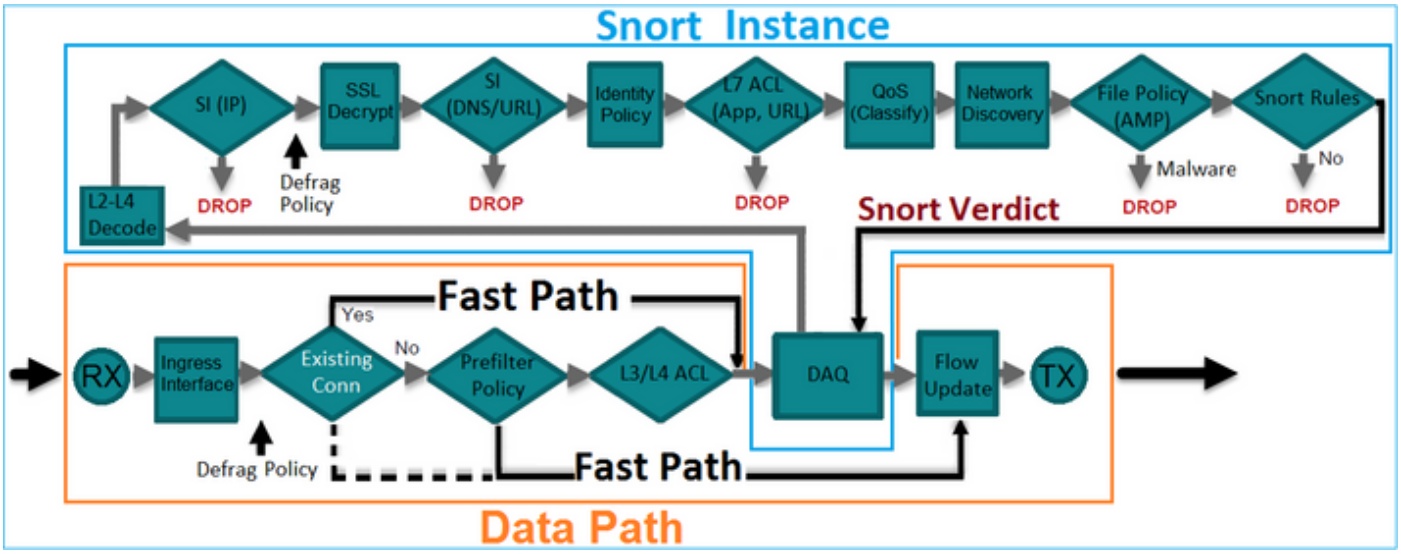
- 验证1.使用Packet Tracer
- 验证2.启用带有跟踪的捕获，并通过内联对发送TCP同步/确认(SYN/ACK)数据包

- 验证3.使用防火墙引擎调试监控FTD流量
- 验证4.检验链路状态传播功能
- 验证5.配置静态网络地址转换(NAT)

解决方案

架构概述

当2个FTD接口在内联对模式下运行时，数据包的处理方式如图所示。

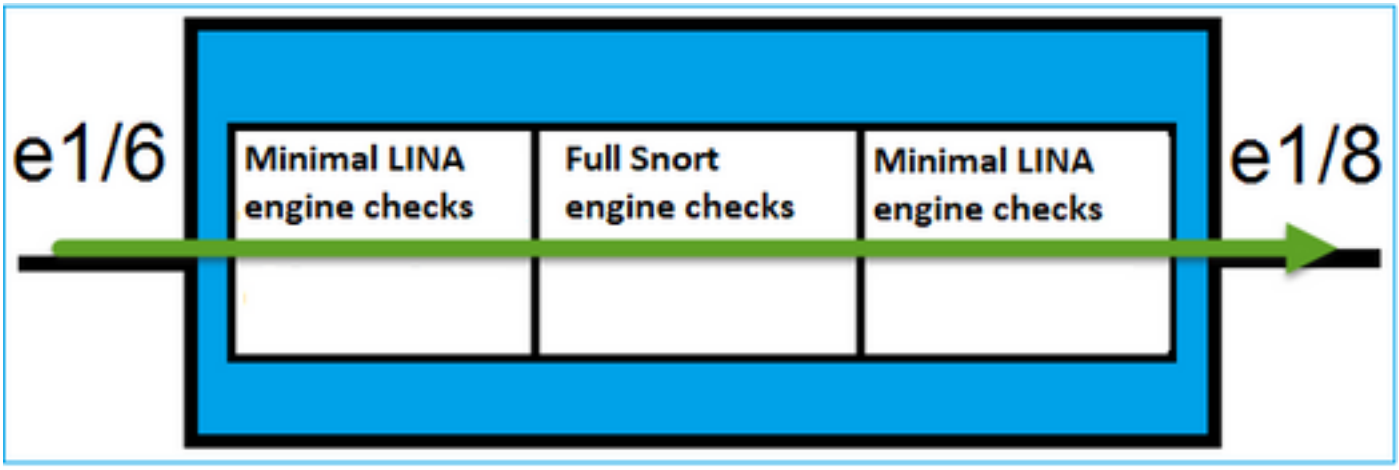


注意：只有物理接口才能成为内联对集的成员

基本原理

- 当您配置内联对2时，物理接口在内部桥接
- 非常类似于经典的内联入侵防御系统(IPS)
- 在路由或透明部署模式下可用
- 大多数LINA引擎功能（NAT、路由等）对于通过内联对的流不可用
- 可以丢弃中转流量
- 一些LINA引擎检查与完整的Snort引擎检查一起应用

最后一点可以可视化，如图所示：



验证1.使用Packet-Tracer

Packet Tracer输出模拟经过内联对的数据包，其中突出显示的重要点：

<#root>

```
>

packet-tracer input INSIDE tcp 192.168.201.50 1111 192.168.202.50 80


Phase: 1
Type: ACCESS-LIST
Subtype:
Result: ALLOW
Config:
Implicit Rule
Additional Information:
MAC Access list


Phase: 2


Type: NGIPS-MODE


Subtype: ngips-mode
Result: ALLOW
Config:
Additional Information:

The flow ingressed an interface configured for NGIPS mode and NGIPS services is be applied



Phase: 3


Type: ACCESS-LIST
```

```
Subtype: log
Result: ALLOW
Config:
access-group CSM_FW_ACL_ global
access-list CSM_FW_ACL_ advanced permit ip any any rule-id 268438528
access-list CSM_FW_ACL_ remark rule-id 268438528: ACCESS POLICY: FTD4100 - Default/1
access-list CSM_FW_ACL_ remark rule-id 268438528: L4 RULE: DEFAULT ACTION RULE
```

Additional Information:

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

Phase: 4

Type: NGIPS-EGRESS-INTERFACE-LOOKUP

```
Subtype: Resolve Egress Interface
Result: ALLOW
Config:
```

Additional Information:

Ingress interface INSIDE is in NGIPS inline mode.

Egress interface OUTSIDE is determined by inline-set configuration

Phase: 5

Type: FLOW-CREATION

```
Subtype:
Result: ALLOW
Config:
Additional Information:
New flow created with id 106, packet dispatched to next module

Result:
input-interface: INSIDE
input-status: up
input-line-status: up
Action: allow

>
```

验证2.通过内联对发送TCP SYN/ACK数据包

您可以使用可设计实用程序（如Scapy）的数据包生成TCP SYN/ACK数据包。此语法生成启用了SYN/ACK标志的3个数据包：

<#root>

```
root@KALI:~#

scapy

INFO: Can't import python gnuplot wrapper . Won't be able to plot.
WARNING: No route found for IPv6 destination :: (no default route?)
Welcome to Scapy (2.2.0)
>>>

conf.iface='eth0'

>>>

packet = IP(dst="192.168.201.60")/TCP(flags="SA",dport=80)

>>>

syn_ack=[]

>>>

for i in range(0,3): # Send 3 packets

...

syn_ack.extend(packet)

...
>>>

send(syn_ack)
```

在FTD CLI上启用此捕获并发送一些TCP SYN/ACK数据包：

<#root>

```
>

capture CAPI interface INSIDE trace match ip host 192.168.201.60 any


>

capture CAPO interface OUTSIDE match ip host 192.168.201.60 any


>
```

通过FTD发送数据包后，您可以看到已创建的连接：

<#root>

```
>

show conn detail


1 in use, 34 most used
Flags: A - awaiting responder ACK to SYN, a - awaiting initiator ACK to SYN,


 b - TCP state-bypass or nailed,


       C - CTIQBE media, c - cluster centralized,
       D - DNS, d - dump, E - outside back connection, e - semi-distributed,
       F - initiator FIN, f - responder FIN,
       G - group, g - MGCP, H - H.323, h - H.225.0, I - initiator data,
       i - incomplete, J - GTP, j - GTP data, K - GTP t3-response
       k - Skinny media, M - SMTP data, m - SIP media,

N - inspected by Snort

, n - GUP
       O - responder data, P - inside back connection,
       q - SQL*Net data, R - initiator acknowledged FIN,
       R - UDP SUNRPC, r - responder acknowledged FIN,
       T - SIP, t - SIP transient, U - up,
       V - VPN orphan, v - M3UA W - WAAS,
       w - secondary domain backup,
       X - inspected by service module,
       x - per session, Y - director stub flow, y - backup stub flow,
       Z - Scansafe redirection, z - forwarding stub flow


TCP Inline-Pair-1:OUTSIDE(OUTSIDE): 192.168.201.60/80 Inline-Pair-1:INSIDE(INSIDE): 192.168.201.50/20,



flags b N

, idle 13s, uptime 13s, timeout 1h0m, bytes 0

>
```

注意:b标志 — 传统ASA将丢弃未经请求的SYN/ACK数据包，除非启用TCP状态旁路。内联对模式下的FTD接口在TCP状态旁路模式下处理TCP连接，并且不丢弃不属于现有连接的TCP数据包。

注意：N标志 — 数据包由FTD Snort引擎进行检查。

捕获结果证明了这一点，因为您可以看到流经FTD的3个数据包：

<#root>

```
>
show capture CAPI



3 packets captured


   1: 15:27:54.327146       192.168.201.50.20 > 192.168.201.60.80:
S
 0:0(0)
ack
 0 win 8192
   2: 15:27:54.330000       192.168.201.50.20 > 192.168.201.60.80:
S
 0:0(0)
ack
 0 win 8192
   3: 15:27:54.332517       192.168.201.50.20 > 192.168.201.60.80:
S
 0:0(0)
ack
 0 win 8192
3 packets shown
>
```

3个数据包退出FTD设备：

<#root>

```
>
show capture CAPO



3 packets captured


   1: 15:27:54.327299       192.168.201.50.20 > 192.168.201.60.80:
S
 0:0(0)
ack
```

```
 0 win 8192
   2: 15:27:54.330030       192.168.201.50.20 > 192.168.201.60.80:
```

S

```
 0:0(0)
```

ack

```
 0 win 8192
   3: 15:27:54.332548       192.168.201.50.20 > 192.168.201.60.80:
```

S

```
 0:0(0)
```

ack

```
 0 win 8192
3 packets shown
>
```

通过跟踪第一个捕获数据包，可以揭示一些其他信息，如Snort引擎判定：

<#root>

```
>
```

show capture CAPI packet-number 1 trace

```
3 packets captured

   1: 15:27:54.327146       192.168.201.50.20 > 192.168.201.60.80:
```

S

```
 0:0(0)
```

ack

```
 0 win 8192
Phase: 1
Type: CAPTURE
Subtype:
Result: ALLOW
Config:
Additional Information:
MAC Access list

Phase: 2
Type: ACCESS-LIST
Subtype:
Result: ALLOW
Config:
Implicit Rule
Additional Information:
MAC Access list
```

Phase: 3

Type: NGIPS-MODE
Subtype: ngips-mode
Result: ALLOW
Config:
Additional Information:
The flow ingressed an interface configured for NGIPS mode and NGIPS services is applied

Phase: 4
Type: ACCESS-LIST
Subtype: log
Result: ALLOW
Config:
access-group CSM_FW_ACL_ global
access-list CSM_FW_ACL_ advanced permit ip any any rule-id 268438528
access-list CSM_FW_ACL_ remark rule-id 268438528: ACCESS POLICY: FTD4100 - Default/1
access-list CSM_FW_ACL_ remark rule-id 268438528: L4 RULE: DEFAULT ACTION RULE

Additional Information:
This packet is sent to snort for additional processing where a verdict is reached

Phase: 5
Type: NGIPS-EGRESS-INTERFACE-LOOKUP
Subtype: Resolve Egress Interface

Result: ALLOW
Config:
Additional Information:

Ingress interface INSIDE is in NGIPS inline mode.
Egress interface OUTSIDE is determined by inline-set configuration

Phase: 6
Type: FLOW-CREATION
Subtype:
Result: ALLOW
Config:
Additional Information:
New flow created with id 282, packet dispatched to next module

Phase: 7
Type: EXTERNAL-INSPECT

Subtype:
Result: ALLOW
Config:
Additional Information:

Application: 'SNORT Inspect'

Phase: 8
Type: SNORT

Subtype:

Result: ALLOW

Config:

Additional Information:
Snort Verdict: (pass-packet) allow this packet

```
Phase: 9
Type: CAPTURE
Subtype:
Result: ALLOW
Config:
Additional Information:
MAC Access list

Result:
input-interface: OUTSIDE
input-status: up
input-line-status: up
Action: allow


1 packet shown
>
```

通过跟踪第二个捕获的数据包，可以显示数据包与当前连接匹配，因此它会绕过ACL检查，但仍会由Snort引擎进行检查：

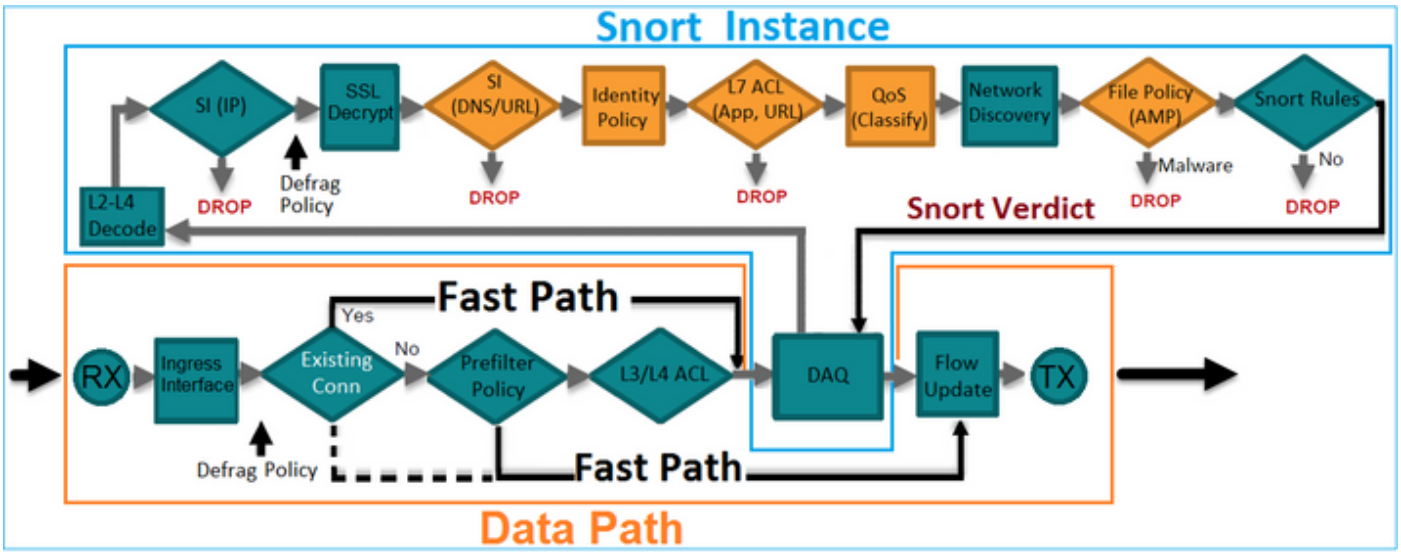
<#root>

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


3 packets captured

   2: 15:27:54.330000       192.168.201.50.20 > 192.168.201.60.80:
S
 0:0(0)
ack
 0 win 8192
Phase: 1
Type: CAPTURE
Subtype:
Result: ALLOW
Config:
Additional Information:
MAC Access list

Phase: 2
Type: ACCESS-LIST
Subtype:
Result: ALLOW
Config:
Implicit Rule
Additional Information:
MAC Access list
```

```
Phase: 3
Type: FLOW-LOOKUP
Subtype:ing
Result: ALLOW
Config:
Additional Information:
Found flow with id 282, using current flow


Phase: 4
Type: EXTERNAL-INSPECT

Subtype:
Result: ALLOW
Config:

Additional Information:
Application: 'SNORT Inspect'


Phase: 5
Type: SNORT

Subtype:
Result: ALLOW
Config:
Additional Information:
Snort Verdict: (pass-packet) allow this packet


Phase: 6
Type: CAPTURE
Subtype:
Result: ALLOW
Config:
Additional Information:
MAC Access list

Result:
input-interface: OUTSIDE
input-status: up
input-line-status: up
Action: allow


1 packet shown
>
```

验证3.允许流量的防火墙引擎调试

防火墙引擎调试针对FTD Snort引擎的特定组件（如图中所示的访问控制策略）运行：



通过内联对发送TCP SYN/ACK数据包时，可以在调试输出中看到：

<#root>

```
>
system support firewall-engine-debug


Please specify an IP protocol:
tcp

Please specify a client IP address:
Please specify a client port:
Please specify a server IP address:
192.168.201.60

Please specify a server port:
80

Monitoring firewall engine debug messages

192.168.201.60-80 > 192.168.201.50-20 6 AS 4 I 12 New session


192.168.201.60-80 > 192.168.201.50-20 6 AS 4 I 12 using HW or preset rule order 3, id 268438528 action A


192.168.201.60-80 > 192.168.201.50-20 6 AS 4 I 12 allow action


192.168.201.60-80 > 192.168.201.50-20 6 AS 4 I 12 Deleting session
```

验证4.检验链路状态传播

启用FTD上的缓冲区日志并关闭连接到e1/6接口的交换机端口。在FTD CLI上，您必须看到两个接口都关闭：

<#root>

```
>
show interface ip brief

Interface                  IP-Address      OK? Method Status                Protocol
Internal-Data0/0           unassigned      YES unset  up                    up
Internal-Data0/1           unassigned      YES unset  up                    up
Internal-Data0/2           169.254.1.1     YES unset  up                    up
Ethernet1/6                unassigned      YES unset  down                  down

Ethernet1/7                unassigned      YES unset  up                    up
Ethernet1/8                unassigned      YES unset  administratively down up

>
```

FTD日志显示：

<#root>

```
>
show log

Jan 03 2017 15:53:19: %ASA-4-411002:
Line protocol on Interface Ethernet1/6, changed state to down

Jan 03 2017 15:53:19: %ASA-4-411004:
Interface OUTSIDE, changed state to administratively down

Jan 03 2017 15:53:19: %ASA-4-411004:
Interface Ethernet1/8, changed state to administratively down

Jan 03 2017 15:53:19: %ASA-4-812005:
Link-State-Propagation activated on inline-pair due to failure of interface Ethernet1/6(INSIDE) bringing

>
```

内联集状态显示两个接口成员的状态：

<#root>

```
>
show inline-set


Inline-set Inline-Pair-1
  Mtu is 1500 bytes
  Failsafe mode is on/activated
  Failsecure mode is off
  Tap mode is off
 Propagate-link-state option is on

  hardware-bypass mode is disabled

Interface-Pair[1]:


    Interface: Ethernet1/6 "INSIDE"


      Current-Status: Down(Propagate-Link-State-Activated)


    Interface: Ethernet1/8 "OUTSIDE"


      Current-Status: Down(Down-By-Propagate-Link-State)

    Bridge Group ID: 509
>
```

注意2个接口状态的差异：

<#root>

```
>
show interface e1/6


Interface Ethernet1/6 "INSIDE", is down, line protocol is down


  Hardware is EtherSVI, BW 1000 Mbps, DLY 1000 usec
        MAC address 5897.bdb9.770e, MTU 1500
        IPS Interface-Mode: inline, Inline-Set: Inline-Pair-1
```

```
  Propagate-Link-State-Activated


        IP address unassigned
  Traffic Statistics for "INSIDE":
        3393 packets input, 234923 bytes
        120 packets output, 49174 bytes
        1 packets dropped
      1 minute input rate 0 pkts/sec,  0 bytes/sec
      1 minute output rate 0 pkts/sec,  0 bytes/sec
      1 minute drop rate, 0 pkts/sec
      5 minute input rate 0 pkts/sec,  6 bytes/sec
      5 minute output rate 0 pkts/sec,  3 bytes/sec
      5 minute drop rate, 0 pkts/sec
>
```

对于Ethernet1/8接口：

<#root>

```
>
show interface e1/8


Interface Ethernet1/8 "OUTSIDE", is administratively down, line protocol is up


  Hardware is EtherSVI, BW 1000 Mbps, DLY 1000 usec
        MAC address 5897.bdb9.774d, MTU 1500
        IPS Interface-Mode: inline, Inline-Set: Inline-Pair-1


Down-By-Propagate-Link-State


        IP address unassigned
  Traffic Statistics for "OUTSIDE":
        120 packets input, 46664 bytes
        3391 packets output, 298455 bytes
        0 packets dropped
      1 minute input rate 0 pkts/sec,  0 bytes/sec
      1 minute output rate 0 pkts/sec,  0 bytes/sec
      1 minute drop rate, 0 pkts/sec
      5 minute input rate 0 pkts/sec,  3 bytes/sec
      5 minute output rate 0 pkts/sec,  8 bytes/sec
      5 minute drop rate, 0 pkts/sec
>
```

重新启用交换机端口后，FTD日志显示：

<#root>

```
>
```

```
show log

...
Jan 03 2017 15:59:35: %ASA-4-411001:
Line protocol on Interface Ethernet1/6, changed state to up

Jan 03 2017 15:59:35: %ASA-4-411003:
Interface Ethernet1/8, changed state to administratively up

Jan 03 2017 15:59:35: %ASA-4-411003:
Interface OUTSIDE, changed state to administratively up

Jan 03 2017 15:59:35: %ASA-4-812006:
Link-State-Propagation de-activated on inline-pair due to recovery of interface Ethernet1/6(INSIDE) brin

>
```

验证5.配置静态 NAT

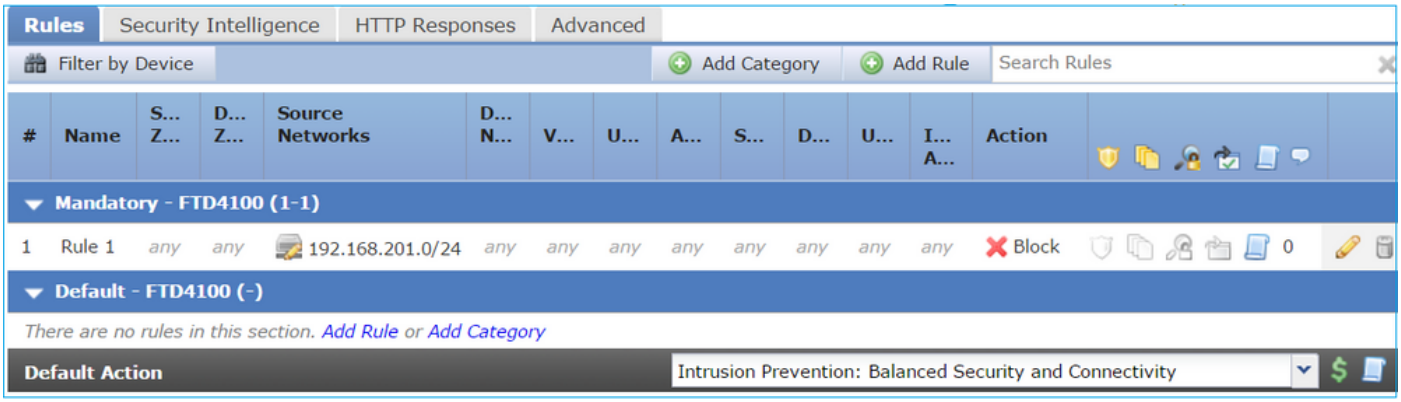
解决方案

内联、内联分路器或被动模式下运行的接口不支持NAT:

https://www.cisco.com/c/en/us/td/docs/security/firepower/601/configuration/guide/fpmc-config-guide-v601/Network_Address_Translation__NAT__for_Threat_Defense.html

内联对接口模式上的阻止数据包

创建阻止规则，通过FTD内联对发送流量并观察行为，如图所示。



解决方案

通过跟踪启用捕获，并通过FTD内联对发送SYN/ACK数据包。流量被阻止：

<#root>

```
>

show capture

capture CAPI type raw-data trace interface INSIDE

[Capturing - 210 bytes]

  match ip host 192.168.201.60 any
capture CAPO type raw-data interface OUTSIDE

[Capturing - 0 bytes]

  match ip host 192.168.201.60 any
```

通过跟踪，数据包可以显示：

<#root>

```
>

show capture CAPI packet-number 1 trace



3 packets captured

   1: 16:12:55.785085

192.168.201.50.20 > 192.168.201.60.80: S 0:0(0) ack 0 win 8192


Phase: 1
Type: CAPTURE
Subtype:
Result: ALLOW
Config:
Additional Information:
MAC Access list

Phase: 2
Type: ACCESS-LIST
Subtype:
Result: ALLOW
Config:
Implicit Rule
Additional Information:
MAC Access list


Phase: 3



Type: NGIPS-MODE



Subtype: ngips-mode
```

```
Result: ALLOW
Config:
```

Additional Information:

The flow ingressed an interface configured for NGIPS mode and NGIPS services is applied

Phase: 4

Type: ACCESS-LIST

Subtype: log

Result: DROP

```
Config:
access-group CSM_FW_ACL_ global
access-list CSM_FW_ACL_ advanced deny ip 192.168.201.0 255.255.255.0 any rule-id 268441600 event-log fl
access-list CSM_FW_ACL_ remark rule-id 268441600: ACCESS POLICY: FTD4100 - Mandatory/1
access-list CSM_FW_ACL_ remark rule-id 268441600: L4 RULE: Rule 1
```

Additional Information:

```
Result:
input-interface: INSIDE
input-status: up
input-line-status: up
```

Action: drop

Drop-reason: (acl-drop) Flow is denied by configured rule

```
1 packet shown
```

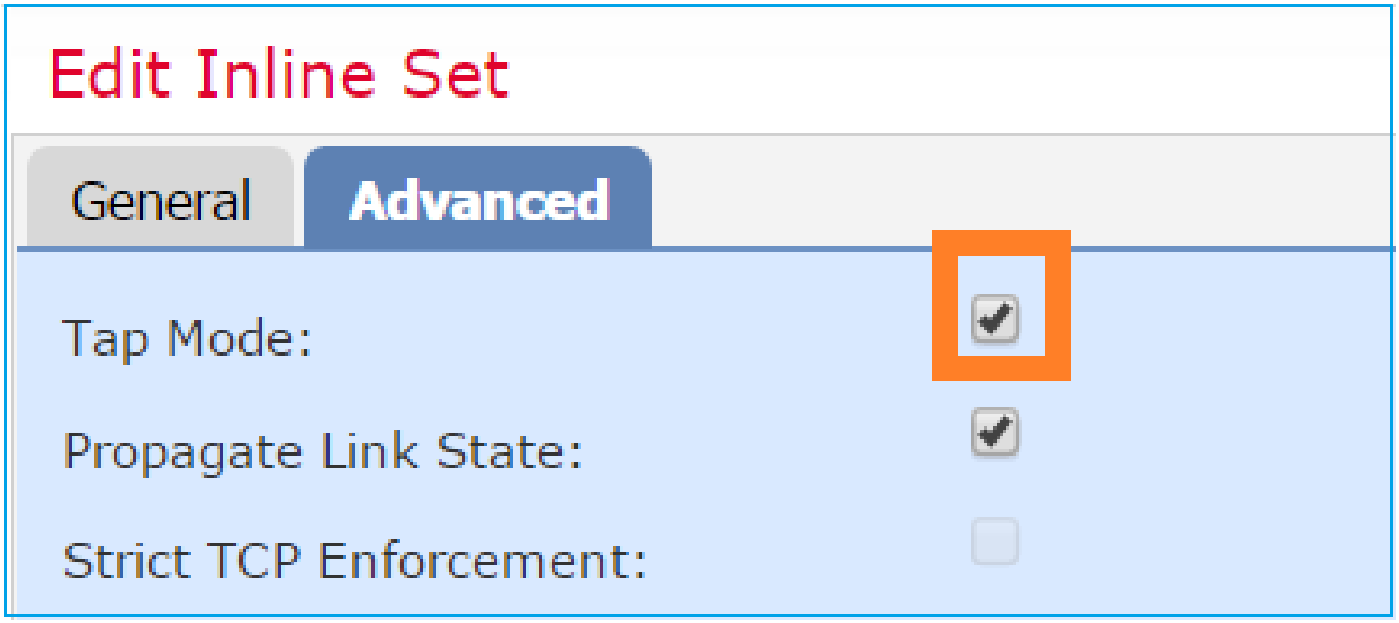
在此跟踪中，可以看到，数据包被FTD LINA引擎丢弃，并且未转发到FTD Snort引擎。

使用Tap配置内联对模式

在内联对上启用分路模式。

解决方案

导航到设备>设备管理>内联集>编辑内联集>高级并启用分路模式，如图所示。



确认

<#root>

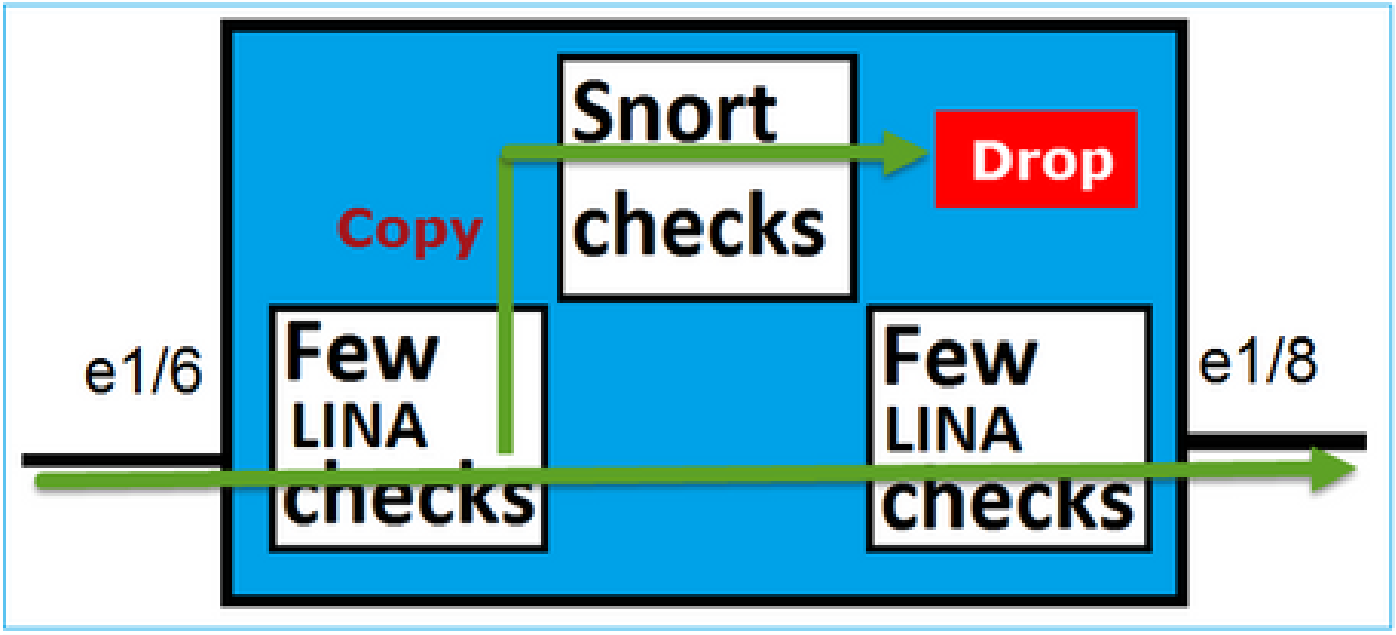
```
>

show inline-set


Inline-set Inline-Pair-1
  Mtu is 1500 bytes
  Failsafe mode is on/activated
  Failsecure mode is off


Tap mode is on

  Propagate-link-state option is on
  hardware-bypass mode is disabled
  Interface-Pair[1]:
    Interface: Ethernet1/6 "INSIDE"
      Current-Status: UP
    Interface: Ethernet1/8 "OUTSIDE"
      Current-Status: UP
    Bridge Group ID: 0
>
```

使用分路接口验证FTD内联对

基本原理

- 使用分路2配置内联对时，物理接口在内部桥接
- 在路由或透明部署模式下可用
- 大多数LINA引擎功能（NAT、路由等）对于通过内联对的流不可用
- 无法丢弃实际流量
- 一些LINA引擎检查与完整的Snort引擎检查一起应用于实际流量的副本

最后一点如图所示：



带分路模式的内联对不会丢弃中转流量。通过数据包的跟踪，可以确认以下情况：

<#root>

```
>

show capture CAPI packet-number 2 trace


3 packets captured

   2: 13:34:30.685084       192.168.201.50.20 > 192.168.201.60.80: S 0:0(0) win 8192
Phase: 1
Type: CAPTURE
Subtype:
Result: ALLOW
Config:
Additional Information:
MAC Access list
```

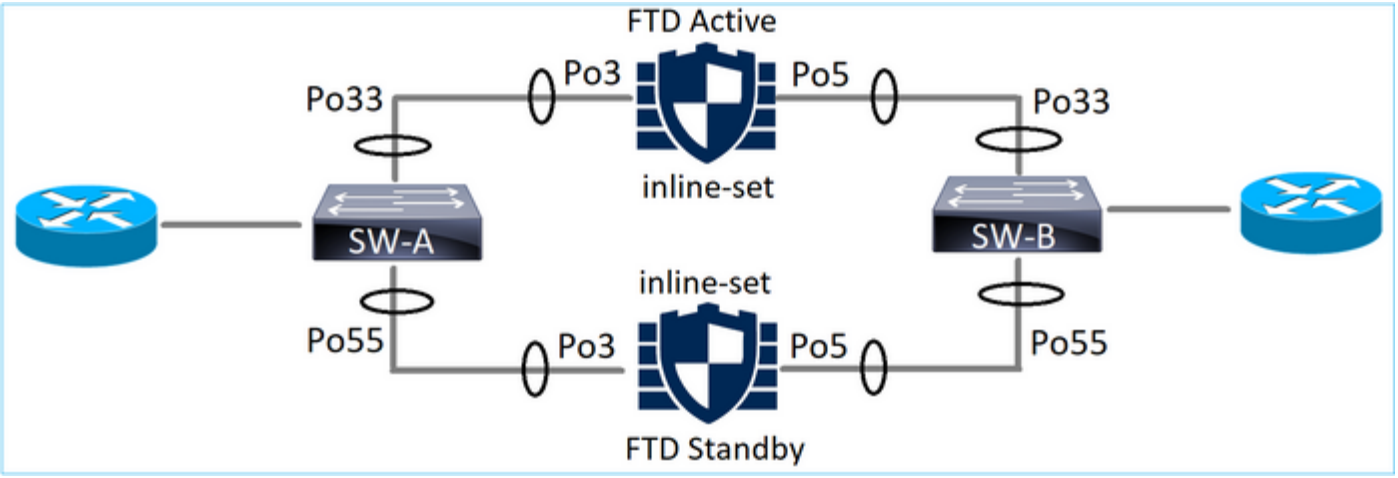
```
Phase: 2
Type: ACCESS-LIST
Subtype:
Result: ALLOW
Config:
Implicit Rule
Additional Information:
MAC Access list


Phase: 3
Type: NGIPS-MODE
Subtype: ngips-mode

Result: ALLOW
Config:
Additional Information:

The flow ingressed an interface configured for NGIPS mode and NGIPS services is applied



Phase: 4
Type: ACCESS-LIST
Subtype: log
Result: WOULD HAVE DROPPED

Config:
access-group CSM_FW_ACL_ global
access-list CSM_FW_ACL_ advanced deny ip 192.168.201.0 255.255.255.0 any rule-id 268441600 event-log fl
access-list CSM_FW_ACL_ remark rule-id 268441600: ACCESS POLICY: FTD4100 - Mandatory/1
access-list CSM_FW_ACL_ remark rule-id 268441600: L4 RULE: Rule 1
Additional Information:

Result:
input-interface: INSIDE
input-status: up
input-line-status: up

Action: Access-list would have dropped, but packet forwarded due to inline-tap


1 packet shown
>
```

内联对和Etherchannel

您可以通过两种方式配置与etherchannel的内联对：

1. Etherchannel在FTD上终止
2. Etherchannel通过FTD（需要FXOS代码2.3.1.3及更高版本）

Etherchannel在FTD上终止



SW-A上的Etherchannel:

<#root>

```
SW-A#

show etherchannel summary | i Po33|Po55

33      Po33(SU)         LACP       Gi3/11(P)
35      Po35(SU)         LACP       Gi2/33(P)
```

SW-B上的Etherchannel:

<#root>

```
SW-B#

show etherchannel summary | i Po33|Po55

33      Po33(SU)         LACP         Gi1/0/3(P)
55      Po55(SU)         LACP         Gi1/0/4(P)
```

根据MAC地址学习，通过活动FTD转发流量：

<#root>

```
SW-B#

 show mac address-table address 0017.dfd6.ec00

          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
 201    0017.dfd6.ec00    DYNAMIC

Po33
```

```
Total Mac Addresses for this criterion: 1
```

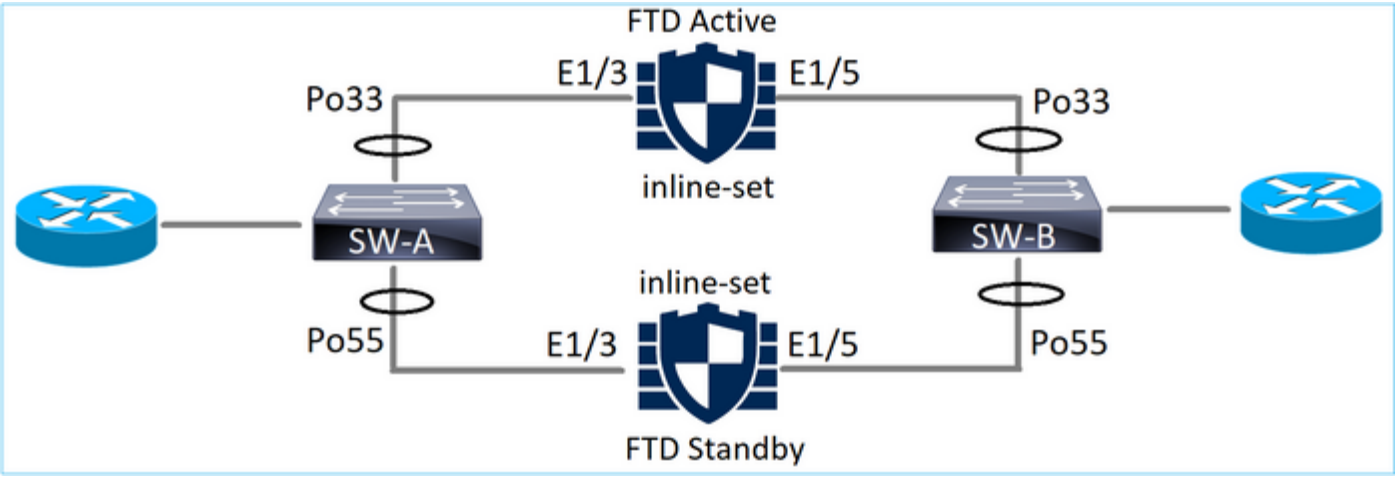
FTD上的内联集：

<#root>

```
FTD#

show inline-set


Inline-set SET1
  Mtu is 1500 bytes
  Fail-open for snort down is on
  Fail-open for snort busy is off
  Tap mode is off
  Propagate-link-state option is off
  hardware-bypass mode is disabled


Interface-Pair[1]:
    Interface: Port-channel3 "INSIDE"
      Current-Status: UP
    Interface: Port-channel5 "OUTSIDE"
      Current-Status: UP

    Bridge Group ID: 775
```

注：在FTD故障切换事件中，流量中断主要取决于交换机获取远程对等体的MAC地址所用的时间。

通过FTD的Etherchannel



SW-A上的Etherchannel:

<#root>

```
SW-A#
show etherchannel summary | i Po33|Po55

33     Po33(SU)        LACP      Gi3/11(P)
55     Po55(SD)        LACP      Gi3/7
(I)
```

阻止通过备用FTD的LACP数据包：

<#root>

```
FTD#
capture ASP type asp-drop fo-standby
FTD#
show capture ASP | i 0180.c200.0002

  29: 15:28:32.658123       a0f8.4991.ba03 0180.c200.0002 0x8809 Length: 124
  70: 15:28:47.248262       f0f7.556a.11e2 0180.c200.0002 0x8809 Length: 124
```

SW-B上的Etherchannel:

<#root>

```
SW-B#
show etherchannel summary | i Po33|Po55

33     Po33(SU)        LACP        Gi1/0/3(P)
55     Po55(SD)        LACP        Gi1/0/4
(s)
```

根据MAC地址学习，通过活动FTD转发流量：

<#root>

```
SW-B#
 show mac address-table address 0017.dfd6.ec00

          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
```

```
----    -----------       --------    -----
 201    0017.dfd6.ec00    DYNAMIC
```

Po33

```
Total Mac Addresses for this criterion: 1
```

FTD上的内联集：

<#root>

```
FTD#
```

show inline-set

```
Inline-set SET1
  Mtu is 1500 bytes
  Fail-open for snort down is on
  Fail-open for snort busy is off
  Tap mode is off
  Propagate-link-state option is off
  hardware-bypass mode is disabled
```

Interface-Pair[1]:

Interface: Ethernet1/3 "INSIDE"

Current-Status: UP

Interface: Ethernet1/5 "OUTSIDE"

Current-Status: UP

Bridge Group ID: 519

⚠ 注意：在本场景中，如果发生一个FTD故障切换事件，收敛时间主要取决于Etherchannel LACP协商，而根据中断时间，收敛时间可能会相当长。如果Etherchannel模式为ON(no LACP)，则收敛时间取决于MAC地址学习。

故障排除

当前没有可用于此配置的特定信息。

比较：内联对与带分路的内联对

	内联对	带分路器的内联对
show inline-set	> show inline-set 内联集内联对1 MTU is 1500 bytes 打开/激活故障安全模式 Failsecure模式关闭 分路模式关闭 Propagate-link-state选项为on 已禁用硬件旁路模式 接口对[1]: 接口：Ethernet1/6“内部” 当前状态：UP 接口：Ethernet1/8“OUTSIDE” 当前状态：UP 网桥组ID:509 >	> show inline-set 内联集内联对1 MTU is 1500 bytes 打开/激活故障安全模式 Failsecure模式关闭 分路模式已打开 Propagate-link-state选项为on 已禁用硬件旁路模式 接口对[1]: 接口：Ethernet1/6“内部” 当前状态：UP 接口：Ethernet1/8“OUTSIDE” 当前状态：UP 网桥组ID:0 >
show interface	> show interface e1/6 接口Ethernet1/6“INSIDE”，启用，线路协议启用 硬件为EtherSVI，BW 1000 Mbps，DLY 1000 usec MAC地址5897.bdb9.770e，MTU 1500 IPS接口模式：内联，内联集：内联对–1 未分配IP地址 “INSIDE”的流量统计信息： 3957个数据包输入，264913字节 144个数据包输出，58664字节 4个数据包被丢弃 1分钟输入速率0数据包/秒，26字节/秒 1分钟输出速率0 pkts/sec，7字节/sec 1分钟丢弃率，0数据包/秒 5分钟输入速率0数据包/秒，28字节/秒 5分钟输出速率0 pkts/sec，9字节/sec	> show interface e1/6 接口Ethernet1/6“INSIDE”，启用，线路协议启用 硬件为EtherSVI，BW 1000 Mbps，DLY 1000 usec MAC地址5897.bdb9.770e，MTU 1500 IPS接口模式：inline-tap，Inline-Set:Inline-Pair-1 未分配IP地址 “INSIDE”的流量统计信息： 24个数据包输入，1378字节 0个数据包输出，0个字节 丢弃了24个数据包 1分钟输入速率0数据包/秒，0字节/秒 1分钟输出速率0 pkts/sec，0字节/sec 1分钟丢弃率，0数据包/秒 5分钟输入速率0数据包/秒，0字节/秒 5分钟输出速率0 pkts/sec，0字节/sec 5分钟丢弃率，0数据包/秒 > show interface e1/8

	5分钟丢弃率，0数据包/秒 > show interface e1/8 Ethernet1/8接口“OUTSIDE”，启用，线路协议启用 硬件为EtherSVI，BW 1000 Mbps，DLY 1000 usec MAC地址5897.bdb9.774d，MTU 1500 IPS接口模式：内联，内联集：内联对–1 未分配IP地址 “OUTSIDE”的流量统计信息： 输入144个数据包，55634字节 3954数据包输出，339987字节 0个数据包被丢弃 1分钟输入速率0数据包/秒，7字节/秒 1分钟输出速率0 pkts/sec，37字节/sec 1分钟丢弃率，0数据包/秒 5分钟输入速率0数据包/秒，8字节/秒 5分钟输出速率0 pkts/sec，39字节/sec 5分钟丢弃率，0数据包/秒 >	Ethernet1/8接口“OUTSIDE”，启用，线路协议启用 硬件为EtherSVI，BW 1000 Mbps，DLY 1000 usec MAC地址5897.bdb9.774d，MTU 1500 IPS接口模式：inline-tap，Inline-Set:Inline-Pair-1 未分配IP地址 “OUTSIDE”的流量统计信息： 输入1个数据包，441字节 0个数据包输出，0个字节 1个数据包被丢弃 1分钟输入速率0数据包/秒，0字节/秒 1分钟输出速率0 pkts/sec，0字节/sec 1分钟丢弃率，0数据包/秒 5分钟输入速率0数据包/秒，0字节/秒 5分钟输出速率0 pkts/sec，0字节/sec 5分钟丢弃率，0数据包/秒 >
使用阻止规则处理数据包	> show capture CAPI packet-number 1 trace 捕获了3个数据包 1:16:12:55.785085 192.168.201.50.20 > 192.168.201.60.80:S 0:0(0)ack 0 win 8192 阶段：1 类型：CAPTURE 子类型： 结果：允许 Config : 其它信息： MAC访问列表 阶段：2 类型：ACCESS-LIST 子类型： 结果：允许	> show capture CAPI packet-number 1 trace 捕获了3个数据包 1:16:56:02.631437 192.168.201.50.20 > 192.168.201.60.80:S 0:0(0)win 8192 阶段：1 类型：CAPTURE 子类型： 结果：允许 Config : 其它信息： MAC访问列表 阶段：2 类型：ACCESS-LIST 子类型： 结果：允许 Config :

	Config : 隐式规则 其它信息： MAC访问列表 阶段：3 类型：NGIPS-MODE 子类型：ngips-mode 结果：允许 Config : 其它信息： 流进入配置为NGIPS模式的接口并应用NGIPS服务 阶段：4 类型：ACCESS-LIST 子类型：日志 结果：丢弃 Config : access-group CSM_FW_ACL_ global access-list CSM_FW_ACL_ advanced deny ip 192.168.201.0 255.255.255.0 any rule-id 268441600 event-log flow-start access-list CSM_FW_ACL_ remark rule-id 268441600：访问策略：FTD4100 — 必备/1 access-list CSM_FW_ACL_ remark rule-id 268441600: L4规则：规则1 其它信息： 结果： input-interface:INSIDE input-status: up input-line-status: up 操作：丢弃 丢弃原因：(acl-drop)流被配置的规则拒绝 1个数据包显示 >	隐式规则 其它信息： MAC访问列表 阶段：3 类型：NGIPS-MODE 子类型：ngips-mode 结果：允许 Config : 其它信息： 流进入配置为NGIPS模式的接口并应用NGIPS服务 阶段：4 类型：ACCESS-LIST 子类型：日志 结果：本应已丢弃 Config : access-group CSM_FW_ACL_ global access-list CSM_FW_ACL_ advanced deny ip 192.168.201.0 255.255.255.0 any rule-id 268441600 event-log flow-start access-list CSM_FW_ACL_ remark rule-id 268441600：访问策略：FTD4100 — 必备/1 access-list CSM_FW_ACL_ remark rule-id 268441600: L4规则：规则1 其它信息： 结果： input-interface:INSIDE input-status: up input-line-status: up 操作：访问列表已丢弃，但由于内联分路而转发数据包 1个数据包显示 >

摘要

- 当您使用内联对模式时，数据包主要通过FTD Snort引擎
- TCP连接在TCP状态旁路模式下处理
- 从FTD LINA引擎的角度来看，应用ACL策略
- 当内联对模式处于使用状态时，由于数据包是内联处理的，因此可以阻止它们
- 启用分路模式时，数据包副本会在内部进行检测并丢弃，同时实际流量不会经过修改的FTD

相关信息

- Cisco Firepower NGFW
- 技术支持和文档 - Cisco Systems

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