

# 使用L3out配置IP SLA功能以跟踪静态路由

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## 简介

本文档介绍如何在思科以应用为中心的基础设施(ACI)中配置互联网协议服务级别协议(IPSLA)，以跟踪从一个L3out获知的静态路由，并仅在从第一个L3out可到达子网时通告给另一个L3out。

## 先决条件

### 要求

Cisco 建议您了解以下主题：

- ACI软件版本4.1及更高版本
- L3out指向外部设备或服务器
- EX和 — FX机箱
- 跟踪路由以使用互联网控制消息协议(ICMP)和TCP探测功能（在本示例中使用ICMP探测功能）

**注意：**所有Cisco Nexus第二代交换机都支持ACI映像IP SLA，包括 — EX和 — FX机箱。请阅读IP SLA的[指南和限制](#)。

### 使用的组件

本文档中的信息基于以下软件和硬件版本：

- ACI版本5.2(2f)
- N9K-C93180YC-FX

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。

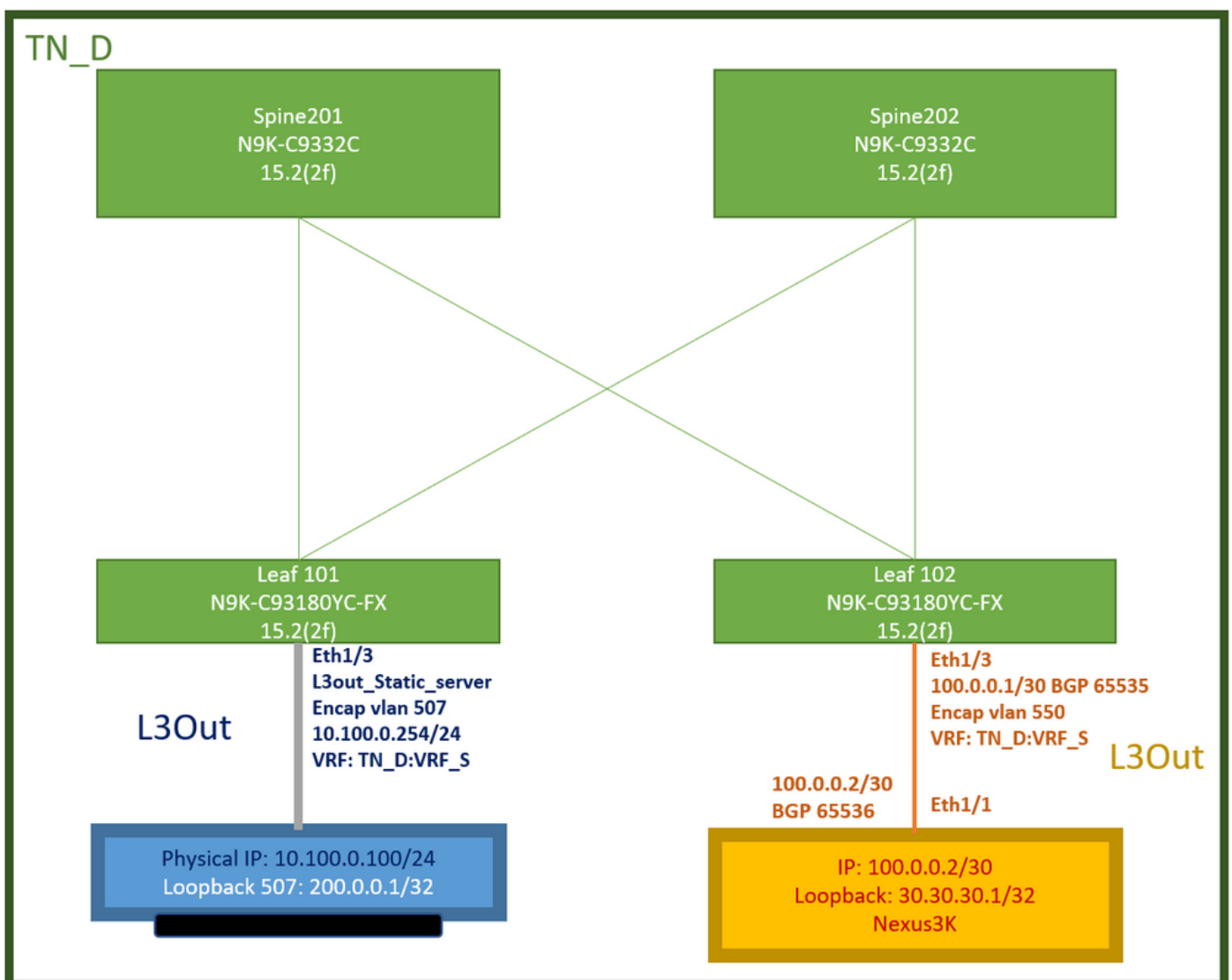
## 背景信息

某些服务器有多个接口（如环回接口），可通过服务器的物理IP地址从ACI访问。在这种情况下，您可能需要添加静态路由并向外部通告，但前提是服务器的物理IP可访问。因此，IP SLA跟踪功能是无法避免的配置，只能通过L3out配置实现这些服务器。此时，网桥域上的静态路由不[支持IP SLA跟踪功能](#)。在本文档中，我们将查找使用IP SLA的服务器示例和中转路由配置。

## 配置

- L3out向服务器和N3K设备。
- 为服务器的物理IP地址配置IP SLA跟踪。
- 在L3out下配置指向服务器的静态路由，该服务器使用IP SLA跟踪并从另一个L3out通告给N3K。

## 网络图



ACI实验拓扑

## 配置

总结步骤：

[ACI交换矩阵策略：](#)

- 创建合同(对于本例，是允许使用所有流量的通用默认过滤器，但您可以使用在同一租户中本地创建的特定过滤器来允许特定流量。在这种情况下，请确保您允许我们用于IP SLA跟踪的协议)。
- 为服务器10.100.0.100/24 ( ACI端SVI 550,IP地址为10.100.0.254 ) 创建新的L3out
- 创建IP SLA跟踪策略 ( IP SLA监控策略、跟踪成员策略、跟踪列表策略 )
- 在L3out下向带IP SLA跟踪列表的服务器添加静态路由。
- 为使用BGP的N3K设备创建新的L3out。(EBGP)ACI AS 65535和N3K AS 65536
- 从L3out向N3K导出静态路由。
- 检验配置和连通性。

1. 创建合同 ( 在本例中，使用允许所有流量的通用默认过滤器，但是，您可以使用在同一租户中本地创建的特定过滤器来允许特定流量，但在这种情况下，请确保允许我们用于IP SLA跟踪的协议 ) 。



## 创建合同

2.为服务器10.100.0.100/24 ( ACI端SVI 550,IP地址为10.100.0.254 ) 创建新的L3out。

**L3 Outside - L3out\_Static\_server**

Properties

Name: L3out\_Static\_server

Alias:

Description: optional

Annotations:  Click to add a new annotation

Global Alias:

Provider Label:   
enter names separated by comma

Consumer Label:

Target DSCP:

PIM:

PIMv6:

Route Control Enforcement:  Import  Export

VRF:

Resolved VRF: TN\_D/VRF\_S

L3 Domain:

Route Profile for Interleak:

Route Profile for Redistribution:

Enable BGP/EIGRP/OSPF:  BGP  OSPF  EIGRP

Route Control for Dampening:

## 创建L3out

**Logical Node Profile - L3out\_Static\_server\_nodeProfile**

Properties

Name: L3out\_Static\_server\_nodeProfile

Description: optional

Alias:

Target DSCP:

Nodes:

Node ID	Router ID	Loopback Address
topology/pod-1/node-101	101.101.101.101	101.101.101.101

Create BGP Protocol Profile:

Create BFD Multihop Protocol Profile:

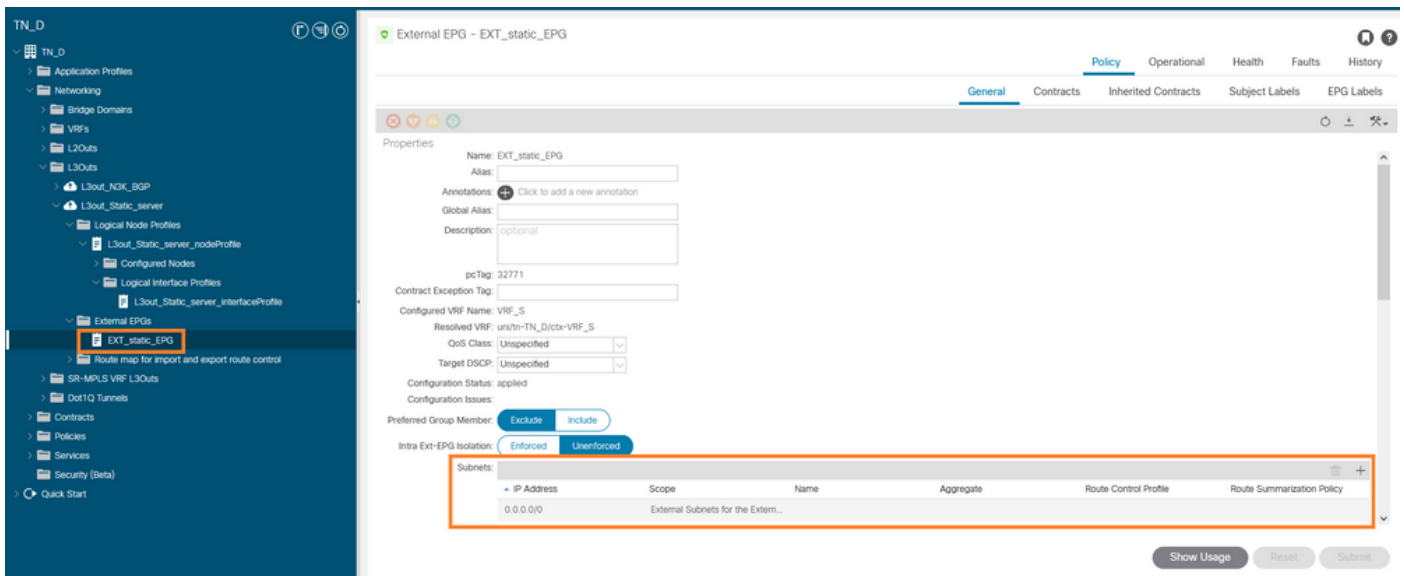
## 将节点连接到L3out

**Logical Interface Profile - L3out\_Static\_server\_interfaceProfile**

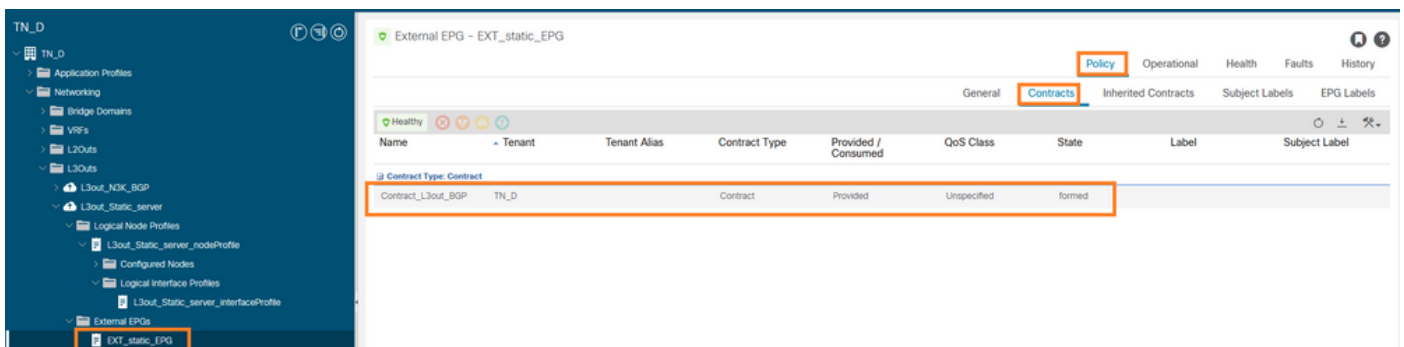
Policy

Path	Side A IP	Side B IP	Secondary IP Address	IP Address	MAC Address	MTU (bytes)	Encap	Encap Scope
Pod-1/node-101/eth1/3				10.100.0.254/24	00:22:BD:F8:19:FF	inherit	vlan-507	Local

## 将接口连接到L3out



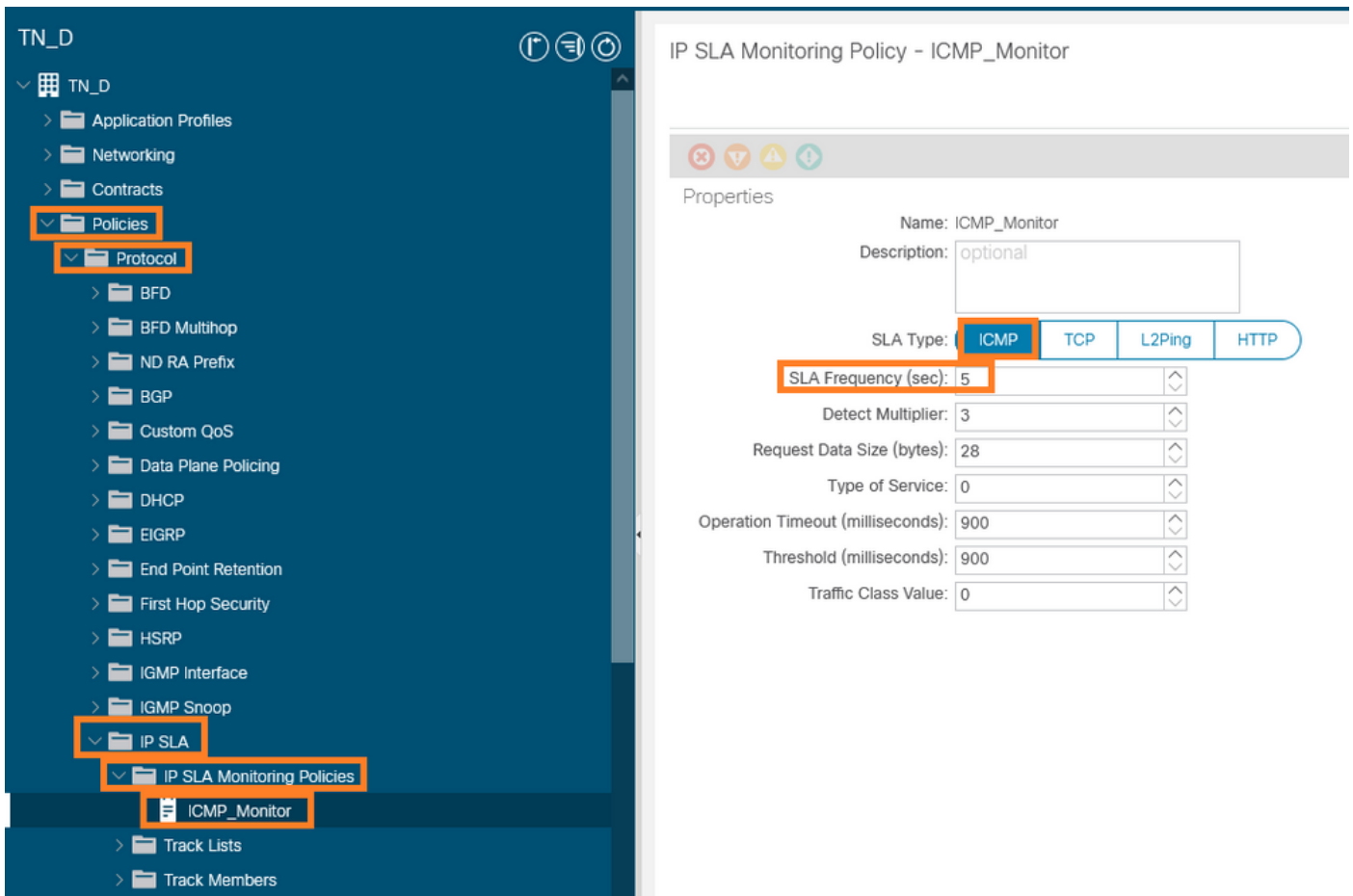
## 配置外部EPG



## 将合同附加到L3out

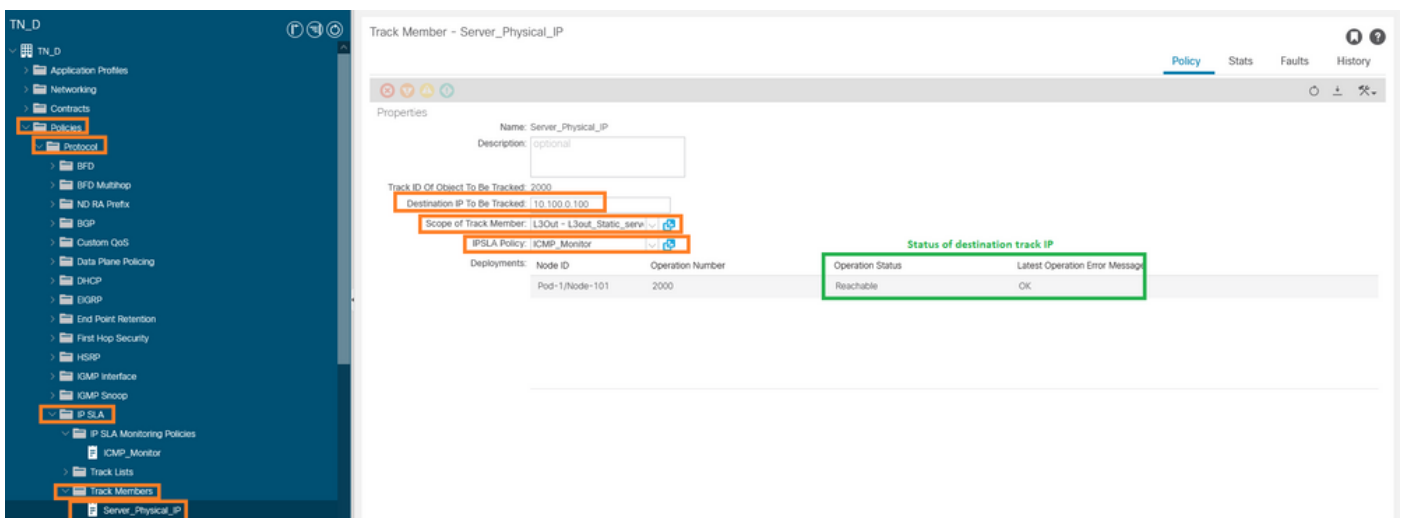
3.创建IP SLA跟踪策略 ( IP SLA监控策略、跟踪成员策略、跟踪列表策略 )。

IP SLA监控策略：



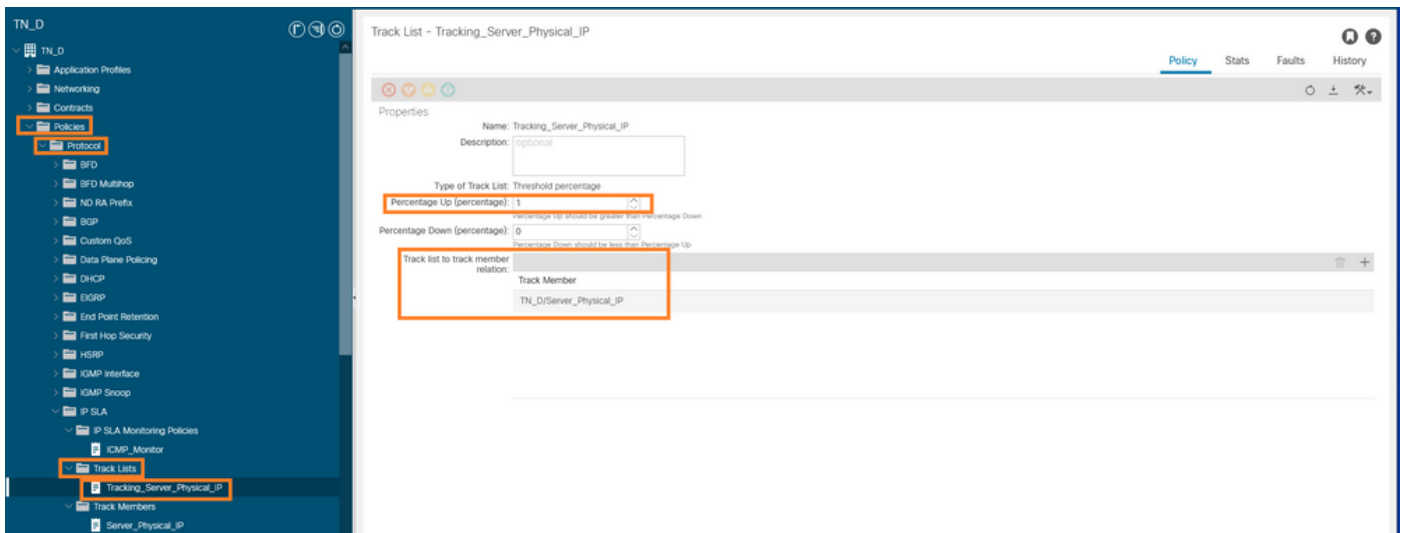
配置IP SLA监控策略

IP SLA跟踪成员：



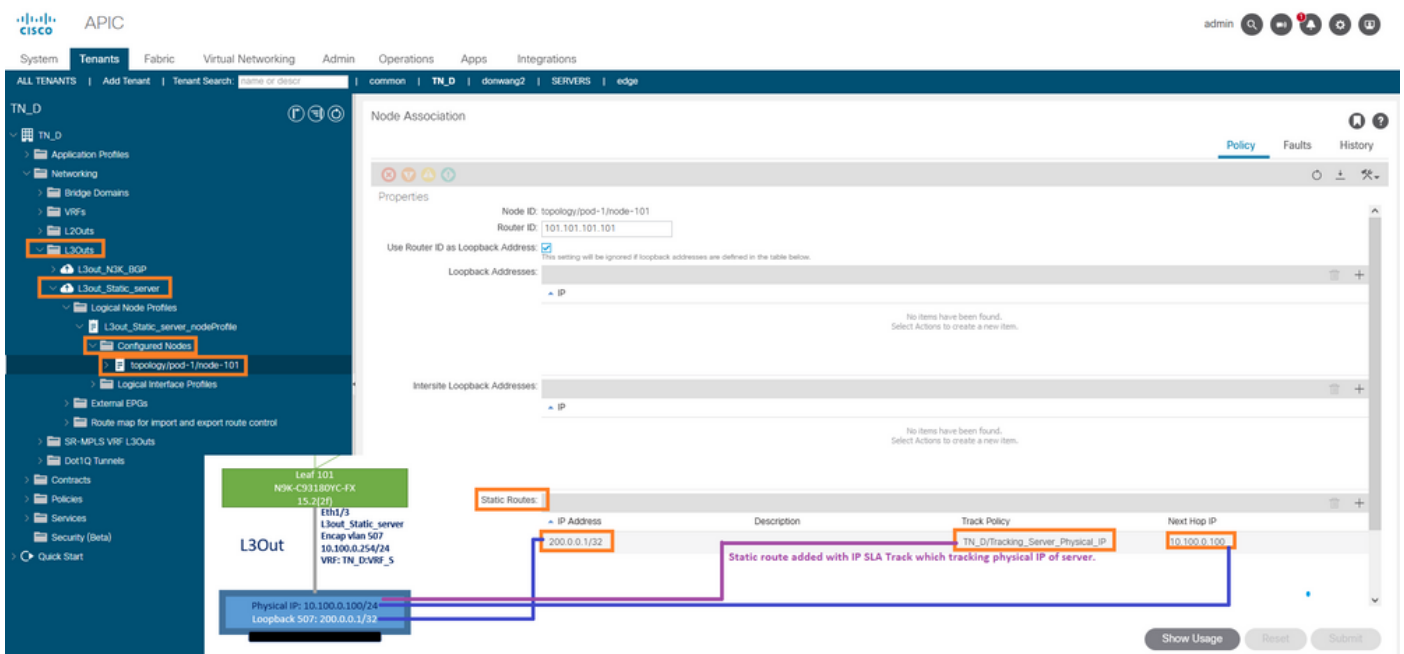
添加IP以监控策略

跟踪列表策略：



配置跟踪列表

4. 在L3out下使用新创建的IP SLA跟踪列表策略配置指向服务器的静态路由。



在L3out下配置静态路由

5. 为使用边界网关协议(BGP)的N3K设备创建新的L3out。(EBGP)ACI AS 65535和N3K AS 65536。

**Properties**

Name: L3out\_N3K\_BGP

Alias:

Description: optional

Annotations: + Click to add a new annotation

Global Alias:

Provider Label:

Consumer Label:

Target DSCP: Unspecified

PIM:

PIMv6:

Route Control Enforcement:  Import  Export

VRF: VRF\_S

Resolved VRF: TN\_D/VRF\_S

L3 Domain: TN\_D L3Dom

Route Profile for Interleak:

Route Profile for Redistribution:

Enable BGP/EIGRP/OSPF:  BGP  OSPF  EIGRP

Route Control for Dampening:

Address Family Type:

## 配置BGP协议

**Logical Node Profile - L3out\_BGP\_nodeProfile**

Name: L3out\_BGP\_nodeProfile

Description: optional

Alias:

Target DSCP: Unspecified

Node ID	Node ID	Loopback Address
Topology/Spw-1/node-102	102.102.102.102	102.102.102.102

BGP Peer Connectivity:

Peer IP Address	Peer Controls	Interface
100.0.0.2		Pod-1/Node-102/eth1/3

Create BGP Protocol Profile:

Create EFD Multihop Protocol Profile:

## BGP对等配置文件



The screenshot displays the configuration of a BGP Peer Connectivity Profile. The left sidebar shows the navigation tree with the following path highlighted: TN\_D > Networking > L3Outs > L3out\_N3K\_BGP > Logical Node Profiles > L3out\_BGP\_nodeProfile > Configured Nodes > Logical Interface Profiles > L3out\_N3K\_BGP\_interfaceProfile > BGP Peer 100.0.0.2- Node-102/1/3.

The main configuration area is titled "BGP Peer Connectivity Profile 100.0.0.2- Node-102/1/3" and includes the following properties:

- Address:** 100.0.0.2
- Description:** optional
- BGP Controls:**
  - Allow Self AS
  - AS override
  - Disable Peer AS Check
  - Next-hop Self
  - Send Community
  - Send Extended Community
  - Send Domain Path
- Password:** [Empty field]
- Confirm Password:** [Empty field]
- Allowed Self AS Count:** 3
- Peer Controls:**
  - Bidirectional Forwarding Detection
  - Disable Connected Check
- Address Type Controls:**
  - AF Mcast
  - AF Ucast
- Routing Domain ID:** EBGp Multihop TTL: 3
- Weight for routes from this neighbor:** 0
- Private AS Control:**
  - Remove all private AS
  - Remove private AS
  - Replace private AS with local AS
- BGP Peer Prefix Policy:** select a value
- Site of Origin:** [Empty field]
- Remote Autonomous System Number:** 65536
- Local-AS Number Config:** [Empty field]
- Local-AS Number:** [Empty field]
- Admin State:** Disabled (Enabled button is highlighted)
- Route Control Profile:** [Empty field]

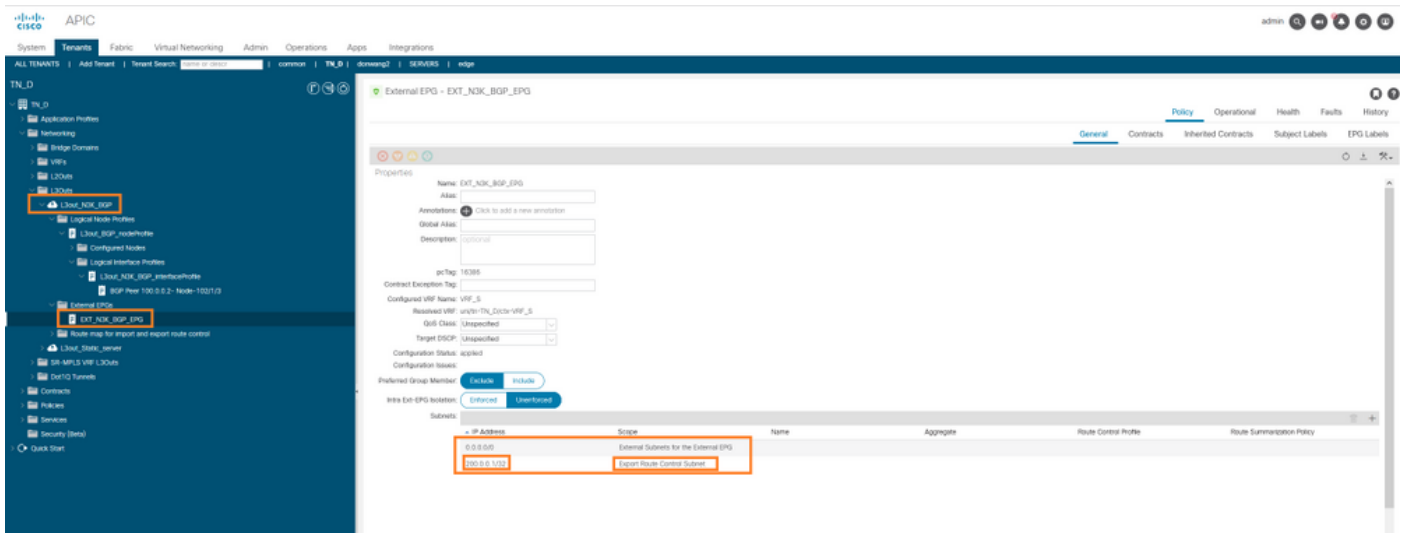
## 配置BGP对等策略

The screenshot shows the configuration of a Logical Interface Profile. The left sidebar shows the path: TN\_D > Networking > L3Outs > L3out\_N3K\_BGP > Logical Node Profiles > L3out\_BGP\_nodeProfile > Configured Nodes > Logical Interface Profiles > L3out\_N3K\_BGP\_interfaceProfile > BGP Peer 100.0.0.2- Node-102/1/3.

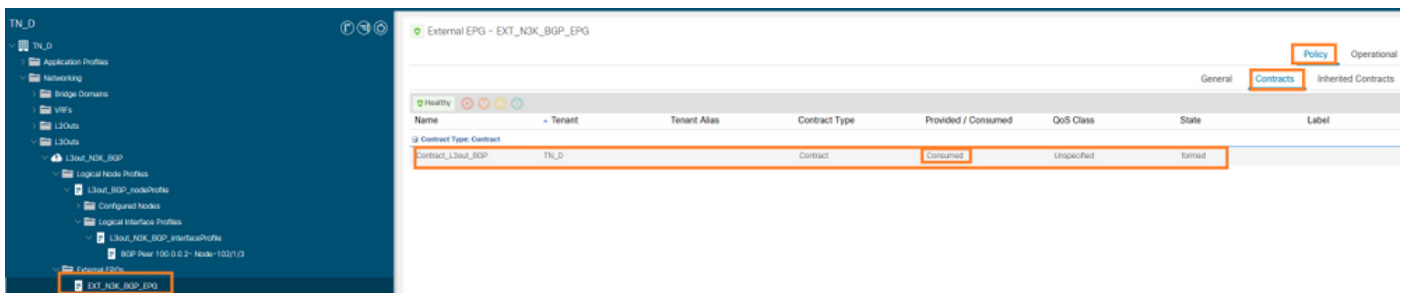
The main configuration area is titled "Logical Interface Profile - L3out\_N3K\_BGP\_interfaceProfile" and includes a table of sub-interfaces:

Path	Side A IP	Side B IP	Secondary IP Address	IP Address	MAC Address	MTU (bytes)	Encap	Encap Scope
Node-102/1/3/102/1/3				100.0.0.1/30	90:22:80:F8:19:0F	inherit	vlan-500	Local

## 在L3out下配置逻辑接口配置文件



传输L3out中的外部EPG导出子网



将合同附加到外部EPG

## 6.从L3out向N3K导出静态路由。

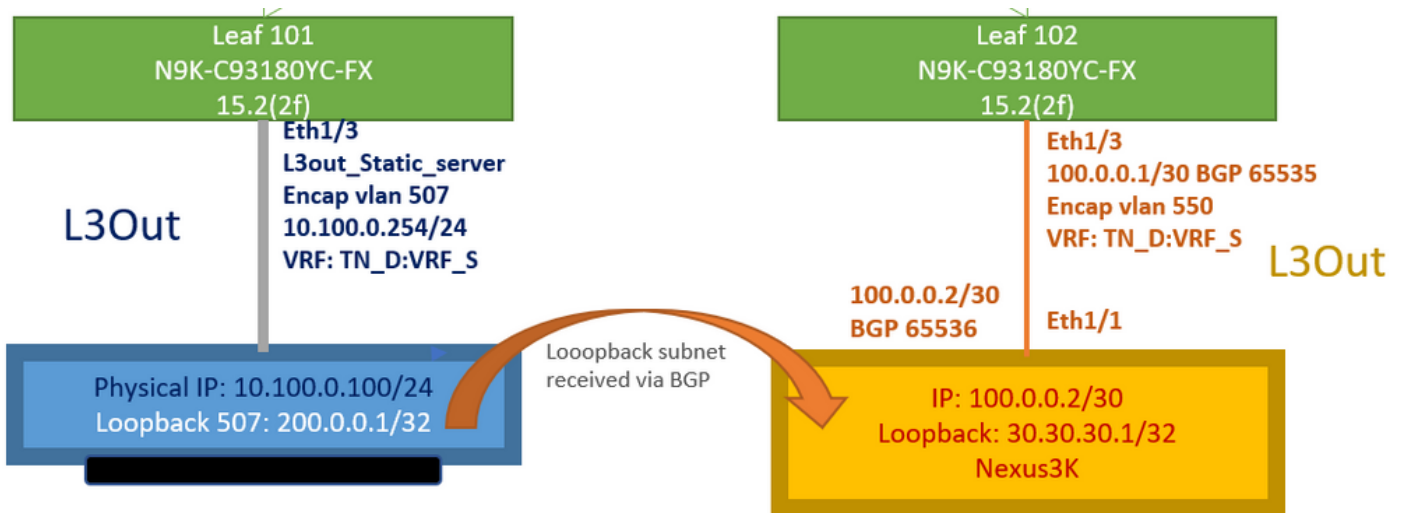
```

switchname N3K
feature bgp
feature interface-vlan
interface Vlan550
  no shutdown
  vrf member BGP_L3out
  ip address 100.0.0.2/30
interface loopback200
  vrf member BGP_L3out
  ip address 30.30.30.1/32
interface Ethernet1/1
  switchport mode trunk
router bgp 65536
  address-family ipv4 unicast
  neighbor 100.0.0.1
  vrf BGP_L3out
  router-id 3.3.3.3
  address-family ipv4 unicast
  network 30.30.30.1/32
  neighbor 100.0.0.1
  remote-as 65535
  update-source Vlan550
  address-family ipv4 unicast
  
```

## 验证

使用本部分可确认配置能否正常运行。

## Nexus3K。



## 中转路由通告由拓扑解释

```
N3K# routing vrf BGP_L3out
```

```
N3K%BGP_L3out# show ip route IP Route Table for VRF "BGP_L3out" '*' denotes best ucast next-hop
'*' denotes best mcast next-hop '[x/y]' denotes [preference/metric] '%' in via output denotes
VRF 30.30.30.1/32, ubest/mbest: 2/0, attached *via 30.30.30.1, Lo200, [0/0], 02:35:27, local
*via 30.30.30.1, Lo200, [0/0], 02:35:27, direct 100.0.0.0/30, ubest/mbest: 1/0, attached *via
100.0.0.2, Vlan550, [0/0], 05:52:18, direct 100.0.0.2/32, ubest/mbest: 1/0, attached *via
100.0.0.2, Vlan550, [0/0], 05:52:18, local 200.0.0.1/32, ubest/mbest: 1/0 *via 100.0.0.1,
[20/0], 02:32:36, bgp-65536, external, tag 65535
```

源地址为N3K环回地址时，可以访问服务器环回。

```
N3K
```

```
interface loopback200
  vrf member BGP_L3out
  ip address 30.30.30.1/32
```

```
N3K# ping 200.0.0.1 vrf BGP_L3out source 30.30.30.1
```

```
PING 200.0.0.1 (200.0.0.1): 56 data bytes
64 bytes from 200.0.0.1: icmp_seq=0 ttl=252 time=0.94 ms
64 bytes from 200.0.0.1: icmp_seq=1 ttl=252 time=0.729 ms
64 bytes from 200.0.0.1: icmp_seq=2 ttl=252 time=0.658 ms
64 bytes from 200.0.0.1: icmp_seq=3 ttl=252 time=0.706 ms
64 bytes from 200.0.0.1: icmp_seq=4 ttl=252 time=0.655 ms
--- 200.0.0.1 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.655/0.737/0.94 ms
```

## ACI枝叶102路由表 ( 具有面向Nexus 3K的L3out ) 。

```
Leaf102# show ip route vrf TN_D:VRF_S
```

```
IP Route Table for VRF "TN_D:VRF_S"
'*' denotes best ucast next-hop
'*' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
 '%' in via output denotes VRF
10.100.0.0/24, ubest/mbest: 1/0
   *via 10.0.96.64%overlay-1, [200/0], 02:56:36, bgp-65535, internal, tag 65535
30.30.30.1/32, ubest/mbest: 1/0
```

<<address

```

of N3K.
  *via 100.0.0.2%TN_D:VRF_S, [20/0], 02:44:34, bgp-65535, external, tag 65536
100.0.0.0/30, ubest/mbest: 1/0, attached, direct
  *via 100.0.0.1, vlan19, [0/0], 05:09:37, direct
100.0.0.1/32, ubest/mbest: 1/0, attached
  *via 100.0.0.1, vlan19, [0/0], 05:09:37, local, local
101.101.101.101/32, ubest/mbest: 1/0
  *via 10.0.96.64%overlay-1, [1/0], 02:56:36, bgp-65535, internal, tag 65535
102.102.102.102/32, ubest/mbest: 2/0, attached, direct
  *via 102.102.102.102, lo5, [0/0], 16:49:13, local, local
  *via 102.102.102.102, lo5, [0/0], 16:49:13, direct
200.0.0.1/32, ubest/mbest: 1/0
  *via 10.0.96.64%overlay-1, [1/0], 02:42:15, bgp-65535, internal, tag 65535

```

## 枝叶101 IP SLA配置验证 ( 从CLI )。

### Leaf101# show ip sla configuration

```

IP SLAs Infrastructure Engine-III
Entry number: 2000
Owner: owner-icmp-echo-dme
Tag:
Operation timeout (milliseconds): 900
Type of operation to perform: icmp-echo
Target address/Source address: 10.100.0.100/0.0.0.0
Traffic-Class parameter: 0x0
Type Of Service parameter: 0x0
Request size (ARR data portion): 28
Verify data: No
Vrf Name: TN_D:VRF_S
Schedule:
  Operation frequency (seconds): 5 (not considered if randomly scheduled)
  Next Scheduled Start Time: Start Time already passed
  Group Scheduled : FALSE
  Randomly Scheduled : FALSE
  Life (seconds): Forever
  Entry Ageout (seconds): 3600
  Recurring (Starting Everyday): FALSE
  Status of entry (SNMP RowStatus): Active
Threshold (milliseconds): 900
Distribution Statistics:
  Number of statistic hours kept: 2
  Number of statistic distribution buckets kept: 1
  Statistic distribution interval (milliseconds): 20
History Statistics:
  Number of history Lives kept: 0
  Number of history Buckets kept: 15
  History Filter Type: None

```

### Leaf101# show track brief

TrackId	Type	Instance	Parameter	State	Last Change
4	IP SLA	2000	reachability	up	2021-09-16T18:08:42.364+00:00
3	List	---	percentage	up	2021-09-16T18:08:42.365+00:00

### Leaf101# show track

```

Track 1
  List Threshold percentage
  Threshold percentage is up
  6 changes, last change 2021-09-16T00:01:50.339+00:00
  Threshold percentage up 1% down 0%
  Tracked List Members:
    Object 2 (100)% up
  Attached to:

```

```
Route prefix 200.0.0.1/32
Track 2
  IP SLA 2000
  reachability is up
  6 changes, last change 2021-09-16T00:01:50.338+00:00
  Tracked by:
    Track List 1
```

使用托管对象查询(Moquery)命令进行验证：

```
apic1# moquery -c fvIPSLAMonitoringPol -f 'fv.IPSLAMonitoringPol.name=="ICMP_Monitor"'
Total Objects shown: 1
```

```
# fv.IPSLAMonitoringPol
name           : ICMP_Monitor
annotation     :
childAction    :
descr         :
dn            : uni/tn-TN_D/ipslaMonitoringPol-ICMP_Monitor
extMngdBy     :
httpMethod    : get
httpUri       : /
httpVersion   : HTTP10
ipv4Tos       : 0
ipv6TrfClass  : 0
lcOwn        : local
modTs        : 2021-09-15T21:18:48.195+00:00
monPolDn     : uni/tn-common/monepg-default
nameAlias     :
ownerKey      :
ownerTag      :
reqDataSize   : 28
rn           : ipslaMonitoringPol-ICMP_Monitor
slaDetectMultiplier : 3
slaFrequency  : 5
slaPort      : 0
slaType      : icmp
status       :
threshold    : 900
timeout      : 900
uid         : 15374
userdom     : :all:
```

```
apic1# moquery -c fvTrackMember -f 'fv.TrackMember.name=="Server_Physical_IP"'
Total Objects shown: 1
```

```
# fv.TrackMember
name           : Server_Physical_IP
annotation     :
childAction    :
descr         :
dn            : uni/tn-TN_D/trackmember-Server_Physical_IP
dstIpAddr     : 10.100.0.100
extMngdBy     :
id           : 2000
lcOwn        : local
modTs        : 2021-09-15T21:16:22.992+00:00
monPolDn     : uni/tn-common/monepg-default
nameAlias     :
ownerKey      :
ownerTag      :
```

```
rn          : trackmember-Server_Physical_IP
scopeDn     : uni/tn-TN_D/out-L3out_Static_server
status      :
uid         : 15374
userdom     : :all:
```

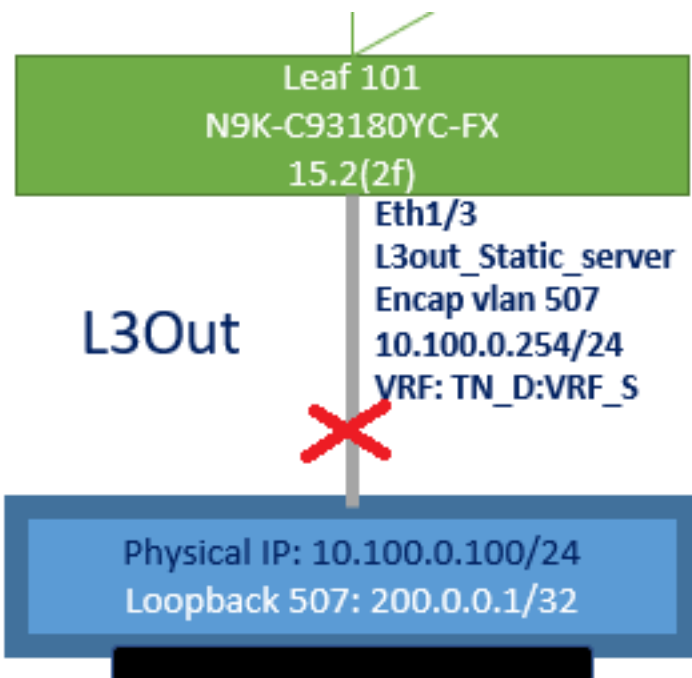
```
apic1# moquery -c fvTrackList -f 'fv.TrackList.name=="Tracking_Server_Physical_IP"'
Total Objects shown: 1
```

```
# fv.TrackList
name        : Tracking_Server_Physical_IP
annotation  :
childAction :
descr       :
dn          : uni/tn-TN_D/tracklist-Tracking_Server_Physical_IP
extMngdBy   :
lcOwn       : local
modTs       : 2021-09-15T07:41:15.958+00:00
monPolDn    : uni/tn-common/monepg-default
nameAlias   :
ownerKey    :
ownerTag    :
percentageDown : 0
percentageUp  : 1
rn          : tracklist-Tracking_Server_Physical_IP
status      :
type        : percentage
uid         : 15374
userdom     : :all:
weightDown  : 0
weightUp    : 1
```

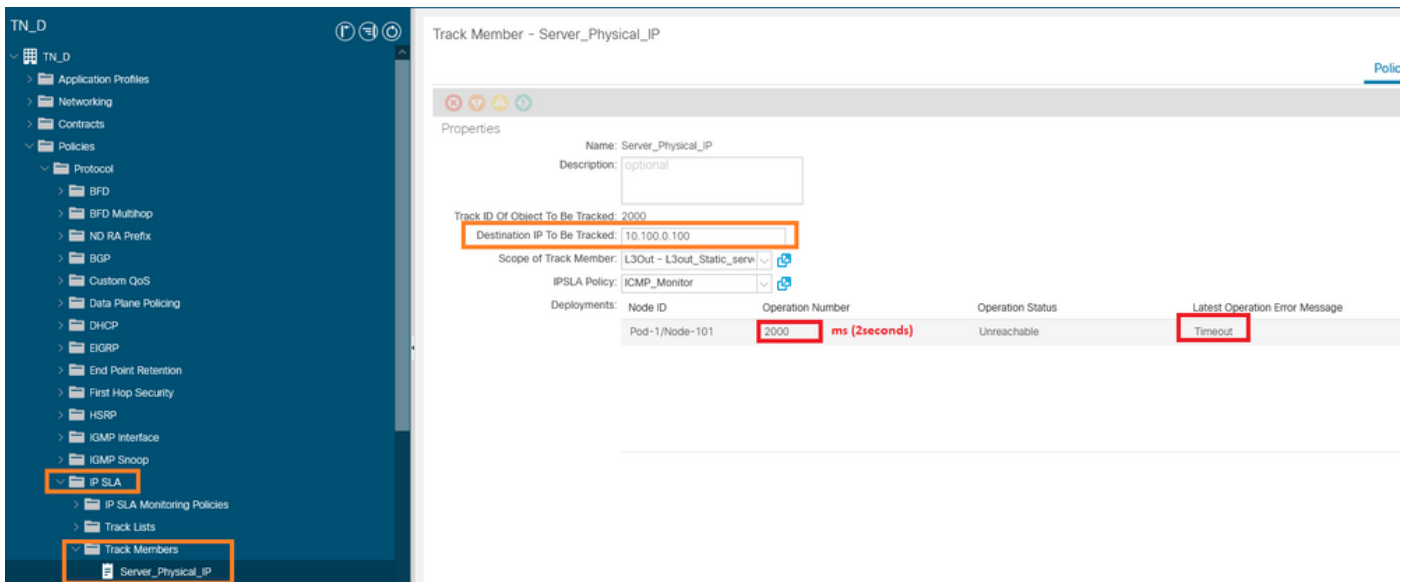
## 故障排除

目前没有针对此配置的故障排除信息。

如果链路断开或物理IP地址无法到达，ACI IP SLA在配置的阈值达到后显示目标IP“超时”。



L3out接口关闭



链路关闭后IP SLA监控链路状态

枝叶101 CLI验证 ( 您可以看到“上次操作返回代码”的超时 )。

```
Leaf101# show ip sla statistics
```

```
IPSLAs Latest Operation Statistics
```

```
IPSLA operation id: 2000
```

```
Latest RTT: NoConnection/Busy/Timeout
```

```
Latest operation start time: 23:54:30 UTC Wed Sep 15 2021
```

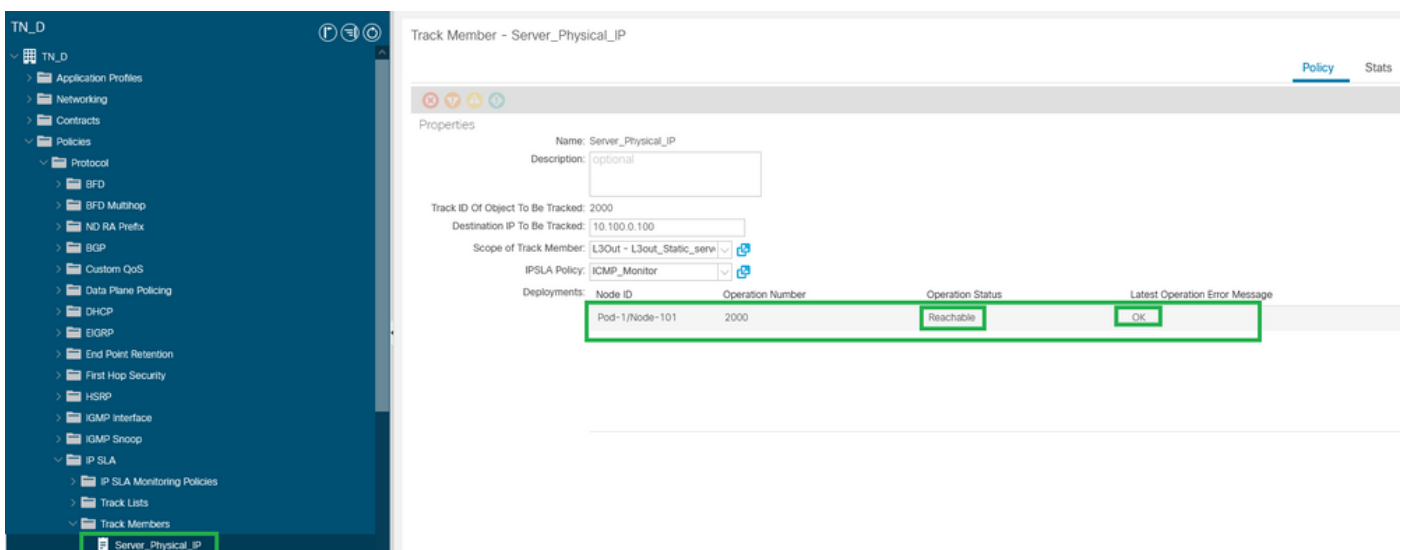
```
Latest operation return code: Timeout
```

```
Number of successes: 658
```

```
Number of failures: 61
```

```
Operation time to live: forever
```

一旦服务器可达，它就会显示状态OK。



链路启动后IP SLA监控器状态

```
Leaf101# show ip sla statistics
```

```
IPSLAs Latest Operation Statistics
```

```
IPSLA operation id: 2000
```

```
Latest RTT: 1 milliseconds
```

```
Latest operation start time: 00:03:15 UTC Thu Sep 16 2021
```

```
Latest operation return code: OK
```

Number of successes: 18

Number of failures: 86

Operation time to live: forever

## 相关信息

- [思科APIC第3层网络配置指南，版本5.2\(x\)](#)
- [技术支持和文档 - Cisco Systems](#)