INSTALL GUIDE FOR OPENSTACK

Introduction
This document describes the necessary procedures to install Avi Networks Cloud Application Delivery Platform v14.2 within OpenStack Havana or Icehouse. Avi provides a rich analytics and load balancing solution, which is software driven, multi-tenant, and deeply integrated into OpenStack. Management of Avi’s distributed load balancers, called Service Engines, may be done directly via the centralized Controller, or via OpenStack Horizon. Avi’s Controller hooks into Horizon to mirror configuration changes from OpenStack into the Controller and vice-versa. Avi also leverages Glance, Keystone, Nova, and Neutron for additional services.

System Requirements

| Hypervisors Supported | KVM – RHEL/CentOS 6.4, Ubuntu 12.04, 14.04  
| VMware ESX 5.1, 5.5 |
| Management Systems Integration | VMware vCenter 5.1, 5.5  
| Integrated Puppet Agent |
| OpenStack Version Support | OpenStack Havana, IceHouse |
| OpenStack Distro Support | RedHat, Mirantis, Canonical/Ubuntu |
| Recommended Hardware | Controller  
| CPU: Intel Xeon  
| Memory: 8 GB  
| Disk Space: 64 GB |
| Service Engine |
**OpenStack Requirements:**
Below are required components to install and run the Avi LBaaS plugin-driver.

- OpenStack Havana or Icehouse release
- Neutron networking
- Avi LBaaS plugin install script (`avi_openstack_package.tar.gz`)
- Avi Controller image (`controller.qcow2` or `controller.vmdk`)
- The Avi Controller should be able to access OpenStack APIs, such as Nova, Neutron, and Keystone APIs. This API access can be done via:
  - Public URL, Internal URL, or Admin URL of the OpenStack.

**Optional Requirements:**
- NTP
- DNS

**Avi LBaaS Model**
Avi’s LBaaS plugin driver follows OpenStack’s REST proxy model optimized for cloud deployment (Figure 1). The Avi Controller acts as a single control and management point for Neutron LBaaS and is integrated with Nova and Keystone to allow seamless multi-tenancy support and scalable performance. It creates and provisions a Service Engine as a tenant creates a virtual server for load-balancing service. Avi’s SE is a component that performs data plane services such as load balancing.

In this model, the Avi Controller runs in the admin tenant (or project) and will create an SE VM in a user tenant when a virtual server is created with LBaaS. The user will be able to login to the Avi Controller for advanced feature access or monitoring traffic. At the same time, the Avi Controller exposes RESTful APIs to allow the user to programmatically provision a service or gather information.

**Note:** The Admin URL access allows the Avi Controller to provide authentication and authorization services based on the OpenStack role associated with a user account and a tenant ID. When the Admin URL access is not allowed, the Avi Controller provides basic authentication and authorization services; it still uses the Keystone service via the Public URL to authentication a user and identify a project or tenant.
Installation Overview

The installation involves two sequential steps, 1) Avi Controller installation and 2) Avi LBaaS plugin driver installation (if needed). The examples within this document will use the following information for the installation instructions.

- OpenStack controller cluster IP address: 10.10.5.79
- Credentials: admin / avixyz
- Avi management network name in the OpenStack admin tenant: avi-mgmt
- Avi Controller IP address: 10.10.5.81
- DNS server IP and search domain: 10.10.5.64, demo.avi.local

Note: If you do not plan to use OpenStack LBaaS APIs or Horizon dashboard to configure load balancing services, you may skip the plugin driver installation. Only the Avi Controller installation is needed. You can use the Avi Controller to create, update and delete virtual services. This can be done via the Avi UI or Avi RESTful APIs. In this operation mode, the Avi Controller will still interact with Nova, Neutron, and Keystone services without the plugin driver and be fully functional.

Avi Controller Installation

This installation process takes 4 steps: Avi Controller image upload, management network creation, Avi Controller instance launch, and the Avi Controller setup.

1: Avi Controller Image Upload

Add the Avi Controller image to the OpenStack, using Glance.

```
glance image-create --file controller.qcow2 --name avi-controller --disk-format qcow2 --min-disk 64 --min-ram 8192 --container-format bare --progress
```

2: Avi Management Network Creation

Create a management network and an Avi Controller instance in the admin project. You can use the Horizon UI for the following steps.

1. Create a management network for Avi system.
   - Create a network by selecting “Admin > System Panel > Networks > Create Networks” on the Horizon UI. In this example, name it to avi-mgmt and select the “Shared” option.
   - After creation, click the Network Name field in the network list. Click Create Subnet.
   - Assign an IP subnet and enable DHCP service.
   - Navigate to Project > Network > Routers and select a router.
   - Add a router interface to the IP subnet such that the Avi Controller can be reachable from other tenants. For this purpose, a floating IP address should be associated with the Avi Controller IP address.

2. Create a security-group named avi-mgmt-acl to allow the following traffic:
   - Ingress TCP port number: 22 for Service Engines will initiate a connection to the Controller
   - Ingress TCP port number: 443 for Avi UI and API access. Port 80 is optional for HTTP-to-HTTPS redirect
   - ICMP

3: Avi Controller Instance Launch

Create an Avi Controller instance and attach it to the Avi management network.

1. Use at least the m1.large flavor for the instance.
2. Attach the avi-mgmt-acl security group.
3. Attach its network interface to the avi-mgmt network.
Make sure that only one interface exists on the Avi Controller.

After these steps, you should be able to login to the Avi Controller, using an OpenStack user account. The Avi Controller authenticates a user via the Keystone service and creates a proper tenant. By default, a user is allowed to create, modify, and delete a virtual service for the tenant they belong to.

**Note:** The Avi Controller must have access to the OpenStack cluster for API access and vice versa. If the Avi management network is isolated or not accessible from the OpenStack controller cluster, you can associate a floating IP address with the Avi Controller IP address. This floating IP address will represent the Avi LBaaS service endpoint in the Neutron configuration. Hence, this is a recommended configuration. Users can access the Avi Controller service via the floating IP address.

### 4: Avi Controller Settings

After the Avi Controller is spawned, it can take up to 10 minutes for first time initialization. Login to the Avi Controller via a web browser for the initial setup.

Configure the admin account for the Avi system and basic system settings.

![Avi Vantage](image1.png)

**Note:** Make sure that you provide a correct DNS server and search domain to allow the Avi Controller to resolve OpenStack API service endpoints.

Configure OpenStack access information so that the Avi Controller can interact with Neutron, Nova and Keystone services. If you use VMware ESX servers, choose VMWARE_ESX for hypervisor type.

![OpenStack Login](image2.png)

![Management Network](image3.png)
If you have a Nuage Virtualized Service Controller (VSC) to integrate, provide the VSC access information.

**Note:** The Avi admin can access tenants on the Avi controller conveniently and has full access. The Avi controller creates a tenant when an OpenStack user logs in and the tenant does not exist. If the Avi admin does not see tenants on the Avi UI, login to the Avi Controller as an OpenStack user for that tenant once.
After this setup, you can login to the Avi Controller via its UI, using an OpenStack user account, create and manage virtual services. If you do not need the OpenStack LBaaS API access, your installation is complete. You do not need the Avi LBaaS plugin driver.

### Avi LBaaS Plugin Driver Installation with an Avi Script

You can run an Avi LBaaS installation script to install the LBaaS plugin driver. The script will make necessary OpenStack configuration changes automatically.

First, copy the package file, `avi_openstack_package.tar.gz`, to your OpenStack Neutron host. Then follow the steps below to install the package. You need a root privilege for the installation.

- Unzip and untar the file.

```bash
Unzip and untar the file.
```

- Run the Avi LBaaS installation script. Note that 10.10.5.81 is the sample Avi Controller IP address and admin/avixyz are the credential of the Avi Controller.

```bash
cd ./openstack_lbplugin
./install.sh --aip 10.10.5.81 --auser admin --apass avixyz
--> Install SeLinux module ‘avi_lbaas’? (y/n) n
--> Configure Neutron Server with Avi LBaaS provider ‘Avi_ADC’ with driver ‘avi’? (y/n) y
08/28/2014 23:27:56 INFO: Neutron Avi LBaaS driver ‘avi’ setup...OK
08/28/2014 23:28:01 INFO: neutron-server restart...OK
08/28/2014 23:28:01 INFO: Neutron Avi LBaaS configuration setup...OK
```

Now, the installation is complete. You should be able to create a load balancing pool on the OpenStack Horizon UI.

**Note:** If you have multiple Neutron hosts, all Neutron hosts should be installed with the LBaaS driver. You can run the Avi installation package remotely. Refer to the README file included in the package directory.
Avi LBaaS Plugin Driver Manual Installation

The manual installation process involves 3 steps:

1. Copy the Avi LBaaS plugin driver files into the OpenStack Neutron host.
2. Modify `neutron.conf` to add the driver.
3. Modify the OpenStack dashboard file to enable the LBaaS on the Horizon UI.

Let’s review each of steps in detail.

1: Copy Avi LBaaS Plugin

- Copy the package file, avi-device-package.tar.gz, to your OpenStack Neutron host.
- Unzip and untar the file.

```
tar -xzf avi_openstack_package.tar.gz
cd ./openstack_lbplugin
```

- Copy the directory avi into one of the following locations depending on your OpenStack Linux distribution. The first one is for the RPM package manager (e.g., RedHat). The second one is for the Debian package manager (e.g., Ubuntu)

```
cp -r ./avi /usr/lib/python2.7/site-packages/neutron/services/loadbalancer/drivers/
cp -r ./avi /usr/lib/python2.7/dist-packages/neutron/services/loadbalancer/drivers/
```

2: Neutron LBaaS Configuration

Edit `/etc/neutron/neutron.conf` to enable LBaaS and Avi LBaaS plugin driver as follows.

- Go to the DEFAULT section and add the LBaaS plugin for Neutron.

```
[DEFAULT]
service_plugins = neutron.services.loadbalancer.plugin.LoadBalancerPlugin
```

- Go to the service_providers section and add the Avi LBaaS plugin driver. If you have an existing LBaaS plugin driver, e.g., HAproxy, comment it out.

```
[service_providers]
service_provider=LOADBALANCER:Avi_ADC:neutron.services.loadbalancer.drivers.avi.avi_driver.AvilbaaSDriver:default
```

- Create the “avi_adc” section at the end of the file. The address is Avi Controller IP address. The user and password are Avi Controller shell login ID and password.

```
[avi_adc]
address="10.10.5.81"
user="admin"
password="avixyz"
```

- Restart the Neutron service.

```
   service neutron-server restart
```

*Note:* If you have multiple Neutron hosts, you have to install the LBaaS plugin driver to each of them.
3: Enable LBaaS for Horizon Dashboard
LBaaS is disabled on the Horizon dashboard by default. Enable it by changing the `enable_lb` option to `True` in the `/etc/openstack-dashboard/local_settings.py` or `local_settings` file, depending on your OpenStack distribution.

```python
OPENSTACK_NEUTRON_NETWORK = {'enable_lb': True,
```

Restart the HTTP service. In the example below, the first one is for Ubuntu and the second one is for RedHat.

```bash
service apache2 restart
service httpd restart
```

The Avi LBaaS installation is now complete. You should be able to create a load balancing pool using the OpenStack Dashboard.

About Avi Networks
Avi Networks is the Cloud Application Delivery Company. The Avi Networks Cloud Application Delivery Platform (CADP) brings the benefits of hyperscale application delivery to enterprises at any scale. With a unique analytics-driven and distributed application delivery architecture – HYDRA™, the Avi Networks solution guarantees end-user application experience for on-premise and cloud-based applications. For more information, visit us at www.avinetworks.com, follow us at @avinetworks or email us at tryavi@avinetworks.com to get started today.