Configure Intersite L3out With ACI Multi-Site Fabrics

Contents

Introduction

This document describes the steps for the intersite L3out configuration with Cisco Application Centric Infrastructure (ACI) multi-site fabric.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Functional ACI multi-site fabric setup
- External router/connectivity

Components Used

The information in this document is based on:

- Multi-Site Orchestrator (MSO) Version 2.2(1) or later
- ACI Version 4.2(1) or later
- MSO nodes
- ACI fabrics
- Nexus 9000 Series Switch (N9K) (End Host and L3out external device simulation)
- Nexus 9000 Series Switch (N9K) (Inter-site Network (ISN))

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Background Information

Supported Schemas for Intersite L3out Configuration

Schema-config1

- Tenant stretched between sites (A and B).
- Virtual Routing and Forwarding (VRF) stretched between sites (A and B).
- Endpoint Group (EPG)/Bridge Domain (BD) local to one site (A).
- L3out local to another site (B).
- External EPG of L3out local to site (B).
- Contract creation and configuration done from MSO.

Schema-config2

- Tenant stretched between sites (A and B).
- VRF stretched between sites (A and B).

- EPG/BD stretched between sites (A and B).
- L3out local to one site (B).
- External EPG of L3out local to site (B).
- Contract configuration can be done from MSO, or each site has local contract creation from Application Policy Infrastructure Controller (APIC) and attached locally between the stretched EPG and L3out external EPG. In this case, shadow External_EPG appears at site-A because it is needed for local contract relation and policy implementations.

Schema-config3

- Tenant stretched between sites (A and B).
- VRF stretched between sites (A and B).

- EPG/BD stretched between sites (A and B).
- L3out local to one site (B).
- External EPG of L3out stretched between sites (A and B).
- Contract configuration can be done from MSO, or each site has local contract creation from APIC and attached locally between the stretched EPG and stretched external EPG.

Schema-config4

- Tenant stretched between sites (A and B).
- VRF stretched between sites (A and B).

- EPG/BD local to one site (A) or EPG/BD local to each site (EPG-A in site A and EPG-B in site B).
- L3out local to one site (B), or for redundancy toward external connectivity you can have L3out local to each site (local to site A and local to site B).
- External EPG of L3out stretched between sites (A and B).
- Contract configuration can be done from MSO or each site has local contract creation from APIC and attached locally between stretched EPG and stretched external EPG.

Schema-config5 (Transit routing)

- Tenant stretched between sites (A and B).
- VRF stretched between sites (A and B).

- L3out local to each site (local to site A and local to site B).
- External EPG of local to each site (A and B).
- Contract configuration can be done from MSO or each site has local contract creation from APIC and attached locally between the external EPG local and shadow external EPG local.

Schema-config5 (InterVRF Transit Routing)

- Tenant stretched between sites (A and B).
- VRF local to each site (A and B).

- L3out local to each site (local to site A and local to site B).

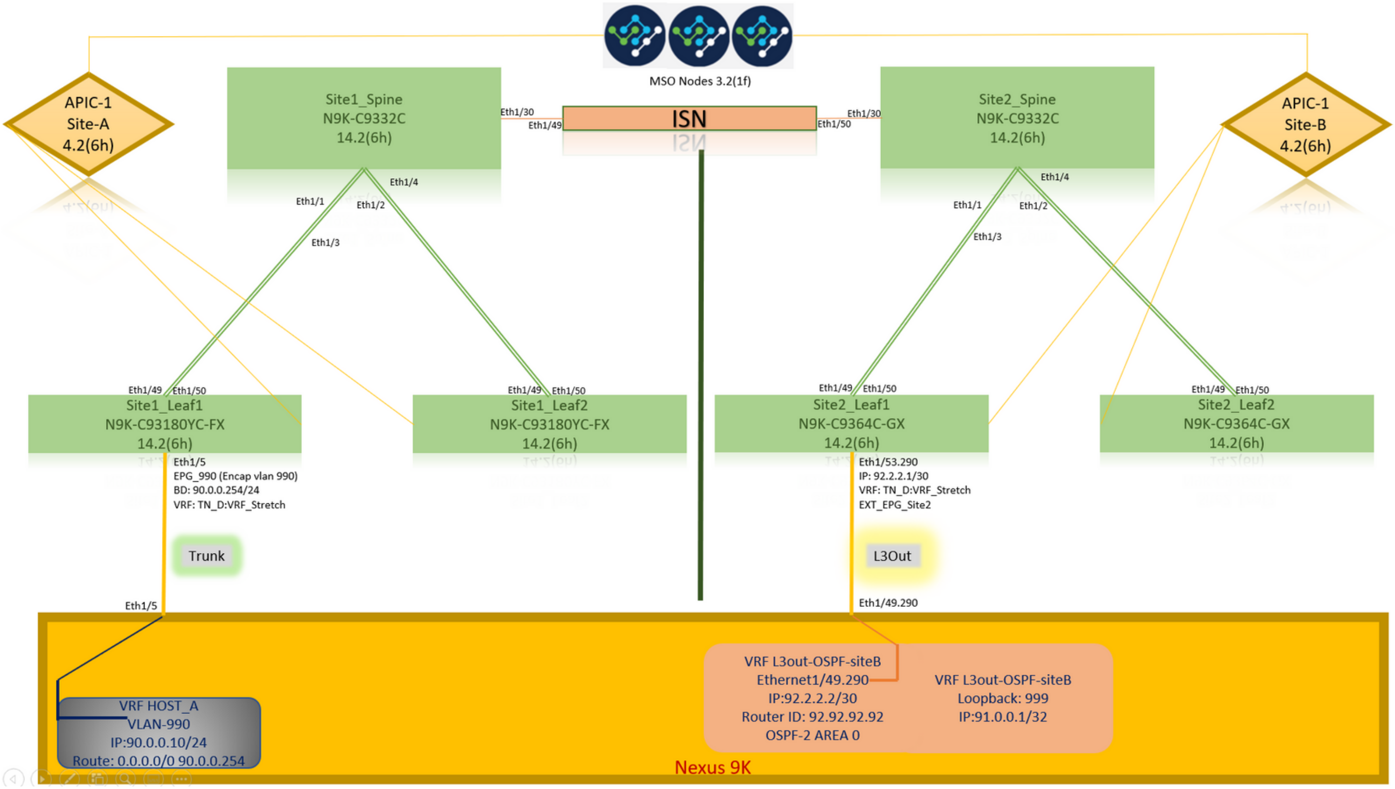
- External EPG of local to each site (A and B).
- Contract configuration can be done from MSO or each site has local contract creation from APIC and attached locally between the external EPG local and shadow external EPG local.

Note: This document provides basic intersite L3out configuration steps and verification. In this example, Schema-config1 is used.

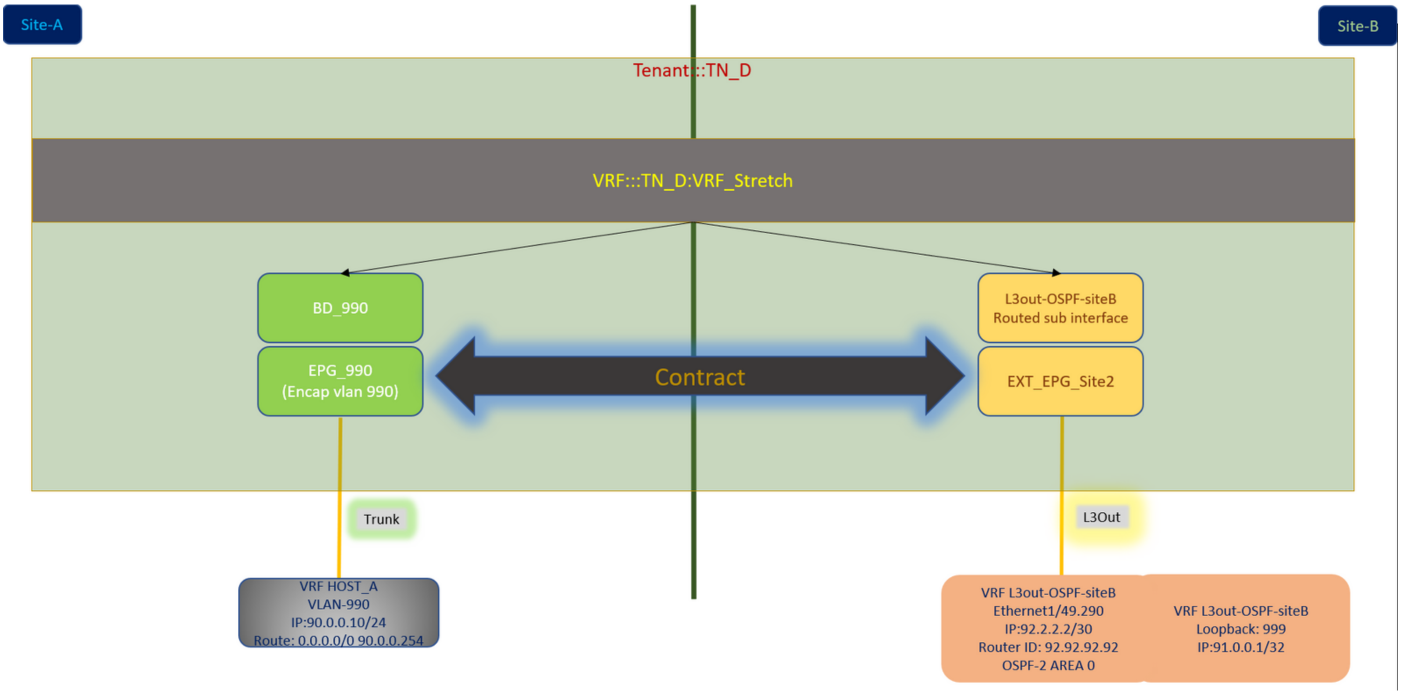
Configure

Network Diagrams

Physical Topology



Logical Topology



Configurations

In this example, we use Schema-config1. However, this configuration can be completed in a similar way (with minor changes as per contract relation) for other supported schema-configs, except the stretched object needs to be in the stretched template instead of the specific site template.

Configure Schema-config1

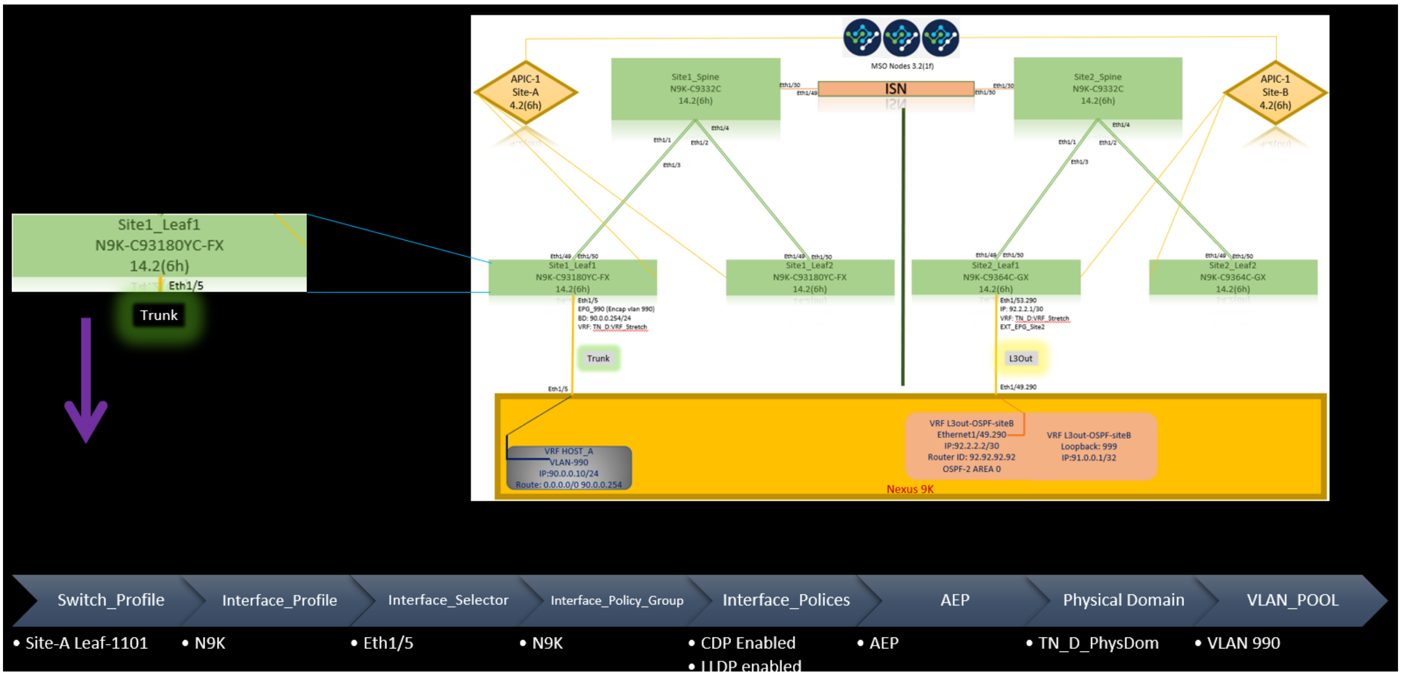
- Tenant stretched between sites (A and B).
- VRF stretched between sites (A and B).
- EPG/BD local to one site (A).
- L3out local to another site (B).
- External EPG of L3out local to site (B).
- Contract creation and configurations done from MSO.
  Review the Intersite L3Out Guidelines and Limitations.

- Unsupported configuration with intersite L3out:Multicast receivers in a site that receives multicast from an external source via another site L3out. Multicast received in a site from an external source is never sent to other sites. When a receiver in a site receives multicast from an external source it must be received on a local L3out.An internal multicast source sends a multicast to an external receiver with PIM-SM any source multicast (ASM). An internal multicast source must be able to reach an external Rendezvous Point (RP) from a local L3out.Giant OverLay Fabric (GOLF).Preferred groups for external EPG.

Configure the Fabric Policies

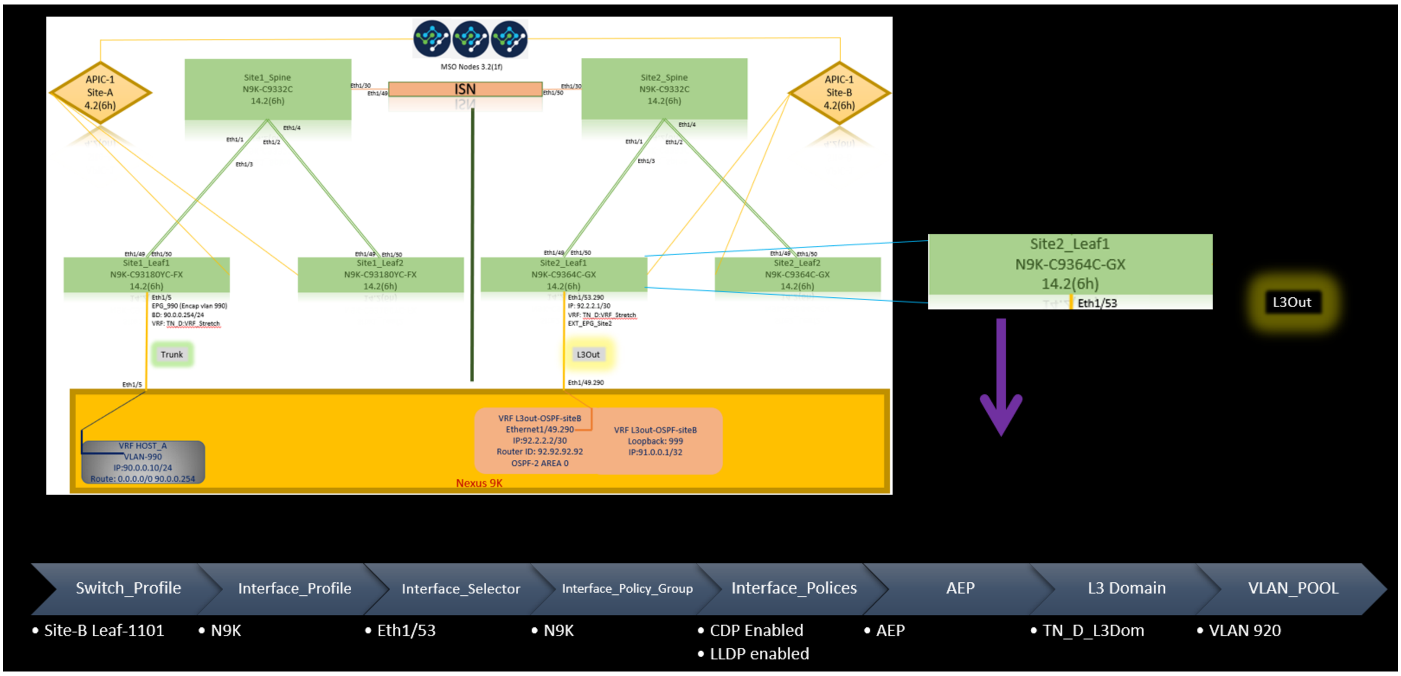
Fabric policies at each site are an essential configuration, because those policy configurations are linked to specific tenant/EPG/static port bind or L3out physical connections. Any misconfiguration with fabric policies can lead to failure of the logical configuration from APIC or MSO, hence the provided fabric policy configuration which was used in a lab setup. It helps to understand what object is linked to which object in MSO or APIC.

Host_A Connection Fabric Policies at Site-A



Switch_Profile	Interface_Profile	Interface_Selector	Interface_Policy_Group	Interface_Polices	AEP	Physical Domain	VLAN_POOL
• Site-A Leaf-1101	• N9K	• Eth1/5	• N9K	• CDP Enabled • LLDP enabled	• AEP	• TN_D_PhysDom	• VLAN 990

L3out Connection Fabric Policies at Site-B



Switch_Profile	Interface_Profile	Interface_Selector	Interface_Policy_Group	Interface_Polices	AEP	L3 Domain	VLAN_POOL
• Site-B Leaf-1101	• N9K	• Eth1/53	• N9K	• CDP Enabled • LLDP enabled	• AEP	• TN_D_L3Dom	• VLAN 920

Optional Step

Once you have fabric policies in place for respective connections, you can ensure all leaf/spines are discovered and reachable from the respective APIC cluster. Next, you can validate both sites (APIC clusters) are reachable from MSO and the multi-site setup is operational (and IPN connectivity).

Configure RTEP/ETEP

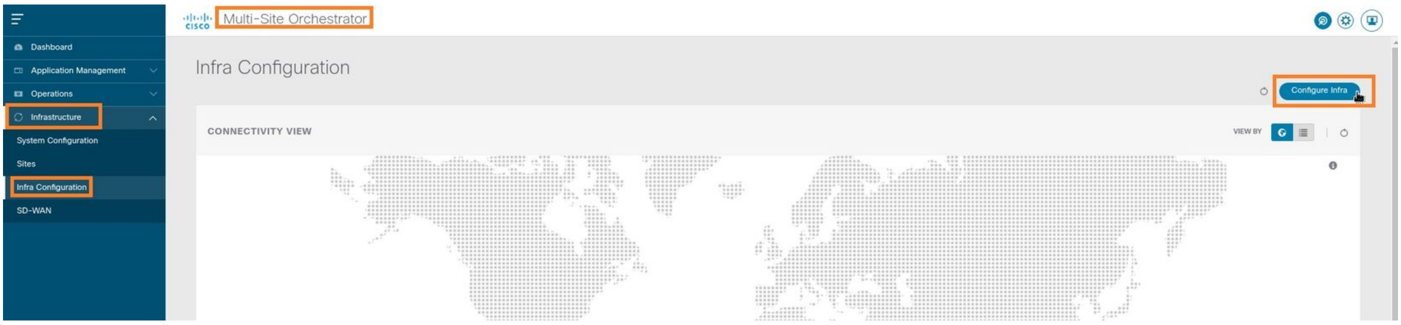
Routable Tunnel Endpoint Pool (RTEP) or External Tunnel Endpoint Pool (ETEP) is the required configuration for intersite L3out. The older version of MSO displays "Routable TEP Pools" while the newer version of MSO displays "External TEP Pools", but both are synonymous. These TEP pools are used for Border Gateway Protocol (BGP) Ethernet VPN (EVPN) via VRF "Overlay-1".

External routes from L3out are advertised via BGP EVPN toward another site. This RTEP/ETEP is also used for remote leaf configuration, so if you have an ETEP/RTEP configuration that already exists in APIC then it must be imported in MSO.

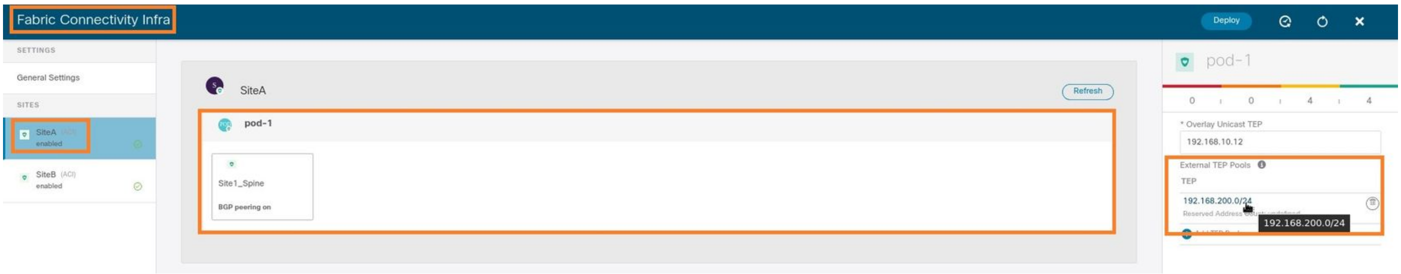
Here are the steps to configure ETEP from the MSO GUI. Since the version is 3.X MSO, it displays ETEP. ETEP pools must be unique at each site and must not overlap with any internal EPG/BD subnet of each site.

Site-A

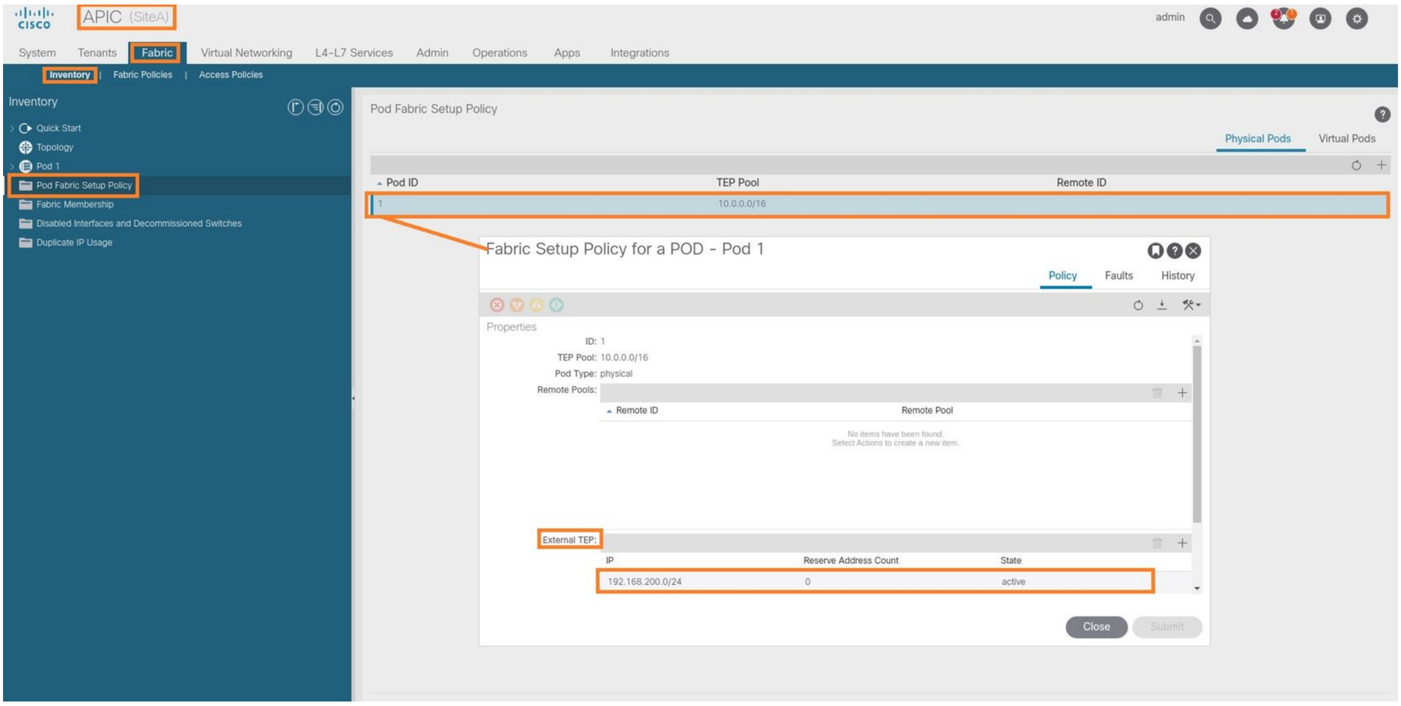
Step 1. In the MSO GUI page (open the multi-site controller in a web page), choose **Infrastructure > Infra Configuration**. Click **Configure Infra.**



Step 2. Inside Configure Infra, choose **Site-A**, Inside Site-A, choose **pod-1.** Then, inside pod-1, configure **External TEP Pools** with the external TEP IP address for Site-A. (In this example it is 192.168.200.0/24). If you have Multi-POD in Site-A, repeat this step for other pods.



Step 3. In order to verify the configuration of the ETEP pools in the APIC GUI, choose **Fabric > Inventory > Pod Fabric Setup Policy > Pod-ID** (double click to open **[Fabric Setup Policy a POD-Pod-x]**) **> External TEP.**



Pod ID	TEP Pool	Remote ID
1	10.0.0.0/16	

ID: 1
TEP Pool: 10.0.0.0/16
Pod Type: physical
Remote Pools:

Remote ID	Remote Pool

External TEP:

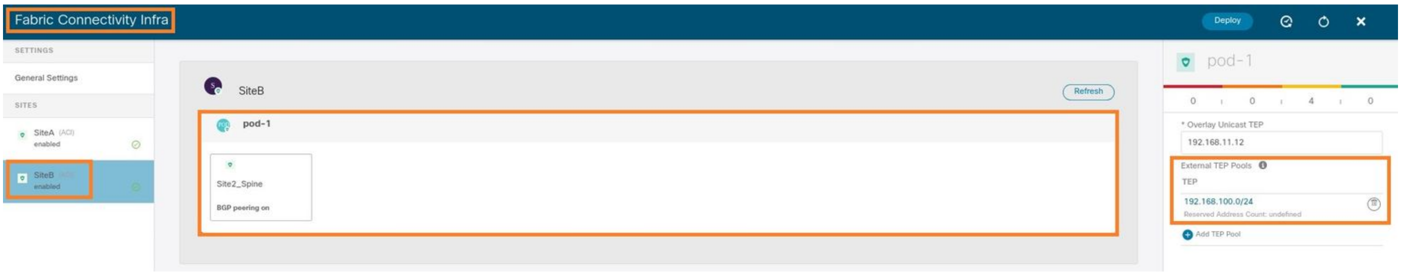
IP	Reserve Address Count	State
192.168.200.0/24	0	active

You can also verify the configuration with these commands:

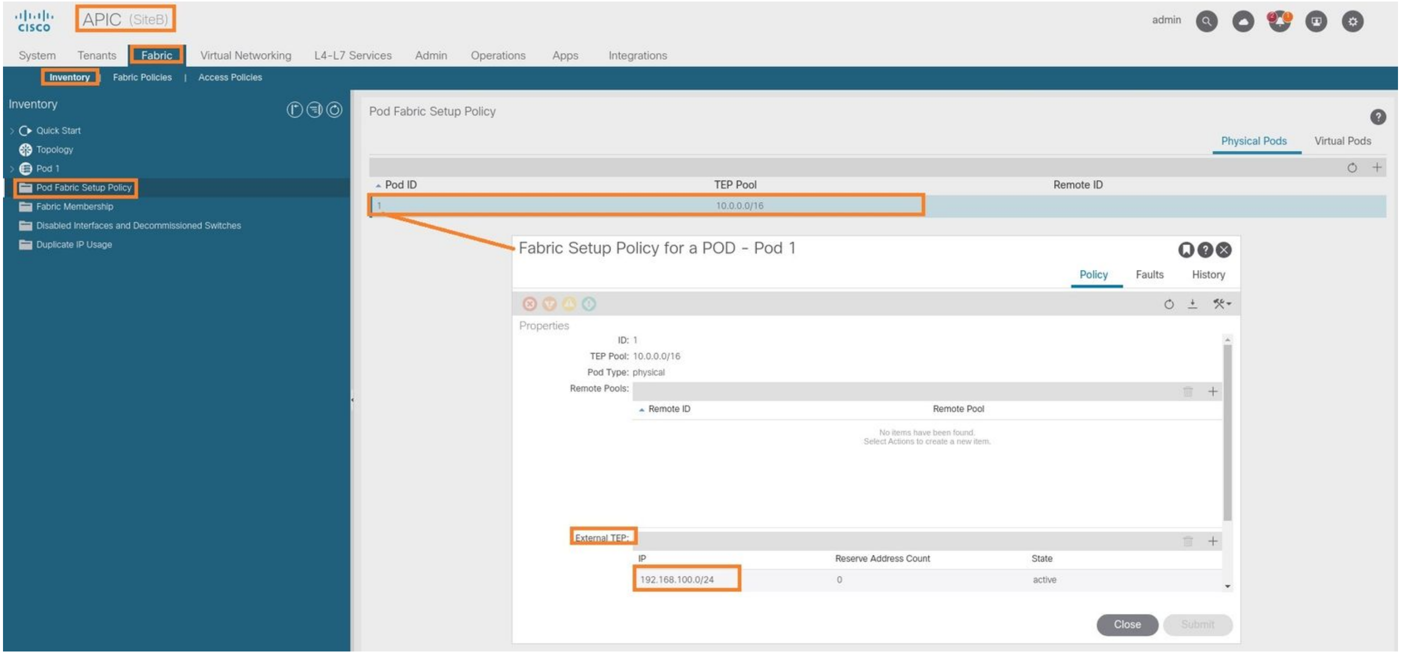
```
moquery -c fabricExtRoutablePodSubnet
moquery -c fabricExtRoutablePodSubnet -f 'fabric.ExtRoutablePodSubnet.pool=="192.168.200.0/24"'

APIC1# moquery -c fabricExtRoutablePodSubnet
Total Objects shown: 1
# fabric.ExtRoutablePodSubnet
pool                 : 192.168.200.0/24
annotation           : orchestrator:msc
childAction          :
descr                :
dn                   : uni/controller/setuppol/setupp-1/extrtpodsubnet-[192.168.200.0/24]
extMngdBy            :
lcOwn                : local
modTs                : 2021-07-19T14:45:22.387+00:00
name                 :
nameAlias            :
reserveAddressCount  : 0
rn                   : extrtpodsubnet-[192.168.200.0/24]
state                : active
status               :
uid                  : 0
```

Site-B

Step 1. Configure the External TEP Pool for Site-B (The same steps as for Site-A.) In the MSO GUI page (open the multi-site controller in a web page), choose **Infrastructure > Infra Configuration**. Click **Configure Infra**. Inside Configure Infra, choose **Site-B**. Inside Site-B, choose **pod-1**. Then, inside pod-1, configure **External TEP Pools** with the external TEP IP address for Site-B. (In this example it is 192.168.100.0/24). If you have Multi-POD in Site-B, repeat this step for other pods.



Step 2. In order to verify the configuration of the ETEP pools in the APIC GUI, choose **Fabric > Inventory > Pod Fabric Setup Policy > Pod-ID** (double click to open **[Fabric Setup Policy a POD-Pod-x]**) **> External TEP.**

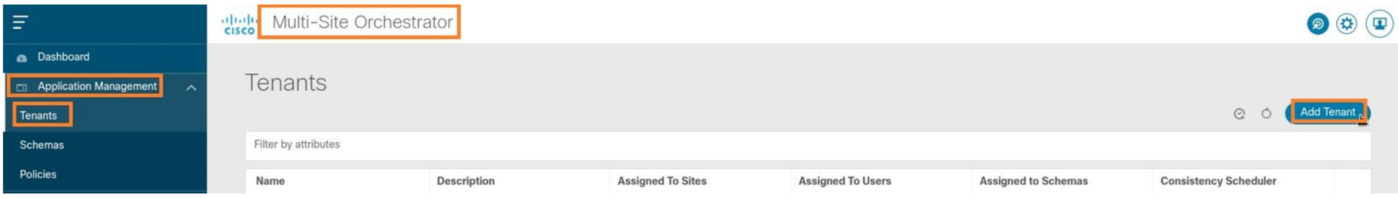


For the Site-B APIC, enter this command in order to verify the ETEP address pool.

```
apic1# moquery -c fabricExtRoutablePodSubnet -f
'fabric.ExtRoutablePodSubnet.pool=="192.168.100.0/24"'
Total Objects shown: 1
# fabric.ExtRoutablePodSubnet
pool                    : 192.168.100.0/24
annotation              : orchestrator:msc  <<< This means, configuration pushed from MSO.
childAction             :
descr                   :
dn                      : uni/controller/setuppol/setupp-1/extrtpodsubnet-[192.168.100.0/24]
extMngdBy               :
lcOwn                   : local
modTs                   : 2021-07-19T14:34:18.838+00:00
name                    :
nameAlias               :
reserveAddressCount     : 0
rn                      : extrtpodsubnet-[192.168.100.0/24]
state                   : active
status                  :
uid                     : 0
```

Configure the Stretch Tenant

Step 1. In the MSO GUI, choose **Application Management > Tenants**. Click **Add Tenant**. In this example, the Tenant name is "TN_D".

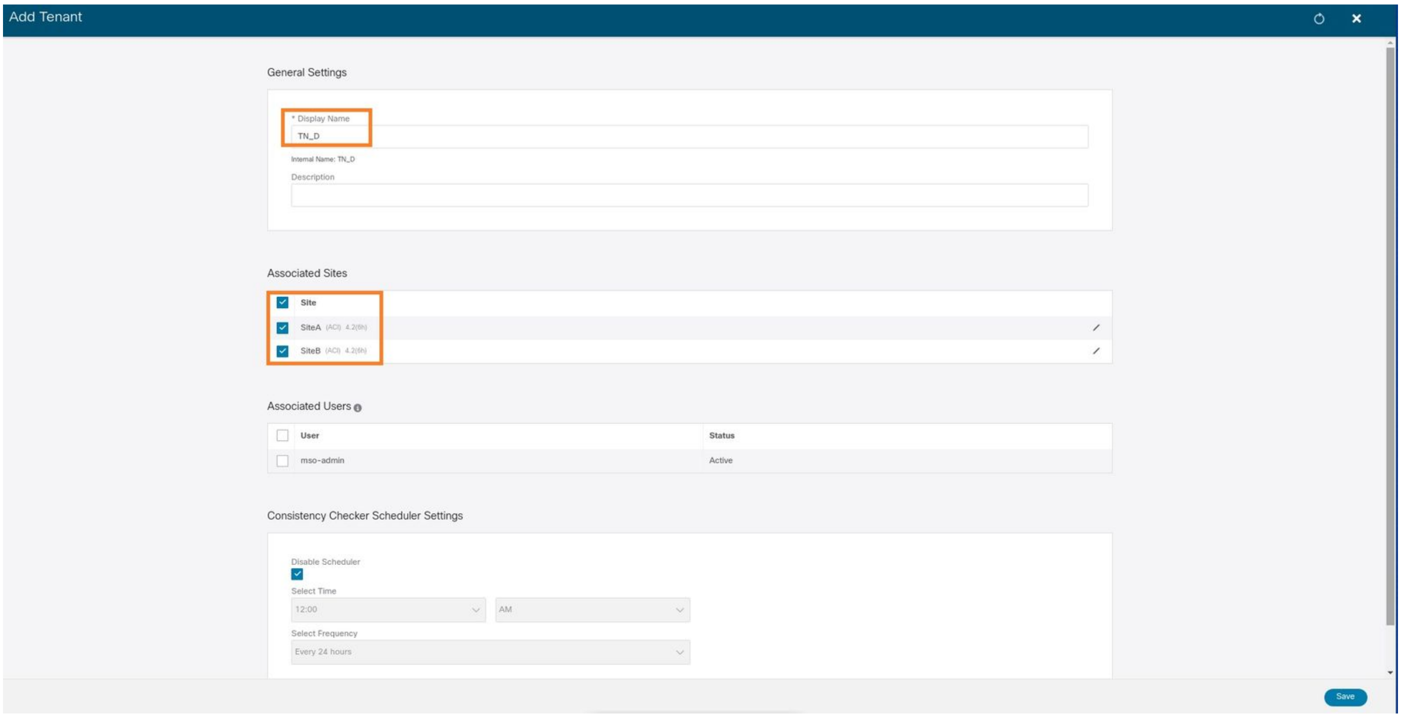


Tenants

Filter by attributes

Name	Description	Assigned To Sites	Assigned To Users	Assigned to Schemas	Consistency Scheduler

Step 2. In the **Display Name** field, enter the tenant's name. In the **Associated Sites** section, check the **Site A** and **Site B** check boxes.



General Settings

* Display Name: TN_D

Internal Name: TN_D

Description

Associated Sites

☑	Site
☑	SiteA (ACI) 4.2(6h)
☑	SiteB (ACI) 4.2(6h)

Associated Users

□	User	Status
□	mso-admin	Active

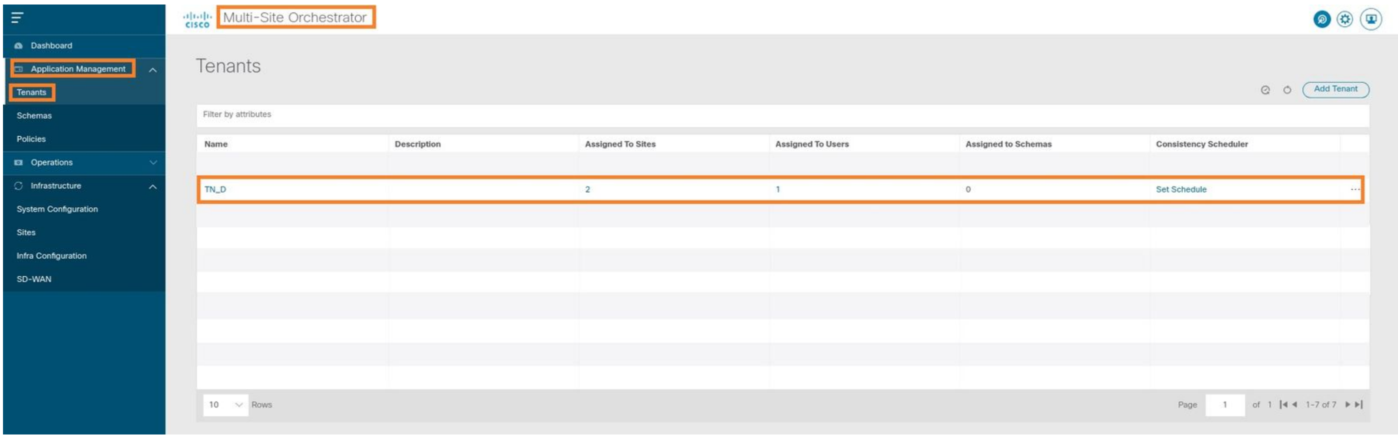
Consistency Checker Scheduler Settings

Disable Scheduler ☑

Select Time: 12:00 AM

Select Frequency: Every 24 hours

Step 3. Verify that the new tenant "Tn_D" is created.



Tenants

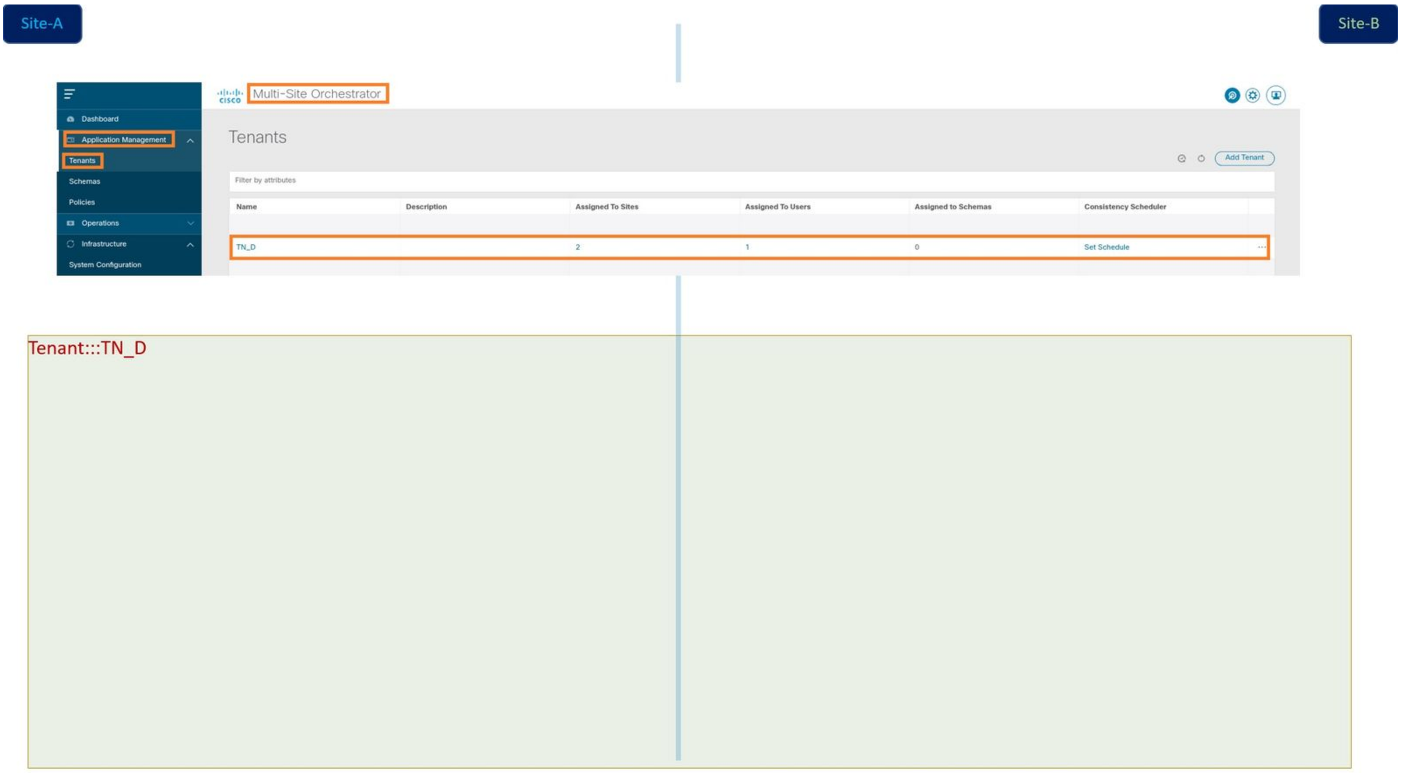
Filter by attributes

Name	Description	Assigned To Sites	Assigned To Users	Assigned to Schemas	Consistency Scheduler
TN_D		2	1	0	Set Schedule

10 Rows Page 1 of 1 1-7 of 7

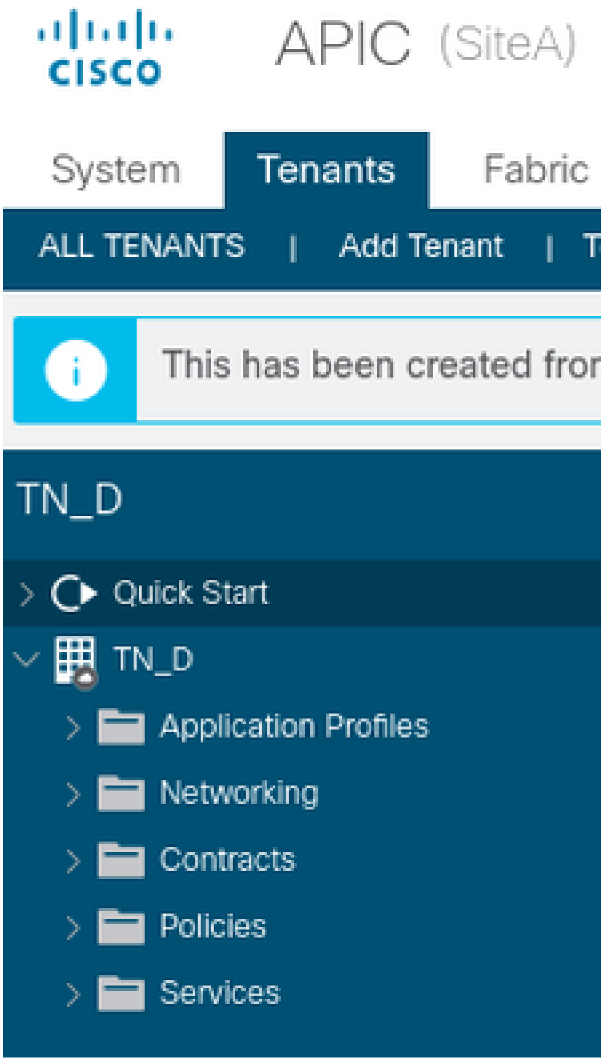
Logical View

When we create a tenant from MSO, it basically creates a tenant at Site-A and Site-B. It is a stretch tenant. A logical view of this tenant is shown in this example. This logical view helps to understand that tenant TN_D is stretched tenant between Site-A and Site-B.



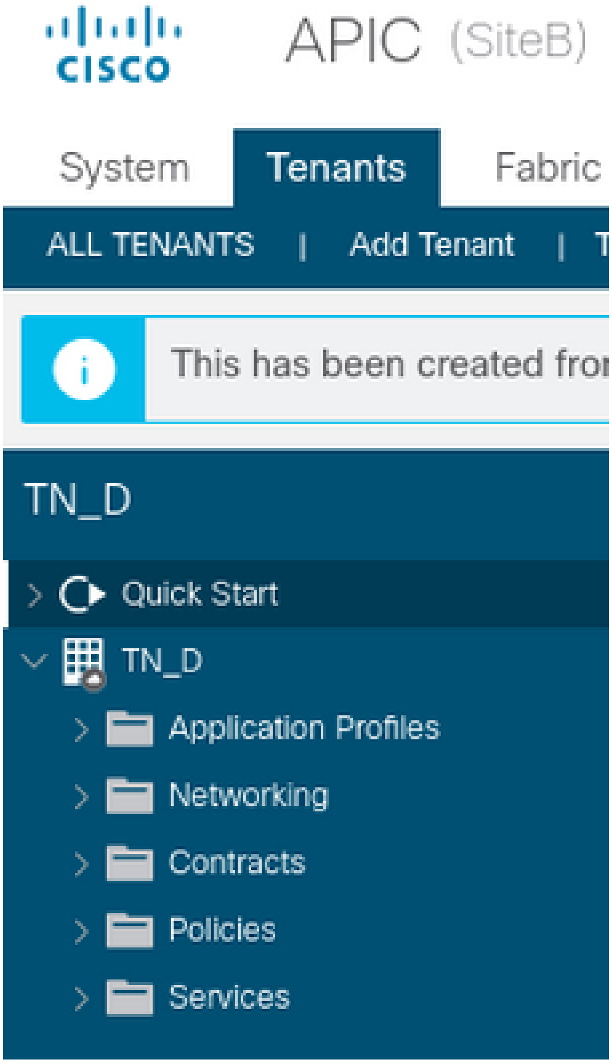
Name	Description	Assigned To Sites	Assigned To Users	Assigned to Schemas	Consistency Scheduler
TN_D		2	1	0	Set Schedule

You can verify the logical view in the APIC of each site. You can see that Site-A and Site-B both show "TN_D" tenant created.



This has been created fror

The same stretched tenant "TN_D" is also created in Site-B.



This command shows the tenant pushed from MSO and you can use it for verification purposes. You can run this command in the APIC of both sites.

```
APIC1# moquery -c fvTenant -f 'fv.Tenant.name=="TN_D"'
Total Objects shown: 1
# fv.Tenant
name          : TN_D
annotation    : orchestrator:msc
childAction   :
descr         :
dn            : uni/tn-TN_D
extMngdBy     : msc
lcOwn         : local
modTs         : 2021-09-17T21:42:52.218+00:00
monPolDn      : uni/tn-common/monepg-default
nameAlias     :
ownerKey      :
ownerTag      :
rn            : tn-TN_D
status        :
uid           : 0


apic1# moquery -c fvTenant -f 'fv.Tenant.name=="TN_D"'
Total Objects shown: 1
```

```
# fv.Tenant
name          : TN_D
annotation    : orchestrator:msc
childAction   :
descr         :
dn            : uni/tn-TN_D
extMngdBy     : msc
lcOwn         : local
modTs         : 2021-09-17T21:43:04.195+00:00
monPolDn      : uni/tn-common/monepg-default
nameAlias     :
ownerKey      :
ownerTag      :
rn            : tn-TN_D
status        :
uid           : 0
```

Configure the Schema

Next, create a schema that has a total of three templates:

1. Template for Site-A: The template for Site-A only associates with Site-A, hence whatever logical object configuration in that template can only push to the APIC of Site-A.
2. Template for Site-B: The template for Site-B only associates with Site-B, hence whatever logical object configuration in that template can only push to the APIC of Site-B.
3. Stretched Template: The stretched template associates with both sites and any logical configuration in the stretched template can push to both sites of APICs.

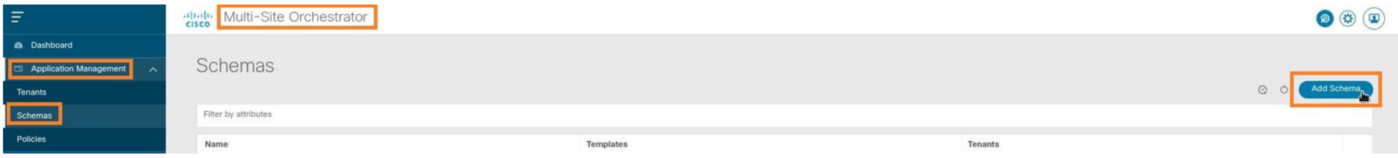
Create the Schema

Schema is locally significant in MSO, it does not create any object in APIC. Schema configuration is the logical separation of each configuration. You can have multiple schema for the same tenants, and you can also have multiple templates inside each schema.

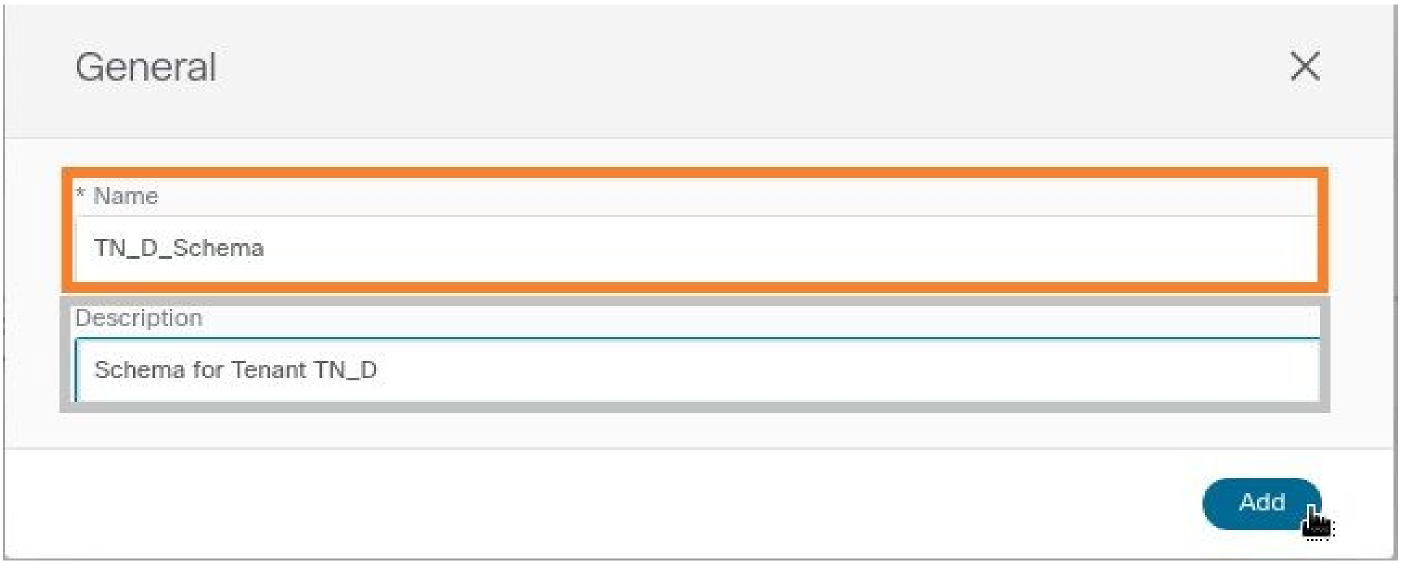
For example, you can have a schema for the database server for tenant X and the application server uses a different schema for the same tenant-X. This can help to separate each specific application-related configuration and is easy when you need to debug an issue. It is also easy to find information.

Create a schema with the name of the tenant (for example, TN_D_Schema). However, it is not necessary to have the name of schema start with the tenant name, you can create a schema with any name.

Step 1. Choose **Application Management > Schemas**. Click **Add Schema**.



Step 2. In the **Name** field, enter the name of the schema. In this example it is "TN_D_Schema", however you can keep any name which is appropriate for your environment. Click **Add**.



General

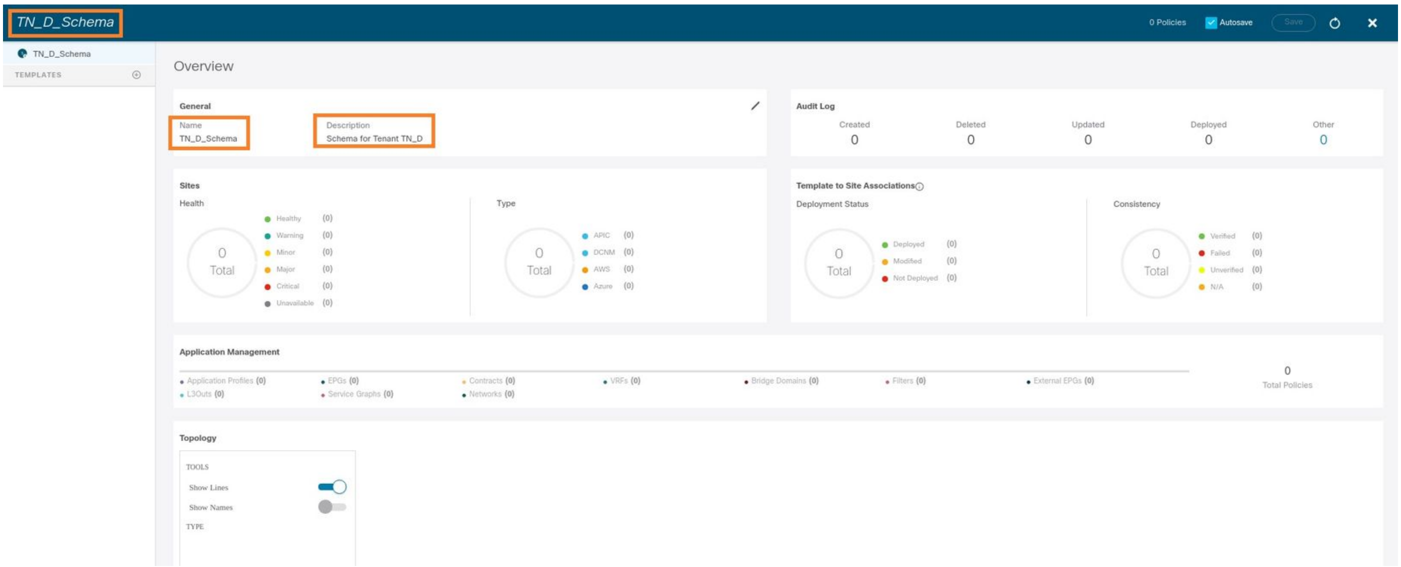
* Name

TN_D_Schema

Description

Schema for Tenant TN_D

Step 3. Verify that schema "TN_D_Schema" was created.



TN_D_Schema

Overview

General

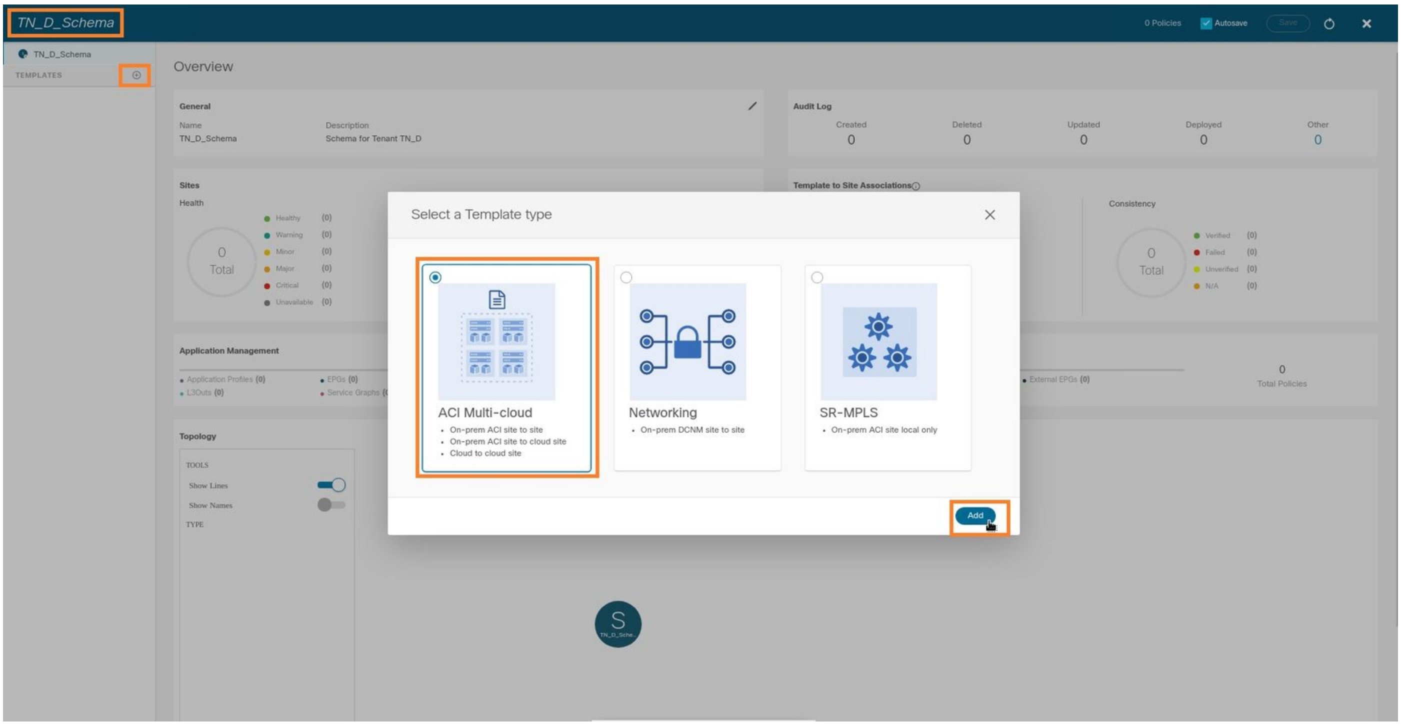
Name: TN_D_Schema

Description: Schema for Tenant TN_D

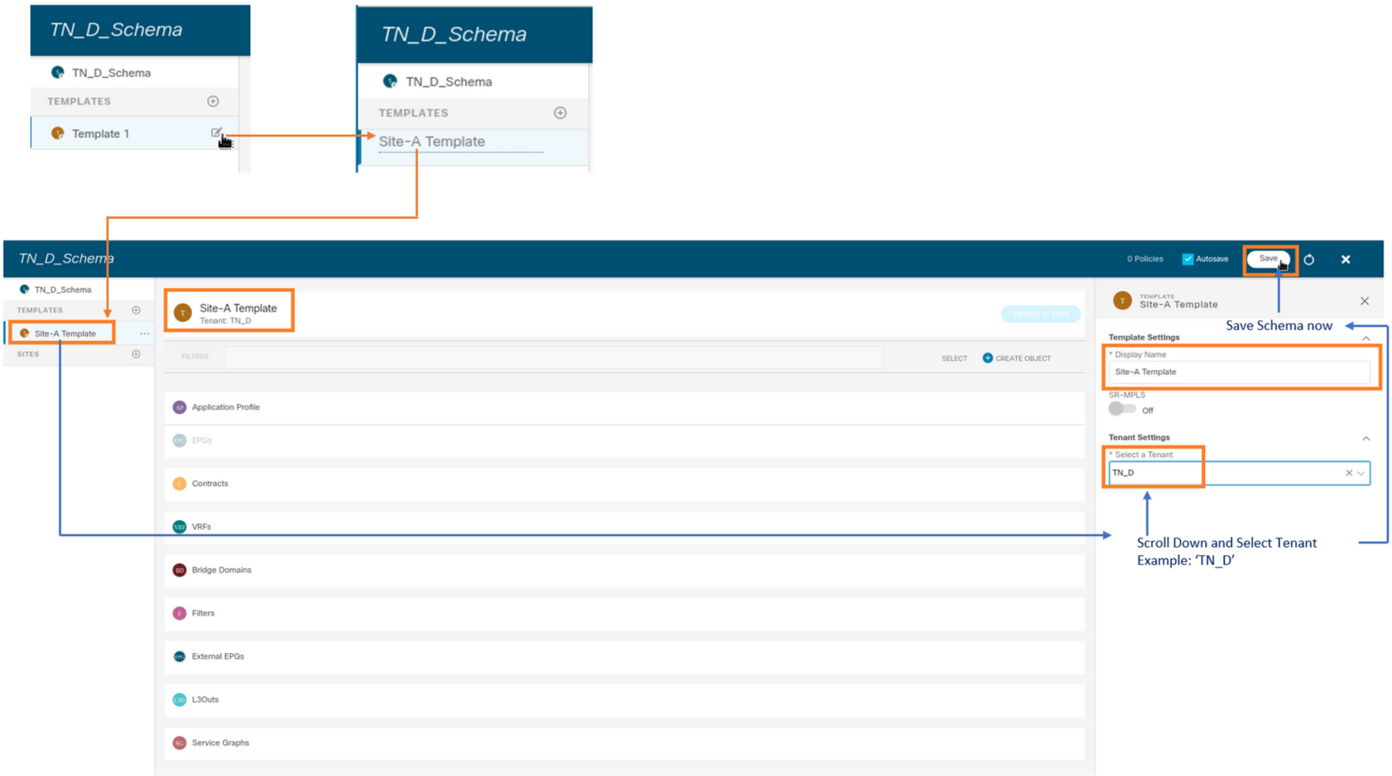
Create the Site-A Template

Step 1. Add a template inside the schema.

1. In order to create a template, click **Templates** under the schema which you have created. The Select a Template type dialog box is displayed.
2. Choose **ACI Multi-cloud**.
3. Click **Add**.



Step 2. Enter a name for the template. This template is specific to Site-A, hence the template name "Site-A Template". Once the template is created, you can attach a specific tenant to the template. In this example, the tenant "TN_D" is attached.



Display Name: Site-A Template

Select a Tenant: TN_D

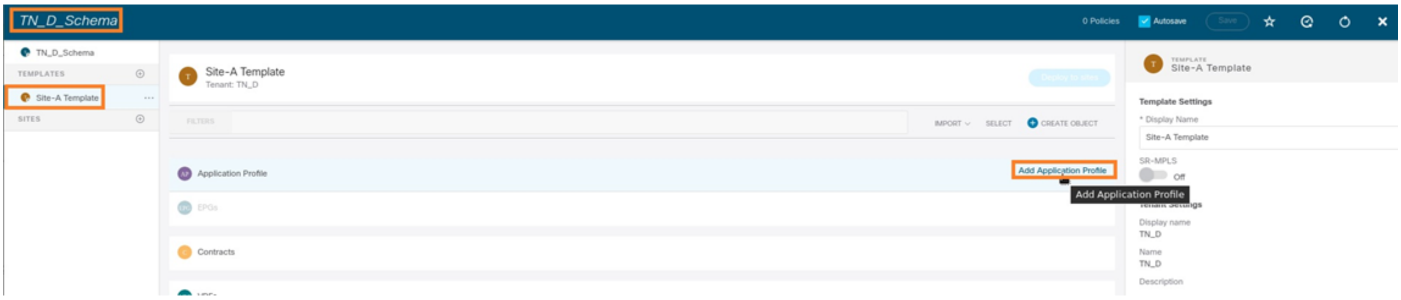
Save Schema now

Scroll Down and Select Tenant Example: 'TN_D'

Configure the Template

Application Profile Configuration

Step 1. From the schema that you created, choose **Site-A Template**. Click **Add Application Profile**.

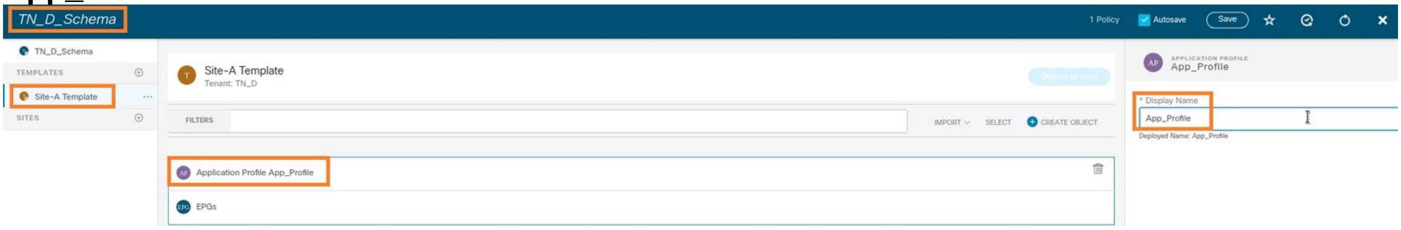


Display Name: Site-A Template

Display name: TN_D

Name: TN_D

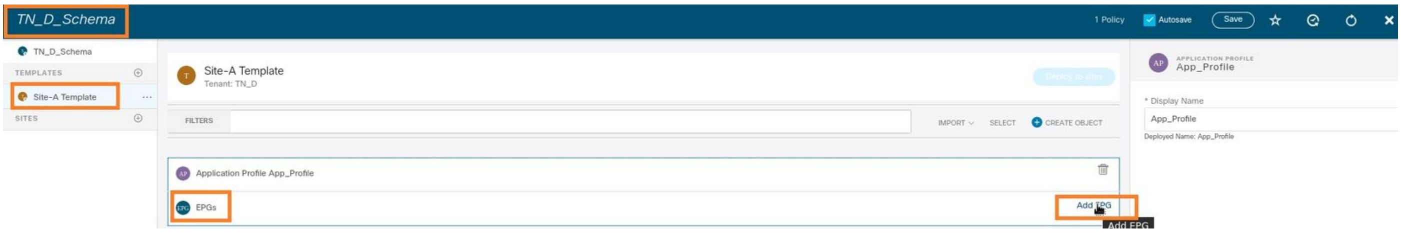
Step 2. In the **Display Name** field, enter the application profile name **App_Profile**.



Display Name: App_Profile

Deployed Name: App_Profile

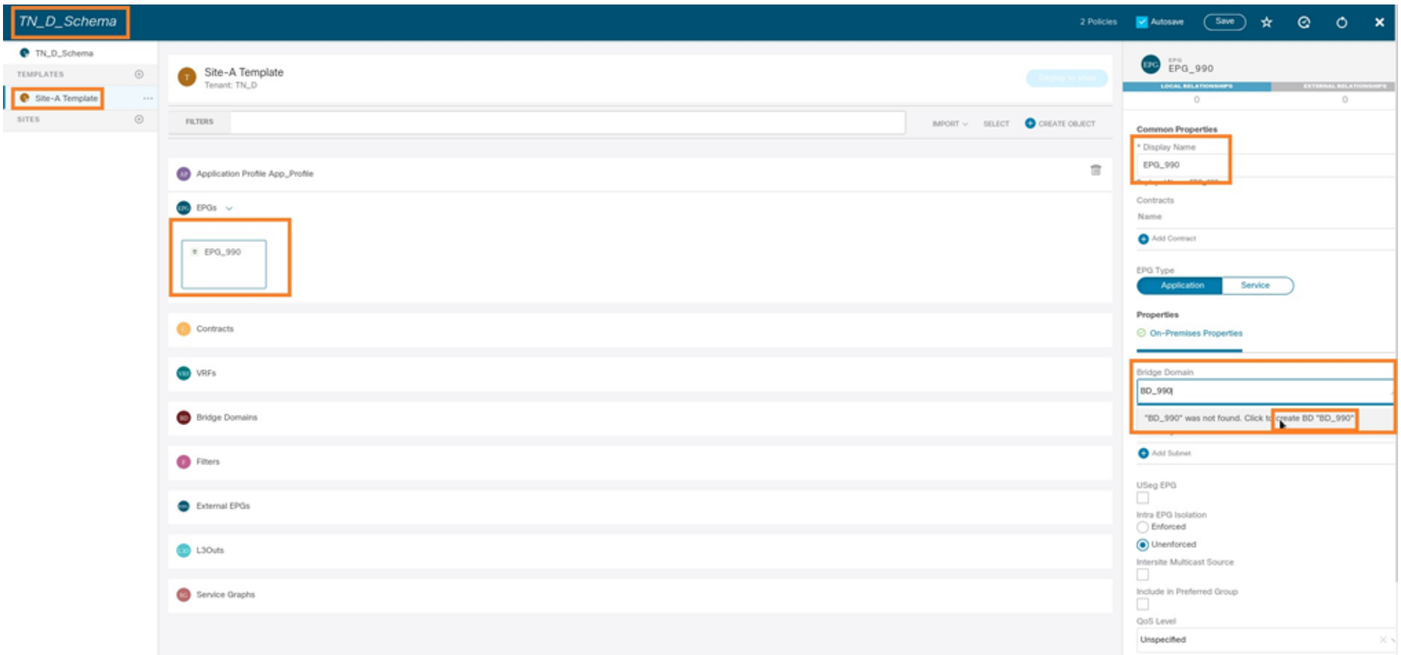
Step 3. The next step is to create EPG. In order to add EPG under the application profile, click **Add EPG** under the Site-A template. You can see a new EPG is created inside the EPG configuration.



Display Name: App_Profile

Deployed Name: App_Profile

Step 4. In order to attach EPG with BD and VRF, you have to add BD and VRF under EPG. Choose **Site-A Template**. In the **Display Name** field, enter the name of the EPG and attach a new BD (you can create a new BD or attach an existing BD).



Display Name: EPG_990

Bridge Domain: BD_990

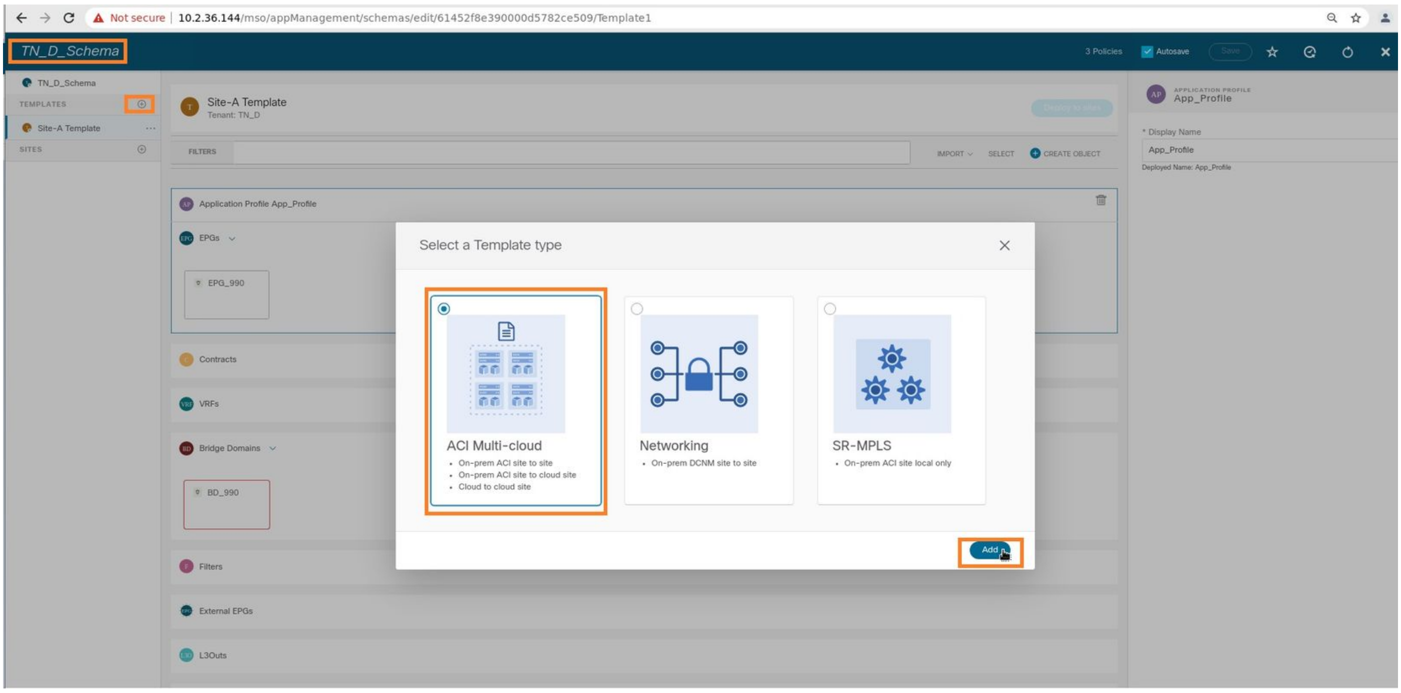
"BD_990" was not found. Click to create BD "BD_990"

QoS Level: Unspecified

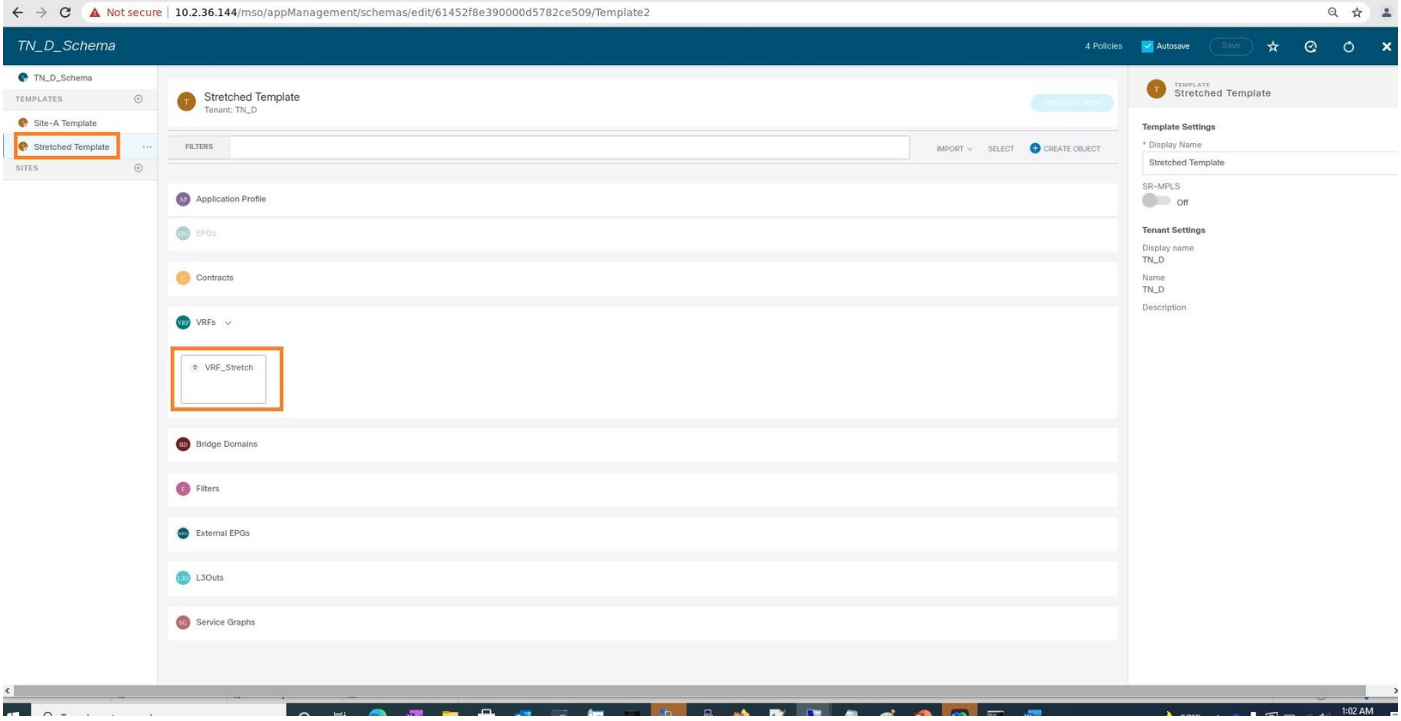
Note that you have to attach VRF to a BD, but VRF is stretched in this case. You can create the stretched template with stretched VRF and then attach that VRF to BD under site specific template (in our case it is **Site-A Template**).

Create the Stretch Template

Step 1. In order to create the stretch template, under the TN_D_Schema click **Templates**. The Select a Template type dialog box is displayed. Choose **ACI Multi-cloud**. Click **Add**. Enter the name **Stretched Template** for the template. (You can enter any name for the stretched template.)

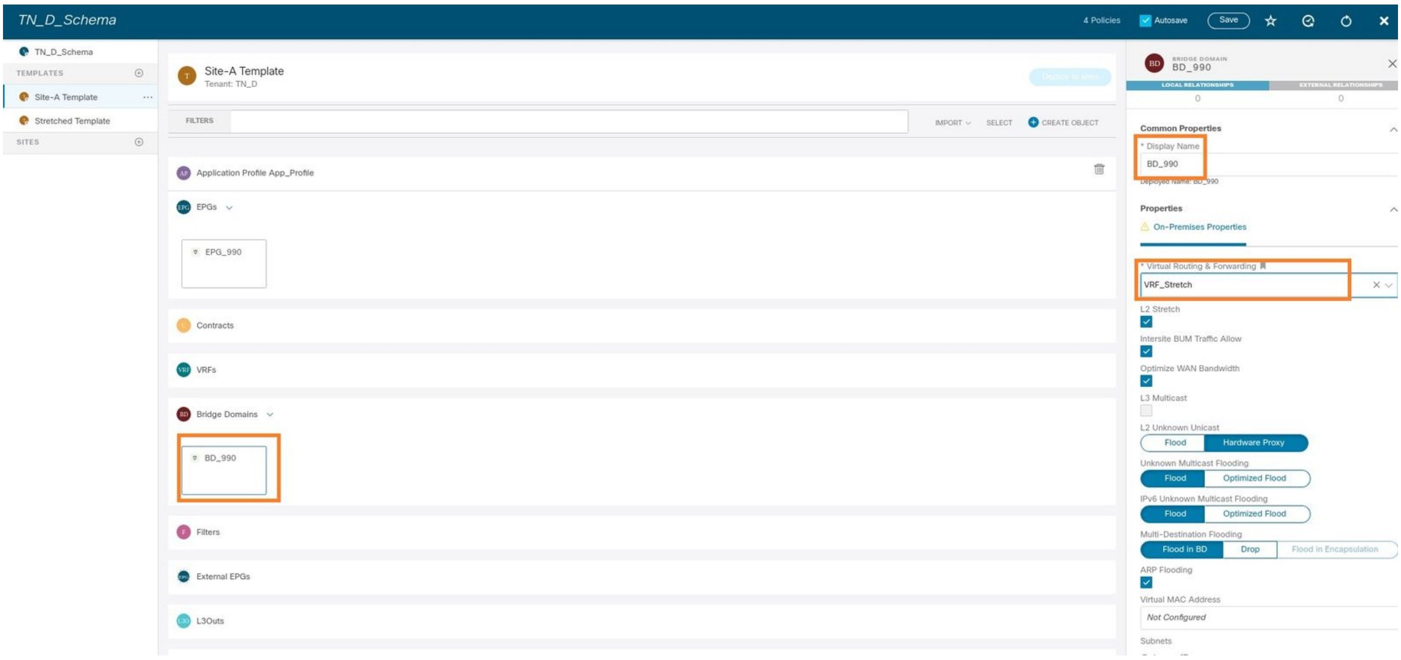


Step 2. Choose **Stretched Template** and create a VRF with the name **VRF_Stretch**. (You can enter any name for VRF.)



BD was created with the EPG creation under **Site-A Template**, but there were no VRF attached, hence you have to attach VRF which is now reated in the **Stretched Template**.

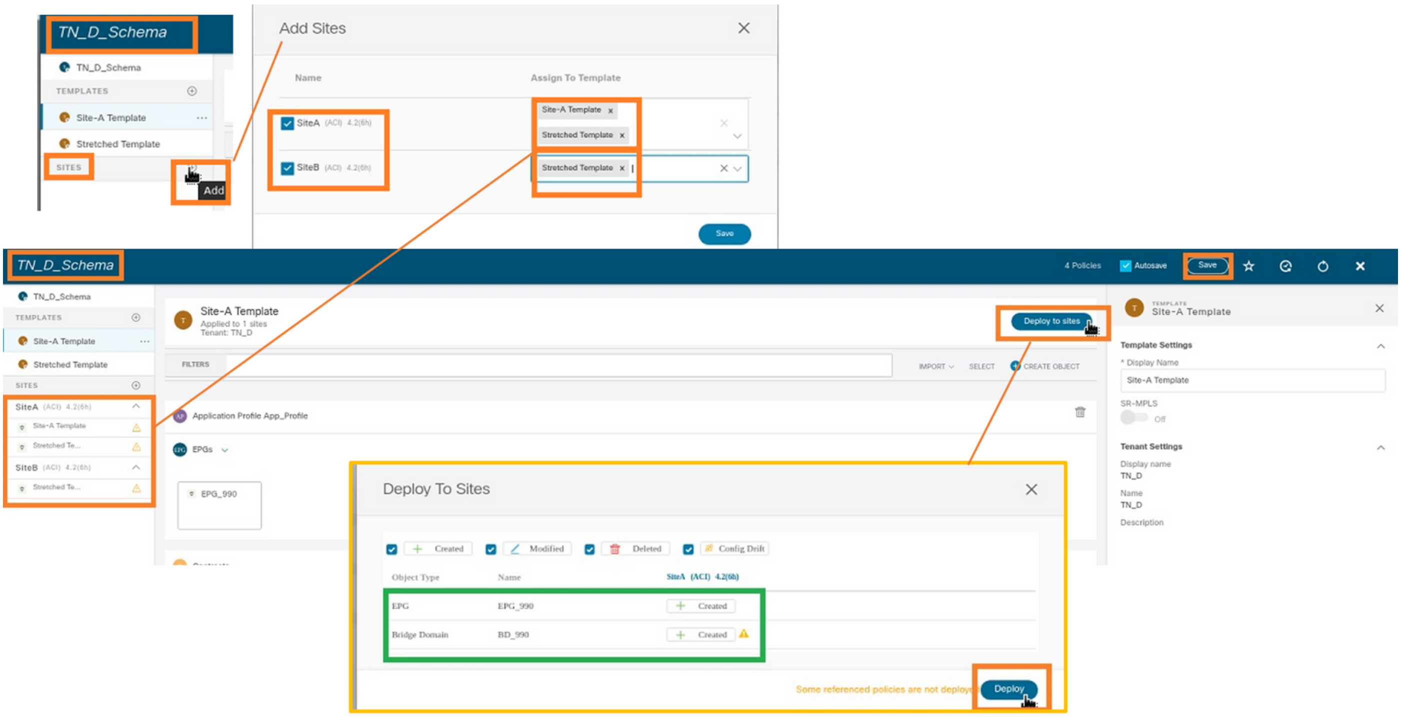
Step 3. Choose **Site-A Template > BD_990**. In the **Virtual Routing & Forwarding** drop-down list, choose **VRF_Stretch**. (The one you created in Step 2 of this section.)



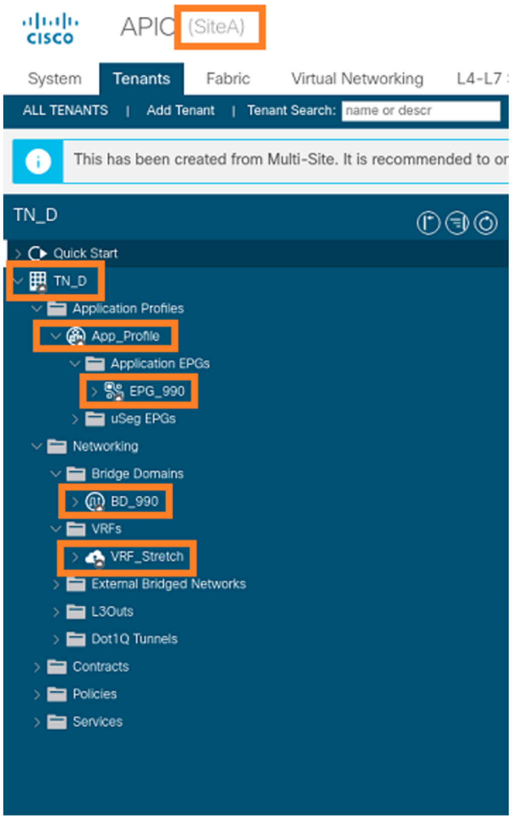
Attach the Template

The next step is to attach the **Site-A Template** with **Site-A** only, and the stretched template needs to be attached to both sites. Click **Deploy to site** inside the schema in order to deploy templates to the respective sites.

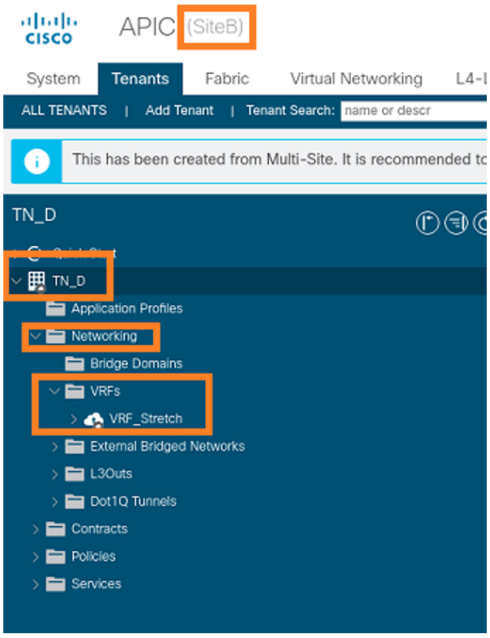
Step 1. Click the **+** sign under **TN_D_Schema > SITES** to add sites to template. In the **Assign to Template** drop-down list, choose the respective template for the appropriate sites.



Step 2. You can see **Site-A** has EPG and BD now create but **Site-B** does not have same EPG/BD created because those configuration only applies to Site-A from MSO. However, you can see VRF is created in the **Stretched Template** hence it is created in both sites.



This has been created from Multi-Site. It is recommended to or



This has been created from Multi-Site. It is recommended to

Step 3. Verify the configuration with these commands.

```
APIC1# moquery -c fvAEPg -f 'fv.AEPg.name=="EPG_990"'
Total Objects shown: 1
# fv.AEPg
name                     : EPG_990
annotation               : orchestrator:msc
childAction              :
configIssues             :
configSt                 : applied
descr                    :
dn                       : uni/tn-TN_D/ap-App_Profile/epg-EPG_990
exceptionTag             :
extMngdBy                :
floodOnEncap             : disabled
fwdCtrl                  :
hasMcastSource           : no
isAttrBasedEPg           : no
isSharedSrvMsiteEPg      : no
lcOwn                    : local
matchT                   : AtleastOne
modTs                    : 2021-09-18T08:26:49.906+00:00
monPolDn                 : uni/tn-common/monepg-default
nameAlias                :
pcEnfPref                : unenforced
pcTag                    : 32770
prefGrMemb               : exclude
prio                     : unspecified
rn                       : epg-EPG_990
scope                    : 2850817
shutdown                 : no
status                   :
triggerSt                : triggerable
txId                     : 1152921504609182523
uid                      : 0
```

```
APIC1# moquery -c fvBD -f 'fv.BD.name=="BD_990"'
Total Objects shown: 1
# fv.BD
name                     : BD_990
OptimizeWanBandwidth     : yes
annotation               : orchestrator:msc
arpFlood                 : yes
bcastP                   : 225.0.56.224
childAction              :
configIssues             :
descr                    :
dn                       : uni/tn-TN_D/BD-BD_990
epClear                  : no
epMoveDetectMode         :
extMngdBy                :
hostBasedRouting         : no
intersiteBumTrafficAllow : yes
intersiteL2Stretch       : yes
ipLearning               : yes
ipv6McastAllow           : no
lcOwn                    : local
limitIpLearnToSubnets    : yes
llAddr                   : ::
mac                      : 00:22:BD:F8:19:FF
mcastAllow               : no
modTs                    : 2021-09-18T08:26:49.906+00:00
monPolDn                 : uni/tn-common/monepg-default
mtu                      : inherit
multiDstPktAct           : bd-flood
nameAlias                :
ownerKey                 :
ownerTag                 :
pcTag                    : 16387
rn                       : BD-BD_990
scope                    : 2850817
seg                      : 16580488
status                   :
type                     : regular
uid                      : 0
unicastRoute             : yes
unkMacUcastAct           : proxy
unkMcastAct              : flood
v6unkMcastAct            : flood
vmac                     : not-applicable
               : 0
```

```
APIC1# moquery -c fvCtx -f 'fv.Ctx.name=="VRF_Stretch"'
Total Objects shown: 1
# fv.Ctx
name                 : VRF_Stretch
annotation           : orchestrator:msc
bdEnforcedEnable     : no
childAction          :
descr                :
dn                   : uni/tn-TN_D/ctx-VRF_Stretch
extMngdBy            :
ipDataPlaneLearning  : enabled
knwMcastAct          : permit
lcOwn                : local
modTs                : 2021-09-18T08:26:58.185+00:00
```

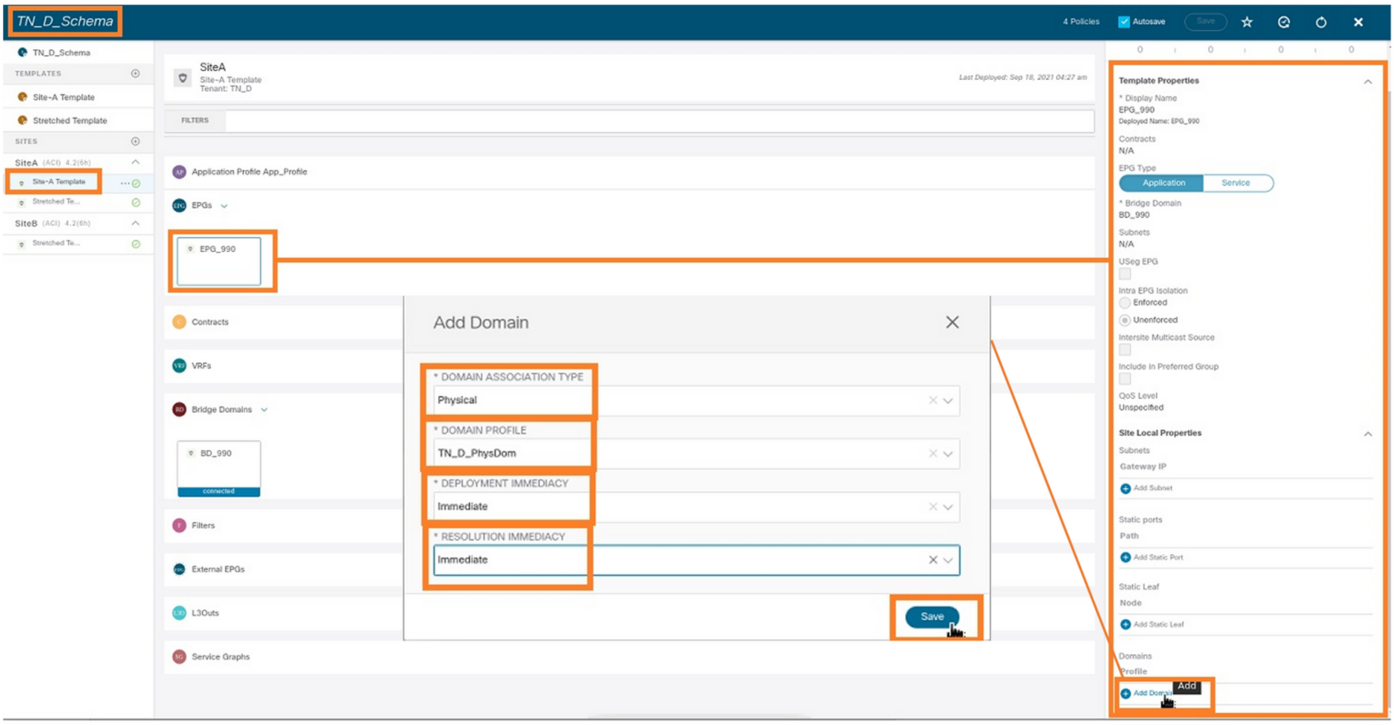
```
monPolDn               : uni/tn-common/monepg-default
nameAlias              :
ownerKey               :
ownerTag               :
pcEnfDir               : ingress
pcEnfDirUpdated        : yes
pcEnfPref              : enforced
pcTag                  : 16386
rn                     : ctx-VRF_Stretch
scope                  : 2850817
seg                    : 2850817
status                 :
uid                    : 0
```

Configure Static Port Bind

You can now configure static port bind under EPG "EPG_990" and also configure the N9K with VRF HOST_A (basically it simulates HOST_A). The ACI side static port bind configuration will be completed first.

Step 1. Add the physical domain under EPG_990.

1. From the schema that you created, choose **Site-A Template > EPG_990**.
2. In the **Template Properties** box, click **Add Domain**.
3. In the **Add Domain** dialog box, choose these options from the drop-down lists: Domain Association Type - **Physical**Domain Profile - T**N_D_PhysDom**Deployment Immediacy - **Immediate**Resolution Immediacy - **Immediate**
4. Click **Save**.



Add Domain

* DOMAIN ASSOCIATION TYPE: Physical
* DOMAIN PROFILE: TN_D_PhysDom
* DEPLOYMENT IMMEDIACY: Immediate
* RESOLUTION IMMEDIACY: Immediate

Save

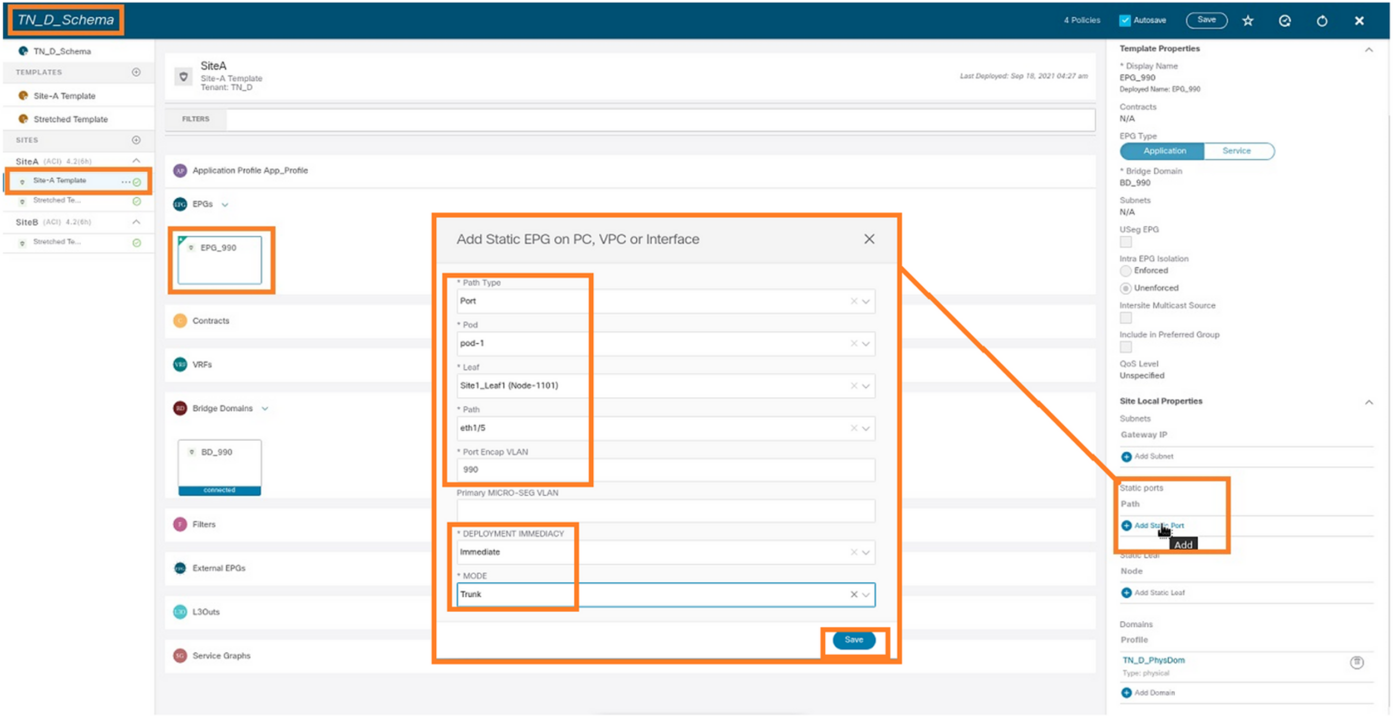
Template Properties
* Display Name: EPG_990
Deployed Name: EPG_990
Contracts: N/A
EPG Type: Application | Service
* Bridge Domain: BD_990
Subnets: N/A
USeg EPG: □
Intra EPG Isolation: ○ Enforced ● Unenforced
Intersite Multicast Source: □
Include in Preferred Group: □
QoS Level: Unspecified

Site Local Properties
Subnets: Gateway IP
Add Subnet
Static ports: Path
Add Static Port
Static Leaf: Node
Add Static Leaf
Domains: Profile
Add Domain

Step 2. Add the static port (Site1_Leaf1 eth1/5).

1. From the schema that you created, choose **Site-A Template > EPG_990**.
2. In the **Template Properties** box, click **Add Static Port**.
3. In the **Add Static EPG on PC, VPC or Interface** dialog box, choose **Node-101 eth1/5** and

assign **VLAN 990**.



Add Static EPG on PC, VPC or Interface

- * Path Type: Port
- * Pod: pod-1
- * Leaf: Site1_Leaf1 (Node-1101)
- * Path: eth1/5
- * Port Encap VLAN: 990
- Primary MICRO-SEG VLAN:
- * DEPLOYMENT IMMEDIACY: Immediate
- * MODE: Trunk

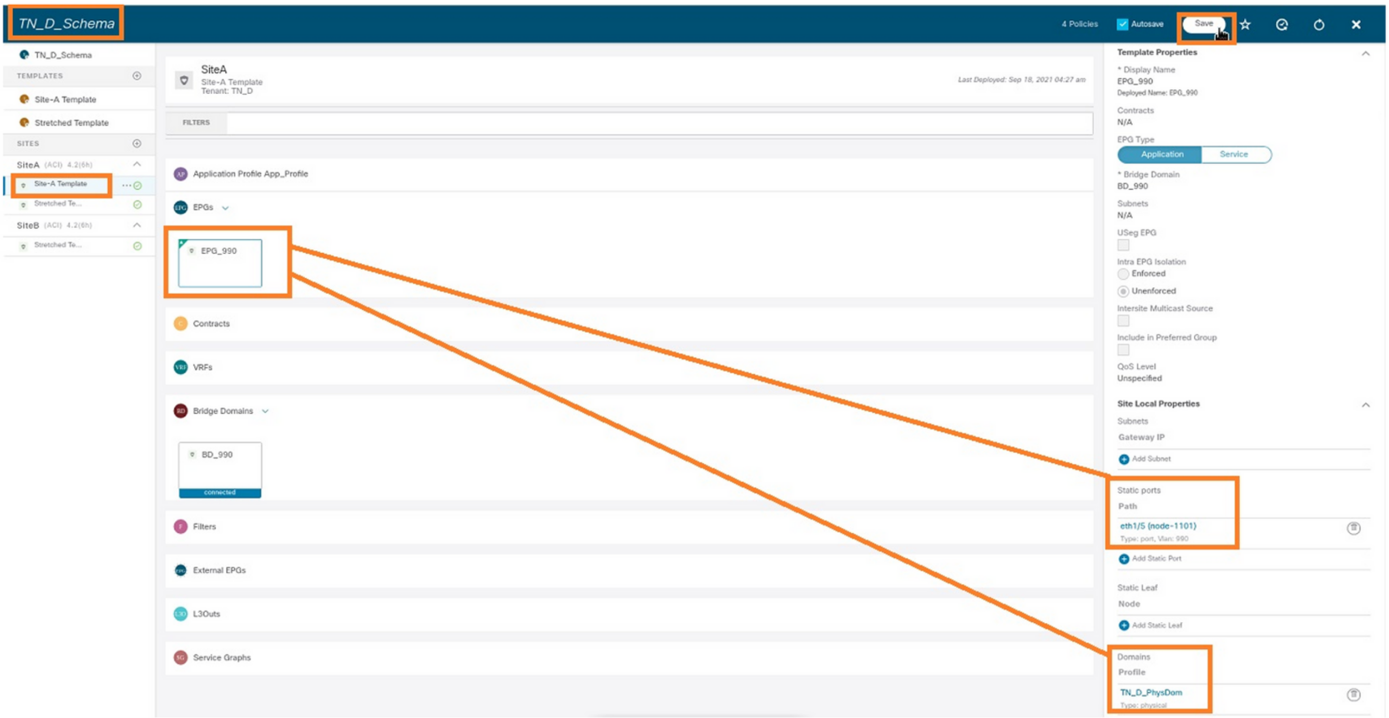
Template Properties

- * Display Name: EPG_990
- Deployed Name: EPG_990
- Contracts: N/A
- EPG Type: Application | Service
- * Bridge Domain: BD_990
- Subnets: N/A
- USeg EPG: □
- Intra EPG Isolation: ○ Enforced ● Unenforced
- Intersite Multicast Source: □
- Include in Preferred Group: □
- QoS Level: Unspecified

Site Local Properties

- Subnets / Gateway IP
- Static ports / Path
- Static Leaf / Node
- Domains / Profile: TN_D_PhysDom, Type: physical

Step 3. Ensure the static ports and physical domain are added under **EPG_990.**



Template Properties

- * Display Name: EPG_990
- Deployed Name: EPG_990
- Contracts: N/A
- EPG Type: Application | Service
- * Bridge Domain: BD_990
- Subnets: N/A
- USeg EPG: □
- Intra EPG Isolation: ○ Enforced ● Unenforced
- Intersite Multicast Source: □
- Include in Preferred Group: □
- QoS Level: Unspecified

Site Local Properties

- Subnets / Gateway IP
- Static ports / Path: eth1/5 (node-1101), Type: port, Vlan: 990
- Static Leaf / Node
- Domains / Profile: TN_D_PhysDom, Type: physical

Verify the static path bind with this command:

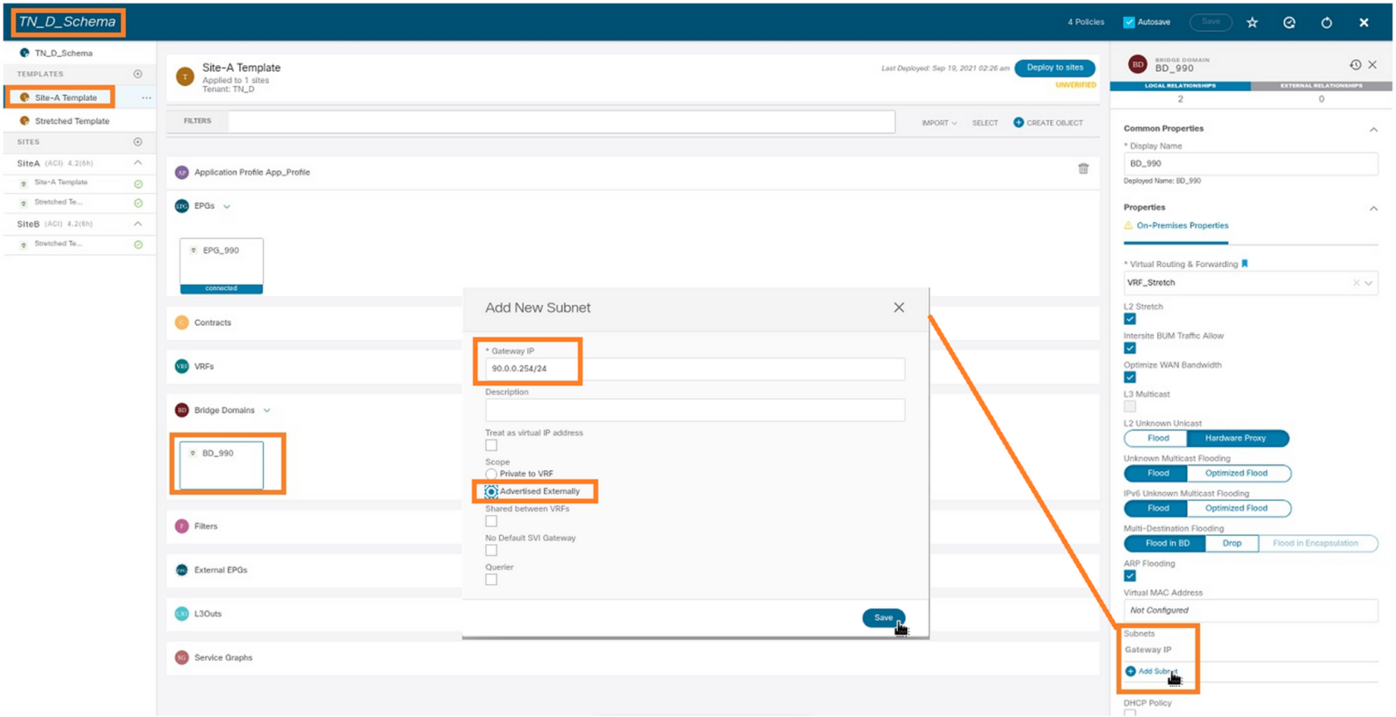
```
APIC1# moquery -c fvStPathAtt -f 'fv.StPathAtt.pathName=="eth1/5"' | grep EPG_990 -A 10 -B 5
# fv.StPathAtt
pathName     : eth1/5
childAction  :
descr        :
dn           : uni/epp/fv-[uni/tn-TN_D/ap-App_Profile/epg-EPG_990]/node-1101/stpathatt-[eth1/5]
lcOwn        : local
modTs        : 2021-09-19T06:16:46.226+00:00
monPolDn     : uni/tn-common/monepg-default
```

```
name         :
nameAlias    :
ownerKey     :
ownerTag     :
rn           : stpathatt-[eth1/5]
status       :
```

Configure BD

Step 1. Add the subnet/IP under BD (HOST_A uses BD IP as the gateway).

1. From the schema that you created, choose **Site-A Template > BD_990**.
2. Click **Add Subnet**.
3. In the **Add New Subnet** dialog box, enter the **Gateway IP** address and click the **Advertised Externally** radio button.



Add New Subnet

* Gateway IP: 90.0.0.254/24

Description:

Treat as virtual IP address ☐

Scope: ○ Private to VRF ● Advertised Externally

Shared between VRFs ☐

No Default SVI Gateway ☐

Querier ☐

BRIDGE DOMAIN BD_990

Common Properties

* Display Name: BD_990

Deployed Name: BD_990

Properties

* Virtual Routing & Forwarding: VRF_Stretch

L2 Stretch ☑

Intersite BUM Traffic Allow ☑

Optimize WAN Bandwidth ☑

L3 Multicast ☐

L2 Unknown Unicast: Hardware Proxy

Unknown Multicast Flooding: Flood

IPv6 Unknown Multicast Flooding: Flood

Multi-Destination Flooding: Flood in BD

ARP Flooding ☑

Virtual MAC Address: Not Configured

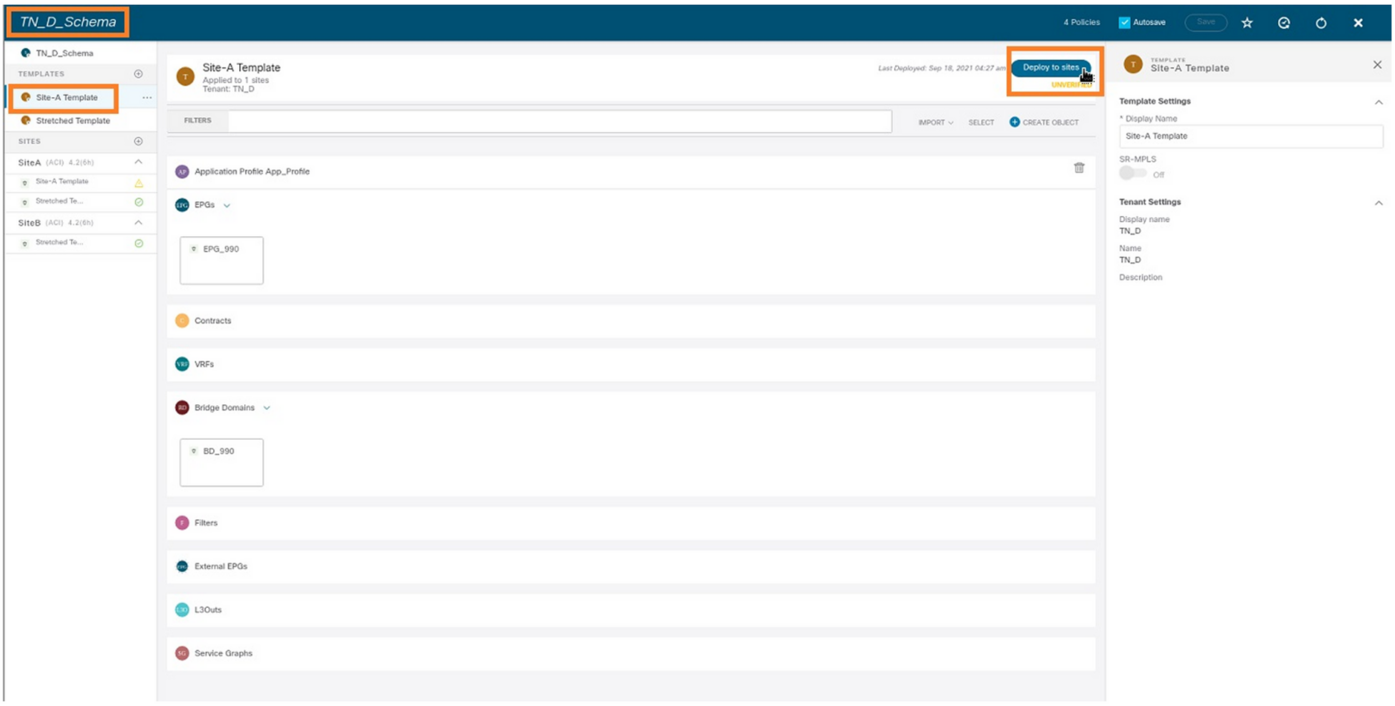
Step 2. Verify that the subnet is added in APIC1 Site-A with this command.

```
APIC1# moquery -c fvSubnet -f 'fv.Subnet.ip=="90.0.0.254/24"'
Total Objects shown: 1

# fv.Subnet
ip           : 90.0.0.254/24
annotation   : orchestrator:msc
childAction  :
ctrl         : nd
descr        :
dn           : uni/tn-TN_D/BD-BD_990/subnet-[90.0.0.254/24]
extMngdBy    :
lcOwn        : local
modTs        : 2021-09-19T06:33:19.943+00:00
monPolDn     : uni/tn-common/monepg-default
name         :
nameAlias    :
preferred    : no
rn           : subnet-[90.0.0.254/24]
```

```
scope          : public
status         :
uid            : 0
virtual        : no
```

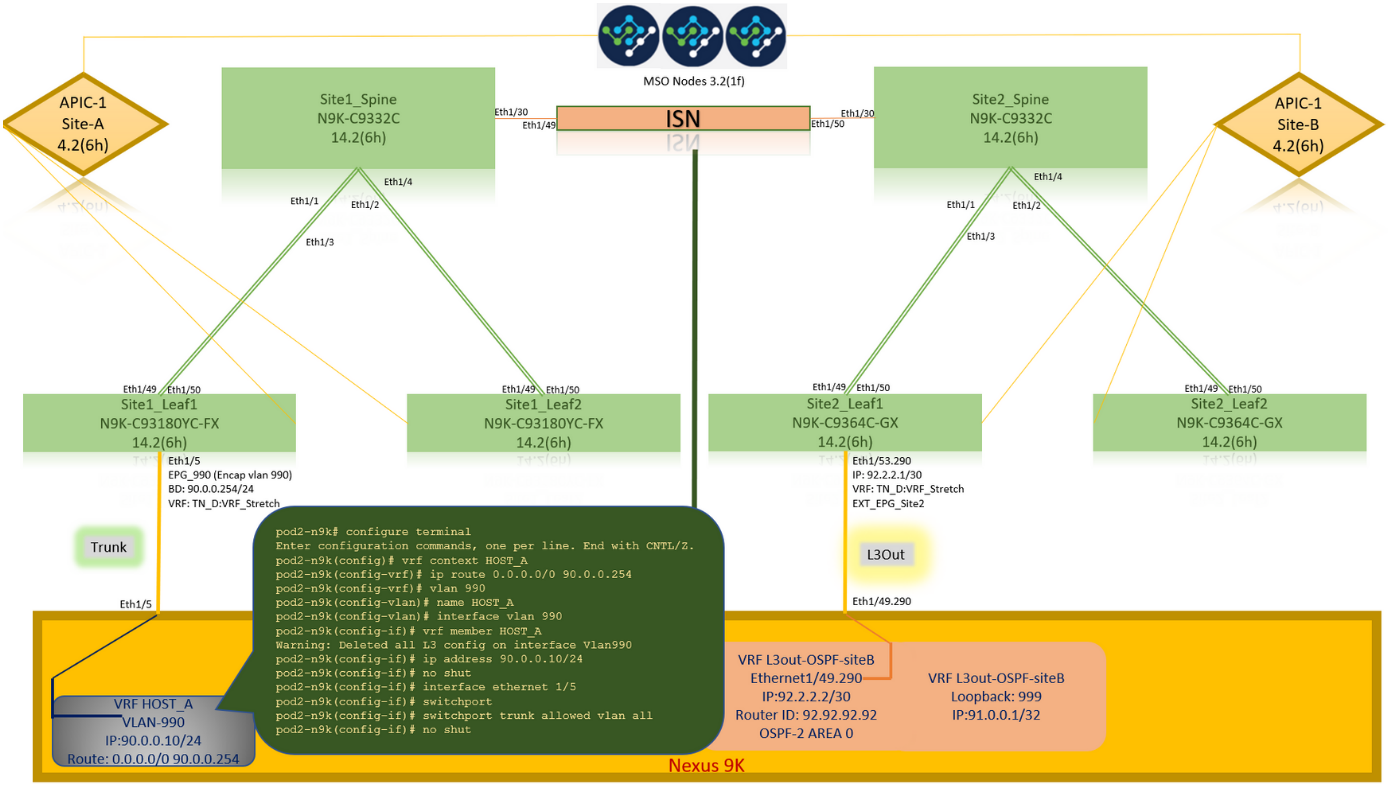
Step 3. Deploy the Site-A template.

1. From the schema that you created, choose **Site-A Template**.
2. Click **Deploy to sites**.



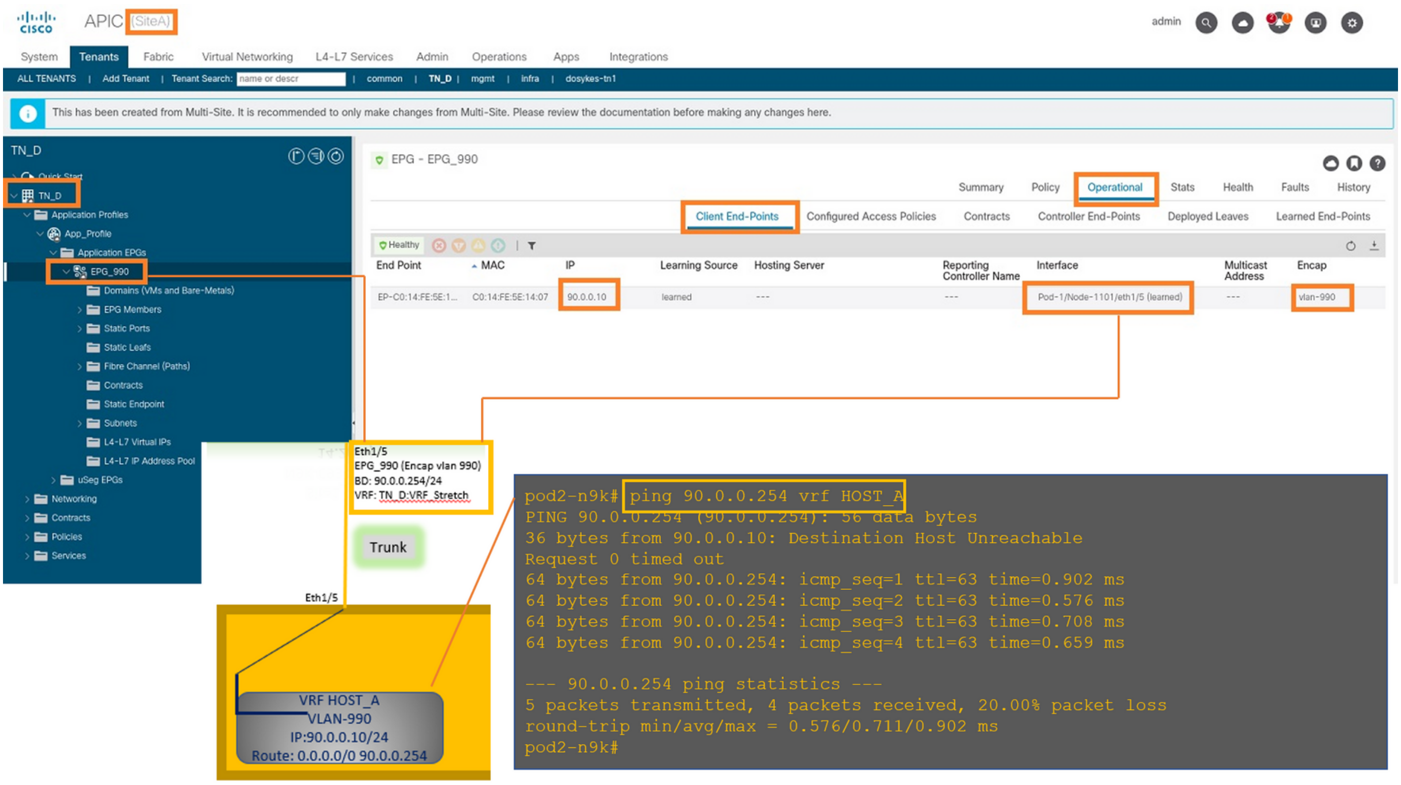
Configure Host-A (N9K)

Configure the N9K device with VRF HOST_A. Once the N9K configuration completes, you can see ACI Leaf BD anycast address (gateway of HOST_A) is reachable now via ICMP(ping).



```
pod2-n9k# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
pod2-n9k(config)# vrf context HOST_A
pod2-n9k(config-vrf)# ip route 0.0.0.0/0 90.0.0.254
pod2-n9k(config-vrf)# vlan 990
pod2-n9k(config-vlan)# name HOST_A
pod2-n9k(config-vlan)# interface vlan 990
pod2-n9k(config-if)# vrf member HOST_A
Warning: Deleted all L3 config on interface Vlan990
pod2-n9k(config-if)# ip address 90.0.0.10/24
pod2-n9k(config-if)# no shut
pod2-n9k(config-if)# interface ethernet 1/5
pod2-n9k(config-if)# switchport
pod2-n9k(config-if)# switchport trunk allowed vlan all
pod2-n9k(config-if)# no shut
```

In the ACI operational tab, you can see 90.0.0.10 (HOST_A IP address) is learned.



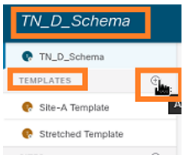
This has been created from Multi-Site. It is recommended to only make changes from Multi-Site. Please review the documentation before making any changes here.

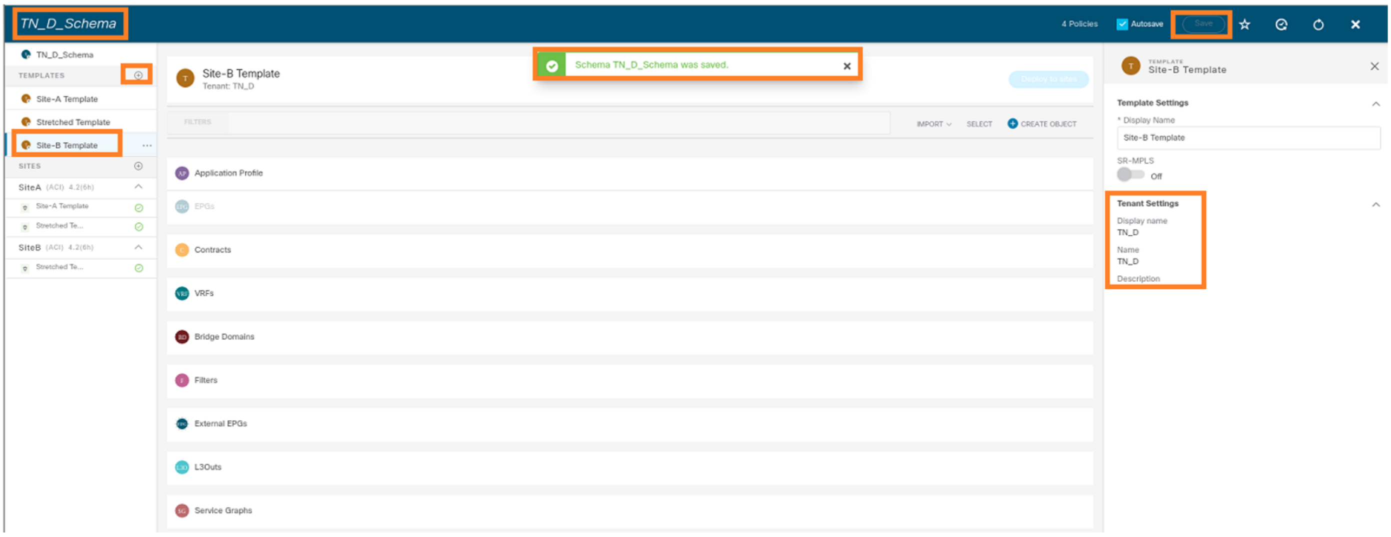
End Point	MAC	IP	Learning Source	Hosting Server	Reporting Controller Name	Interface	Multicast Address	Encap
EP-C0:14:FE:5E:1...	C0:14:FE:5E:14:07	90.0.0.10	learned	---	---	Pod-1/Node-1101/eth1/5 (learned)	---	vlan-990

```
pod2-n9k# ping 90.0.0.254 vrf HOST_A
PING 90.0.0.254 (90.0.0.254): 56 data bytes
36 bytes from 90.0.0.10: Destination Host Unreachable
Request 0 timed out
64 bytes from 90.0.0.254: icmp_seq=1 ttl=63 time=0.902 ms
64 bytes from 90.0.0.254: icmp_seq=2 ttl=63 time=0.576 ms
64 bytes from 90.0.0.254: icmp_seq=3 ttl=63 time=0.708 ms
64 bytes from 90.0.0.254: icmp_seq=4 ttl=63 time=0.659 ms

--- 90.0.0.254 ping statistics ---
5 packets transmitted, 4 packets received, 20.00% packet loss
round-trip min/avg/max = 0.576/0.711/0.902 ms
pod2-n9k#
```

Create the Site-B Template

Step 1. From the schema that you created, choose **TEMPLATES**. Click the **+** sign and create a template with the name **Site-B Template**.





Schema TN_D_Schema was saved.

* Display Name: Site-B Template

Display name: TN_D

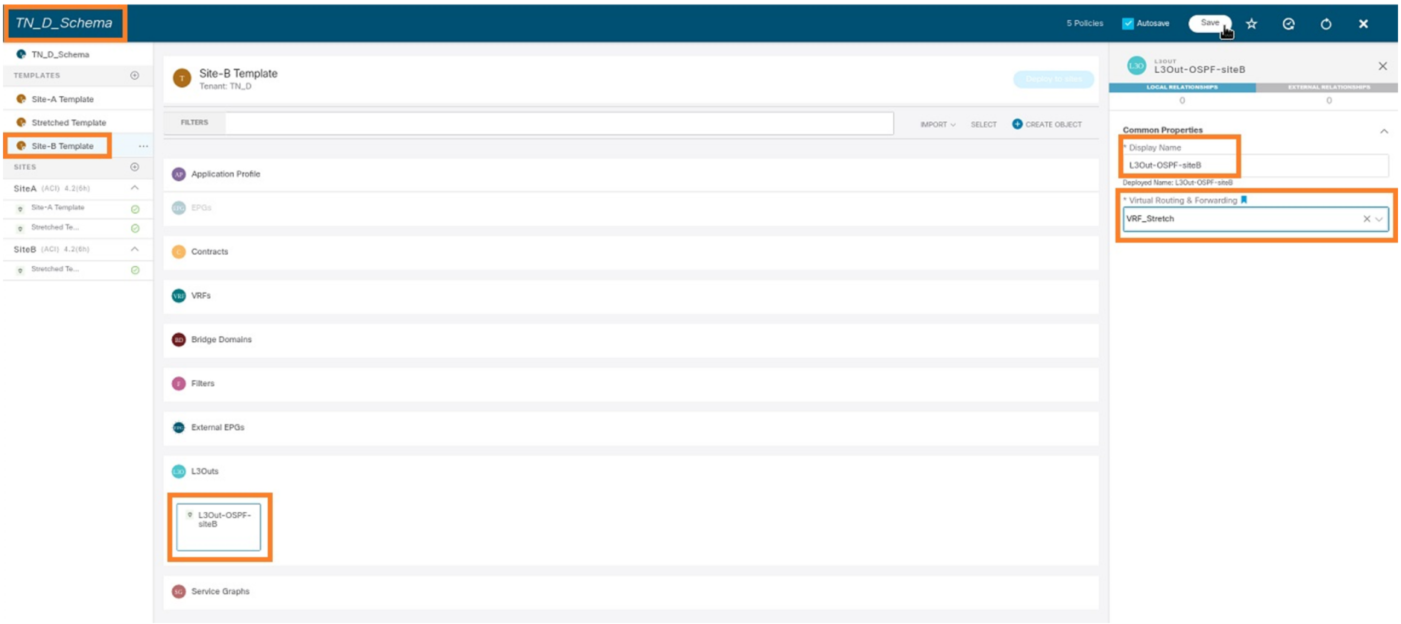
Name: TN_D

Description

Configure Site-B L3out

Create L3out and attach VRF_Stretch. You have to create an L3out object from MSO and the rest of the L3out configuration needs to be done from APIC (as L3out parameters are not available in MSO). Also, create an external EPG from MSO (in the Site-B template only, as external EPG is not stretched).

Step 1. From the schema that you created, choose **Site-B Template**. In the **Display Name** field, enter **L3out_OSPF_siteB**. In the **Virtual Routing & Forwarding** drop-down list, choose **VRF_Stretch**.



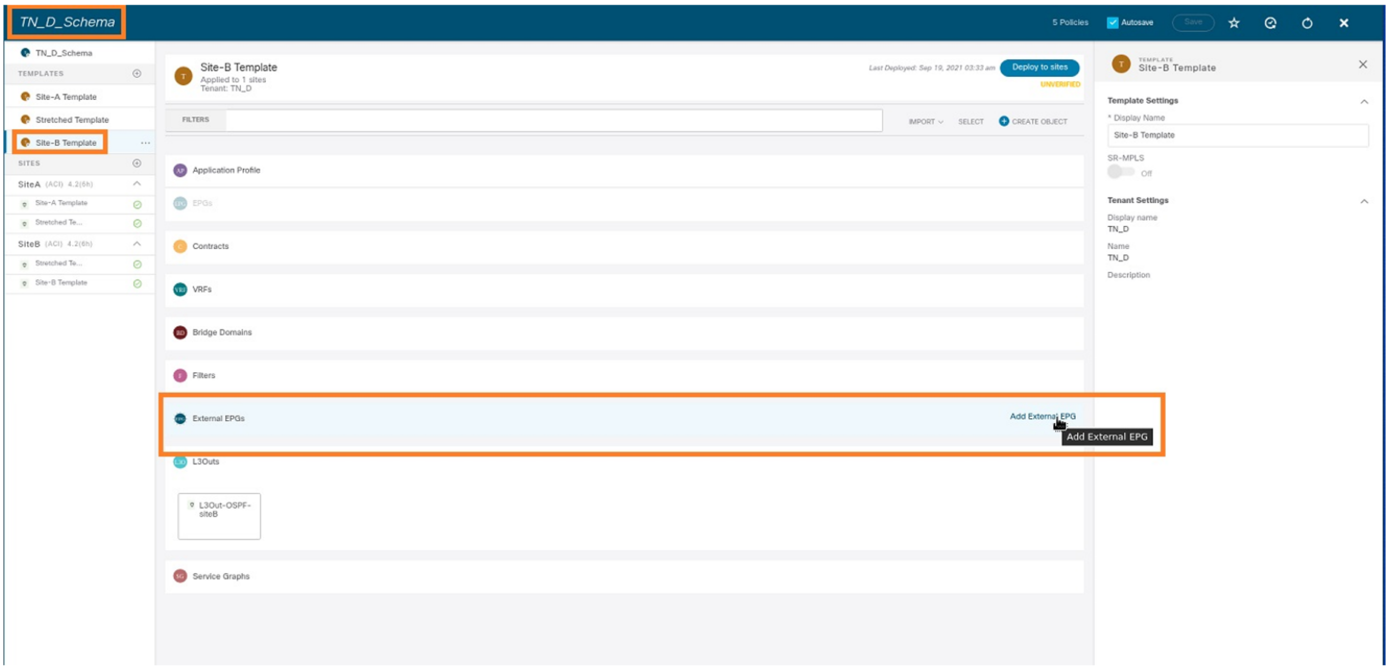
* Display Name: L3Out-OSPF-siteB

Deployed Name: L3Out-OSPF-siteB

* Virtual Routing & Forwarding: VRF_Stretch

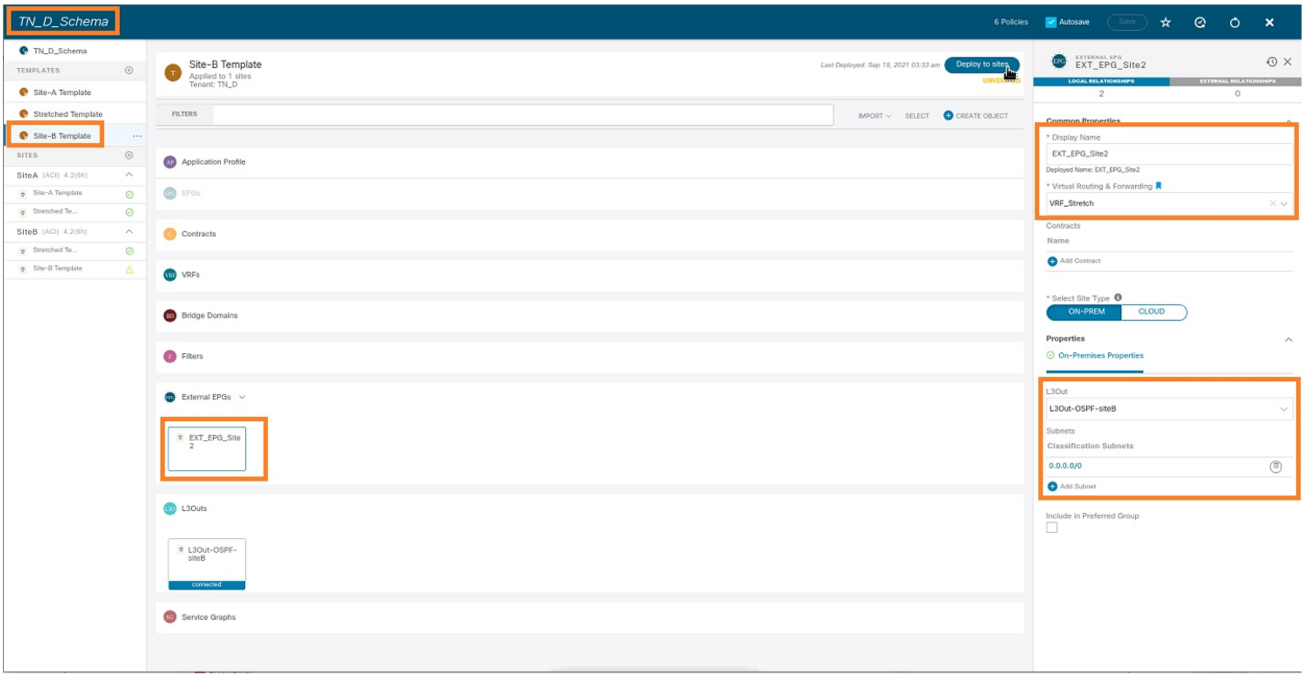
Create the External EPG

Step 1. From the schema that you created, choose **Site-B Template**. Click **Add External EPG**.



Step 2. Attach L3out with External EPG.

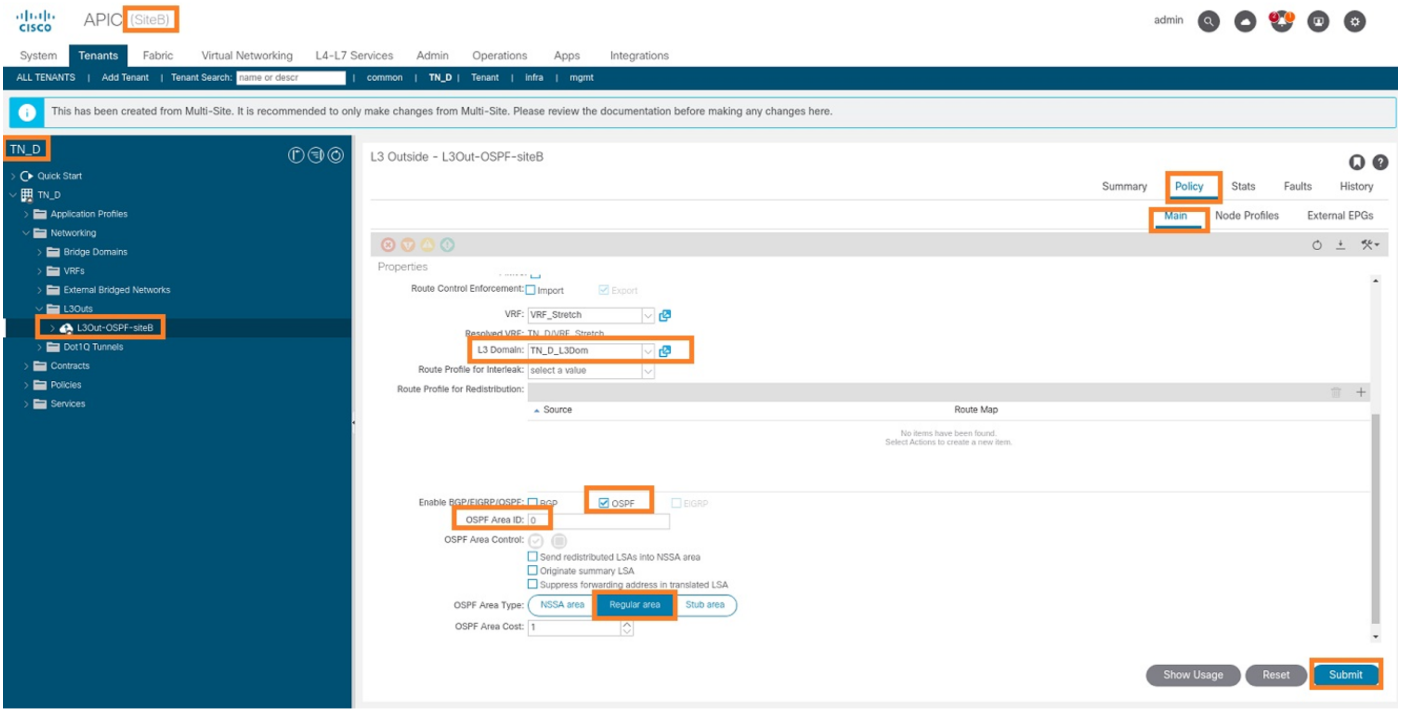
1. From the schema that you created, choose **Site-B Template**.
2. In the **Display Name** field, enter **EXT_EPG_Site2**.
3. In the **Classification Subnets** field, enter **0.0.0.0/0** for the external subnet for external EPG.



The rest of the L3out configuration is completed from APIC (Site-B).

Step 3. Add the L3 domain, enable the OSPF protocol, and configure OSPF with regular area 0.

1. From APIC-1 at Site-B, choose **TN_D > Networking > L3out-OSPF-siteB > Policy > Main**.
2. In the **L3 Domain** drop-down list, choose **TN_D_L3Dom**.
3. Check the **OSPF** check box for **Enable BGP/EIGRP/OSPF**.
4. In the **OSPF Area ID** field, enter **0**.
5. In the **OSPF Area Type**, choose **Regular area**.
6. Click **Submit**.



This has been created from Multi-Site. It is recommended to only make changes from Multi-Site. Please review the documentation before making any changes here.

L3 Outside - L3Out-OSPF-siteB

Properties

Route Control Enforcement: □ Import ☑ Export

VRF: VRF_Stretch

Resolved VRF: TN_D/VRF_Stretch

L3 Domain: TN_D_L3Dom

Route Profile for Interleak: select a value

Route Profile for Redistribution:

Source	Route Map

No items have been found.
Select Actions to create a new item.

Enable BGP/EIGRP/OSPF: □ BGP ☑ OSPF □ EIGRP

OSPF Area ID: 0

OSPF Area Control:

□ Send redistributed LSAs into NSSA area

□ Originate summary LSA

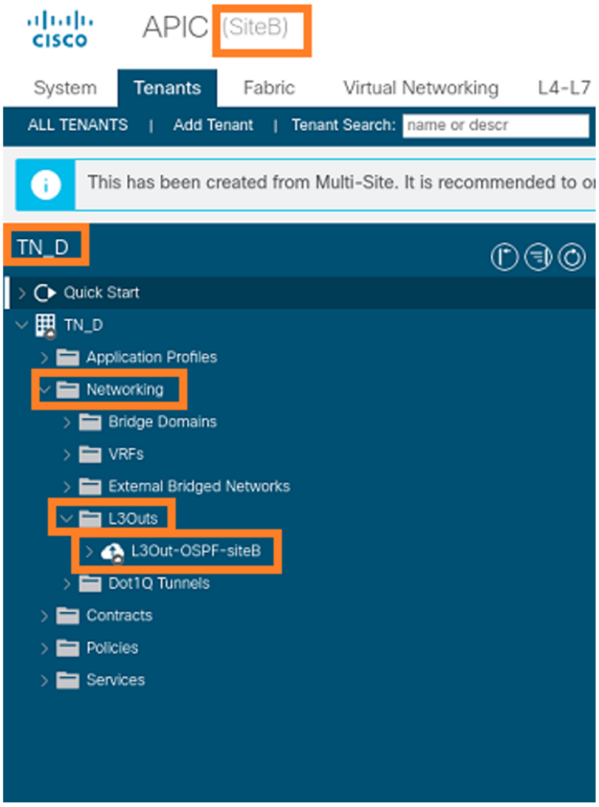
□ Suppress forwarding address in translated LSA

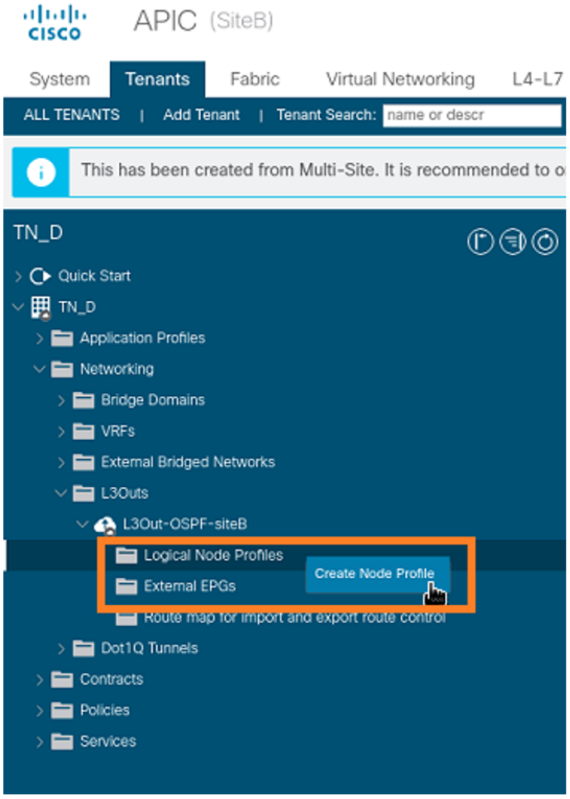
OSPF Area Type: NSSA area [✓ Regular area] Stub area

OSPF Area Cost: 1

Step 4. Create the node profile.

1. From APIC-1 at Site-B, choose **TN_D > Networking > L3Outs > L3Out-OSPF-siteB > Logical Node Profiles**.
2. Click **Create Node Profile.**

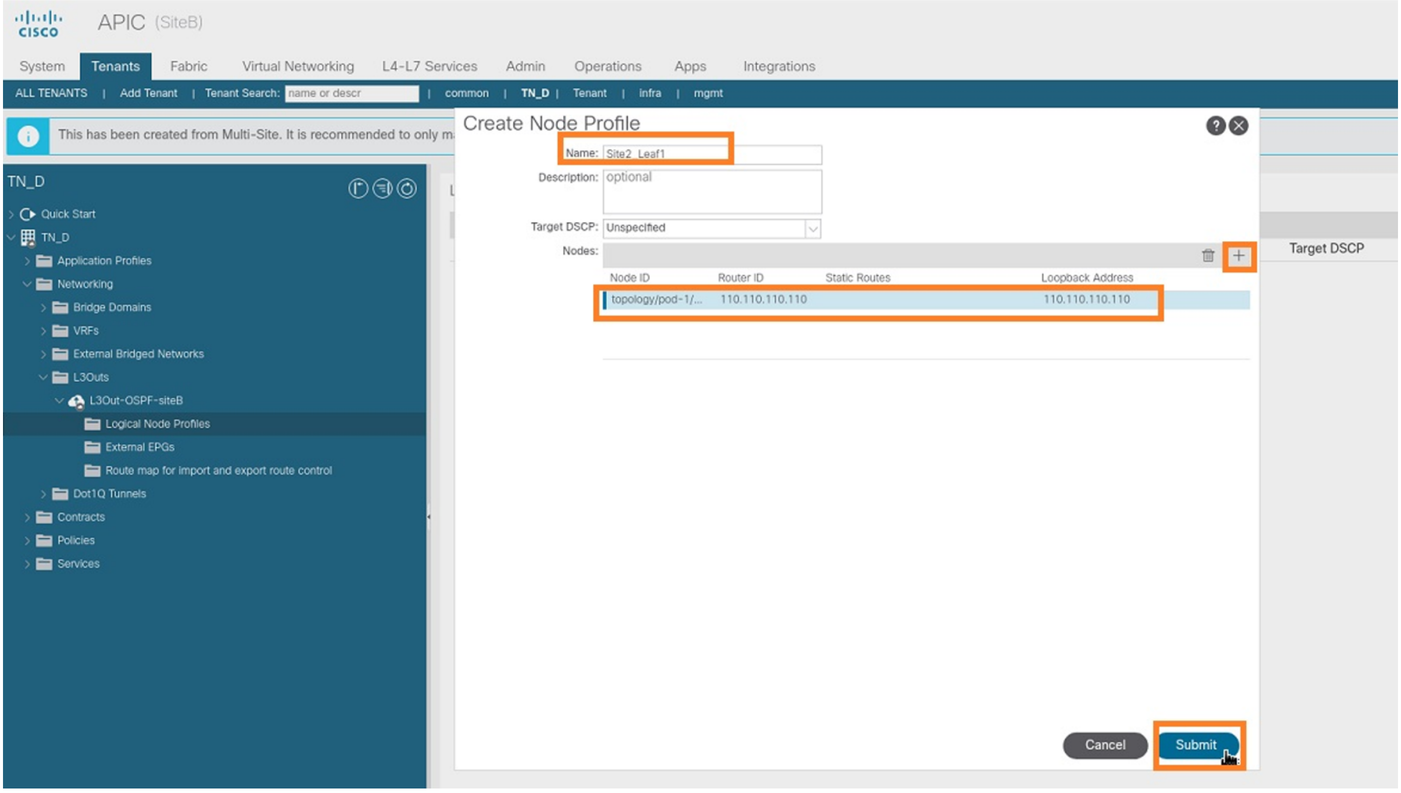




Step 5. Choose switch Site2_Leaf1 as a node at site-B.

1. From APIC-1 at Site-B, choose **TN_D > Networking > L3Outs > L3Out-OSPF-siteB > Logical Node Profiles > Create Node Profile**.
2. In the **Name** field, enter **Site2_Leaf1**.
3. Click the **+** sign to add a node.

4. Add the **pod-2 node-101** with the router ID IP address.



Create Node Profile

Name: Site2_Leaf1

Description: optional

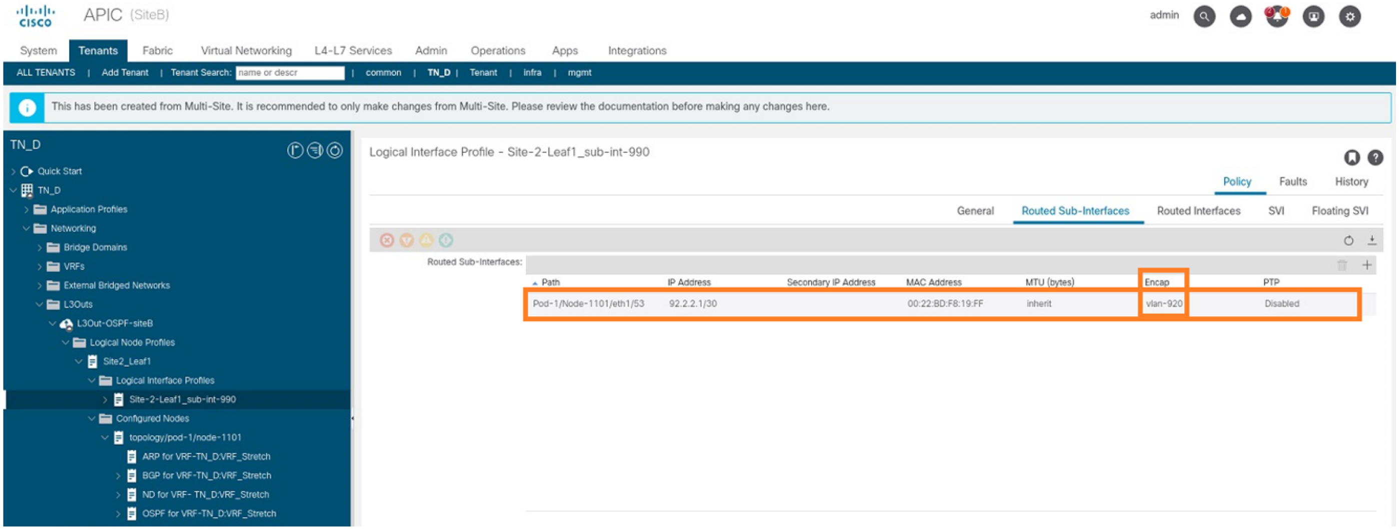
Target DSCP: Unspecified

Nodes:

Node ID	Router ID	Static Routes	Loopback Address
topology/pod-1/...	110.110.110.110		110.110.110.110

Step 6. Add the Interface profile (External VLAN is 920 (SVI creation)).

1. From APIC-1 at Site-B, choose **TN_D > Networking > L3Outs > L3out-OSPF-SiteB > Logical Interface Profiles**.
2. Right-click and add the interface profile.
3. Choose **Routed Sub-Interfaces.**
4. Configure the IP Address, MTU, and VLAN-920.



This has been created from Multi-Site. It is recommended to only make changes from Multi-Site. Please review the documentation before making any changes here.

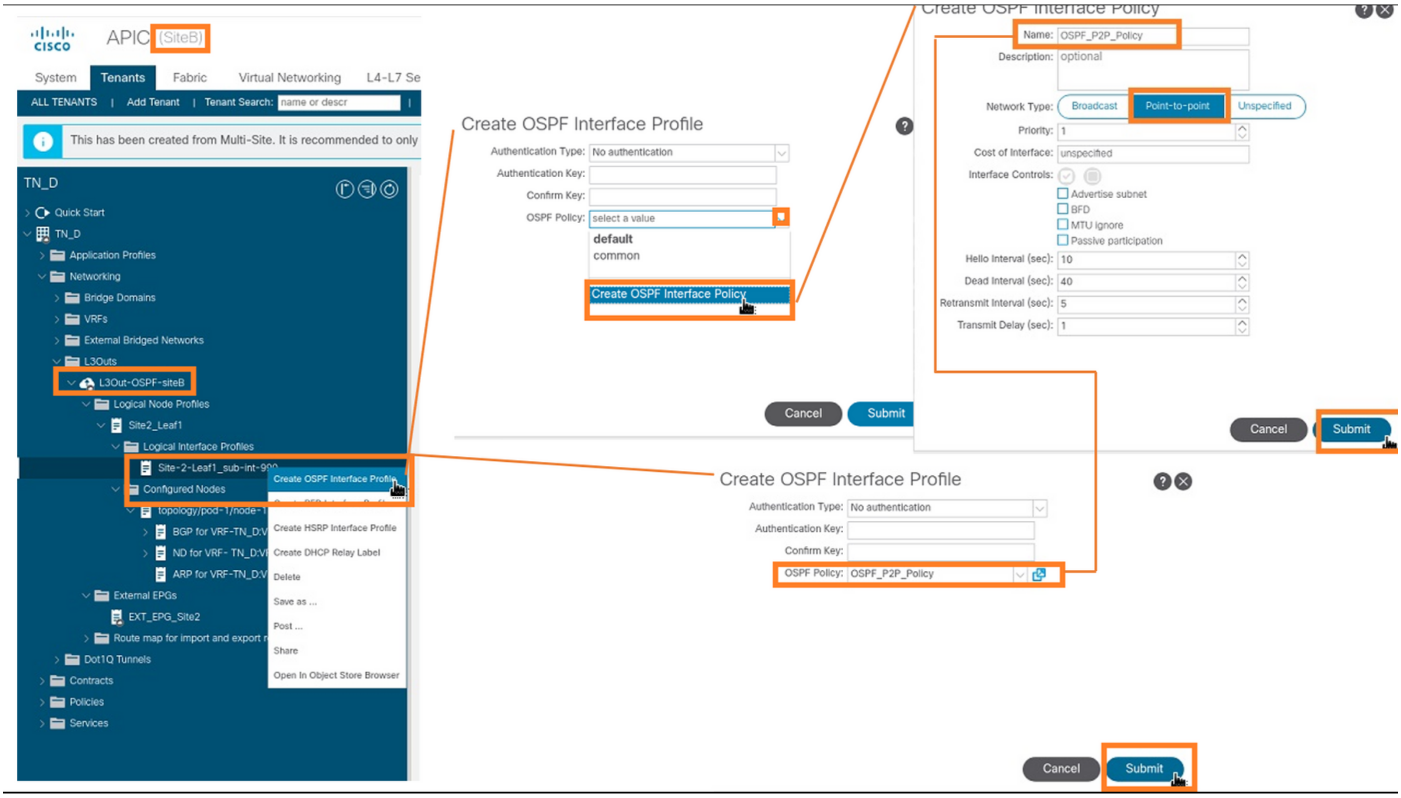
Logical Interface Profile - Site-2-Leaf1_sub-int-990

Routed Sub-Interfaces:

Path	IP Address	Secondary IP Address	MAC Address	MTU (bytes)	Encap	PTP
Pod-1/Node-1101/eth1/53	92.2.2.1/30		00:22:BD:F8:19:FF	inherit	vlan-920	Disabled

Step 7. Create the OSPF policy (Point to Point Network).

1. From APIC-1 at Site-B, choose **TN_D > Networking > L3Outs > L3Out-OSPF-siteB > Logical Interface Profiles**.
2. Right-click and choose **Create OSPF Interface Profile**.
3. Choose the options as shown in the screenshot and **click** Submit.



Create OSPF Interface Profile

Authentication Type: No authentication
Authentication Key:
Confirm Key:
OSPF Policy: select a value
default
common
Create OSPF Interface Policy

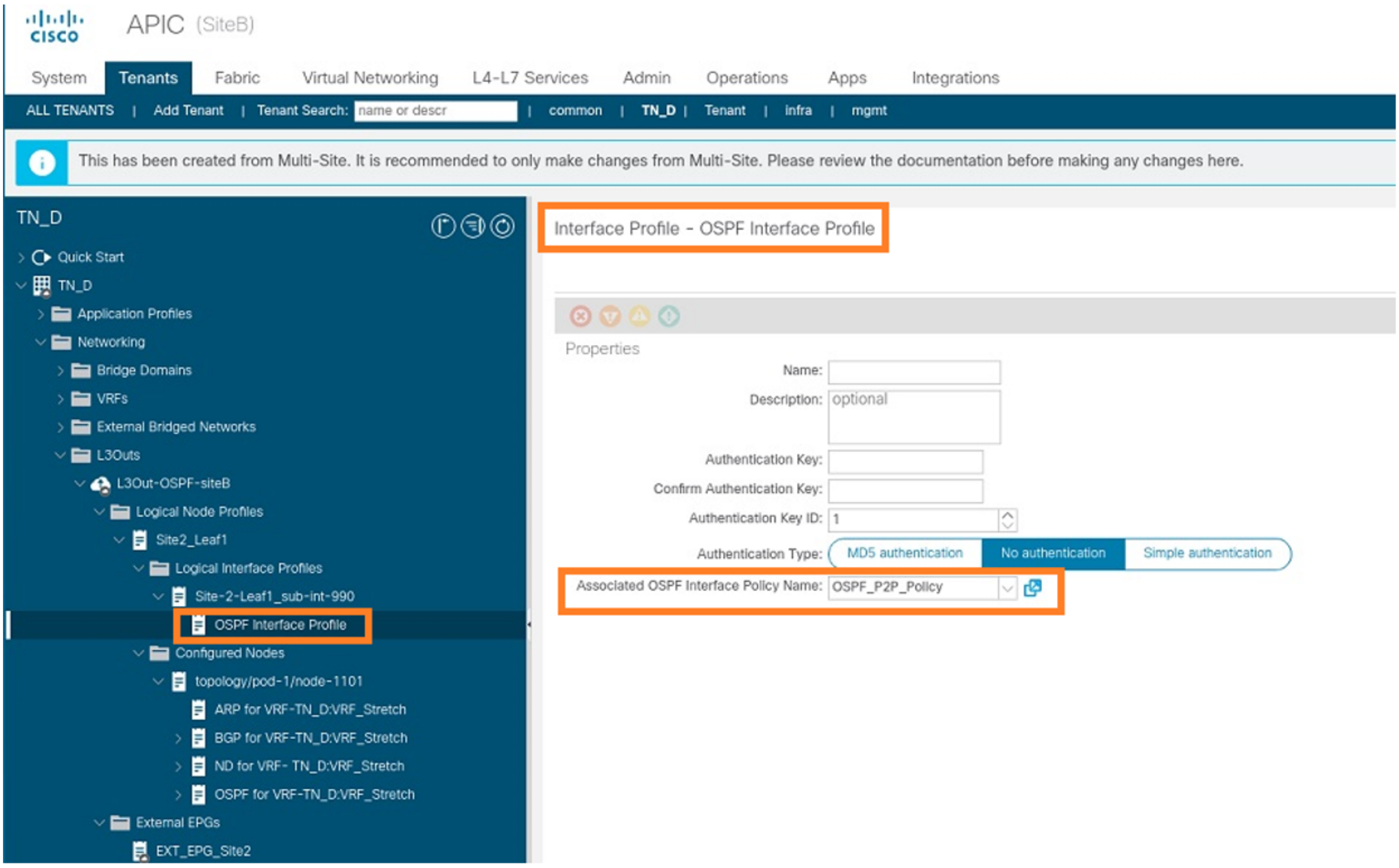
Create OSPF Interface Policy

Name: OSPF_P2P_Policy
Description: optional
Network Type: Broadcast [✓ Point-to-point] Unspecified
Priority: 1
Cost of Interface: unspecified
Interface Controls:
□ Advertise subnet
□ BFD
□ MTU ignore
□ Passive participation
Hello Interval (sec): 10
Dead Interval (sec): 40
Retransmit Interval (sec): 5
Transmit Delay (sec): 1

Create OSPF Interface Profile

Authentication Type: No authentication
Authentication Key:
Confirm Key:
OSPF Policy: OSPF_P2P_Policy

Step 8. Verify the OSPF interface profile policy attached under **TN_D > Networking > L3Outs > L3Out-OSPF-siteB > Logical Interface Profiles > (interface profile) > OSPF Interface Profile**.



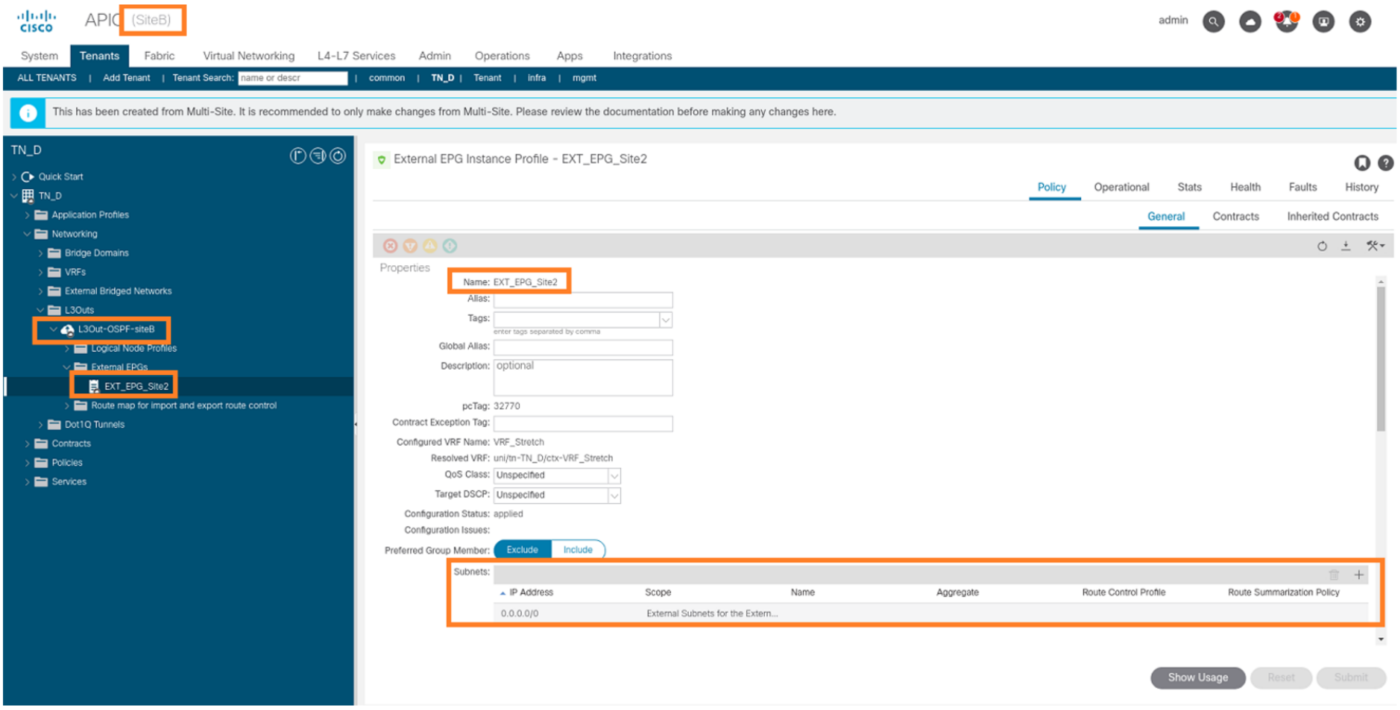
This has been created from Multi-Site. It is recommended to only make changes from Multi-Site. Please review the documentation before making any changes here.

Interface Profile - OSPF Interface Profile

Properties

Name:
Description: optional
Authentication Key:
Confirm Authentication Key:
Authentication Key ID: 1
Authentication Type: MD5 authentication [✓ No authentication] Simple authentication
Associated OSPF Interface Policy Name: OSPF_P2P_Policy

Step 9. Verify External EPG "EXT_EPG_Site2" is created by MSO. From APIC-1 at Site-B, choose **TN_D > L3Outs > L3Out-OSPF-siteB > External EPGs > EXT_EPG_Site2**.



This has been created from Multi-Site. It is recommended to only make changes from Multi-Site. Please review the documentation before making any changes here.

External EPG Instance Profile - EXT_EPG_Site2

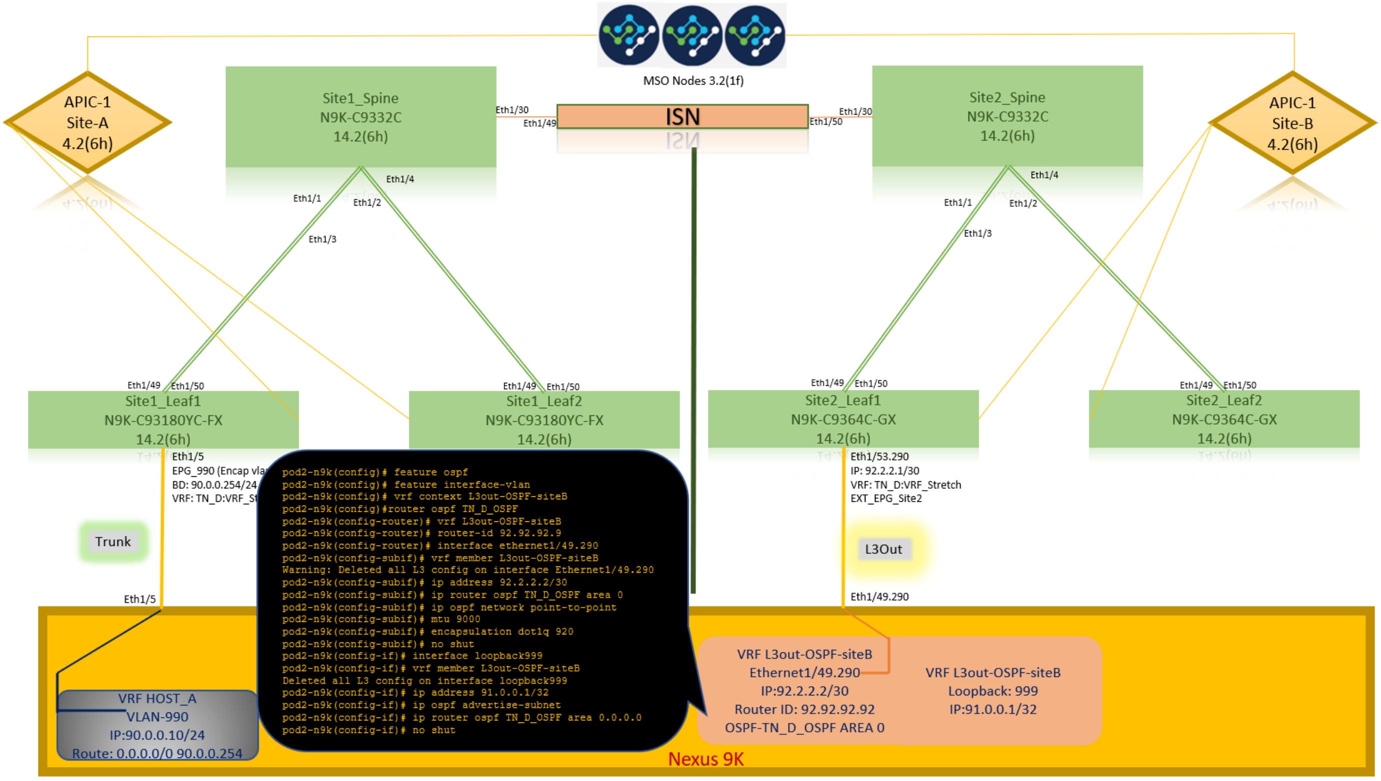
Properties

Name: EXT_EPG_Site2
Alias:
Tags: enter tags separated by comma
Global Alias:
Description: optional
pcTag: 32770
Contract Exception Tag:
Configured VRF Name: VRF_Stretch
Resolved VRF: uni/tn-TN_D/ctx-VRF_Stretch
QoS Class: Unspecified
Target DSCP: Unspecified
Configuration Status: applied
Configuration Issues:
Preferred Group Member: [✓ Exclude] Include

Subnets:

IP Address	Scope	Name	Aggregate	Route Control Profile	Route Summarization Policy
0.0.0.0/0	External Subnets for the Extern...				

Configure the External N9K (Site-B)

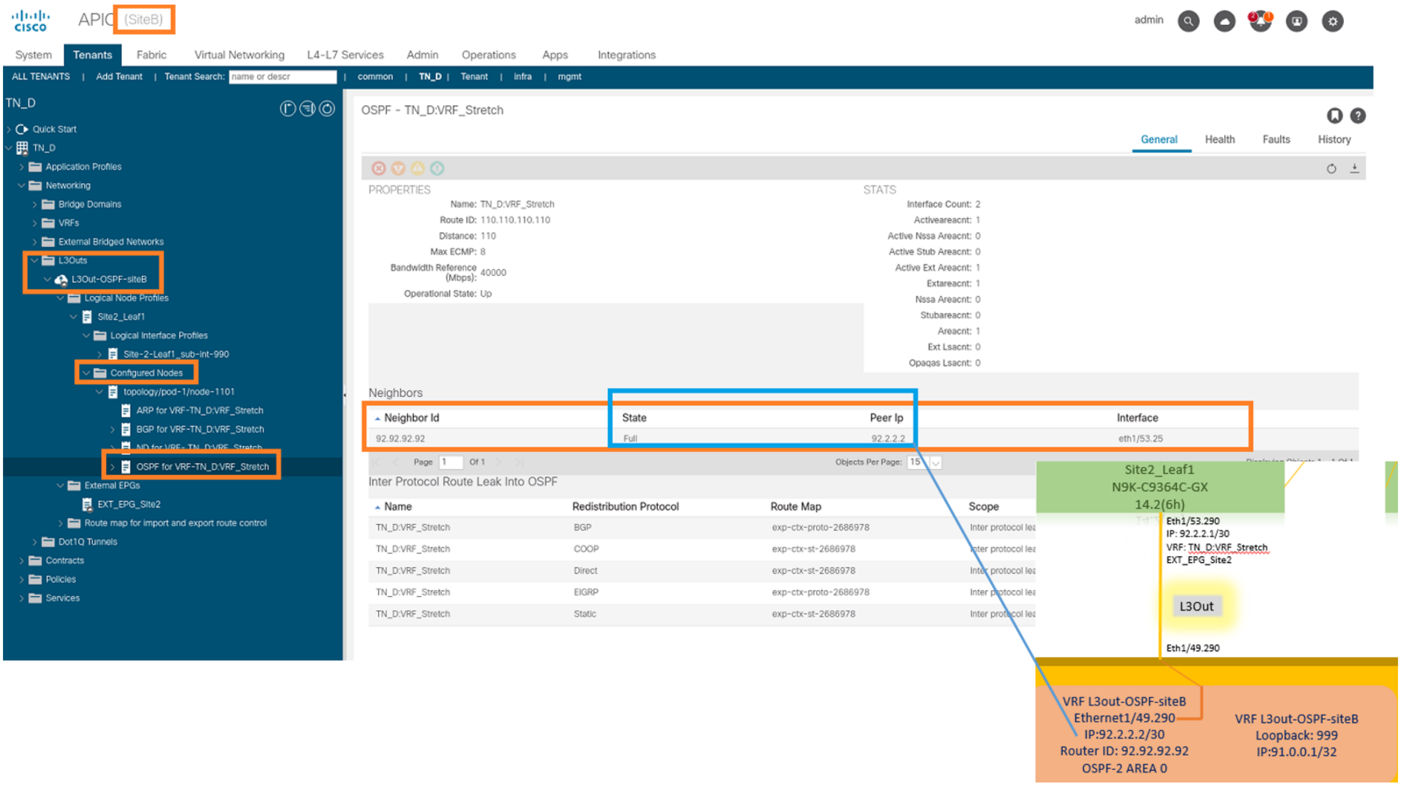


```
pod2-n9k(config)# feature ospf
pod2-n9k(config)# feature interface-vlan
pod2-n9k(config)# vrf context L3out-OSPF-siteB
pod2-n9k(config)#router ospf TN_D_OSPF
pod2-n9k(config-router)# vrf L3out-OSPF-siteB
pod2-n9k(config-router)# router-id 92.92.92.9
pod2-n9k(config-router)# interface ethernet1/49.290
pod2-n9k(config-subif)# vrf member L3out-OSPF-siteB
Warning: Deleted all L3 config on interface Ethernet1/49.290
pod2-n9k(config-subif)# ip address 92.2.2.2/30
pod2-n9k(config-subif)# ip router ospf TN_D_OSPF area 0
pod2-n9k(config-subif)# ip ospf network point-to-point
pod2-n9k(config-subif)# mtu 9000
pod2-n9k(config-subif)# encapsulation dot1q 920
pod2-n9k(config-subif)# no shut
pod2-n9k(config-if)# interface loopback999
pod2-n9k(config-if)# vrf member L3out-OSPF-siteB
Deleted all L3 config on interface loopback999
pod2-n9k(config-if)# ip address 91.0.0.1/32
pod2-n9k(config-if)# ip ospf advertise-subnet
pod2-n9k(config-if)# ip router ospf TN_D_OSPF area 0.0.0.0
pod2-n9k(config-if)# no shut
```

After the N9K configuration (VRF L3out-OSPF-siteB), we can see OSPF neighborship is established between the N9K and the ACI Leaf (at Site-B).

Verify OSPF neighborship is established and UP (Full State).

From APIC-1 at Site-B, choose **TN_D > Networking > L3Outs > L3Out-OSPF-siteB > Logical Node Profiles > Logical Interface Profiles > Configured Nodes > topology/pod01/node-1101 > OSPF for VRF-TN_DVRF_Switch > Neighbor ID state > Full.**



OSPF - TN_D:VRF_Stretch

PROPERTIES

Name: TN_D:VRF_Stretch
Route ID: 110.110.110.110
Distance: 110
Max ECMP: 8
Bandwidth Reference (Mbps): 40000
Operational State: Up

STATS

Interface Count: 2
Activeareacnt: 1
Active Nssa Areacnt: 0
Active Stub Areacnt: 0
Active Ext Areacnt: 1
Extareacnt: 1
Nssa Areacnt: 0
Stubareacnt: 0
Areacnt: 1
Ext Lsacnt: 0
Opaqas Lsacnt: 0

Neighbors

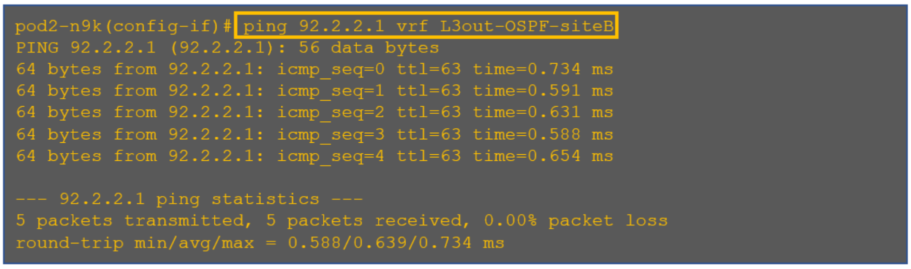
Neighbor Id	State	Peer Ip	Interface
92.92.92.92	Full	92.2.2.2	eth1/53.25

Page 1 Of 1 Objects Per Page: 15

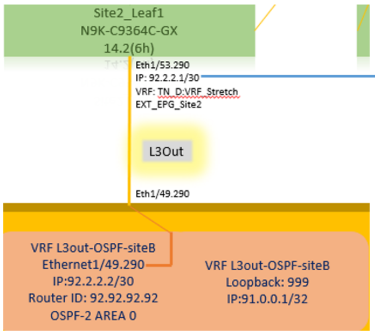
Inter Protocol Route Leak Into OSPF

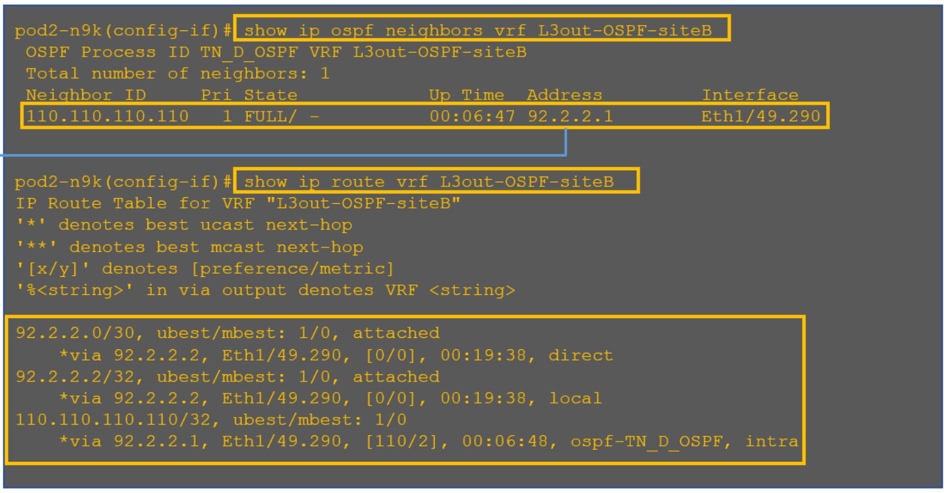
Name	Redistribution Protocol	Route Map	Scope
TN_D:VRF_Stretch	BGP	exp-ctx-proto-2686978	Inter protocol lea
TN_D:VRF_Stretch	COOP	exp-ctx-st-2686978	Inter protocol lea
TN_D:VRF_Stretch	Direct	exp-ctx-st-2686978	Inter protocol lea
TN_D:VRF_Stretch	EIGRP	exp-ctx-proto-2686978	Inter protocol lea
TN_D:VRF_Stretch	Static	exp-ctx-st-2686978	Inter protocol lea

You can also check OSPF neighborship in N9K. Also, you are able to ping ACI Leaf IP (Site-B).



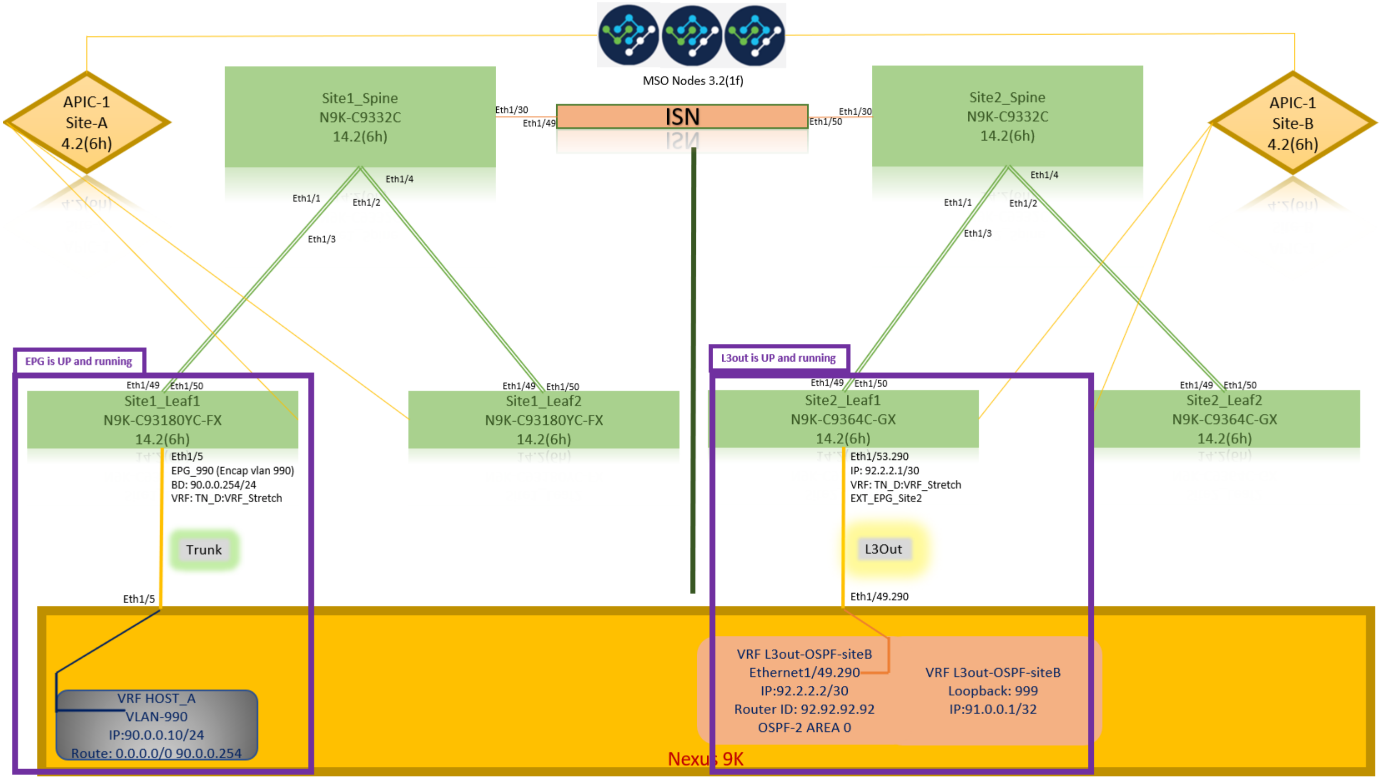
```
pod2-n9k(config-if)# ping 92.2.2.1 vrf L3out-OSPF-siteB
PING 92.2.2.1 (92.2.2.1): 56 data bytes
64 bytes from 92.2.2.1: icmp_seq=0 ttl=63 time=0.734 ms
64 bytes from 92.2.2.1: icmp_seq=1 ttl=63 time=0.591 ms
64 bytes from 92.2.2.1: icmp_seq=2 ttl=63 time=0.631 ms
64 bytes from 92.2.2.1: icmp_seq=3 ttl=63 time=0.588 ms
64 bytes from 92.2.2.1: icmp_seq=4 ttl=63 time=0.654 ms

--- 92.2.2.1 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.588/0.639/0.734 ms
```





```
pod2-n9k(config-if)# show ip ospf neighbors vrf L3out-OSPF-siteB
 OSPF Process ID TN_D_OSPF VRF L3out-OSPF-siteB
 Total number of neighbors: 1
 Neighbor ID     Pri State            Up Time  Address         Interface
 110.110.110.110   1 FULL/ -          00:06:47 92.2.2.1        Eth1/49.290

pod2-n9k(config-if)# show ip route vrf L3out-OSPF-siteB
IP Route Table for VRF "L3out-OSPF-siteB"
'*' denotes best ucast next-hop
'**' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%<string>' in via output denotes VRF <string>

92.2.2.0/30, ubest/mbest: 1/0, attached
    *via 92.2.2.2, Eth1/49.290, [0/0], 00:19:38, direct
92.2.2.2/32, ubest/mbest: 1/0, attached
    *via 92.2.2.2, Eth1/49.290, [0/0], 00:19:38, local
110.110.110.110/32, ubest/mbest: 1/0
    *via 92.2.2.1, Eth1/49.290, [110/2], 00:06:48, ospf-TN_D_OSPF, intra
```

At this point, Host_A configuration at site-A and L3out configuration at site-B is complete.

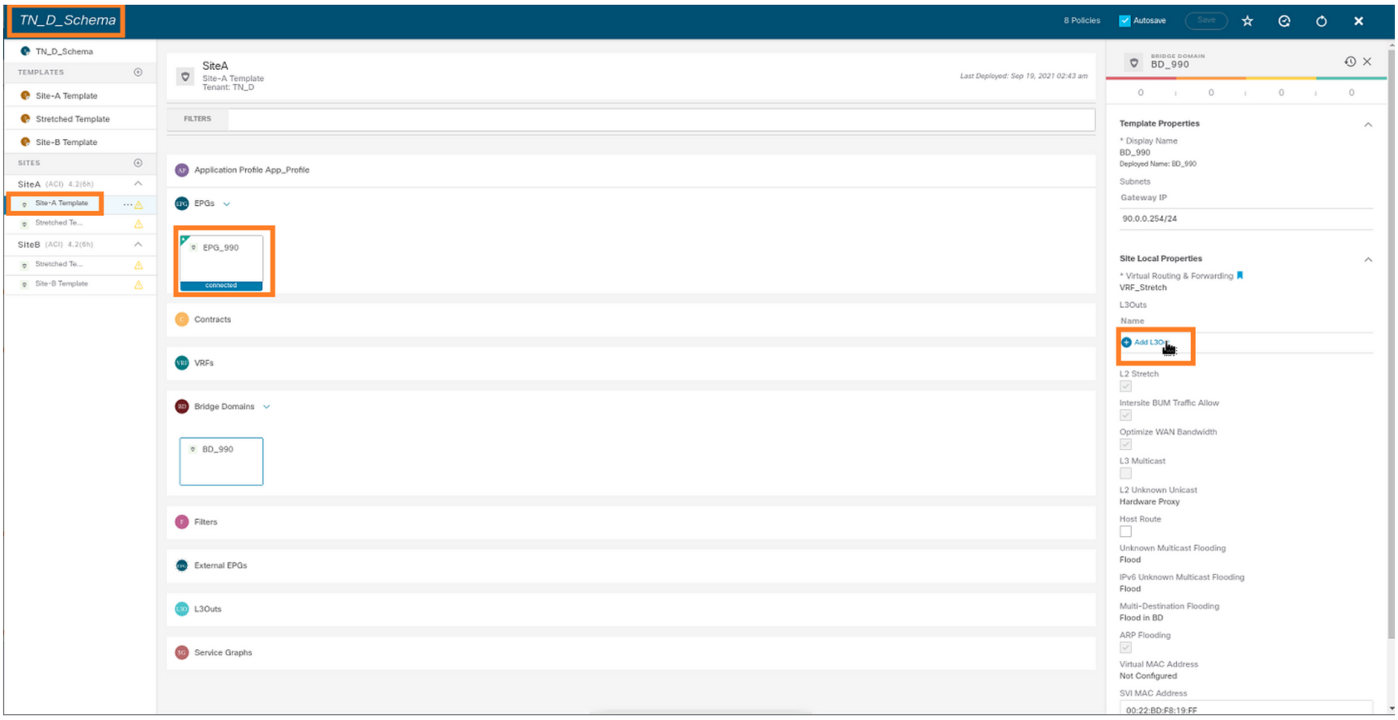


Attach Site-B L3out to Site-A EPG(BD)

Next, you can attach Site-B L3out to Site-A BD-990 from MSO. Note that the left side column has two sections: 1) Template and 2) Sites.

Step 1. In the second section **Sites,** you can see the template attached with each site. When you attach L3out to "Site-A Template", you are basically attached from the already attached template inside the **Sites** section.

However, when you deploy the template, deploy from section **Templates > Site-A Template** and choose **save/deploy** to sites.



SiteA
Site-A Template
Tenant: TN_D

Last Deployed: Sep 19, 2021 02:43 am

BRIDGE DOMAIN
BD_990

0 0 0 0

Template Properties

* Display Name
BD_990
Deployed Name: BD_990

Subnets
Gateway IP
90.0.0.254/24

Site Local Properties

* Virtual Routing & Forwarding
VRF_Stretch

L3Outs
Name

L2 Stretch
☑

Intersite BUM Traffic Allow
☑

Optimize WAN Bandwidth
☑

L3 Multicast
□

L2 Unknown Unicast
Hardware Proxy

Host Route
□

Unknown Multicast Flooding
Flood

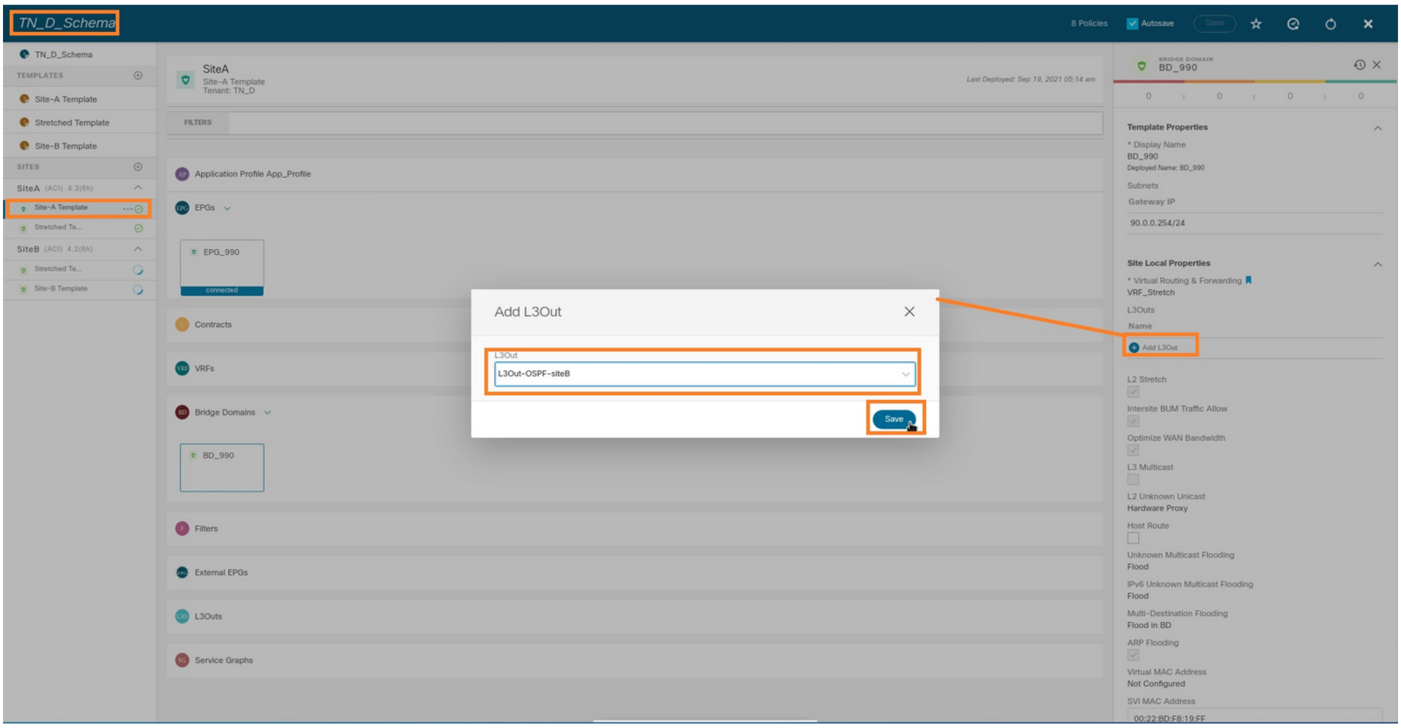
IPv6 Unknown Multicast Flooding
Flood

Multi-Destination Flooding
Flood in BD

ARP Flooding
☑

Virtual MAC Address
Not Configured

SVI MAC Address
00:22:BD:F8:19:FF



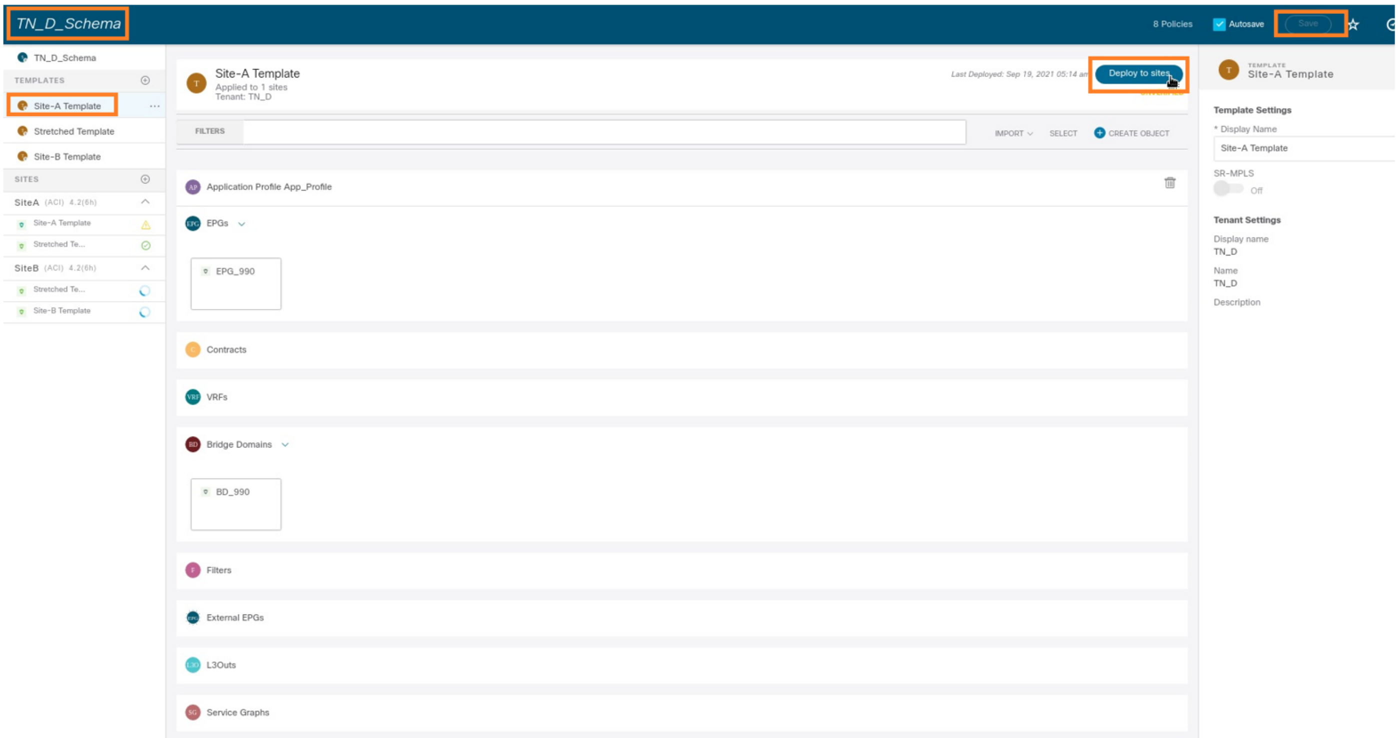
Add L3Out

L3Out: L3Out-OSPF-siteB

Template Properties
- Display Name: BD_990
- Subnets: Gateway IP 90.0.0.254/24

Site Local Properties
- Virtual Routing & Forwarding: VRF_Stretch
- L3Outs

Step 2. Deploy from main template "Site-A Template" in first section "Templates".



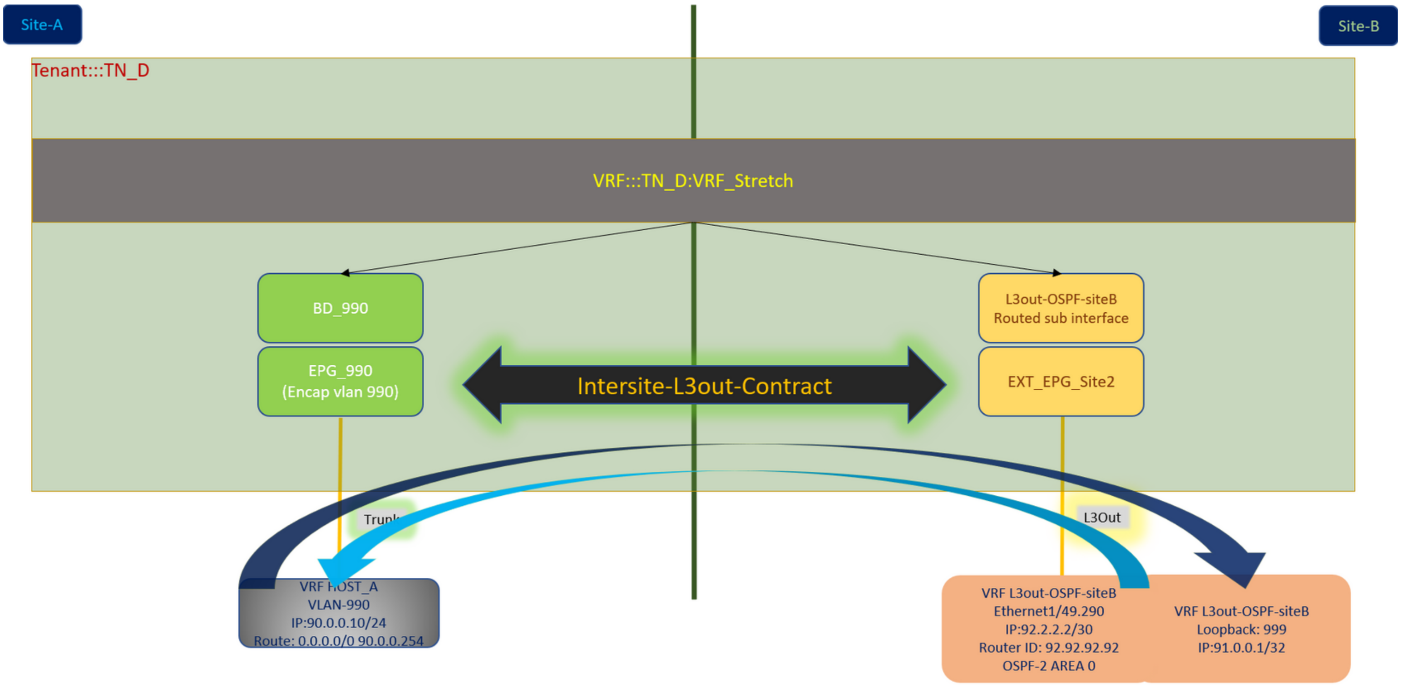
Template Settings
- Display Name: Site-A Template
- SR-MPLS: Off

Tenant Settings
- Display name: TN_D
- Name: TN_D
- Description

Configure the Contract

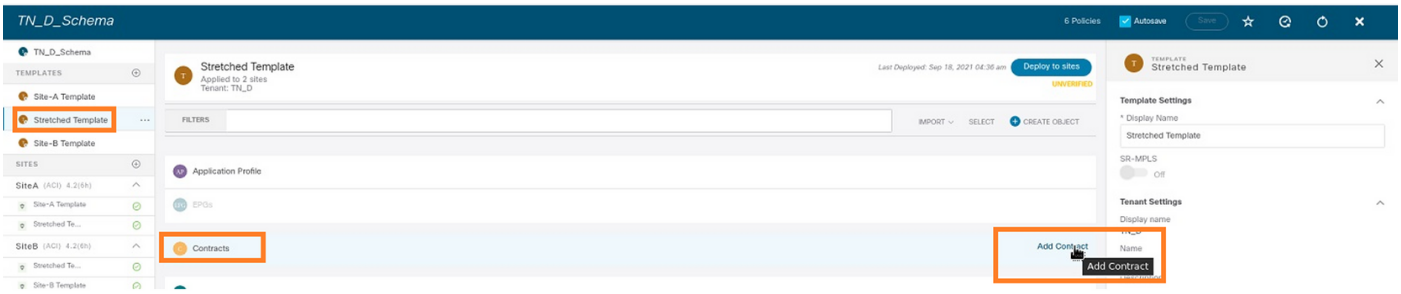
You require a contract between External EPG at site-B and Internal EPG_990 at site-A. So, you can first create a contract from MSO and attach it to both EPGs.

Cisco Application Centric Infrastructure - Cisco ACI Contract Guide can help to understand the contract. Generally, internal EPG is configured as a provider and external EPG is configured as a consumer.



Create the Contract

Step 1. From TN_D_Schema, choose **Stretched Template > Contracts**. Click **Add Contract.**

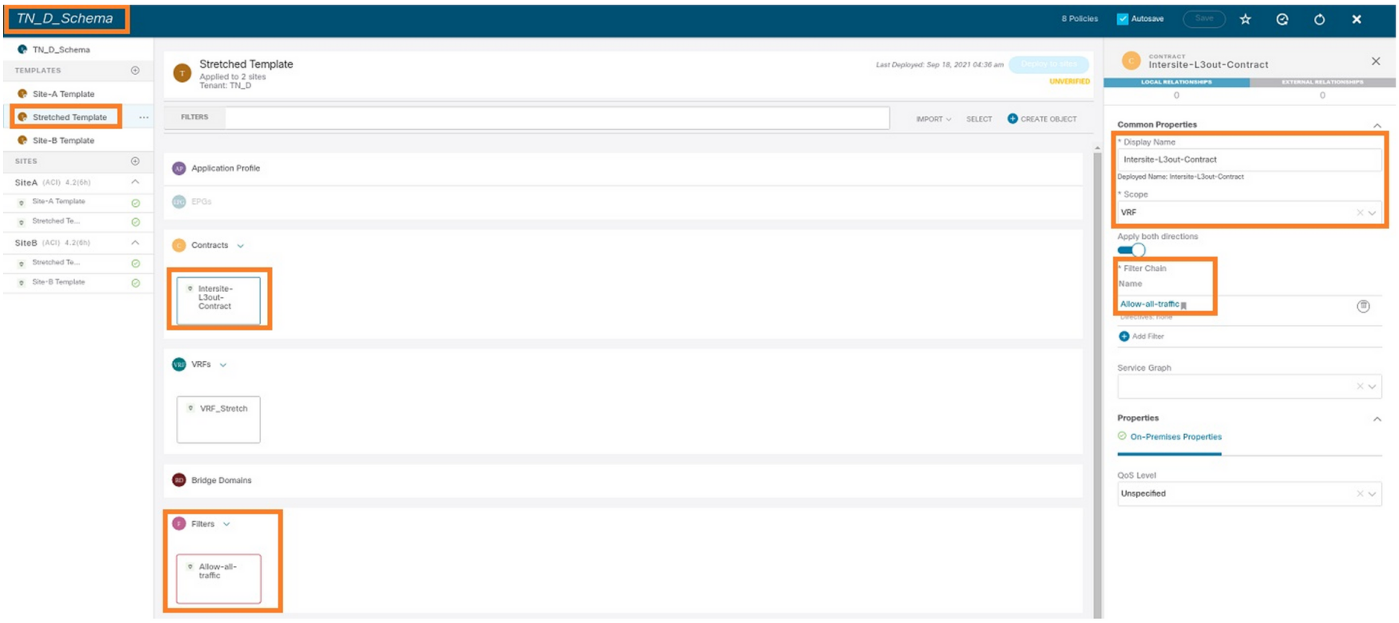


* Display Name: Stretched Template

Step 2. Add a filter to allow all traffic.

1. From TN_D_Schema, choose **Stretched Template > Contracts**.
2. Add a contract with:

- Display Name: **Intersite-L3out-Contract**
- Scope: **VRF**



CONTRACT Intersite-L3out-Contract

Common Properties

Display Name: Intersite-L3out-Contract

Deployed Name: Intersite-L3out-Contract

Scope: VRF

Apply both directions

Filter Chain Name: Allow-all-traffic

Service Graph

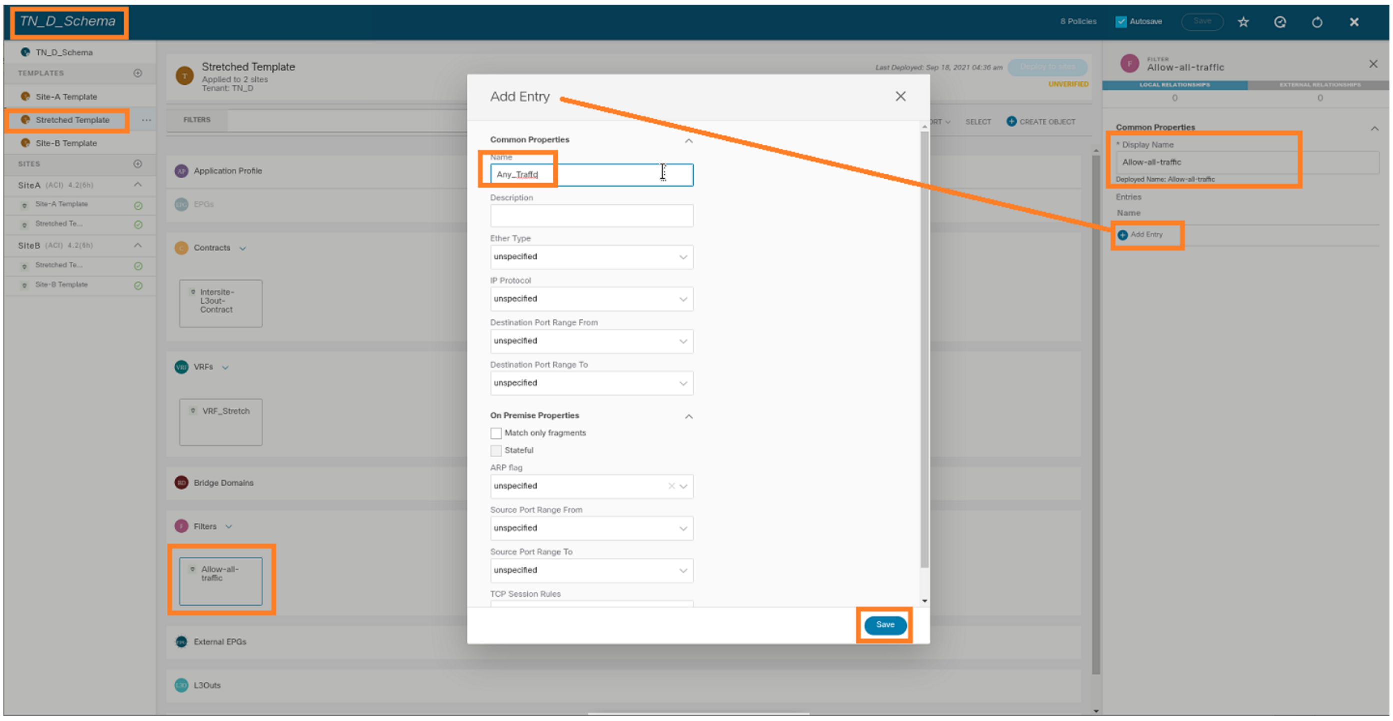
Properties

On-Premises Properties

QoS Level: Unspecified

Step 3.

1. From TN_D_Schema, choose **Stretched Template > Filters**.
2. In the **Display Name** field, enter **Allow-all-traffic**.
3. Click **Add Entry**. The Add Entry dialog box displays.
4. In the **Name** field, enter **Any_Traffic**.
5. In the **Ether Type** drop-down list, choose **unspecified** to allow all traffic.
6. Click **Save**.



Add Entry

Common Properties

Name: Any_Traffic

Description

Ether Type: unspecified

IP Protocol: unspecified

Destination Port Range From: unspecified

Destination Port Range To: unspecified

On Premise Properties

□ Match only fragments

□ Stateful

ARP flag: unspecified

Source Port Range From: unspecified

Source Port Range To: unspecified

TCP Session Rules

Save

FILTER Allow-all-traffic

Common Properties

Display Name: Allow-all-traffic

Deployed Name: Allow-all-traffic

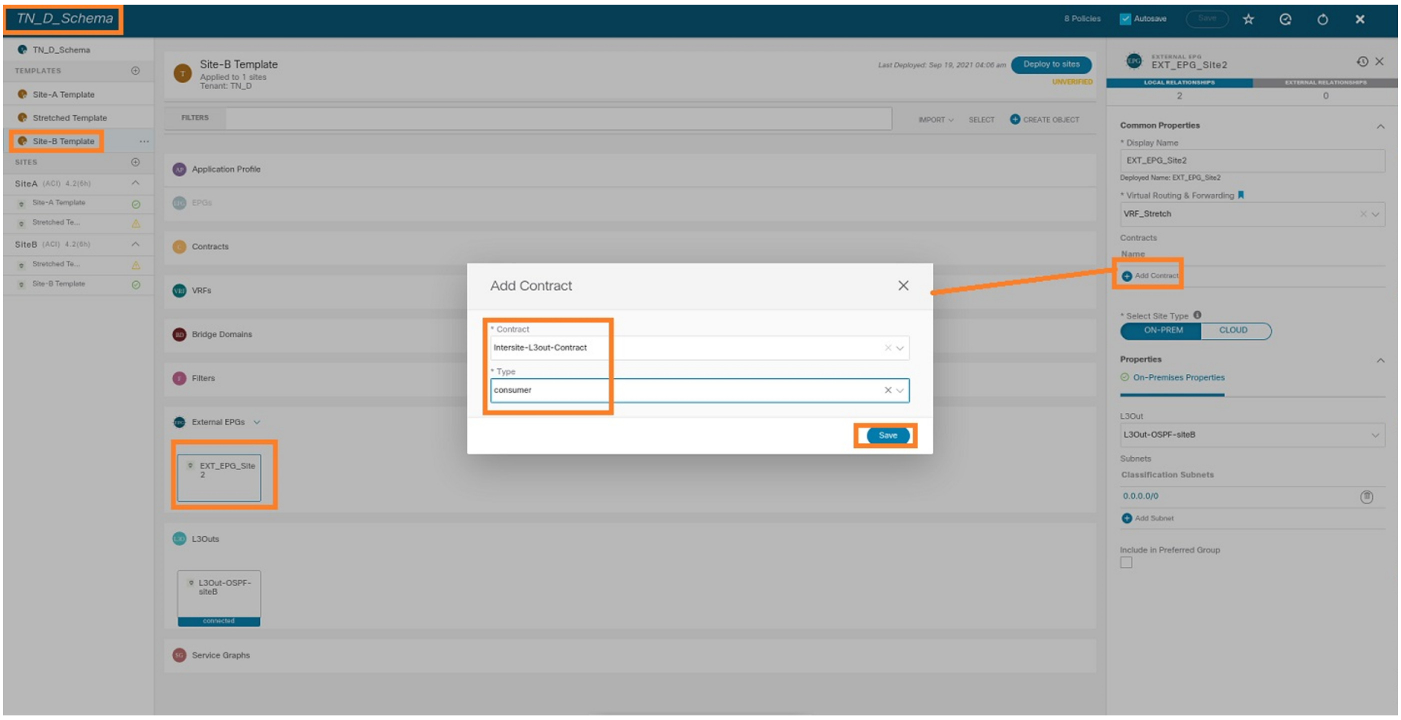
Entries

Name

Add Entry

Step 4. Add contract to External EPG as "Consumer" (In Site-B Template) (Deploy to the site).

1. From TN_D_Schema, choose **Site-B Template > EXT_EPG_Site2**.
2. Click **Add Contract**. The Add Contract dialog box displays.
3. In the **Contract** field, enter **Intersite-L3out-Contract**.
4. In the **Type** drop-down list, choose **consumer**.



Add Contract

* Contract: Intersite-L3out-Contract

* Type: consumer

Save

* Display Name: EXT_EPG_Site2

Deployed Name: EXT_EPG_Site2

* Virtual Routing & Forwarding: VRF_Stretch

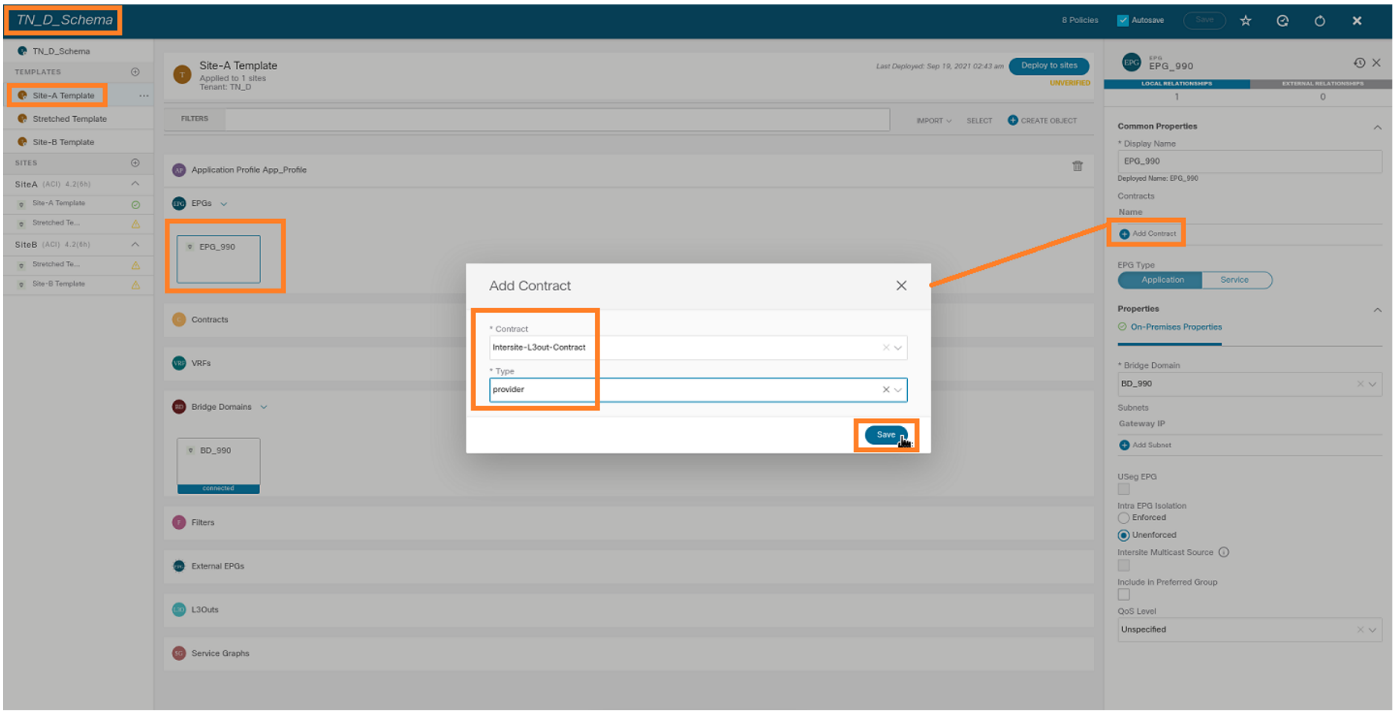
* Select Site Type: ON-PREM | CLOUD

L3Out: L3Out-OSPF-siteB

Classification Subnets: 0.0.0.0/0

Step 5. Add contract to Internal EPG "EPG_990" as "Provider" (In Site-A Template) (Deploy to site).

1. From TN_D_Schema, choose **Site-A Template > EPG_990**.
2. Click **Add Contract**. The Add Contract dialog box displays.
3. In the **Contract** field, enter **Intersite-L3out-Contract**.
4. In the **Type** drop-down list, choose **provider**.



Add Contract

* Contract: Intersite-L3out-Contract

* Type: provider

Save

* Display Name: EPG_990

Deployed Name: EPG_990

EPG Type: Application | Service

* Bridge Domain: BD_990

USeg EPG □

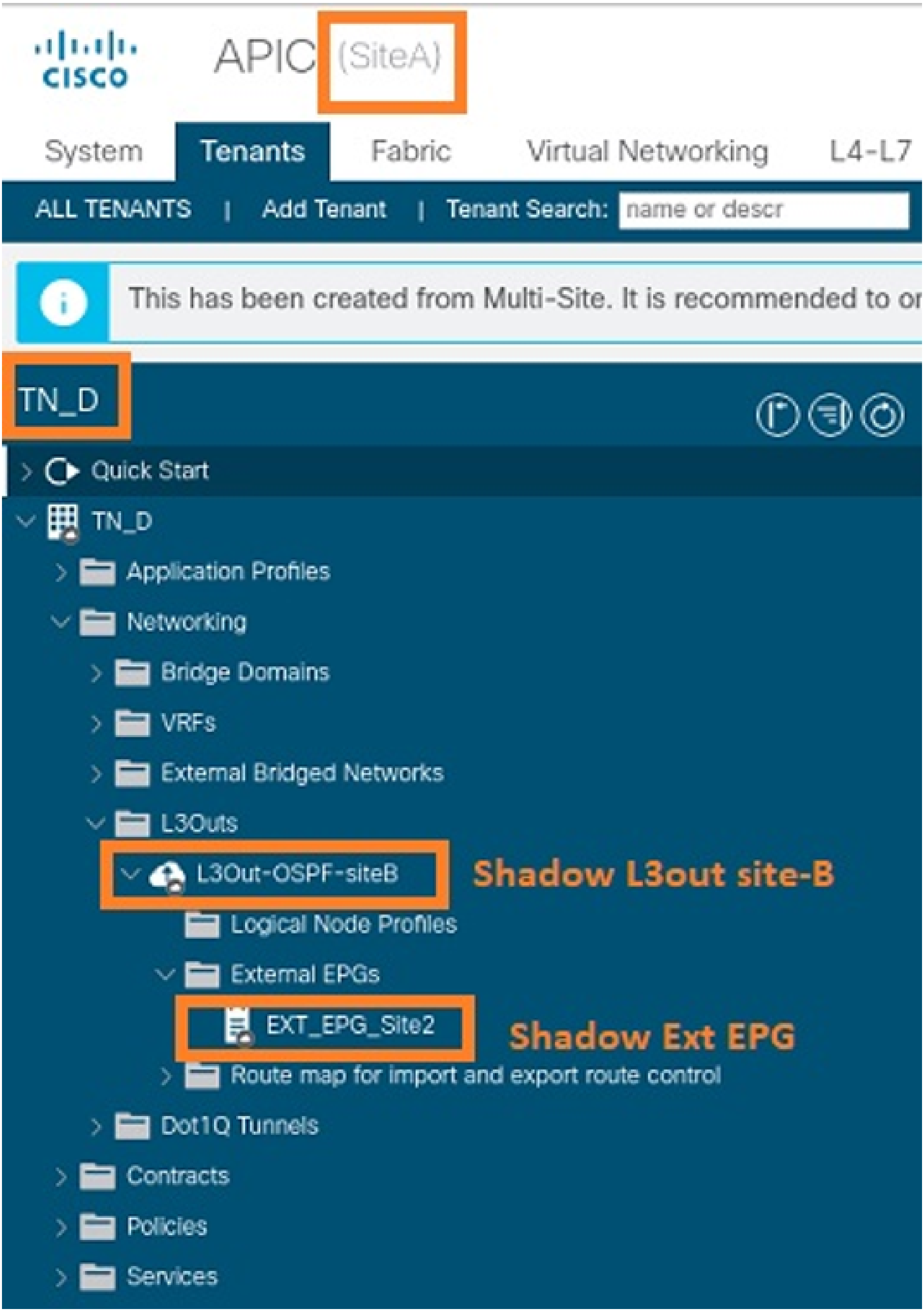
Intra EPG Isolation: ○ Enforced ● Unenforced

Intersite Multicast Source □

Include in Preferred Group □

QoS Level: Unspecified

As soon as the contract gets added, you can see "Shadow L3out / External EPG" created at Site-A.

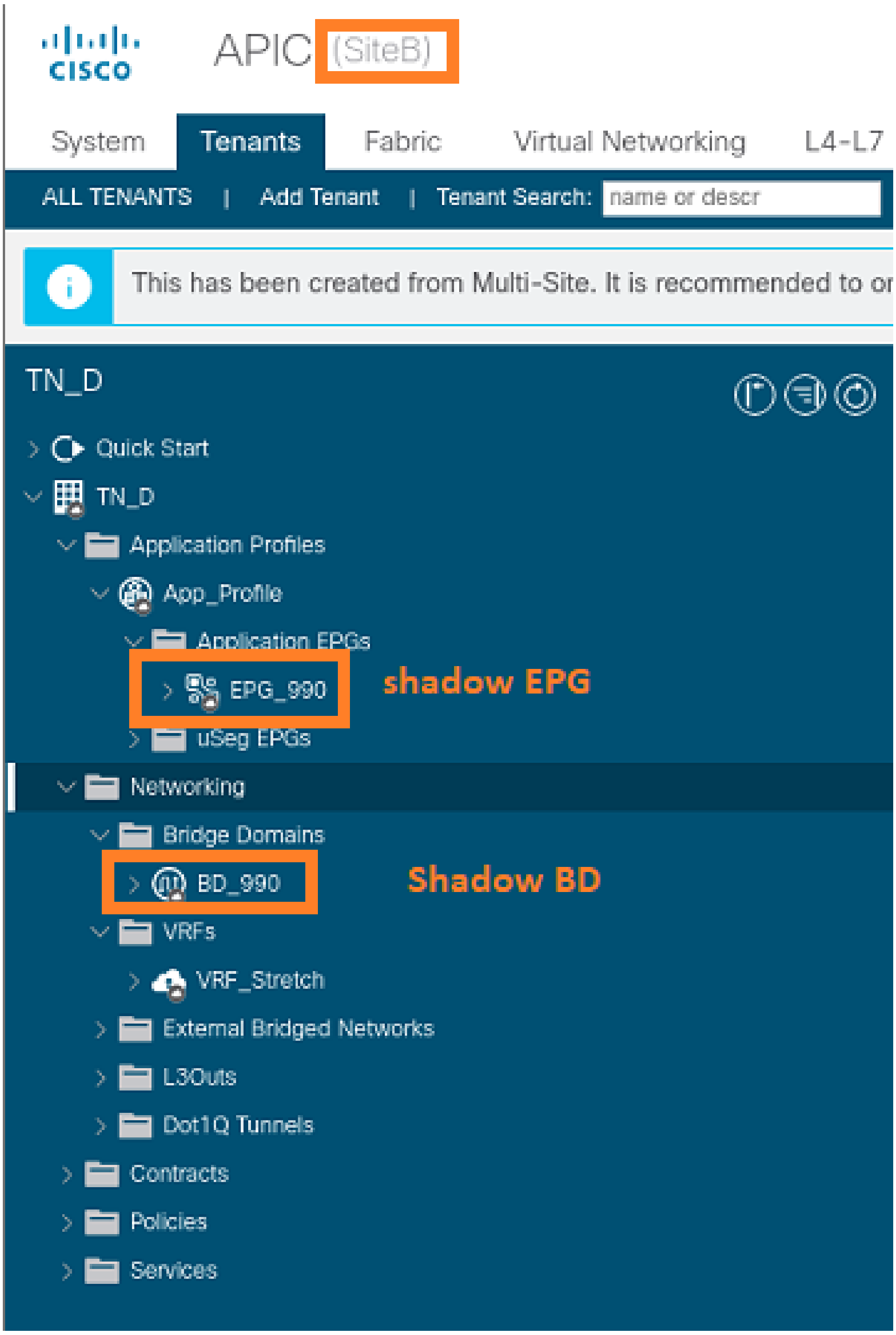


This has been created from Multi-Site. It is recommended to or

Shadow L3out site-B

Shadow Ext EPG

You can also see that "Shadow EPG_990 and BD_990" were also created at Site-B.



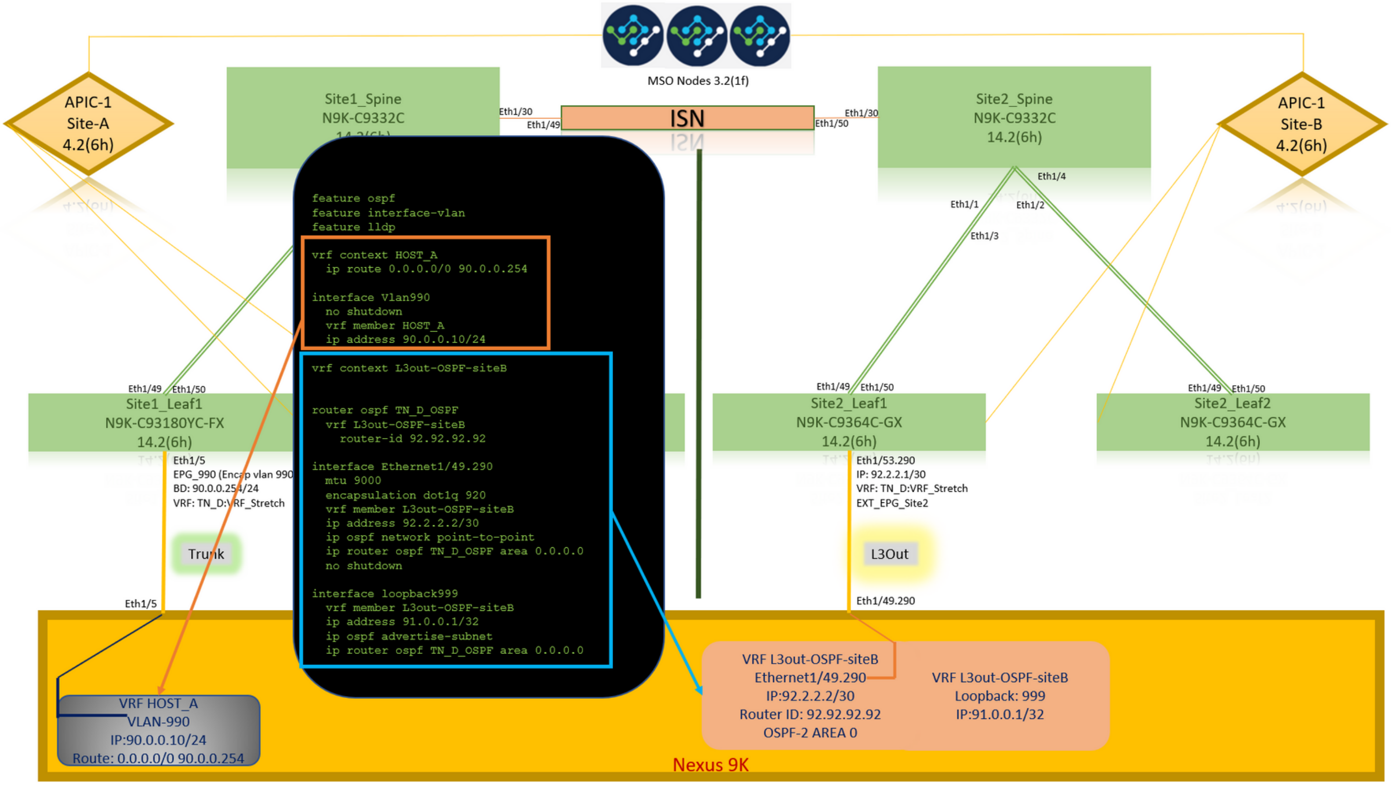
Step 6. Enter these commands in order to verify Site-B APIC.

```
apic1# moquery -c fvAEPg -f 'fv.AEPg.name=="EPG_990"'
Total Objects shown: 1
# fv.AEPg
name                    : EPG_990
annotation              : orchestrator:msc
childAction             :
configIssues            :
configSt                : applied
descr                   :
dn                      : uni/tn-TN_D/ap-App_Profile/epg-EPG_990
exceptionTag            :
extMngdBy               :
floodOnEncap            : disabled
fwdCtrl                 :
```

```
hasMcastSource       : no
isAttrBasedEPg       : no
isSharedSrvMsiteEPg  : no
lcOwn                : local
matchT               : AtleastOne
modTs                : 2021-09-19T18:47:53.374+00:00
monPolDn             : uni/tn-common/monepg-default
nameAlias            :
pcEnfPref            : unenforced
pcTag                : 49153          <<< Note that pcTag is different for shadow EPG.
prefGrMemb           : exclude
prio                 : unspecified
rn                   : epg-EPG_990
scope                : 2686978
shutdown             : no
status               :
triggerSt            : triggerable
txId                 : 1152921504609244629
uid                  : 0


apic1# moquery -c fvBD -f 'fv.BD.name==\"BD_990\"'
Total Objects shown: 1
# fv.BD
name                     : BD_990
OptimizeWanBandwidth     : yes
annotation               : orchestrator:msc
arpFlood                 : yes
bcastP                   : 225.0.181.192
childAction              :
configIssues             :
descr                    :
dn                       : uni/tn-TN_D/BD-BD_990
epClear                  : no
epMoveDetectMode         :
extMngdBy                :
hostBasedRouting         : no
intersiteBumTrafficAllow : yes
intersiteL2Stretch       : yes
ipLearning               : yes
ipv6McastAllow           : no
lcOwn                    : local
limitIpLearnToSubnets    : yes
llAddr                   : ::
mac                      : 00:22:BD:F8:19:FF
mcastAllow               : no
modTs                    : 2021-09-19T18:47:53.374+00:00
monPolDn                 : uni/tn-common/monepg-default
mtu                      : inherit
multiDstPktAct           : bd-flood
nameAlias                :
ownerKey                 :
ownerTag                 :
pcTag                    : 32771
rn                       : BD-BD_990
scope                    : 2686978
seg                      : 15957972
status                   :
type                     : regular
uid                      : 0
unicastRoute             : yes
unkMacUcastAct           : proxy
unkMcastAct              : flood
```

```
v6unkMcastAct                 : flood
vmac                          : not-applicable
```

Step 7. Review and verify the external device N9K configuration.



```
feature ospf
feature interface-vlan
feature lldp

vrf context HOST_A
  ip route 0.0.0.0/0 90.0.0.254

interface Vlan990
  no shutdown
  vrf member HOST_A
  ip address 90.0.0.10/24

vrf context L3out-OSPF-siteB


router ospf TN_D_OSPF
  vrf L3out-OSPF-siteB
    router-id 92.92.92.92

interface Ethernet1/49.290
  mtu 9000
  encapsulation dot1q 920
  vrf member L3out-OSPF-siteB
  ip address 92.2.2.2/30
  ip ospf network point-to-point
  ip router ospf TN_D_OSPF area 0.0.0.0
  no shutdown

interface loopback999
  vrf member L3out-OSPF-siteB
  ip address 91.0.0.1/32
  ip ospf advertise-subnet
  ip router ospf TN_D_OSPF area 0.0.0.0
```

Verify

Use this section to confirm that your configuration works properly.

Endpoint Learn

Verify the Site-A endpoint was learned as an endpoint in Site1_Leaf1.

```
Site1_Leaf1# show endpoint interface ethernet 1/5
Legend:
 s - arp              H - vtep              V - vpc-attached     p - peer-aged
 R - peer-attached-rl B - bounce            S - static           M - span
 D - bounce-to-proxy  O - peer-attached     a - local-aged       m - svc-mgr
 L - local            E - shared-service
+-----------------------------------+---------------+-----------------+--------------+----------
---+
      VLAN/                           Encap           MAC Address       MAC Info/
Interface
      Domain                          VLAN            IP Address        IP Info
+-----------------------------------+---------------+-----------------+--------------+----------
---+
18                                            vlan-990     c014.fe5e.1407 L
eth1/5
TN_D:VRF_Stretch vlan-990         90.0.0.10 L                        eth1/5
```

ETEP/RTEP Verification

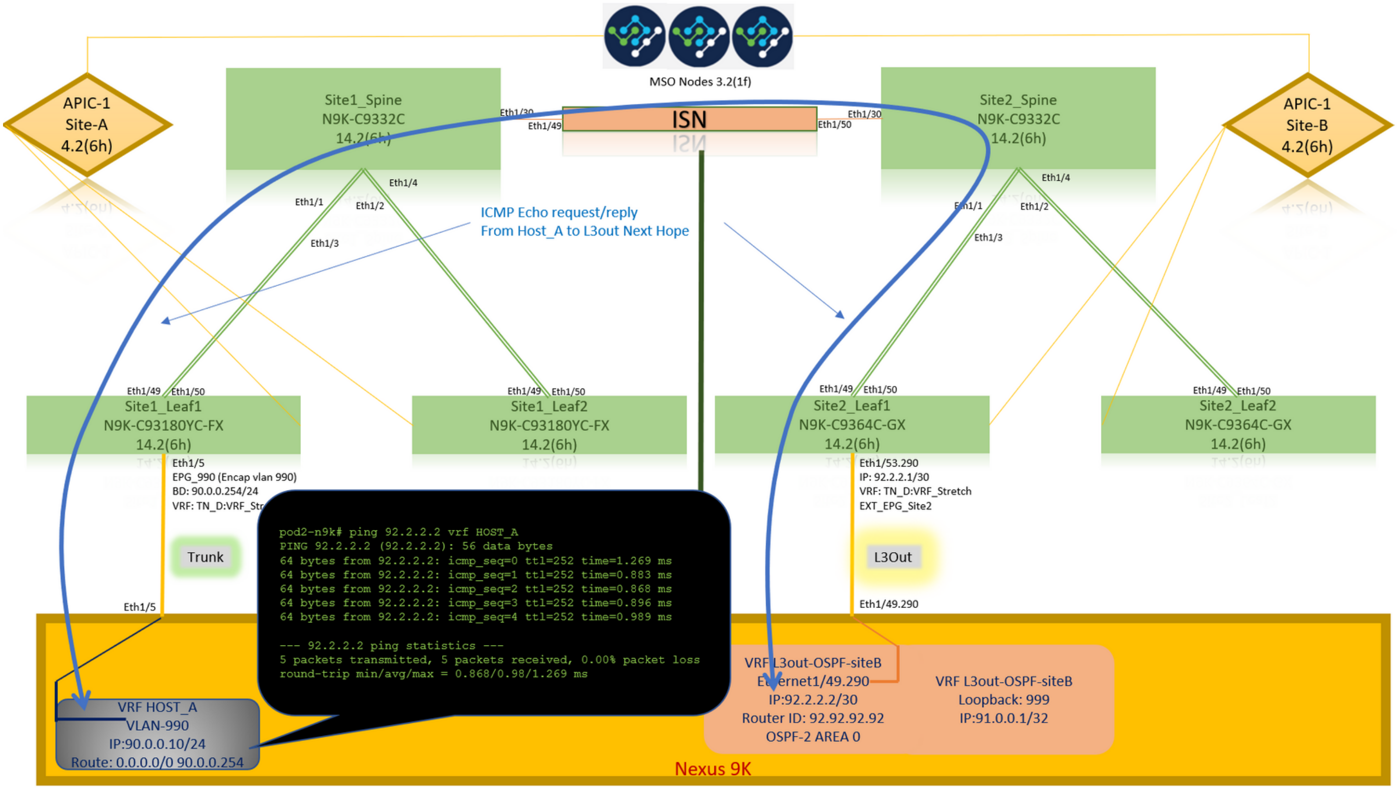
Site_A Leafs.

```
Site1_Leaf1# show ip interface brief vrf overlay-1
IP Interface Status for VRF "overlay-1"(4)
Interface            Address              Interface Status
eth1/49              unassigned           protocol-up/link-up/admin-up
eth1/49.7            unnumbered           protocol-up/link-up/admin-up
                     (lo0)
eth1/50              unassigned           protocol-up/link-up/admin-up
eth1/50.8            unnumbered           protocol-up/link-up/admin-up
                     (lo0)
eth1/51              unassigned           protocol-down/link-down/admin-up
eth1/52              unassigned           protocol-down/link-down/admin-up
eth1/53              unassigned           protocol-down/link-down/admin-up
eth1/54              unassigned           protocol-down/link-down/admin-up
vlan9                10.0.0.30/27         protocol-up/link-up/admin-up
lo0                  10.0.80.64/32        protocol-up/link-up/admin-up
lo1                  10.0.8.67/32         protocol-up/link-up/admin-up
lo8                  192.168.200.225/32   protocol-up/link-up/admin-up  <<<<< IP from ETEP site-
A
lo1023               10.0.0.32/32         protocol-up/link-up/admin-up
```

```
Site2_Leaf1# show ip interface brief vrf overlay-1
IP Interface Status for VRF "overlay-1"(4)
Interface            Address              Interface Status
eth1/49              unassigned           protocol-up/link-up/admin-up
eth1/49.16           unnumbered           protocol-up/link-up/admin-up
                     (lo0)
eth1/50              unassigned           protocol-up/link-up/admin-up
eth1/50.17           unnumbered           protocol-up/link-up/admin-up
                     (lo0)
eth1/51              unassigned           protocol-down/link-down/admin-up
eth1/52              unassigned           protocol-down/link-down/admin-up
eth1/54              unassigned           protocol-down/link-down/admin-up
eth1/55              unassigned           protocol-down/link-down/admin-up
eth1/56              unassigned           protocol-down/link-down/admin-up
eth1/57              unassigned           protocol-down/link-down/admin-up
eth1/58              unassigned           protocol-down/link-down/admin-up
eth1/59              unassigned           protocol-down/link-down/admin-up
eth1/60              unassigned           protocol-down/link-down/admin-up
eth1/61              unassigned           protocol-down/link-down/admin-up
eth1/62              unassigned           protocol-down/link-down/admin-up
eth1/63              unassigned           protocol-down/link-down/admin-up
eth1/64              unassigned           protocol-down/link-down/admin-up
vlan18               10.0.0.30/27         protocol-up/link-up/admin-up
lo0                  10.0.72.64/32        protocol-up/link-up/admin-up
lo1                  10.0.80.67/32        protocol-up/link-up/admin-up
lo6                  192.168.100.225/32   protocol-up/link-up/admin-up <<<<< IP from ETEP site-B
lo1023               10.0.0.32/32         protocol-up/link-up/admin-up
```

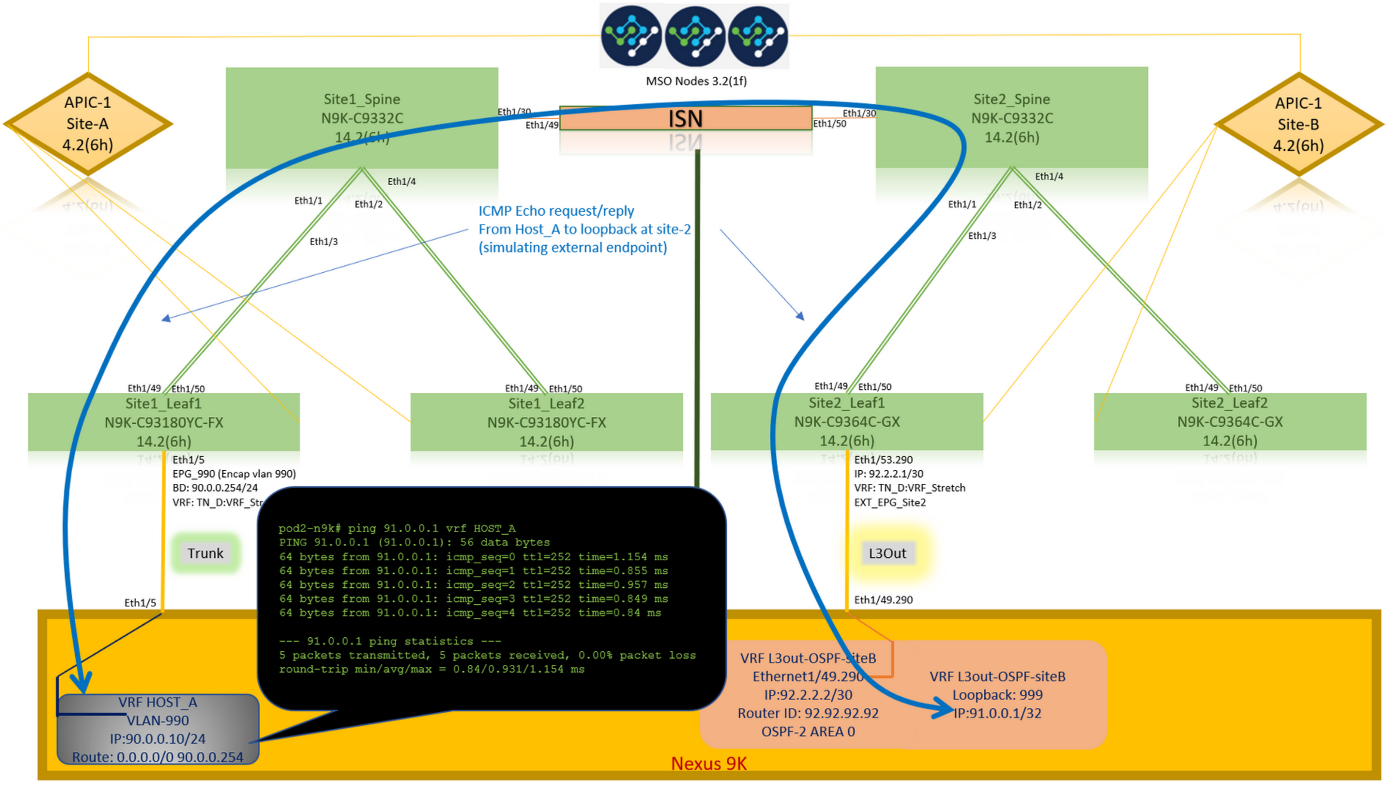
ICMP Reachability

Ping the external device WAN IP address from HOST_A.



```
pod2-n9k# ping 92.2.2.2 vrf HOST_A
PING 92.2.2.2 (92.2.2.2): 56 data bytes
64 bytes from 92.2.2.2: icmp_seq=0 ttl=252 time=1.269 ms
64 bytes from 92.2.2.2: icmp_seq=1 ttl=252 time=0.883 ms
64 bytes from 92.2.2.2: icmp_seq=2 ttl=252 time=0.868 ms
64 bytes from 92.2.2.2: icmp_seq=3 ttl=252 time=0.896 ms
64 bytes from 92.2.2.2: icmp_seq=4 ttl=252 time=0.989 ms

--- 92.2.2.2 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.868/0.98/1.269 ms
```

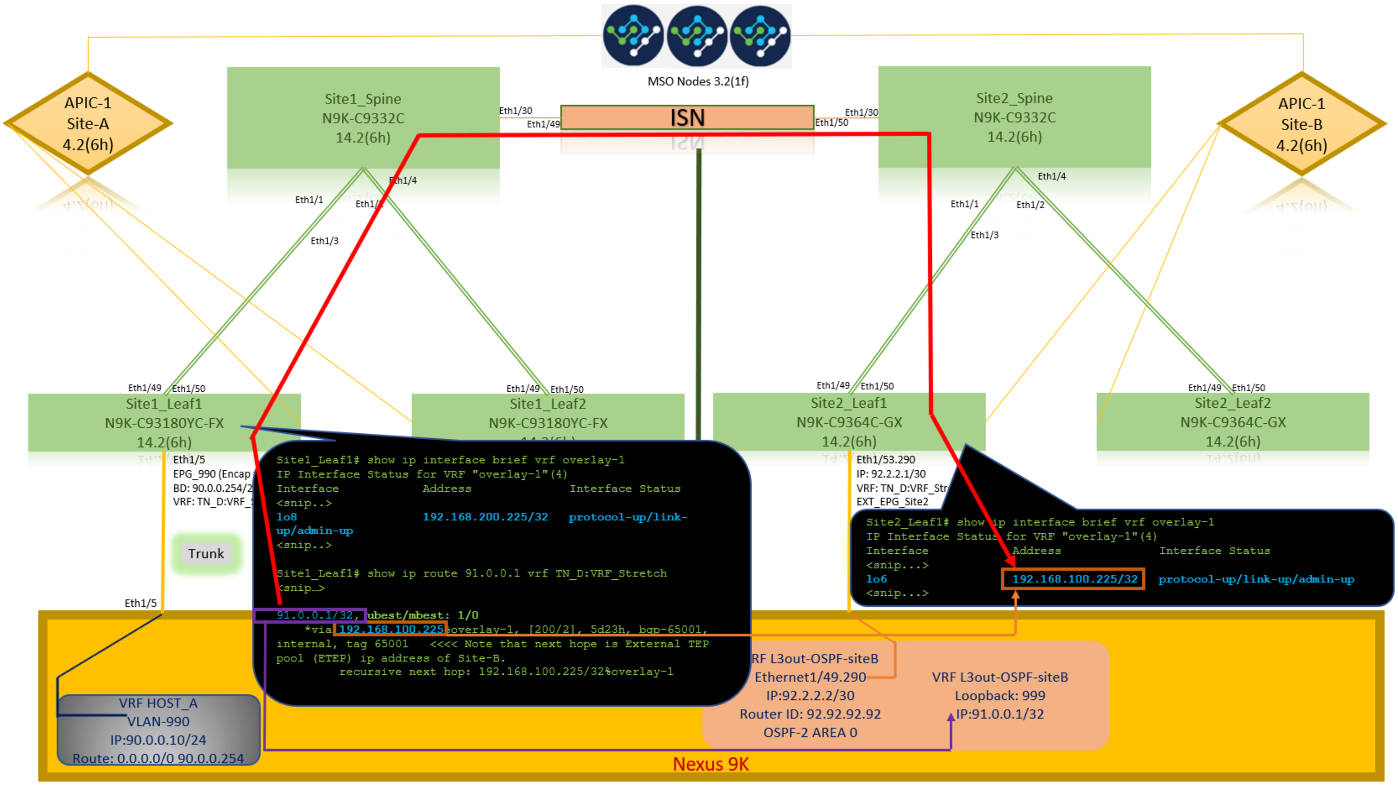
Ping the external device loopback address.



```
pod2-n9k# ping 91.0.0.1 vrf HOST_A
PING 91.0.0.1 (91.0.0.1): 56 data bytes
64 bytes from 91.0.0.1: icmp_seq=0 ttl=252 time=1.154 ms
64 bytes from 91.0.0.1: icmp_seq=1 ttl=252 time=0.855 ms
64 bytes from 91.0.0.1: icmp_seq=2 ttl=252 time=0.957 ms
64 bytes from 91.0.0.1: icmp_seq=3 ttl=252 time=0.849 ms
64 bytes from 91.0.0.1: icmp_seq=4 ttl=252 time=0.84 ms

--- 91.0.0.1 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.84/0.931/1.154 ms
```

Route Verification

Verify the external device WAN IP address OR the loopback subnet route is present in the routing table. When you check the next hop for external device subnet in "Site1_Leaf1", it is the External TEP IP of Leaf "Site2-Leaf1".



```
Site1_Leaf1# show ip interface brief vrf overlay-1
IP Interface Status for VRF "overlay-1"(4)
Interface                Address                Interface Status
<snip..>
lo8                      192.168.200.225/32     protocol-up/link-
up/admin-up
<snip..>

Site1_Leaf1# show ip route 91.0.0.1 vrf TN_D:VRF_Stretch
<snip…>

91.0.0.1/32, ubest/mbest: 1/0
    *via 192.168.100.225%overlay-1, [200/2], 5d23h, bgp-65001,
internal, tag 65001   <<<< Note that next hope is External TEP
pool (ETEP) ip address of Site-B.
         recursive next hop: 192.168.100.225/32%overlay-1
```

```
Site2_Leaf1# show ip interface brief vrf overlay-1
IP Interface Status for VRF "overlay-1"(4)
Interface                Address                Interface Status
<snip...>
lo6                      192.168.100.225/32     protocol-up/link-up/admin-up
<snip...>
```

```
Site1_Leaf1# show ip route 92.2.2.2 vrf TN_D:VRF_Stretch
IP Route Table for VRF "TN_D:VRF_Stretch"
'*' denotes best ucast next-hop
'**' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%' in via output denotes VRF
92.2.2.0/30, ubest/mbest: 1/0
    *via 192.168.100.225%overlay-1, [200/0], 5d23h, bgp-65001, internal, tag 65001   <<<< Note
that next hope is External TEP pool (ETEP) ip address of Site-B.
         recursive next hop: 192.168.100.225/32%overlay-1
Site1_Leaf1# show ip route 91.0.0.1 vrf TN_D:VRF_Stretch
IP Route Table for VRF "TN_D:VRF_Stretch"
'*' denotes best ucast next-hop
'**' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%' in via output denotes VRF
91.0.0.1/32, ubest/mbest: 1/0
    *via 192.168.100.225%overlay-1, [200/2], 5d23h, bgp-65001, internal, tag 65001   <<<< Note
that next hope is External TEP pool (ETEP) ip address of Site-B.
         recursive next hop: 192.168.100.225/32%overlay-1
```

Troubleshoot

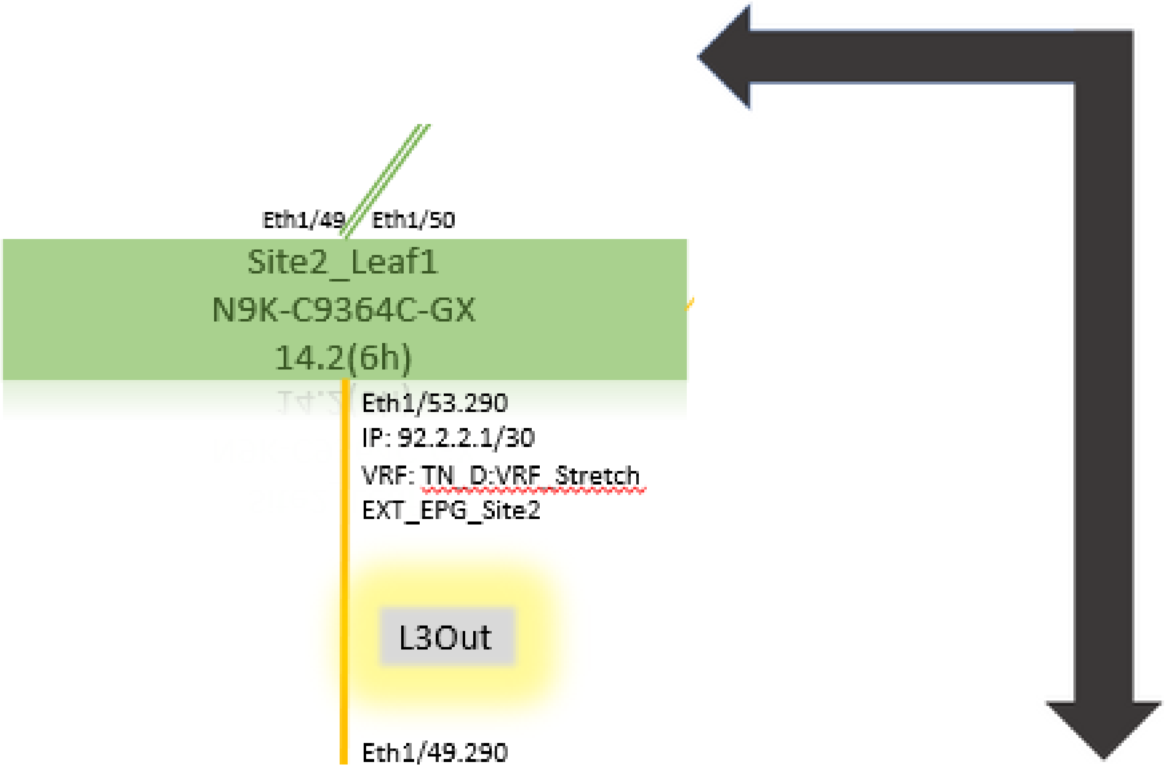
This section provides information you can use to troubleshoot your configuration.

Site2_Leaf1

BGP address-family route import/export between TN_D:VRF_stretch and Overlay-1.

```
Site2_Leaf1# show system internal epm vrf TN_D:VRF_Stretch
+--------------------------------+--------+----------+----------+------+--------
```

```
               VRF                   Type    VRF vnid  Context ID Status Endpoint
                                                                           Count
+---------------------------------+--------+----------+----------+------+--------
  TN_D:VRF_Stretch                   Tenant   2686978    46         Up     1

Site2_Leaf1# show vrf TN_D:VRF_Stretch detail
VRF-Name: TN_D:VRF_Stretch, VRF-ID: 46, State: Up
    VPNID: unknown
    RD: 1101:2686978
    Max Routes: 0  Mid-Threshold: 0
    Table-ID: 0x8000002e, AF: IPv6, Fwd-ID: 0x8000002e, State: Up
    Table-ID: 0x0000002e, AF: IPv4, Fwd-ID: 0x0000002e, State: Up
```



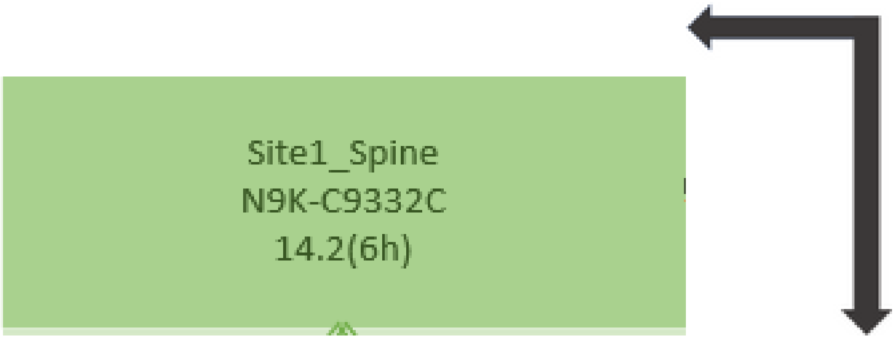
```
Site2_Leaf1# vsh
Site2_Leaf1# show bgp vpnv4 unicast 91.0.0.1 vrf TN_D:VRF_Stretch
BGP routing table information for VRF overlay-1, address family VPNv4 Unicast
Route Distinguisher: 1101:2686978     (VRF TN_D:VRF_Stretch)
BGP routing table entry for 91.0.0.1/32, version 12 dest ptr 0xae6da350
Paths: (1 available, best #1)
Flags: (0x80c0002 00000000) on xmit-list, is not in urib, exported
  vpn: version 346, (0x100002) on xmit-list
Multipath: eBGP iBGP

  Advertised path-id 1, VPN AF advertised path-id 1
  Path type: redist 0x408 0x1 ref 0 adv path ref 2, path is valid, is best path
  AS-Path: NONE, path locally originated
    0.0.0.0 (metric 0) from 0.0.0.0 (10.0.72.64)
      Origin incomplete, MED 2, localpref 100, weight 32768
      Extcommunity:
          RT:65001:2686978
          VNID:2686978
          COST:pre-bestpath:162:110
  VRF advertise information:
  Path-id 1 not advertised to any peer
  VPN AF advertise information:
  Path-id 1 advertised to peers:
    10.0.72.65                                       <<<Spine site-2 'Site2_Spine'
```

```
Site-B
apic1# acidiag fnvread
      ID   Pod ID                 Name    Serial Number         IP Address    Role        State
LastUpdMsgId
--------------------------------------------------------------------------------------------------
--------------
     101        1          Site2_Spine      FDO243207JH      10.0.72.65/32   spine
active   0
     102        1          Site2_Leaf2      FDO24260FCH      10.0.72.66/32    leaf
active   0
    1101        1          Site2_Leaf1      FDO24260ECW      10.0.72.64/32    leaf
active   0
```

Site2_Spine

```
Site2_Spine# vsh
Site2_Spine# show bgp vpnv4 unicast 91.0.0.1 vrf overlay-1
BGP routing table information for VRF overlay-1, address family VPNv4 Unicast
<---------26bits--------->
Route Distinguisher: 1101:2686978                                          <<<<<2686978 <--
Binary--> 00001010010000000000000010
BGP routing table entry for 91.0.0.1/32, version 717 dest ptr 0xae643d0c
Paths: (1 available, best #1)
Flags: (0x000002 00000000) on xmit-list, is not in urib, is not in HW
Multipath: eBGP iBGP
  Advertised path-id 1
  Path type: internal 0x40000018 0x800040 ref 0 adv path ref 1, path is valid, is best path
  AS-Path: NONE, path sourced internal to AS
    10.0.72.64 (metric 2) from 10.0.72.64 (10.0.72.64)  <<< Site2_leaf1 IP
      Origin incomplete, MED 2, localpref 100, weight 0
      Received label 0
      Received path-id 1
      Extcommunity:
          RT:65001:2686978
          COST:pre-bestpath:168:3221225472
          VNID:2686978
          COST:pre-bestpath:162:110
  Path-id 1 advertised to peers:
    192.168.10.13                             <<<< Site1_Spine mscp-etep IP.
Site1_Spine# show ip interface vrf overlay-1
<snip...>
lo12, Interface status: protocol-up/link-up/admin-up, iod: 89, mode: mscp-etep
  IP address: 192.168.10.13, IP subnet: 192.168.10.13/32                       <<<Site-B spine
mscp-ETEP address which is BGP peer with Site-A Spine
  IP broadcast address: 255.255.255.255
  IP primary address route-preference: 0, tag: 0
<snip...>
```

Site1_Spine



```
Site1_Spine# vsh
Site1_Spine# show bgp vpnv4 unicast 91.0.0.1 vrf overlay-1
BGP routing table information for VRF overlay-1, address family VPNv4 Unicast
<---------26Bits-------->
Route Distinguisher: 1101:36241410
<<<<<36241410<--binary-->10001010010000000000000010
BGP routing table entry for 91.0.0.1/32, version 533 dest ptr 0xae643dd4
Paths: (1 available, best #1)
Flags: (0x000002 00000000) on xmit-list, is not in urib, is not in HW
Multipath: eBGP iBGP
  Advertised path-id 1
  Path type: internal 0x40000018 0x880000 ref 0 adv path ref 1, path is valid, is best path,
remote site path
  AS-Path: NONE, path sourced internal to AS
    192.168.100.225 (metric 20) from 192.168.11.13 (192.168.11.13)  <<< Site2_Leaf1 ETEP IP
learn via Site2_Spine mcsp-etep address.
      Origin incomplete, MED 2, localpref 100, weight 0
      Received label 0
      Extcommunity:
          RT:65001:36241410
          SOO:65001:50331631
          COST:pre-bestpath:166:2684354560
          COST:pre-bestpath:168:3221225472
          VNID:2686978
          COST:pre-bestpath:162:110
      Originator: 10.0.72.64 Cluster list: 192.168.11.13 <<< Originator Site2_Leaf1 and
Site2_Spine ips are listed here...
  Path-id 1 advertised to peers:
    10.0.80.64                         <<<< Site1_Leaf1 ip

Site2_Spine# show ip interface vrf overlay-1
<snip..>
lo13, Interface status: protocol-up/link-up/admin-up, iod: 92, mode: mscp-etep IP address:
192.168.11.13, IP subnet: 192.168.11.13/32
  IP broadcast address: 255.255.255.255
  IP primary address route-preference: 0, tag: 0
<snip..>
Site-B apic1# acidiag fnvread
      ID   Pod ID                 Name    Serial Number         IP Address    Role        State
LastUpdMsgId
--------------------------------------------------------------------------------------------------
--------------
     101        1          Site2_Spine      FDO243207JH      10.0.72.65/32   spine
active    0
     102        1          Site2_Leaf2      FDO24260FCH      10.0.72.66/32    leaf
active    0
    1101        1          Site2_Leaf1      FDO24260ECW      10.0.72.64/32    leaf
active    0
```

Verify the intersite flag.

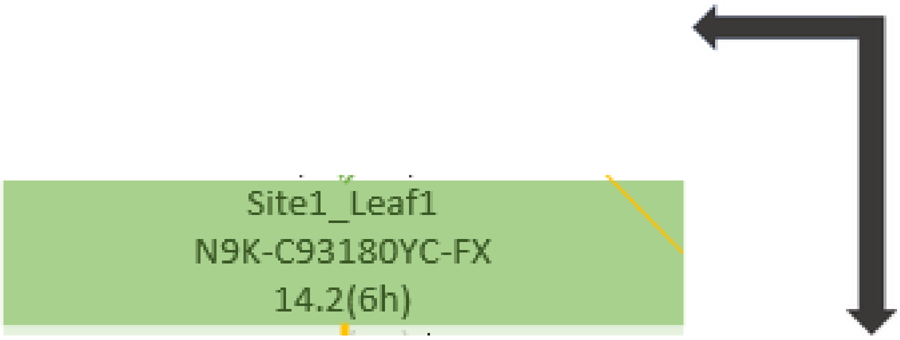
```
Site1_Spine# moquery -c bgpPeer -f 'bgp.Peer.addr*"192.168.11.13"'
Total Objects shown: 1
# bgp.Peer
addr             : 192.168.11.13/32
activePfxPeers   : 0
adminSt          : enabled
asn              : 65001
bgpCfgFailedBmp  :
bgpCfgFailedTs   : 00:00:00:00.000
bgpCfgState      : 0
childAction      :
ctrl             :
curPfxPeers      : 0
dn               : sys/bgp/inst/dom-overlay-1/peer-[192.168.11.13/32]
lcOwn            : local
maxCurPeers      : 0
maxPfxPeers      : 0
modTs            : 2021-09-13T11:58:26.395+00:00
monPolDn         :
name             :
passwdSet        : disabled
password         :
peerRole         : msite-speaker
privateASctrl    :
rn               : peer-[192.168.11.13/32] <<<site-2 Spine
srcIf            : lo12
status           :
totalPfxPeers    : 0
ttl              : 16
type             : inter-site <<<Inter-site Flag is set
```

Understand Route Distinguisher Entry

When the intersite flag is set, the local-site spine can set the local site id in the route-target starting at the 25th bit. When Site1 gets the BGP path with this bit set in the RT, it knows this is a remote-site path.

```
Site2_Leaf1# vsh
Site2_Leaf1# show bgp vpnv4 unicast 91.0.0.1 vrf TN_D:VRF_Stretch
BGP routing table information for VRF overlay-1, address family VPNv4 Unicast
<---------26Bits-------->
Route Distinguisher: 1101:2686978    (VRF TN_D:VRF_Stretch)                         <<<<<2686978
<--Binary--> 00001010010000000000000010
BGP routing table entry for 91.0.0.1/32, version 12 dest ptr 0xae6da350

Site1_Spine# vsh
Site1_Spine# show bgp vpnv4 unicast 91.0.0.1 vrf overlay-1

<---------26Bits-------->
Route Distinguisher: 1101:36241410
<<<<<36241410<--binary-->10001010010000000000000010

^^---26th bit set to 1 and with 25th bit value it become 10.
```

Notice that the RT binary value is exactly the same for Site1 except for the 26th bit set to 1. It has a decimal value (marked as blue). 1101:36241410 is what you can expect to see in Site1 and what the internal leaf at Site1 must be imported.



Site1_Leaf1

```
Site1_Leaf1# show vrf TN_D:VRF_Stretch detail
VRF-Name: TN_D:VRF_Stretch, VRF-ID: 46, State: Up
VPNID: unknown
RD: 1101:2850817
Max Routes: 0 Mid-Threshold: 0
Table-ID: 0x8000002e, AF: IPv6, Fwd-ID: 0x8000002e, State: Up
Table-ID: 0x0000002e, AF: IPv4, Fwd-ID: 0x0000002e, State: Up

Site1_Leaf1# show bgp vpnv4 unicast 91.0.0.1 vrf overlay-1
BGP routing table information for VRF overlay-1, address family VPNv4 Unicast
Route Distinguisher: 1101:2850817    (VRF TN_D:VRF_Stretch)
BGP routing table entry for 91.0.0.1/32, version 17 dest ptr 0xadeda550
Paths: (1 available, best #1)
Flags: (0x08001a 00000000) on xmit-list, is in urib, is best urib route, is in HW
  vpn: version 357, (0x100002) on xmit-list
Multipath: eBGP iBGP
  Advertised path-id 1, VPN AF advertised path-id 1
  Path type: internal 0xc0000018 0x80040 ref 56506 adv path ref 2, path is valid, is best path,
remote site path
             Imported from 1101:36241410:91.0.0.1/32
  AS-Path: NONE, path sourced internal to AS
    192.168.100.225 (metric 64) from 10.0.80.65 (192.168.10.13)
      Origin incomplete, MED 2, localpref 100, weight 0
      Received label 0
      Received path-id 1
      Extcommunity:
          RT:65001:36241410
          SOO:65001:50331631
          COST:pre-bestpath:166:2684354560
          COST:pre-bestpath:168:3221225472
          VNID:2686978
          COST:pre-bestpath:162:110
      Originator: 10.0.72.64 Cluster list: 192.168.10.13192.168.11.13             <<<<
'10.0.72.64'='Site2_Leaf1' , '192.168.10.13'='Site1_Spine' , '192.168.11.13'='Site2_Spine'
  VRF advertise information:
  Path-id 1 not advertised to any peer
  VPN AF advertise information:
  Path-id 1 not advertised to any peer
<snip..>
Site1_Leaf1# show bgp vpnv4 unicast 91.0.0.1 vrf TN_D:VRF_Stretch
BGP routing table information for VRF overlay-1, address family VPNv4 Unicast
Route Distinguisher: 1101:2850817    (VRF TN_D:VRF_Stretch)
BGP routing table entry for 91.0.0.1/32, version 17 dest ptr 0xadeda550
Paths: (1 available, best #1)
Flags: (0x08001a 00000000) on xmit-list, is in urib, is best urib route, is in HW
  vpn: version 357, (0x100002) on xmit-listMultipath: eBGP iBGP
  Advertised path-id 1, VPN AF advertised path-id 1
  Path type: internal 0xc0000018 0x80040 ref 56506 adv path ref 2, path is valid, is best path,
remote site path
             Imported from 1101:36241410:91.0.0.1/32
  AS-Path: NONE, path sourced internal to AS
    192.168.100.225 (metric 64) from 10.0.80.65 (192.168.10.13)
      Origin incomplete, MED 2, localpref 100, weight 0
      Received label 0
      Received path-id 1
      Extcommunity:
          RT:65001:36241410
          SOO:65001:50331631
          COST:pre-bestpath:166:2684354560
          COST:pre-bestpath:168:3221225472
          VNID:2686978
          COST:pre-bestpath:162:110
      Originator: 10.0.72.64 Cluster list: 192.168.10.13 192.168.11.13
  VRF advertise information:
  Path-id 1 not advertised to any peer
  VPN AF advertise information:
  Path-id 1 not advertised to any peer
```

Hence "Site1_Leaf1" has route entry for subnet 91.0.0.1/32 with next-hop "Site2_Leaf1" ETEP address 192.168.100.225.

```
Site1_Leaf1# show ip route 91.0.0.1 vrf TN_D:VRF_Stretch
IP Route Table for VRF "TN_D:VRF_Stretch"
'*' denotes best ucast next-hop
'**' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%' in via output denotes VRF
91.0.0.1/32, ubest/mbest: 1/0
    *via 192.168.100.225%overlay-1, [200/2], 5d23h, bgp-65001, internal, tag 65001   <<<< Note
that next hope is External TEP pool (ETEP) ip address of Site-B.
         recursive next hop: 192.168.100.225/32%overlay-1
```

Site-A Spine does add route-map toward the BGP neighbor IP address of "Site2_Spine" mcsp-ETEP.

So if you think about traffic flows, when the Site-A endpoint talks to the external IP address, the packet can encapsulate with the source as "Site1_Leaf1" TEP address and the destination is ETEP address of "Site2_Leaf" IP address 192.168.100.225.

Verify ELAM (Site1_Spine)

```
Site1_Spine# vsh_lc
module-1# debug platform internal roc elam asic 0
module-1(DBG-elam)# trigger reset
module-1(DBG-elam)# trigger init in-select 14 out-select 1
module-1(DBG-elam-insel14)# set inner ipv4 src_ip 90.0.0.10 dst_ip 91.0.0.1 next-protocol 1
module-1(DBG-elam-insel14)# start
module-1(DBG-elam-insel14)# status
 ELAM STATUS
===========
Asic 0 Slice 0 Status Armed
Asic 0 Slice 1 Status Armed
Asic 0 Slice 2 Status Armed
Asic 0 Slice 3 Status Armed
```

```
pod2-n9k# ping 91.0.0.1 vrf HOST_A source 90.0.0.10
PING 91.0.0.1 (91.0.0.1) from 90.0.0.10: 56 data bytes
64 bytes from 91.0.0.1: icmp_seq=0 ttl=252 time=1.015 ms
64 bytes from 91.0.0.1: icmp_seq=1 ttl=252 time=0.852 ms
64 bytes from 91.0.0.1: icmp_seq=2 ttl=252 time=0.859 ms
64 bytes from 91.0.0.1: icmp_seq=3 ttl=252 time=0.818 ms
64 bytes from 91.0.0.1: icmp_seq=4 ttl=252 time=0.778 ms
--- 91.0.0.1 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.778/0.864/1.015 ms
```

Site1_Spine ELAM is triggered. Ereport confirms that the packet encapsulates with a TEP address of the Site-A Leaf TEP IP address and destination toward the Site2_Leaf1 ETEP address.

```
module-1(DBG-elam-insel14)# status
 ELAM STATUS
===========
Asic 0 Slice 0 Status Armed
Asic 0 Slice 1 Status Armed
Asic 0 Slice 2 Status Triggered
Asic 0 Slice 3 Status Armed
module-1(DBG-elam-insel14)# ereport
Python available. Continue ELAM decode with LC Pkg
 ELAM REPORT

------------------------------------------------------------------------------------------------
------------------------------------------------------
Outer L3 Header
------------------------------------------------------------------------------------------------
------------------------------------------------------
L3 Type                       : IPv4
DSCP                          : 0
Don't Fragment Bit            : 0x0
TTL                           : 32
IP Protocol Number            : UDP
Destination IP                : 192.168.100.225       <<<'Site2_Leaf1' ETEP address
Source IP                     : 10.0.80.64            <<<'Site1_Leaf1' TEP address
------------------------------------------------------------------------------------------------
------------------------------------------------------
Inner L3 Header
------------------------------------------------------------------------------------------------
------------------------------------------------------
L3 Type                       : IPv4
DSCP                          : 0
Don't Fragment Bit            : 0x0
TTL                           : 254
IP Protocol Number            : ICMP
Destination IP                : 91.0.0.1
Source IP                     : 90.0.0.10
```

Site1_Spine Verify Route-Map

When the Site-A spine receives a packet, it can redirect to "Site2_Leaf1" ETEP address instead of looking coop or route entry. (When you have intersite-L3out at Site-B, then the Site-A spine creates a route-map called "infra-intersite-l3out" to redirect traffic toward ETEP of Site2_Leaf1 and exit out from L3out.)

```
Site1_Spine# show bgp vpnv4 unicast neighbors 192.168.11.13 vrf overlay-1
BGP neighbor is 192.168.11.13,  remote AS 65001, ibgp link,  Peer index 4
  BGP version 4, remote router ID 192.168.11.13
  BGP state = Established, up for 10w4d
  Using loopback12 as update source for this peer
  Last read 00:00:03, hold time = 180, keepalive interval is 60 seconds
  Last written 00:00:03, keepalive timer expiry due 00:00:56
  Received 109631 messages, 0 notifications, 0 bytes in queue
  Sent 109278 messages, 0 notifications, 0 bytes in queue
  Connections established 1, dropped 0
  Last reset by us never, due to No error
  Last reset by peer never, due to No error
  Neighbor capabilities:
  Dynamic capability: advertised (mp, refresh, gr) received (mp, refresh, gr)
  Dynamic capability (old): advertised received
  Route refresh capability (new): advertised received
  Route refresh capability (old): advertised received
  4-Byte AS capability: advertised received
  Address family VPNv4 Unicast: advertised received
  Address family VPNv6 Unicast: advertised received
  Address family L2VPN EVPN: advertised received
  Graceful Restart capability: advertised (GR helper) received (GR helper)
  Graceful Restart Parameters:
  Address families advertised to peer:
  Address families received from peer:
  Forwarding state preserved by peer for:
  Restart time advertised by peer: 0 seconds
  Additional Paths capability: advertised received
  Additional Paths Capability Parameters:
  Send capability advertised to Peer for AF:
    L2VPN EVPN
  Receive capability advertised to Peer for AF:
    L2VPN EVPN
  Send capability received from Peer for AF:
    L2VPN EVPN
  Receive capability received from Peer for AF:
    L2VPN EVPN
  Additional Paths Capability Parameters for next session:
  [E] - Enable [D] - Disable
  Send Capability state for AF:
    VPNv4 Unicast[E] VPNv6 Unicast[E]
  Receive Capability state for AF:
    VPNv4 Unicast[E] VPNv6 Unicast[E]
  Extended Next Hop Encoding Capability: advertised received
  Receive IPv6 next hop encoding Capability for AF:
    IPv4 Unicast
  Message statistics:
                              Sent               Rcvd
  Opens:                         1                  1
  Notifications:                 0                  0
  Updates:                    1960               2317
  Keepalives:               107108             107088
  Route Refresh:               105                123
  Capability:                  104                102
  Total:                    109278             109631
  Total bytes:             2230365            2260031
  Bytes in queue:                0                  0
  For address family: VPNv4 Unicast
  BGP table version 533, neighbor version 533
  3 accepted paths consume 360 bytes of memory
  3 sent paths
  0 denied paths
  Community attribute sent to this neighbor
  Extended community attribute sent to this neighbor
  Third-party Nexthop will not be computed.
  Outbound route-map configured is infra-intersite-l3out, handle obtained   <<<< route-map to
redirect traffic from Site-A to Site-B 'Site2_Leaf1' L3out
  For address family: VPNv6 Unicast
  BGP table version 241, neighbor version 241
  0 accepted paths consume 0 bytes of memory
  0 sent paths
  0 denied paths
  Community attribute sent to this neighbor
  Extended community attribute sent to this neighbor
  Third-party Nexthop will not be computed.
  Outbound route-map configured is infra-intersite-l3out, handle obtained
<snip...> Site1_Spine# show route-map infra-intersite-l3out
route-map infra-intersite-l3out, permit, sequence 1
  Match clauses:
    ip next-hop prefix-lists: IPv4-Node-entry-102
    ipv6 next-hop prefix-lists: IPv6-Node-entry-102
  Set clauses:
    ip next-hop 192.168.200.226
route-map infra-intersite-l3out, permit, sequence 2   <<<< This route-map match if destination
IP of packet 'Site1_Spine' TEP address then send to 'Site2_Leaf1' ETEP address.
  Match clauses:
    ip next-hop prefix-lists: IPv4-Node-entry-1101
    ipv6 next-hop prefix-lists: IPv6-Node-entry-1101
  Set clauses:
    ip next-hop 192.168.200.225
route-map infra-intersite-l3out, deny, sequence 999
  Match clauses:
    ip next-hop prefix-lists: infra_prefix_local_pteps_inexact
  Set clauses:
route-map infra-intersite-l3out, permit, sequence 1000
  Match clauses:
  Set clauses:
    ip next-hop unchanged

Site1_Spine# show ip prefix-list IPv4-Node-entry-1101
ip prefix-list IPv4-Node-entry-1101: 1 entries
   seq 1 permit 10.0.80.64/32  <<<Site1_Leaf1 TEP address.
Site1_Spine# show ip prefix-list IPv4-Node-entry-102
ip prefix-list IPv4-Node-entry-102: 1 entries
   seq 1 permit 10.0.80.66/32
Site1_Spine# show ip prefix-list infra_prefix_local_pteps_inexact
ip prefix-list infra_prefix_local_pteps_inexact: 1 entries
   seq 1 permit 10.0.0.0/16 le 32
```