Installing Cisco ACI with OpenStack Ussuri on Ubuntu using Juju Charms

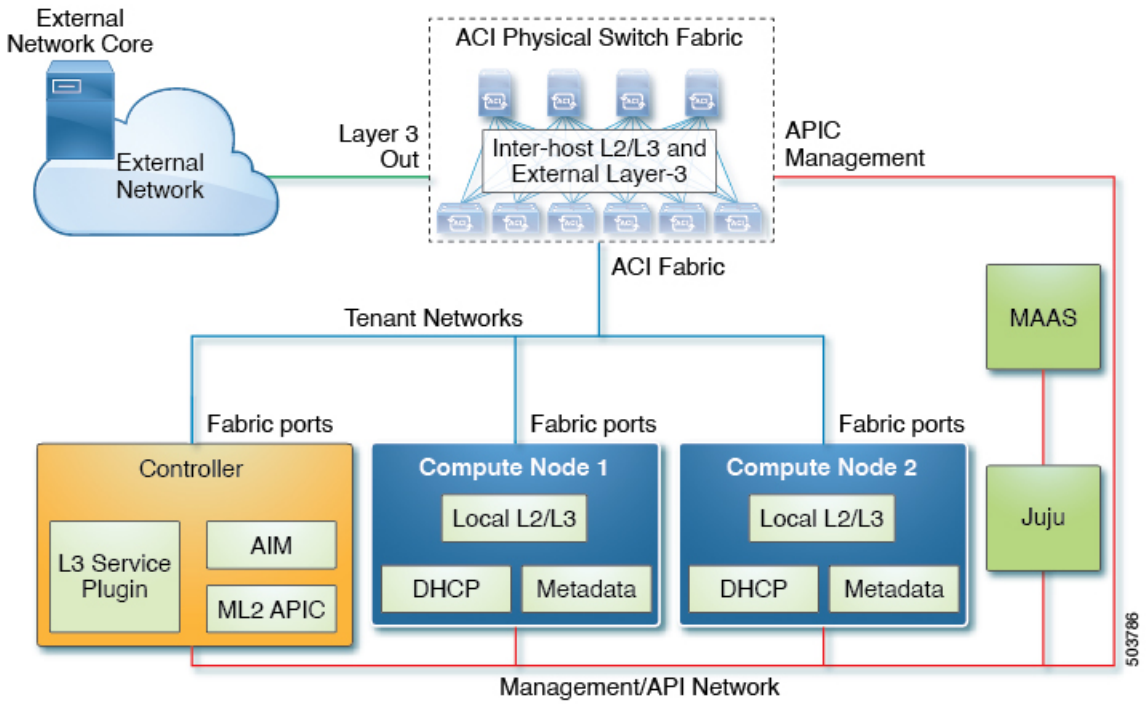
This chapter contains the following sections:

Prerequisites

This section describes the prerequisites for installing the opflex plugin on Ubuntu with Juju.

- Working knowledge of Ubuntu Linux
- Experience in deployment of OpenStack using MAAS and Juju
- Some experience in APIC UI maybe required
- Working ACI Fabric
- MAAS setup on Ubuntu Bionic with Juju2
- Minimum of 3 servers with at least one fabric interface

Figure 1: Typical Network Topology



This document is intended as a generic guide to deploy Openstack with ACI using Juju. For details about OpenStack releases, refer the Openstack release notes, for the ACI release that you are deploying to make sure there are no exceptions.

Server Preparation

This section describes the server preparation.

- The OpenStack nodes need to be connected to the leaf switches either in direct mode or VPC/bonded mode.
- The MTU of the interfaces should be greater than 1600.
- The bonding should be setup using 802.3ad

Preparing the Site

This section describes how to prepare the site by downloading opflex released archive file from the software download link and setting up an apt repository on the repo server. Charms support both signed and un-signed repositories.

Step 1 Take note of the following:

- APIC IP addresses

- APIC credentials
- AAEP created for deployment

  For example, my-aep in the Example of a configuration YAML file, on page 5.
- Infra VLAN ID
- `opflex_peer_ip` and `opflex_remote_ip` parameters

  The `opflex_remote_ip` address matches the anycast ip address assigned to interface Loopback 1023 on the leaf switches. The `opflex_peer_ip` address for the OpFlex peer is the anycast IP address assigned to the SVI of the infra VLAN on the leaf switches.
- An ID string to identify this OpenStack instance (APIC_SYSTEM_ID)
- Server interface name that is connected to fabric.

  For example, '`eth2`' or '`bond0`'.

Step 2 Install, configure MAAS and Juju.

For more information, see the Ubuntu documentation.

Step 3 Download the **Debian packages for Openstack** <*Release_Name*> **ACI plugins** gzip file matching your OpenStack, ACI release and create a Debian/Ubuntu repo.

a) Go to the Software Download link:

https://software.cisco.com/download/home/285968390/type

b) Click **APIC OpenStack and Container Plugins**.

c) Choose the Debian packages for Openstack <*Release_Name*> ACI plugins gzip file matching your OpenStack, ACI release and click the download icon.

Step 4 Untar and extract the files.

Step 5 Take note of the repo URL. The "`deb http://1.11.1.1/ubuntu ussuri32 main`" repo URL is used as an example in the Example of a configuration YAML file, on page 5.

Requirements for the config `juju-aci-ussuri.yaml` file:

- Nodes are connected to leaf in a vPC/Linux bonding configuration. The bonded device name is "`bond0`". If it is a single interface, replace it with the interface name. For example, "`eth1`", "`ens9`".
- APIC is configured with a default VLAN 3901 (infra VLAN). Replace this number with whatever VLAN is configured on APIC.
- The AAEP created for deployment is `my-aep`.
- The URL for the created package repo is "`deb http://1.11.1.1/ubuntu ussuri32 main`".
- APIC_SYSTEM_ID is "`juju2-ostack`".

For more details, see the OpenStack External Network chapter, in the *Cisco ACI Installation Guide for Red Hat OpenStack* guide.

Also see, Cisco ACI Fabric Initialization Example.

Installing the OpFlex Plugin

This section describes how to install the opflex plugin on Ubuntu with Juju charm by downloading from the software download link, untar and extract the files on the Juju server under a directory.

Step 1 Download the **Juju charms for ACI plugins for Openstack** <*Release_Name*> gzip file matching your OpenStack and ACI release.

a) Go to the Software Download link:

https://software.cisco.com/download/home/285968390/type

b) Click **APIC OpenStack and Container Plugins**.

c) Choose the **Juju charms for ACI plugins for Openstack** <*Release_Name*> matching your OpenStack, ACI release and click the download icon.

Step 2 Untar and extract the files into a directory on the Juju server. For example, `/home/ubuntu/charms/bionic`.

Note To support Openstack deployment on ACI fabric using Juju, the following charms from upstream had to be modified:

- charm-neutron-gateway
- charm-neutron-api

In addition, the following new charms were developed:

- charm-neutron-api-plugin-aci (runs as subordinate to neutron-api)
- charm-neutron-aci-opflex (runs as subordinate to nova-compute and charm-neutron-gateway)
- charm-openstack-dashboard-plugin-gbp (runs as subordinate to openstack-dashboard)

Additionally, when using the ACI plugin, the security groups are implemented in Open vSwitch. For the best performance, nova should be configured with NoopFirewallDriver as below. This can only be done if using rocky and older releases, as the firewall_driver parameter was removed in the pike release. Currently, Ubuntu JuJu charm does not allow the firewall_driver to be configured, which means it uses the default value of OVSHybridFirewallDriver, resulting in an extra bridge being created. You can ignore the extra bridge as it does not create any issues.

Step 3 Create a configuration file, for example, `juju-aci-ussuri.yaml`, and place it in a directory. For example, `/home/ubuntu`.

For more information, see *Configuration Example*.

Step 4 Deploy the charms and add relations. Below is a sample script for deployment of the ACI charms:

```
juju bootstrap maas maas-controller --config=config.yaml
juju add-machine -n 4

CONFIG=/home/ubuntu/juju-aci-ussuri.yaml

juju deploy --config=$CONFIG cs:xenial/mysql --to lxd:1
juju config mysql max-connections=1300
juju deploy --config=$CONFIG rabbitmq-server --to lxd:1
```

```
sleep 120

juju deploy --config=$CONFIG keystone --to lxd:1
juju add-relation keystone:shared-db mysql:shared-db

juju deploy --config=$CONFIG glance --to lxd:1
juju add-relation glance:identity-service keystone:identity-service
juju add-relation glance:shared-db mysql:shared-db

juju deploy /home/noiro/charms/bionic/charm-neutron-api --series bionic
--config=$CONFIG neutron-api --to 1
juju add-relation neutron-api:amqp rabbitmq-server:amqp
juju add-relation neutron-api:identity-service keystone:identity-service
juju add-relation neutron-api:shared-db mysql:shared-db

juju deploy /home/noiro/charms/bionic/charm-neutron-api-plugin-aci --series bionic
--config=$CONFIG neutron-api-plugin-aci
juju add-relation neutron-api-plugin-aci neutron-api
juju add-relation neutron-api-plugin-aci:amqp rabbitmq-server:amqp
juju add-relation neutron-api-plugin-aci:shared-db mysql:shared-db


juju deploy /home/noiro/charms/bionic/charm-neutron-gateway --series bionic
--config=$CONFIG neutron-gateway --to 3
juju add-relation neutron-gateway:amqp rabbitmq-server:amqp
juju add-relation neutron-gateway:neutron-plugin-api neutron-api:neutron-plugin-api

juju deploy --config=$CONFIG nova-cloud-controller --to lxd:1
juju add-relation nova-cloud-controller:amqp rabbitmq-server:amqp
juju add-relation nova-cloud-controller:identity-service keystone:identity-service
juju add-relation nova-cloud-controller:image-service glance:image-service
juju add-relation nova-cloud-controller:neutron-api neutron-api:neutron-api
juju add-relation nova-cloud-controller:shared-db mysql:shared-db
juju add-relation nova-cloud-controller:quantum-network-service
neutron-gateway:quantum-network-service

juju deploy --config=$CONFIG nova-compute --to 2
juju add-relation nova-compute:amqp rabbitmq-server:amqp
juju add-relation nova-compute:cloud-compute nova-cloud-controller:cloud-compute
juju add-relation nova-compute:image-service glance:image-service
juju add-relation nova-compute:shared-db mysql:shared-db

juju deploy /home/noiro/charms/bionic/charm-neutron-aci-opflex --config=$CONFIG neutron-aci-opflex
juju add-relation neutron-aci-opflex:neutron-plugin-api neutron-api:neutron-plugin-api
juju add-relation neutron-aci-opflex:neutron-plugin nova-compute:neutron-plugin
juju add-relation neutron-aci-opflex:amqp rabbitmq-server:amqp
juju add-relation neutron-aci-opflex:quantum-network-service neutron-gateway:quantum-network-service

juju deploy --config=$CONFIG openstack-dashboard --to 0
juju add-relation openstack-dashboard:identity-service keystone:identity-service

juju deploy /home/noiro/charms/bionic/charm-openstack-dashboard-plugin-gbp --series bionic
--config=$CONFIG openstack-dashboard-plugin-gbp

juju add-relation openstack-dashboard-plugin-gbp openstack-dashboard
```

Example of a configuration YAML file

This is an example of the configuration `juju-aci-ussuri.yaml` file.

```
mysql:
  max-connections: 1300
keystone:
  openstack-origin: 'cloud:bionic-ussuri'
  admin-password: 'noir0123'
  log-level: 'DEBUG'
  verbose: true
  debug: true
nova-cloud-controller:
  openstack-origin: 'cloud:bionic-ussuri'
  network-manager: Neutron
  console-access-protocol: novnc
neutron-gateway:
  plugin: aci
  openstack-origin: 'cloud:bionic-ussuri'
  data-port: 'br-data:bond0'
  vlan-ranges: physnet1:250:300
  enable-isolated-metadata: true
  enable-metadata-network: true
  aci-repo: 'deb http://1.11.1.1/ubuntu ussuri32 main'
  aci-apic-system-id: juju2-ostack
  aci-encap: vxlan
  aci-uplink-interface: bond0
  aci-infra-vlan: 3901
neutron-api:
  openstack-origin: 'cloud:bionic-ussuri'
  neutron-plugin: aci
  neutron-security-groups: true
  #vlan-ranges: physnet1:250:300
neutron-aci-opflex:
  aci-repo: 'deb http://1.11.1.1/ubuntu ussuri32 main'
  aci-apic-system-id: juju2-ostack
  aci-encap: vxlan
  aci-uplink-interface: bond0
  aci-infra-vlan: 3901
rabbitmq-server:
## Cinder is deployed in two parts: one for the API and scheduler
## (which can live in a container), one for the volume service (which
## cannot, at least not for the LVM/iSCSI backend)
cinder-api:
  openstack-origin: 'cloud:bionic-ussuri'
  enabled-services: api,scheduler
cinder-volume:
  openstack-origin: 'cloud:bionic-ussuri'
  enabled-services: volume
  # Adjust this to match the block device on your volume host
  block-device: vdb
glance:
  openstack-origin: 'cloud:bionic-ussuri'
heat:
  openstack-origin: 'cloud:bionic-ussuri'
mysql:
openstack-dashboard:
  openstack-origin: 'cloud:bionic-ussuri'
  webroot: /
  vip_iface: bond0
nova-compute:
  openstack-origin: 'cloud:bionic-ussuri'
  virt-type: kvm
##
## ACI
##
neutron-api-plugin-aci:
```

```
  aci-repo: 'deb http://1.11.1.1/ubuntu ussuri32 main'
  aci-apic-hosts: 10.3.12.1
  aci-apic-username: admin
  aci-apic-password: k%jiou^
  aci-apic-entity-profile: my-aep
  aci-apic-system-id: juju2-ostack
  aci-encap: vxlan
  aci-vlan-ranges: 250:300
  aci-connection-json: '{"101": ["srv1:vpc-1-25/101-102-1-25", "srv2:vpc-1-26/101-102-1-26",

"srv3:vpc-1-27/101-102-1-27", "srv4:vpc-1-28/101-102-1-28", "srv5:vpc-1-29/101-102-1-29"],

"102": ["srv1:vpc-1-25/101-102-1-25", "srv2:vpc-1-26/101-102-1-26",
"srv3:vpc-1-27/101-102-1-27",
"srv4:vpc-1-28/101-102-1-28", "srv5:vpc-1-29/101-102-1-29"]}'
  aci-vpc-pairs: '101:102'
#
openstack-dashboard-plugin-gbp:
  aci-repo: 'deb http://1.11.1.1/ubuntu ussuri32 main'
```

For verification and troubleshooting commands, see *relevant JuJu documentation*.