具有重疊專用網路的兩台IOS路由器之間的IPsec配置示例

目錄

簡介

本文檔介紹如何在站點到站點IPsec VPN中配置Cisco IOS路由器，在VPN網關後面使用重疊的專用網路地址。

必要條件

需求

本文件沒有特定需求。

採用元件

本檔案中的資訊是根據執行軟體版本12.4的Cisco IOS 3640路由器。

本文中的資訊是根據特定實驗室環境內的裝置所建立。文中使用到的所有裝置皆從已清除（預設）的組態來啟動。如果您的網路正在作用，請確保您已瞭解任何指令可能造成的影響。

慣例

請參閱思科技術提示慣例以瞭解更多有關文件慣例的資訊。

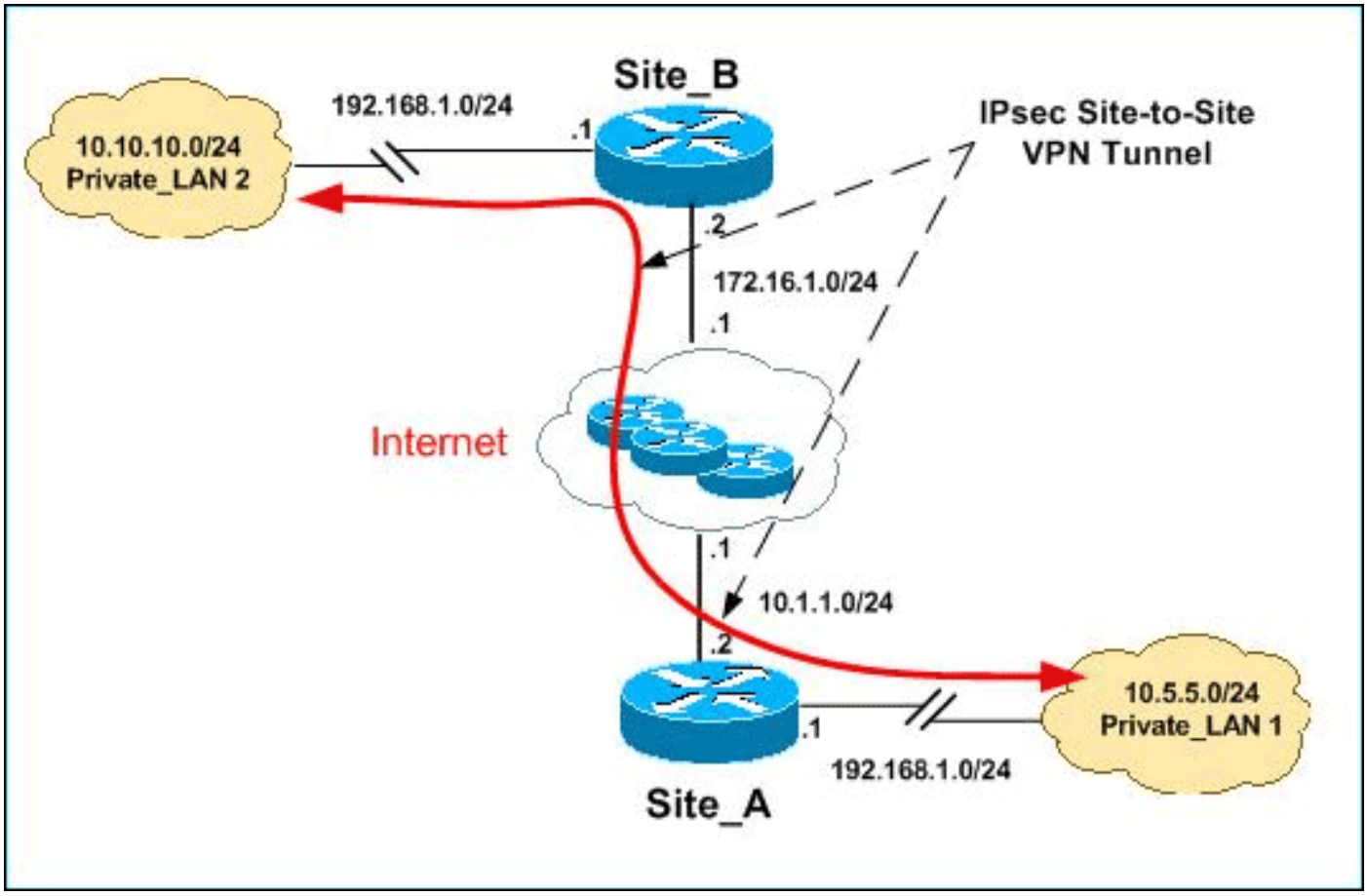
設定

本節提供用於設定本文件中所述功能的資訊。

註：使用Command Lookup Tool(僅供已註冊客戶使用)可獲取本節中使用的命令的詳細資訊。

網路圖表

此文件使用以下網路設定：



注意：此配置中使用的IP編址方案在Internet上不能合法路由。這些地址是在實驗室環境中使用的RFC 1918地址。

Private_LAN1和Private_LAN2的IP子網均為192.168.1.0/24。這將模擬IPsec通道兩端的重疊地址空間。

在本示例中，Site_A路由器執行雙向轉換，以便兩個專用LAN可以通過IPsec隧道通訊。此轉譯意味著Private_LAN1透過IPsec通道「看到」Private_LAN2為10.10.10.0/24，而Private_LAN2透過IPSec通道「看到」Private_LAN1為10.5.5.0/24。

組態

本檔案會使用以下設定：

- 站點_A路由器SDM配置
- Site_A路由器CLI配置
- Site_B路由器配置

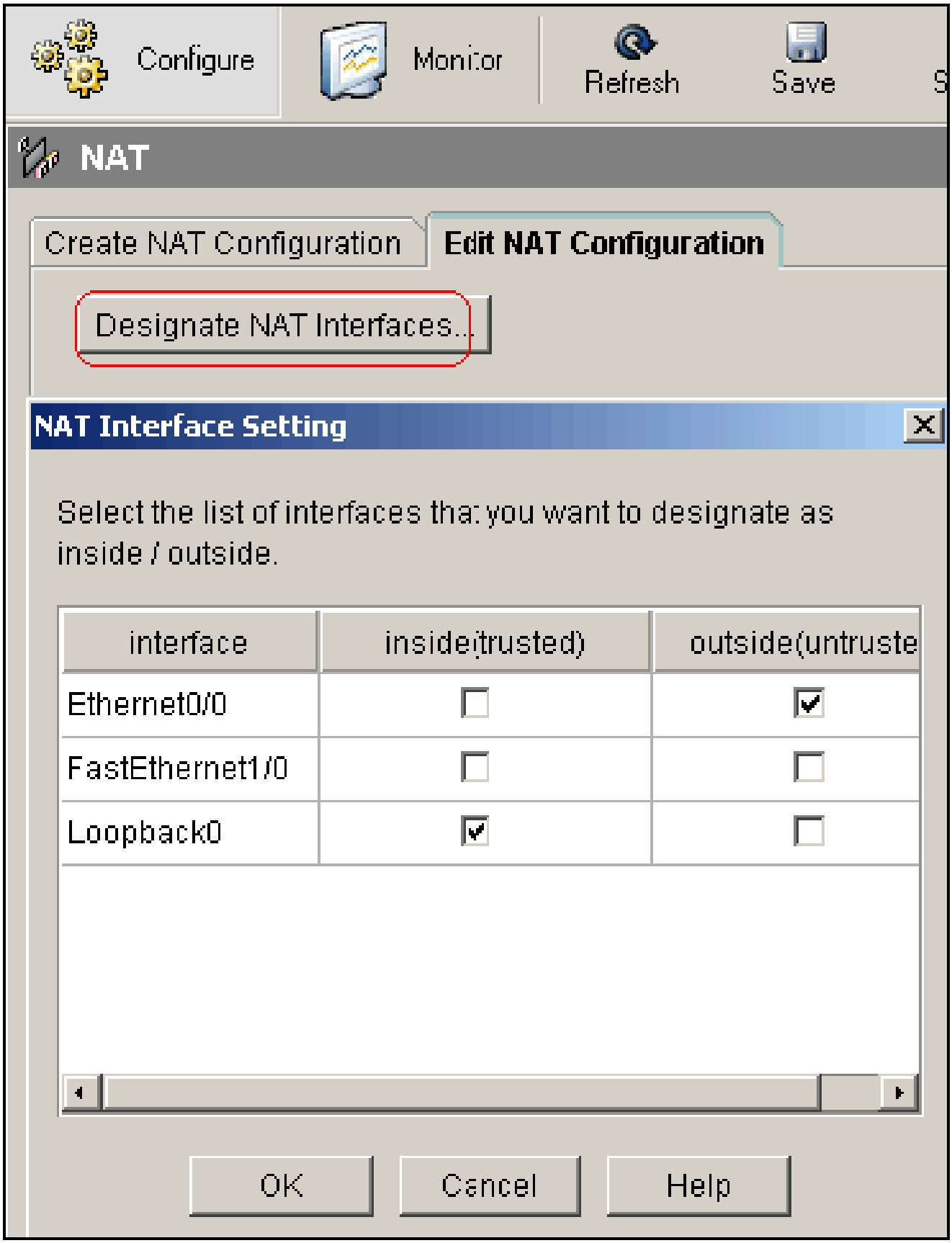
站點_A路由器SDM配置

注意：本檔案假定路由器已配置介面配置等基本設定。有關詳細資訊，請參閱使用SDM的基本路由器配置。

NAT配置

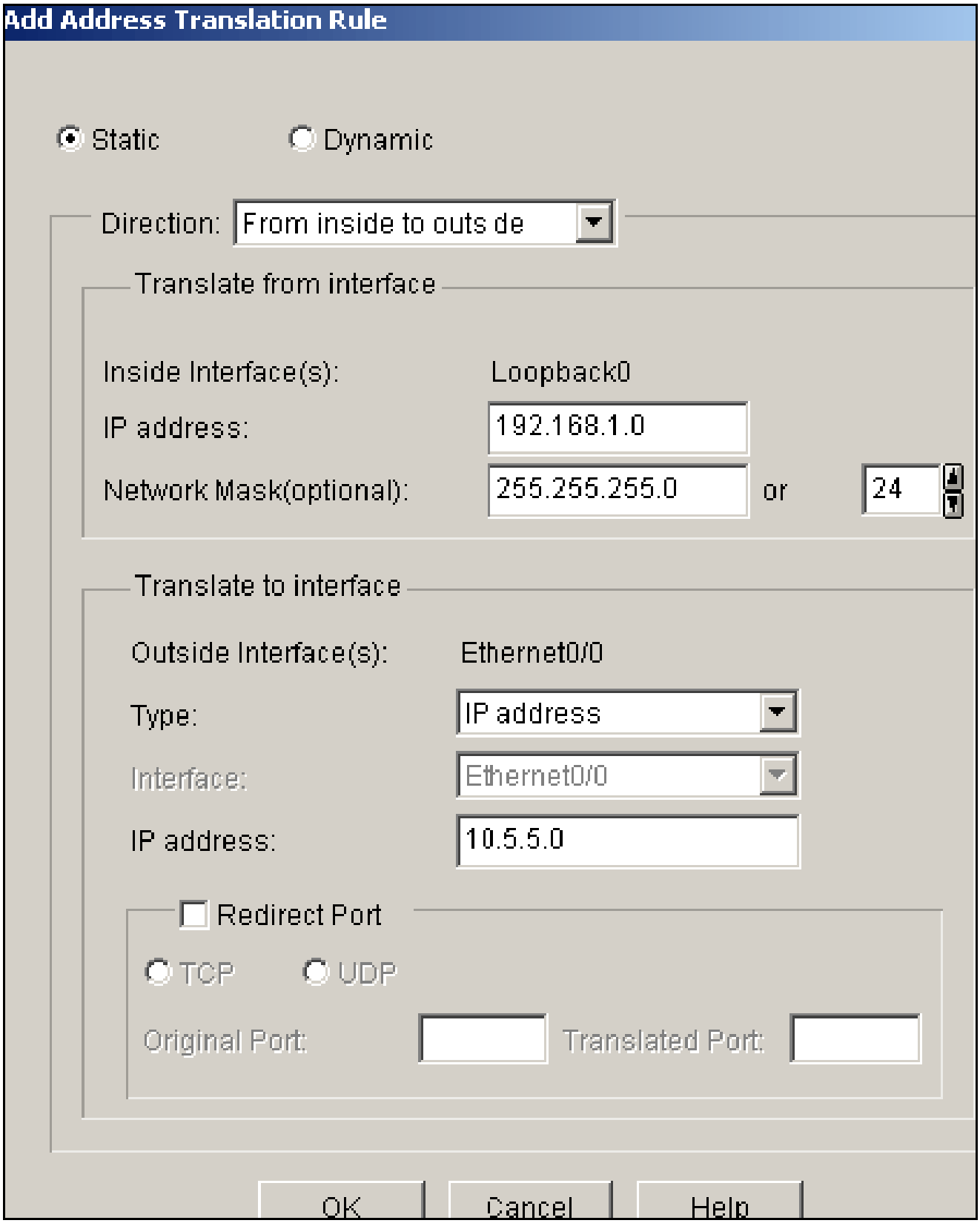
完成以下步驟，以便使用NAT在Site_A路由器上配置SDM:

1. 選擇Configure > NAT > Edit NAT Configuration，然後按一下Designate NAT Interfaces以定義受信任和不受信任的介面，如下所示。

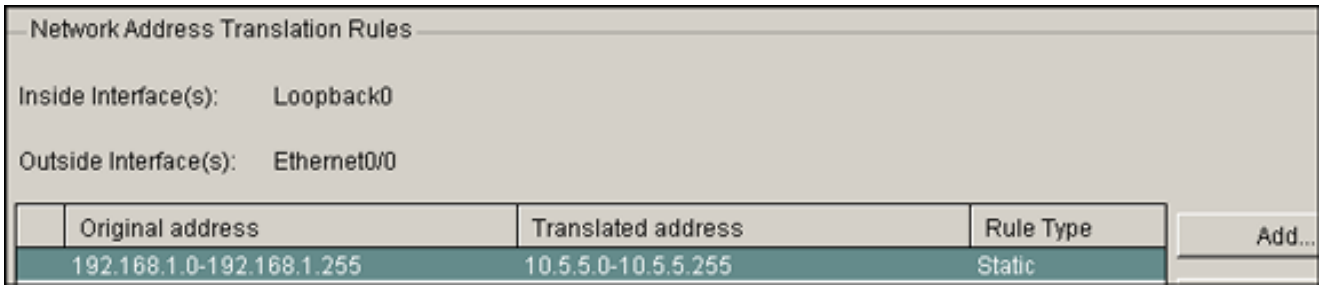


2. 按一下「OK」（確定）。

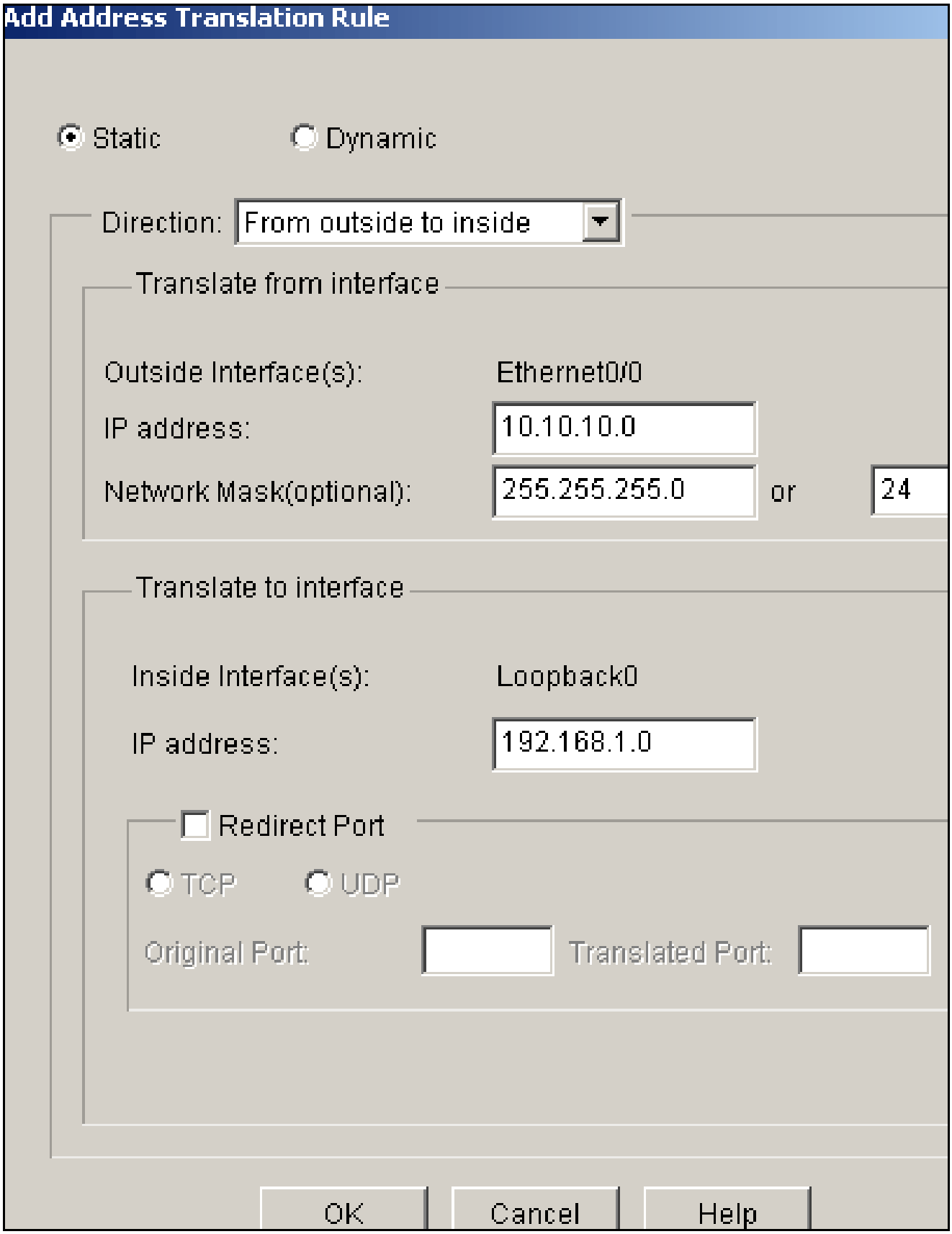
3. 按一下Add以配置從內部到外部方向的NAT轉換，如下所示。


Add Address Translation Rule
Static
Dynamic
Direction:
From inside to outs de
Translate from interface
Inside Interface(s):
Loopback0
IP address:
192.168.1.0
Network Mask(optional):
255.255.255.0
or
24
Translate to interface
Outside Interface(s):
Ethernet0/0
Type:
IP address
Interface:
Ethernet0/0
IP address:
10.5.5.0
Redirect Port
TCP
UDP
Original Port:
Translated Port:
OK
Cancel
Help

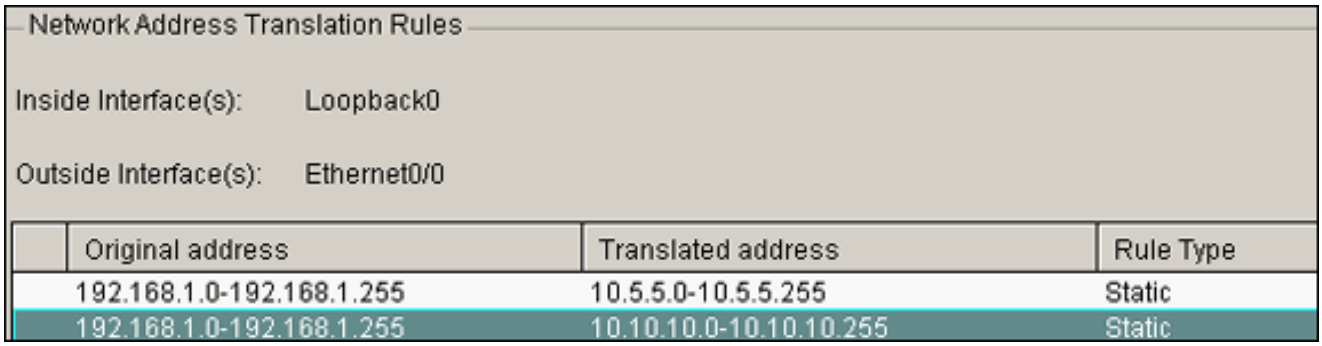
4. 按一下「OK」（確定）。



5. 再次按一下Add以配置從外部到內部方向的NAT轉換，如下所示。


Add Address Translation Rule
Static
Dynamic
Direction:
From outside to inside
Translate from interface
Outside Interface(s):
Ethernet0/0
IP address:
10.10.10.0
Network Mask(optional):
255.255.255.0
or
24
Translate to interface
Inside Interface(s):
Loopback0
IP address:
192.168.1.0
Redirect Port
TCP
UDP
Original Port:
Translated Port:
OK
Cancel
Help

6. 按一下「OK」（確定）。



注意：以下是等效的CLI配置：

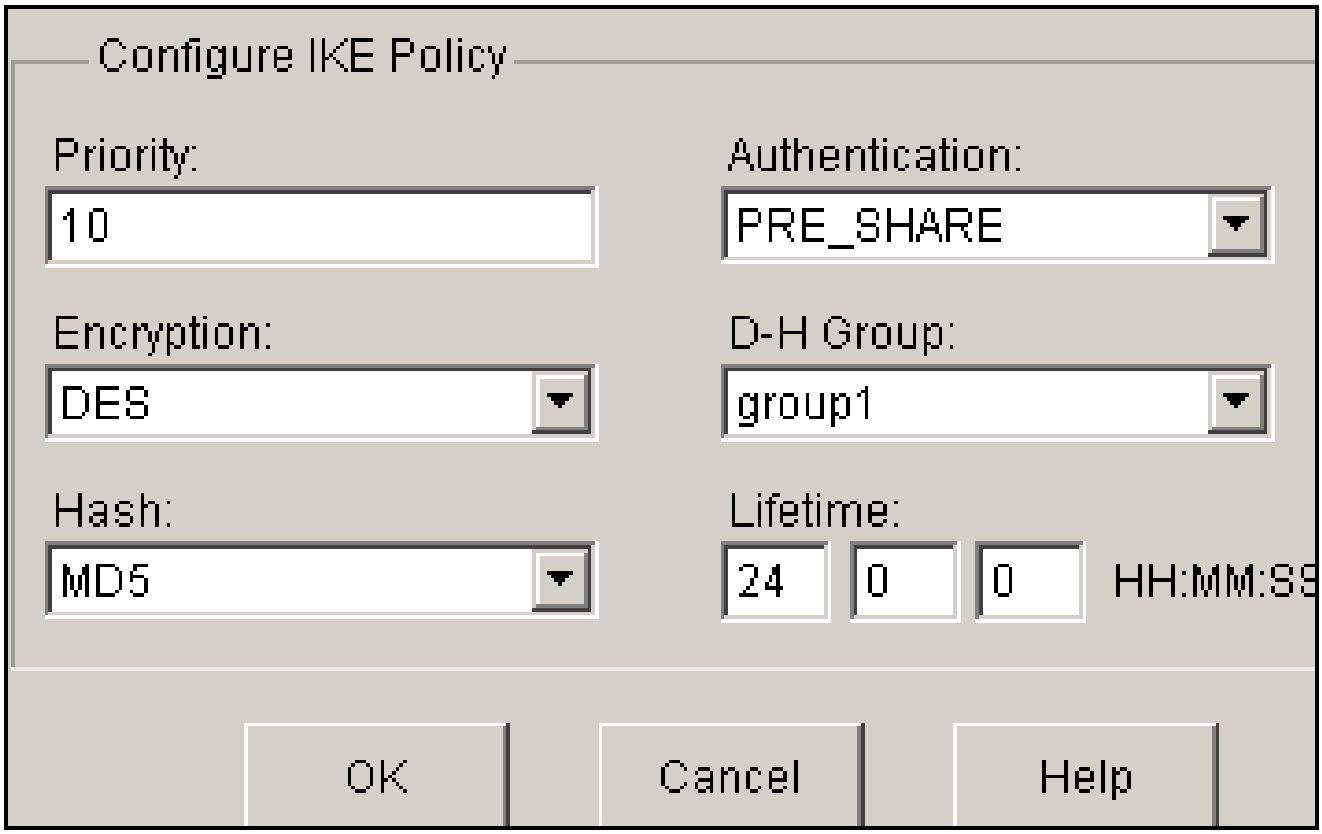
等效的CLI配置

```
interface Loopback0
  ip nat inside
interface Ethernet0/0
  ip nat inside
ip nat inside source static network 192.168.1.0 10.5.5.0 /24
ip nat outside source static network 192.168.1.0 10.10.10.0 /24
```

VPN配置

完成以下步驟，以便使用VPN在Site_A路由器上配置SDM:

1. 選擇Configure > VPN > VPN Components >IKE > IKE Policies > Add以定義IKE策略，如下圖所示。

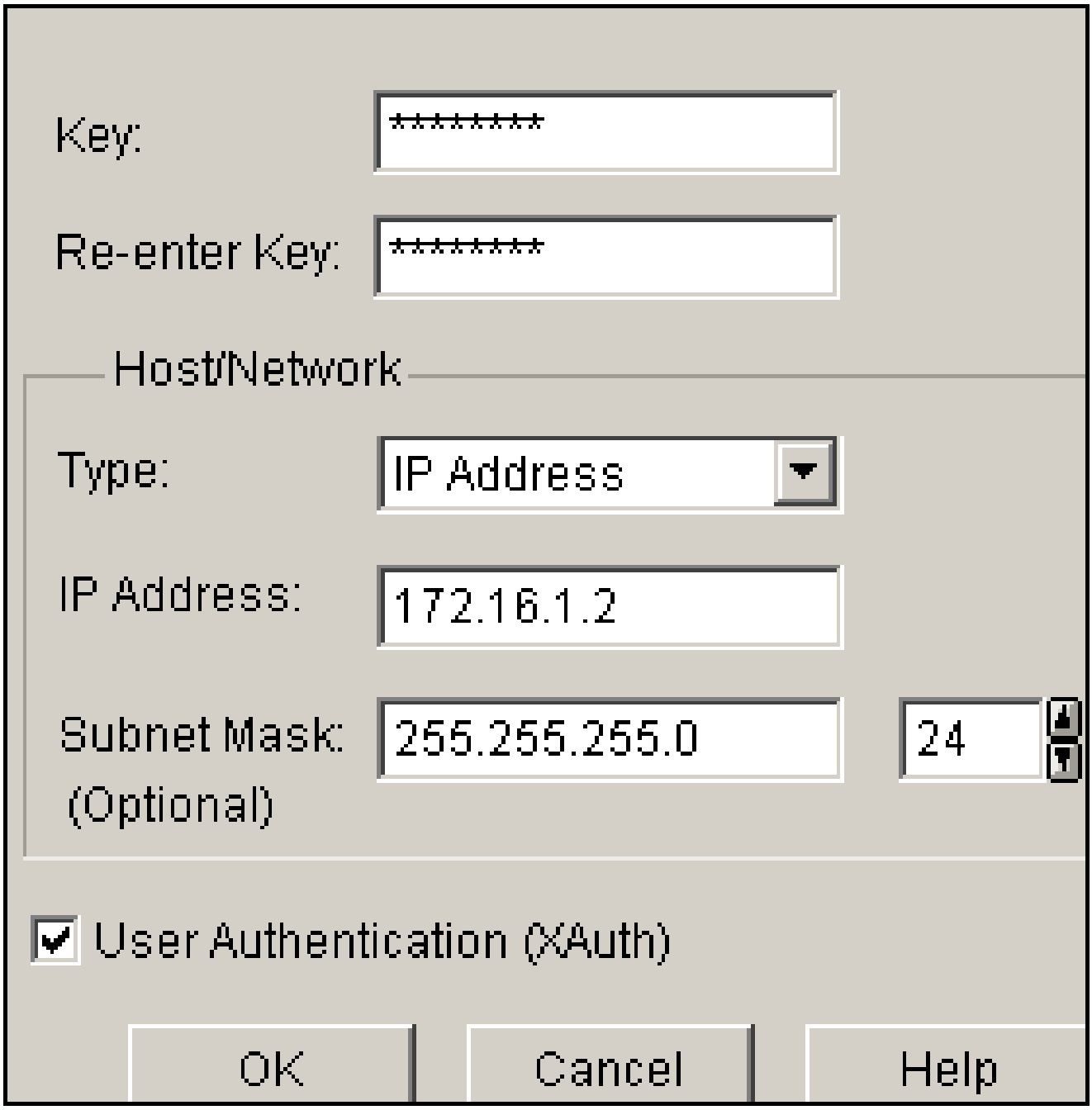


2. 按一下「OK」（確定）。

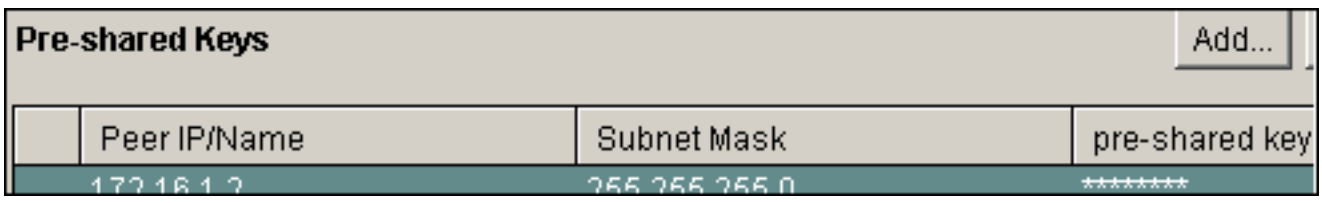
注意：以下是等效的CLI配置：

等效的CLI配置
crypto isakmp policy 10 encr des hash md5 authentication pre-share group1

3. 選擇Configure > VPN > VPN Components >IKE > Pre-shared Keys > Add以使用對等IP地址設定預共用金鑰值。



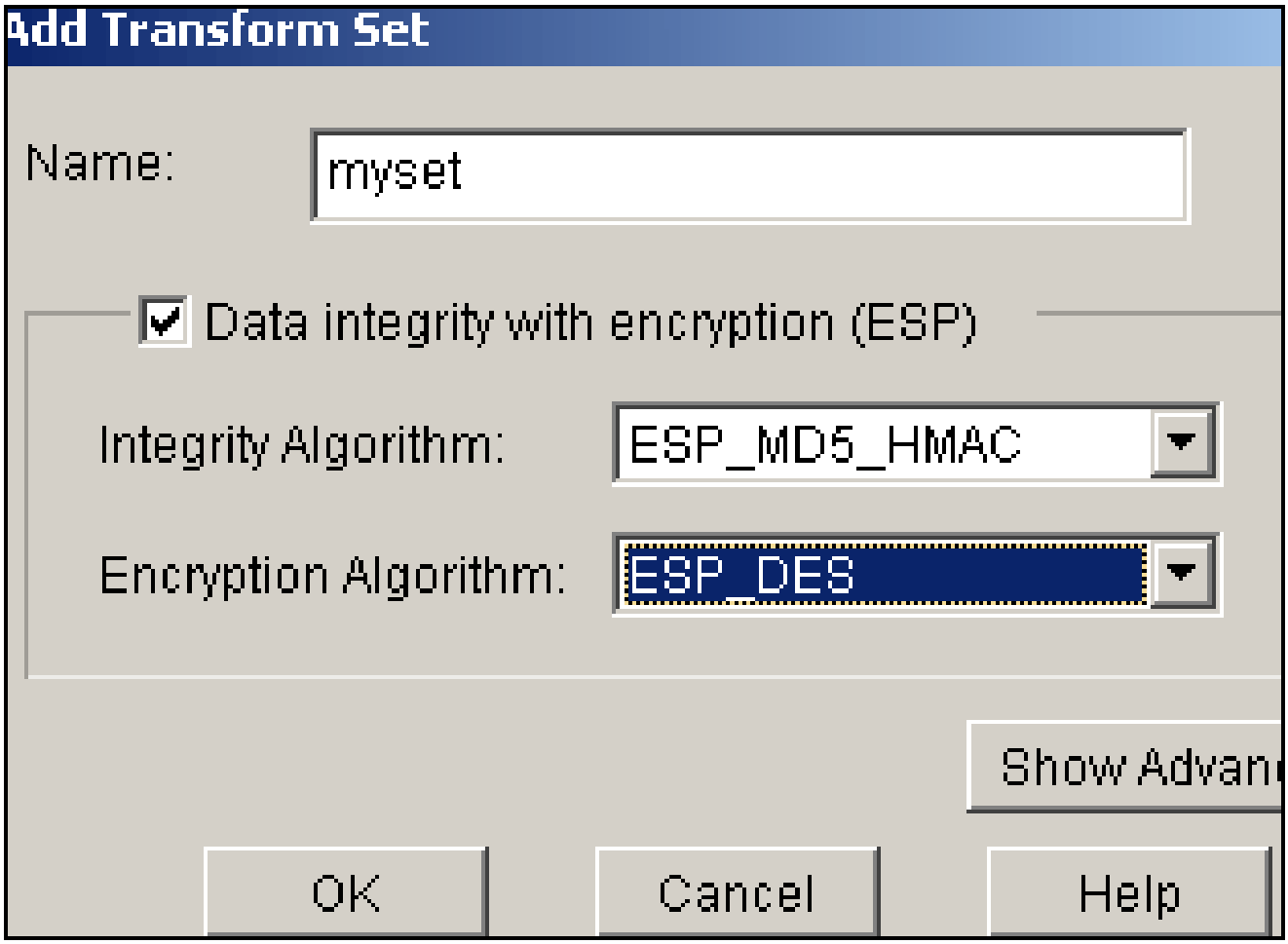
4. 按一下「OK」（確定）。



注意：以下是等效的CLI配置：

等效的CLI配置
crypto isakmp key 6 L2L12345 address 172.16.1.2 255.255.255.0

5. 選擇Configure > VPN > VPN Components > IPSec > Transform Sets > Add以建立轉換集myset，如下圖所示。



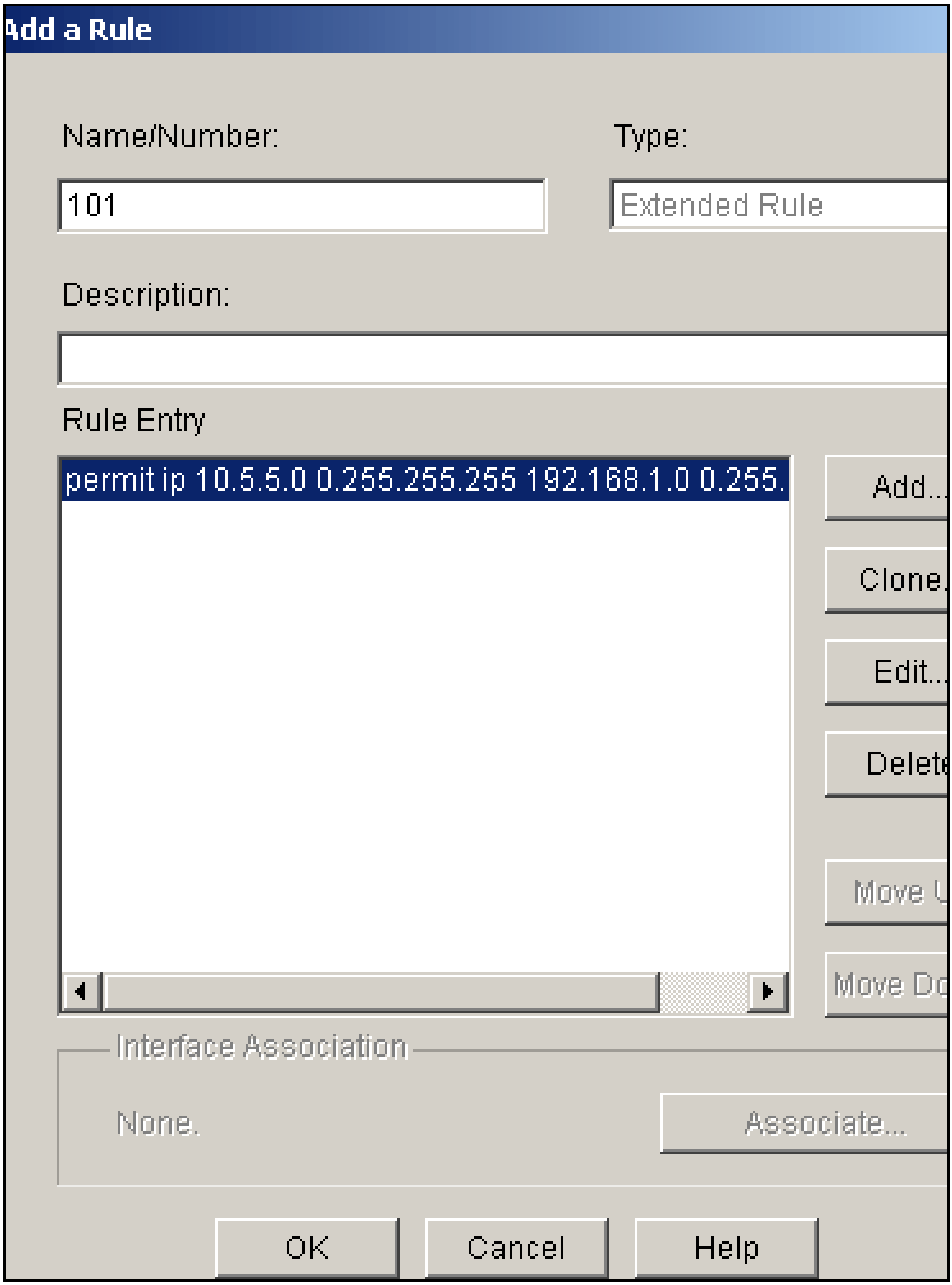
6. 按一下「OK」（確定）。

注意：以下是等效的CLI配置：

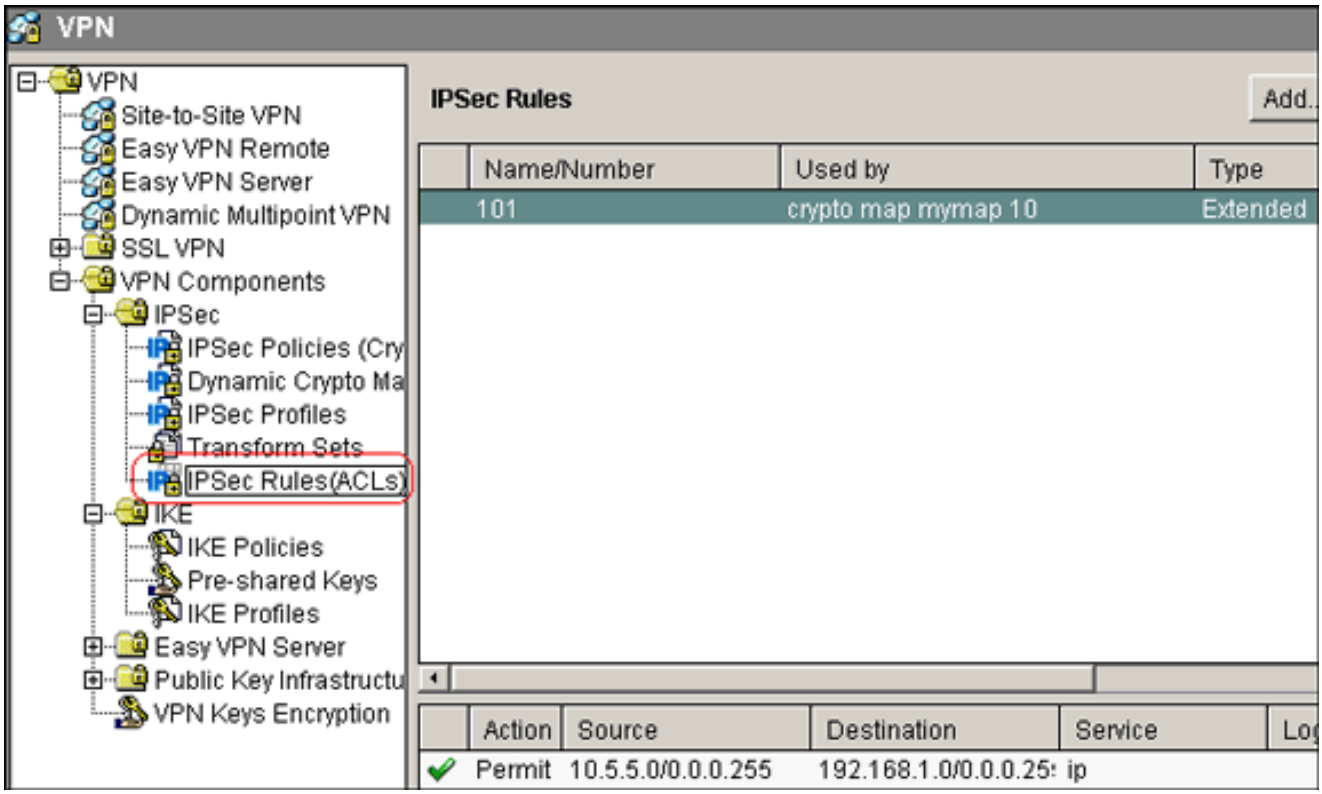
等效的CLI配置
`crypto ipsec transform-set myset esp-des esp-md5-hmac`

7. 選擇Configure > VPN > VPN Components > IPSec > IPSec Rules(ACLs)> Add以建立加密訪

問控制清單(ACL)101。



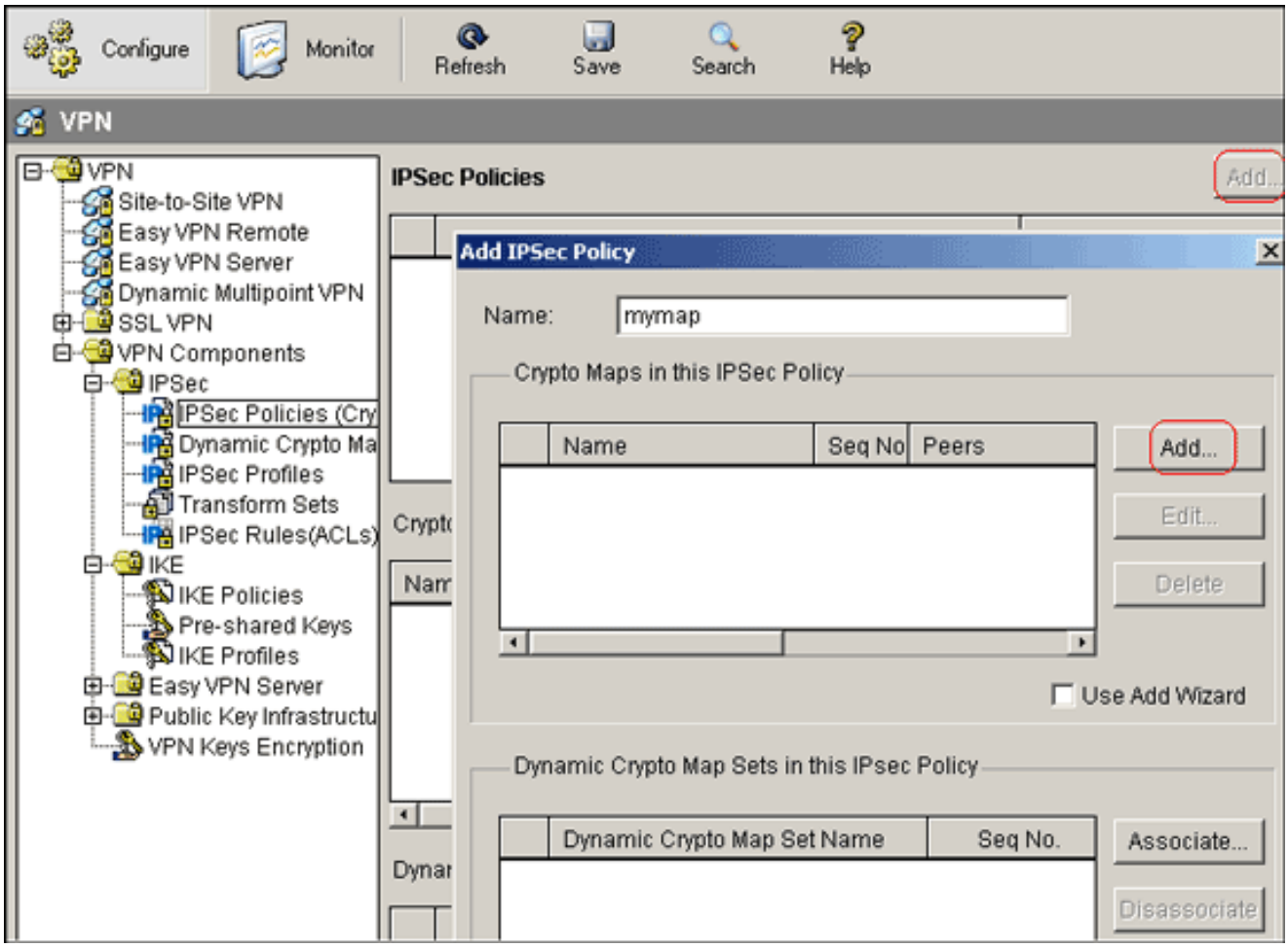
8. 按一下「OK」（確定）。



注意：以下是等效的CLI配置：

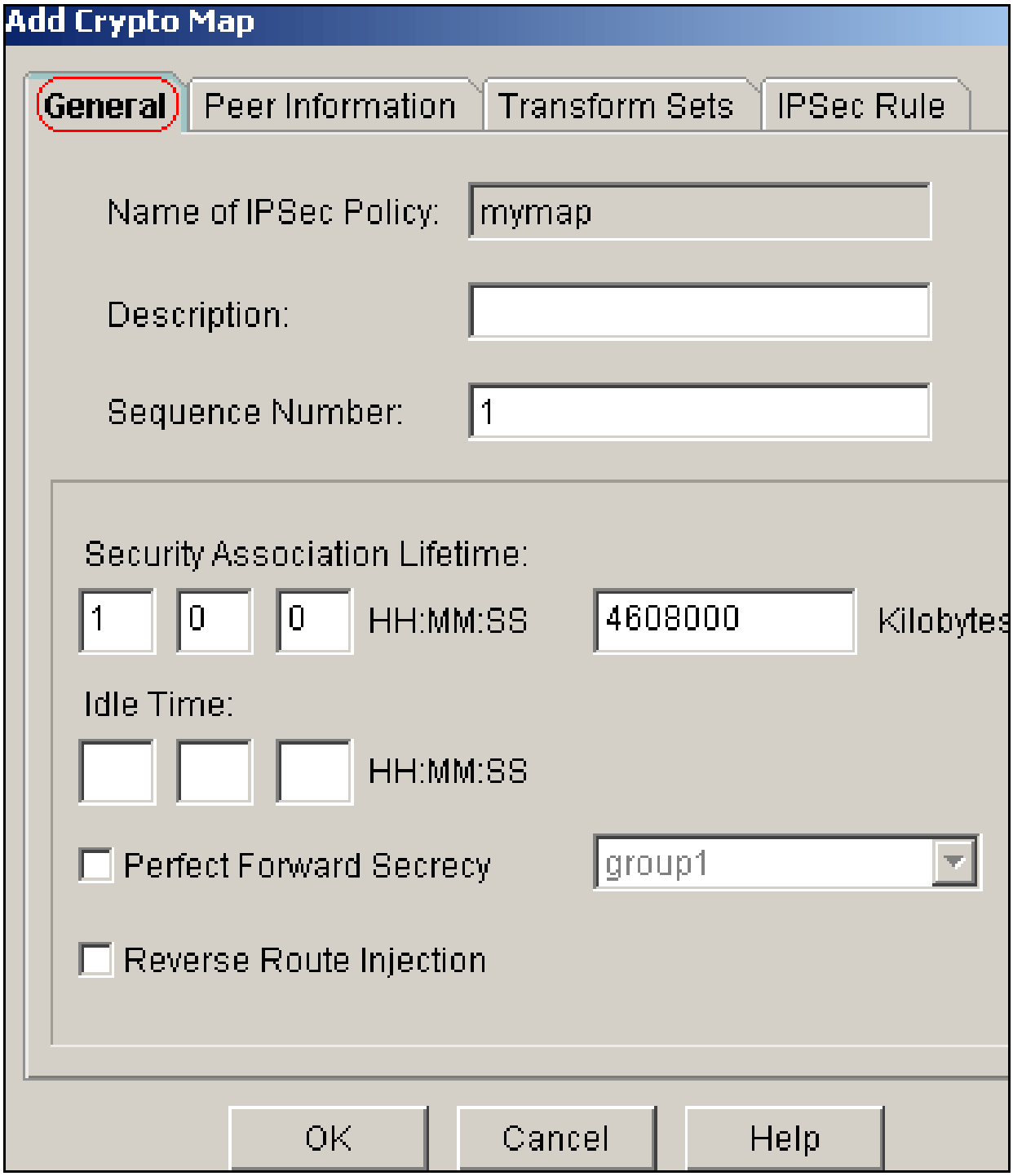
等效的CLI配置
`access-list 101 permit ip 10.5.5.0 0.0.0.255 192.168.1.0 0.0.0.255`

9. 選擇Configure > VPN > VPN Components > IPSec > IPSec Policies > Add以建立加密對映mymap，如下圖所示。

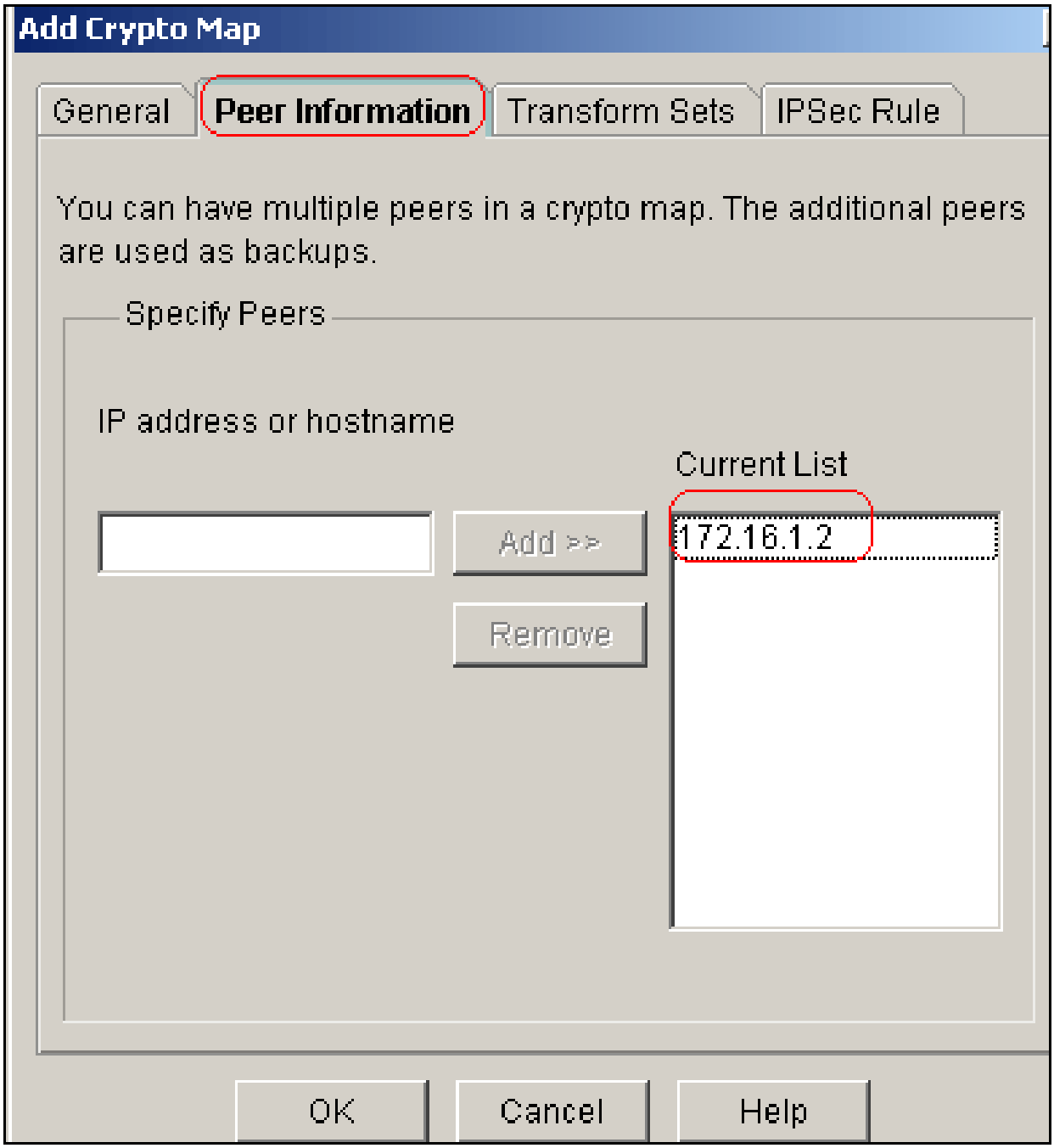


10. 按一下「Add」。

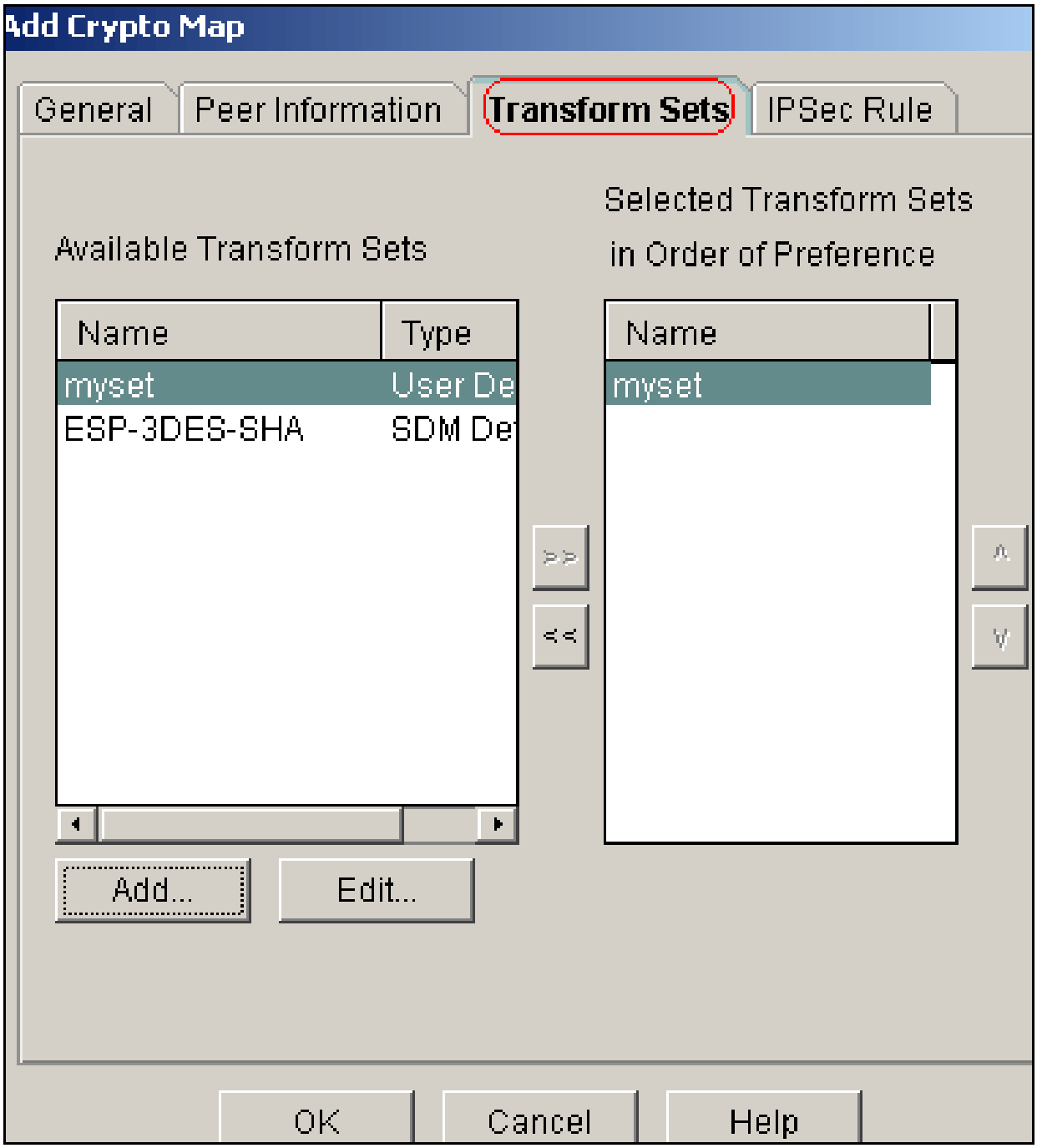
    a. 按一下General頁籤並保留預設設定。



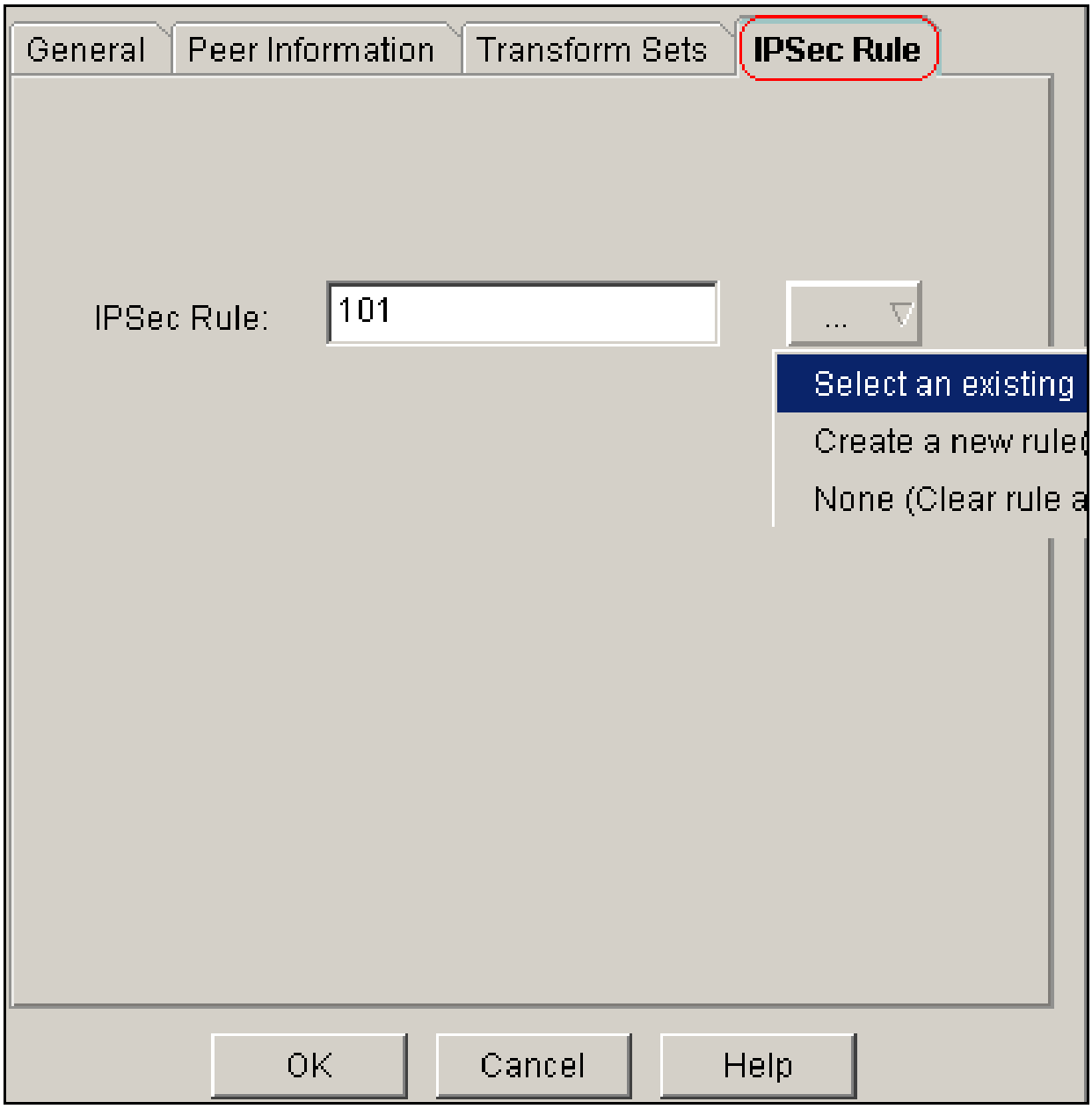
b. 按一下Peer Information頁籤以新增對等IP地址172.16.1.2。



c. 按一下Transform Sets頁籤以選擇所需的轉換集myset。



d. 按一下IPSec Rule頁籤以選擇現有加密ACL 101。

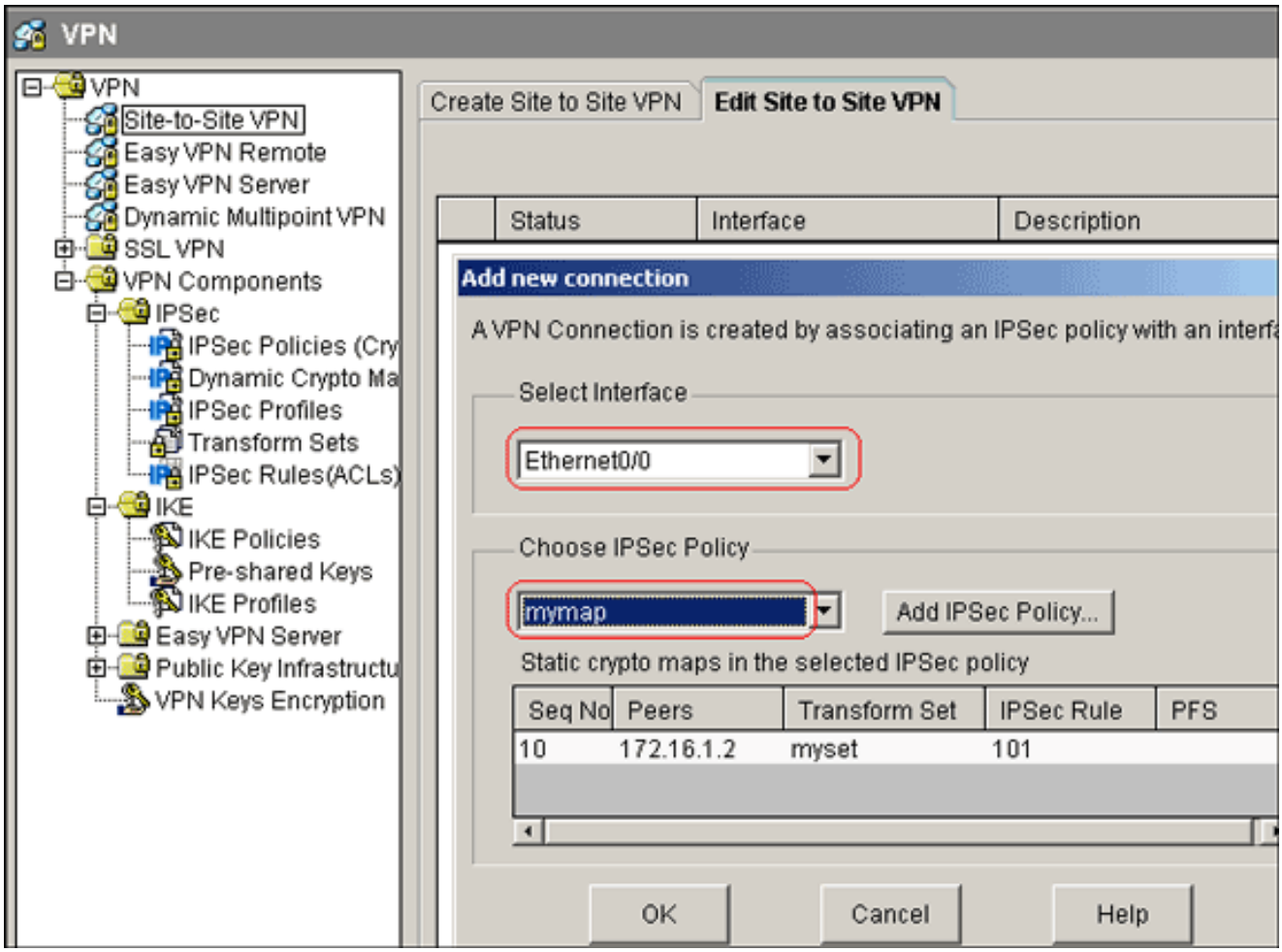


e. 按一下「OK」（確定）。

注意：以下是等效的CLI配置：

等效的CLI配置
crypto map mymap 10 ipsec-isakmp set peer 172.16.1.2 set transform-set myset match address 101

11. 選擇Configure > VPN > Site-to-Site VPN > Edit Site-to-Site VPN > Add，將加密對映mymap應用到介面Ethernet0/0。



12. 按一下「OK」（確定）。

注意：以下是等效的CLI配置：

等效的CLI配置
interface Ethernet0/0 crypto map mymap

Site_A路由器CLI配置

```
<#root>

Site_A#

show running-config

*Sep 25 21:15:58.954: %SYS-5-CONFIG_I: Configured from console by console
Building configuration...
```

```
Current configuration : 1545 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Site_A
!
boot-start-marker
boot-end-marker
!
!
no aaa new-model
!
resource policy
!
!
!
ip cef
!
!
crypto isakmp policy 10
 hash md5
 authentication pre-share

!--- Defines ISAKMP policy.


crypto isakmp key 6 L2L12345 address 172.16.1.2 255.255.255.0


!--- Defines pre-shared secret used for IKE authentication

!
!
crypto ipsec transform-set myset esp-des esp-md5-hmac


!--- Defines IPSec encryption and authentication algorithms.

!
crypto map mymap 10 ipsec-isakmp
 set peer 172.16.1.2
 set transform-set myset
 match address 101


!--- Defines crypto map.

!
!
!
!
interface Loopback0
 ip address 192.168.1.1 255.255.255.0
```

```
ip nat inside

 ip virtual-reassembly
!
interface Ethernet0/0
 ip address 10.1.1.2 255.255.255.0


ip nat outside

 ip virtual-reassembly
 half-duplex


crypto map mymap


!--- Apply crypto map on the outside interface.

!
!

!--- Output Suppressed

!
ip http server
no ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 10.1.1.1

!

ip nat inside source static network 192.168.1.0 10.5.5.0 /24



!--- Static translation defined to translate Private_LAN1 !--- from 192.168.1.0/24 to 10.5.5.0/24. !---



ip nat outside source static network 192.168.1.0 10.10.10.0 /24



!--- Static translation defined to translate Private_LAN2 !--- from 192.168.1.0/24 to 10.10.10.0/24.

!

access-list 101 permit ip 10.5.5.0 0.0.0.255 192.168.1.0 0.0.0.255



!--- Defines IPSec interesting traffic. !--- Note that the host behind Site_A router communicates !---

!
!
control-plane
!
!
line con 0
line aux 0
line vty 0 4
!
!
```

```
end
Site_A#
```

Site_B路由器CLI配置

Site_B路由器

```
<#root>

Site_B#

show running_config

Building configuration...

Current configuration : 939 bytes
!
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Site_B
!
!
ip subnet-zero
!
!

crypto isakmp policy 10
 hash md5
 authentication pre-share

crypto isakmp key L2L12345 address 10.1.1.2 255.255.255.0

!
!

crypto ipsec transform-set myset esp-des esp-md5-hmac

!

crypto map mymap 10 ipsec-isakmp
 set peer 10.1.1.2
 set transform-set myset
 match address 101

!
!
!
!
interface Ethernet0
 ip address 192.168.1.1 255.255.255.0
!
interface Ethernet1
 ip address 172.16.1.2 255.255.255.0


crypto map mymap
```

```
!

!--- Output Suppressed

!
ip classless
ip route 0.0.0.0 0.0.0.0 172.16.1.1

ip http server
!
access-list 101 permit ip 192.168.1.0 0.0.0.255 10.5.5.0 0.0.0.255

!
line con 0
line aux 0
line vty 0 4
!
end

Site_B#
```

驗證

本節提供的資訊可用於確認您的組態是否正常運作。

輸出直譯器工具(僅供已註冊客戶使用)(OIT)支援某些show命令。使用OIT檢視show命令輸出的分析。

- show crypto isakmp sa — 顯示對等體上的所有當前網際網路金鑰交換(IKE)安全關聯(SA)。

```
<#root>

Site_A#

show crypto isakmp sa

dst             src             state          conn-id slot status
172.16.1.2      10.1.1.2        QM_IDLE              1    0 ACTIVE
```

- show crypto isakmp sa detail — 顯示對等體上所有當前IKE SA的詳細資訊。

```
<#root>

Site_A#

show cryto isakmp sa detail

Codes: C - IKE configuration mode, D - Dead Peer Detection
       K - Keepalives, N - NAT-traversal
       X - IKE Extended Authentication
       psk - Preshared key, rsig - RSA signature
```

```
       renc - RSA encryption

C-id  Local           Remote          I-VRF    Status Encr Hash Auth DH Lifetime
 Cap.
1     10.1.1.2        172.16.1.2              ACTIVE des  md5  psk  1  23:59:42

       Connection-id:Engine-id =  1:1(software)
```

- show crypto ipsec sa — 顯示當前SA使用的設定。

```
<#root>

Site_A#

show crypto ipsec sa


interface: Ethernet0/0
    Crypto map tag: mymap, local addr 10.1.1.2

   protected vrf: (none)
   local  ident (addr/mask/prot/port): (10.5.5.0/255.255.255.0/0/0)
   remote ident (addr/mask/prot/port): (192.168.1.0/255.255.255.0/0/0)
   current_peer 172.16.1.2 port 500
     PERMIT, flags={origin_is_acl,}
    #pkts encaps: 2, #pkts encrypt: 2, #pkts digest: 2
    #pkts decaps: 2, #pkts decrypt: 2, #pkts verify: 2
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0
    #pkts not decompressed: 0, #pkts decompress failed: 0
    #send errors 3, #recv errors 0

     local crypto endpt.: 10.1.1.2, remote crypto endpt.: 172.16.1.2
     path mtu 1500, ip mtu 1500, ip mtu idb Ethernet0/0
     current outbound spi: 0x1A9CDC0A(446487562)

     inbound esp sas:
      spi: 0x99C7BA58(2580003416)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Tunnel, }
        conn id: 2002, flow_id: SW:2, crypto map: mymap
        sa timing: remaining key lifetime (k/sec): (4478520/3336)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE

     inbound ah sas:

     inbound pcp sas:

     outbound esp sas:
      spi: 0x1A9CDC0A(446487562)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Tunnel, }
        conn id: 2001, flow_id: SW:1, crypto map: mymap
        sa timing: remaining key lifetime (k/sec): (4478520/3335)
        IV size: 8 bytes
        replay detection support: Y
```

```
        Status: ACTIVE

     outbound ah sas:

     outbound pcp sas:
Site_A#
```

- show ip nat translations — 顯示轉換插槽資訊。

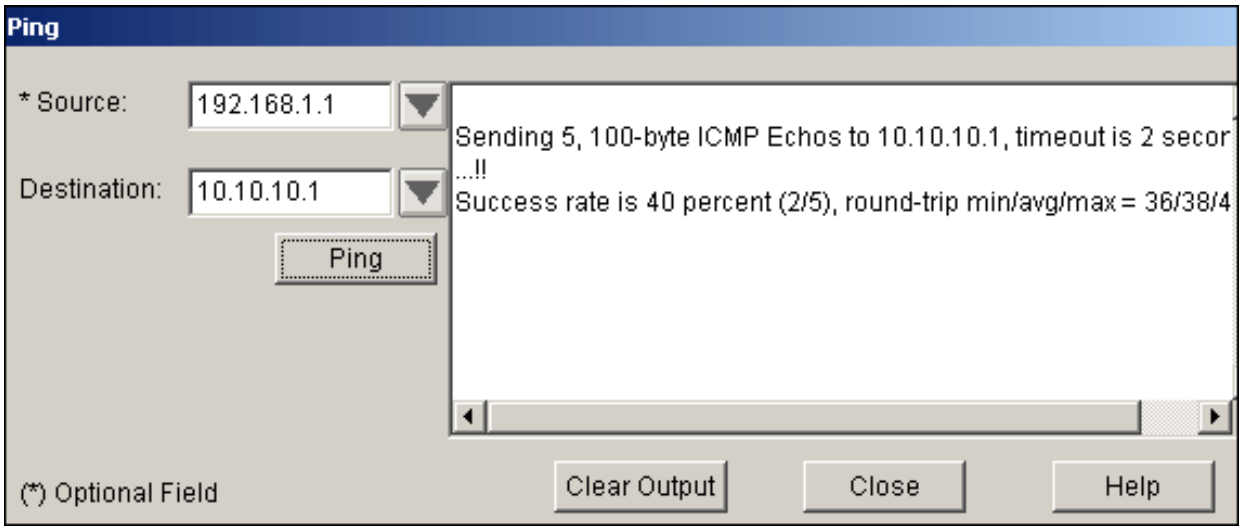
```
<#root>

Site_A#

show ip nat translations

Pro Inside global      Inside local       Outside local      Outside global
--- ---                ---                10.10.10.1         192.168.1.1
--- ---                ---                10.10.10.0         192.168.1.0
--- 10.5.5.1           192.168.1.1        ---                ---
--- 10.5.5.0           192.168.1.0        ---                ---
```

- show ip nat statistics — 顯示有關轉換的靜態資訊。

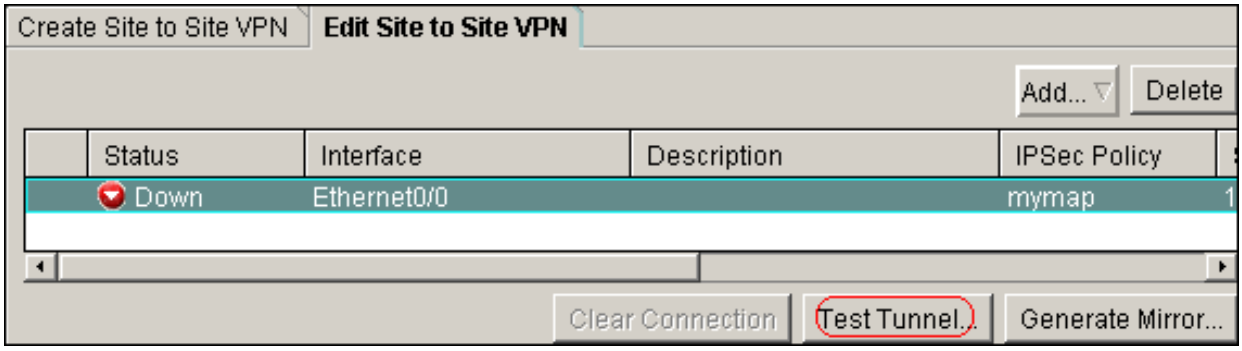
```
<#root>

Site_A#

show ip nat statistics

Total active translations: 4 (2 static, 2 dynamic; 0 extended)
Outside interfaces:
  Ethernet0/0
Inside interfaces:
  Loopback0
Hits: 42  Misses: 2
CEF Translated packets: 13, CEF Punted packets: 0
Expired translations: 7
Dynamic mappings:
Queued Packets: 0
Site_A#
```

- 完成以下步驟以驗證連線：

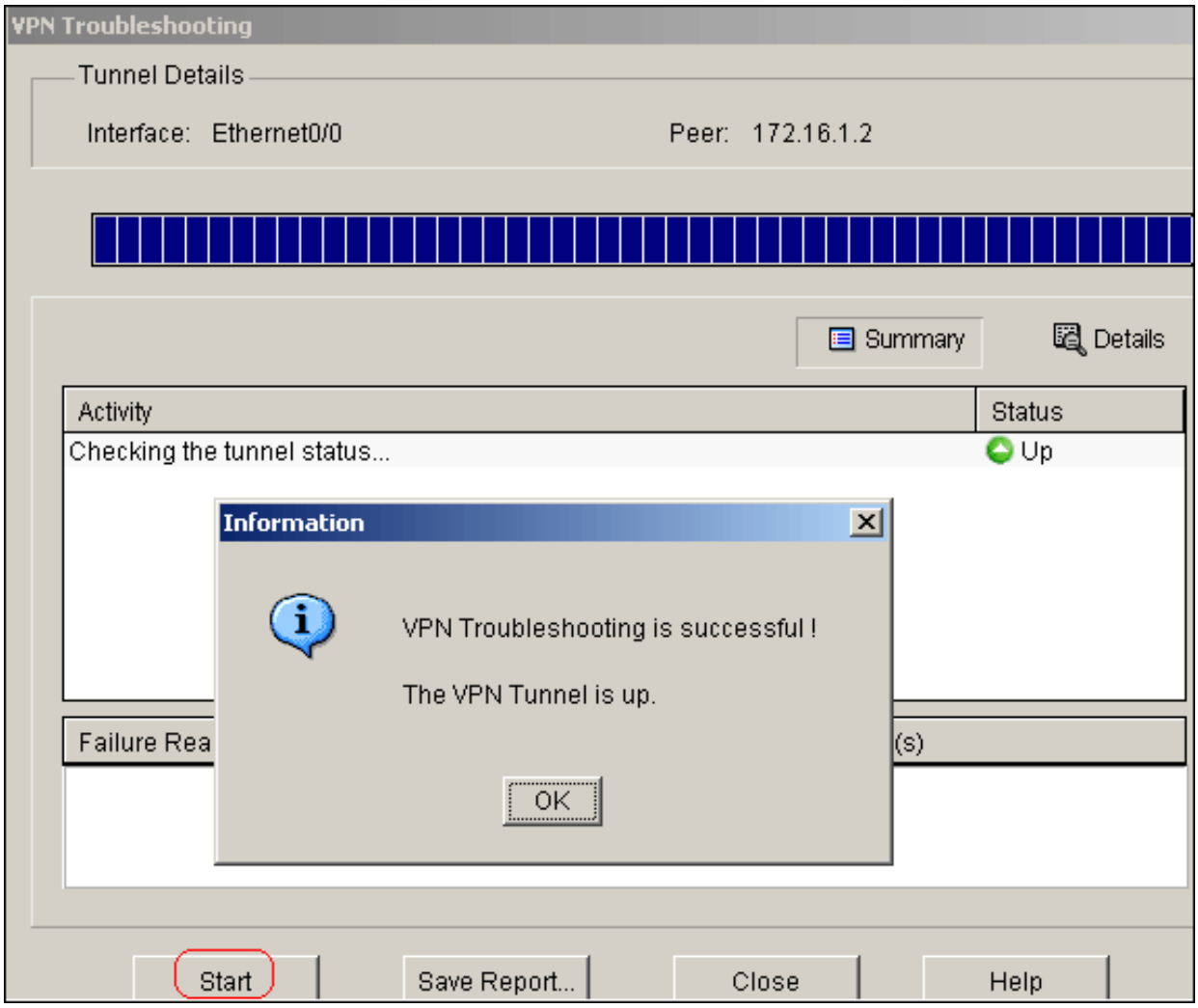
1. 在SDM中，選擇Tools > Ping以建立來源IP為192.168.1.1、目的地IP為10.10.10的IPsec VPN通道。



2. 按一下Test Tunnel以檢查是否已建立IPsec VPN通道，如下圖所示。



3. 按一下「Start」。



疑難排解

本節提供的資訊可用於對組態進行疑難排解。

<#root>

```
Site_A#

debug ip packet

IP packet debugging is on
Site_A#ping
Protocol [ip]:
Target IP address: 10.10.10.1
Repeat count [5]:
Datagram size [100]:
Timeout in seconds [2]:
Extended commands [n]: y
Source address or interface: 192.168.1.1
Type of service [0]:
Set DF bit in IP header? [no]:
Validate reply data? [no]:
Data pattern [0xABCD]:
Loose, Strict, Record, Timestamp, Verbose[none]:
Sweep range of sizes [n]:
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 10.10.10.1, timeout is 2 seconds:
Packet sent with a source address of 192.168.1.1
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 40/45/52 ms
Site_A#
*Sep 30 18:08:10.601: IP: tableid=0, s=192.168.1.1 (local), d=10.10.10.1 (Ethern
et0/0), routed via FIB
*Sep 30 18:08:10.601: IP: s=192.168.1.1 (local), d=10.10.10.1 (Ethernet0/0), len
 100, sending
*Sep 30 18:08:10.641: IP: tableid=0, s=10.10.10.1 (Ethernet0/0), d=192.168.1.1 (
Loopback0), routed via RIB
*Sep 30 18:08:10.641: IP: s=10.10.10.1 (Ethernet0/0), d=192.168.1.1, len 100, rc
vd 4
*Sep 30 18:08:10.645: IP: tableid=0, s=192.168.1.1 (local), d=10.10.10.1 (Ethern
et0/0), routed via FIB
*Sep 30 18:08:10.645: IP: s=192.168.1.1 (local), d=10.10.10.1 (Ethernet0/0), len
 100, sending
*Sep 30 18:08:10.685: IP: tableid=0, s=10.10.10.1 (Ethernet0/0), d=192.168.1.1 (
Loopback0), routed via RIB
*Sep 30 18:08:10.685: IP: s=10.10.10.1 (Ethernet0/0), d=192.168.1.1, len 100, rc
vd 4
*Sep 30 18:08:10.685: IP: tableid=0, s=192.168.1.1 (local), d=10.10.10.1 (Ethern
et0/0), routed via FIB
*Sep 30 18:08:10.689: IP: s=192.168.1.1 (local), d=10.10.10.1 (Ethernet0/0), len
 100, sending
*Sep 30 18:08:10.729: IP: tableid=0, s=10.10.10.1 (Ethernet0/0), d=192.168.1.1 (
Loopback0), routed via RIB
*Sep 30 18:08:10.729: IP: s=10.10.10.1 (Ethernet0/0), d=192.168.1.1, len 100, rc
vd 4
*Sep 30 18:08:10.729: IP: tableid=0, s=192.168.1.1 (local), d=10.10.10.1 (Ethern
et0/0), routed via FIB
*Sep 30 18:08:10.729: IP: s=192.168.1.1 (local), d=10.10.10.1 (Ethernet0/0), len
 100, sending
*Sep 30 18:08:10.769: IP: tableid=0, s=10.10.10.1 (Ethernet0/0), d=192.168.1.1 (
Loopback0), routed via RIB
*Sep 30 18:08:10.769: IP: s=10.10.10.1 (Ethernet0/0), d=192.168.1.1, len 100, rc
vd 4
*Sep 30 18:08:10.773: IP: tableid=0, s=192.168.1.1 (local), d=10.10.10.1 (Ethern
et0/0), routed via FIB
*Sep 30 18:08:10.773: IP: s=192.168.1.1 (local), d=10.10.10.1 (Ethernet0/0), len
 100, sending
*Sep 30 18:08:10.813: IP: tableid=0, s=10.10.10.1 (Ethernet0/0), d=192.168.1.1 (
Loopback0), routed via RIB
*Sep 30 18:08:10.813: IP: s=10.10.10.1 (Ethernet0/0), d=192.168.1.1, len 100, rc
vd 4
```

相關資訊

- 最常見的L2L和遠端訪問IPSec VPN故障排除解決方案
- 具有重疊專用網路的ASA/PIX和Cisco VPN 3000集中器之間的IPSec配置示例
- 技術支援與文件 - Cisco Systems

關於此翻譯

思科已使用電腦和人工技術翻譯本文件，讓全世界的使用者能夠以自己的語言理解支援內容。請注意，即使是最佳機器翻譯，也不如專業譯者翻譯的內容準確。Cisco Systems, Inc. 對這些翻譯的準確度概不負責，並建議一律查看原始英文文件（提供連結）。