



The bridge to possible

# ACI Installation Guide for Red Hat OpenStack

Using OSP16.2 Director

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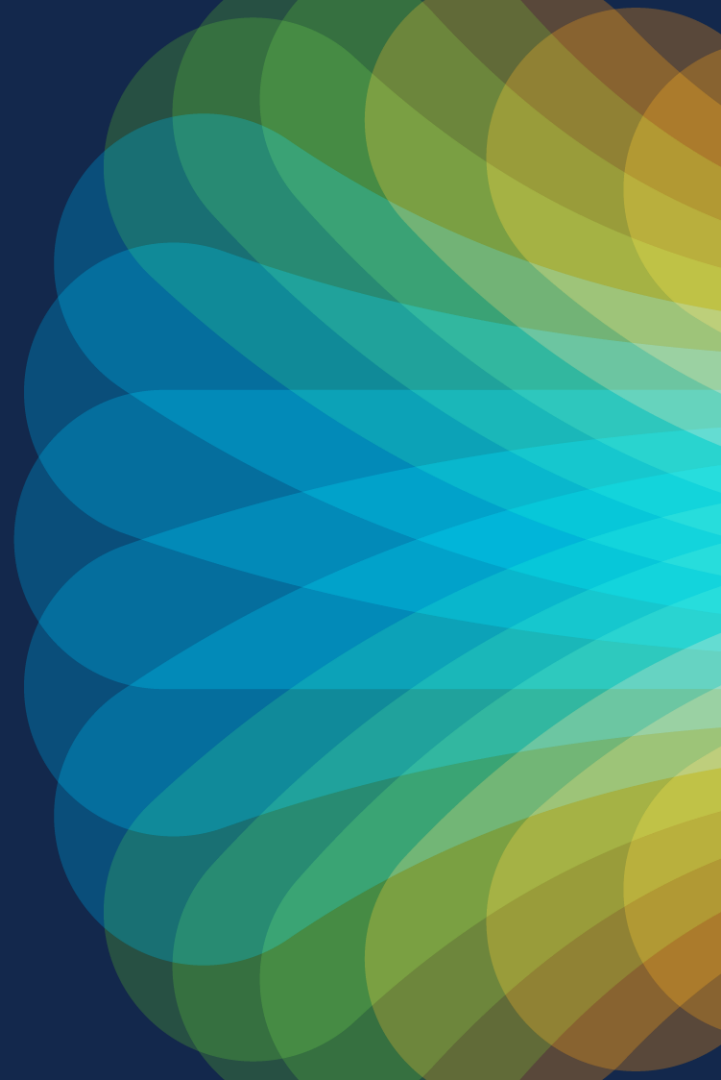
#CiscoLive



# Agenda

- Introduction
- ACI preparation
- ACI plugin installation in OSP director
- Overcloud installation
- Demo

# Introduction



# Introduction

- Both ACI and Openstack are knockout solutions facing SDN and Cloud computing market.

Currently, there is no existing Cisco Live session to present ACI and Openstack integration.

Although several Cisco Validated Design (CVD) documents covering this part are published, but they seem a little unfocused.

This session combines the essence of CVDs , it can save customer's time understanding the solution and ease the deployment and operation.

# Introduction

- This session covers below contents
  - Explanations about key point steps
  - Step-by-step guide for ACI-Openstack integration
  - Basic verification for a successful ACI-Openstack integration

# ACI preparation

# ACI preparation

- In the Cisco APIC GUI, disable the OpFlex authentication in the fabric. Make sure "To enforce Opflex client certificate authentication for GOLF and Linux." is not checked in System > System Settings > Fabric Wide Setting > Fabric Wide Setting Policy pane.

---

## Properties

- Disable Remote EP Learning:  To disable remote endpoint learning in VRFs containing external bridged/routed domains
- Enforce Subnet Check:  To disable IP address learning on the outside of subnets configured in a VRF, for all VRFs
- Enforce EPG VLAN Validation:  Validation check that prevents overlapping VLAN pools from being associated to an EPG
- Enforce Domain Validation:  Validation check if a static path is added but no domain is associated to an EPG
- Enable Remote Leaf Direct Traffic Forwarding:  Enable Remote Leaf direct communication with routable IP connectivity between Remote Leafs and Fabric, once enabled you cannot disable it again
- Opflex Client Authentication:  To enforce Opflex client certificate authentication for GOLF and Linux
- Reallocate Gipo:  Reallocate some non-stretched BD gipos to make room for stretched BDs

# ACI preparation

- Setting Up the Cisco APIC and the Network
  - As per ACI/OSP integration guide, create AAEP, vlan pool, physical domain.
  - make sure “Enabled Infrastructure VLAN” option is checked

Attachable Access Entity Profile - AEP\_OSP

[Policy](#)

Properties

Name: AEP\_OSP

Description: optional

Enable Infrastructure VLAN:  

Domains (VMM, Physical or External) Associated to Interfaces:

name	State
PD_ACI_OSP (Physical)	formed



# ACI preparation

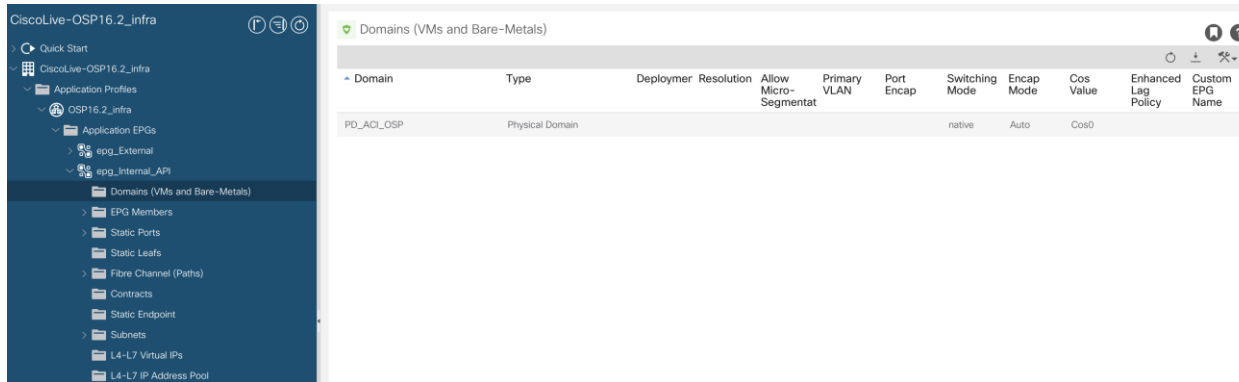
- Setting Up the Cisco APIC and the Network
- Create Tenant, BDs, EPGs for OSP infra network

The screenshot displays the Cisco APIC GUI for the tenant 'CiscoLive-OSP16.2\_infra'. The left sidebar shows a navigation tree with 'Application EPGs' selected. The main panel shows a table of configured Application EPGs.

Name	Alias	Desc	Class ID	Preferred Group Member	Flood in Encapsulation	Bridge Domain	QoS class	Intra EPG Isolation	In Shutdown
epg_External			49157	Exclude	Disabled	bd_External	Unspecified	Unenforced	No
epg_Internal_API			49158	Exclude	Disabled	bd_Internal_API	Unspecified	Unenforced	No
epg_Management			49159	Exclude	Disabled	bd_Management	Unspecified	Unenforced	No
epg_Provision			49160	Exclude	Disabled	bd_Provision	Unspecified	Unenforced	No
epg_Storage			49161	Exclude	Disabled	bd_Storage	Unspecified	Unenforced	No
epg_StorageMgmt			16387	Exclude	Disabled	bd_StorageMgmt	Unspecified	Unenforced	No
epg_Tenant			16388	Exclude	Disabled	bd_Tenant	Unspecified	Unenforced	No

# ACI preparation

- Setting Up the Cisco APIC and the Network
  - Add physical domain for each EPG



The screenshot displays the Cisco APIC GUI. On the left is a navigation tree for 'CiscoLive-OSP16.2\_infra'. The main area shows the 'Domains (VMs and Bare-Metals)' configuration page. A table lists the configured domains.

Domain	Type	Deployer	Resolution	Allow Micro-Segmentat	Primary VLAN	Port Encap	Switching Mode	Encap Mode	Cos Value	Enhanced Lag Policy	Custom EPG Name
PD_ACI_OSP	Physical Domain						native	Auto	Cos0		

# ACI preparation

- Setting Up the Cisco APIC and the Network
  - Static binding port with designed encap\_vlan

Path	Primary VLAN for Micro-Seg	Port Encap (or Secondary VLAN for Micro-Seg)	Deployment Immediacy	Mode	PTP
<b>Node: Pod-1</b>					
Pod-1/Node-101/eth1/46	unknown	vlan-2151	On Demand	Trunk	Disabled

Note:

In this demo, we design encap\_vlan for osp infra like Storage: 2153 , StorageMgmt: 2154 , InternalApi: 2151 , Tenant: 2152 , Management: 2160  
External uses OOB and provision is through another individual network

# ACI plugin installation in OSP director

# ACI plugin installation in OSP director

- To check recommended plugin version via matrix link <https://www.cisco.com/c/dam/en/us/td/docs/Website/datacenter/aci/virtualization/matrix/virtmatrix.html>

	3.2(1)	3.2(2)	3.2(3)	3.2(4) to 3.2(6)	3.2(7) to 3.2(10)	4.0(1)	4.0(2) 4.0(3)	4.1(1) 4.1(2)	4.2(1) to 4.2(3)	4.2(4)	4.2(5) to 4.2(7)	5.0(1)	5.0(2)	5.1(1)	5.1(2)	5.1(3) 5.1(4)	5.2(1) 5.2(2)	5.2(3)	5.2(4) 5.2(5)	5.2(6) 5.2(7)	6.0(1)	
SCVMM 2012 and WAP 2.0 Plugin																						
SCVMM 2016 and WAP																						
SCVMM and WAP Update Rollup 11																						
SCVMM 2019	x	x	x	x	x	x	x	x														
Red Hat Virtualization 4.1.6 or later																						
Red Hat OSP 10	Note	Note	Note	Note	Note	Note	Note	Note	Note	x	x	x	x	x	x	x	x	x	x	x	x	x
Red Hat OSP 11	Note	Note	Note	Note	Note	Note	Note	Note	Note	x	x	x	x	x	x	x	x	x	x	x	x	x
Red Hat OSP 12	Note	Note	Note	Note	Note	Note	Note	Note	Note	x	x	x	x	x	x	x	x	x	x	x	x	x
Red Hat OSP 13	x	x	x	Note	Note	Note	Note	Note	Note	Recommended plugin 5.2(7.20230127)			Note	Note	Note	Note	Note	Note	Note	-	x	
Red Hat OSP 16	x	x	x	x	x	x	x	x	x	x	Note	x	x	x	x	Note	Note	Note	Note	-	x	



Note:

in this demo, aci fabric is 4.2.7s+OSP 16.2. we will download plugin 5.2(7.20230127)

# ACI plugin installation in OSP director

- Download the Cisco ACI OSP (tripleo-ciscoaci-16) RPM 5.1.3 or later and the corresponding plug-in tarball (openstack-ciscorpms-repo-16) from Cisco.com and place them on the OpenStack Platform Director.

[https://software.cisco.com/download/home/285968390/type/286304714/release/5.2\(7.20230127\)](https://software.cisco.com/download/home/285968390/type/286304714/release/5.2(7.20230127))

Repo packages of ACI Plugin for RedHat Openstack 16 	27-Jan-2023	9.79 MB	 
openstack-ciscorpms-repo-16.1-1232.tar.gz			
<a href="#">Advisories</a> 			
Red Hat OpenStack Platform 16 files for ACI 	27-Jan-2023	0.03 MB	 
tripleo-ciscoaci-16.1-1232.noarch.rpm			
<a href="#">Advisories</a> 			

# ACI plugin installation in OSP director

- Install the downloaded RPM :
  - You must follow the *Director Installation and Usage, Red Hat OpenStack Platform 16.2* document to prepare the OpenStack Platform 16.2 Director and create the correct deployment and resource files.
  - After you set up the OpenStack Platform Director, you must install the Cisco Application Centric Infrastructure (ACI) TripleO orchestration before proceeding with deployment
  - Goto directory where aci rpm file places.  
Run the following command:  
`sudo yum -y localinstall --nogpgcheck tripleo-ciscoaci-16.1-1232.noarch.rpm`

# ACI plugin installation in OSP director

- Create the Cisco ACI containers by completing the following steps:
  - Run the following command:  
`sudo podman login registry.redhat.io`
  - When prompted, use your Red Hat credentials to enter the redhat username and password



# ACI plugin installation in OSP director

- Create the Cisco ACI containers by completing the following steps:
  - After you log in, run the following script as root to create the Cisco ACI containers, point the script to the downloaded plug-in tarball:  

```
sudo /opt/ciscoaci-tripleo-heat-templates/tools/build_openstack_aci_containers.py  
-z /home/stack/openstack-ciscorpms-repo-16.1-1232.tar.gz
```
  - It creates an environment file named `/home/stack/templates/ciscoaci_containers.yaml`, which should be included as a template during Overcloud deployment

Note:

During execution of the local container-creation command, you may see an error that is generated by the command `/bin/gbp-db-manage`. You can safely ignore this error, which should not cause the execution of the script to fail.

# Overcloud installation



# Overcloud installation

- Step 1

Copy the `/usr/share/openstack-tripleo-heat-templates/roles_data.yaml` file to a private location

command:

```
cp /usr/share/openstack-tripleo-heat-templates/roles_data.yaml  
/home/stack/templates/aci_roles_data.yaml
```

# Overcloud installation

- Step 2

Edit the local copy of roles\_data.yaml(aci\_roles\_data.yaml)

- Under the controller role, add the following lines:
  - OS::TripleO::Services::CiscoAciAIM
  - OS::TripleO::Services::CiscoAciLldp
  - OS::TripleO::Services::CiscoAciOpflexAgent ←
- Under the compute role, add the following line:
  - OS::TripleO::Services::CiscoAciLldp
  - OS::TripleO::Services::CiscoAciOpflexAgent ←
- Note:

From Cisco ACI Release 5.2(1), [CiscoAciOpflexAgent](#) service is supported. If you are deploying a release prior to 5.2(1), don't add [CiscoAciOpflexAgent](#) service

# Overcloud installation

- Step 3

## Declare resources for ACI environment

- Define Cisco ACI resources in a .yaml template file to include with deployment. For example, `/home/stack/templates/ciscoaci-env.yaml`.
- Run following command to create `ciscoaci-env.yaml` file.  
`sudo vi /home/stack/templates/ciscoaci-env.yaml`
- Copy an example of a full resources declaration from section "Example of Resources Declaration" in the appendix of this guide.

[https://www.cisco.com/c/en/us/td/docs/dcn/aci/openstack/installation-guide/OSP-16-2/aci-installation-guide-openstack-osp-16-2/m-reference-information.html#Cisco\\_Reference.dita\\_15dc6db6-b0ab-4aab-bd6b-3554acd88491](https://www.cisco.com/c/en/us/td/docs/dcn/aci/openstack/installation-guide/OSP-16-2/aci-installation-guide-openstack-osp-16-2/m-reference-information.html#Cisco_Reference.dita_15dc6db6-b0ab-4aab-bd6b-3554acd88491)

# Overcloud installation

- Step 3

Declare resources for ACI environment

- Note :

If you are deploying a release prior to Cisco ACI Release 5.2(1), you need to make the following changes in the example:

- Remove the definition for `OS::TripleO::Services::CiscoAciOpflexAgent`.

- Change the `OS::TripleO::Services::NeutronOvsAgent` and `OS::TripleO::Services::ComputeNeutronOvsAgent` to reference the `/opt/ciscoaci-tripleo-heat-templates/deployment/opflex/opflex-agent-container-puppet.yaml`

# Overcloud installation

- Step 3  
Declare resources for ACI environment
  - For ACI Release 5.2(1) or later with opflex([CiscoAciOpflexAgent](#))  
Example:

resource\_registry:

```
#controller
OS::TripleO::ControllerExtraConfigPre: /opt/ciscoaci-tripleo-heat-templates/nodepre.yaml
OS::TripleO::Services::NeutronOvsAgent: /opt/ciscoaci-tripleo-heat-templates/deployment/neutron_opflex/neutron-opflex-agent-container-puppet.yaml
OS::TripleO::Services::NeutronMl2PluginBase: /opt/ciscoaci-tripleo-heat-templates/deployment/neutron/ml2-ciscoaci.yaml
OS::TripleO::Services::CiscoAciAIM: /opt/ciscoaci-tripleo-heat-templates/deployment/aciain/cisco-aciaim-container-puppet.yaml
OS::TripleO::Services::NeutronMetadataAgent: /usr/share/openstack-tripleo-heat-templates/deployment/neutron/neutron-metadata-container-puppet.yaml
OS::TripleO::Services::NeutronDhcpAgent: /usr/share/openstack-tripleo-heat-templates/deployment/neutron/neutron-dhcp-container-puppet.yaml

#compute
OS::TripleO::ComputeExtraConfigPre: /opt/ciscoaci-tripleo-heat-templates/nodepre.yaml
OS::TripleO::Services::ComputeNeutronOvsAgent: /opt/ciscoaci-tripleo-heat-templates/deployment/neutron_opflex/neutron-opflex-agent-container-puppet.yaml
OS::TripleO::Services::ComputeNeutronMetadataAgent: /opt/ciscoaci-tripleo-heat-templates/deployment/compute_neutron_metadata/compute-neutron-metadata.yaml
OS::TripleO::Services::CiscoAciLldp: /opt/ciscoaci-tripleo-heat-templates/deployment/ldp/cisco_lldp.yaml
OS::TripleO::Services::CiscoAciOpflexAgent: /opt/ciscoaci-tripleo-heat-templates/deployment/opflex/opflex-agent-container-puppet.yaml
OS::TripleO::Services::OVNDBs: OS::Heat::None
OS::TripleO::Services::OVNController: OS::Heat::None
OS::TripleO::Services::OVNMetadataAgent: OS::Heat::None
OS::TripleO::Services::ComputeNeutronL3Agent: OS::Heat::None
OS::TripleO::Services::NeutronL3Agent: OS::Heat::None
```

# Overcloud installation

- Step 3

## Declare resources for ACI environment

- For prior to ACI Release 5.2(1) with non-opflex([neutron-openvswitch-agent](#))

Example:

resource\_registry:

```
#controller
```

```
OS::TripleO::ControllerExtraConfigPre: /opt/ciscoaci-tripleo-heat-templates/nodepre.yaml
```

```
OS::TripleO::Services::NeutronOvsAgent: /opt/ciscoaci-tripleo-heat-templates/deployment/opflex/opflex-agent-container-puppet.yaml
```

```
OS::TripleO::Dockerr::NeutronML2PluginBase: /opt/ciscoaci-tripleo-heat-templates/deployment/neutron/ml2-ciscoaci.yaml
```

```
OS::TripleO::Services::CiscoAciAIM: /opt/ciscoaci-tripleo-heat-templates/deployment/aciaim/cisco-aciaim-container-puppet.yaml
```

```
OS::TripleO::Services::NeutronMetadataAgent: /usr/share/openstack-tripleo-heat-templates/deployment/neutron/neutron-metadata-container-puppet.yaml
```

```
OS::TripleO::Services::NeutronDhcpAgent: /usr/share/openstack-tripleo-heat-templates/deployment/neutron/neutron-dhcp-container-puppet.yaml
```

```
#compute
```

```
OS::TripleO::ComputeExtraConfigPre: /opt/ciscoaci-tripleo-heat-templates/nodepre.yaml
```

```
OS::TripleO::Services::ComputeNeutronOvsAgent: /opt/ciscoaci-tripleo-heat-templates/deployment/opflex/opflex-agent-container-puppet.yaml
```

```
OS::TripleO::Services::ComputeNeutronMetadataAgent: /opt/ciscoaci-tripleo-heat-templates/deployment/compute_neutron_metadata/compute-neutron-metadata.yaml
```

```
OS::TripleO::Services::CiscoAciLldp: /opt/ciscoaci-tripleo-heat-templates/deployment/lldp/cisco_lldp.yaml
```

```
OS::TripleO::Services::OVNDBs: OS::Heat::None
```

```
OS::TripleO::Services::OVNController: OS::Heat::None
```

```
OS::TripleO::Services::OVNMetadataAgent: OS::Heat::None
```

```
OS::TripleO::Services::ComputeNeutronL3Agent: OS::Heat::None
```

```
OS::TripleO::Services::NeutronL3Agent: OS::Heat::None
```

Note:

[OS::TripleO::Services::CiscoAciOpflexAgent: /opt/ciscoaci-tripleo-heat-templates/deployment/opflex/opflex-agent-container-puppet.yaml](#) is removed under #compute.



# Overcloud installation

- Step 3

## Declare resources for ACI environment

- Example of “parameter\_defaults” in `ciscoaci-env.yaml` :

parameter\_defaults:

```
NeutronSfcDriver: 'aim'
NeutronFcDriver: 'aim'
NeutronCorePlugin: 'ml2plus'
NeutronServicePlugins: 'group_policy,ncp,apic_aim_l3'
NeutronPluginMl2PuppetTags: 'neutron_plugin_ml2,neutron_plugin_cisco_aci'
NeutronEnableIsolatedMetadata: true
EnablePackageInstall: true
ACIYumRepo: http://10.10.250.67:8787/v2/\_acirepo
ACIApicHosts: 10.105.1.10
ACIApicUsername: admin
ACIApicPassword: password
ACIApicSystemId: osp16.2
ACIUseLLDPDiscovery: 'true'
ACIApicEntityProfile: OSP16.2
ACIApicInfraVlan: 4093
ACIApicInfraSubnetGateway: 10.0.0.30
ACIApicInfraAnycastAddr: 10.0.0.32
ACIOpflexUplinkInterface: ens8
ACIOpflexEncapMode: vxlan
ACIOpflexVlanRange: 1200:1300
ACIYumRepoMetadataExpiry: 90
DockerInsecureRegistryAddress: ["director16.2.ctlplane.localdomain:8787", "10.10.250.67:8787"]
```

# Overcloud installation

- Step 3  
Declare resources for ACI environment
  - Explanation about some parameters

ACIYumRepo: http://10.10.250.67:8787 /v2/\_\_\_acirepo  
ACIApicHosts: 10.105.1.10  
ACIApicUsername: admin  
ACIApicPassword: password  
ACIApicSystemId: osp16.2

ACIUseLLDPDiscovery: 'true'  
ACIApicEntityProfile: OSP16.2  
ACIApicInfraVlan: 4093  
ACIApicInfraSubnetGateway: 10.0.0.30  
ACIApicInfraAnycastAddr: 10.0.0.32  
ACIOpflexUplinkInterface: ens8  
ACIOpflexEncapMode: vxlan  
ACIOpflexVlanRange: 1200:1300  
ACIYumRepoMetadataExpiry: 90  
DockerInsecureRegistryAddress: ["director16.2.ctlplane.localdomain:8787", "10.10.250.67:8787 "]

--- http://director\_ctlplane\_ip/v2/\_\_\_acirepo  
--- apic oob ip  
--- apic admin id or userid which has admin privilege  
--- apic admin pwd or user pwd which has admin privilege  
--- openstack vmm domain\_name which will be created automatically after overcloud deploy  
  
--- ACI AAEP profile name which is created in ACI preparation steps  
--- can check it in apic's /data/data\_admin/sam\_exported.config  
--- can check it in apic's peer leaf's SVI ip via 'show ip interface vrf overlay-1'  
--- can check it in apic's peer leaf's Lo1023 ip via 'show ip interface vrf overlay-1'  
  
--- vlan scope which is defined in aci vlan\_pool for osp in ACI preparation steps  
  
--- FQDN format is *director\_hostname.ctlplane.overcloud\_domain\_name:8787*  
overcloud\_domain\_name is defined in /home/stack/undercloud.conf during undercloud deployment steps.

# Overcloud installation

- Step 4(optional)

To use Cisco ACI certificate-based authentication, create a local user with an X.509 certificate and specify the certificate and key in the `ciscoaci_env.yaml` file using the parameters `ACIApicPrivateKey` and `ACIApicCertName`.

- See the section "Creating a Local User and Adding a User Certificate" in [https://www.cisco.com/c/en/us/td/docs/dcn/aci/apic/5x/security-configuration/cisco-apic-security-configuration-guide-release-51x/m\\_access\\_authentication\\_and\\_accounting.html#task\\_215D252F7EAC44C48114A89B81639587](https://www.cisco.com/c/en/us/td/docs/dcn/aci/apic/5x/security-configuration/cisco-apic-security-configuration-guide-release-51x/m_access_authentication_and_accounting.html#task_215D252F7EAC44C48114A89B81639587)

- Note :

When you use certificate-based authentication, make sure that you do not specify the parameter `ACIApicPassword` in the `ciscoaci_env.yaml` file.

# Overcloud installation

- Step 5  
Deploy Overcloud.
  - Include the custom roles data file ([aci\\_roles\\_data.yaml](#)) created using the `-r` option.
  - Include the Cisco ACI environment file ([ciscoaci-env.yaml](#)) and Cisco ACI containers YAML file ([ciscoaci\\_containers.yaml](#)) in the environment list using the `-e` option
  - Include site-specific environment files which are created or custom-defined by following the Red Hat guidelines for the creation of custom templates and autogeneration of the network environment template.

# Overcloud installation

- Step 5

- Deploy Overcloud.

- Example :

- ```
openstack overcloud deploy --templates /home/stack/tripleo-heat-templates
```

- ```
-r /home/stack/templates/aci_roles_data.yaml
```

- ```
-e /home/stack/templates/ciscoaci_containers.yaml
```

- ```
-e /home/stack/templates/ciscoaci-env.yaml
```

- ```
-e /home/stack/templates/rhel-registration-resource-registry.yaml
```

- ```
-e /home/stack/templates/environment-rhel-registration
```

- ```
-e /home/stack/tripleo-heat-templates/environments/network-isolation.yaml
```

- ```
-e /home/stack/templates/overcloud_images.yaml
```

- ```
-e /home/stack/templates/network-environment.yaml
```

# Overcloud installation

- Step 5  
Deploy Overcloud.
  - About other parameters which are required, please refer to link below

<https://www.cisco.com/c/en/us/td/docs/dcn/aci/openstack/installation-guide/OSP-16-2/aci-installation-guide-openstack-osp-16-2/m-reference-information.html>

## Parameters for the Cisco ACI Environment

The following table provides information about parameters that are required to configure the Cisco Application Centric Infrastructure (ACI) environment.

| Parameter             | Details                                                                                                                                                                                                         |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NeutronCorePlugin     | <ul style="list-style-type: none"><li>• <b>Value:</b> 'ml2plus'</li><li>• <b>Default:</b> None</li><li>• <b>Mandatory or Optional:</b> Mandatory</li><li>• <b>Comments:</b> None</li></ul>                      |
| NeutronServicePlugins | <ul style="list-style-type: none"><li>• <b>Value:</b> 'group_policy,ncp,apic_aim_l3'</li><li>• <b>Default:</b> None</li><li>• <b>Mandatory or Optional:</b> Mandatory</li><li>• <b>Comments:</b> None</li></ul> |

Demo

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# Demo

- Note:

Demo is only for reference of how to install aci plug-in and configure aci resources files.

Please read and follow official guide according to specific requirements for the real production environment

- Demo Environment :

ACI fabric 4.2(7s)

OSP 16.2(RH8.4)

3+1(3 Controller nodes and 1 compute nodes)

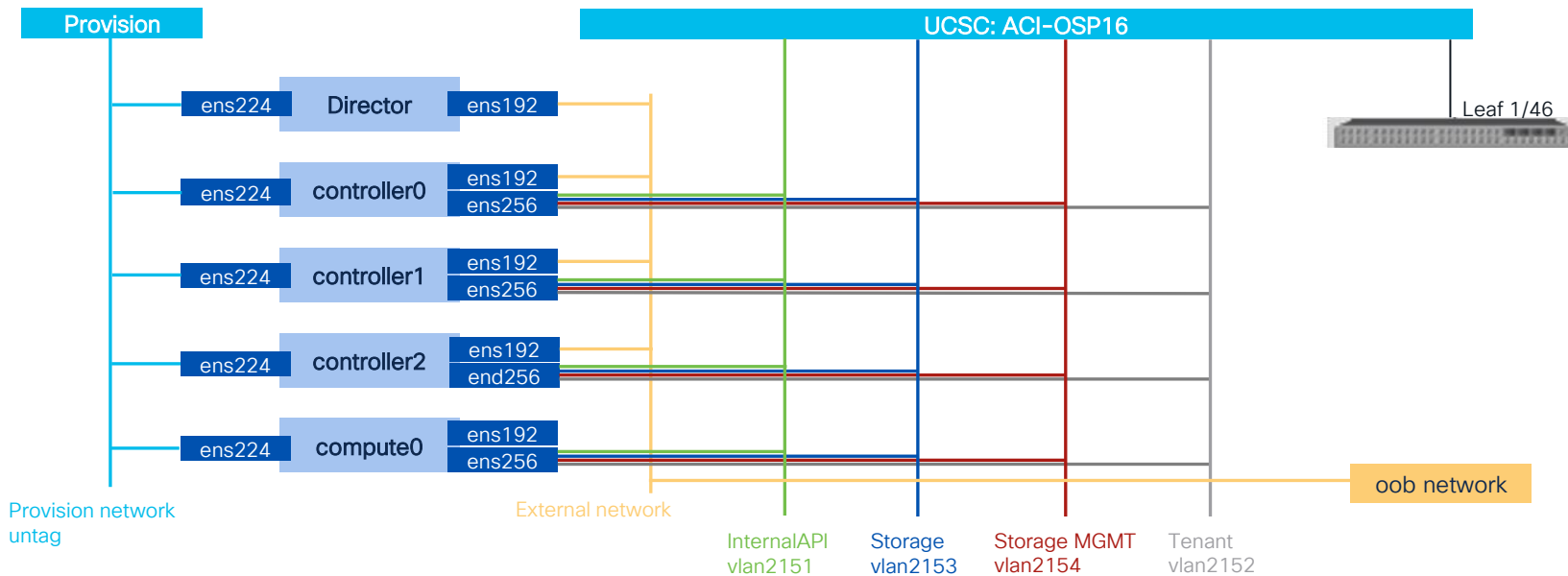
Recommended plugin: 5.2(7.20230127)

<https://www.cisco.com/c/dam/en/us/td/docs/Website/datacenter/aci/virtualization/matrix/virtmatrix.html>



# Demo

- OSP infra network design in Demo:  
provision network and external network have specific NICs in UCSC  
These traffics will not pass through ACI fabric



# Demo

- Install aci plug-in

`sudo yum -y localinstall --nogpgcheck tripleo-ciscoaci-16.1-1232.noarch.rpm`

```
(undercloud) [stack@ciscolive-osp-director ~]$ sudo yum -y localinstall --nogpgcheck tripleo-ciscoaci-16.1-1232.noarch.rpm
Updating Subscription Management repositories.
Last metadata expiration check: 2:44:31 ago on Sat 18 Mar 2023 03:11:40 PM CST.
Dependencies resolved.

```

| Package                         | Architecture | Version      | Repository                           | Size  |
|---------------------------------|--------------|--------------|--------------------------------------|-------|
| <b>Installing:</b>              |              |              |                                      |       |
| tripleo-ciscoaci                | noarch       | 16.1-1232    | @commandline                         | 33 k  |
| <b>Installing dependencies:</b> |              |              |                                      |       |
| createrepo_c                    | x86_64       | 0.16.2-2.el8 | rhel-8-for-x86_64-appstream-eus-rpms | 88 k  |
| createrepo_c-libs               | x86_64       | 0.16.2-2.el8 | rhel-8-for-x86_64-appstream-eus-rpms | 113 k |
| drpm                            | x86_64       | 0.4.1-3.el8  | rhel-8-for-x86_64-appstream-eus-rpms | 68 k  |

```
Transaction Summary
-----
Install 4 Packages

Total sizes: 382 k
Total download size: 270 k
Installed size: 723 k
Downloading Packages:
(1/3): createrepo_c-libs-0.16.2-2.el8.x86_64.rpm 46 kB/s | 113 kB 00:02
(2/3): drpm-0.4.1-3.el8.x86_64.rpm 17 kB/s | 68 kB 00:04
(3/3): createrepo_c-0.16.2-2.el8.x86_64.rpm 21 kB/s | 88 kB 00:04
-----
Total 64 kB/s | 270 kB 00:04
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
Preparing : 1/1
Installing : drpm-0.4.1-3.el8.x86_64 1/4
Installing : createrepo_c-libs-0.16.2-2.el8.x86_64 2/4
Installing : createrepo_c-0.16.2-2.el8.x86_64 3/4
Installed products updated.

Installed:
createrepo_c-0.16.2-2.el8.x86_64 createrepo_c-libs-0.16.2-2.el8.x86_64 drpm-0.4.1-3.el8.x86_64 tripleo-ciscoaci-16.1-1232.noarch

Complete!
(undercloud) [stack@ciscolive-osp-director ~]$
```

# Demo

- Login registry.redhat.io  
`sudo podman login registry.redhat.io`

```
(undercloud) [stack@ciscolive-osp-director ~]$ sudo podman login registry.redhat.io
Username: 
Password: 
Login Succeeded!
(undercloud) [stack@ciscolive-osp-director ~]$
```

- After log in, run the following script as root to create the Cisco ACI containers, point the script to the downloaded plug-in tarball:  
`sudo /opt/ciscoaci-tripleo-heat-templates/tools/build_openstack_aci_containers.py -z /home/stack/openstack-ciscorpms-repo-16.1-1232.tar.gz`

```
4d030482546ec96e64275f2a5adfb0e0d7153f0ef9e7f0cadf4387660e4f7970
Untagged: ciscolive-osp-director.ctlplane.overcloud-ciscolive-osp.aci.pub:8787/ciscoaci/openstack-ciscoaci-neutron-opflex:1679133844
Deleted: 41e3da49284ebe4e2fcd78792a75c2e061004ebd8504af23d86bbe2f74c9cd6a
container = openstack-horizon-ciscoaci
container = openstack-heat-engine-ciscoaci
container = openstack-neutron-server-ciscoaci
container = openstack-ciscoaci-lldp
container = openstack-ciscoaci-aim
container = openstack-ciscoaci-opflex
container = openstack-ciscoaci-neutron-opflex
(undercloud) [stack@ciscolive-osp-director ~]$
```

# Demo

- It creates an environment file named `/home/stack/templates/ciscoaci_containers.yaml`

```
[stack@ciscolive-osp-director templates]$ pwd
/home/stack/templates
[stack@ciscolive-osp-director templates]$ cat ciscoaci_containers.yaml
parameter_defaults:
  ContainerHorizonImage: ciscolive-osp-director.ctlplane.overcloud-ciscolive-osp.aci.pub:8787/ciscoaci/openstack-horizon-ciscoaci:1679133844
  ContainerHeatEngineImage: ciscolive-osp-director.ctlplane.overcloud-ciscolive-osp.aci.pub:8787/ciscoaci/openstack-heat-engine-ciscoaci:1679133844
  ContainerNeutronApiImage: ciscolive-osp-director.ctlplane.overcloud-ciscolive-osp.aci.pub:8787/ciscoaci/openstack-neutron-server-ciscoaci:1679133844
  ContainerNeutronConfigImage: ciscolive-osp-director.ctlplane.overcloud-ciscolive-osp.aci.pub:8787/ciscoaci/openstack-neutron-server-ciscoaci:1679133844
  ContainerCiscoLdpImage: ciscolive-osp-director.ctlplane.overcloud-ciscolive-osp.aci.pub:8787/ciscoaci/openstack-ciscoaci-ldp:1679133844
  ContainerCiscoAciAimImage: ciscolive-osp-director.ctlplane.overcloud-ciscolive-osp.aci.pub:8787/ciscoaci/openstack-ciscoaci-aim:1679133844
  ContainerCiscoAciAimConfigImage: ciscolive-osp-director.ctlplane.overcloud-ciscolive-osp.aci.pub:8787/ciscoaci/openstack-ciscoaci-aim:1679133844
  ContainerOpflexAgentImage: ciscolive-osp-director.ctlplane.overcloud-ciscolive-osp.aci.pub:8787/ciscoaci/openstack-ciscoaci-opflex:1679133844
  ContainerNeutronOpflexAgentImage: ciscolive-osp-director.ctlplane.overcloud-ciscolive-osp.aci.pub:8787/ciscoaci/openstack-ciscoaci-neutron-opflex:1679133844
[stack@ciscolive-osp-director templates]$
```

- Prepare `aci_roles_data.yaml` file.

```
cp /usr/share/openstack-tripleo-heat-templates/roles_data.yaml
/home/stack/templates/aci_roles_data.yaml
```

# Demo

- In aci\_roles\_data.yaml file:  
Add below under Controller:
  - OS::TripleO::Services::CiscoAciAIM
  - OS::TripleO::Services::CiscoAciLdpAdd below under Compute:
  - OS::TripleO::Services::CiscoAciLdp

```
5 #####
6 # Role: Controller #
7 #####
8 - name: Controller
9   description: |
10     Controller role that has all the controller services loaded and handles
11     Database, Messaging and Network functions.
12   CountDefault: 1
13   tags:
14     - primary
15     - controller
16     # Create external Neutron bridge for SNAT (and floating IPs when using
17     # ML2/OVS without DVR)
18     - external_bridge
19     -
20   deprecated_param_image: 'controllerImage'
21   deprecated_nic_config_name: 'controller.yaml'
22   update_serial: 1
23   ServicesDefault:
24     - OS::TripleO::Services::CiscoAciAIM
25     - OS::TripleO::Services::CiscoAciLdp
26     - OS::TripleO::Services::Aide
```

```
204 #####
205 # Role: Compute #
206 #####
207 - name: Compute
208   description: |
209     Basic Compute Node role
210   CountDefault: 1
211   # Create external Neutron bridge (unset if using ML2/OVS without DVR)
212   tags:
213     - external_bridge
214   networks:
215     InternalApi:
216       deprecated_param_ips: 'NovaComputeIPs'
217       deprecated_server_resource_name: 'NovaCompute'
218       deprecated_nic_config_name: 'compute.yaml'
219       update_serial: 25
220     ServicesDefault:
221       - OS::TripleO::Services::CiscoAciLdp
222       - OS::TripleO::Services::Aide
```

Note: Demo ACI OS is 4.2.7s, prior to 5.2.(1), so don't add - OS::TripleO::Services::CiscoAciOpflexAgent

# Demo

- Create ciscoaci\_env.yaml manually.  
`sudo vi /home/stack/templates/ciscoaci-env.yaml`
- Copy an example of a full resources declaration from section "Example of Resources Declaration" in the appendix of this guide.

[https://www.cisco.com/c/en/us/td/docs/dcn/aci/openstack/installation-guide/OSP-16-2/aci-installation-guide-openstack-osp-16-2/m-reference-information.html#Cisco\\_Reference.dita\\_15dc6db6-b0ab-4aab-bd6b-3554acd88491](https://www.cisco.com/c/en/us/td/docs/dcn/aci/openstack/installation-guide/OSP-16-2/aci-installation-guide-openstack-osp-16-2/m-reference-information.html#Cisco_Reference.dita_15dc6db6-b0ab-4aab-bd6b-3554acd88491)

# Demo

- As per guide , prior to Cisco ACI Release 5.2(1)
  - Remove the definition for OS::TripleO::Services::CiscoAciOpflexAgent.
  - Change the OS::TripleO::Services::NeutronOvsAgent and OS::TripleO::Services::ComputeNeutronOvsAgent to reference the /opt/ciscoaci-tripleo-heat-templates/deployment/opflex/opflex-agent-container-puppet.yaml

```
#/home/stack/templates/ciscoaci-env.yaml
# A Heat environment file which can be used to enable a
# a Neutron Cisco Aci backend on the controller, configured via puppet
resource_registry:

  #controller
  OS::TripleO::ControllerExtraConfigPre: /opt/ciscoaci-tripleo-heat-templates/nodepre.yaml
  OS::TripleO::Services::NeutronOvsAgent: /opt/ciscoaci-tripleo-heat-templates/deployment/opflex/opflex-agent-container-puppet.yaml
  OS::TripleO::Dockers::NeutronM2PuginBase: /opt/ciscoaci-tripleo-heat-templates/deployment/neutron/neutron-m2-ciscoaci.yaml
  OS::TripleO::Services::CiscoAciAIM: /opt/ciscoaci-tripleo-heat-templates/deployment/aci/aim/cisco-aci-aim-container-puppet.yaml
  OS::TripleO::Services::NeutronMetadataAgent: /usr/share/openstack-tripleo-heat-templates/deployment/neutron/neutron-metadata-container-puppet.yaml
  OS::TripleO::Services::NeutronDhcpAgent: /usr/share/openstack-tripleo-heat-templates/deployment/neutron/neutron-dhcp-container-puppet.yaml

  #compute
  OS::TripleO::ComputeExtraConfigPre: /opt/ciscoaci-tripleo-heat-templates/nodepre.yaml
  OS::TripleO::Services::ComputeNeutronOvsAgent: /opt/ciscoaci-tripleo-heat-templates/deployment/opflex/opflex-agent-container-puppet.yaml
  OS::TripleO::Services::ComputeNeutronMetadataAgent: /opt/ciscoaci-tripleo-heat-templates/deployment/compute_neutron_metadata/compute-neutron-metadata.yaml

  OS::TripleO::Services::CiscoAciLldp: OS::Heat::None

  OS::TripleO::Services::OVNDBs: OS::Heat::None
  OS::TripleO::Services::OVNController: OS::Heat::None
  OS::TripleO::Services::OVNMetadataAgent: OS::Heat::None
  OS::TripleO::Services::ComputeNeutronL3Agent: OS::Heat::None
  OS::TripleO::Services::NeutronL3Agent: OS::Heat::None
```

# Demo

- In this demo , we do not use lldp because it's VM,  
We set CiscoAciLldp to none and use ACIHostLinks below instead.

```
OS::Triple0::Services::CiscoAciLldp: OS::Heat::None
```

```
parameter_defaults:
  NeutronSfcDriver: 'aim'
  NeutronFcdDriver: 'aim'
  NeutronCorePlugin: 'ml2plus'
  NeutronServicePlugins: 'group_policy,ncp,apic_aim_l3'
  NeutronPluginML2PuppetTags: 'neutron_plugin_ml2,neutron_plugin_cisco_aci'
  NeutronEnableIsolatedMetadata: true
  EnablePackageInstall: true
  ACIYumRepo: http://192.168.14.1:8787/v2/__acirepo
  ACIApicHosts: 10.124.145.57
  ACIApicUsername: aciosp
  ACIApicPassword: aciosp
  ACIApicSystemId: ciscolive-osp16.2-aci
  ACIUseLLDPDiscovery: 'true'
  ACIApicEntityProfile: AEP_OSP
  ACIApicInfraVlan: 3967
  ACIApicInfraSubnetGateway: 104.10.0.30
  ACIApicInfraAnycastAddr: 104.10.0.32
  ACIOpflexUplinkInterface: ens256
  ACIOpflexEncapMode: vxlan
  ACIOpflexVlanRange: 2151:2160
  ACIYumRepoMetadataExpiry: 90
  DockerInsecureRegistryAddress: ["ciscolive-osp-director.ctlplane.overcloud-ciscolive-osp.aci.pub:8787", "192.168.14.1:8787"]
  NeutronPhysicalDevMappings: datacentre:ens256
  NeutronNetworkVLANRanges: datacentre:2151:2160
  ACIMechanismDrivers: 'sriovnicswitch,apic_aim'
  ACIHostLinks: '{"101":{"overcloud-ciscolive-osp-controller-1|ens256":"1/46","overcloud-ciscolive-osp-controller-2|ens256":"1/46","overcloud-ciscolive-osp-controller-3|ens256":"1/46","overcloud-ciscolive-osp-novacompute-0|ens256":"1/46"}}'
```



# Demo

- ACI related yaml files have been prepared.
- OSP template yaml files have been prepared following RedHat guide.
- Run Overcloud deploy :

```
(undercloud) [stack@ciscolive-osp-director ~]$ openstack overcloud deploy --templates
/home/stack/openstack-tripleo-heat-templates-rendered \
> -r /home/stack/templates/aci_roles_data.yaml \
> -e /home/stack/templates/ciscoaci-env.yaml \
> -e /home/stack/templates/ciscoaci_containers.yaml \
> -e /home/stack/templates/node-info.yaml \
> -n /home/stack/network_data.yaml \
> -e /home/stack/openstack-tripleo-heat-templates-rendered/environments/network-isolation.yaml \
> -e /home/stack/openstack-tripleo-heat-templates-rendered/environments/network-environment.yaml \
> -e /home/stack/openstack-tripleo-heat-templates-rendered/environments/net-bond-with-vlans.yaml \
> -e /home/stack/containers-prepare-parameter.yaml \
> --ntp-server 192.168.14.1 | tee openstack-deployment.log
```

# Demo

- Deploy success

```
2023-03-16 16:44:57.713790 | ~~~~~ End Summary Information ~~~~~  
Ansible passed.Overcloud configuration completed.  
Overcloud Endpoint: http://10.124.145.162:5000  
Overcloud Horizon Dashboard URL: http://10.124.145.162:80/dashboard  
Overcloud rc file: /home/stack/overcloudrc  
Overcloud Deployed without error  
(undercloud) [stack@KR-OSP-director ~]$
```

```
(undercloud) [stack@KR-OSP-director ~]$ openstack server list
```

| ID                                   | Name                    | Status | Networks                | Image          | Flavor  |
|--------------------------------------|-------------------------|--------|-------------------------|----------------|---------|
| c8a78e84-e5db-4041-b719-0d0ef18037e8 | overcloud-controller-0  | ACTIVE | ctlplane=192.168.14.112 | overcloud-full | control |
| 716e6ecd-1918-4674-8b5b-67162aa875b5 | overcloud-controller-2  | ACTIVE | ctlplane=192.168.14.108 | overcloud-full | control |
| a12c8ac1-3d49-45fc-929d-609073cd73ad | overcloud-controller-1  | ACTIVE | ctlplane=192.168.14.110 | overcloud-full | control |
| d5244071-74d1-47f3-83fe-07cbaa373423 | overcloud-novacompute-0 | ACTIVE | ctlplane=192.168.14.106 | overcloud-full | compute |

```
(undercloud) [stack@KR-OSP-director ~]$
```

# Demo

- Verify :

Access osp dashboard with ID admin:  
<http://10.124.145.162:80/dashboard>

Default admin pwd can be found in below file  
</home/stack/overcloudrc>

```
export OS_AUTH_TYPE=password  
export OS_PASSWORD=Nj0lSfjXXXXXXXXXXXXVylOqT ←
```

# Demo

- Create an OSP project ,network ,router etc and correlate them in dashboard or via cli.
- Then will see openstack vmm domain has been pushed to ACI.

The screenshot displays the Cisco ACI GUI interface. The top navigation bar includes tabs for System, Tenants, Fabric, **Virtual Networking** (highlighted with a red box), L4-L7 Services, Admin, Operations, Apps, and Integrations. The left sidebar shows the 'Inventory' tree with a red box highlighting the path: OpenStack > KR-OSP16.2-ACI > Controllers > KR-OSP16.2-ACI > Hypervisors > overcloud-controller-0, overcloud-controller-1, overcloud-controller-2, overcloud-novacompute-0, and DVS - KR-OSP16.2-ACI. The main content area shows the configuration for 'Domain - KR-OSP16.2-ACI'. The 'Policy' tab is active, showing 'General', 'Faults', and 'History' sub-tabs. The 'Properties' section includes: Name: KR-OSP16.2-ACI, Virtual Switch: Open vSwitch, Associated Attachable Entity Name: AEP\_OSP, Encapsulation: VXLAN mode, Fabric-Wide Multicast Address: 225.1.2.3, and Pool of Multicast Addresses (one per-EPG): KR-OSP16.2-ACI\_mcast\_r.

# Demo

- Tenant, EPG, BD, subnet etc have been created automatically in ACI.

The screenshot displays the Cisco ACI web interface. The top navigation bar includes tabs for System, Tenants, Fabric, Virtual Networking, L4-L7 Services, Admin, Operations, Apps, and Integrations. The 'Tenants' tab is active, showing a search bar and a list of tenants. The tenant 'minhjin\_project\_1 (prj\_0c6)' is selected, and its 'Application EPGs' are expanded to show 'net3 (net\_00e44e85-38ca-46b1-ab19-e65f63cf012f)'. The configuration page for this EPG is shown, with the 'Policy' tab selected. The 'General' sub-tab is active, displaying various configuration options for the EPG, including Name, Alias, Description, Tags, Global Alias, uSeg EPG, pcTag(sclass), Contract Exception Tag, QoS class, Custom QoS, Data-Plane Policer, Intra EPG Isolation, Preferred Group Member, Flood in Encapsulation, Configuration Status, Configuration Issues, Label Match Criteria, and Bridge Domain. The 'Bridge Domain' is set to 'net\_00e44e85-38ca-46b1'. The 'Intra EPG Isolation' is set to 'Enforced'. The 'Preferred Group Member' is set to 'Exclude'. The 'Flood in Encapsulation' is set to 'Disabled'. The 'Configuration Status' is 'applied'. The 'Label Match Criteria' is 'AtleastOne'. The 'Bridge Domain' is 'net\_00e44e85-38ca-46b1'. At the bottom of the configuration page, there are buttons for 'Show Usage', 'Reset', and 'Submit'.

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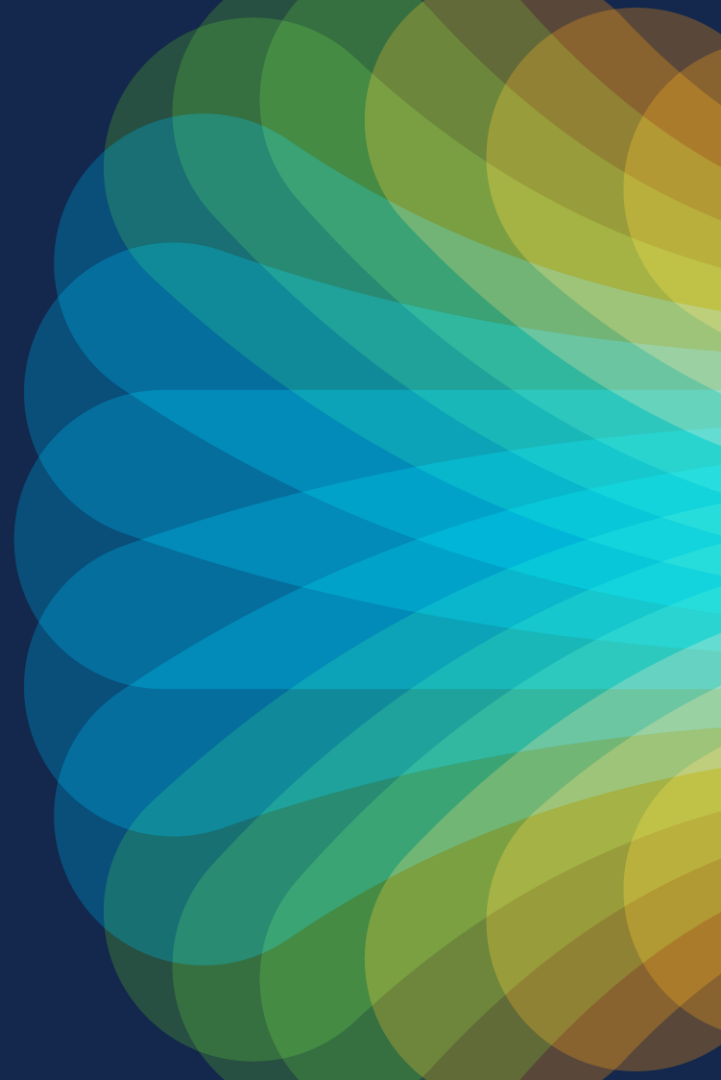


The bridge to possible

# Thank you

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The Cisco Live! logo features the word "CISCO" in a bold, black, sans-serif font, followed by "Live!" in a black, cursive script font. The background of the entire image is a vibrant, multi-colored abstract pattern of overlapping, wavy bands in shades of red, orange, yellow, green, and blue, radiating from a bright white point on the right side.

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