使用ASAv配置和驗證第2層服務圖配置

目錄

簡介

本檔案介紹如何在思科以應用程式為中心的基礎架構(ACI)中設定和驗證第2層服務圖組態。

必要條件

需求

思科建議您瞭解以下主題：

- 瞭解第3層服務圖在ACI中的工作方式
- 瞭解如何在ACI中配置終端策略組、橋接域和合約
- 瞭解如何將（自適應安全裝置虛擬）ASAv配置為透明防火牆

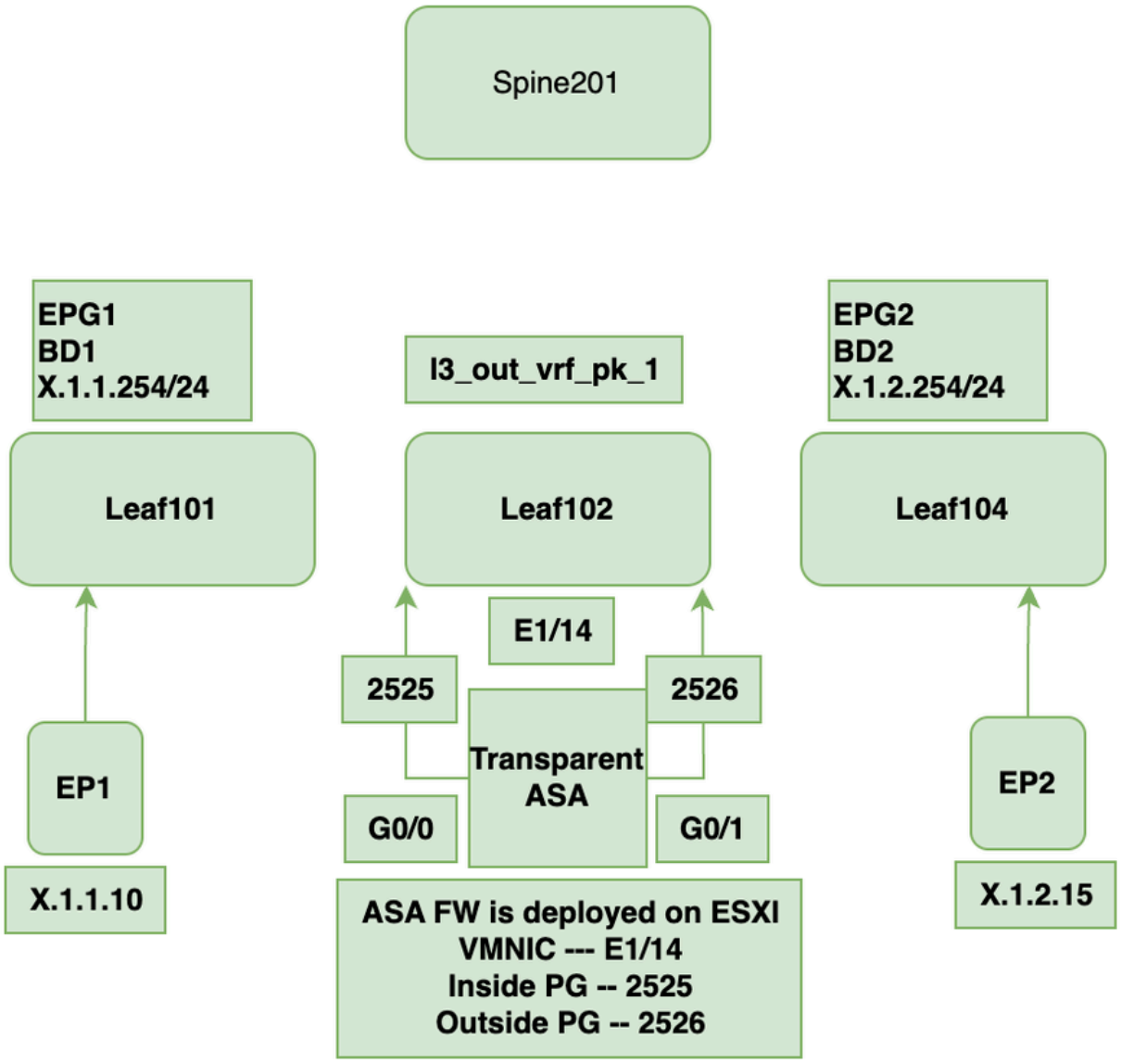
採用元件

本文中的資訊係根據以下軟體和硬體版本：

- APIC版本:6.0(3g)
- 枝葉H/W:N9K-C93180YC-FX
- 枝葉軟體：n9000-16.0(3g)
- 枝葉節點101、102、103
- 在ESXi伺服器上部署的ASAv

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。如果您的網路運作中，請確保您瞭解任何指令可能造成的影響。

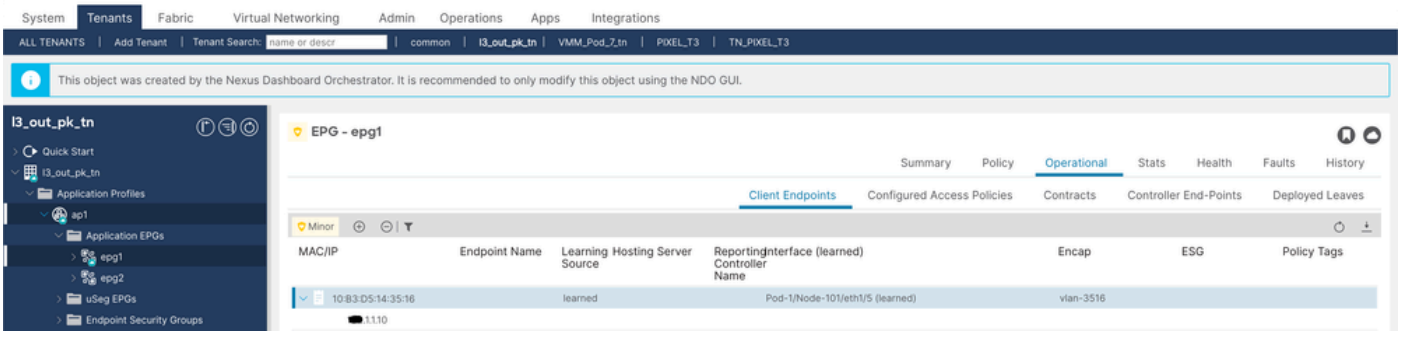
拓撲



拓撲

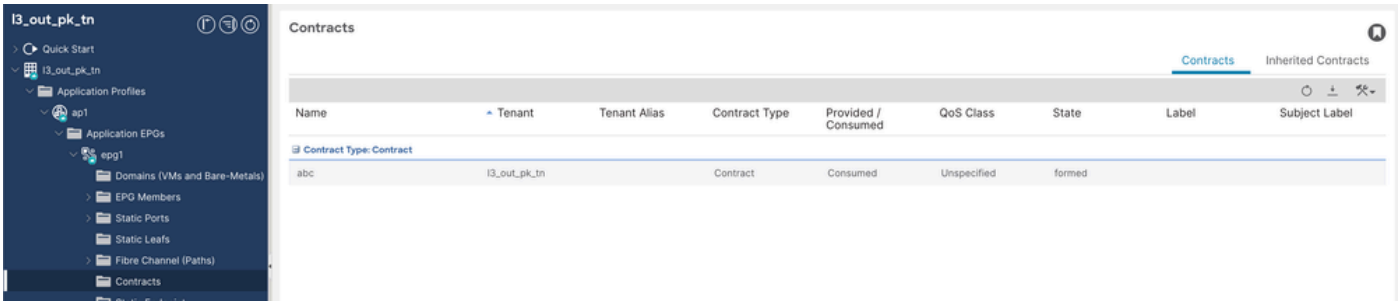
本文檔中未顯示EPG1和EPG2配置，必須在手動配置之前配置該配置，並且必須學習終結點。

1.驗證EPG1已獲ş知端點X.1.1.10（節點101）。



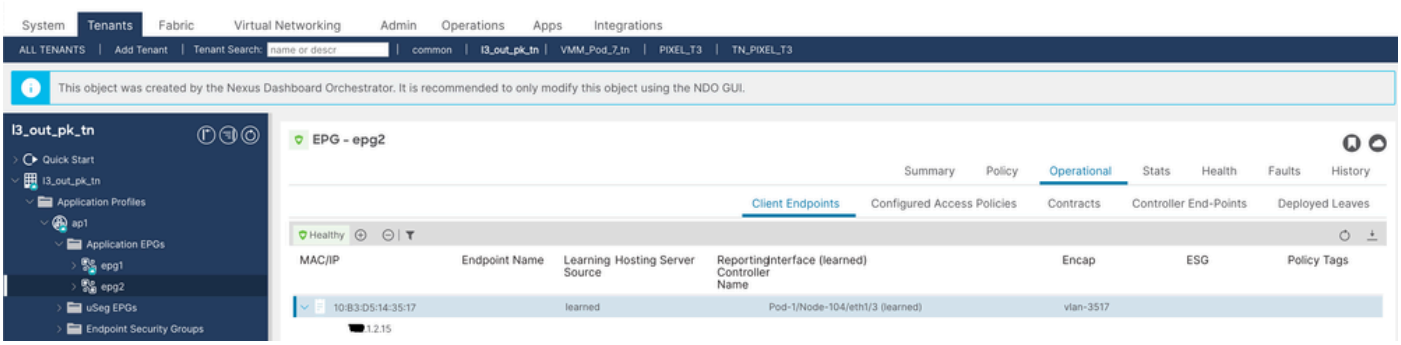
客戶端端點

2.合約abc由EPG1使用。



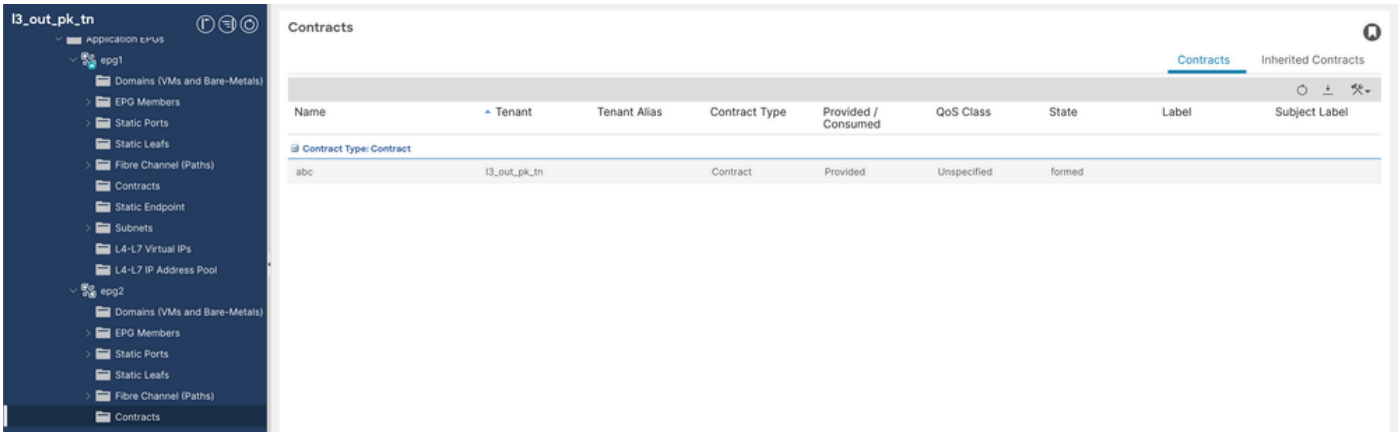
已消耗的合約

3.驗證EPG2具有終結點X.1.2.15已學習（節點104）。



客戶端終結點

4.合約abc由EPG2提供。



提供的合約

為什麼ACI中需要L2服務圖？

- 在Cisco ACI中，L4-L7服務裝置可插入第3層(L3)、第2層(L2)或第1層(L1)。
- 第3層服務插入：外部裝置(例如防火牆、入侵防禦系統(IPS))根據IP地址制定路由決策並轉發流量。

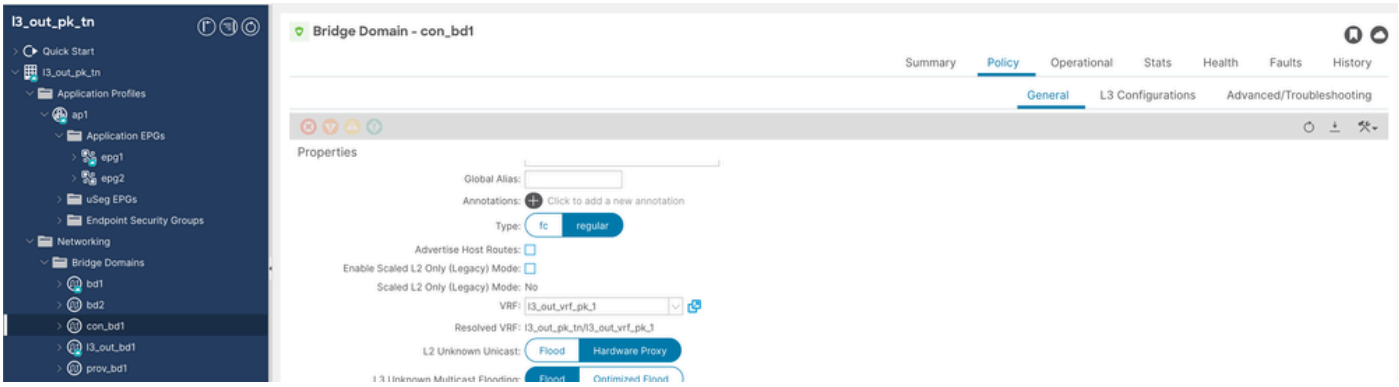
- 第2層服務插入：根據MAC地址轉發流量，無需路由參與。這對於透明防火牆或IPS裝置非常有用。
- 在ACI中插入L2服務裝置（例如IPS或透明防火牆）時，會使用L2基於策略的路由(PBR)。
- 第3層和第2層PBR的流量轉發機制保持不變。
- 關鍵區別在於：
  - L3 PBR:流量被重定向到IP地址（裝置參與路由）。
  - L2 PBR:流量被重定向到MAC地址（裝置在第2層運行）。
- 在第2層PBR中，MAC地址被靜態繫結到枝葉介面，以確保正確的流量轉發。

有關主用/備用或主用/主用L1/L2 PBR使用案例的詳細資訊，請參閱PBR白皮書。

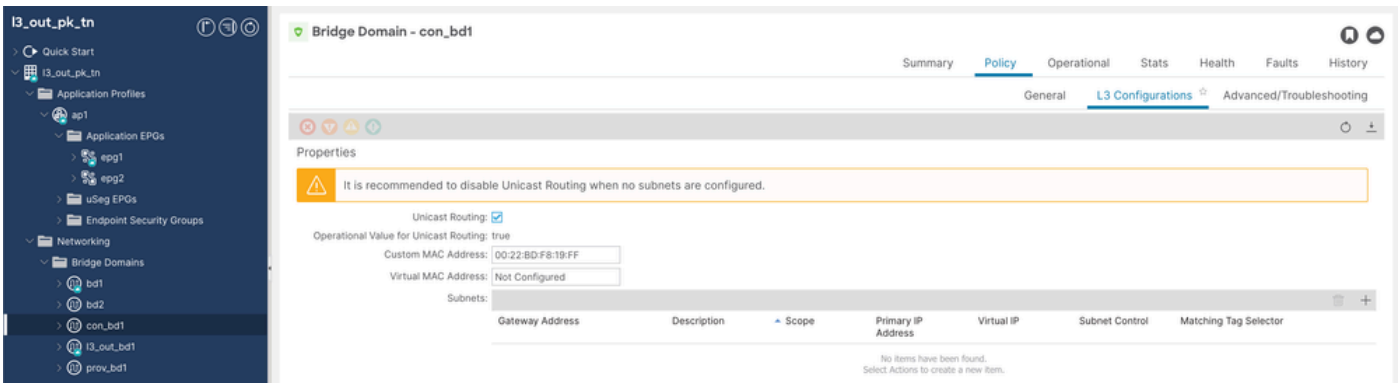
L2服務圖的配置

步驟1.配置名為con-bd1的使用者bd。

必須啟用單播路由，L2未知單播必須設定為硬體代理，並且con和prov網橋域(BD)不需要子網。

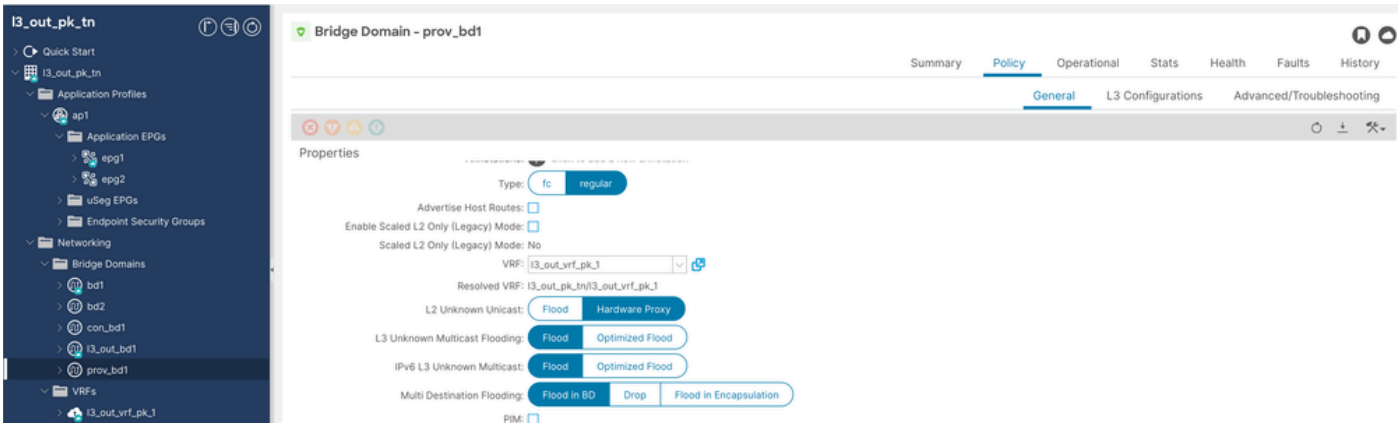


Cons BD配置

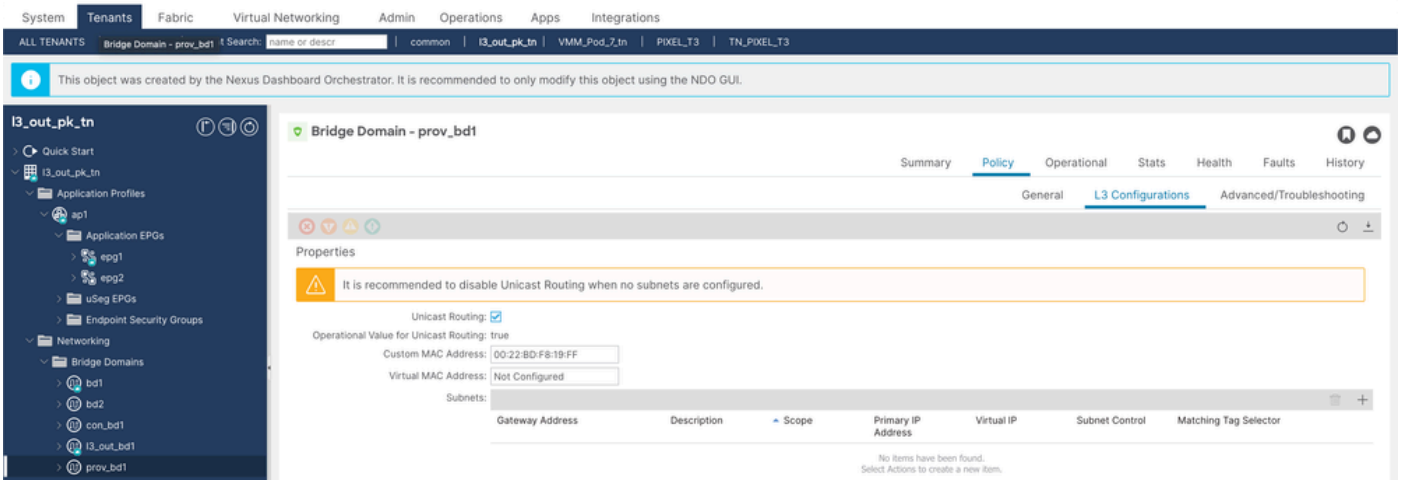


Cons BD配置2

步驟2.配置名為prov-bd1的提供程式bd。



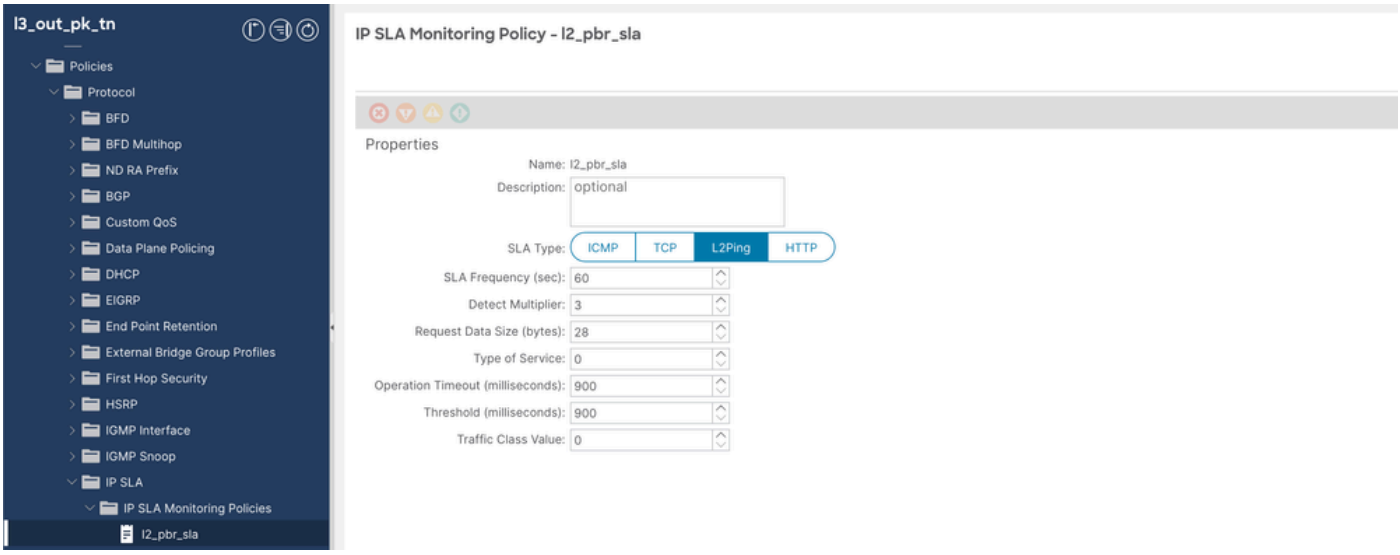
Prov BD配置



Prov BD Config 2

步驟3.使用SLA型別L2Ping配置IP服務級別協定(SLA)策略。

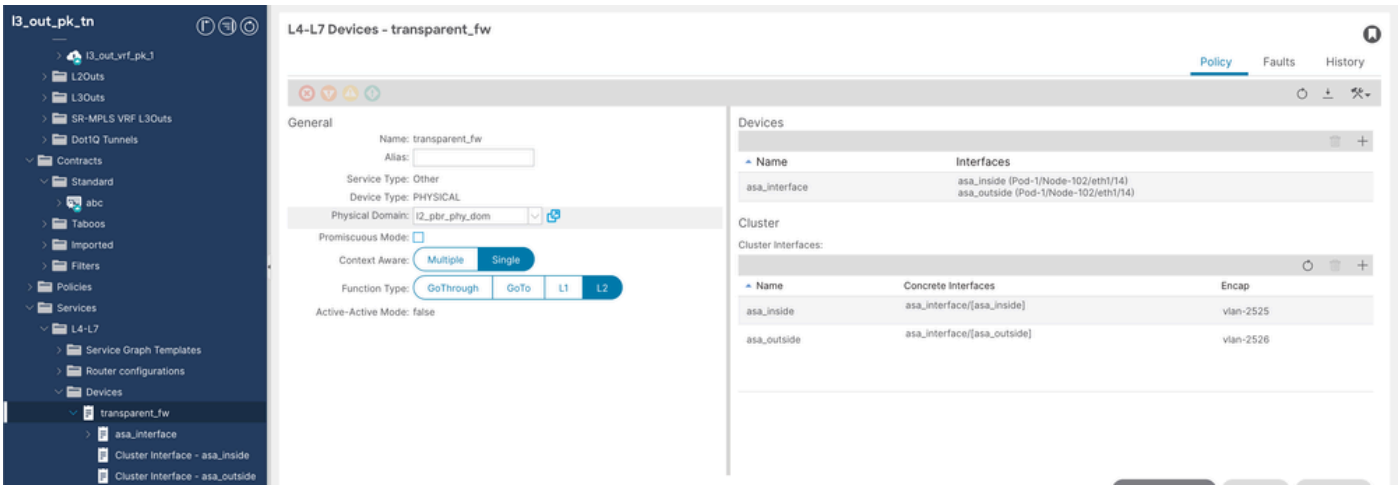
導航到Tenant > Policies > Protocol > IP SLA > IP SLA Monitoring Policies，然後按一下右鍵並建立策略。



IP SLA策略

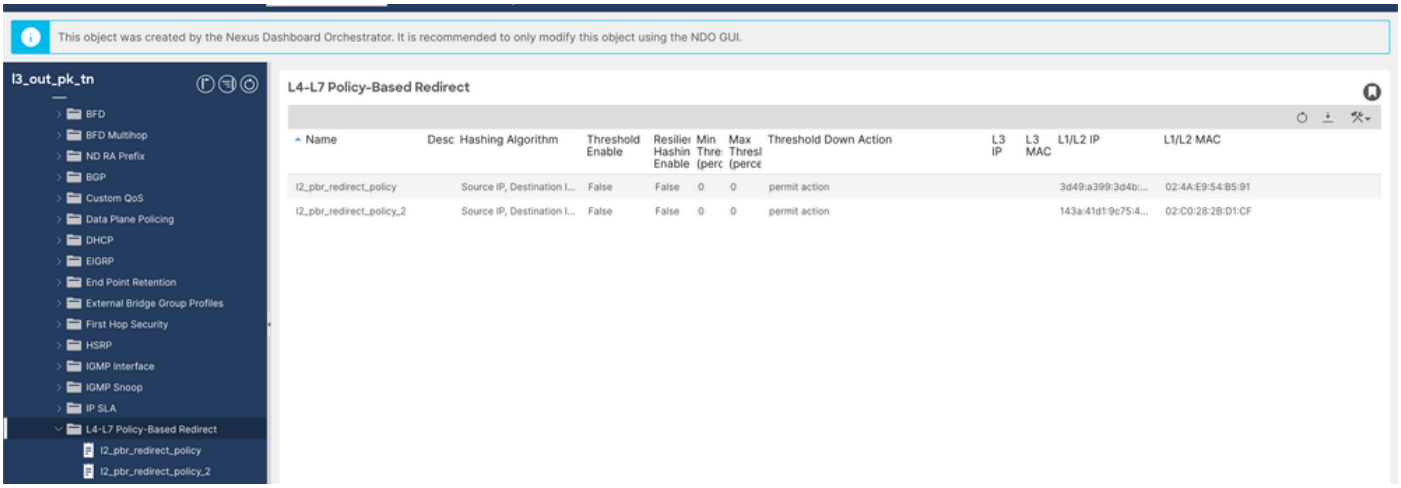
步驟4.配置第4/7層裝置。

導航到Tenant > Services > Devices，然後按一下右鍵並建立L4-L7裝置。



L4-L7裝置

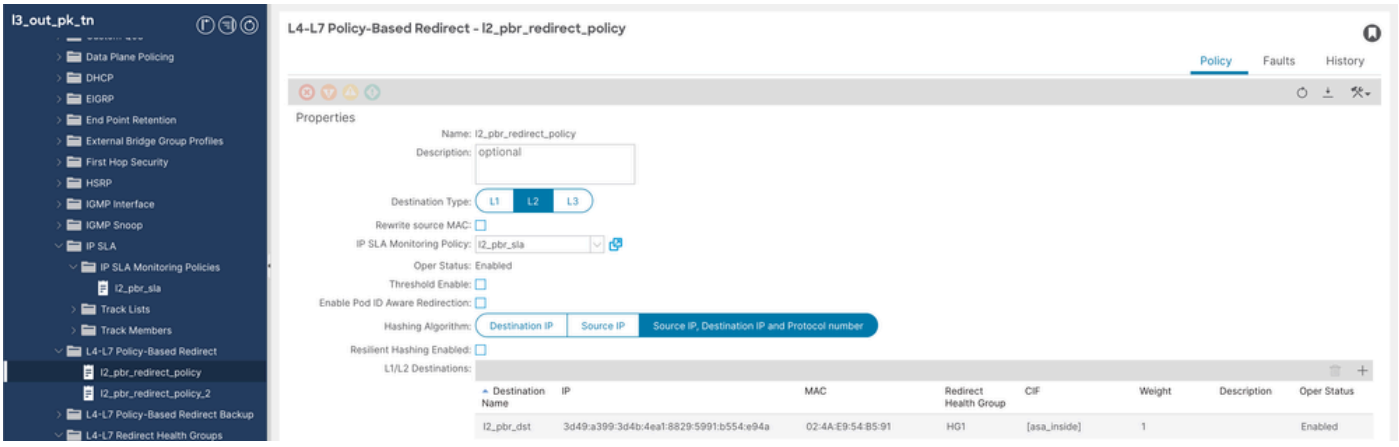
步驟5.驗證基於策略的重定向概述（配置5a和5b後可檢查這一點）。



L4-L7重定向策略

步驟5.1.為自適應安全裝置(ASA)內部介面配置基於L4-L7策略的重定向策略（無需指定MAC或IP，由APIC自身填充）。

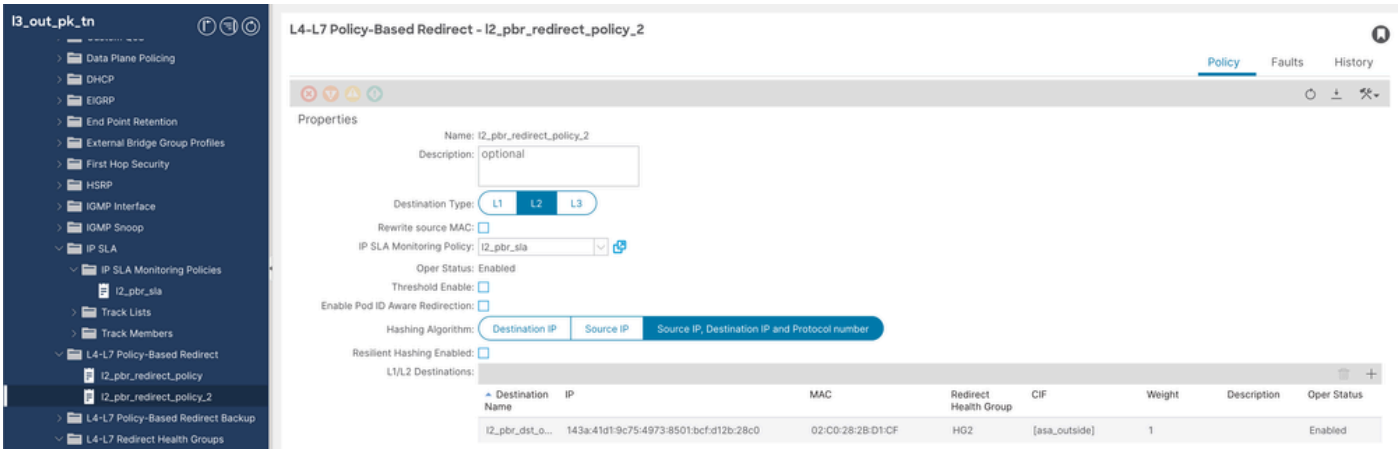
導航到Tenant > Policies > Protocol > L4-L7 Policy based redirect，然後按一下右鍵並創建策略。



L4-L7重定向策略配置

步驟5.2.為ASA外部介面配置基於L4-L7策略的重定向策略（無需指定MAC或IP，由APIC自身填充）。

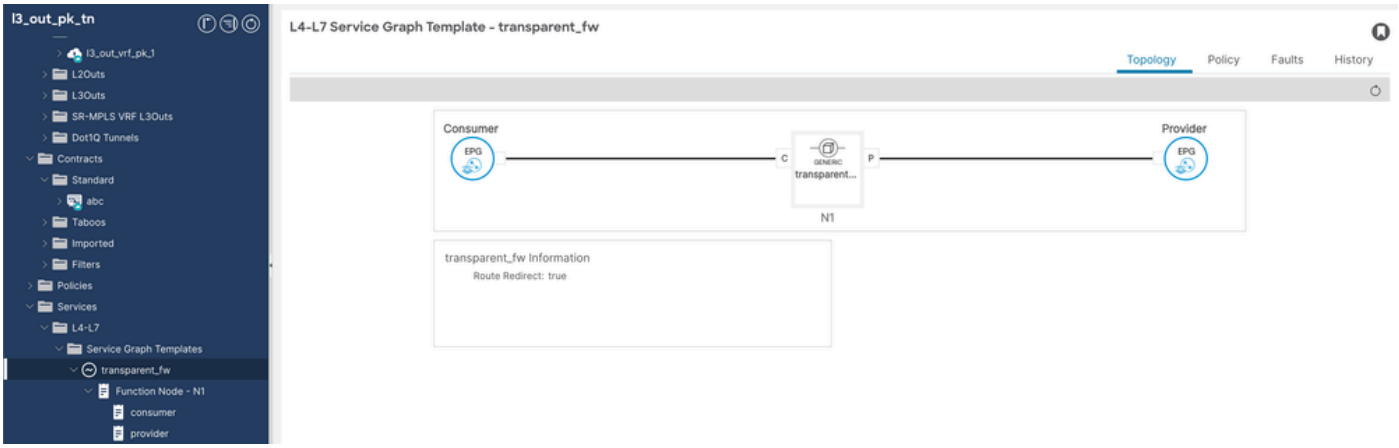
導航到Tenant > Policies > Protocol > L4-L7 Policy based redirect，然後按一下右鍵並創建策略。



L4-L7重定向策略配置2

步驟6.配置服務圖模板。

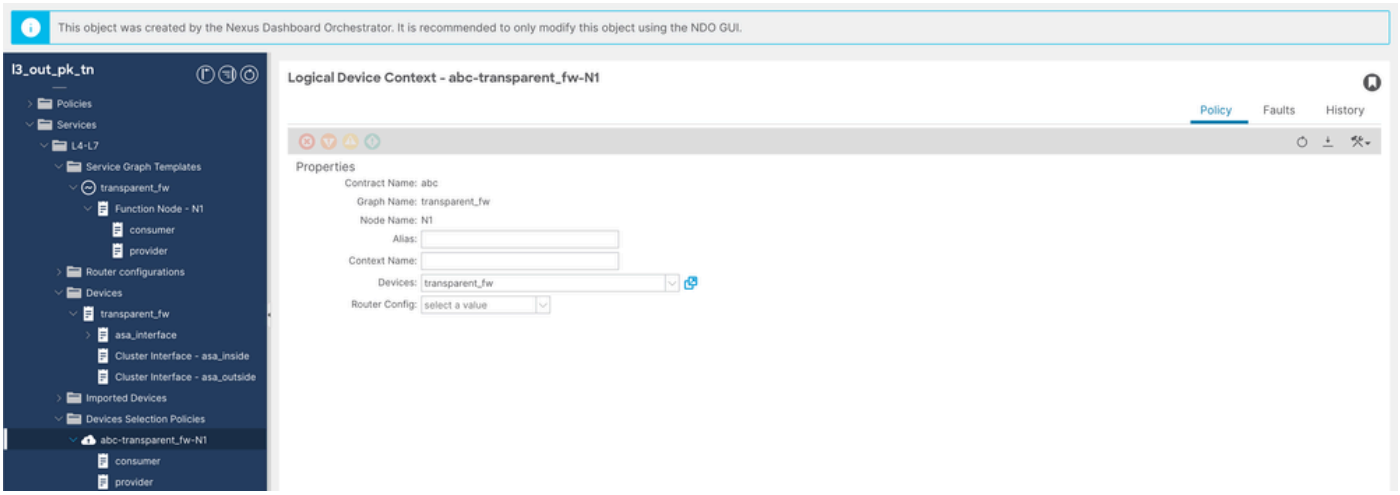
導航到Tenant > Services > Service Graph Template，然後按一下右鍵並建立L4-L7服務圖形模板。



服務圖配置

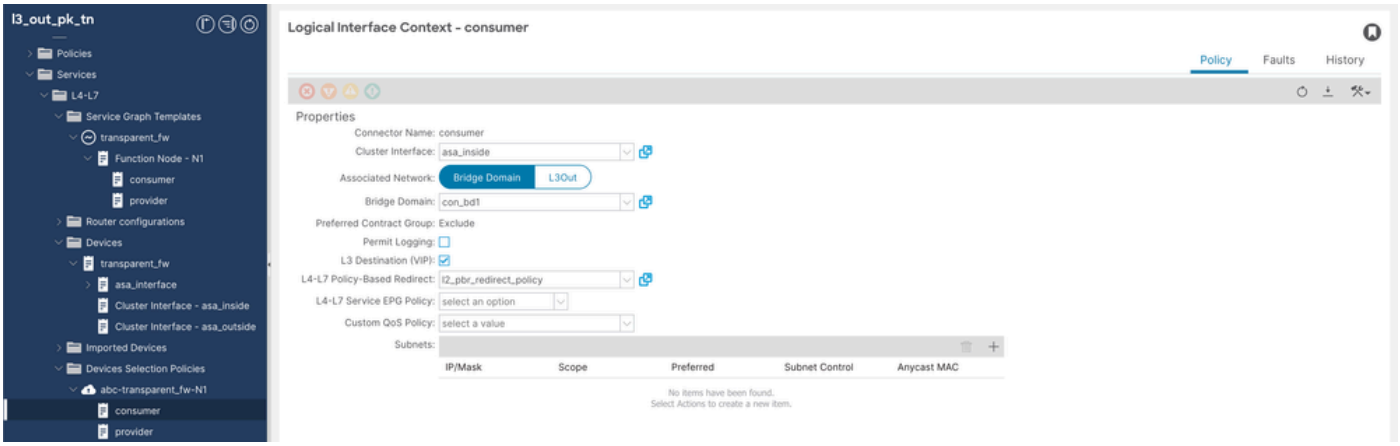
步驟7.配置裝置選擇策略。

導航到Tenant > Services > Device Selection Policy，然後按一下右鍵並建立Device Selection Policy。



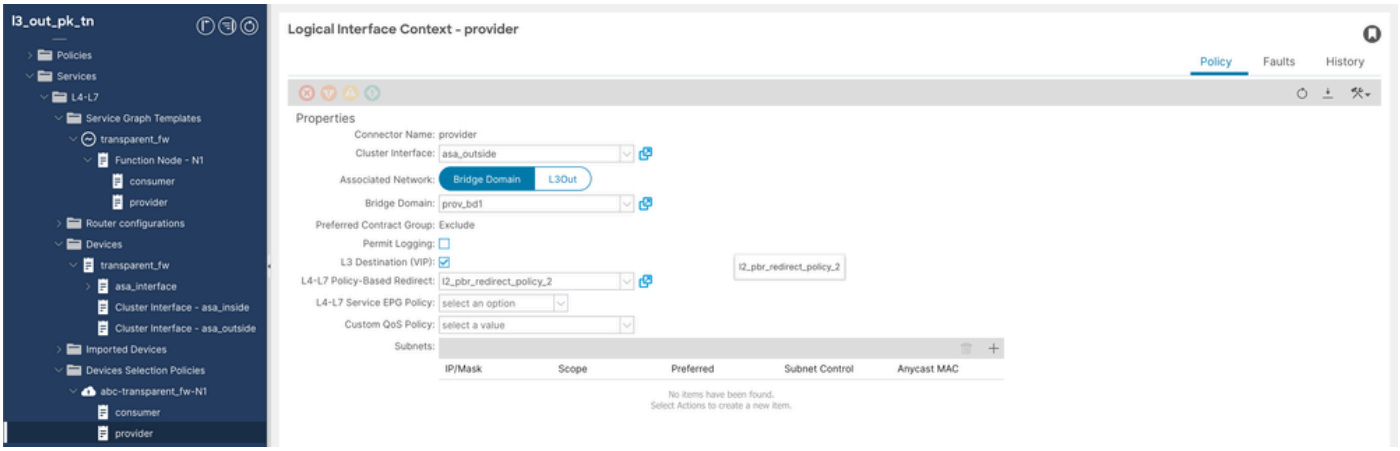
服務圖配置2

++ Consumer邏輯介面上下文

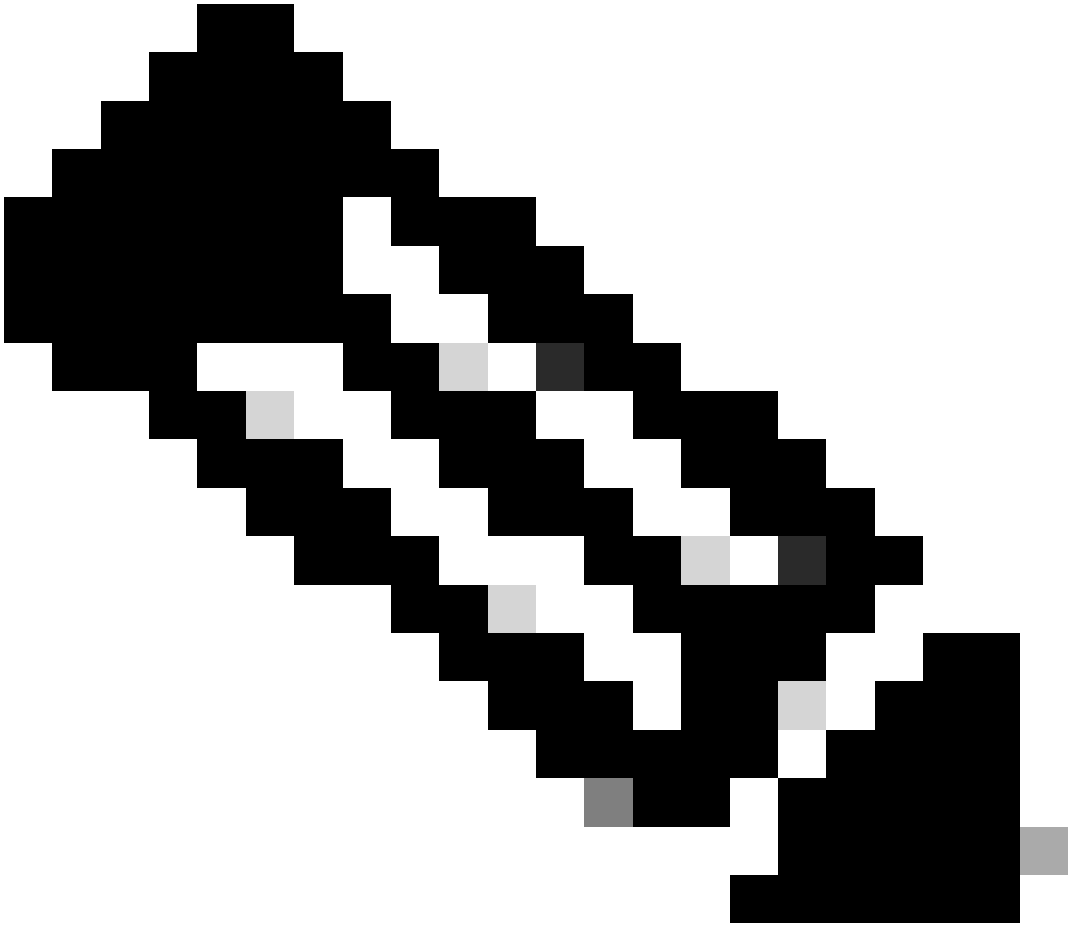


裝置選擇策略使用者配置

++ Provider邏輯介面上下文



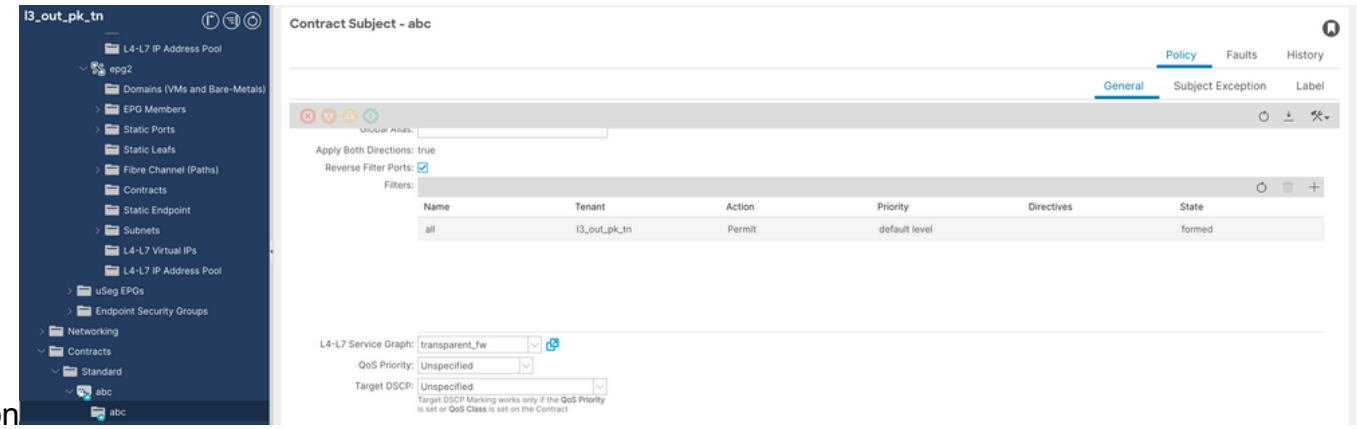
裝置選擇策略提供程式配置



附註：如果將要自動建立裝置選擇策略，則使用Apply Service Graph Option。

步驟8.應用PBR以合約ABC主題。

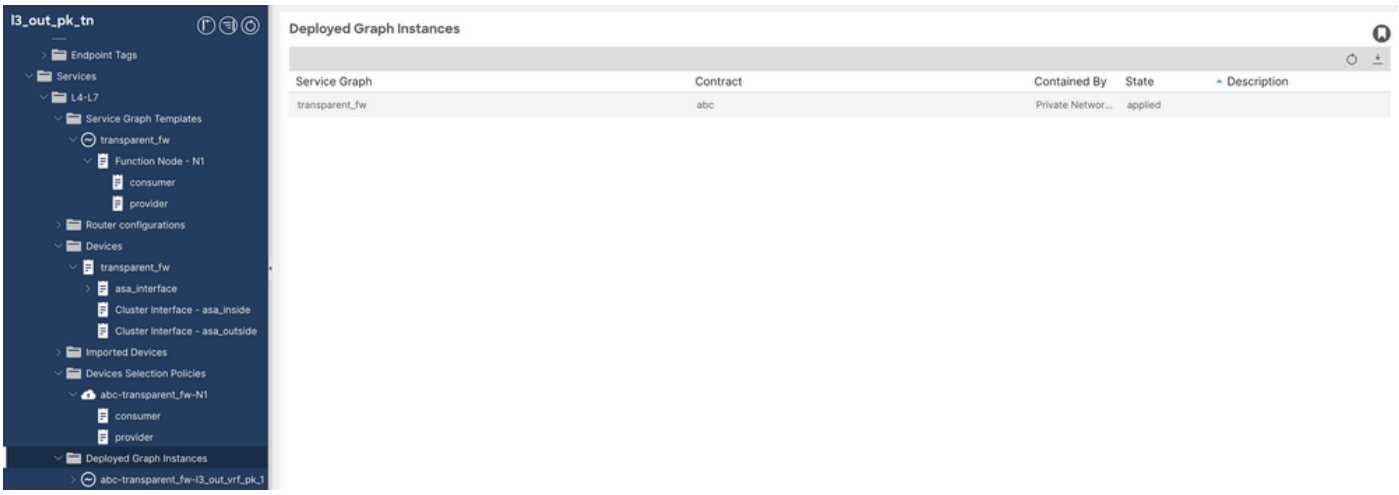
導航到Tenant > Contract > Contract Subject > L4-L7 Service Graph > transparent_fw。



Con

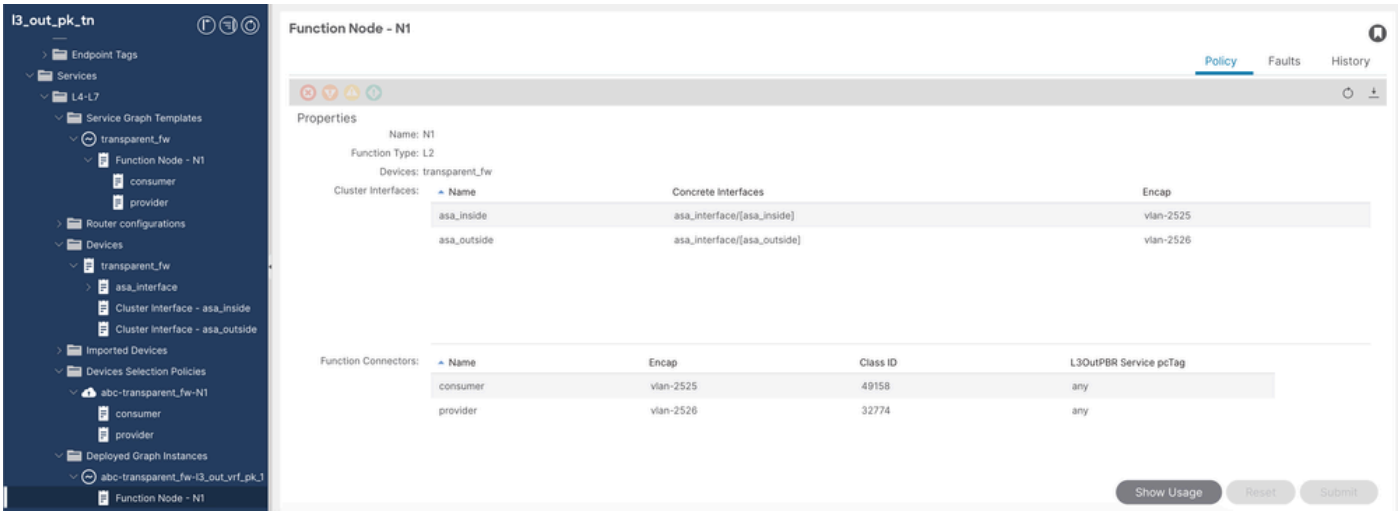
合約配置

步驟9.如果部署成功，則在「已部署的例項」圖下驗證（查詢狀態）。



服務圖驗證

++驗證群集介面、封裝VLAN和功能聯結器類ID。



服務圖驗證2

驗證ASA上的L2 PBR流量

從Src端點到dst端點的安全外殼(SSH)，您可以在ASA上的連線表條目中看到。

ASA驗證

檢驗枝葉上的L2 PBR

1.枝葉節點102上的VLAN程式設計。

<#root>

```
PBR vlan 2525 and 2526 will get programmed on leaf node 102 and mac addresses will be statically tied t

bgl-aci07-apic100#
```

fabric 102 show endpoint

```
------------------------------------------------------------------
Node 102 (bgl-aci07-leaf2)
------------------------------------------------------------------
Legend:
S - static           s - arp              L - local            O - peer-attached
V - vpc-attached     a - local-aged       p - peer-aged        M - span
B - bounce           H - vtep             R - peer-attached-rl D - bounce-to-proxy
E - shared-service   m - svc-mgr
+----------------------------------+---------------+-----------------+--------------+-------------+
      VLAN/                            Encap           MAC Address       MAC Info/       Interface
      Domain                           VLAN            IP Address        IP Info
+----------------------------------+---------------+-----------------+--------------+-------------+
28/l3_out_pk_tn:l3_out_vrf_pk_1           vlan-2525    024a.e954.b591 LS                    eth1/14
1/l3_out_pk_tn:l3_out_vrf_pk_1            vlan-2526    02c0.282b.d1cf LS                    eth1/14
```

2.重定向使用者(101)和提供者(104)節點上的策略和分割槽規則。

<#root>

```
++ Redirect policy on consumer node

bgl-aci07-apic100#
```

fabric 101 show service redir info

```
------------------------------------------------------------------
Node 101 (bgl-aci07-leaf1)
------------------------------------------------------------------
================================================================================================================
LEGEND
TL: Threshold(Low)  |  TH: Threshold(High) |  HP: HashProfile  |  HG: HealthGrp  | BAC: Backup-Dest |
================================================================================================================
List of Dest Groups
GrpID Name            destination                                                 HG-name
===== ====            ===========                                                 ==============
7     destgrp-7       dest-[3d49:a399:3d4b:4ea1:8829:5991:b554:e94a]-[vxlan-2228224] l3_out_pk_tn::HG1
8     destgrp-8       dest-[143a:41d1:9c75:4973:8501:bcf:d12b:28c0]-[vxlan-2228224]  l3_out_pk_tn::HG2

List of destinations
Name                                                        bdVnid          vMac                vrf
====                                                        ======          ====                ===
dest-[3d49:a399:3d4b:4ea1:8829:5991:b554:e94a]-[vxlan-2228224] vxlan-16744328  02:4A:E9:54:B5:91    l3_
dest-[143a:41d1:9c75:4973:8501:bcf:d12b:28c0]-[vxlan-2228224]  vxlan-16056296  02:C0:28:2B:D1:CF    l3_

List of Health Groups
HG-Name                                 HG-OperSt  HG-Dest
=======                                 =========  =======
l3_out_pk_tn::HG1                       enabled    dest-[3d49:a399:3d4b:4ea1:8829:5991:b554:e94a]-[v
l3_out_pk_tn::HG2                       enabled    dest-[143a:41d1:9c75:4973:8501:bcf:d12b:28c0]-[vx

List of Backup Destinations
```

```
Name                                                                primaryDestName
====                                                                ==============
List of AclRules
AclRuleVnid     DestGroup       OperSt   OperStQual
===========     =========       ======   ==========

++ Zoning rule on consumer Node

bgl-aci07-apic100#
```

fabric 101 show zoning-rule | grep redir

```
|   4228  | 32771  | 49157  | default  |     bi-dir     | enabled | 2228224  |
|   4231  | 49157  | 32771  | default  | uni-dir-ignore | enabled | 2228224  |
|   4230  | 32771  |   15   | default  |    uni-dir     | enabled | 2228224  |
|   4229  | 16386  | 32771  | default  |    uni-dir     | enabled | 2228224  |
```

<#root>

```
++ Redirect Policy on Provider Node
bgl-aci07-apic100#
```

fabric 104 show service redir info

```
--------------------------------------------------------------------
Node 104 (bgl-aci07-leaf4)
--------------------------------------------------------------------
================================================================================================================
LEGEND
TL: Threshold(Low)  |  TH: Threshold(High) |  HP: HashProfile  |  HG: HealthGrp  | BAC: Backup-Dest |
================================================================================================================
List of Dest Groups
GrpID Name            destination                                                    HG-name
===== ====            ===========                                                    ==============
3     destgrp-3       dest-[3d49:a399:3d4b:4ea1:8829:5991:b554:e94a]-[vxlan-2228224] l3_out_pk_tn::HG1
4     destgrp-4       dest-[143a:41d1:9c75:4973:8501:bcf:d12b:28c0]-[vxlan-2228224]  l3_out_pk_tn::HG2

List of destinations
Name                                                                bdVnid          vMac                vrf
====                                                                ======          ====                ===
dest-[3d49:a399:3d4b:4ea1:8829:5991:b554:e94a]-[vxlan-2228224] vxlan-16744328  02:4A:E9:54:B5:91    l3_
dest-[143a:41d1:9c75:4973:8501:bcf:d12b:28c0]-[vxlan-2228224]  vxlan-16056296  02:C0:28:2B:D1:CF    l3_

List of Health Groups
HG-Name                                 HG-OperSt  HG-Dest
=======                                 =========  =======
l3_out_pk_tn::HG1                       enabled    dest-[3d49:a399:3d4b:4ea1:8829:5991:b554:e94a]-[v
l3_out_pk_tn::HG2                       enabled    dest-[143a:41d1:9c75:4973:8501:bcf:d12b:28c0]-[vx
List of Backup Destinations
Name                                                                primaryDestName
====                                                                ==============

++ Zoning rule on provider node
bgl-aci07-apic100#
```

fabric 104 show zoning-rule | grep redir

```
|   4220  | 32771  | 49157  | default  |     bi-dir     | enabled | 2228224  |
|   4221  | 49157  | 32771  | default  | uni-dir-ignore | enabled | 2228224  |
```

L2Ping失敗時出現的故障

如果PBR裝置上的L2ping失敗，您會發現PBR仍處於部署狀態，並且故障F4203、F2833和F2911出現的狀態track/health group已關閉。

捕獲L2 Ping

您可以在tahoe介面上使用tcpdump擷取L2Ping，以便知道是否已正確傳送和接收L2Ping。如果只看到CPU傳輸已傳送但未接收，則上述故障應為預期故障，您必須進一步排除ASA丟棄這些故障的原因（請參閱ASA配置部分）。

<#root>

```
Capturing L2Pings using tcpdump on PBR Node 102

bgl-aci07-leaf2#

tcpdump -i tahoe0 -w /data/techsupport/l2_pbr1.pcap


tcpdump: listening on tahoe0, link-type EN10MB (Ethernet), capture size 262144 bytes
^C4858 packets captured
4875 packets received by filter
0 packets dropped by kernel


In order to deocde the tcpdump



cat /data/techsupport/l2_pbr1.pcap | knet_parser.py --decode tahoe --pcap | less


** Search for mac 00ab.8752.3100

++ CPU transmit packets
Frame 505
Time: 2024-10-29T05:55:28.707136+00:00
Header: ieth

CPU Transmit


sup_tx:1, ttl_bypass:0, opcode:0x0, bd:0x207, outer_bd:0x0, dl:0, span:0, traceroute:0, tclass:5
src_idx:0x0, src_chip:0x0, src_port:0x0, src_is_tunnel:0, src_is_peer:0
dst_idx:0x0, dst_chip:0x0, dst_port:0x0, dst_is_tunnel:0
Len: 72
Eth:

00ab.8752.3100 > 024a.e954.b591

, len/

ethertype:0x721
```

Frame 506
Time: 2024-10-29T05:55:28.707297+00:00
Header: ieth CPU Transmit
sup_tx:1, ttl_bypass:0, opcode:0x0, bd:0x208, outer_bd:0x0, dl:0, span:0, traceroute:0, tclass:5
src_idx:0x0, src_chip:0x0, src_port:0x0, src_is_tunnel:0, src_is_peer:0
dst_idx:0x0, dst_chip:0x0, dst_port:0x0, dst_is_tunnel:0
Len: 72
Eth:

00ab.8752.3100 > 02c0.282b.d1cf

, len/

ethertype:0x721

++CPU recived packets

Frame 509
Time: 2024-10-10T20:16:37.580855+00:00
Header: ieth_extn

CPU Receive

sup_qnum:0x33, sup_code:0x4d, istack:

ISTACK_SUP_CODE_PBR_TRACK_REFRESH

(0x4d)
Header: ieth
sup_tx:0, ttl_bypass:0, opcode:0x0, bd:0x209, outer_bd:0x2, dl:0, span:0, traceroute:0, tclass:0
src_idx:0x32, src_chip:0x0, src_port:0x6, src_is_tunnel:0, src_is_peer:0
dst_idx:0x1, dst_chip:0x0, dst_port:0x3d, dst_is_tunnel:0
Len: 76
Eth:

00ab.8752.3100 > 024a.e954.b591

, len/ethertype:0x8100(802.1q)
802.1q:

vlan:2526

, cos:0, len/

ethertype:0x721

Frame 510
Time: 2024-10-10T20:16:37.580891+00:00
Header: ieth_extn

CPU Receive

sup_qnum:0x33, sup_code:0x4d, istack:

ISTACK_SUP_CODE_PBR_TRACK_REFRESH(0x4d)

Header: ieth
sup_tx:0, ttl_bypass:0, opcode:0x0, bd:0x20a, outer_bd:0x2, dl:0, span:0, traceroute:0, tclass:0
src_idx:0x32, src_chip:0x0, src_port:0x6, src_is_tunnel:0, src_is_peer:0
dst_idx:0x1, dst_chip:0x0, dst_port:0x3d, dst_is_tunnel:0
Len: 76

Eth:

00ab.8752.3100 > 02c0.282b.d1cf

, len/ethertype:0x8100(802.1q)
802.1q:

vlan:2525

, cos:0, len/

ethertype:0x721

從Src到Dst端點的流量

<#root>

```
++ Endpoint X.1.1.10 want to send traffic to X.1.2.15
++ If destination is not learned on consumer/source leaf, PBR will be performed on destination leaf
++ For this case we are assuming endpoint X.1.2.15 is learned on Leaf 101 so PBR/Redirection will be pe

bgl-aci07-apic100#
```

fabric 101 show endpoint

```
--------------------------------------------------------------------
Node 101 (bgl-aci07-leaf1)
--------------------------------------------------------------------
Legend:
S - static           s - arp              L - local            O - peer-attached
V - vpc-attached     a - local-aged       p - peer-aged        M - span
B - bounce           H - vtep             R - peer-attached-rl D - bounce-to-proxy
E - shared-service   m - svc-mgr
+----------------------------------+--------------+-----------------+-------------+-------------+
      VLAN/                           Encap          MAC Address       MAC Info/       Interface
      Domain                          VLAN           IP Address        IP Info
+----------------------------------+--------------+-----------------+-------------+-------------+
l3_out_pk_tn:l3_out_vrf_pk_1                              X.1.2.15                      tunnel6 ===> t
17                                    vlan-3516    10b3.d514.3516 L                     eth1/5 ===>
l3_out_pk_tn:l3_out_vrf_pk_1          vlan-3516        X.1.1.10 L                       eth1/5
```

```
++ EPM entry to get the PC TAG
bgl-aci07-apic100#
```

fabric 101 show system internal epm endpoint ip X.1.1.10

```
--------------------------------------------------------------------
Node 101 (bgl-aci07-leaf1)
--------------------------------------------------------------------
MAC : 10b3.d514.3516 ::: Num IPs : 1
IP# 0 : X.1.1.10 ::: IP# 0 flags :  ::: l3-sw-hit: No
Vlan id : 17 ::: Vlan vnid : 11792 ::: VRF name : l3_out_pk_tn:l3_out_vrf_pk_1
BD vnid : 16744307 ::: VRF vnid : 2228224
Phy If : 0x1a004000 ::: Tunnel If : 0
Interface : Ethernet1/5
Flags : 0x80005c04 ::: sclass :
```

32771

```
 ::: Ref count : 5 ==> sclass
EP Create Timestamp : 10/11/2024 09:15:44.430334
EP Update Timestamp : 10/29/2024 10:45:35.458416
EP Flags : local|IP|MAC|host-tracked|sclass|timer|

bgl-aci07-apic100#
```

fabric 101 show system internal epm endpoint ip X.1.2.15

```
------------------------------------------------------------
Node 101 (bgl-aci07-leaf1)
------------------------------------------------------------
MAC : 0000.0000.0000 ::: Num IPs : 1
IP# 0 : X.1.2.15 ::: IP# 0 flags :  ::: l3-sw-hit: No
Vlan id : 0 ::: Vlan vnid : 0 ::: VRF name : l3_out_pk_tn:l3_out_vrf_pk_1
BD vnid : 0 ::: VRF vnid : 2228224
Phy If : 0 ::: Tunnel If : 0x18010006
Interface : Tunnel6
Flags : 0x80004400 ::: sclass :
```

49157

```
 ::: Ref count : 3 ==> sclass
EP Create Timestamp : 10/29/2024 10:38:34.949150
EP Update Timestamp : 10/29/2024 10:45:55.571786
EP Flags : IP|sclass|timer|

++ Traffic will be redirected based on redir(destgrp-7)
bgl-aci07-apic100#
```

fabric 101 show zoning-rule src-epg 32771 dst-epg 49157

```
------------------------------------------------------------
Node 101 (bgl-aci07-leaf1)
------------------------------------------------------------
+---------+--------+--------+----------+--------+---------+---------+------+------------------+--------
| Rule ID | SrcEPG | DstEPG | FilterID |  Dir   |  operSt |  Scope  | Name |      Action      |    Prio
+---------+--------+--------+----------+--------+---------+---------+------+------------------+--------
|   4228  | 32771  | 49157  | default  | bi-dir | enabled | 2228224 |      | redir(destgrp-7) | src_dst_
+---------+--------+--------+----------+--------+---------+---------+------+------------------+--------

++ Based on redirect policy traffic will be redirected to mac
```

02:4A:E9:54:B5:91

```
bgl-aci07-apic100#
```

fabric 101 show service redir info

```
------------------------------------------------------------
Node 101 (bgl-aci07-leaf1)
------------------------------------------------------------
========================================================================================================
LEGEND
TL: Threshold(Low)  |  TH: Threshold(High) |  HP: HashProfile  |  HG: HealthGrp  | BAC: Backup-Dest |  T
========================================================================================================
List of Dest Groups
GrpID Name            destination                                                HG-name
===== ====            ===========                                                ==============
7     destgrp-7       dest-[3d49:a399:3d4b:4ea1:8829:5991:b554:e94a]-[vxlan-2228224] l3_out_pk_tn::HG1
List of destinations
```

```
Name                                                                bdVnid          vMac                vrf
====                                                                ======          ====                ===
dest-[3d49:a399:3d4b:4ea1:8829:5991:b554:e94a]-[vxlan-2228224] vxlan-16744328
```

02:4A:E9:54:B5:91

```
    l3_out_pk_tn:l3_out_vrf_pk_1 enabled    no-oper-dest    l3_out_pk_tn::HG
1

++ PBR mac addresses are never learnt remotely as IP/MAC learning is disabled for PBR BD
++ PBR mac addresses are statically binded to interfaces where L4/L7 device is connected and reported t
++ Traffic will be forwarded to SPINE PROXY
++ Spine has an COOP entry for 02:4A:E9:54:B5:91

bgl-aci07-apic100#
```

fabric 201 show coop internal info repo ep key 16744328 02:4A:E9:54:B5:91

```
------------------------------------------------------------------
Node 201 (bgl-aci07-spine1)
------------------------------------------------------------------
Repo Hdr Checksum : 49503
Repo Hdr record timestamp : 10 29 2024 10:15:07 658496921
Repo Hdr last pub timestamp : 10 29 2024 10:15:07 661679296
Repo Hdr last dampen timestamp : 01 01 1970 00:00:00 0
Repo Hdr dampen penalty : 0
Repo Hdr flags : IN_OBJ ACTIVE
EP bd vnid : 16744328
EP mac :
```

02:4A:E9:54:B5:91

```
 <<<<========== ASA MAC
flags : 0x480
repo flags : 0x102
Vrf vnid : 2228224
PcTag : 0x100c006
EVPN Seq no : 0
Remote publish timestamp: 01 01 1970 00:00:00 0
Snapshot timestamp: 10 29 2024 10:15:07 658496921
Tunnel nh : 10.0.144.66
MAC Tunnel  : 10.0.144.66
IPv4 Tunnel : 10.0.144.66
IPv6 Tunnel : 10.0.144.66
ETEP Tunnel : 0.0.0.0
num of active ipv4 addresses : 0
num of anycast ipv4 addresses : 0
num of ipv4 addresses : 0
num of active ipv6 addresses : 0
num of anycast ipv6 addresses : 0
num of ipv6 addresses : 0
Primary Path:
Current published TEP :
```

10.0.144.66

```
Backup Path:
BackupTunnel nh : 0.0.0.0
Current Backup (publisher_id): 0.0.0.0
Anycast_flags : 0
Current citizen (publisher_id): 10.0.144.66
Previous citizen : 10.0.144.66
```

```
Prev to Previous citizen : 10.0.144.66
Synthetic Flags : 0x5
Synthetic Vrf : 411
Synthetic IP : X.X.83.223
Tunnel EP entry: 0x7f20900167a8
Backup Tunnel EP entry: (nil)
TX Status: COOP_TX_DONE\
Damp penalty: 0
Damp status: NORMAL
Exp status: 0
Exp timestamp: 01 01 1970 00:00:00 0
Hash: 3209430840 owner: 10.0.144.65

++ Spine will forward this to PBR Leaf Node 102 based on COOP entry
++ PBR Leaf Node will forward this to ASA FW on interface E1/14
++ ASA FW will forward the traffic based on mac address table and send it back to PBR Leaf Node 102
++ PBR Leaf Node will look for Dst IP in the traffic and route it to Leaf 104 if remote endpoint entry
++ Leaf 104 will get this traffic forwarded to actual EP X.1.2.15 (Leaf4 does not learn the client IP a
```

ASA配置

步驟1.介面配置。

<#root>

```
ASA(config)#
```

show running-config interface

```
!
interface GigabitEthernet0/0
 bridge-group 1
 nameif inside
 security-level 100
!
interface GigabitEthernet0/1
 bridge-group 1
 nameif outside
 security-level 0
!
interface BVI1
ip address 192.168.100.1 255.255.255.0 ==> In case BVI IP is not defined ASA will not switch the packet
!
```

步驟2.必須禁用MAC學習。

<#root>

```
ASA(config)#
```

show run mac-learn

```
mac-learn inside disable
mac-learn outside disable
```

PBR:

步驟3.用於PBR Mac的靜態mac地址表。

<#root>

```
The mac statically binded to inside interface is the PBR mac generated by provider and vice versa
ASA(config)#
```

show run mac-address-table

```
mac-address-table static outside 024a.e954.b591
mac-address-table static inside 02c0.282b.d1cf
```

步驟4.設定存取控制清單(ACL)以便通過L2ping。

<#root>

```
ASA(config)#
```

show access-list

```
access-list L2_PBR ethertype permit 721

ASA(config)# show run access-group
access-group L2_PBR in interface inside
access-group L2_PBR in interface outside
```

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）。