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Brocade VCS Plugin Deployment Guide

In Red Hat OpenStack environment

Preface

This document is a deployment guide for implementing a Brocade VCS Plugin, including the key features and options supported NOS device. It is written for technology decision-makers, architects, systems engineers, NOC engineers and other experts responsible for network upgrades and migration.

This document provides step-by-step examples to prepare, perform, and verify the deployment of a Brocade VCS Plugin. It is assumed that the reader is familiar with establishing console access and entering commands using the Brocade CLI.

Overview

This document describes a Red Hat OpenStack 6.0 installation via PackStack with OpenvSwitch plugin. Once complete, Neutron can be reconfigured to use the Brocade ML2 and SVI driver for managing both virtual and physical networking infrastructure through OpenStack API.

Brocade ML2 and SVI plugin helps to configure L2 and L3 Networking on the underlying Ethernet fabrics from OpenStack Neutron Service.

This document provides an overview of Brocade's AMPP based ML2 plugin and SVI L3 routing solutions.

This guide has been tested using RHEL 7.0.

Document History

Date	Version	Description
2015-05-07	1.0	Initial Release

About Brocade

Brocade® (NASDAQ: BRCD) networking solutions help the world's leading organizations transition smoothly to a world where applications and information reside anywhere. This vision is designed to deliver key business benefits such as unmatched simplicity, non-stop networking, application optimization, and investment protection.

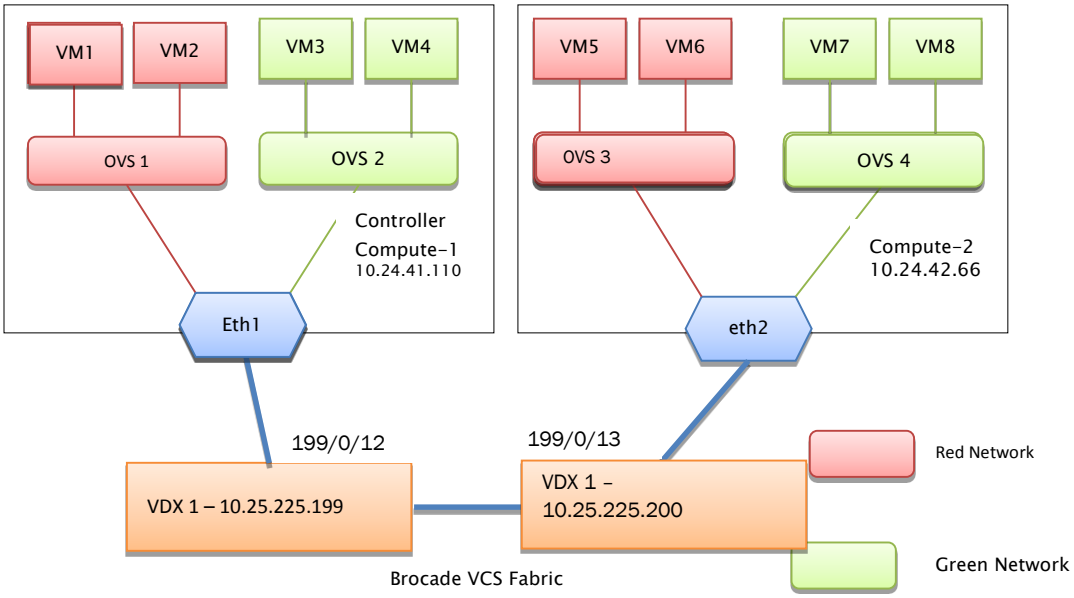
Innovative Ethernet and storage networking solutions for datacenter, campus, and service provider networks help reduce complexity and cost while enabling virtualization and cloud computing to increase business agility.

To help ensure a complete solution, Brocade partners with world-class IT companies and provides comprehensive education, support, and professional services offerings. (www.brocade.com)

Glossary

Term	Meaning
VCS	Virtual Cluster and Switching
ML2	Modular Layer 2
NC	Netconf Client
NOS	Network Operating System
AMPP	Automatic Migration of Port Profiles
RHEL	Red Hat Enterprise Linux
SVI	Switched virtual interface

Topology Overview



Hardware

- VCS devices running in Logical Chassis Mode

Platform	Description
VDX6710(Carme)	Firmware running v4.0.x,v4.1.x
VDX6720(Callisto)	Firmware running v4.0.x,v4.1.x
VDX6730(F-Callisto)	Firmware running v4.0.x,v4.1.x

VDX8770(Mercury)	Firmware running v4.0.x,v4.1.x,v5.0
VDX6740(Castor)	Firmware running v4.0.x,v4.1.x,v5.0
VDX6740T(Castor-T)	Firmware running v4.0.x,v4.1.x,v5.0

Brocade VCS configuration

Brocade VDX/VCS switches should be running NOS 4.0.x or above with logical chassis mode enabled for configuration distribution across all fabric nodes. See the Brocade NOS administrators guide for additional information. Any ports connected to OpenStack controller, compute and network nodes should be configured as port-profile ports.

To configure Port-profile-port

```
sw0# configure terminal
sw0(config)# interface TenGigabitEthernet 199/0/12
sw0(conf-if-te-199/0/12)# port-profile-port
```

To view Port-profile-port configuration

```
sw0# show running-config interface TenGigabitEthernet 199/0/12
interface TenGigabitEthernet 199/0/12
 port-profile-port
 no shutdown
```

Server Interface Configuration:

For Tenant networks, edit the configuration of the physical interface connected to the VCS fabric. It should be configured with no IP address and in promiscuous mode. All nodes should have a similar configuration.

```
NAME=eth1
BOOTPROTO=static
ONBOOT=yes
TYPE=Ethernet
```

One method to configure the interface for promiscuous mode during boot, is to create /sbin/ifup-local with the following content

```
#!/bin/bash
if [[ "$1" == "eth1" ]]
then
  /sbin/ifconfig $1 promisc
  RC=$?
fi
```

Set executable bit. This script will run during boot right after network interfaces are brought online.

```
# chmod +x /sbin/ifup-local
# /etc/init.d/network restart
```

Install the software repos

Red Hat Enterprise Linux OpenStack Platform requires that each system in the OpenStack environment is running Red Hat Enterprise Linux Server and that all systems be signed up to receive updates from the Customer Portal Subscription Management using Subscription Manager.

Below steps in this procedure must be executed while logged in to the account of the `root` user on the system being registered.

```
#subscription-manager register
# subscription-manager list --available
# subscription-manager attach --pool=<pool ID from previous output>
# yum repolist
# subscription-manager repos --enable=rhel-7-server-rpms
# subscription-manager repos --enable=rhel-7-server-openstack-6.0-rpms
# subscription-manager repos --enable=rhel-7-server-rh-common-rpms
# subscription-manager repos --enable=rhel-7-server-optional-rpms
# subscription-manager repos --enable=rhel-7-server-openstack-6.0-installer-rpms
# subscription-manager repos --enable=rhel-server-rhscl-7-rpms
# yum -y update
# reboot
```

Installation using PackStack

Below procedure will walk through the process of deploying OpenStack on multi node (one controller and two compute nodes).

Begin by deploying OpenStack as documented in the RHEL OpenStack Platform – Deploying OpenStack: Proof-of-Concept Environment (PackStack) guides at https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux_OpenStack_Platform/6/html/Deploying_OpenStack_Proof_of_Concept_Environments/index.html and install PackStack.

```
yum install -y openstack-packstack
```

Followed PackStack interactive method to deploy controller and compute nodes. Additional compute nodes can be specified as mentioned below ('novacompute-hosts' field).

```
# packstack

Installer will be installed using the following configuration:
============================================================
ssh-public-key:                 /root/.ssh/id_rsa.pub
default-password:
mariadb-install:                y
os-glance-install:              y
os-cinder-install:              y
os-nova-install:                y
os-neutron-install:             y
os-horizon-install:             y
os-swift-install:               y
os-ceilometer-install:          y
os-heat-install:                n
os-client-install:              y
ntp-servers:
nagios-install:                 y
exclude-servers:
os-debug-mode:                  n
```

```
os-controller-host:            10.24.41.110
os-compute-hosts:              10.24.41.110,10.24.42.66,10.24.42.68
os-network-hosts:              10.24.41.110
os-vmware:                     n
unsupported:                   n
use-epel:                      n
additional-repo:
rh-username:
rhn-satellite-server:
amqp-backend:                  rabbitmq
amqp-host:                     10.24.41.110
amqp-enable-ssl:               n
amqp-enable-auth:              n
mariadb-host:                  10.24.41.110
mariadb-pw:                    ********
keystone-db-passwd:            ********
keystone-admin-passwd:         ********
keystone-demo-passwd:          ********
glance-db-passwd:              ********
glance-ks-passwd:              ********
glance-backend:                file
cinder-db-passwd:              ********
cinder-ks-passwd:              ********
cinder-backend:                lvm
cinder-volumes-create:         y
cinder-volumes-size:           20G
nova-db-passwd:                ********
nova-ks-passwd:                ********
novasched-cpu-allocation-ratio:16.0
novasched-ram-allocation-ratio:1.5
novacompute-migrate-protocol:  tcp
os-neutron-ks-password:        ********
os-neutron-db-password:        ********
os-neutron-l3-ext-bridge:      br-ex
os-neutron-metadata-pw:        ********
os-neutron-lbaas-install:      n
os-neutron-metering-agent-install:n
neutron-fwaas:                 n
os-neutron-ml2-type-drivers:   vlan
os-neutron-ml2-tenant-network-types:vlan
os-neutron-ml2-mechanism-drivers:openvswitch
os-neutron-ml2-flat-networks:  *
os-neutron-ml2-vlan-ranges:    physnet1
os-neutron-ml2-tunnel-id-ranges:
os-neutron-ml2-vxlan-group:
os-neutron-ml2-vni-ranges:     10:100
os-neutron-l2-agent:           openvswitch
os-neutron-ovs-bridge-mappings:physnet1:br-eth1
os-neutron-ovs-bridge-interfaces:br-eth1:eth1
os-neutron-ovs-tunnel-if:
os-horizon-ssl:                n
os-swift-ks-passwd:            ********
os-swift-storages:
os-swift-storage-zones:        1
os-swift-storage-replicas:     1
os-swift-storage-fstype:       ext4
os-swift-storage-size:         2G
provision-demo:                y
provision-tempest:             n
provision-tempest-user:
provision-tempest-user-passwd: ********
```

```
provision-demo-floatrange:     172.24.4.224/28
provision-cirros-url:          http://download.cirros-cloud.net/0.3.3/cirros-0.3.3-
x86_64-disk.img
provision-tempest-repo-uri:    https://github.com/openstack/tempest.git
provision-tempest-repo-revision:master
provision-all-in-one-ovs-bridge:n
ceilometer-ks-passwd:          ********
mongodb-host:                  10.24.41.110
redis-host:                    10.24.41.110
redis-port:                    6379
nagios-passwd:                 ********
Proceed with the configuration listed above? (yes|no): yes
```

Brocade Neutron plugins

Ml2 driver description

Brocade NOS plugin for OpenStack Neutron Service implements the Neutron 2 API to manage L2 network on NOS devices.

Brocade NOS Plugin will work with Juno release of OpenStack and extend the following Neutron API's

1. CREATE_NETWORK –

On receiving a create_network call, Brocade Plugin would create a port-profile on the NOS device using the following syntax.

Syntax of the Profile created : openstack-profile-<vlan>

Note:

- vlan number is allocated by the Neutron service based on the range provided in the configuration. Red Network is carried as VLAN 100 and Green Network is carried as VLAN 101 on the VDX box
- Brocade ML2 driver doesn't support multiple physical network so external network creation will fail
- Ml2 driver supports vlan provider network

2. DELETE_NETWORK –

On receiving a delete_network, Brocade Plugin would delete the port-profile on the NOS device corresponding to that Network.

3. CREATE_PORT –

On receiving a create_port, Brocade Plugin would create a mac association with port-profile (corresponding to the VLAN) on the NOS device using the mac address of the VM

Note : Openvswitch driver is used for vif port bingind so create_port operation is dependant on openvswitch

4. DELETE_PORT –

On receiving a delete_port, Brocade Plugin would

Delete the mac association with port-profile(corresponding to the VLAN) on the NOS device using the mac address of the VM.

Note : Openvswitch driver is used to remove vif port bingind so delete_port operation is dependant on openvswitch

L3 driver description

5. Create_router, Update_router

Create_router and update_router methods will set the admin_state state as down

6. add_interface_to_router

Openstack subnet_id is provided in the request parameters. Using this API, Brocade Plugin will create ve interface and assign gateway ip of the subnet to the VCS device

7. Remove_interface_from_router

Using this API, Brocade Plugin will remove ve interface along with assigned gateway ip of the subnet from VCS device

8. Delete_router

This method is used to clean up the NETCONF, db connection and any caches.

Deploy VCS Ml2 driver

On the controller, install the netconf client needed to communicate with the VCS fabric

```
# git clone https://code.grnet.gr/git/ncclient
# cd ncclient && python setup.py install
```

Install the Brocade ML2 VCS plugin from the repository on controller nodes.

```
# yum install –y openstack-neutron-ml2
```

Edit /etc/neutron/plugins/ml2/ml2_conf.ini

```
[ml2]
tenant_network_types = vlan
type_drivers = vlan
mechanism_drivers = openvswitch,brocade

[ml2_type_vlan]
network_vlan_ranges = physnet1:100:200

[securitygroup]
enable_security_group = True
```

```
[database]
connection = mysql://neutron:password@10.24.41.110/neutron

[ovs]
local_ip = 10.24.41.110
bridge_mappings = physnet1:br-eth1
integration_bridge = br-int

[ml2_brocade]
username = admin
password = password
address  = 10.25.225.199
ostype=NOS
physical_networks = physnet1
osversion = autodetect
```

Edit /etc/neutron/plugins/ml2/ml2_conf_brocade.ini file

```
[ml2_brocade]
username = admin
password = password
address  = 10.25.225.199
ostype   = NOS
physical_networks = physnet1
osversion = autodetect
```

Edit /etc/neutron/neutron.conf

```
core_plugin = ml2
```

Make sure the correct network interface is configured to bridges. If interface name is renamed add the renamed interface to the bridge.

```
#ovs-vsctl add-br br-eth1
#ovs-vsctl add-port br-eth1 eth1
#ovs-vsctl show
941f36d3-1dff-44ec-a930-517bf4083c8d
    Bridge br-int
        Port "int-br-eth1"
            Interface "int-br-eth1"
        Port br-int
            Interface br-int
                type: internal
    Bridge "br-eth1"
        Port "br-eth1"
            Interface "br-eth1"
                type: internal
        Port "phy-br-eth1"
            Interface "phy-br-eth1"
        Port "eth1"
            Interface "eth1"
    Bridge br-ex
        Port br-ex
            Interface br-ex
                type: internal
    ovs_version: "2.0.0"
```

SVI - L3 Networking driver.

This section describes how SVI feature can be leveraged to provide internetworking between networks configured using OpenStack.

Edit /etc/neutron/neutron.conf

```
service_plugins = neutron.services.l3_router.brocade.l3_router_plugin.BrocadeSVIPlugin
```

A new field has been added to the existing fields in brocade.ini file.

Add the below configuration in both /etc/neutron/plugins/ml2/ml2_conf.ini and /etc/neutron/plugins/ml2/ml2_conf_brocade.ini

```
rbridge_id = <rbridge id of vcs device>
```

This field indicates the Rbridge on which the SVI interfaces would get created.

Testing things out – VCS ML2 driver

Source the keystone rc file that was installed into root's home directory to obtain credentials and use the CLI or Horizon to create networks, and launch new virtual machine instances.

Within the VCS fabric, check that new port-profiles are created for every tenant network that is created.

```
sw0# show port-profile
port-profile default
ppid 0
 vlan-profile
  switchport
  switchport mode trunk
  switchport trunk allowed vlan all
  switchport trunk native-vlan 1
port-profile openstack-profile-100
ppid 1
 vlan-profile
  switchport
  switchport mode trunk
  switchport trunk allowed vlan add 100
port-profile openstack-profile-101
ppid 2
 vlan-profile
  switchport
  switchport mode trunk
  switchport trunk allowed vlan add 101
```

As new instances are launched, they should be tied to the port-profile corresponding to the network they belong to. Any instances on the same network should be able to communicate with each other.

```
sw0# show port-profile status
Port-Profile                    PPID        Activated       Associated MAC        Interface
openstack-profile-100             1           Yes           fa16.3e1b.95d0        None
                                                            fa16.3e64.fce8        Gi 2/0/28
                                                            fa16.3e85.5b2f        Gi 2/0/28
                                                            fa16.3ea6.3741        Gi 2/0/5
```

```
                                                    fa16.3ecd.bfc1        Gi 2/0/5
                                                    fa16.3eeb.87f7        Gi 2/0/28
openstack-profile-101               2           Yes  fa16.3e2c.0baf        None
```

Testing things out – SVI L3 driver

Use the CLI or Horizon to create router, add interface to the routers.
Configuring the SVI (Ve interface) IP address to be same as the Network's Gateway IP address would enable us to provide internetworking between the L3 networks.
Red Network is carried as VLAN 100 and Green Network is carried as VLAN 101 on the VDX box (This is achieved using brocade ml2 driver Integration with OpenStack).
VDX Plugin would now configure the router interface IP address as the SVI (Ve) IP address on the switch.
Ve 100 is configured with 6.6.6.1 and Ve 101 is configured with 5.5.5.1
This would allow VM1 (6.6.6.2) on compute-1 to communicate with VM7(5.5.5.7) on compute-2