在Firepower 4100上配置FTD多实例高可用性

目录

简介

本文档介绍如何在FTD容器实例（多实例）中配置故障切换。

先决条件

要求

思科建议您具备Firepower管理中心和防火墙威胁防御知识。

使用的组件

思科Firepower管理中心虚拟7.2.5
思科Firepower 4145 NGFW设备(FTD) 7.2.5
Firepower可扩展操作系统(FXOS) 2.12 (0.498)
Windows 10

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。

在部署FTD多实例之前，必须了解它如何影响您的系统性能并做出相应的规划。务必参考思科官方文档或咨询思科技术代表，以确保实现最佳部署和配置。

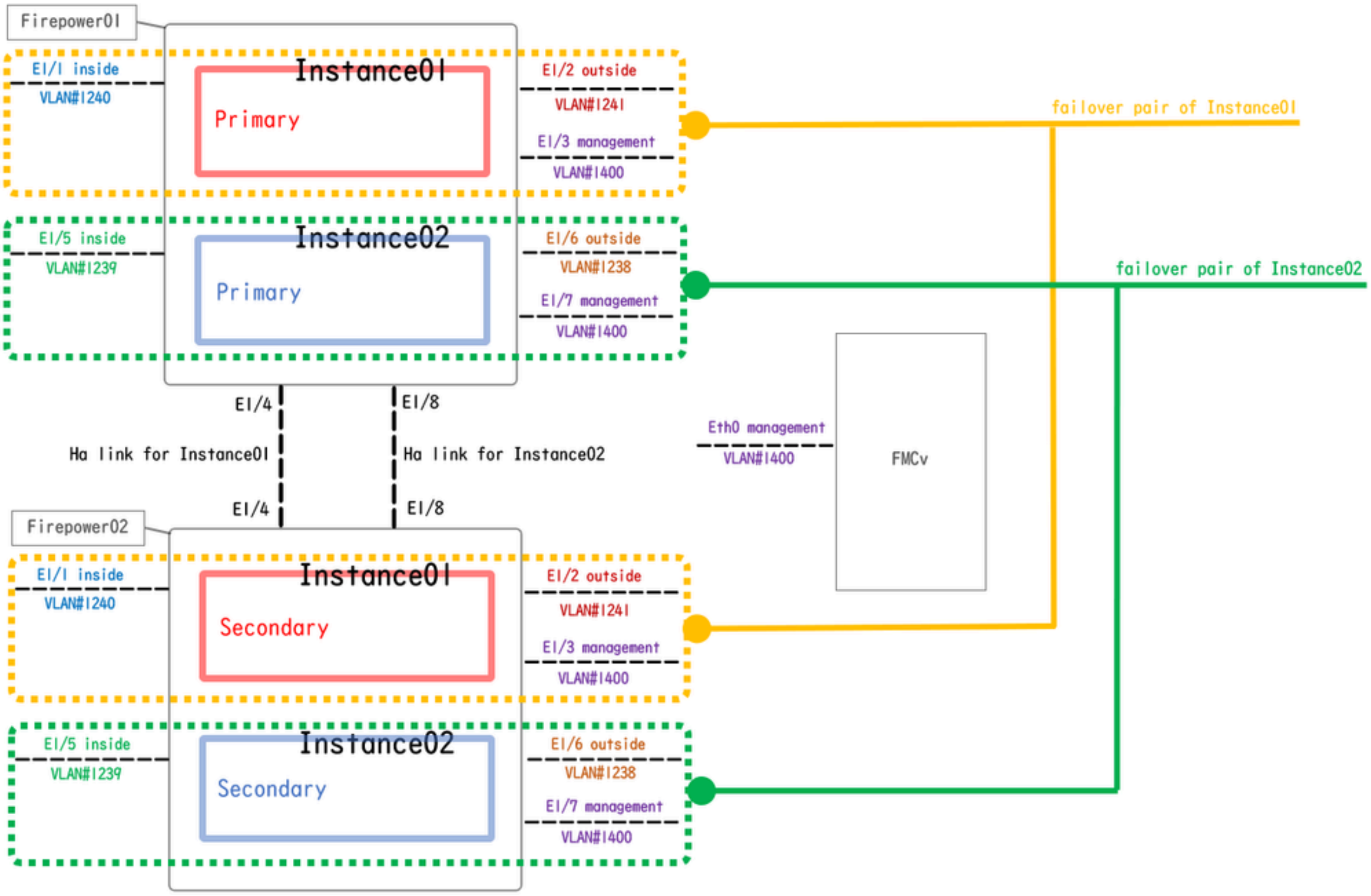
背景信息

多实例是Firepower威胁防御(FTD)的一项功能，类似于ASA多情景模式。它允许您在单个硬件上运行FTD的多个独立容器实例。每个容器实例允许硬资源分离、独立的配置管理、独立的重新加载、独立的软件更新和全面的威胁防御功能支持。这对于需要针对不同部门或项目实施不同安全策略，但又不想投资于多个独立硬件设备的组织特别有用。运行FTD 6.4及更高版本的Firepower 4100和9300系列安全设备当前支持多实例功能。

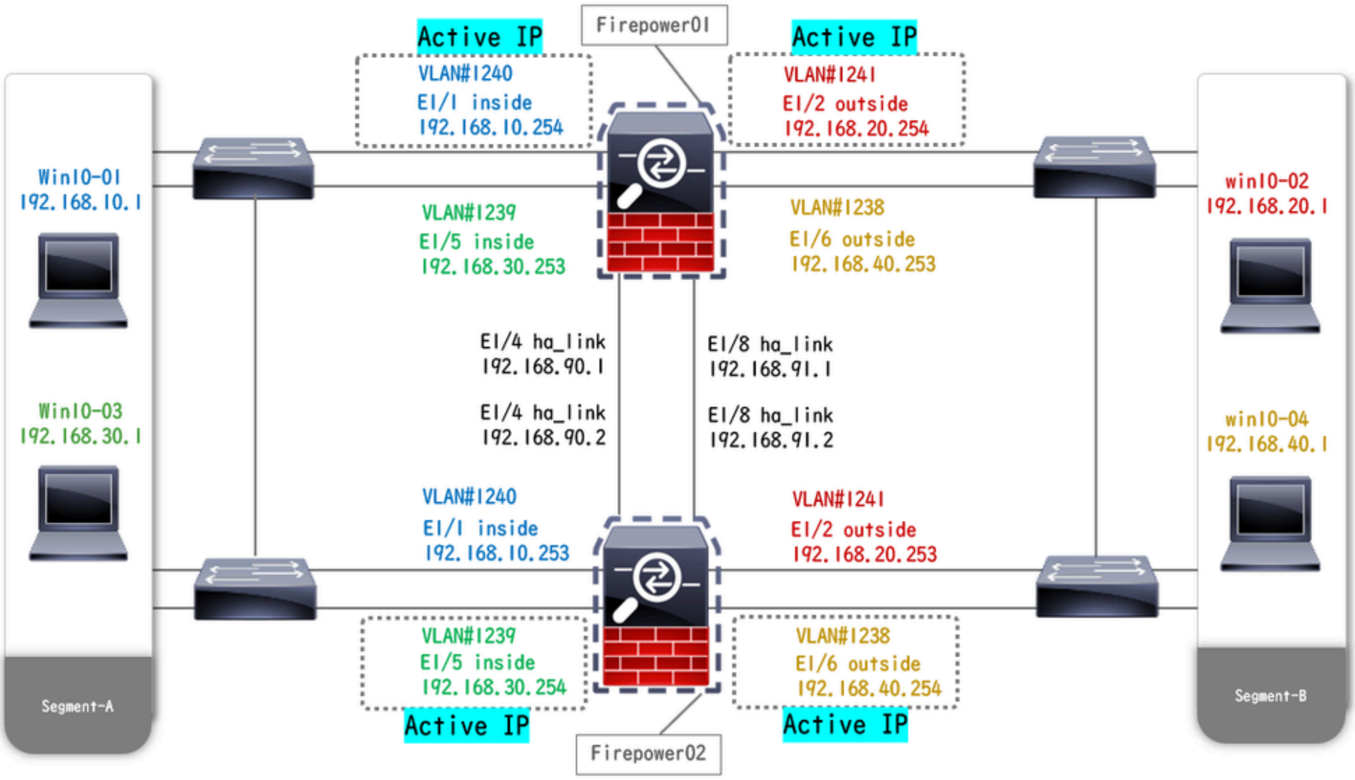
本文档使用最多支持14个容器实例的Firepower4145。有关Firepower设备支持的最大实例数，请参阅每个型号的最大容器实例和资源数。

网络图

本文档介绍此图上多实例中的HA配置和验证。



逻辑配置图

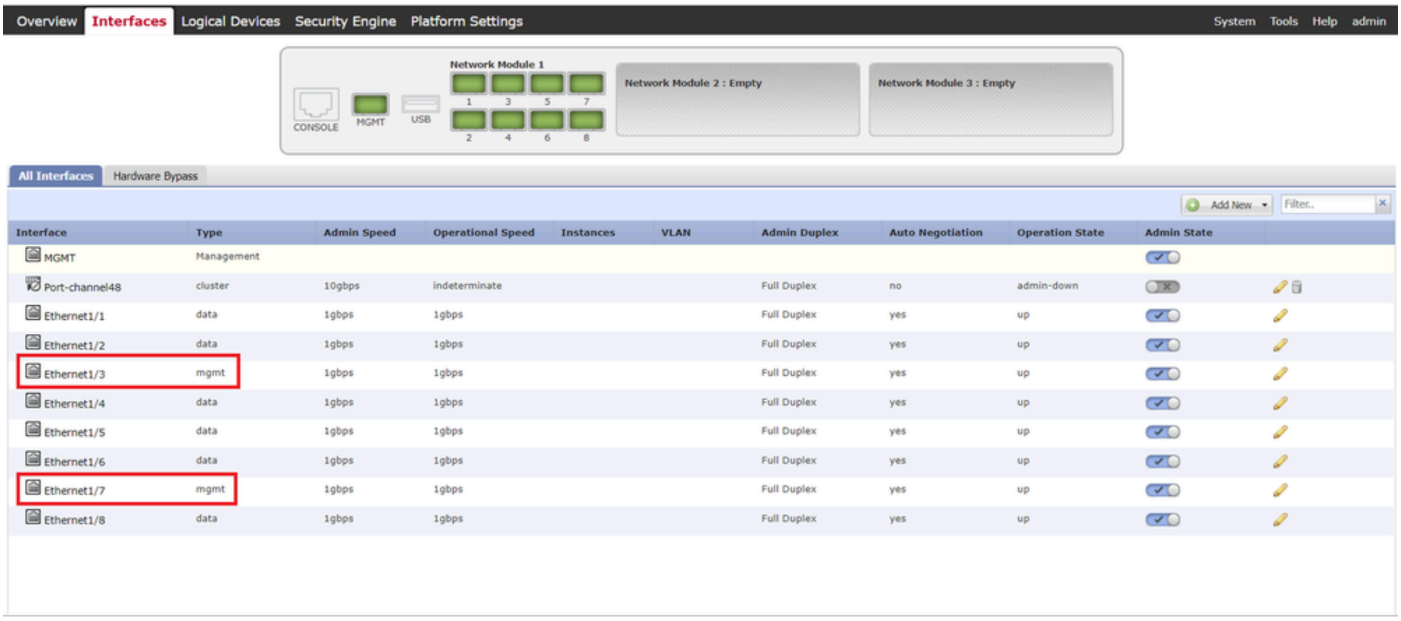


物理配置图

配置

步骤1:预配置接口

a.导航到FCM上的接口。设置2个管理接口。在本示例中，Ethernet1/3和Ethernet1/7。



Interface	Type	Admin Speed	Operational Speed	Instances	VLAN	Admin Duplex	Auto Negotiation	Operation State	Admin State
MGMT	Management								✓
Port-channel48	cluster	10gbps	indeterminate			Full Duplex	no	admin-down	✗
Ethernet1/1	data	1gbps	1gbps			Full Duplex	yes	up	✓
Ethernet1/2	data	1gbps	1gbps			Full Duplex	yes	up	✓
Ethernet1/3	mgmt	1gbps	1gbps			Full Duplex	yes	up	✓
Ethernet1/4	data	1gbps	1gbps			Full Duplex	yes	up	✓
Ethernet1/5	data	1gbps	1gbps			Full Duplex	yes	up	✓
Ethernet1/6	data	1gbps	1gbps			Full Duplex	yes	up	✓
Ethernet1/7	mgmt	1gbps	1gbps			Full Duplex	yes	up	✓
Ethernet1/8	data	1gbps	1gbps			Full Duplex	yes	up	✓

预配置接口

第二步：为容器实例添加2个资源配置文件。

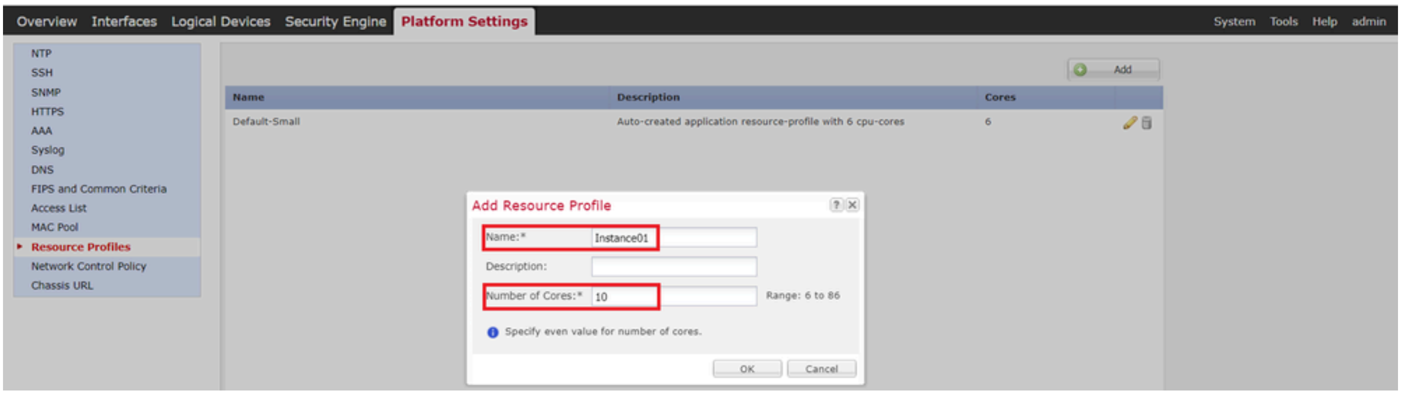
a.导航到平台设置 > 资源配置文件 > 在FCM上添加。设置第一个资源配置文件。

在本例中：
·名称：Instance01
·核心数：10

注意：对于容器实例对的高可用性，必须使用相同的资源配置文件属性。

将配置文件的名称设置为1到64个字符。请注意，添加此配置文件后，无法更改其名称。

设置配置文件的核心数量，在6和最大数量之间。



Name	Description	Cores
Default-Small	Auto-created application resource-profile with 6 cpu-cores	6

Add Resource Profile

Name:* Instance01

Description:

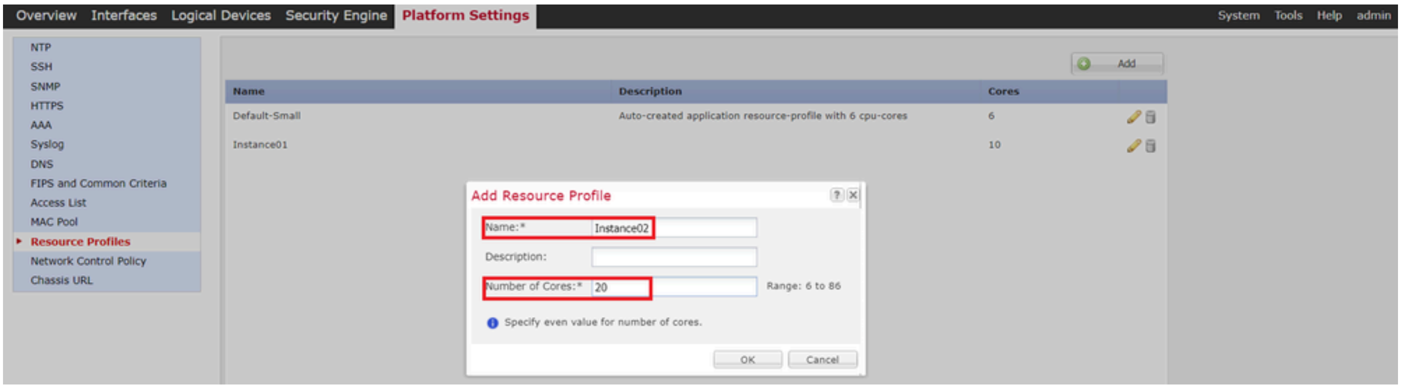
Number of Cores:* 10 Range: 6 to 86

Specify even value for number of cores.

添加第一个资源配置文件

b.在第2步中重复a.以配置第2个资源配置文件。

在本例中：
·名称：Instance02
·核心数：20



Name	Description	Cores
Default-Small	Auto-created application resource-profile with 6 cpu-cores	6
Instance01		10

Add Resource Profile

Name:* Instance02

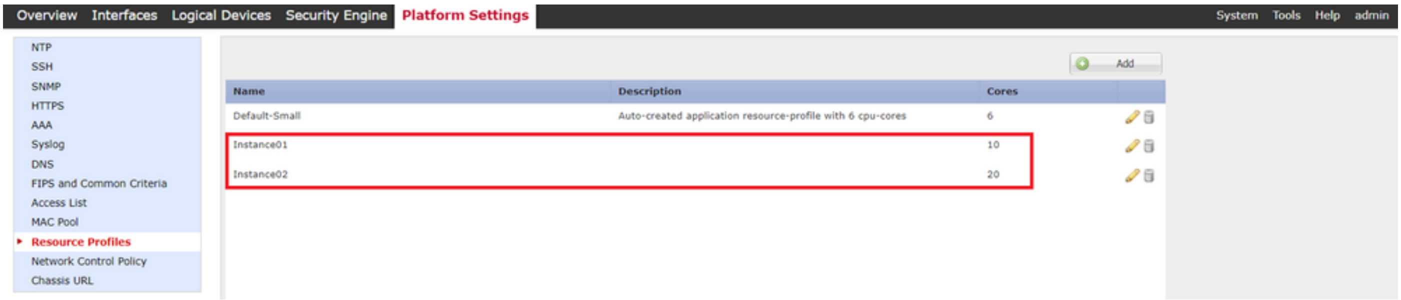
Description:

Number of Cores:* 20 Range: 6 to 86

Specify even value for number of cores.

添加第2个资源配置文件

c.检查2个资源配置文件已成功添加。



Name	Description	Cores
Default-Small	Auto-created application resource-profile with 6 cpu-cores	6
Instance01		10
Instance02		20

确认资源配置文件

第3步：（可选）为容器实例接口添加虚拟MAC地址的MAC池前缀。

您可以手动设置主用/备用接口的虚拟MAC地址。如果未设置虚拟MAC地址，对于多实例功能，机箱会自动为实例接口生成MAC地址，并确保每个实例中的共享接口使用唯一的MAC地址。

有关MAC地址的详细信息，请选中添加一个MAC池前缀和查看容器实例接口的MAC地址。

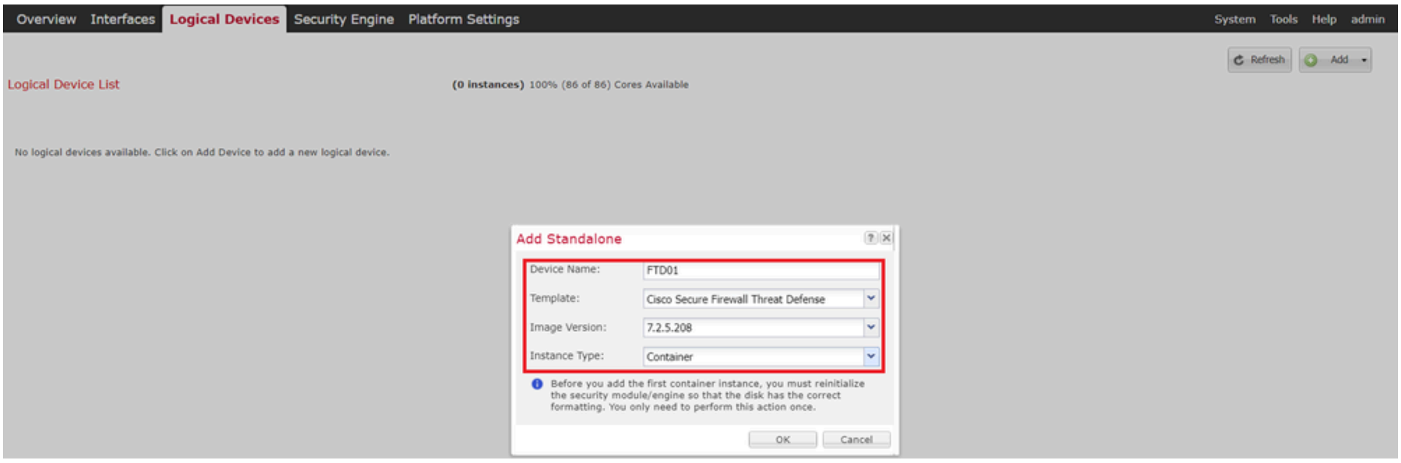
第四步：添加独立实例。

a.导航到逻辑设备 > 添加独立。设置第一个实例。

在本例中：
·设备名称：FTD01
·实例类型：容器

注意：部署容器应用的唯一方法是预部署实例类型设置为容器的应用实例。 确保选择Container。

添加逻辑设备后，无法更改此名称。



Logical Device List

(0 instances) 100% (86 of 86) Cores Available

No logical devices available. Click on Add Device to add a new logical device.

Add Standalone

Device Name: FTD01

Template: Cisco Secure Firewall Threat Defense

Image Version: 7.2.5.208

Instance Type: Container

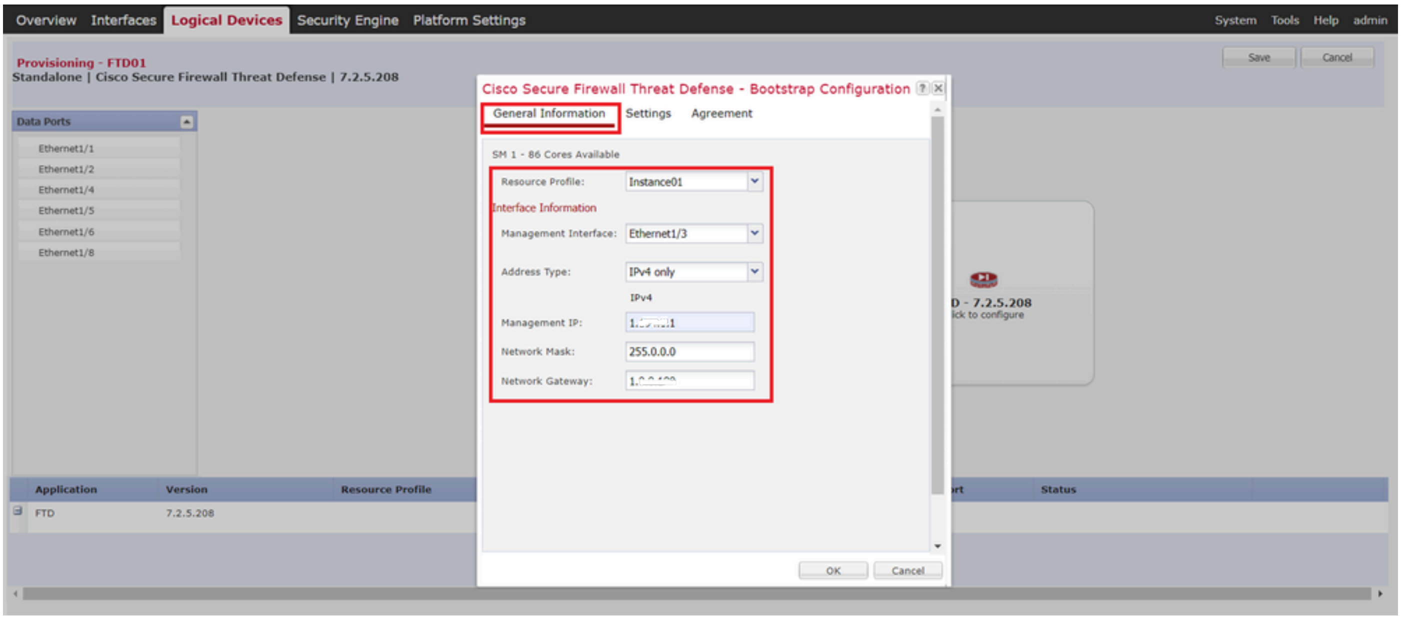
Before you add the first container instance, you must reinitialize the security module/engine so that the disk has the correct formatting. You only need to perform this action once.

添加实例

第五步：配置接口

a.为Instance01设置Resource Profile、Management Interface和Management IP。

在本例中：
·资源配置文件：Instance01
·管理接口：Ethernet1/3
·管理IP：x.x.1.1



Provisioning - FTD01
Standalone | Cisco Secure Firewall Threat Defense | 7.2.5.208

Data Ports
Ethernet1/1
Ethernet1/2
Ethernet1/4
Ethernet1/5
Ethernet1/6
Ethernet1/8

Application	Version	Resource Profile
FTD	7.2.5.208	

Cisco Secure Firewall Threat Defense - Bootstrap Configuration

SM 1 - 86 Cores Available

Resource Profile: Instance01

Interface Information

Management Interface: Ethernet1/3

Address Type: IPv4 only

IPv4

Management IP: 1.[redacted]1

Network Mask: 255.0.0.0

Network Gateway: 1.[redacted]

配置配置文件/管理接口/管理IP

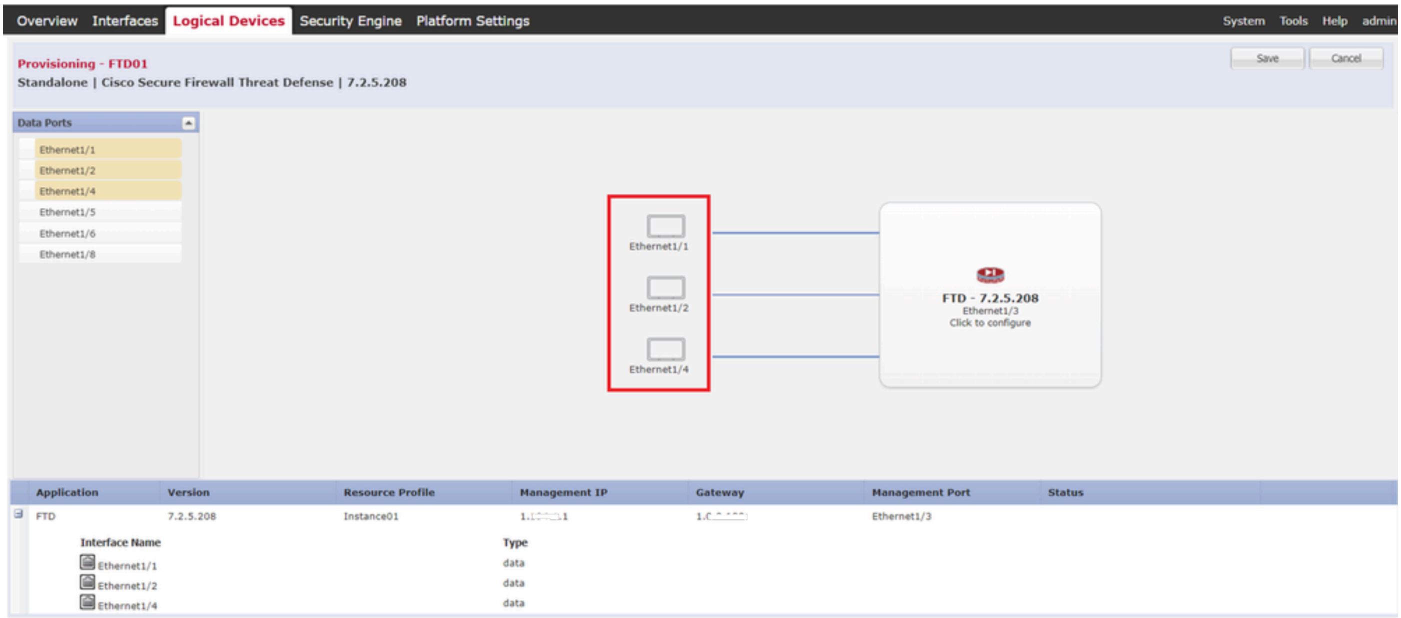
b.设置数据接口。

在本例中：

·Ethernet1/1（用于内部）

·Ethernet1/2（用于外部）

·Ethernet1/4（用于高可用性链路）



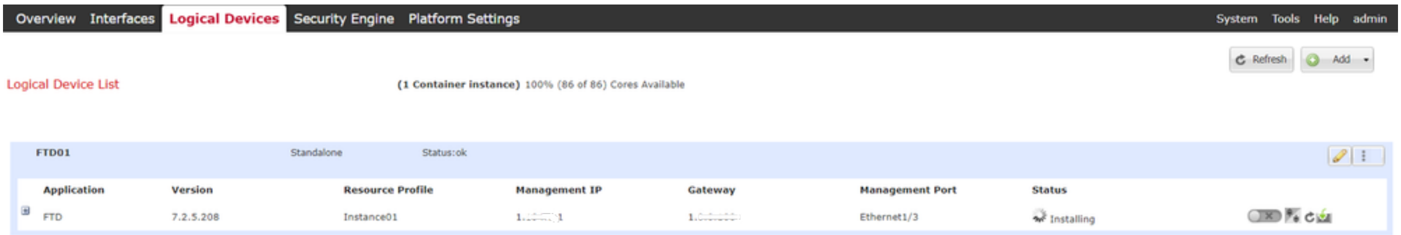
Provisioning - FTD01
Standalone | Cisco Secure Firewall Threat Defense | 7.2.5.208

Application	Version	Resource Profile	Management IP	Gateway	Management Port	Status
FTD	7.2.5.208	Instance01	1.[redacted]1	1.[redacted]	Ethernet1/3	

Interface Name	Type
Ethernet1/1	data
Ethernet1/2	data
Ethernet1/4	data

设置数据接口

c.导航到逻辑设备。正在等待实例启动。



Logical Device List

(1 Container instance) 100% (86 of 86) Cores Available

FTD01 Standalone Status:ok

Application	Version	Resource Profile	Management IP	Gateway	Management Port	Status
FTD	7.2.5.208	Instance01	1.[redacted]1	1.[redacted]	Ethernet1/3	Installing

确认Instance01的状态

d.在步骤4.a和步骤5.a至c中重复a.以添加第二个实例并设置其详细信息。

在本例中：

· 设备名称：FTD11
· 实例类型：容器

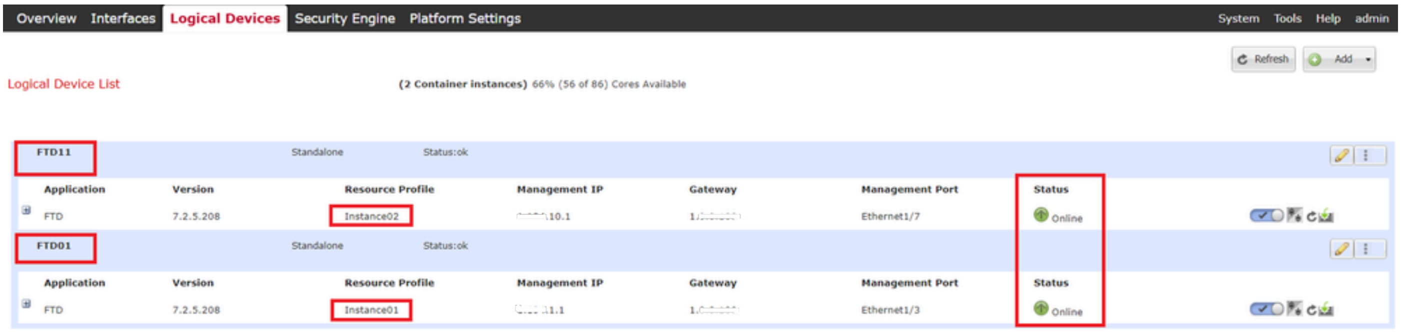
· 资源配置文件：Instance02
· 管理接口：Ethernet1/7
· 管理IP：x.x.10.1

· 以太网接口1/5 =内部

· 以太网接口1/6 =外部

· 以太网接口1/8 =高可用性链路

e.确认2个实例在FCM上处于在线状态。



Logical Device List

(2 Container instances) 66% (56 of 86) Cores Available

FTD11 Standalone Status:ok

Application	Version	Resource Profile	Management IP	Gateway	Management Port	Status
FTD	7.2.5.208	Instance02	[redacted]10.1	1.[redacted]	Ethernet1/7	Online

FTD01 Standalone Status:ok

Application	Version	Resource Profile	Management IP	Gateway	Management Port	Status
FTD	7.2.5.208	Instance01	[redacted]11.1	1.[redacted]	Ethernet1/3	Online

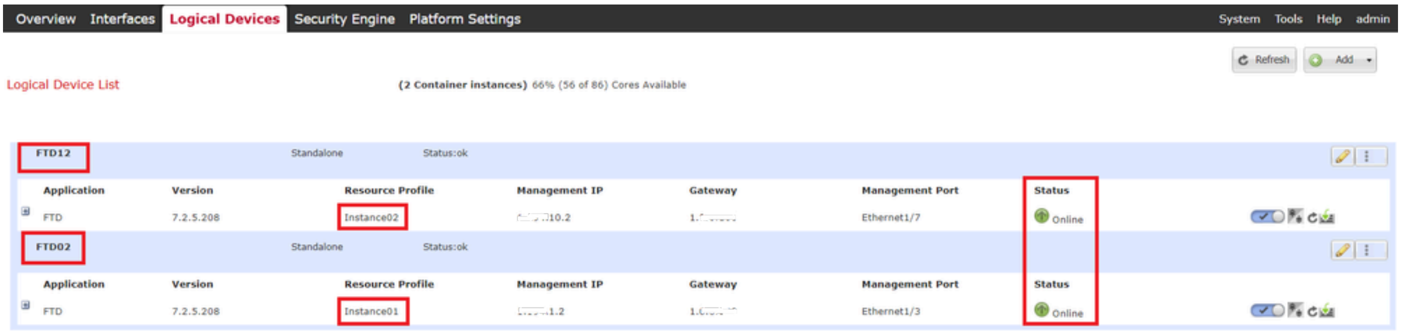
确认主设备中的实例状态

f.（可选）在Firepower CLI上运行 scope ssa、 **scope slot 1** 和 **show app-Instance** 命令以确认2个实例处于联机状态。

<#root>

```
FPR4145-ASA-K9#

scope ssa

 FPR4145-ASA-K9 /ssa #

scope slot 1

 FPR4145-ASA-K9 /ssa/slot #

show app-Instance

 Application Instance: App Name Identifier Admin State Oper State Running Version Startup Version Deplo

Online

7.2.5 208 7.2.5 208 Container No Instance01 Not Applicable None --> FTD01 Instance is Online ftd FTD11 

Online

7.2.5 208 7.2.5 208 Container No Instance02 Not Applicable None --> FTD11 Instance is Online
```

g.在辅助设备上执行相同的操作。 确认2个实例处于联机状态。



Logical Device List

(2 Container instances) 66% (56 of 86) Cores Available

FTD12 Standalone Status:ok

Application	Version	Resource Profile	Management IP	Gateway	Management Port	Status
FTD	7.2.5.208	Instance02	[redacted]10.2	1.[redacted]	Ethernet1/7	Online

FTD02 Standalone Status:ok

Application	Version	Resource Profile	Management IP	Gateway	Management Port	Status
FTD	7.2.5.208	Instance01	[redacted]1.2	1.[redacted]	Ethernet1/3	Online

确认辅助设备中的实例状态

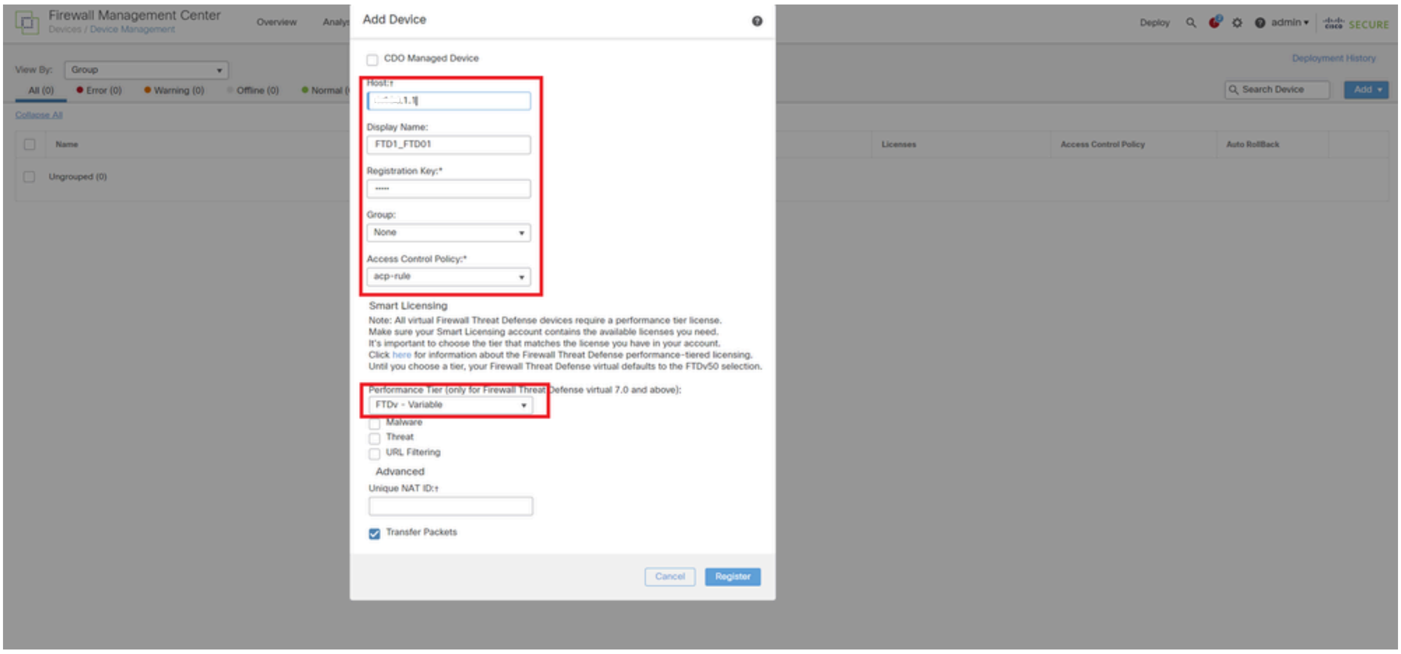
第六步：为每个实例添加高可用性对。

a.导航到设备 > **在FMC上添加**设备。将所有实例添加到FMC。

在本例中：

·FTD1的实例01的显示名称：FTD1_FTD01
·FTD1的实例02的显示名称：FTD1_FTD11
·FTD2的实例01的显示名称：FTD2_FTD02
·FTD2的实例02的显示名称：FTD2_FTD12

下图显示**FTD1_FTD01**的设置。



Add Device

□ CDO Managed Device

Host:†
[redacted].1.1

Display Name:
FTD1_FTD01

Registration Key:*
•••••

Group:
None ▾

Access Control Policy:*
acp-rule ▾

Smart Licensing

Note: All virtual Firewall Threat Defense devices require a performance tier license.
Make sure your Smart Licensing account contains the available licenses you need.
It's important to choose the tier that matches the license you have in your account.
Click here for information about the Firewall Threat Defense performance-tiered licensing.
Until you choose a tier, your Firewall Threat Defense virtual defaults to the FTDv50 selection.

Performance Tier (only for Firewall Threat Defense virtual 7.0 and above):
FTDv - Variable ▾

□ Malware
□ Threat
□ URL Filtering

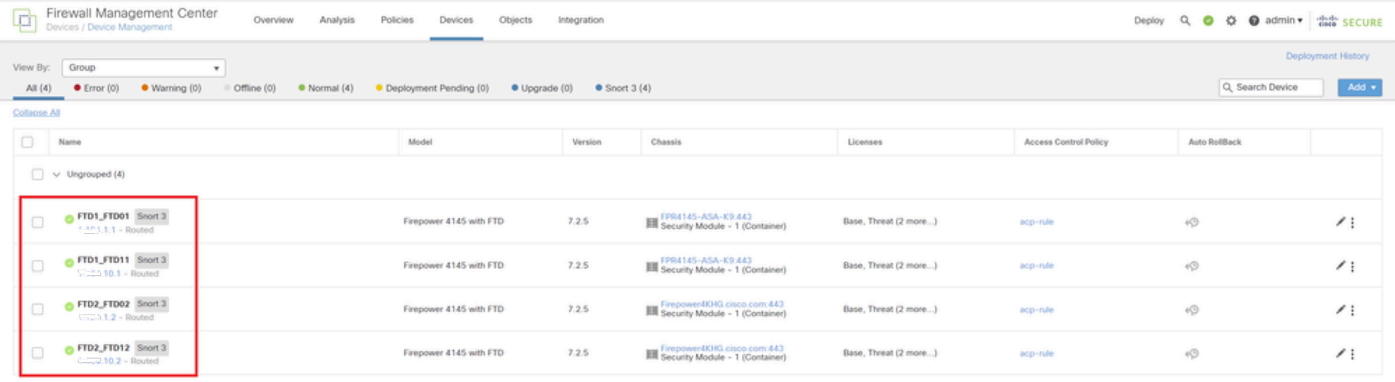
Advanced

Unique NAT ID:†

☑ Transfer Packets

将*FTD*实例添加到*FMC*

b.确认所有实例都是正常的。



View By: Group

All (4) ● Error (0) ● Warning (0) ● Offline (0) ● Normal (4) ● Deployment Pending (0) ● Upgrade (0) ● Snort 3 (4)

Name	Model	Version	Chassis	Licenses	Access Control Policy	Auto RollBack
Ungrouped (4)						
FTD1_FTD01 Snort 3 [redacted].1.1 - Routed	Firepower 4145 with FTD	7.2.5	FPR4145-ASA-K9:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule	
FTD1_FTD11 Snort 3 [redacted].10.1 - Routed	Firepower 4145 with FTD	7.2.5	FPR4145-ASA-K9:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule	
FTD2_FTD02 Snort 3 [redacted].1.2 - Routed	Firepower 4145 with FTD	7.2.5	Firepower4KHG.cisco.com:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule	
FTD2_FTD12 Snort 3 [redacted].10.2 - Routed	Firepower 4145 with FTD	7.2.5	Firepower4KHG.cisco.com:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule	

确认*FMC*中的实例状态

c.导航到设备 > **添加高可用性**。设置第1个故障转移对。

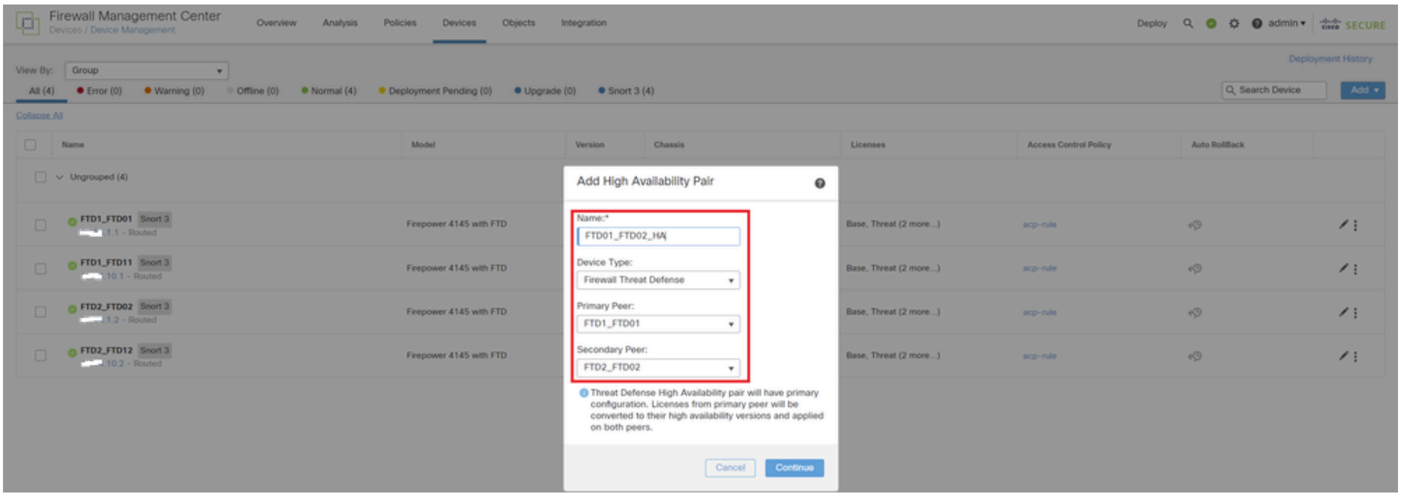
在本例中：

·名称：**FTD01_FTD02_HA**

·主对等体：**FTD1_FTD01**

·辅助对等体：**FTD2_FTD02**

注意：请确保选择正确的设备作为主设备。



Add High Availability Pair

Name:* FTD01_FTD02_HA

Device Type: Firewall Threat Defense

Primary Peer: FTD1_FTD01

Secondary Peer: FTD2_FTD02

Threat Defense High Availability pair will have primary configuration. Licenses from primary peer will be converted to their high availability versions and applied on both peers.

添加第1个故障转移对

d.为第1个故障转移对中的故障转移链路设置IP。

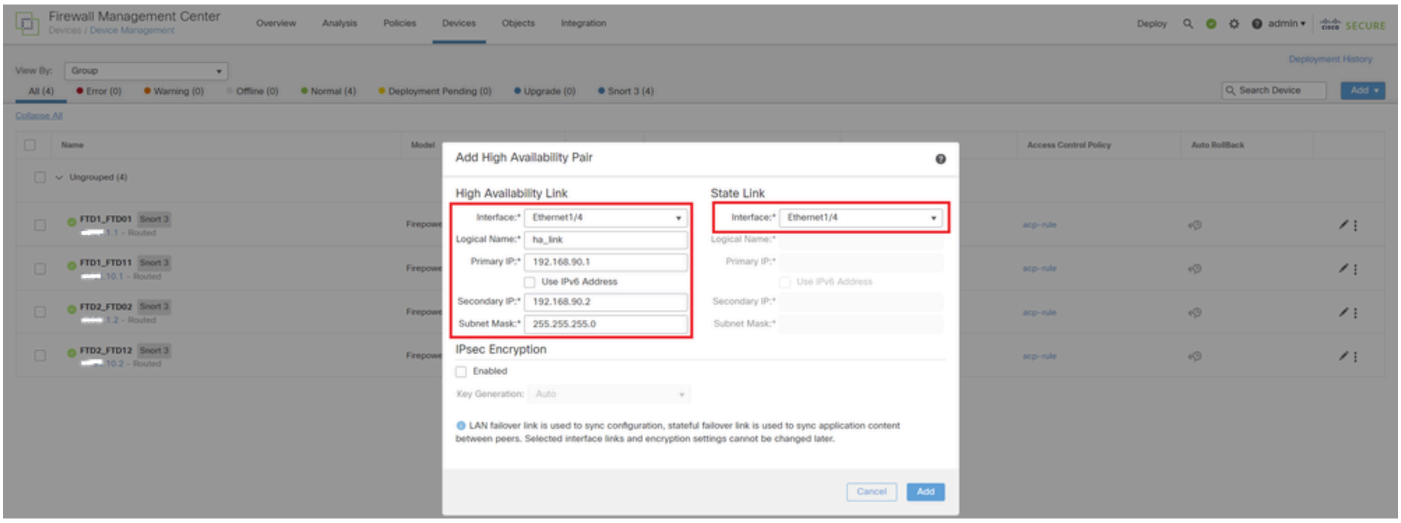
在本例中：

·**高可用性链路：Ethernet1/4**

·状态链路：**Ethernet1/4**

·**主IP：192.168.90.1/24**

·**辅助IP：192.168.90.2/24**



Add High Availability Pair

High Availability Link

Interface:* Ethernet1/4

Logical Name:* ha_link

Primary IP:* 192.168.90.1

□ Use IPv6 Address

Secondary IP:* 192.168.90.2

Subnet Mask:* 255.255.255.0

State Link

Interface:* Ethernet1/4

IPsec Encryption

□ Enabled

Key Generation: Auto

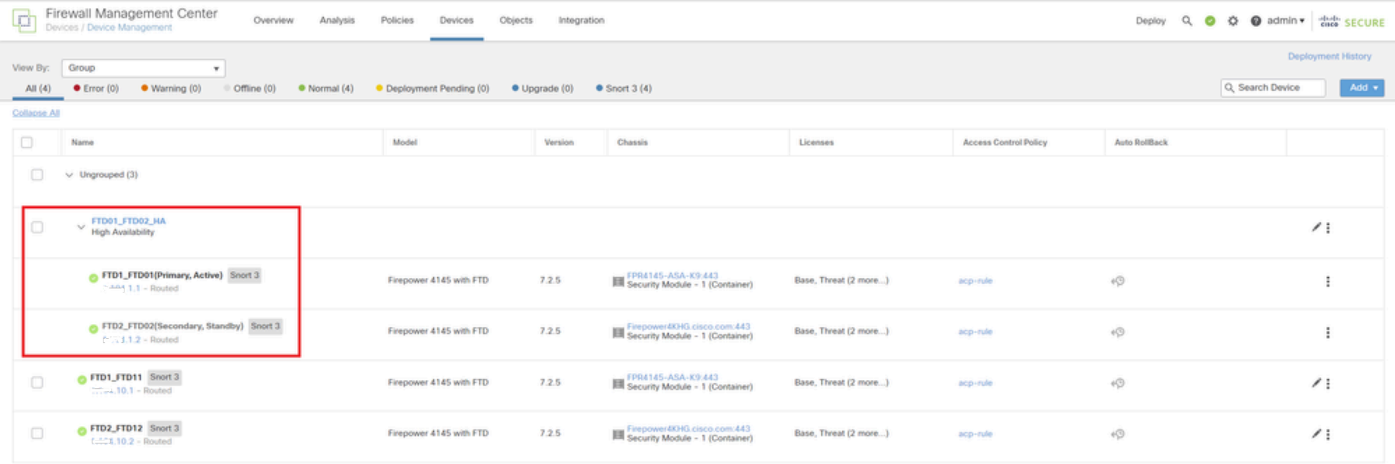
LAN failover link is used to sync configuration, stateful failover link is used to sync application content between peers. Selected interface links and encryption settings cannot be changed later.

为第1个故障转移对设置*HA*接口和*IP*

e.确认故障切换状态

·**FTD1_FTD01：主，活动**

·**FTD2_FTD02：备用**



View By: Group

All (4) ● Error (0) ● Warning (0) ● Offline (0) ● Normal (4) ● Deployment Pending (0) ● Upgrade (0) ● Snort 3 (4)

Name	Model	Version	Chassis	Licenses	Access Control Policy	Auto RollBack
Ungrouped (3)						
FTD01_FTD02_HA High Availability						
FTD1_FTD01(Primary, Active) Snort 3 [redacted]1.1 - Routed	Firepower 4145 with FTD	7.2.5	FPR4145-ASA-K9:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule	
FTD2_FTD02(Secondary, Standby) Snort 3 [redacted]1.2 - Routed	Firepower 4145 with FTD	7.2.5	Firepower4KHG.cisco.com:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule	
FTD1_FTD11 Snort 3 [redacted].10.1 - Routed	Firepower 4145 with FTD	7.2.5	FPR4145-ASA-K9:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule	
FTD2_FTD12 Snort 3 [redacted]1.10.2 - Routed	Firepower 4145 with FTD	7.2.5	Firepower4KHG.cisco.com:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule	

确认第1个故障转移对的状态

f.导航到设备>单击**FTD01_FTD02_HA**（在本例中）**> 接口**。 为数据接口设置活动IP。

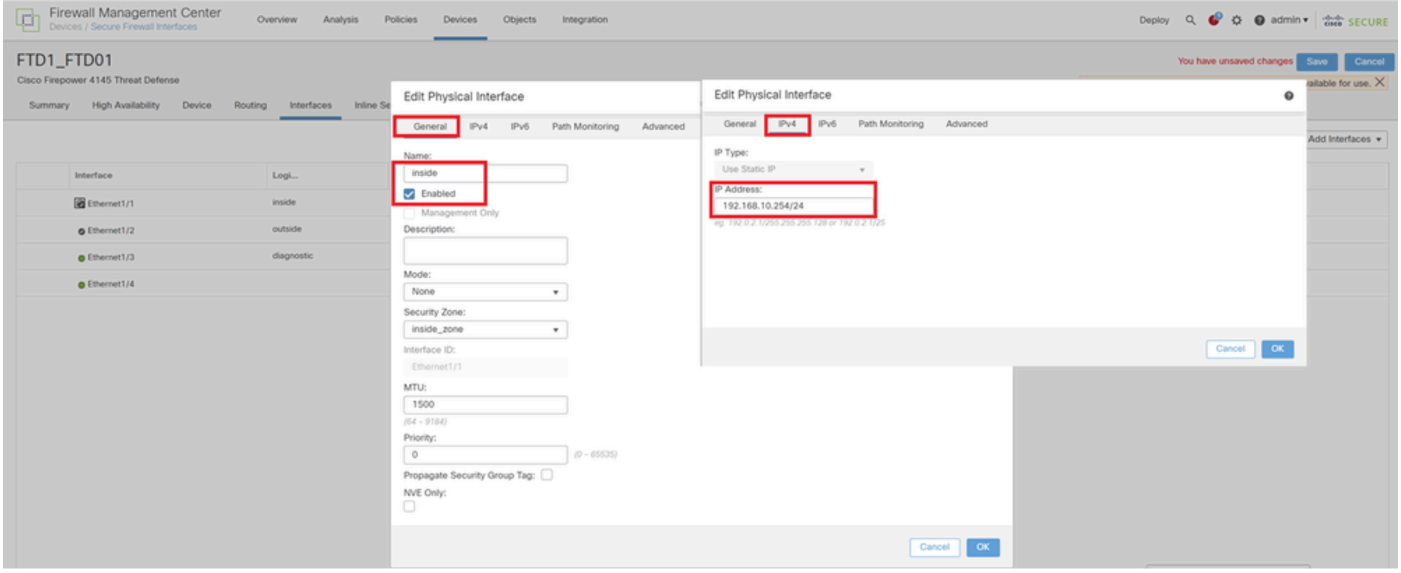
在本例中：

· 以太网接口1/1（内部）：192.168.10.254/24

· 以太网接口1/2（外部）：192.168.20.254/24

· 以太网接口1/3（诊断）：192.168.80.1/24

下图显示了**Ethernet1/1**的“Active IP”设置。



FTD1_FTD01
Cisco Firepower 4145 Threat Defense

Interface	Logi...
Ethernet1/1	inside
Ethernet1/2	outside
Ethernet1/3	diagnostic
Ethernet1/4	

Edit Physical Interface

Name: inside
☑ Enabled
□ Management Only
Description:
Mode: None
Security Zone: inside_zone
Interface ID: Ethernet1/1
MTU: 1500 (64 - 9184)
Priority: 0 (0 - 65535)
Propagate Security Group Tag: □
NVE Only: □

Edit Physical Interface

IP Type: Use Static IP
IP Address: 192.168.10.254/24
eg. 192.0.2.1/255.255.255.128 or 192.0.2.1/25

设置数据接口的活动*IP*

g.导航到设备> **点击FTD01_FTD02_HA**（在本例中）**> 高可用性**。 设置数据接口的备用IP。

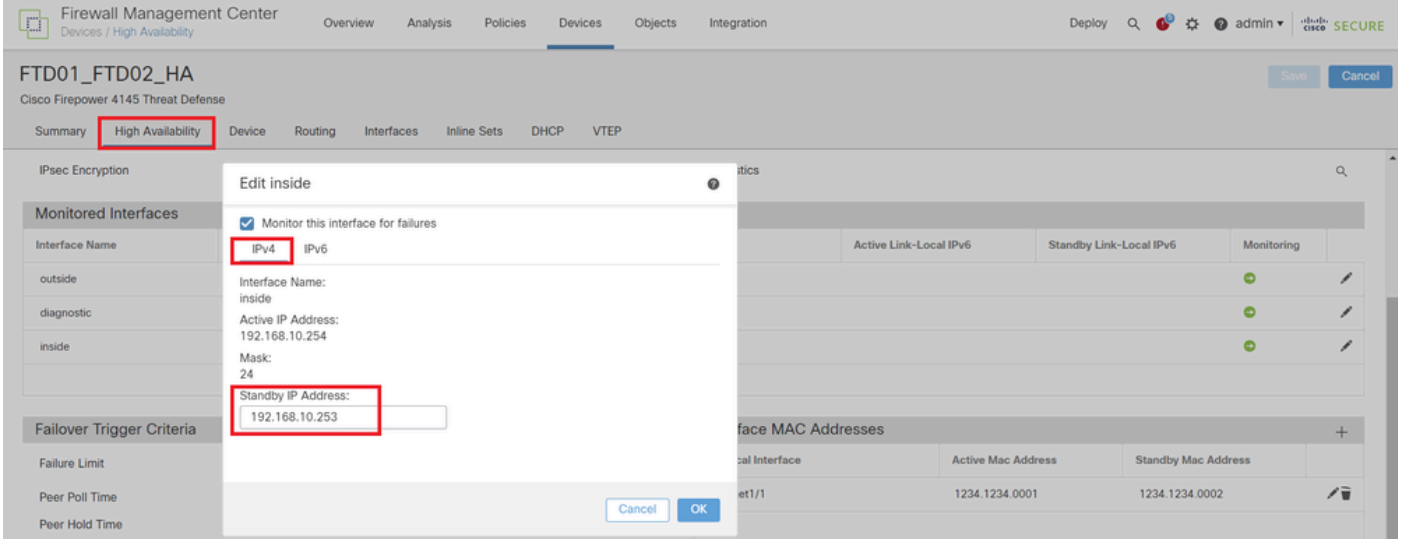
在本例中：

· 以太网接口1/1（内部）：192.168.10.253/24

· 以太网接口1/2（外部）：192.168.20.253/24

· 以太网接口1/3（诊断）：192.168.80.2/24

下图显示**Ethernet1/1**的备用IP设置。



FTD01_FTD02_HA

Cisco Firepower 4145 Threat Defense

Edit inside

☑ Monitor this interface for failures

IPv4 IPv6

Interface Name:
inside

Active IP Address:
192.168.10.254

Mask:
24

Standby IP Address:
192.168.10.253

Interface Name	Active Link-Local IPv6	Standby Link-Local IPv6	Monitoring
outside			●
diagnostic			●
inside			●

cal Interface	Active Mac Address	Standby Mac Address
et1/1	1234.1234.0001	1234.1234.0002

设置数据接口的备用*IP*

h.重复步骤6.c至g，添加第2个故障转移对。

在本例中：

· 名称：FTD11_FTD12_HA
· 主要对等体：FTD1_FTD11
· 次要对等体：FTD2_FTD12

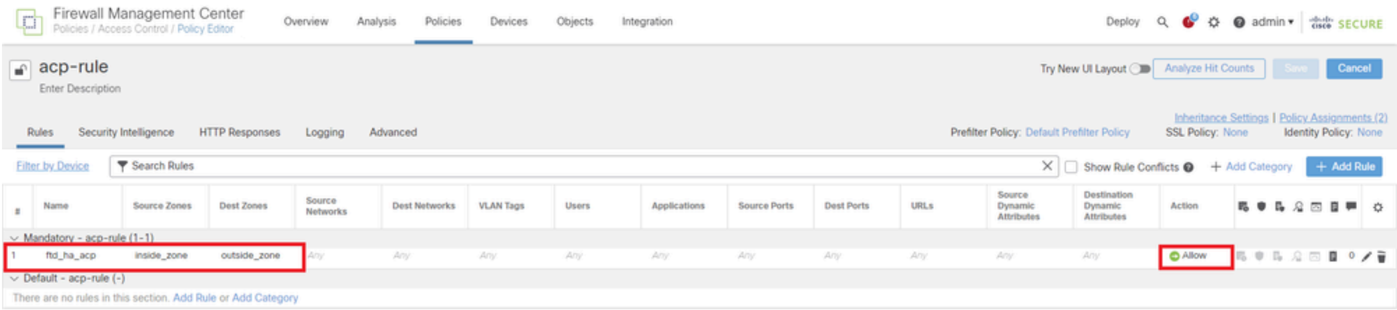
· 高可用性链路：Ethernet1/8
· 状态链路：Ethernet1/8
· 以太网接口1/8（ha_link处于活动状态）：192.168.91.1/24

· 以太网接口1/5（内部主用）：192.168.30.254/24
· 以太网接口1/6（外部主用接口）：192.168.40.254/24
· 以太网接口1/7（诊断活动接口）：192.168.81.1/24

· 以太网接口1/8（ha_link备用）：192.168.91.2/24

· 以太网接口1/5（内部备用）：192.168.30.253/24
· 以太网接口1/6（外部备用）：192.168.40.253/24
· 以太网接口1/7（诊断待机）：192.168.81.2/24

i.导航到逻辑设备 > **添加**独立。设置ACP规则以允许从内部到外部的流量。



acp-rule

Prefilter Policy: Default Prefilter Policy　SSL Policy: None　Identity Policy: None

#	Name	Source Zones	Dest Zones	Source Networks	Dest Networks	VLAN Tags	Users	Applications	Source Ports	Dest Ports	URLs	Source Dynamic Attributes	Destination Dynamic Attributes	Action
Mandatory - acp-rule (1-1)														
1	ftd_ha_acp	inside_zone	outside_zone	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Allow
Default - acp-rule (-)														

There are no rules in this section. Add Rule or Add Category

设置*ACP*规则

j.将设置部署到FTD。

k.在CLI中确认高可用性状态

每个实例的HA状态也在Firepower CLI中确认，这与ASA相同。

运行 **show running-config failover** 和 **show failover** 命令以确认FTD1_FTD01（主实例01）的高可用性状态。

```
<#root>

// confrim HA status of FTD1_FTD01 (Instance01 of Primary Device) >

show running-config failover

 failover failover lan unit primary failover lan interface ha_link Ethernet1/4 failover replication htt

show failover

 Failover On Failover unit Primary Failover LAN Interface: ha_link Ethernet1/4 (up) ...... This host: P
...... Other host: Secondary - Standby Ready <---- Instance01 of FPR02 is Standby Interface diagnostic
```

运行 **show running-config failover** 和 **show failover** 命令以确认FTD1_FTD11（主实例02）的高可用性状态。

```
<#root>

// confrim HA status of FTD1_FTD11 (Instance02 of Primary Device) >

show running-config failover

 failover failover lan unit primary failover lan interface ha_link Ethernet1/8 failover replication htt

show failover

 Failover On Failover unit Primary Failover LAN Interface: ha_link Ethernet1/8 (up) ...... This host: P
Other host: Secondary - Standby Ready <---- Instance02 of FPR02 is Standby Interface diagnostic (192.16
```

运行 **show running-config failover** 和 **show failover** 命令以确认FTD2_FTD02（辅助实例01）的高可用性状态。

```
<#root>

// confrim HA status of FTD2_FTD02 (Instance01 of Secondary Device) >

show running-config failover

 failover failover lan unit secondary failover lan interface ha_link Ethernet1/4 failover replication h

show failover

 Failover On Failover unit Secondary Failover LAN Interface: ha_link Ethernet1/4 (up) ...... This host:
Other host: Primary - Active <---- Instance01 of FPR01 is Active Active time: 31651 (sec) slot 0: UCSB-
```

运行 **show running-config failover** 和 **show failover** 命令以确认FTD2_FTD12 (Seconday Instance02)的高可用性状态。

<#root>

// confrim HA status of FTD2_FTD12 (Instance02 of Secondary Device) >

```
show running-config failover
```

```
 failover failover lan unit secondary failover lan interface ha_link Ethernet1/8 failover replication h
Other host: Primary - Active <---- Instance02 of FPR01 is Active Active time: 31275 (sec) slot 0: UCSB-
```

1.确认许可证使用

所有许可证按安全引擎/机箱使用，而不是按容器实例使用。

·自动分配基本许可证：每个安全引擎/机箱一个。

·功能许可证手动分配给每个实例，但每个功能每个安全引擎/机箱仅使用一个许可证。对于特定功能许可证，无论使用的实例数量是多少，您总共只需要1个许可证。

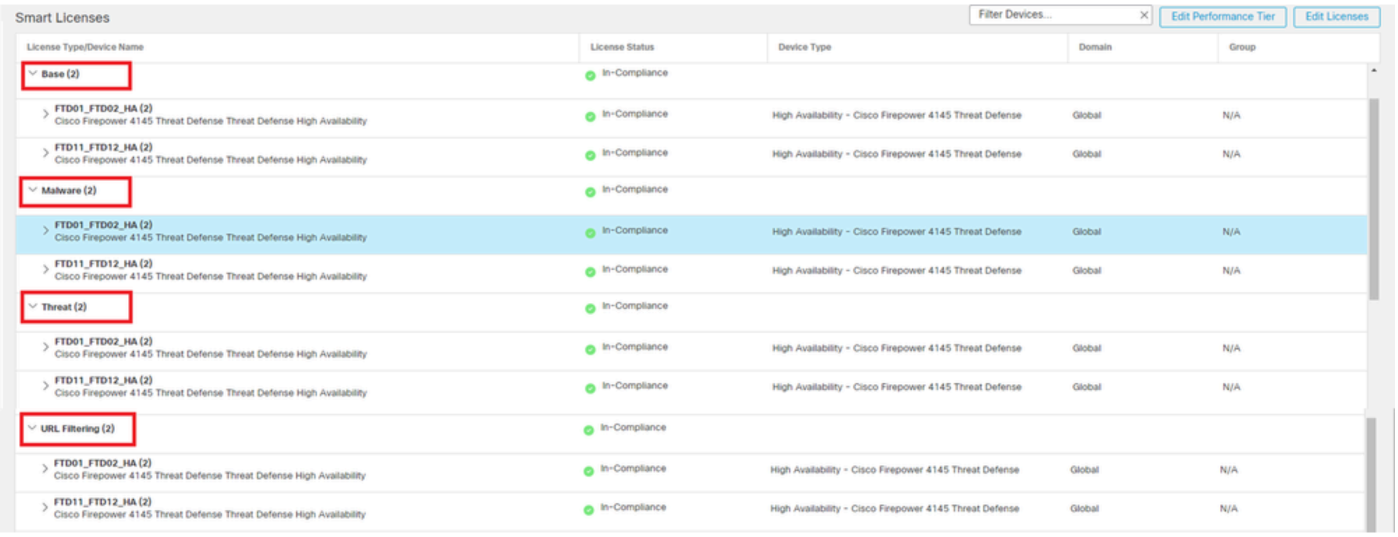
此表显示本文档中许可证的使用方式。

FPR01	实例01	基础、URL过滤、恶意软件、威胁
	实例02	基础、URL过滤、恶意软件、威胁
FPR02	实例01	基础、URL过滤、恶意软件、威胁
	实例02	基础、URL过滤、恶意软件、威胁

许可证总数

基础	URL 过滤	恶意软件	威胁
2	2	2	2

在FMC GUI中确认已使用的许可证数量。



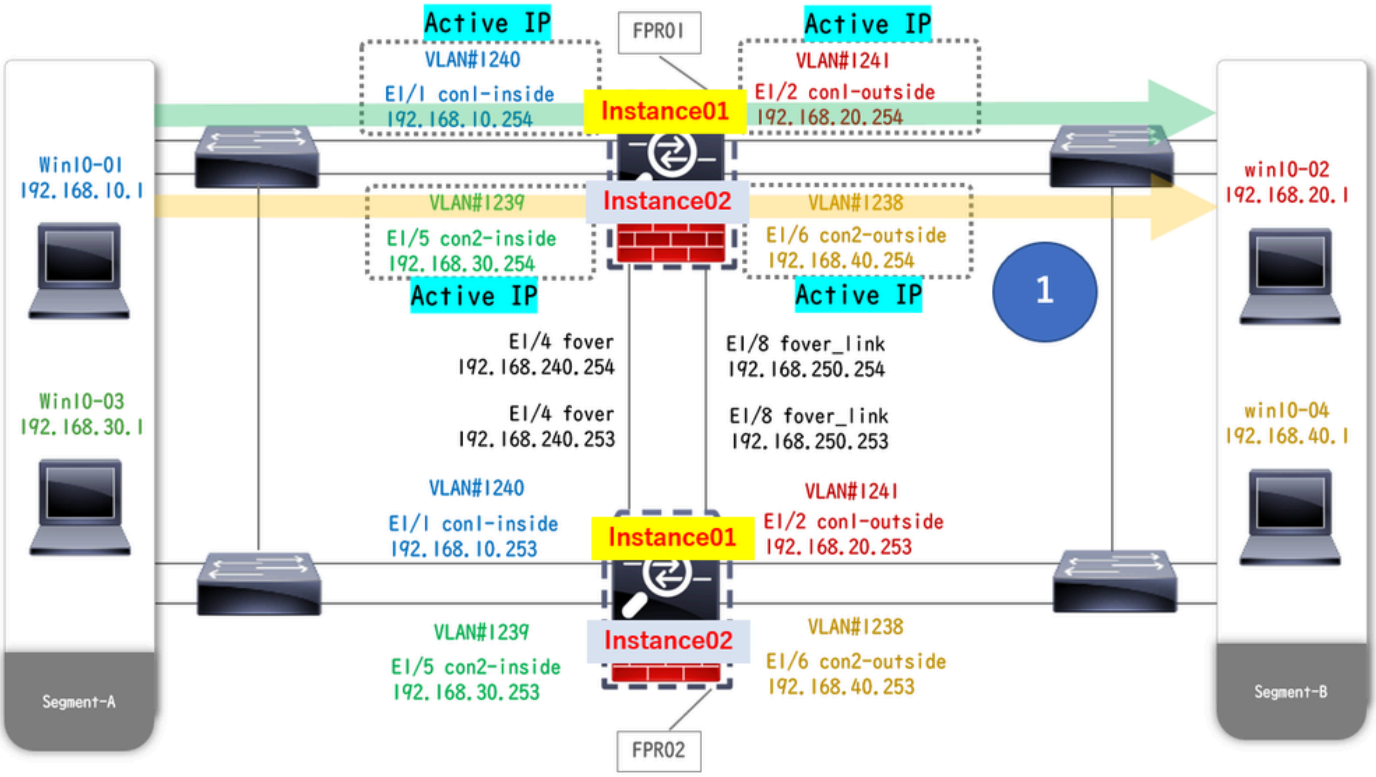
Smart Licenses

License Type/Device Name	License Status	Device Type	Domain	Group
Base (2)	In-Compliance			
FTD01_FTD02_HA (2) Cisco Firepower 4145 Threat Defense Threat Defense High Availability	In-Compliance	High Availability - Cisco Firepower 4145 Threat Defense	Global	N/A
FTD11_FTD12_HA (2) Cisco Firepower 4145 Threat Defense Threat Defense High Availability	In-Compliance	High Availability - Cisco Firepower 4145 Threat Defense	Global	N/A
Malware (2)	In-Compliance			
FTD01_FTD02_HA (2) Cisco Firepower 4145 Threat Defense Threat Defense High Availability	In-Compliance	High Availability - Cisco Firepower 4145 Threat Defense	Global	N/A
FTD11_FTD12_HA (2) Cisco Firepower 4145 Threat Defense Threat Defense High Availability	In-Compliance	High Availability - Cisco Firepower 4145 Threat Defense	Global	N/A
Threat (2)	In-Compliance			
FTD01_FTD02_HA (2) Cisco Firepower 4145 Threat Defense Threat Defense High Availability	In-Compliance	High Availability - Cisco Firepower 4145 Threat Defense	Global	N/A
FTD11_FTD12_HA (2) Cisco Firepower 4145 Threat Defense Threat Defense High Availability	In-Compliance	High Availability - Cisco Firepower 4145 Threat Defense	Global	N/A
URL Filtering (2)	In-Compliance			
FTD01_FTD02_HA (2) Cisco Firepower 4145 Threat Defense Threat Defense High Availability	In-Compliance	High Availability - Cisco Firepower 4145 Threat Defense	Global	N/A
FTD11_FTD12_HA (2) Cisco Firepower 4145 Threat Defense Threat Defense High Availability	In-Compliance	High Availability - Cisco Firepower 4145 Threat Defense	Global	N/A

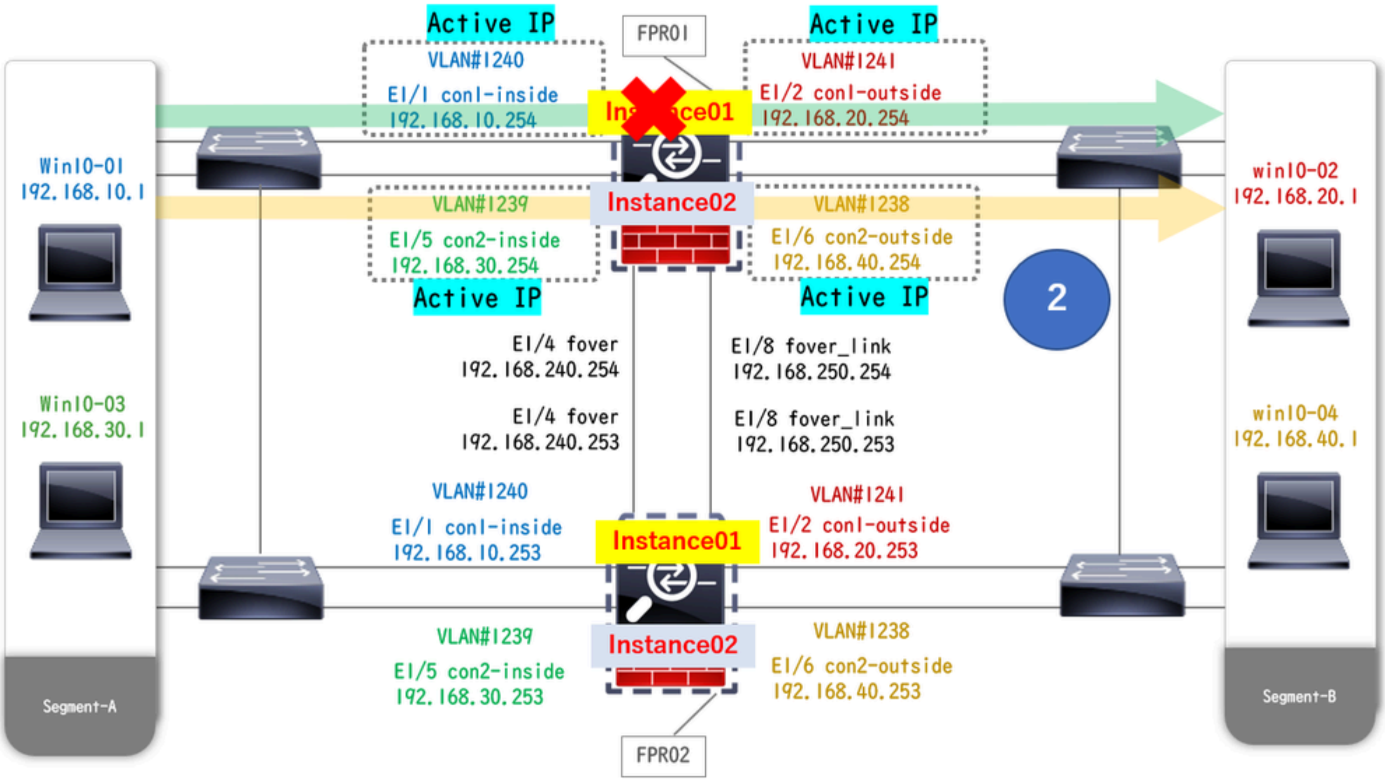
确认已使用的许可证

验证

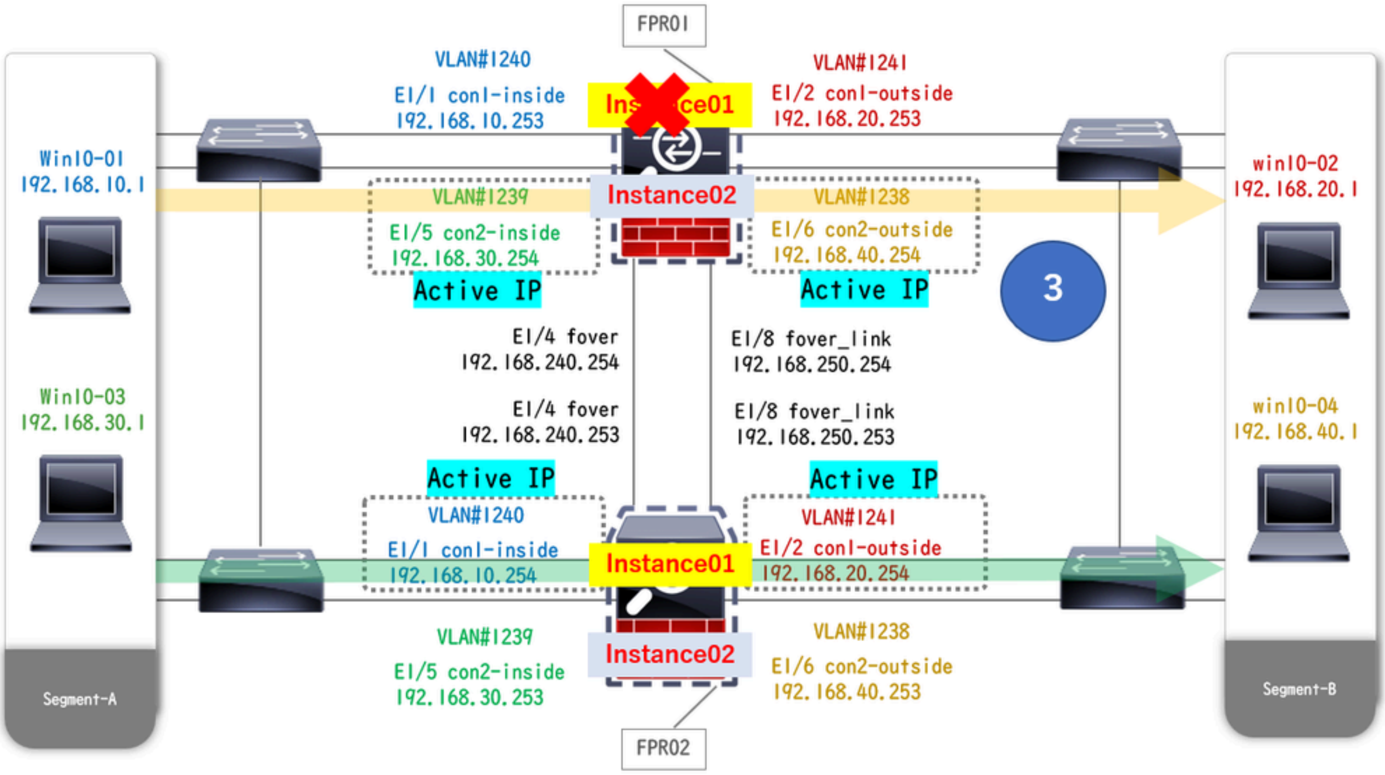
当FTD1_FTD01（主实例01）发生故障时，会触发实例01的故障切换，备用端的数据接口会接管原始主用接口的IP/MAC地址，确保Firepower持续传递流量（本文档中的FTP连接）。



崩溃前



在崩溃期间



故障转移已触发

步骤1:启动从Win10-01到Win10-02的FTP连接。

第二步：运行 show conn 命令以确认在实例01的两个实例中均建立了FTP连接。

<#root>

// Confirm the connection in Instance01 of FPR01 >

```
show conn

 TCP outside 192.168.20.1:21 inside 192.168.10.1:49723, idle 0:00:11, bytes 529, flags UIO N1 // Confirm

show conn

 TCP outside 192.168.20.1:21 inside 192.168.10.1:49723, idle 0:00:42, bytes 530, flags UIO N1
```

第三步：启动从Win10-03到Win10-04的FTP连接。

第四步：运行 **show conn** 命令以确认在实例02的两个实例中均建立了FTP连接。

<#root>

// Confirm the connection in Instance02 of FPR01 >

```
show conn

 TCP outside 192.168.40.1:21 inside 192.168.30.1:52144, idle 0:00:02, bytes 530, flags UIO N1 // Confirm

show conn

 TCP outside 192.168.40.1:21 inside 192.168.30.1:52144, idle 0:00:13, bytes 530, flags UIO N1
```

第五步：运行 connect ftd FTD01和 system support diagnostic-cli命令以进入ASA CLI。 运行 enable和 **crashinfo force watchdog** 命令，强制使主/主用设备中的实例01崩溃。

<#root>

Firepower-module1>

```
connect ftd FTD01

 >

system support diagnostic-cli

 FTD01>

enable

 Password: FTD01# FTD01#

crashinfo force watchdog

 reboot. Do you wish to proceed? [confirm]:
```

第六步：在Instance01中发生故障切换，且FTP连接未中断。 运行 show failover和 show conn命令以确认FPR02中Instance01的状态。

<#root>

>

```
show failover
```

```
 Failover On Failover unit Secondary Failover LAN Interface: ha_link Ethernet1/4 (up) ...... This host:
Other host: Primary - Failed Interface diagnostic (192.168.80.2): Unknown (Monitored) Interface inside (
```

```
show conn
```

```
 TCP outside 192.168.20.1:21 inside 192.168.10.1:49723, idle 0:02:25, bytes 533, flags U N1
```

步骤 7.在Instance01中发生的崩溃对Instance02没有影响。 运行 show failover和 show conn命令以确认Instance02的状态。

<#root>

>

```
show failover
```

```
 Failover On Failover unit Secondary Failover LAN Interface: ha_link Ethernet1/8 (up) ...... This host:
Other host: Primary - Active Interface diagnostic (192.168.81.1): Normal (Monitored) Interface inside (1
```

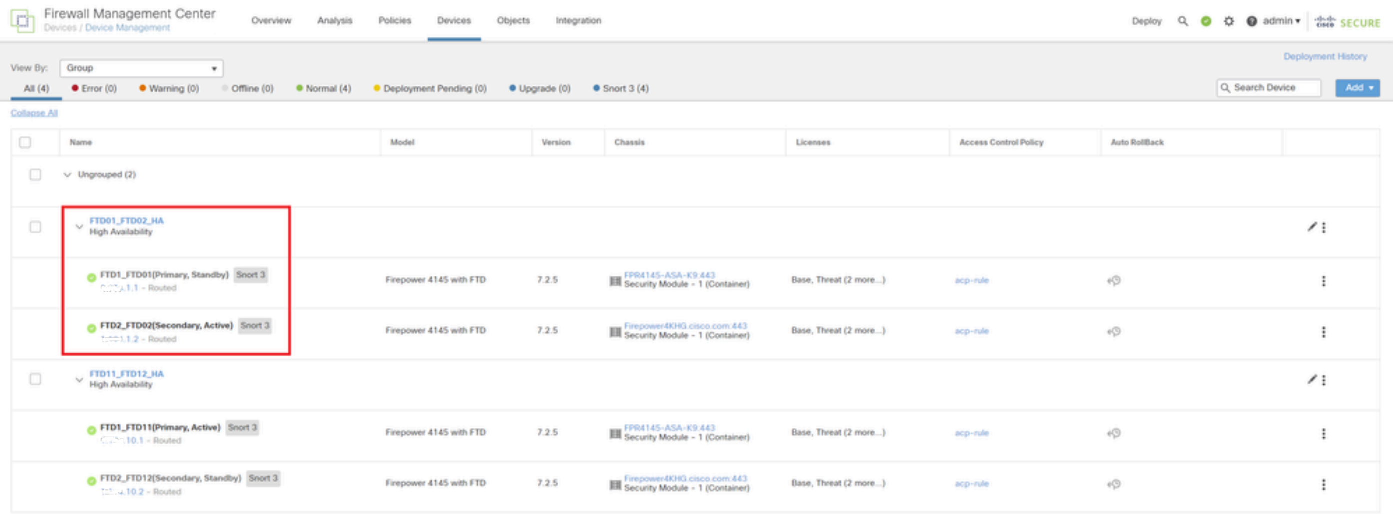
```
show conn
```

```
 TCP outside 192.168.40.1:21 inside 192.168.30.1:52144, idle 0:01:18, bytes 533, flags UIO N1
```

步骤 8在FMC上导航到设备 > **全部**。确认高可用性状态。

·**FTD1_FTD01：**主、备用

·**FTD2_FTD02：**辅助、活动

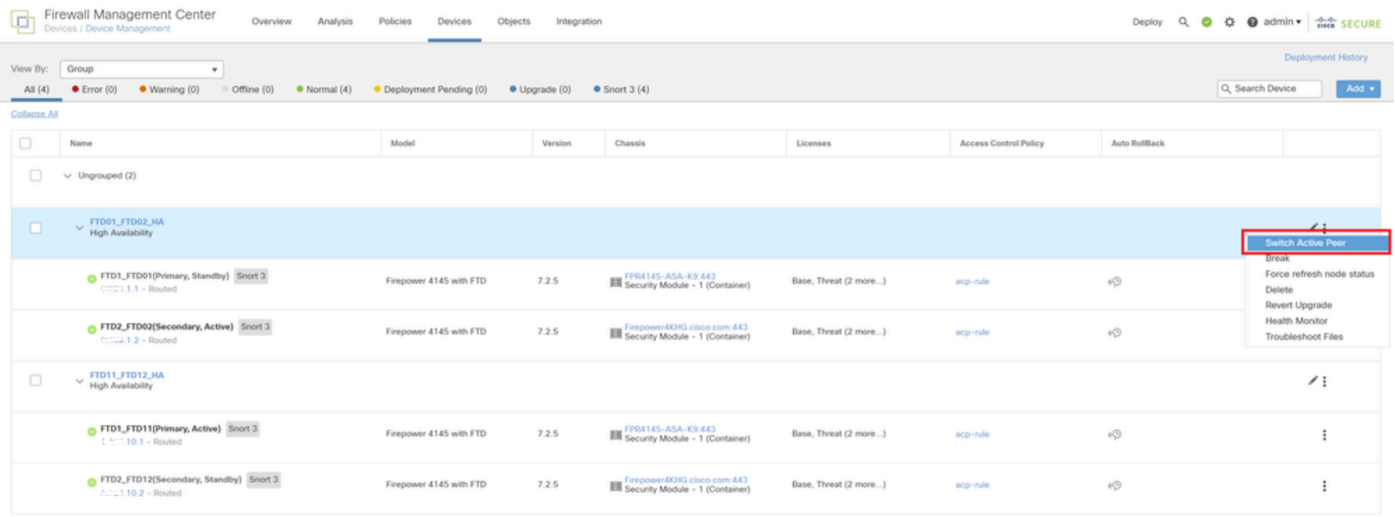


□	Name	Model	Version	Chassis	Licenses	Access Control Policy	Auto RollBack	
□	Ungrouped (2)							
□	FTD01_FTD02_HA High Availability							
	FTD1_FTD01(Primary, Standby) Snort 3 [redacted].1.1 - Routed	Firepower 4145 with FTD	7.2.5	FPR4145-ASA-K9:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule		
	FTD2_FTD02(Secondary, Active) Snort 3 [redacted].1.2 - Routed	Firepower 4145 with FTD	7.2.5	Firepower4KHG.cisco.com:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule		
□	FTD11_FTD12_HA High Availability							
	FTD1_FTD11(Primary, Active) Snort 3 [redacted].10.1 - Routed	Firepower 4145 with FTD	7.2.5	FPR4145-ASA-K9:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule		
	FTD2_FTD12(Secondary, Standby) Snort 3 [redacted].10.2 - Routed	Firepower 4145 with FTD	7.2.5	Firepower4KHG.cisco.com:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule		

确认*HA*状态

第9步：（可选）在FPR01的Instance01恢复正常后，您可以手动切换HA的状态。这可以通过FMC GUI或FRP CLI完成。

在FMC上，导航到设备 > **全部**。单击**Switch Active Peer**以切换**FTD01_FTD02_HA**的HA状态。



Name	Model	Version	Chassis	Licenses	Access Control Policy	Auto RollBack
Ungrouped (2)						
FTD01_FTD02_HA High Availability						
FTD1_FTD01(Primary, Standby) Snort 3 [redacted]1.1 - Routed	Firepower 4145 with FTD	7.2.5	FPR4145-ASA-K9:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule	
FTD2_FTD02(Secondary, Active) Snort 3 [redacted]1.2 - Routed	Firepower 4145 with FTD	7.2.5	Firepower4KHG.cisco.com:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule	
FTD11_FTD12_HA High Availability						
FTD1_FTD11(Primary, Active) Snort 3 [redacted]1.10.1 - Routed	Firepower 4145 with FTD	7.2.5	FPR4145-ASA-K9:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule	
FTD2_FTD12(Secondary, Standby) Snort 3 [redacted]1.10.2 - Routed	Firepower 4145 with FTD	7.2.5	Firepower4KHG.cisco.com:443 Security Module - 1 (Container)	Base, Threat (2 more...)	acp-rule	

交换机*HA*状态

在Firepower CLI上，运行 connect ftd FTD01和 system support diagnostic-cli命令以进入ASA CLI。 运行 enable和 **failover active** 命令以切换FTD01_FTD02_HA的HA。

```
<#root>
Firepower-module1>
connect ftd FTD01

 >

system support diagnostic-cli

 Attaching to Diagnostic CLI ... Press 'Ctrl+a then d' to detach. Type help or '?' for a list of availab

enable

 firepower#

failover active
```

故障排除

要验证故障切换的状态，请运行 **show failover** 和 **show failover history** 命令。

```
<#root>
>

show failover

 Failover On Failover unit Secondary Failover LAN Interface: ha_link Ethernet1/8 (up) ...... This host:
Other host: Primary - Active Interface diagnostic (192.168.81.1): Normal (Monitored) Interface inside (1

>

show failover history
```

```
 ========================================================================== From State To State Reason =
```

运行 debug fover <option>命令以启用故障切换调试日志。

<#root>

```
>

debug fover

 auth Failover Cloud authentication cable Failover LAN status cmd-exec Failover EXEC command execution c
```

参考

https://www.cisco.com/c/en/us/support/docs/security/firepower-management-center/212699-configure-ftd-high-availability-on-firep.html
https://www.cisco.com/c/en/us/td/docs/security/firepower/fxos/multi-Instance/multi-Instance_solution.html

https://www.cisco.com/c/en/us/support/docs/availability/high-availability/217763-troubleshoot-firepower-threat-defense-hi.html#toc-hId-46641497

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