由FMC管理的FTD上的站点到站点VPN配置

目录

简介

本文档介绍如何在FMC管理的Firepower威胁防御(FTD)上配置站点到站点VPN。

先决条件

要求

您应该了解以下主题：

- 对VPN的基本了解
- 使用Firepower管理中心的经验
- 使用ASA命令行体验

使用的组件

本文档中的信息基于以下软件和硬件版本：

- 思科FTD 6.5
- ASA 9.10(1)32
- IKEv2

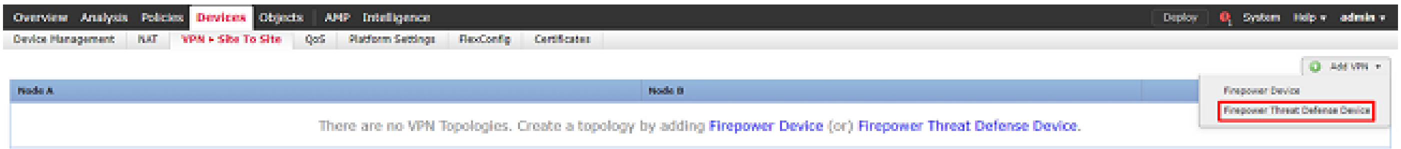
本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您的网络处于活动状态，请确保您了解所有命令的潜在影响。

配置

首先在FTD上配置FirePower管理中心。

步骤1:定义VPN拓扑。

1.导航到设备> VPN >站点到站点。 在Add VPN下,点击Firepower Threat Defense Device，如下图所示。



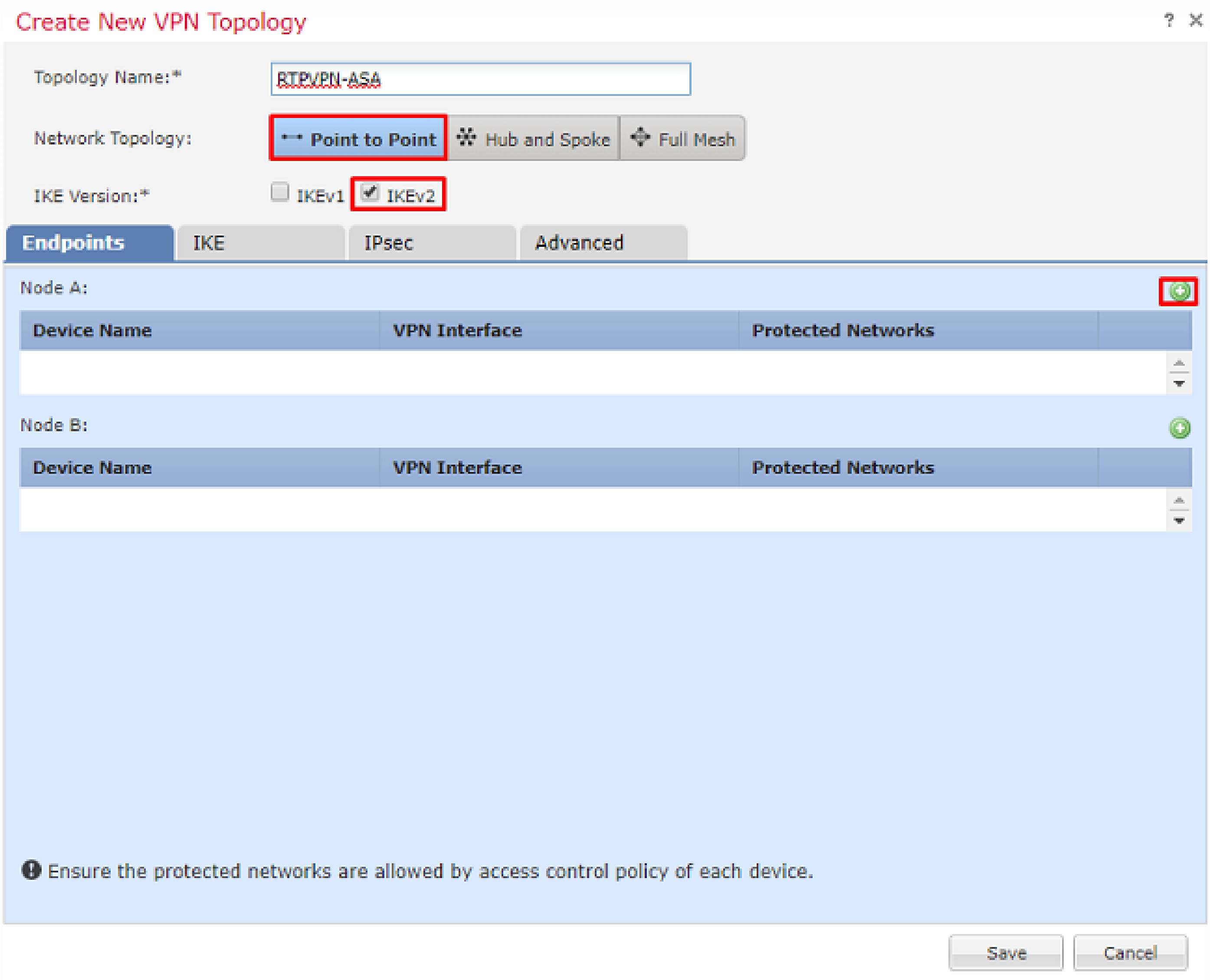
Node A	Node B
There are no VPN Topologies. Create a topology by adding Firepower Device (or) Firepower Threat Defense Device.	

2.出现Create New VPN Topology（创建新VPN拓扑）框。为VPN提供一个易于识别的名称。

网络拓扑：点对点

IKE版本：IKEv2

在本示例中，当您选择终端时，节点A是FTD，节点B是ASA。单击绿色的加号按钮将设备添加到拓扑中，如图所示。



Create New VPN Topology

Topology Name:* RTPVPN-ASA

Network Topology: Point to Point

IKE Version:* □ IKEv1 ☑ IKEv2

Node A:

Device Name	VPN Interface	Protected Networks

Node B:

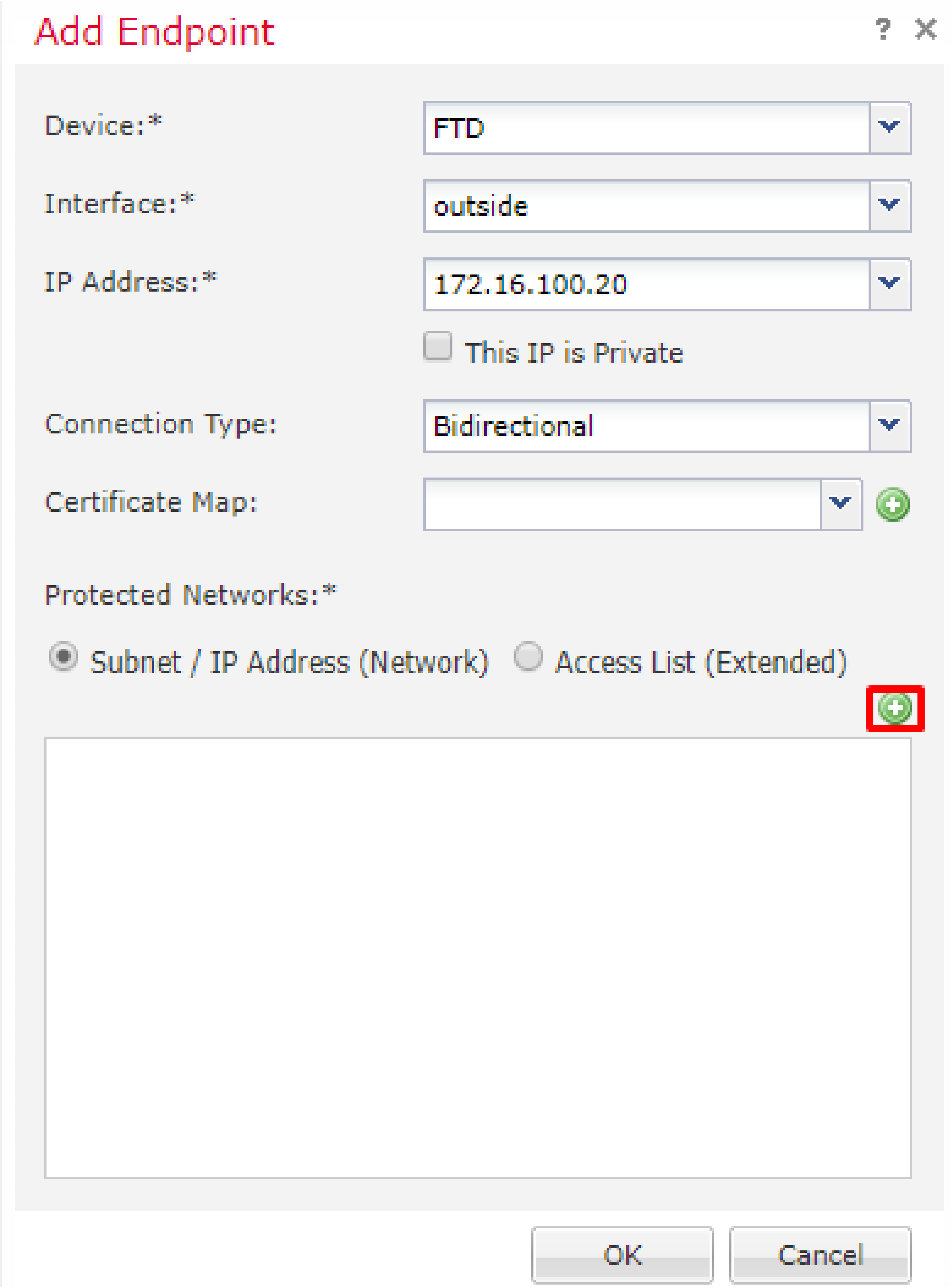
Device Name	VPN Interface	Protected Networks

Ensure the protected networks are allowed by access control policy of each device.

3.添加FTD作为第一个终端。

选择放置加密映射的接口。IP地址应该从设备配置中自动填充。

点击Protected Networks下的绿色加号（如图所示），选择此VPN中应加密哪些子网。



Add Endpoint

Device:* FTD

Interface:* outside

IP Address:* 172.16.100.20

□ This IP is Private

Connection Type: Bidirectional

Certificate Map:

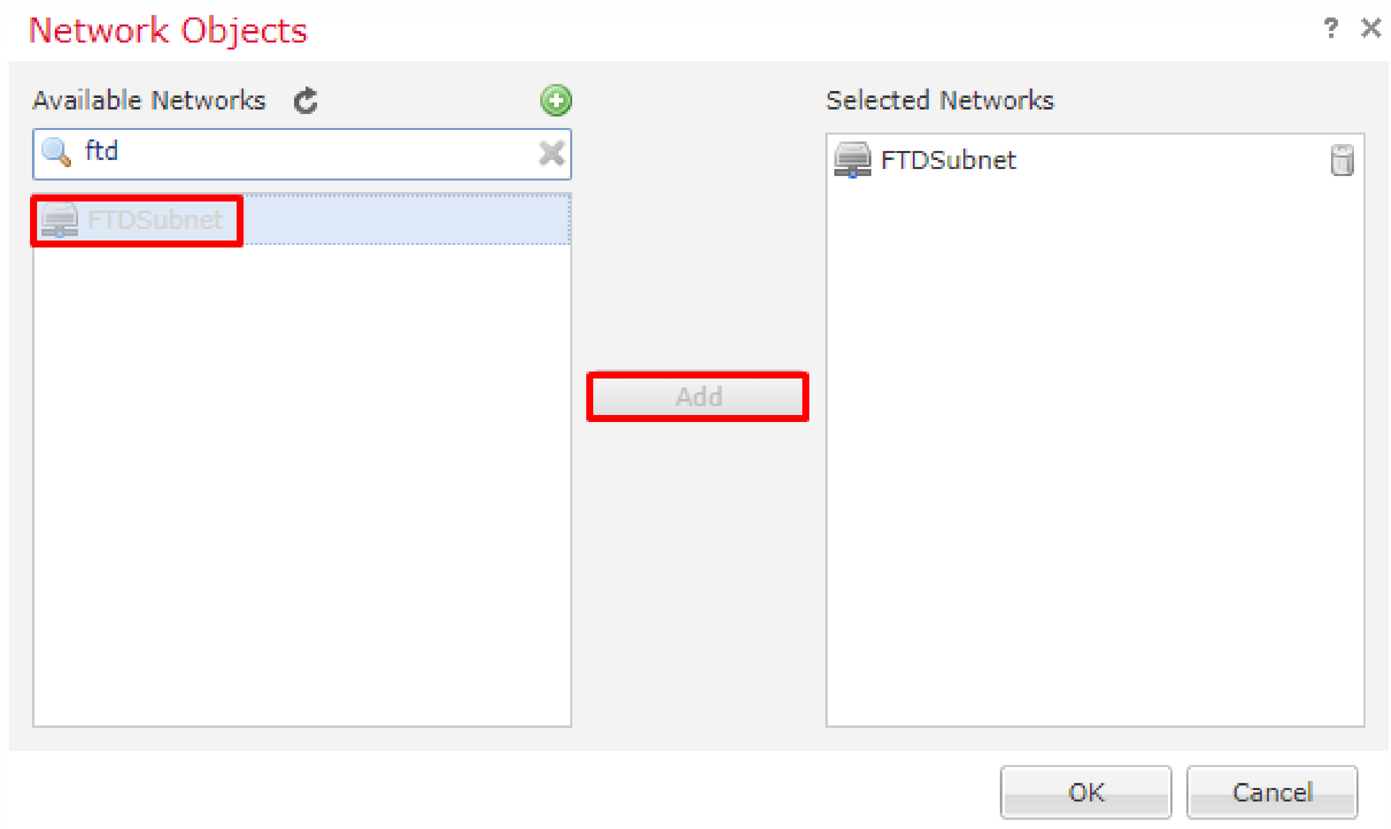
Protected Networks:*

● Subnet / IP Address (Network) ○ Access List (Extended)

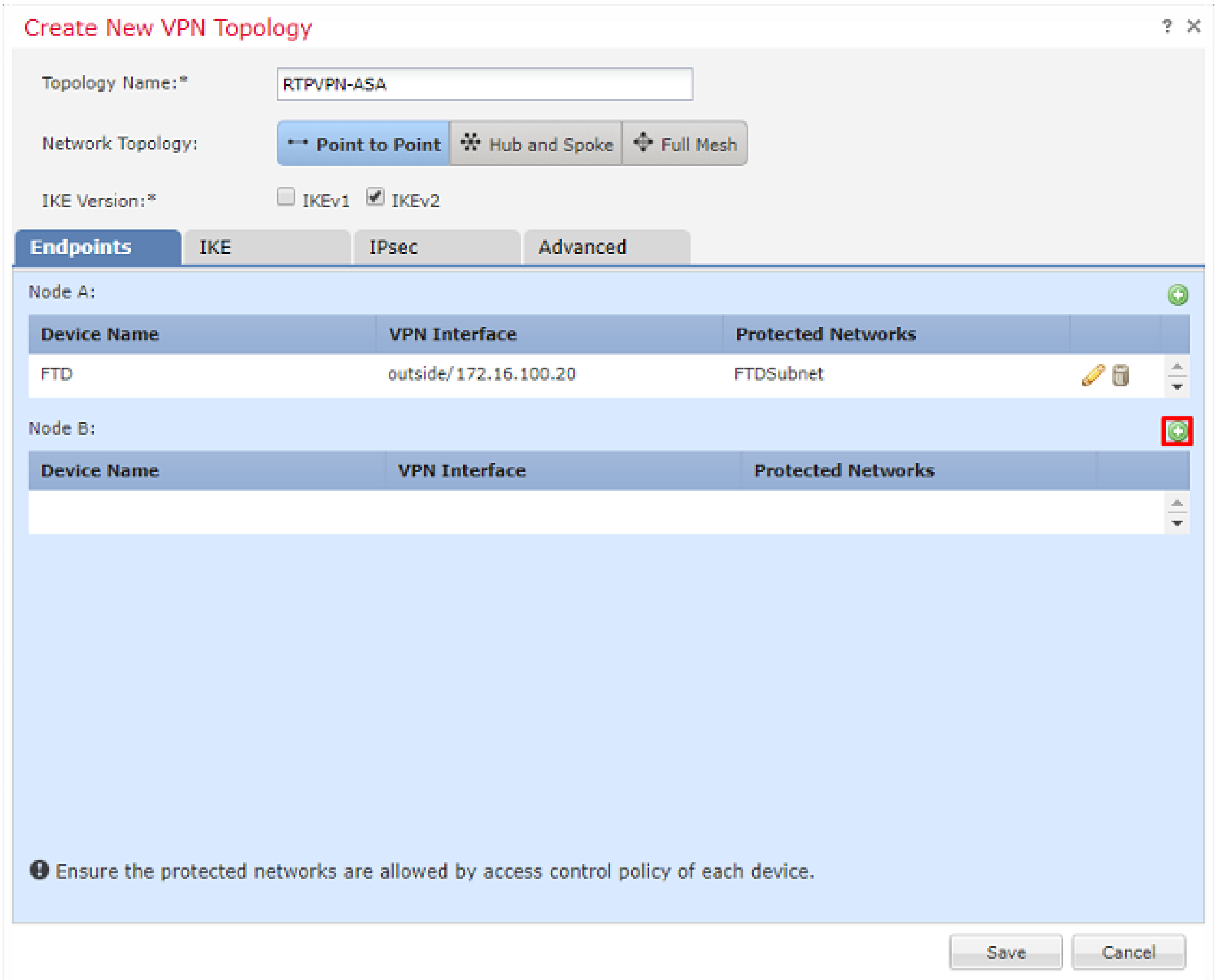
4.单击绿色加号，此时将创建网络对象。

5.添加需要加密的FTD的所有本地子网。单击Add将其移动到Selected Networks。现在单击OK，如图所示。

FTDSubnet = 10.10.113.0/24



节点A:(FTD)终端已完成。如图所示，点击节点B的绿色加号。



Create New VPN Topology

Topology Name:* RTPVPN-ASA

Network Topology: Point to Point | Hub and Spoke | Full Mesh

IKE Version:* □ IKEv1 ☑ IKEv2

Node A:

Device Name	VPN Interface	Protected Networks
FTD	outside/172.16.100.20	FTDSubnet

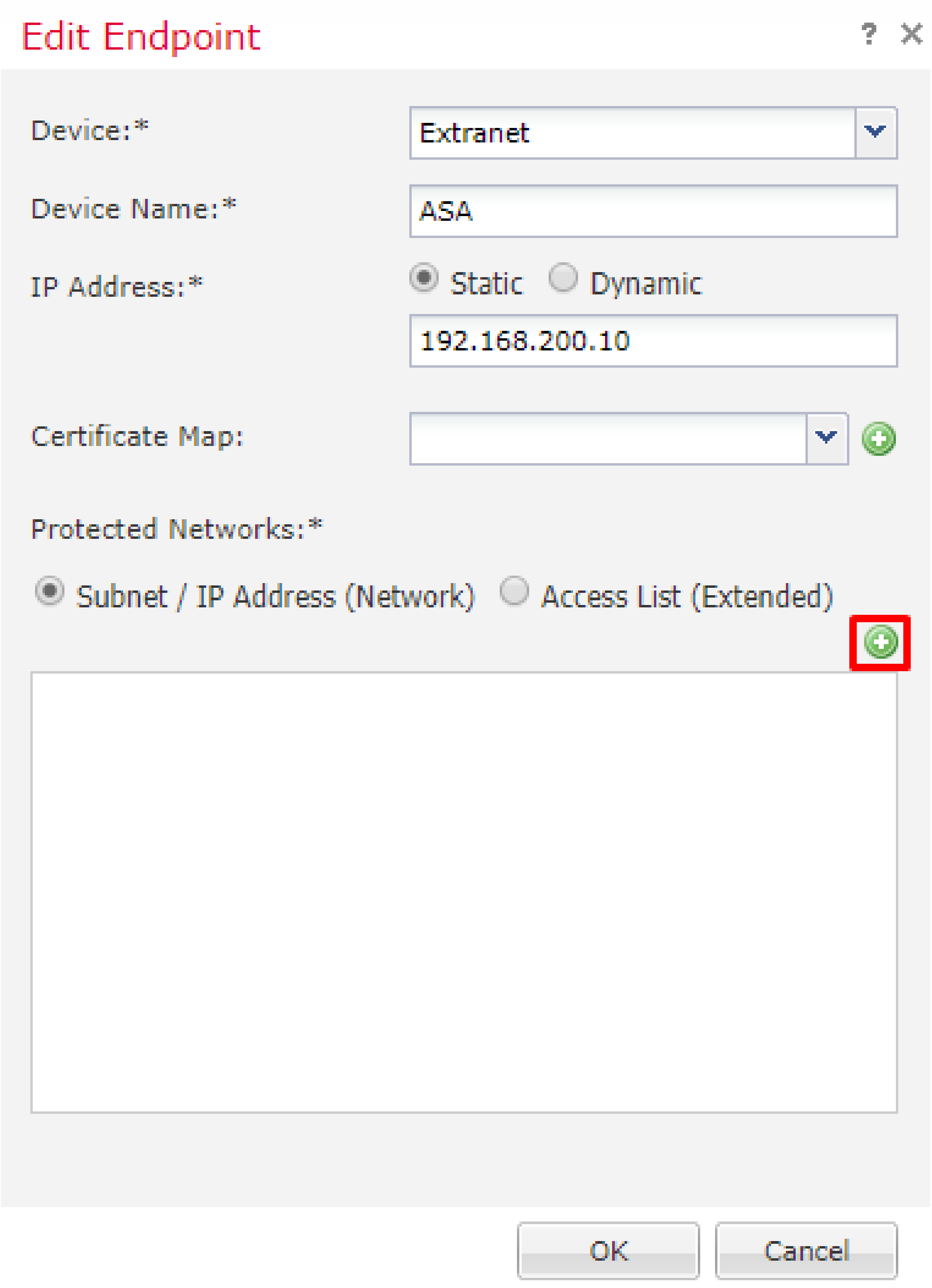
Node B:

Device Name	VPN Interface	Protected Networks

Ensure the protected networks are allowed by access control policy of each device.

节点B是ASA。不受FMC管理的设备被视为外联网设备。

6.添加设备名称和IP地址。单击绿色加号以添加受保护的网络，如图所示。



Edit Endpoint

Device:* Extranet

Device Name:* ASA

IP Address:* ● Static ○ Dynamic

192.168.200.10

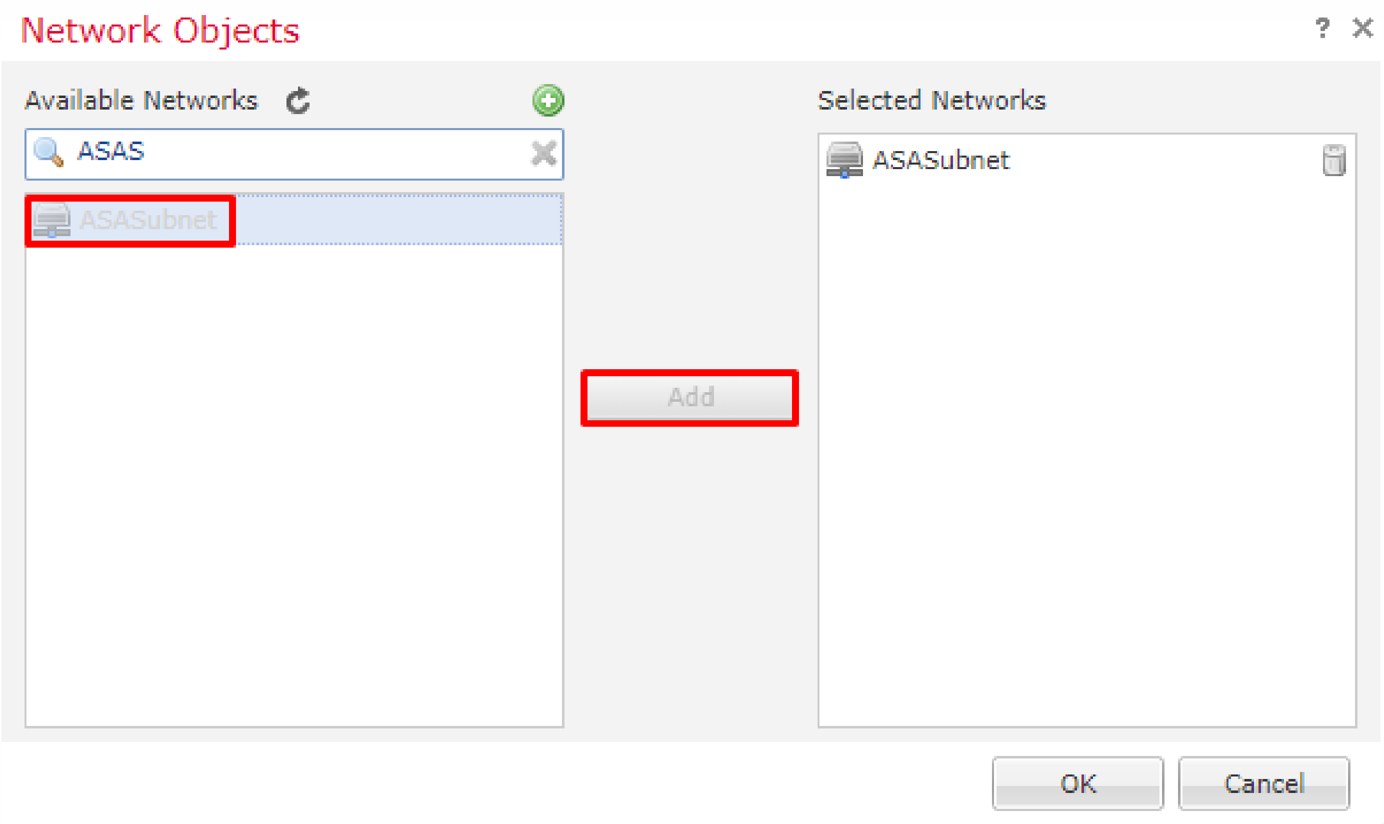
Certificate Map:

Protected Networks:*

● Subnet / IP Address (Network) ○ Access List (Extended)

7.如本图所示，选择需要加密的ASA子网，然后将其添加到所选网络。

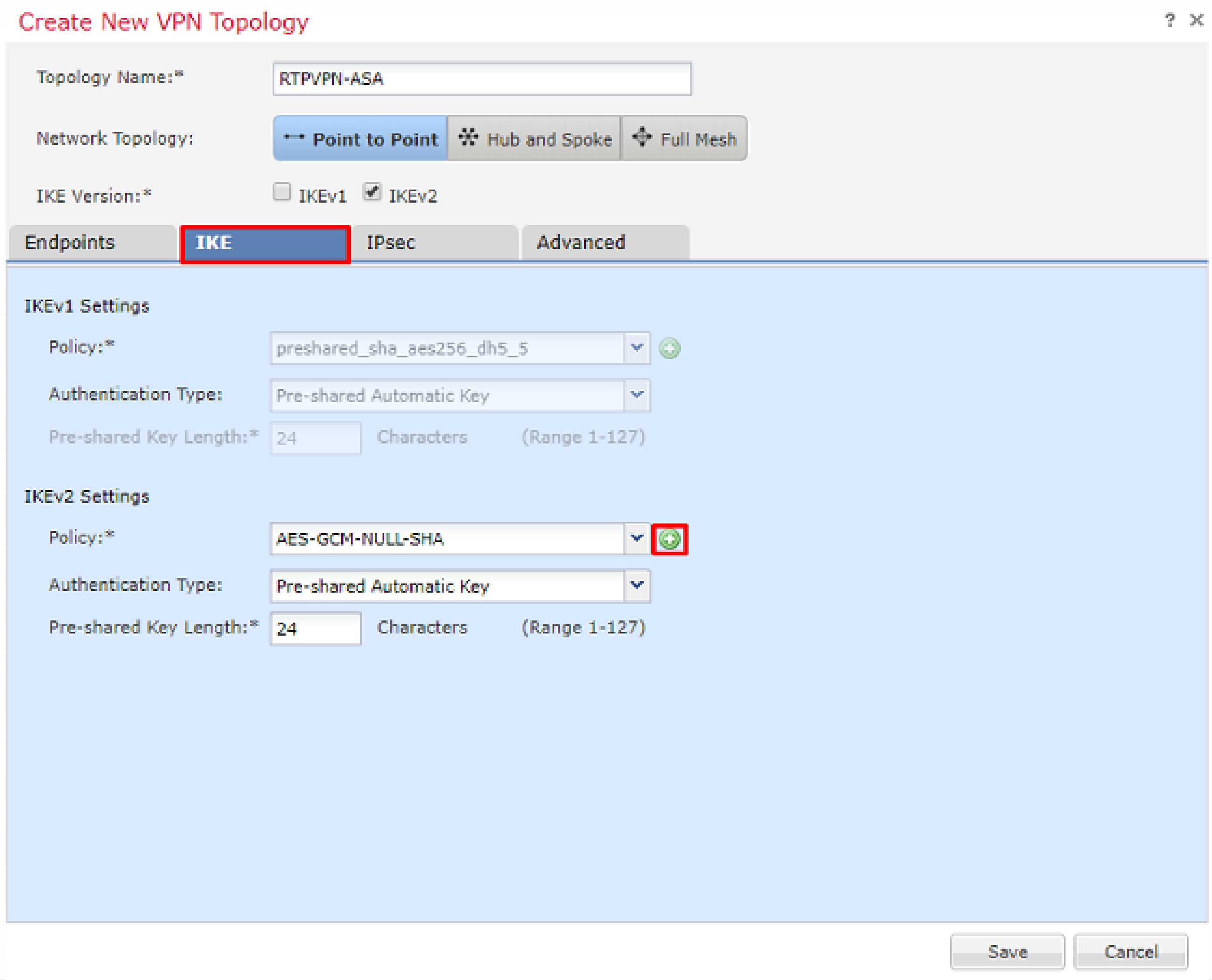
ASA子网= 10.10.110.0/24



第二步：配置IKE参数。

现在，两个终端都已通过IKE/IPSEC配置。

1.在IKE选项卡下，指定用于IKEv2初始交换的参数。单击绿色加号可创建新的IKE策略，如图所示。



Create New VPN Topology

Topology Name:* RTPVPN-ASA

Network Topology: Point to Point | Hub and Spoke | Full Mesh

IKE Version:* ☐ IKEv1 ☑ IKEv2

IKEv1 Settings

Policy:* preshared_sha_aes256_dh5_5

Authentication Type: Pre-shared Automatic Key

Pre-shared Key Length:* 24 Characters (Range 1-127)

IKEv2 Settings

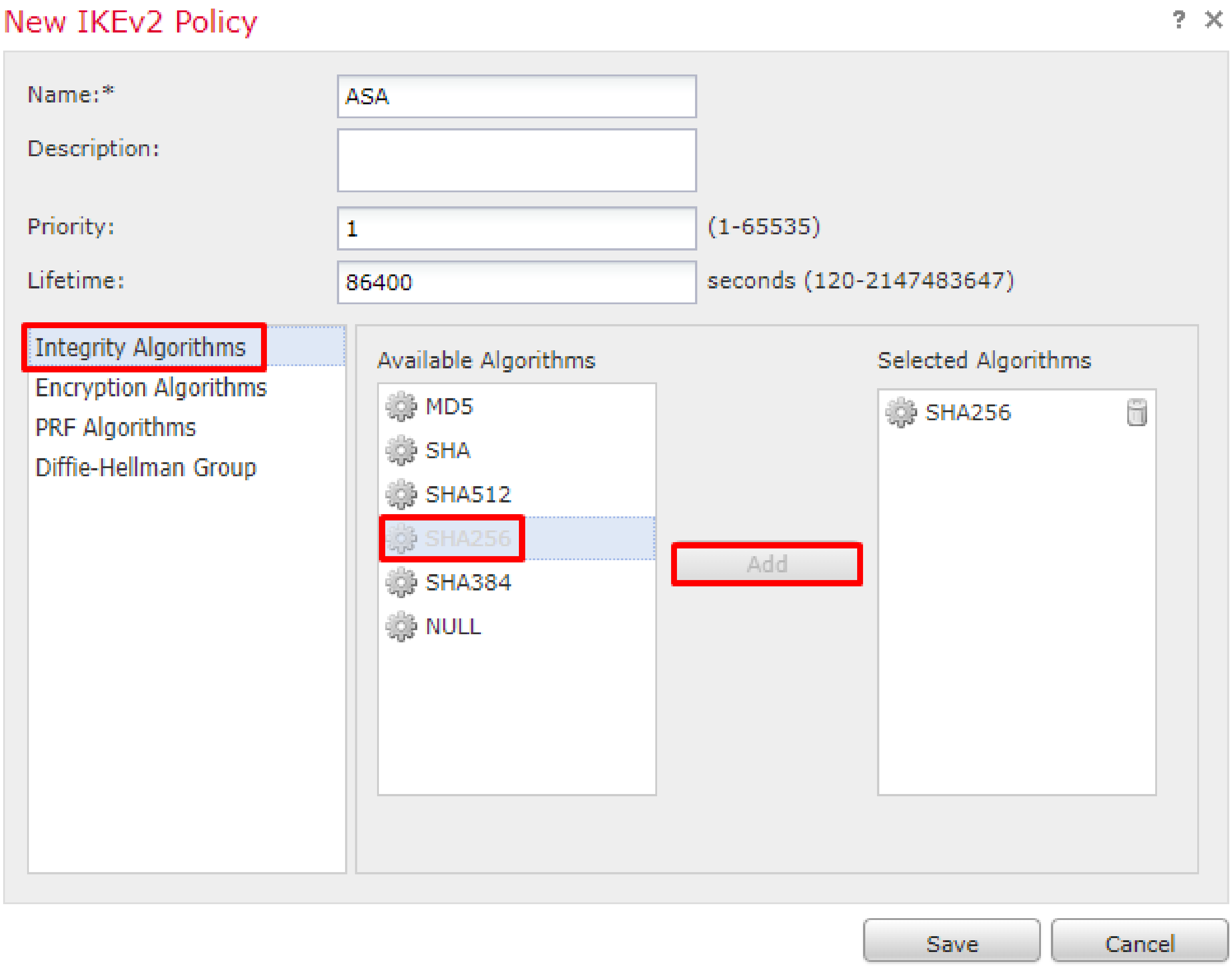
Policy:* AES-GCM-NULL-SHA

Authentication Type: Pre-shared Automatic Key

Pre-shared Key Length:* 24 Characters (Range 1-127)

2.在新的IKE策略中，指定连接的优先级编号和阶段1的生存期。本文档在初始交换中使用以下参数：完整性(SHA256)、加密(AES-256)、PRF(SHA256)和Diffie-Hellman组（组14）

注意：无论所选策略部分中的内容如何，设备上的所有IKE策略都将发送到远程对等体。为VPN连接选择与远程对等项匹配的第一个IKE策略。使用优先级字段选择首先发送的策略。优先级1将首先发送。



New IKEv2 Policy

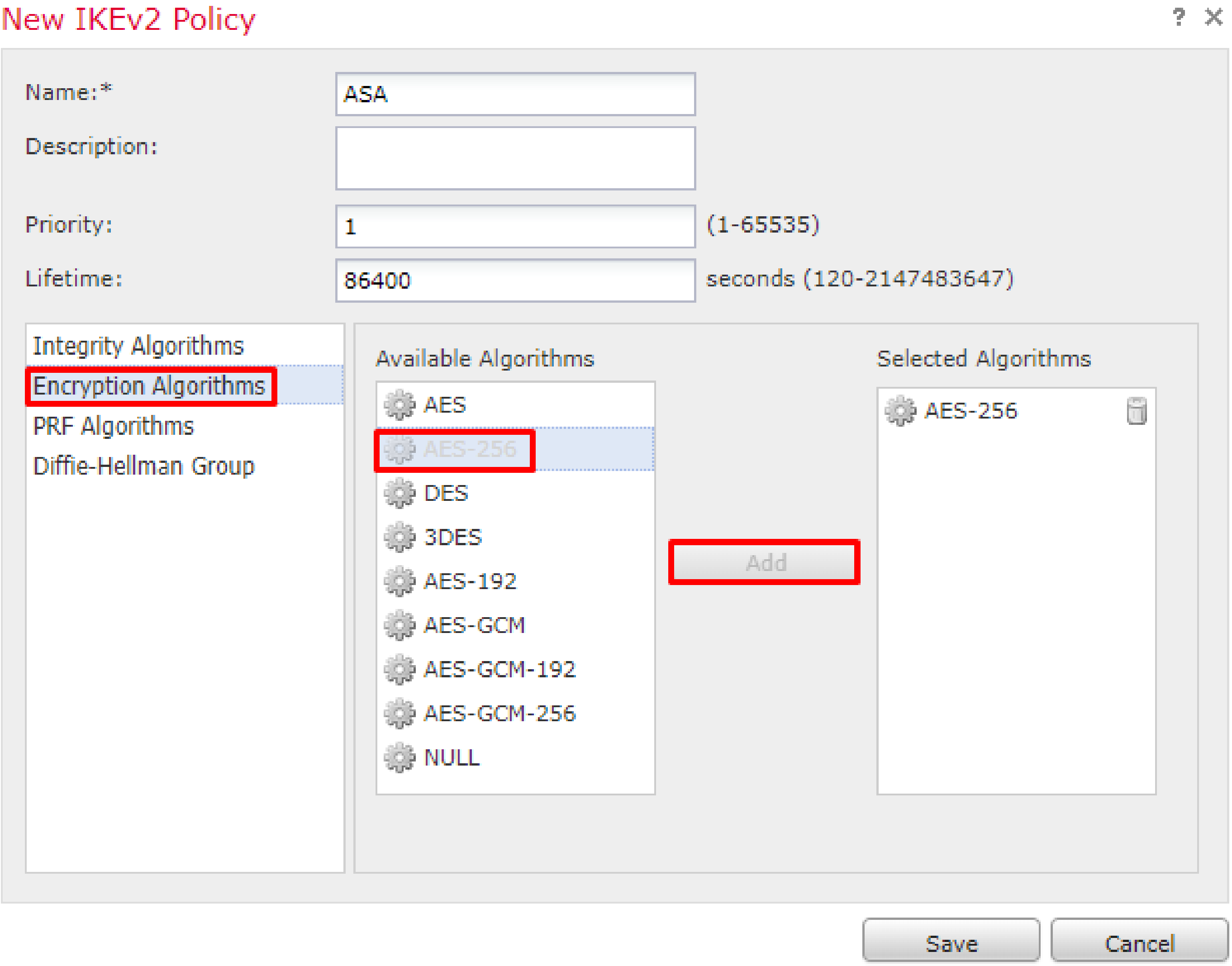
Name:* ASA

Description:

Priority: 1 (1-65535)

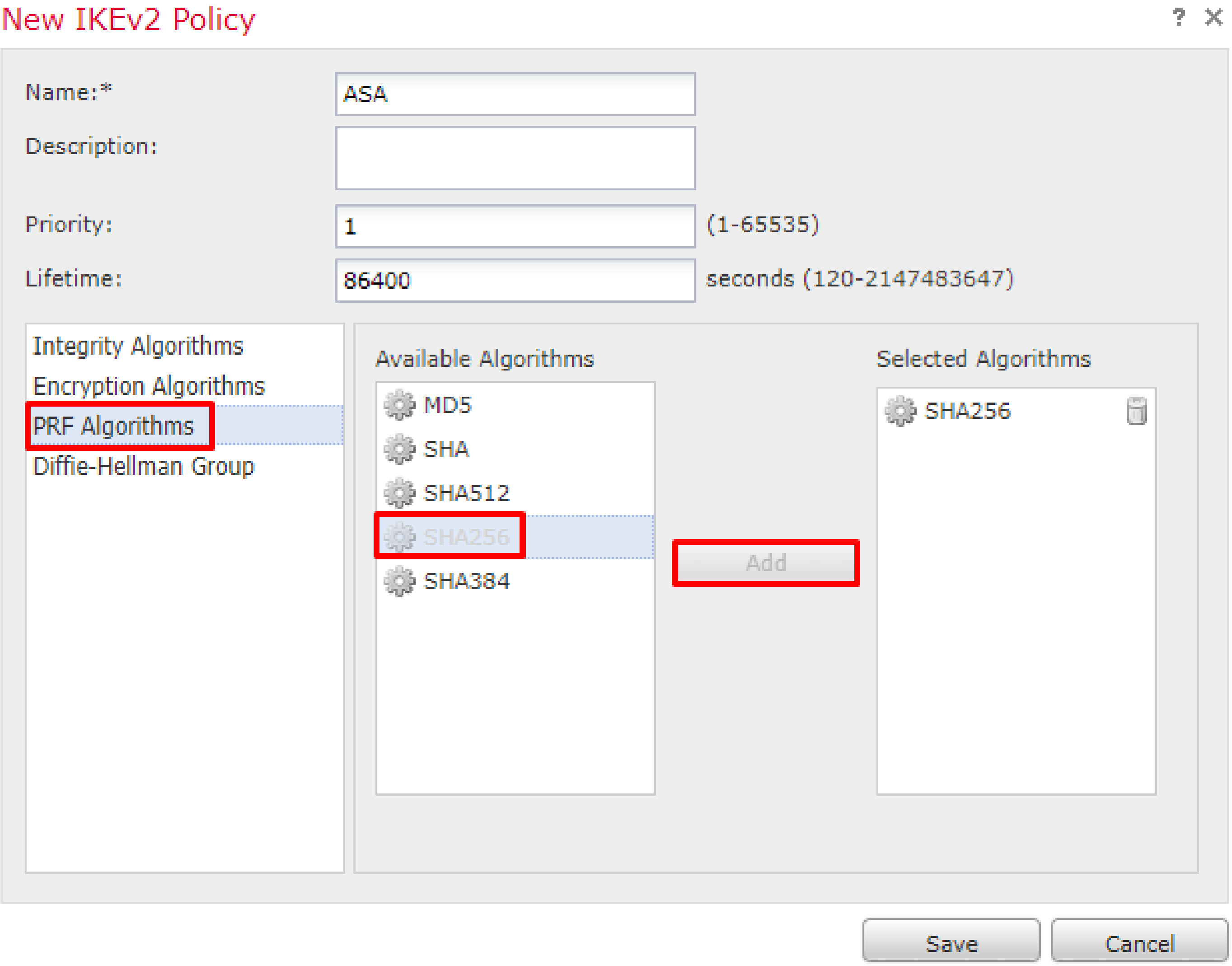
Lifetime: 86400 seconds (120-2147483647)

Selected Algorithms: SHA256



New IKEv2 Policy

Name:*	ASA	
Description:		
Priority:	1	(1-65535)
Lifetime:	86400	seconds (120-2147483647)



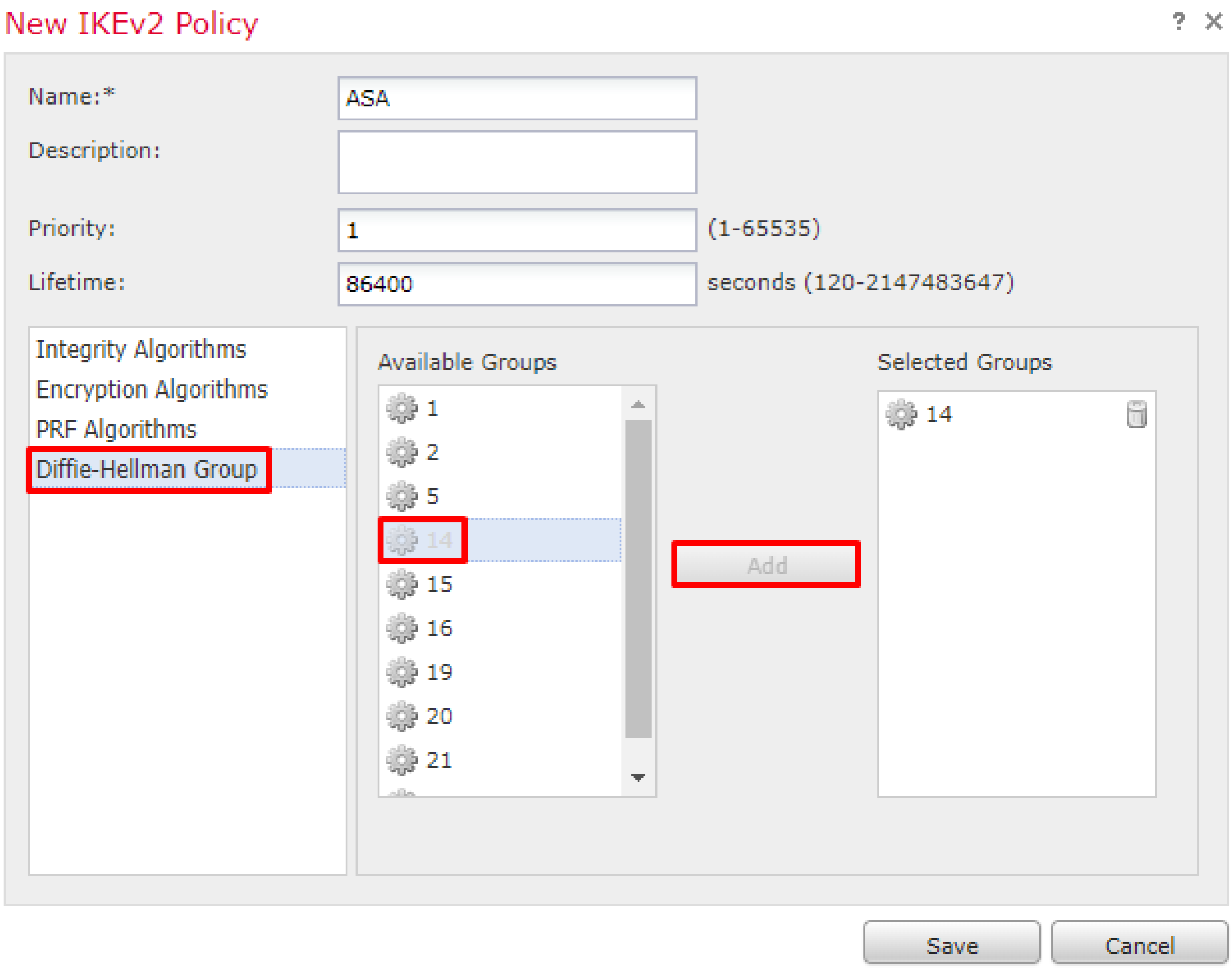
New IKEv2 Policy

Name:* ASA

Description:

Priority: 1 (1-65535)

Lifetime: 86400 seconds (120-2147483647)



New IKEv2 Policy

Name:* ASA

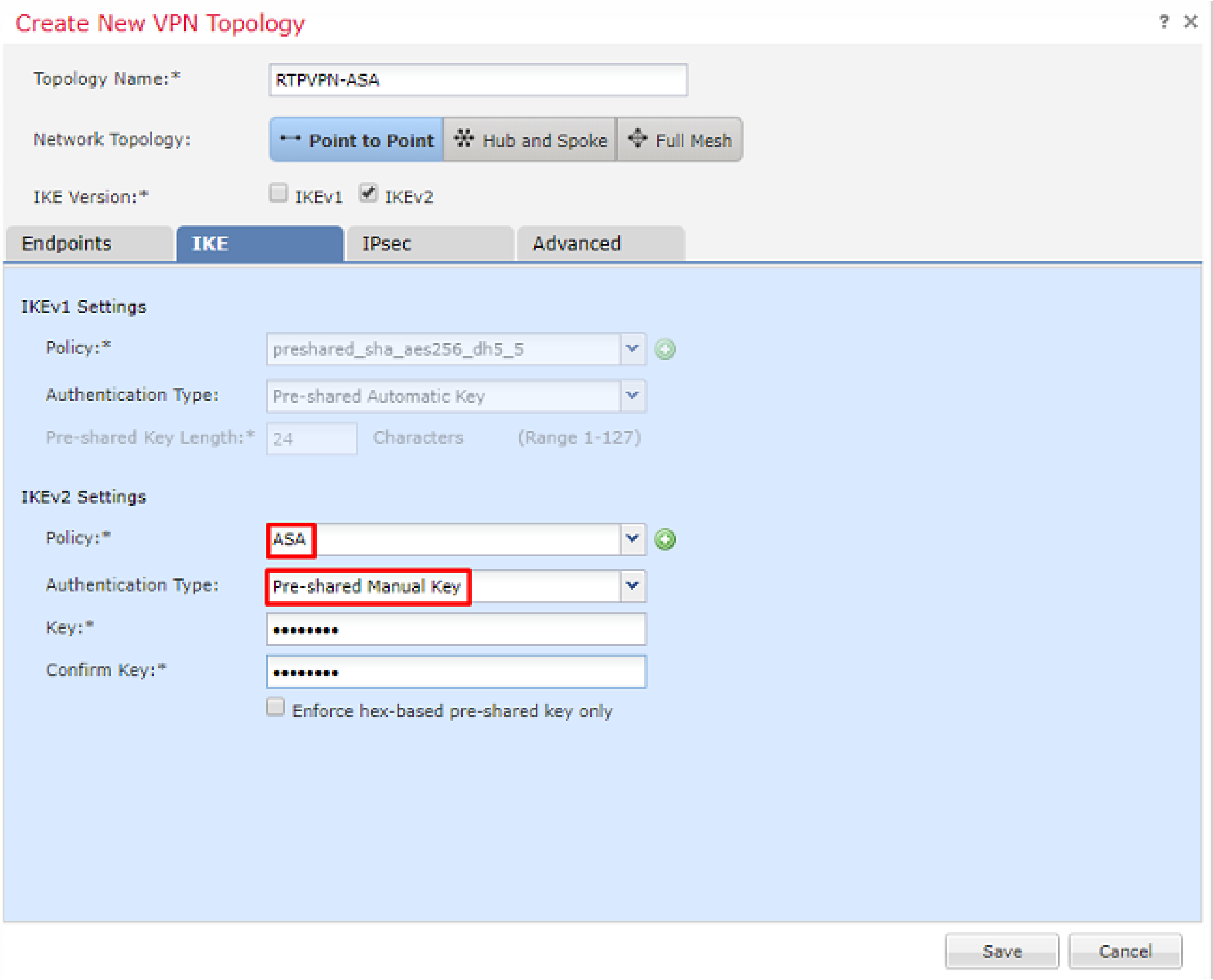
Description:

Priority: 1 (1-65535)

Lifetime: 86400 seconds (120-2147483647)

3.添加参数后，选择此策略，然后选择验证类型。

4.选择pre-shared-key manual。本文档使用PSK cisco123。



Create New VPN Topology

Topology Name:* RTPVPN-ASA

Network Topology: Point to Point | Hub and Spoke | Full Mesh

IKE Version:* □ IKEv1 ☑ IKEv2

IKEv1 Settings

Policy:* preshared_sha_aes256_dh5_5

Authentication Type: Pre-shared Automatic Key

Pre-shared Key Length:* 24 Characters (Range 1-127)

IKEv2 Settings

Policy:* ASA

Authentication Type: Pre-shared Manual Key

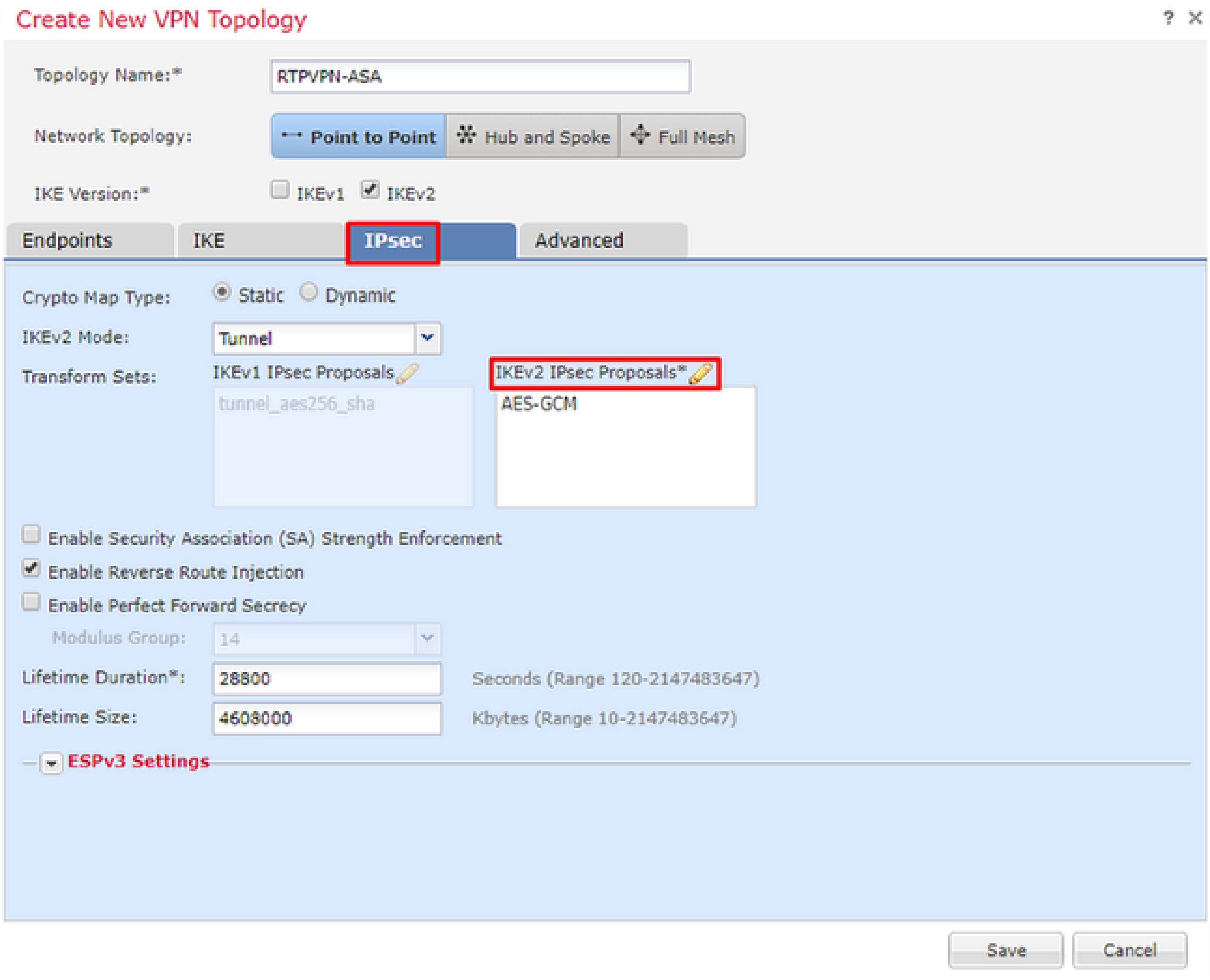
Key:* •••••••••

Confirm Key:* •••••••••

□ Enforce hex-based pre-shared key only

第三步：配置 IPSec 参数.

1.在IPsec下，单击铅笔编辑转换集并创建新的IPsec提议，如下图所示。


Create New VPN Topology

Topology Name:* RTPVPN-ASA

Network Topology: Point to Point | Hub and Spoke | Full Mesh

IKE Version:* □ IKEv1 ☑ IKEv2

Endpoints | IKE | IPsec | Advanced

Crypto Map Type: ● Static ○ Dynamic

IKEv2 Mode: Tunnel

Transform Sets: IKEv1 IPsec Proposals: tunnel_aes256_sha — IKEv2 IPsec Proposals*: AES-GCM

□ Enable Security Association (SA) Strength Enforcement

☑ Enable Reverse Route Injection

□ Enable Perfect Forward Secrecy

Modulus Group: 14

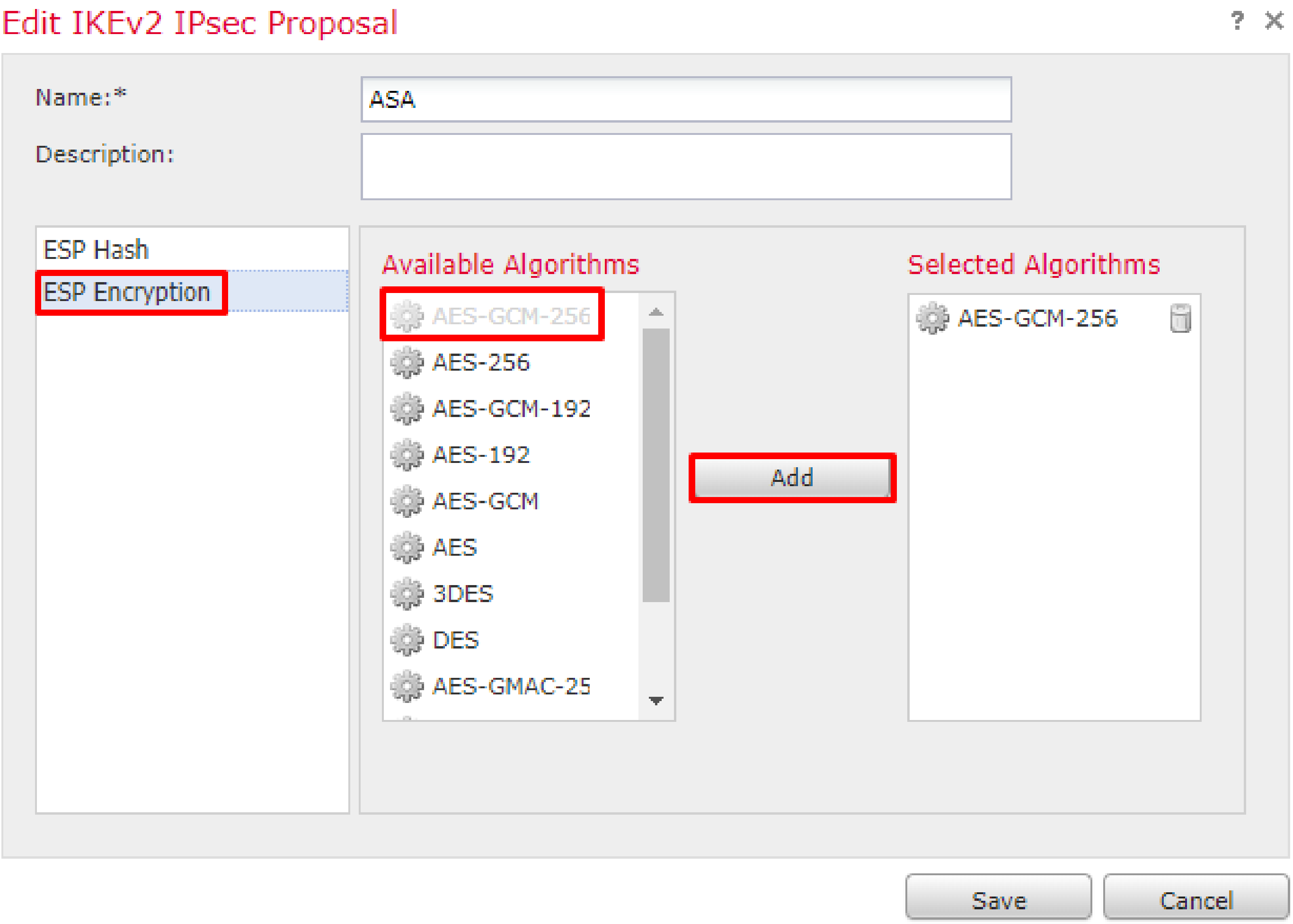
Lifetime Duration*: 28800 Seconds (Range 120-2147483647)

Lifetime Size: 4608000 Kbytes (Range 10-2147483647)

ESPv3 Settings

2.要创建新的IKEv2 IPsec提议，请单击绿色加号并输入阶段2参数。

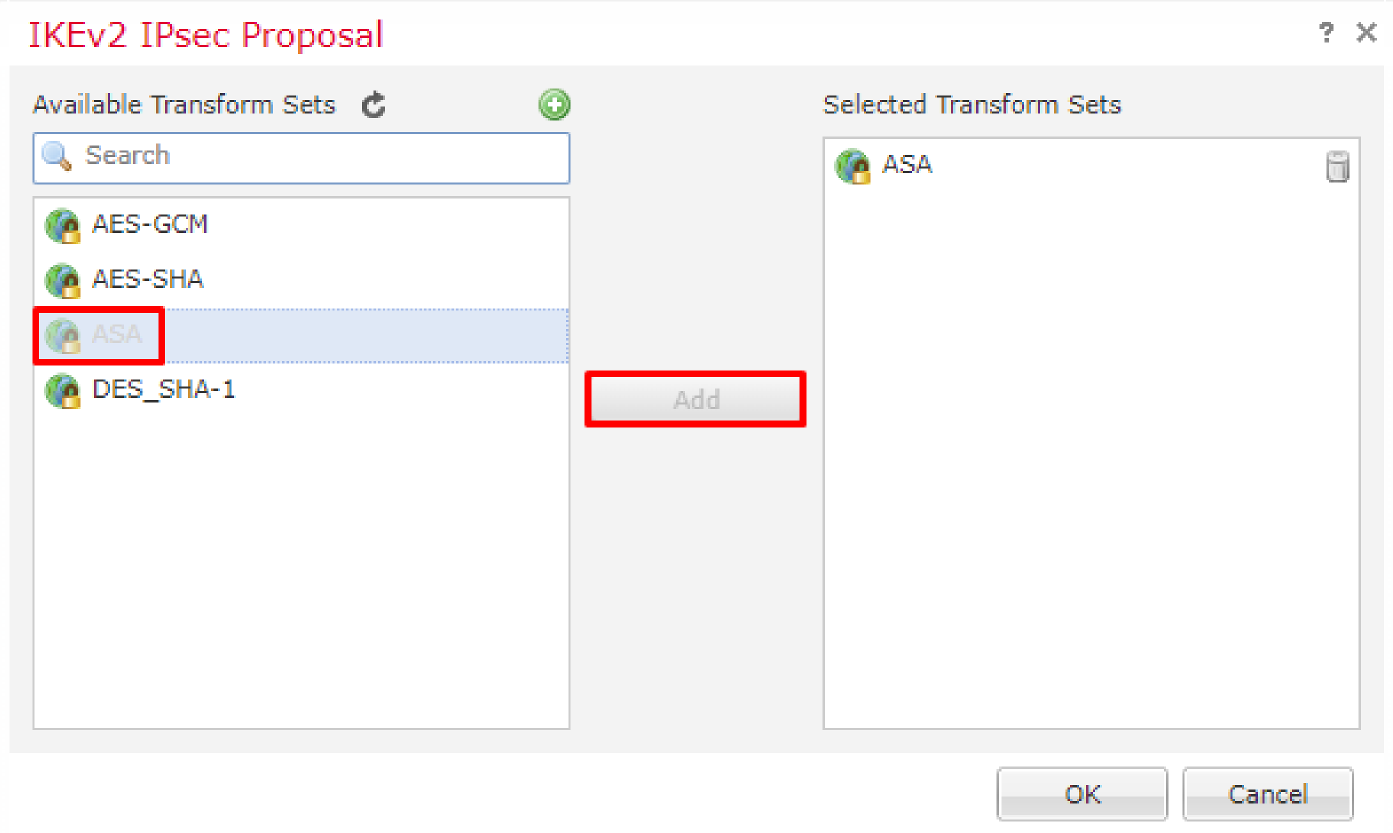
选择ESP Encryption > AES-GCM-256。使用GCM算法加密时，不需要散列算法。使用GCM时，哈希函数是内置的。



Name:* ASA

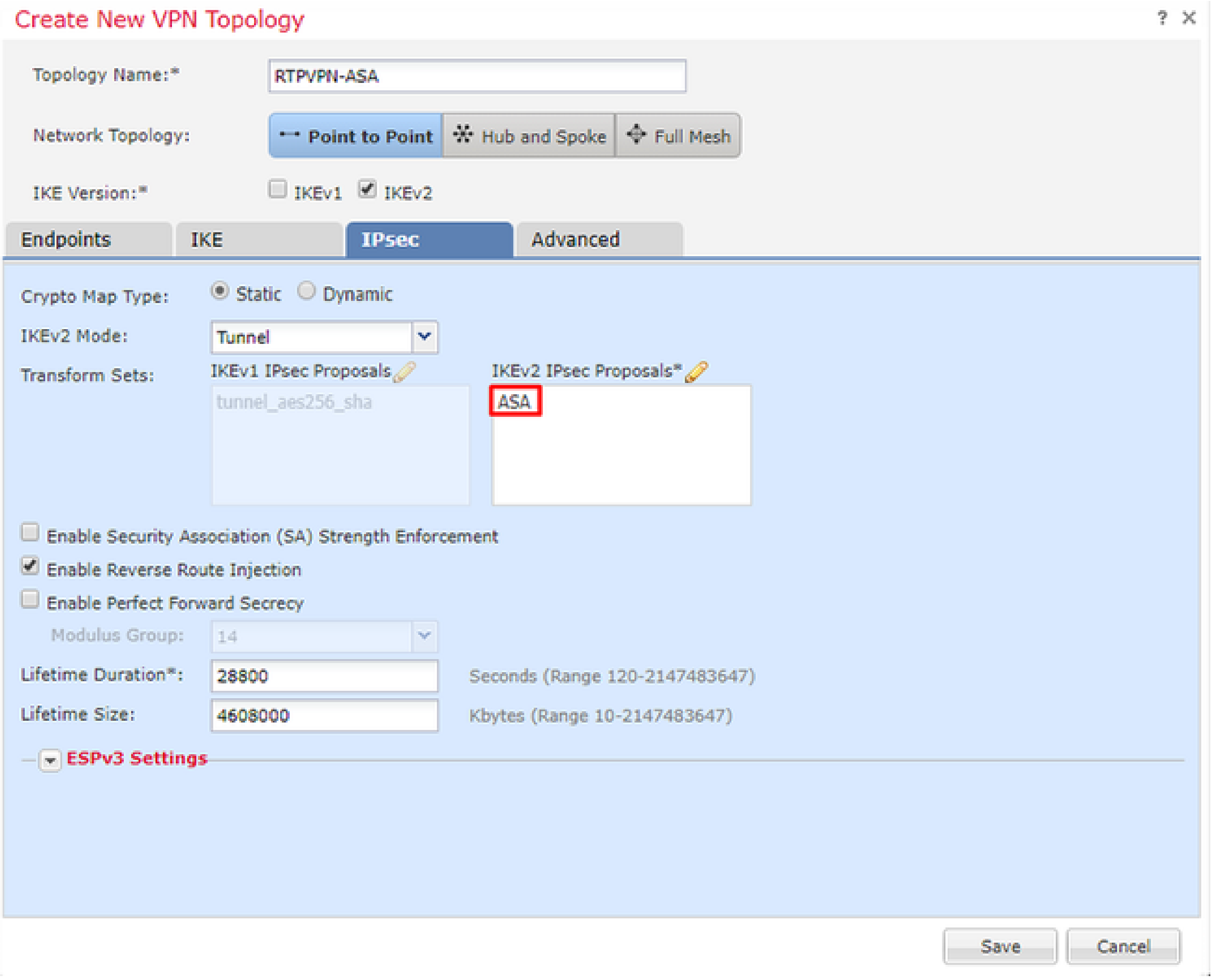
Description:

3.创建新的IPsec方案后，将其添加到选定的转换集。



新选择的IPsec建议现在列在IKEv2 IPsec建议下。

如果需要，可在此处编辑阶段2的有效期和PFS。在本例中，生命周期将被设置为默认值，PFS将被禁用。



Create New VPN Topology

Topology Name:* RTPVPN-ASA

Network Topology: Point to Point | Hub and Spoke | Full Mesh

IKE Version:* □ IKEv1 ☑ IKEv2

Endpoints | IKE | IPsec | Advanced

Crypto Map Type: ● Static ○ Dynamic

IKEv2 Mode: Tunnel

Transform Sets: IKEv1 IPsec Proposals: tunnel_aes256_sha; IKEv2 IPsec Proposals*: ASA

□ Enable Security Association (SA) Strength Enforcement

☑ Enable Reverse Route Injection

□ Enable Perfect Forward Secrecy

Modulus Group: 14

Lifetime Duration*: 28800 Seconds (Range 120-2147483647)

Lifetime Size: 4608000 Kbytes (Range 10-2147483647)

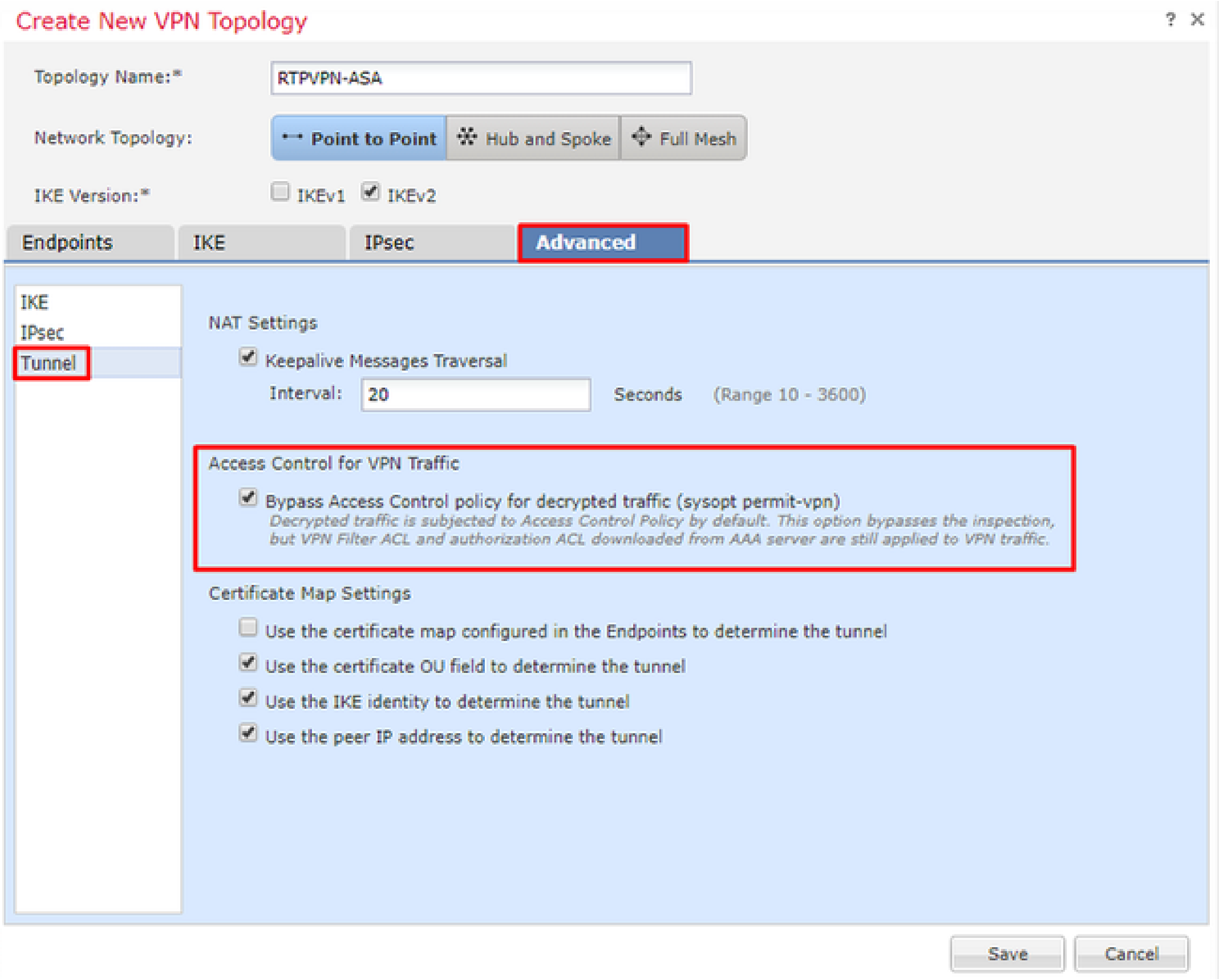
ESPv3 Settings

可选 — 必须完成旁路访问控制选项或创建访问控制策略。

第四步：绕过访问控制。

或者，可以在Advanced > Tunnel下启用sysopt permit-vpn。

这消除了使用访问控制策略检查来自用户的流量的可能性。VPN过滤器或可下载ACL仍可用于过滤用户流量。 这是全局命令，如果启用此复选框，该命令将应用于所有VPN。



Topology Name:* RTPVPN-ASA

Network Topology: Point to Point | Hub and Spoke | Full Mesh

IKE Version:* □ IKEv1 ☑ IKEv2

NAT Settings

☑ Keepalive Messages Traversal

Interval: 20 Seconds (Range 10 - 3600)

Access Control for VPN Traffic

☑ Bypass Access Control policy for decrypted traffic (sysopt permit-vpn)

Decrypted traffic is subjected to Access Control Policy by default. This option bypasses the inspection, but VPN Filter ACL and authorization ACL downloaded from AAA server are still applied to VPN traffic.

Certificate Map Settings

□ Use the certificate map configured in the Endpoints to determine the tunnel

☑ Use the certificate OU field to determine the tunnel

☑ Use the IKE identity to determine the tunnel

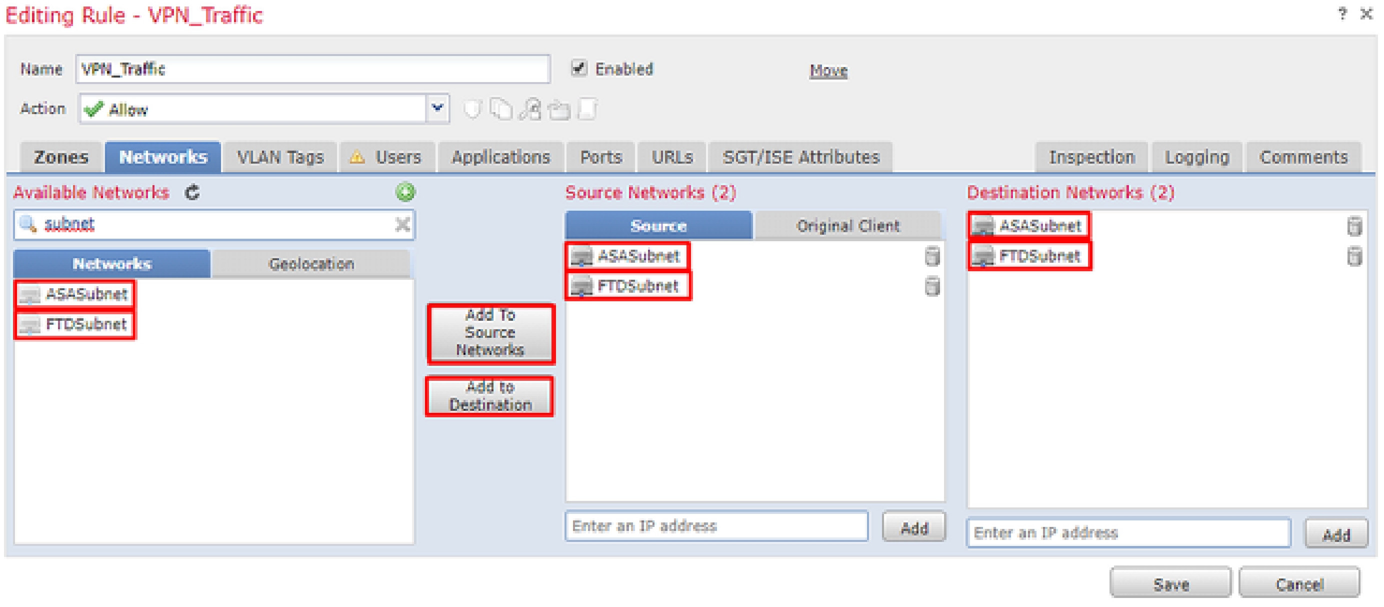
☑ Use the peer IP address to determine the tunnel

如果未启用sysopt permit-vpn，则必须创建访问控制策略，以允许VPN流量通过FTD设备。如果sysopt permit-vpn已启用，请跳过创建访问控制策略。

第五步：创建访问控制策略。

在Access Control Policies下，导航到Policies > Access Control > Access Control，并选择针对FTD设备的策略。要添加规则，请点击Add Rule，如图所示。

必须允许流量从内部网络传出到外部网络，以及从外部网络传到内部网络。创建一个规则以同时执行这两个操作，或创建两个规则以将其分开。在本例中，创建一条规则来同时执行这两个操作。



Editing Rule - VPN_Traffic

Name: VPN_Traffic ☑ Enabled Move

Action: Allow

Tabs: Zones | Networks | VLAN Tags | Users | Applications | Ports | URLs | SGT/ISE Attributes | Inspection | Logging | Comments

Available Networks: subnet
- Networks | Geolocation
- ASASubnet
- FTDSubnet

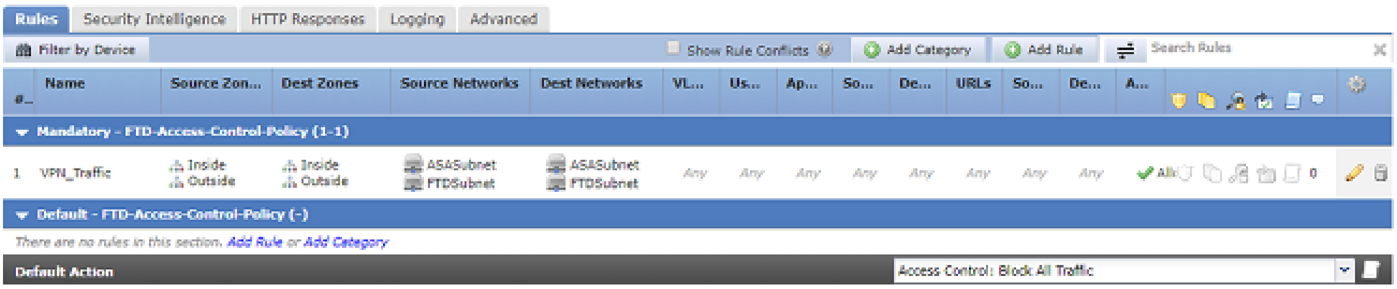
Add To Source Networks | Add to Destination

Source Networks (2): Source | Original Client
- ASASubnet
- FTDSubnet

Destination Networks (2)
- ASASubnet
- FTDSubnet

Enter an IP address | Add

Save | Cancel



Rules | Security Intelligence | HTTP Responses | Logging | Advanced

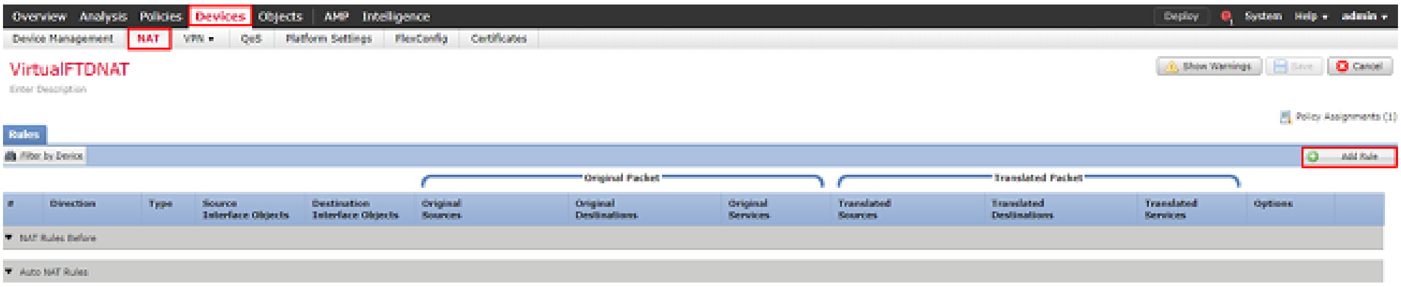
Filter by Device ☐ Show Rule Conflicts | Add Category | Add Rule | Search Rules

#.	Name	Source Zon...	Dest Zones	Source Networks	Dest Networks	VL...	Us...	Ap...	So...	De...	URLs	So...	De...	A...
▼ Mandatory - FTD-Access-Control-Policy (1-1)														
1	VPN_Traffic	Inside Outside	Inside Outside	ASASubnet FTDSubnet	ASASubnet FTDSubnet	Any	Any	Any	Any	Any	Any	Any	Any	Allow
▼ Default - FTD-Access-Control-Policy (-)														
There are no rules in this section. Add Rule or Add Category														
Default Action														Access Control: Block All Traffic

第六步：配置NAT免除。

为VPN流量配置NAT免除语句。必须实施NAT免除，以防止VPN流量到达另一个NAT语句并错误地转换VPN流量。

1.导航到设备> NAT，选择以FTD为目标的NAT策略。 点击Add Rule按钮时创建新规则。



Overview | Analysis | Policies | Devices | Objects | AMP | Intelligence — Deploy | System | Help | admin

Device Management | NAT | VPN | QoS | Platform Settings | FlexConfig | Certificates

VirtualFTDNAT

Enter Description

Show Warnings | Save | Cancel

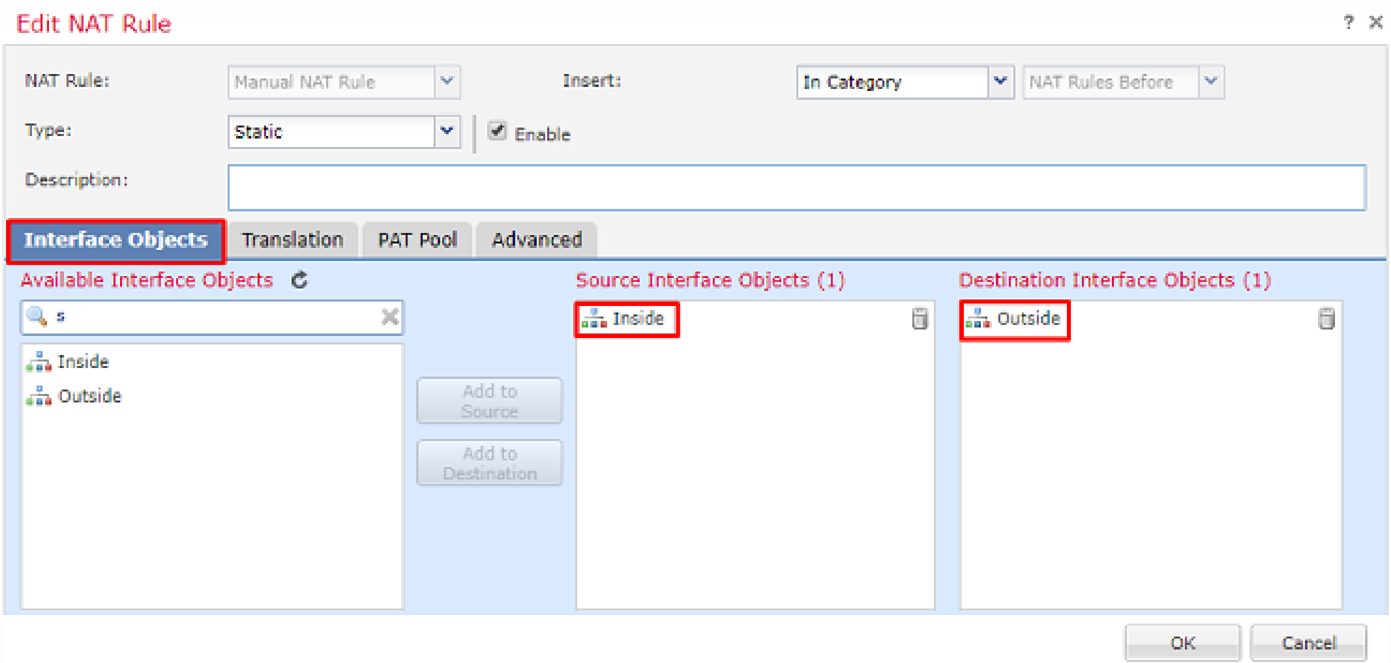
Policy Assignments (1)

Rules

Filter by Device — Add Rule

					Original Packet			Translated Packet			
#	Direction	Type	Source Interface Objects	Destination Interface Objects	Original Sources	Original Destinations	Original Services	Translated Sources	Translated Destinations	Translated Services	Options
▼ NAT Rules Before											
▼ Auto NAT Rules											

2.创建新的静态手动NAT规则。参考内部和外部接口。


Edit NAT Rule

NAT Rule: Manual NAT Rule

Insert: In Category | NAT Rules Before

Type: Static

☑ Enable

Description:

Available Interface Objects

s

Inside

Outside

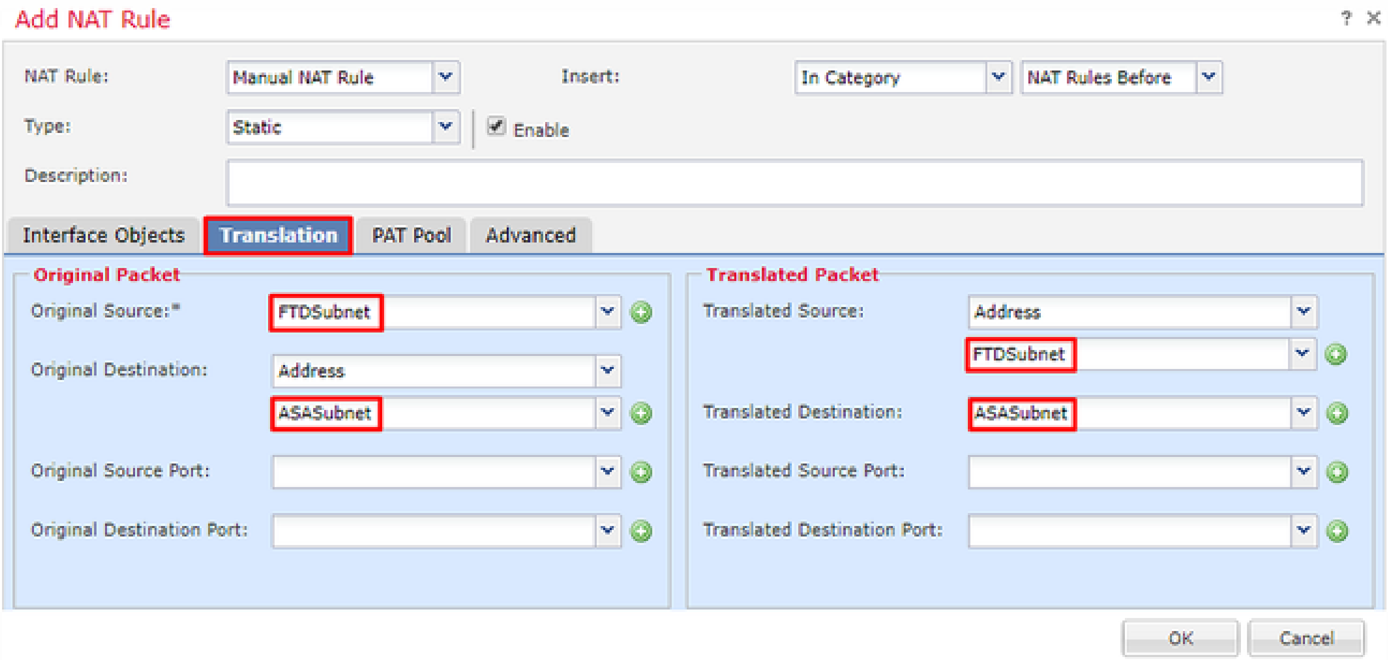
Source Interface Objects (1)

Inside

Destination Interface Objects (1)

Outside

3.在转换选项卡下，选择源子网和目标子网。由于这是NAT免除规则，请使原始源/目标与转换后的源/目标相同，如下图所示：


Add NAT Rule

NAT Rule: Manual NAT Rule

Insert: In Category | NAT Rules Before

Type: Static

☑ Enable

Description:

Original Packet

Original Source:* FTDSubnet

Original Destination: Address

ASASubnet

Original Source Port:

Original Destination Port:

Translated Packet

Translated Source: Address

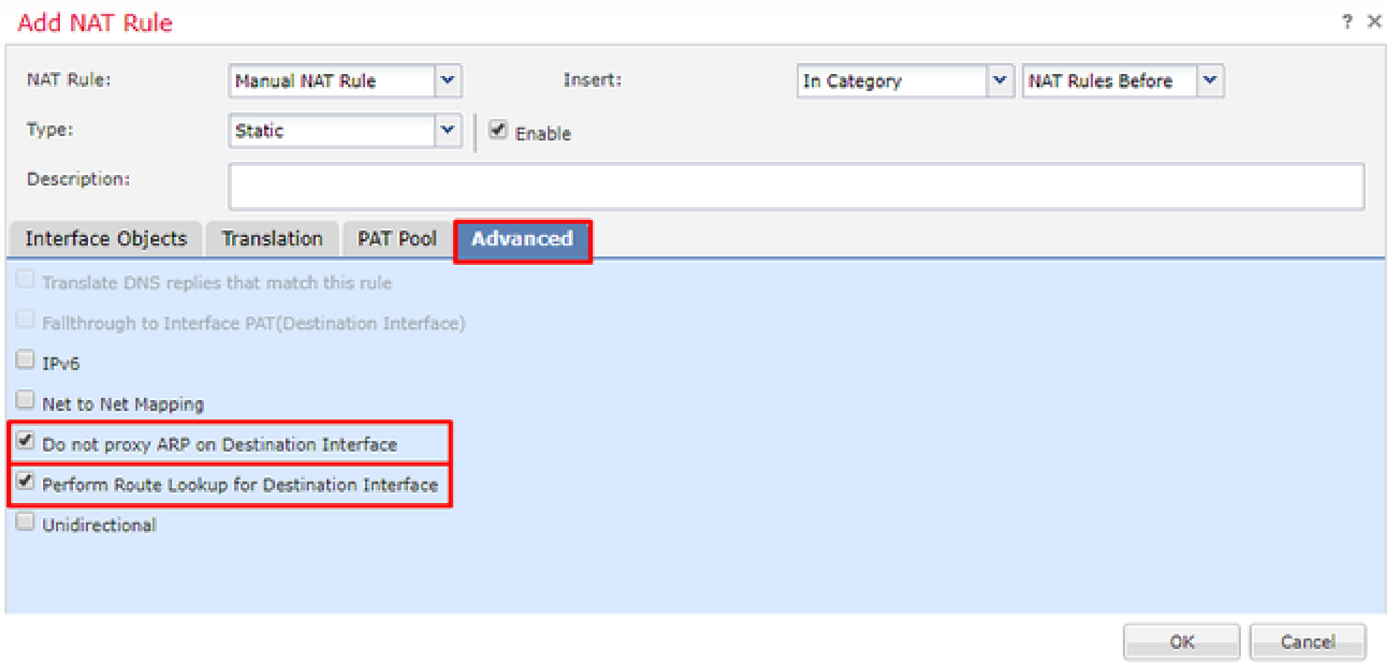
FTDSubnet

Translated Destination: ASASubnet

Translated Source Port:

Translated Destination Port:

4.最后，转到Advanced选项卡并启用无代理arp和路由查找。



Add NAT Rule

NAT Rule: Manual NAT Rule

Insert: In Category | NAT Rules Before

Type: Static ☑ Enable

Description:

Interface Objects | Translation | PAT Pool | Advanced

□ Translate DNS replies that match this rule

□ Fallthrough to Interface PAT(Destination Interface)

□ IPv6

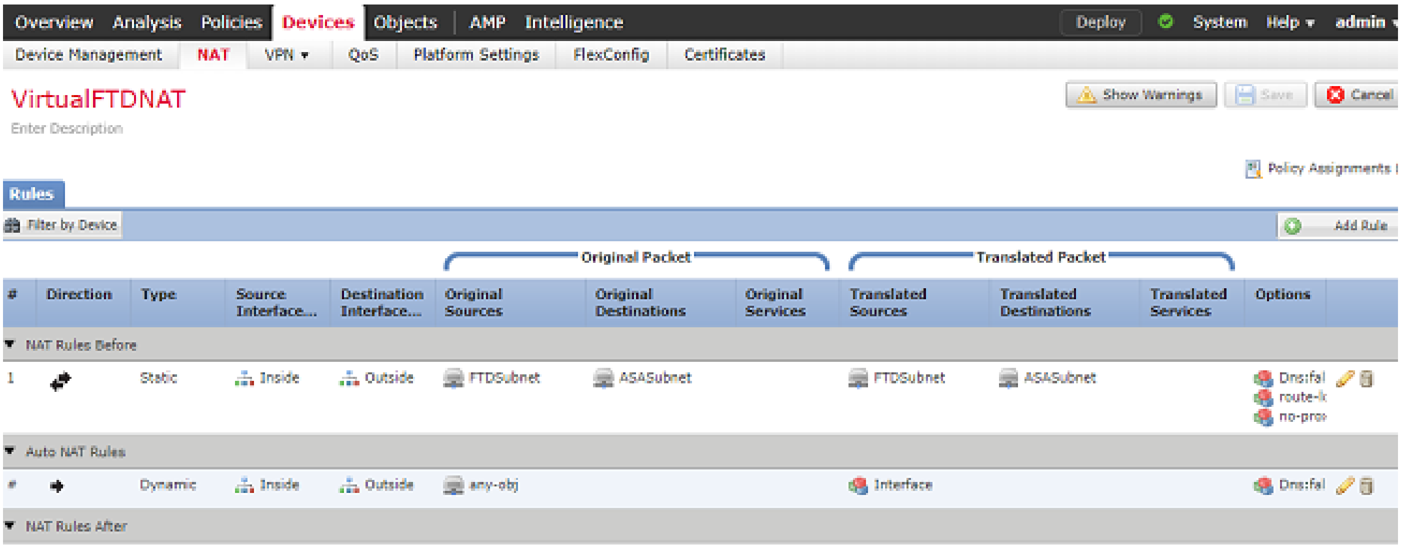
□ Net to Net Mapping

☑ Do not proxy ARP on Destination Interface

☑ Perform Route Lookup for Destination Interface

□ Unidirectional

5.保存此规则并在NAT列表中查看最终结果。



VirtualFTDNAT

Enter Description

					Original Packet			Translated Packet			
#	Direction	Type	Source Interface...	Destination Interface...	Original Sources	Original Destinations	Original Services	Translated Sources	Translated Destinations	Translated Services	Options
▼ NAT Rules Before											
1	⇄	Static	Inside	Outside	FTDSubnet	ASASubnet		FTDSubnet	ASASubnet		Dns:fal route-l no-prox
▼ Auto NAT Rules											
#	→	Dynamic	Inside	Outside	any-obj			Interface			Dns:fal
▼ NAT Rules After											

6.完成配置后，保存配置并将其部署到FTD。

步骤 7.配置ASA。

1. 在ASA的外部接口上启用IKEv2:

```
Crypto ikev2 enable outside
```

2.创建定义在FTD上配置的相同参数的IKEv2策略：

```
Crypto ikev2 policy 1
```

```
 Encryption aes-256
 Integrity sha256
 Group 14
 Prf sha256
 Lifetime seconds 86400
```

3.创建允许ikev2协议的组策略：

```
Group-policy FTD_GP internal
Group-policy FTD_GP attributes
 Vpn-tunnel-protocol ikev2
```

4.创建对等FTD公有IP地址的隧道组。引用组策略并指定预共享密钥：

```
Tunnel-group 172.16.100.20 type ipsec-l2l
Tunnel-group 172.16.100.20 general-attributes
Default-group-policy FTD_GP
Tunnel-group 172.16.100.20 ipsec-attributes
 ikev2 local-authentication pre-shared-key cisco123
 ikev2 remote-authentication pre-shared-key cisco123
```

5.创建定义要加密的流量的访问列表：(FTDSubnet 10.10.113.0/24)(ASASubnet 10.10.110.0/24)

```
Object network FTDSubnet
 Subnet 10.10.113.0 255.255.255.0
Object network ASASubnet
 Subnet 10.10.110.0 255.255.255.0
Access-list ASAtoFTD extended permit ip object ASASubnet object FTDSubnet
```

6.创建一个引用FTD上指定的算法的ikev2 ipsec-proposal:

```
Crypto ipsec ikev2 ipsec-proposal FTD
 Protocol esp encryption aes-gcm-256
```

7.创建将配置关联在一起的加密映射条目：

```
Crypto map outside_map 10 set peer 172.16.100.20
Crypto map outside_map 10 match address ASAtoFTD
Crypto map outside_map 10 set ikev2 ipsec-proposal FTD
Crypto map outside_map 10 interface outside
```

8.创建NAT免除语句，阻止防火墙NAT传输VPN流量：

```
    Nat (inside,outside) 1 source static ASASubnet ASASubnet destination static FTDSubnet FTDSubnet no-
```

验证

注：此时无法从FMC查看VPN隧道状态。此功能CSCvh77603有一个增强请求。

尝试通过VPN隧道发起流量。通过访问ASA或FTD的命令行，可以使用packet tracer命令完成此操作。使用packet-tracer命令启动VPN隧道时，必须运行两次以验证隧道是否启动。首次发出该命令时，VPN隧道关闭，因此packet-tracer命令在VPN加密DROP时将会失败。请勿将防火墙的内部IP地址用作Packet Tracer中的源IP地址，因为此操作始终会失败。

```
firepower# packet-tracer input inside icmp 10.10.113.10 8 0 10.10.110.10

Phase: 10
Type: VPN
Subtype: encrypt
Result: DROP
Config:
Additional Information:


firepower# packet-tracer input inside icmp 10.10.113.10 8 0 10.10.110.10

Phase: 1
Type: ROUTE-LOOKUP
Subtype: Resolve Egress Interface
Result: ALLOW
Config:
Additional Information:
found next-hop 172.16.100.1 using egress ifc outside

Phase: 2
Type: UN-NAT
Subtype: static
Result: ALLOW
Config:
nat (Inside,outside) source static FTDSubnet FTDSubnet destination static ASASubnet ASASubnet no-proxy-
Additional Information:
NAT divert to egress interface outside
Untranslate 10.10.110.10/0 to 10.10.110.10/0

Phase: 3
Type: ACCESS-LIST
Subtype: log
Result: ALLOW
Config:
access-group CSM_FW_ACL_ global
access-list CSM_FW_ACL_ advanced permit ip ifc Inside object-group FMC_INLINE_src_rule_268436483 ifc ou
```

```
access-list CSM_FW_ACL_ remark rule-id 268436483: ACCESS POLICY: FTD-Access-Control-Policy - Mandatory
access-list CSM_FW_ACL_ remark rule-id 268436483: L7 RULE: VPN_Traffic
object-group network FMC_INLINE_src_rule_268436483
description: Auto Generated by FMC from src of UnifiedNGFWRule# 1 (FTD-Access-Control-Policy/mandatory)
network-object object ASASubnet
network-object object FTDSubnet
object-group network FMC_INLINE_dst_rule_268436483
description: Auto Generated by FMC from dst of UnifiedNGFWRule# 1 (FTD-Access-Control-Policy/mandatory)
network-object object ASASubnet
network-object object FTDSubnet
Additional Information:
This packet will be sent to snort for additional processing where a verdict will be reached

Phase: 5
Type: NAT
Subtype:
Result: ALLOW
Config:
nat (Inside,outside) source static FTDSubnet FTDSubnet destination static ASASubnet ASASubnet no-proxy-
Additional Information:
Static translate 10.10.113.10/0 to 10.10.113.10/0

Phase: 10
Type: VPN
Subtype: encrypt
Result: ALLOW
Config:
Additional Information:

Result:
input-interface: Inside
input-status: up
input-line-status: up
output-interface: outside
output-status: up
output-line-status: up
Action: allow
```

要监控隧道状态，请导航到FTD或ASA的CLI。

在FTD CLI中，使用以下命令验证第1阶段和第2阶段：

Show crypto ikev2 sa

<#root>

```
> show crypto ikev2 sa

IKEv2 SAs:

Session-id:4, Status:UP-ACTIVE, IKE count:1, CHILD count:1

Tunnel-id Local                                                Remote
  9528731 172.16.100.20/500                                     192.168.200.10/500

 READY

   INITIATOR
```

```
      Encr: AES-CBC, keysize: 256, Hash: SHA256, DH Grp:14, Auth sign: PSK, Auth verify: PSK
      Life/Active Time: 86400/118 sec
Child sa: local selector

10.10.113.0/0 - 10.10.113.255/65535


          remote selector

10.10.110.0/0 - 10.10.110.255/65535


          ESP spi in/out:

0x66be357d/0xb74c8753
```

故障排除和调试

初始连接问题

构建VPN时，需要双方协商隧道。因此，当您排除任何类型的隧道故障时，最好让对话双方都参与进来。 有关如何调试IKEv2隧道的详细指南位于：如何调试IKEv2 VPN

隧道故障的最常见原因是连接问题。确定这一点的最佳方法是在设备上捕获数据包。 使用此命令获取设备上的数据包捕获：

```
Capture capout interface outside match ip host 172.16.100.20 host 192.168.200.10
```

捕获到位后，尝试通过VPN发送流量并检查数据包捕获中的双向流量。

使用以下命令检查数据包捕获：

show cap capout

```
firepower# show cap capout

4 packets captured

   1: 11:51:12.059628       172.16.100.20.500 > 192.168.200.10.500:  udp 690
   2: 11:51:12.065243       192.168.200.10.500 > 172.16.100.20.500:  udp 619
   3: 11:51:12.066692       172.16.100.20.500 > 192.168.200.10.500:  udp 288
   4: 11:51:12.069835       192.168.200.10.500 > 172.16.100.20.500:  udp 240
```

特定流量问题

您遇到的常见流量问题包括：

- FTD后的路由问题 — 内部网络无法将数据包路由回分配的IP地址和VPN客户端。
- 访问控制列表阻止流量。
- VPN流量未绕过网络地址转换。

有关FMC管理的FTD上的VPN的详细信息，您可以在此处找到完整配置指南：FMC管理的FTD配置指南

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