



Integration Guide: Nuage Networks VSP® & IBM Cloud Manager with OpenStack

[Nuage Networks VSP 3.2R4 & IBM CMO 4.3 FP4]

EXTERNAL

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1. Scope

This document provides details on the integration related activity between the IBM Cloud Manager with OpenStack 4.3 FP4 and the Nuage Networks VSP 3.2R4. This document assumes that the user can:

- ❑ Refer to the IBM website/documentation to install/deploy the IBM Cloud Manager with OpenStack (ICMO) 4.3; this document **does not** provide a step-by-step installation guide of IBM Cloud Manager with OpenStack
- ❑ Refer to the Nuage Networks VSP documentation and is able to install the Nuage Networks VSP; this document **does not** provide a step-by-step installation guide

What this document covers:

- ❑ High-level architecture and integration models supported by the current phase of integration
- ❑ Current state of integration and “in-progress” items
- ❑ Product specific settings and configurations that are required for the integration (Nuage and Partner)
- ❑ Deployment process of the joint integration

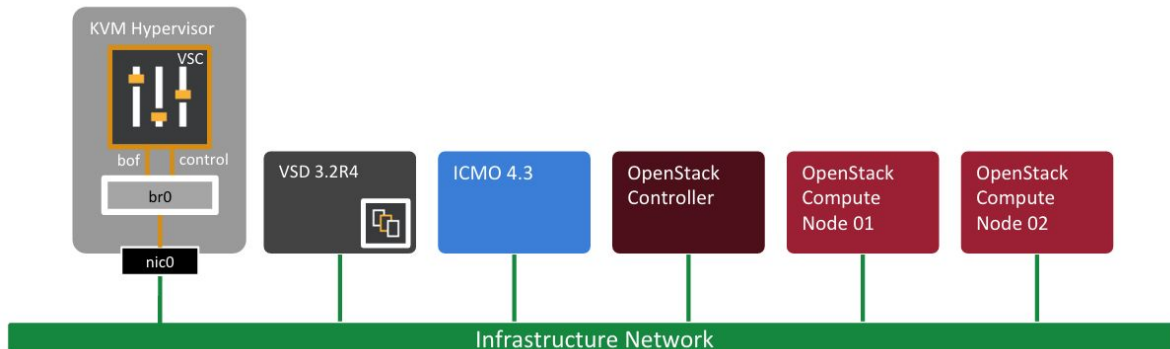
What this document does not cover:

- ❑ This is not a reference architecture document, it is simply a guide that shares details about the current phase of the technical integration

2. Overview

This document will guide you through the configuration and setup of an OpenStack Kilo and Nuage Networks VSP 3.2R4 environment using IBM Cloud Manager with OpenStack 4.3.

As mentioned before this is not a reference architecture document. The architecture described below is just an example to help you understand the deployment process of a minimal/testing environment.



The deployment process includes several steps required to successfully setup your OpenStack Kilo Cloud with Nuage Networks 3.2R4 environment:

1. Deploy IBM Cloud Manager 4.3 using the official IBM documentation
2. Deploy Nuage Networks VSD and VSC and configure them. You can choose to deploy the Nuage Networks solution manually using the official Nuage documentation or deploy it using the automated installer developed for this integration (Ansible playbooks)
3. Create a new ICMO deployment and customize it with Nuage Networks VSP specific attributes
4. Deploy your OpenStack Kilo Cloud using the deployment file created before

As of today, this integration supports:

- OpenStack Controller deployment with Nuage neutron plugin and nuagenetlib
- Nuage VRS installation and configuration on compute nodes
- Nuage metadata agent installation and configuration on compute nodes
- Automated standalone VSD deployment
- Automated VSC pair deployment (includes full VSC configuration such as NTP, DNS, XMPP and BGP peering)
- Automated CMS_ID generation
- Automated VSD licensing
- Automated CMS user creation

But **does not** support:

- OpenStack HA Controllers
- DB2 database for OpenStack; the integration was done based on mysql
- Automated clustered VSD deployment
- MPLSoGRE support on compute nodes
- FIP/PAT to underlay on compute nodes
- VRS-G deployment

These features can be included in a future release of this guide based on customer requests.

3. Requirements

As mentioned in the overview section, the minimal installation requires at least 5 servers (bare-metal or Virtual Machines).

3.1. IBM Cloud Manager with OpenStack 4.3 requirements

Please refer to the official documentation for up-to-date requirements. As of today, it requires to have **at least three servers** (Reference to IBM official installation guide [here](#)):

- One server to install ICMO 4.3 (bare-metal or VM).
- One server to deploy the OpenStack controller
- One server to deploy a single OpenStack compute node (additional compute nodes can be added)

And the following packages (Reference: IBM download page [here](#)):

- Last IBM Cloud Manager with OpenStack 4.3 installation package: **cmwo430_xlinux_install.bin**

3.2. Nuage Networks VSP requirements

Please refer to the official documentation for up-to-date requirements. As of today, the installation requires at least one server and one KVM hypervisor:

- One server to install Nuage VSD 3.2R4. VSD server must be **CentOS 6.5** with **4 CPU** and **8GB** of RAM (bare-metal or VM).
- One **KVM or ESXi** hypervisor to deploy Nuage VSC 3.2R4.

And the following packages:

- Nuage Networks YUM repository archive (see [5. Deliverables](#) chapter to retrieve this package)
- Nuage Networks VSD 3.2R4 qcow2/ISO/ovf image ; provided by Nuage Networks
- Nuage Networks VSC 3.2R4 qcow2/ovf image ; provided by Nuage Networks

Your servers must have access to at least one NTP server and one DNS server before starting the deployment. **VSD and VSC FQDN must be registered in your DNS server.**

Optional requirements:

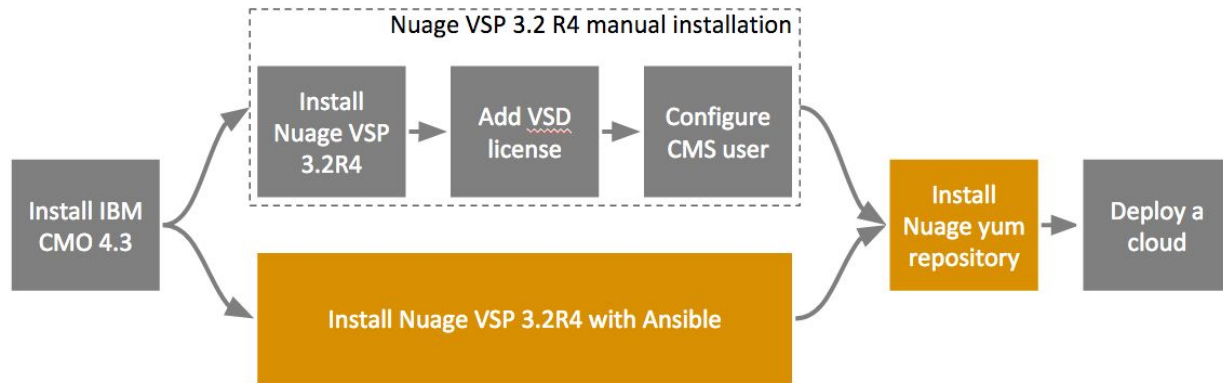
If you want to use the Nuage Networks VSP automated installation, there are additional requirements:

- Another server with at least 1 CPU and 1GB of RAM to deploy the Nuage Networks automated installer (bare-metal or VM)
- Nuage Networks 3.2R4 automated installer (.i.e Nuage Ansible playbooks). (see [5. Deliverables](#) chapter to retrieve this package)
- KVM hypervisor **only** to deploy Nuage VSC

The KVM hypervisor must be RedHat/CentOS based, have at least one Linux Bridge configured to connect the VSC VM and the following packages installed: qemu-kvm, libvirt and libguestfs-tools. Nuage VSD server must have access to the Internet to install RPM packages and python packages.

4. Deployment Process

This sample deployment of the Nuage Networks VSP & IBM Cloud Manager with OpenStack installs a complete Nuage VSP platform (VSD, VSC and VRS), an ICMO deployment server and an OpenStack Kilo cloud. The following diagram illustrates the sequence of steps that the guide will follow.



Important Note:

Nuage Networks installation can be **manual** or **automated**. We do recommend doing a manual installation for production deployment with the assistance of a Nuage Networks representative. The **automated installation** should be used for **demonstration/testing environment ONLY**.

4.1. Install IBM Cloud Manager with OpenStack 4.3

This document does not cover the deployment of IBM Cloud Manager with OpenStack in your environment. Follow the official IBM documentation or contact an IBM representative that can help you install ICMO 4.3.

References:

Official ICMO 4.3 documentation

https://www-01.ibm.com/support/knowledgecenter/SST55W_4.3.0/liaca/liaca_kc_welcome.html

Official ICMO 4.3 installation guide (make sure to read the planning section before installing)

https://www-01.ibm.com/support/knowledgecenter/SST55W_4.3.0/liaca/liacainstallsmentry.html

4.2. Install Nuage Networks VSP 3.2 R4

You can directly jump to [4.3. Install Nuage Networks yum repository](#) chapter if you already have a Nuage Networks 3.2R4 environment installed.

4.2.1 Manual installation

This document does not cover the manual deployment of Nuage Networks VSP 3.2R4. Follow the official Nuage Networks VSP 3.2R4 documentation or contact a Nuage Networks representative that can help you install the Nuage Networks VSP.

Before moving to the next chapter [4.3. Install Nuage Networks yum repository](#), make sure that the following steps have been completed:

- VSD is correctly licensed
- OpenStack Neutron user has been created on VSD and assigned to the CMS group
- VSD and VSC are working correctly (i.e. xmpp / functional)

4.2.2 Automated installation

4.2.2.1 Ansible environment

1. Install ansible on a separate server or ICMO deployment server if you do not have any other server available.

```
[root@ansible-master ~]# yum install
http://dl.fedoraproject.org/pub/epel/7/x86_64/e/epel-release-7-5.noarch.rpm
[root@ansible-master ~]# yum install ansible
```

2. Copy Nuage Networks ansible playbooks (nuage-ansible-playbooks.tar.gz) on the server under root home folder or any other user who has rights to execute ansible binaries.
3. Copy Nuage Networks binaries on the server under root home folder or any other user who has rights to execute ansible binaries.
4. Extract the archive

```
[root@ansible-master ~]# ls
nuage-ansible-playbooks.tar.gz  VSD-c66-3.2.4_134.iso  vsc_singledisk.qcow2
[root@ansible-master ~]# tar -xvf nuage-ansible-playbooks.tar.gz
...
...
```

5. Move Nuage Networks binaries in the target folder

```
[root@ansible-master ~]# mv VSD-c66-3.2.4_134.iso nuage-ansible-playbooks/roles/vsd/files/
[root@ansible-master ~]# mv vsc_singledisk.qcow2 nuage-ansible-playbooks/roles/vsc/files/
```

4.2.2.2 Deployment configuration

The ansible playbook package contain some configuration files to deploy VSD and VSC. First, you must update the **hosts** file to indicate the hypervisor you want to deploy VSC on and the fully qualified domain name (FQDN) of the VSD machine. Then, you have to set several attributes in the groups_vars/all YAML file to specify custom attributes specific of your environment. This configuration is detailed in the following steps:

1. Change your working directory

```
[root@ansible-master ~]# cd nuage-ansible-playbooks
[root@ansible-master nuage-ansible-playbooks]# ls
ansible.cfg  group_vars  hosts      roles      vsc.yml    vsd.yml
```

2. Edit the **hosts** configuration file

```
[hypervisors]
# Add VSC hypervisor

[vsd]
# Add VSD machine FQDN
# ex: vsdtest.bdteam.local
```

3. Edit the YAML configuration file named **all** in the **group_vars** directory

```
# A place to put variables that apply to all groups

# vsd_iso: VSD-c66-3.2.4_134.iso (defined in roles/vsd/defaults/main.yml)
# vsc_qcow2: vsc_singledisk.qcow2 (defined in roles/vsc/defaults/main.yml)

vsc:
  - name: <VSC hostname>
    hypervisor: <target hypervisor IP address>
    nics:
      - bridge: <linux bridge to connect bof interface>
      - bridge: <linux bridge to connect control interface>
    # Set bof configuration
    bof:
      ip: <bof IP address>
      netmask_prefix: <bof IP netmask>
      dns:
        server: <bof DNS server IP address>
        domain: <bof DNS domain>
    # Set admin configuration
    config:
```



```
# Set system interface configuration (Optional)
system:
  ip: 1.1.1.1
# Set control interface configuration (Optional)
control:
  ip: 10.21.0.10
  netmask_prefix: 24
# Set AS number (Optional)
as_number: 65000
# Set XMPP settings
xmpp:
  username: <XMAPP user>
  password: <XMPP password>
  vsd_fqdn: <VSD FQDN>
# Set NTP servers (at least one server)
ntp_servers:
  - <primary NTP server>
  - <secondary NTP server (optional)>

# Set the CMS user information (Optional)
cms:
  username: osadmin
  firstname: osadmin
  lastname: osadmin
  email: osadmin@nuagenetworks.net
  password: osadmin

# Set the VSD license provided by your Nuage Networks representative
vsd_license: <VSD license>
```

4.2.2.3 Install and configure VSD

Use the following command to deploy a standalone VSD on a pre-installed CentOS 6.5 server:

```
[root@ansible-master nuage-ansible-playbooks]# ansible-playbooks vsd.yml
...
...
```

4.2.2.4 Deploy and configure VSC

Use the following command to deploy a standalone VSC on a pre-configured KVM hypervisor:

```
[root@ansible-master nuage-ansible-playbooks]# ansible-playbooks vsc.yml
...
...
```

4.3. Install Nuage Networks yum repository

The steps to install the Nuage Networks yum repository are the following:

1. Copy the Nuage Networks yum repository on the ICMO deployment server in */tmp*
2. Make sure that the md5sum is correct

```
[root@icmo43 ~]# md5sum /tmp/nuage-yum-repository.tar.gz  
1f16c96fa40c94e0b32957a72d93d3d6 nuage-yum-repository.tar.gz
```

3. Untar the repository archive

```
[root@icmo43 ~]# cd /opt/ibm/cmwo/yum-repo/  
[root@icmo43 yum-repo]# mkdir nuage  
[root@icmo43 nuage]# cd nuage  
[root@icmo43 nuage]# tar -xvf /tmp/nuage-yum-repository.tar.gz
```

4. Remove the yum repository archive

```
[root@icmo43 nuage]# rm -f /tmp/nuage-yum-repository.tar.gz
```

Important Note:

There is no need to create a yum repo file on chef clients (i.e. controller and compute nodes), it is handled by ICMO.

4.4. Deploy a cloud environment

This document does not cover the configuration of a new OpenStack cloud deployment. Follow the official IBM documentation ([here](#)) or contact an IBM representative that can help you deploy your cloud environment.

Reference:

To deploy a new OpenStack cloud with Nuage plugin support use the following documentation:
https://www-01.ibm.com/support/knowledgecenter/SST55W_4.3.0/liaca/liaca_deploy_nuage.html

Important Note:

The current integration only supports the following topologies:

- Minimal
- Controller + n compute nodes

4.5. Check your OpenStack environment health

Before starting using your cloud, make sure to check the following workflow to ensure that your OpenStack and Nuage Networks platform is working correctly.

4.5.1. Check Nuage Networks VSD, VSC and VRS health

- Open <https://<VSD FQDN>:8443> using a web browser.
- Log into VSD using the following the default **csproot** credentials
- Check that an Enterprise has been created (default name is OpenStack_default)
- Check that the VSD status is **green**
- Check that the VSC status is **green**
- Check that VRS status is **green**

4.5.2. Check OpenStack Cloud health

- Log into your OpenStack Cloud **Dashboard** as an **administrator**
- Go to the **network** menu inside the **default project**
 - Create a network:** myNetwork1
 - Create a **subnet** inside **myNetwork1**:
 - Name:** mySubnet1
 - CIDR:** 192.168.0.0/24
 - Gateway:** 192.168.0.1
 - Leave **default** DHCP, DNS and routes **parameters**
 - Create another network:** myNetwork2
 - Create a subnet inside **myNetwork2**:
 - Name:** mySubnet2
 - CIDR:** 192.168.1.0/24
 - Gateway:** 192.168.1.1
 - Leave **default** DHCP, DNS and routes **parameters**
 - Create a new router:** myRouter
 - Attach previously created networks (**myNetwork1** and **myNetwork2**) to **myRouter**
- Go to the **instance** menu inside the **default project**
 - Launch a first instance **myInstance1** and connect it to **myNetwork1**
 - Launch a second instance **myInstance2** and connect it to **myNetwork2**
 - Open **myInstance1** console and ping **myInstance2** to check that routed networks are working correctly

5. Deliverables

Deliverables	Owner	Status	Resources
<u>Add Nuage Networks support to cookbook-openstack-network stable/kilo upstream</u>	Nuage Networks	Completed	https://github.com/openstack/cookbook-openstack-network/tree/stable/kilo
<u>Add Nuage Networks support to cookbook-openstack-dashboard stable/kilo upstream</u>	Nuage Networks	Completed	https://github.com/openstack/cookbook-openstack-dashboard/tree/stable/kilo
<u>Add Nuage Networks support to cookbook-openstack-orchestration stable/kilo upstream</u>	Nuage Networks	Completed	https://github.com/openstack/cookbook-openstack-orchestration/tree/stable/kilo
<u>Document integration</u>	Nuage Networks	Completed	IBM documentation (public): https://www-01.ibm.com/support/knowledgecenter/SST55W_4.3.0/liaca/liaca_deploy_nuage.html
Integrate OpenStack updated community cookbooks to ICMO 4.3	IBM	Completed	ICMO 4.3 FP4: http://www-933.ibm.com/support/fixcentral/swg/downloadFixes?parent=ibm~Other%2Bsoftware&product=ibm/Other+software/Cloud+Manager+with+Openstack&release=4.3.0&platform=All&function=fixId&fixids=4.3.0.4-IBM-CMWO-FP04&includeRequisites=1&includeSupersedes=0&downloadMethod=http
Develop Chef recipes to configure Nuage Networks repository on Chef clients (i.e. OpenStack controller, compute nodes, ...)	IBM	Completed	ICMO 4.3 FP4: http://www-933.ibm.com/support/fixcentral/swg/downloadFixes?parent=ibm~Other%2Bsoftware&product=ibm/Other+software/Cloud+Manager+with+Openstack&release=4.3.0&platform=All&function=fixId&fixids=4.3.0.4-IBM-CMWO-FP04&includeRequisites=1&includeSupersedes=0&downloadMethod=http

Appendix A

Below is the complete list of Nuage Networks custom attributes

```
# Install Nuage Networks Heat extensions
openstack.orchestration.plugins: [nuage]
# Install Nuage Networks Dashboard extensions
openstack.dashboard.nuage.customization_module.enabled: true
# Enable overlapping IPs
openstack.network.allow_overlapping_ips: true
# Set the neutron core plugin to NuagePlugin
openstack.network.core_plugin: neutron.plugins.nuage.plugin.NuagePlugin
# Set your platform specific attributes
openstack.network.nuage.server: <your VSD IP address>*:8443
openstack.network.nuage.serverauth.username: <neutron admin user>*
openstack.network.nuage.serverauth.password: <neutron admin password>*
openstack.network.nuage.active_controller: <primary VSC IP address>*
openstack.network.nuage.standby_controller: <secondary VSC IP address>*
# Define the default bridge to attach Virtual Machines
openstack.compute.network.neutron.ovs_bridge: alubr0
# Set security group api to nova (bypass host iptables)
openstack.compute.network.neutron.security_group_api: neutron
# Set the network compute plugin to nuage (install VRS and nuage-metadata-agent)
openstack.compute.network.plugins: [nuage]
# Set the service_type to neutron as Nuage plugin is a core neutron plugin
openstack.compute.network.service_type: neutron
# METADATA_PORT: TCP Port used by Nuage metadata agent
openstack.network.nuage.metadata_port = 9697
# NOVA_CLIENT_VERSION
openstack.network.nuage.nova_client_version = 2
# NUAGE_METADATA_AGENT_START_WITH_OVS: if nuage-metadata-agent needs to be started with
nuage-openvswitch-switch
openstack.network.nuage.metadata_start_with_vrs = true
# NOVA_API_ENDPOINT_TYPE: one of publicURL, internalURL, adminURL
openstack.network.nuage.nova_api_endpoint_type = internalURL
# Desired Name of VSD Organization/Enterprise to use
openstack.network.nuage.default_net_partition_name = OpenStack_default
# CMS ID generated by Nuage VSD
openstack.network.nuage.cms_id = ''
# Default configuration for standard installs
openstack.network.nuage.organization = csp
openstack.network.nuage.auth_resource = /me
openstack.network.nuage.serverss1 = True
openstack.network.nuage.base_uri = /nuage/api/v3_2
```