

# VMware Integrated OpenStack Quick Start Guide

VMware Integrated OpenStack 1.0.0

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## About This Guide

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*VMware Integrated OpenStack Quick Start Guide* explains the process of deploying a working instance of standard OpenStack in your vCenter environment.

*VMware Integrated OpenStack Quick Start Guide* also describes the prerequisites for preparing a dedicated vCenter instance, deploying the VMware Integrated OpenStack plug-in, and installing and configuring your VMware Integrated OpenStack cloud management infrastructure.

### Intended Audience

This guide is for system administrators and developers who want to integrate their VMware<sup>®</sup> vSphere<sup>®</sup> deployment with OpenStack services by installing VMware Integrated OpenStack. To do so successfully, you should be familiar with VMware<sup>®</sup> vSphere<sup>®</sup> and the OpenStack components and functions. If you are deploying VMware Integrated OpenStack with NSX-V, you should be familiar with NSX-V administration. See the VMware technical documentation for VMware technical documentation at [https://www.vmware.com/support/pubs/nsx\\_pubs.html](https://www.vmware.com/support/pubs/nsx_pubs.html).

### VMware Technical Publications Glossary

VMware Technical Publications provides a glossary of terms that might be unfamiliar to you. For definitions of terms as they are used in VMware technical documentation, go to <http://www.vmware.com/support/pubs>.

This chapter includes the following topics:

- [“Updated Information,”](#) on page 5
- [“About VMware Integrated OpenStack,”](#) on page 6
- [“VMware Integrated OpenStack Architecture,”](#) on page 6

### Updated Information

This *VMware Integrated OpenStack Quick Start Guide* is updated with each release of the product or when necessary.

This table provides the update history of the *VMware Integrated OpenStack Quick Start Guide*.

Revision	Description
001582-01	<ul style="list-style-type: none"> <li>■ Added a new section describing the post-deployment procedure for adding VMware Integrated OpenStack VMs to the exclusion list for the NSX-V manager. See <a href="#">“Exclude the VMware Integrated OpenStack VMs from Firewall Protection,”</a> on page 31.</li> <li>■ Minor revisions.</li> </ul>
001582-00	Initial release.

## About VMware Integrated OpenStack

With VMware Integrated OpenStack, you can implement OpenStack services on your existing VMware vSphere implementation.

You deploy VMware Integrated OpenStack through the Integrated OpenStack Manager vApp in vCenter.

The Integrated OpenStack Manager provides a workflow that guides you through and completes the VMware Integrated OpenStack deployment process. With Integrated OpenStack Manager, you can specify your management and compute clusters, configure networking, and add resources. Post-deployment, you can use Integrated OpenStack Manager to add components or otherwise modify the configuration of your VMware Integrated OpenStack cloud infrastructure.

## VMware Integrated OpenStack Architecture

The VMware Integrated OpenStack architecture connects vSphere resources to the OpenStack Compute, Networking, Block Storage, Image Service, Identity Service, and Orchestration components.

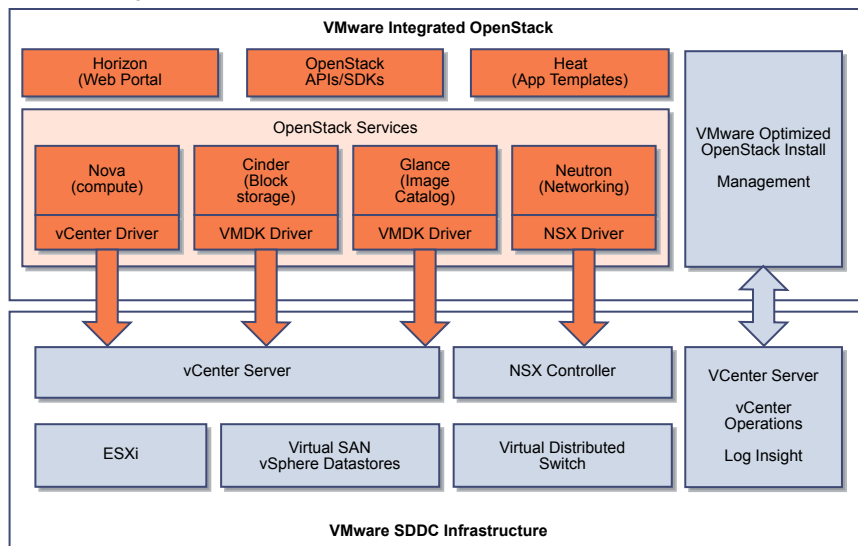
VMware Integrated OpenStack is implemented as compute and management clusters in your vSphere environment.

The compute cluster handles all tenant workloads. Your VMware Integrated OpenStack deployment can have multiple compute clusters. Integrated OpenStack Manager creates one Compute driver instance in the management cluster for each compute cluster.

The management cluster contains the VMs that comprise your OpenStack cloud deployment. It also contains the memory cache (memcache), message queue (RabbitMQ), load balancing, DHCP, and database services.

VMware Integrated OpenStack deployments can use NSX-V for the Networking component. You will require an additional cluster for the NSX-V Edge nodes.

**Figure 1-1.** VMware Integrated OpenStack with NSX-V in the SDDC context



# VMware Integrated OpenStack Deployments with NSX-V

# 2

You can deploy VMware Integrated OpenStack using NSX-V for the Neutron networking component.

This chapter includes the following topics:

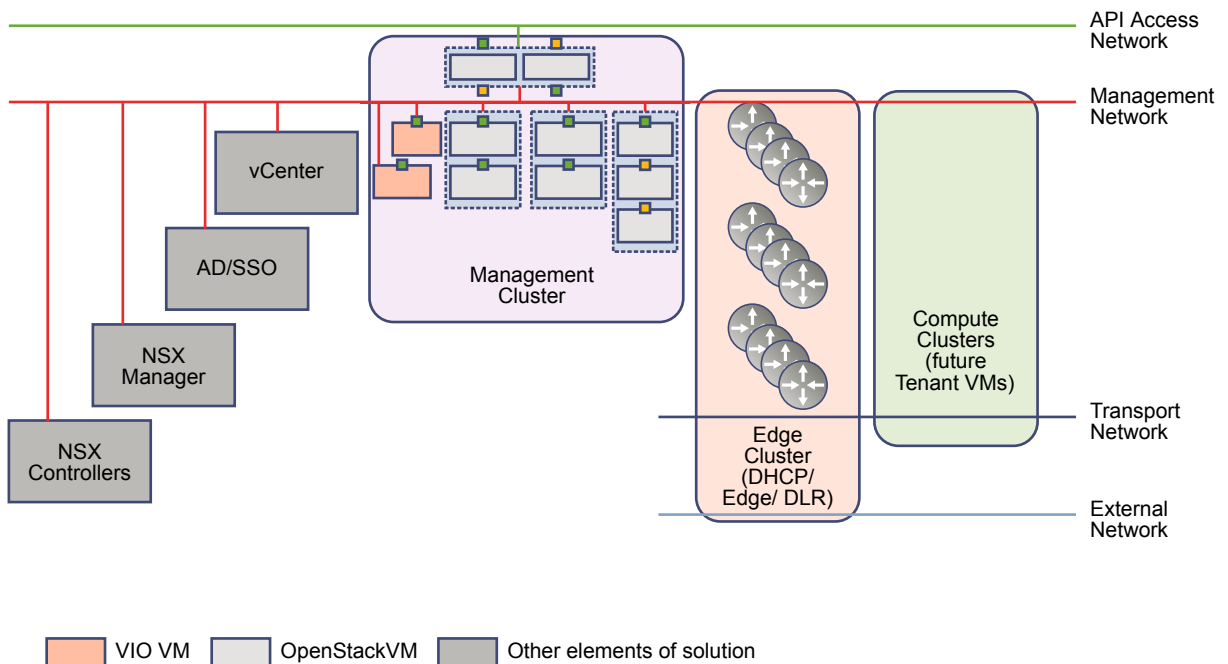
- [“Architectural Overview of NSX-V Deployments,”](#) on page 7
- [“VMware Integrated OpenStack System Requirements,”](#) on page 9
- [“Physical NSX-V Network,”](#) on page 11

## Architectural Overview of NSX-V Deployments

A VMware Integrated OpenStack NSX-V deployment includes management and compute clusters with four principal networks. You can also separate the NSX-V Edge node into a separate cluster.

### Cluster and Component Architecture

A typical NSX-V deployment architecture consists of three clusters and four VLANs. For details about the VLANs, see [“Physical NSX-V Network,”](#) on page 11.



The VMware Integrated OpenStack architecture includes the following clusters and components.

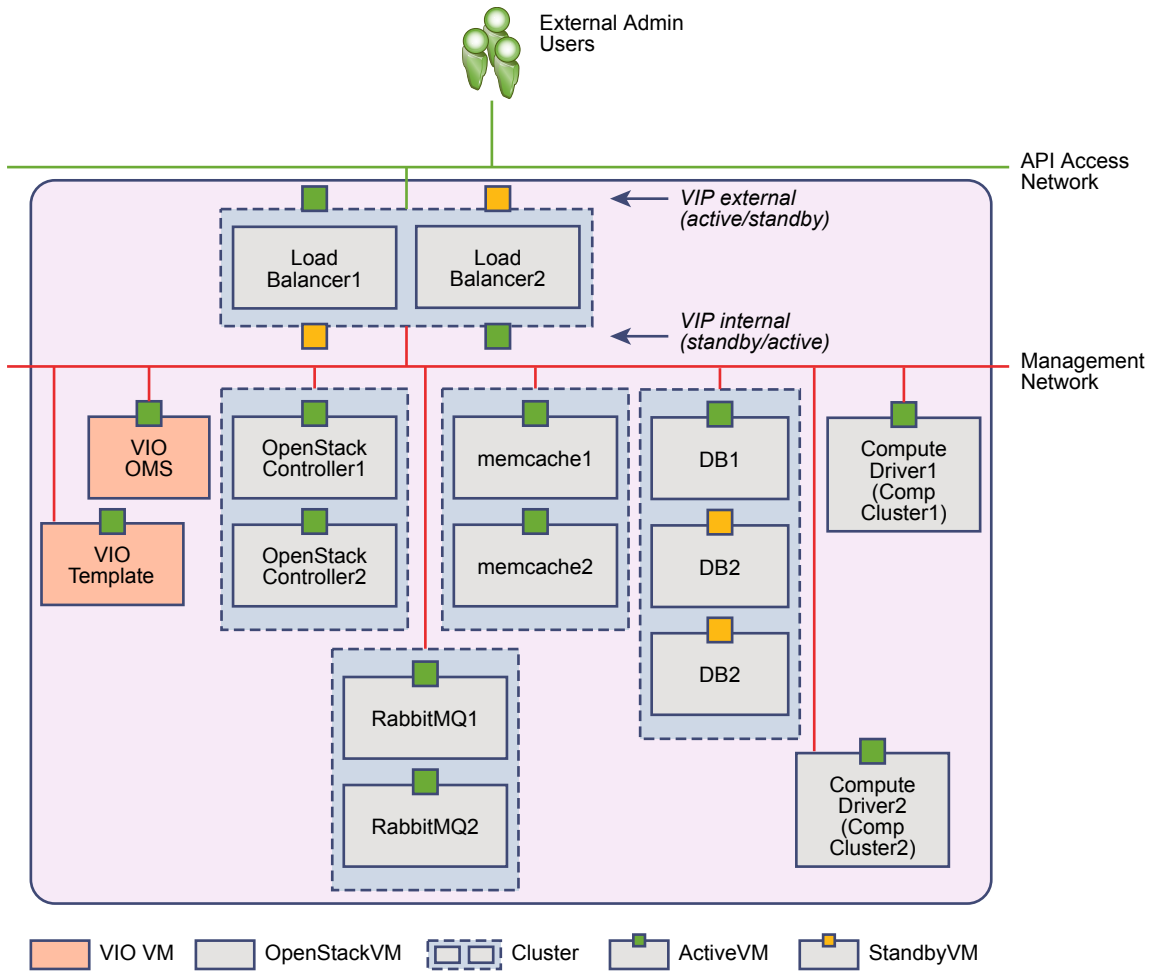
Cluster or Component	Description
vCenter instance	A dedicated vCenter instance is not required but optimizes deployment.
Active Directory	For user authentication by the OpenStack Identity Service.
Management cluster	Contains all the deployed OpenStack component and management VMs. See <a href="#">“Management Cluster,”</a> on page 14 below for a detailed description of the management cluster and its components.
Compute cluster	Compute resources for Nova. All tenant VMs are created on these compute clusters.
NSX-V Edge cluster	Contains Edge VMs that provide edge security and gateway services to logical networks, and provide DHCP, Floating IP (NAT), Security Groups and routing functions for the OpenStack Networking component.
NSX-V Manager	The centralized network management component of NSX-V that provides an aggregated system view.
NSX-V Controllers	An advanced distributed state management system that controls virtual networks and overlay transport tunnels.
Management network	Carries traffic among the management components.
API access network	Exposes the VMware Integrated OpenStack dashboard and provides access for tenants to the OpenStack APIs and services.
Transport network	Connects the DHCP nodes in the Edge cluster with the compute clusters.
External Network	Provides external access for the instances created in VMware Integrated OpenStack.

The NSX-V Controller and NSX-V Manager nodes can be deployed on separate clusters or hosts. It is a best practice to deploy the NSX-V Controller and NSX-V Manager nodes in the Management Cluster.

## Management Cluster

The Management Cluster contains all the deployed OpenStack component and management VMs.





The management cluster contains the following components.

Component	Description	Nodes
Load Balancers	Provide HA and enable horizontal scale-out architecture.	2 (1 active, 1 standby)
Databases (DBs)	Instances of the MariaDB that store the OpenStack metadata.	3 (1 active, 2 standby)
VMware Integrated OpenStack Controller	Contains all the OpenStack services, including Compute, Block Storage, Image Service, Identity Service, and Object Storage.	2 (both active)
Memcache	Enables production-grade performance for the Identity Service.	2 (both active)
Rabbit MQ	The message queue service used by all OpenStack services.	2 (both active)
Compute Driver	Contains a subset of Compute processes that interact with the compute clusters to manage VMs.	1 per compute cluster
VMware Integrated OpenStack Manager Service (OMS)	The vApp that you use to manage your VMware Integrated OpenStack vApp.	1
VMware Integrated OpenStack Template	Base template for creating all OpenStack service VMs.	1

## VMware Integrated OpenStack System Requirements

Before you begin the VMware Integrated OpenStack deployment tasks, your system must comply with all hardware, software, networking, and storage requirements.

## Hardware Requirements for NSX-V Deployments

The hardware requirements are based on the number of VMs used for each component. For example, two VMs are used for load balancing, each of which requires two CPUs for a total requirement of four CPUs.

### Core VMware Integrated OpenStack Components

Component	VMs	CPU	RAM (GB)	Disk Space (GB)
Integrated OpenStack Manager	1	2 (2 per VM)	4 (4 per VM)	25
Load balancing service	2	4 (2 per VM)	8 (4 per VM)	40 (20 per VM)
Database service	3	12 (4 per VM)	48 (16 per VM)	240 (80 per VM)
Memory cache service	2	4 (2 per VM)	32 (16 per VM)	40 (20 per VM)
Message queue service	2	8 (4 per VM)	32 (16 per VM)	40 (20 per VM)
Controllers	2	16 (8 per VM)	32 (16 per VM)	160 (80 per VM)
Compute service (Nova CPU)	1	2 (2 per VM)	4 (4 per VM)	20 (20 per VM)
TOTAL	15	56	192	565

### NSX-V Components

Additional CPU, RAM, and disk space is required for NSX-V components if they are deployed with VMware Integrated OpenStack. It is a best practice to deploy the NSX-V Manager and NSX-V Controller nodes in the Management cluster.

**Table 2-1.** NSX-V Components

Component	VMs	CPU	RAM (GB)	Disk Space (GB)
NSX-V Controller	3	12 (4 per VM)	12 (4 per VM)	60 (20 per VM)
NSX-V Manager	1	4 (4 per VM)	12 (12 per VM)	60 (60 per VM)
NSX-V Edge (see note below)	Varies: created on demand.	1 per Edge DHCP VM, 2 per Edge router VM	0.5 per Edge DHCP VM, 1 per Edge router VM	0.5 per Edge DHCP VM, 1 per Edge router VM
TOTAL	4 plus Edge requirements	16 plus Edge requirements	24 plus Edge requirements	120 plus Edge requirements

**NOTE** When you create a logical subnet or logical router, a new Edge VM is dynamically created to serve this request if an existing Edge node cannot.

## Software Requirements for NSX-V Deployments

Before you begin the VMware Integrated OpenStack deployment tasks, the software components must meet all of the version prerequisites for vSphere, ESXi hosts, and the NSX-V product.

Requirement	Description
vSphere version	<ul style="list-style-type: none"> <li>■ vSphere 5.5 Update 2 Enterprise Plus</li> <li>■ vSphere 6 Enterprise Plus</li> </ul>
ESXi hosts	<ul style="list-style-type: none"> <li>■ Version 5.5 Update 2</li> <li>■ Eight or more logical processes on each host.</li> <li>■ The vCenter and all ESXi hosts intended for the VMware Integrated OpenStack deployment must use the same Network Time Protocol (NTP) server. For details about configuring NTP on ESX servers, see the VMware knowledge base article at <a href="http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&amp;cmd=displayKC&amp;externalId=1003063">http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&amp;cmd=displayKC&amp;externalId=1003063</a> and the vSphere documentation at <a href="http://pubs.vmware.com/vsphere-55/index.jsp?topic=%2Fcom.vmware.vsphere.vcenterhost.doc%2FGUID-8756D419-A878-4AE0-9183-C6D5A91A8FB1.html">http://pubs.vmware.com/vsphere-55/index.jsp?topic=%2Fcom.vmware.vsphere.vcenterhost.doc%2FGUID-8756D419-A878-4AE0-9183-C6D5A91A8FB1.html</a>.</li> <li>■ The ESXi host firewalls must be configured to allow gdbserver access. Typically, the port range is 5900-5964.</li> </ul>
NSX-V	Consult with VMware for the preferred version.

## Required NSX-V Parameters

When you are deploying VMware Integrated OpenStack with NSX-V for the Networking component, you must configure the NSX-V nodes in advance.

When you install VMware Integrated OpenStack, you must provide the following information.

Property	Description
Username	User name for accessing the NSX-V Manager node.
Password	Password for accessing the NSX-V Manager node.
Transport Zone	Name of the default transport zone.
Edge Cluster	The name of the cluster containing the Edge nodes.
vSphere Distributed Switch for Edge VTEP	The VDS from the NSX-V configuration.
Port Group for External Network	The port group created on a VLAN specifically for the External network. You created this port group as part of the process of preparing to deploy VMware Integrated OpenStack with NSX-V.

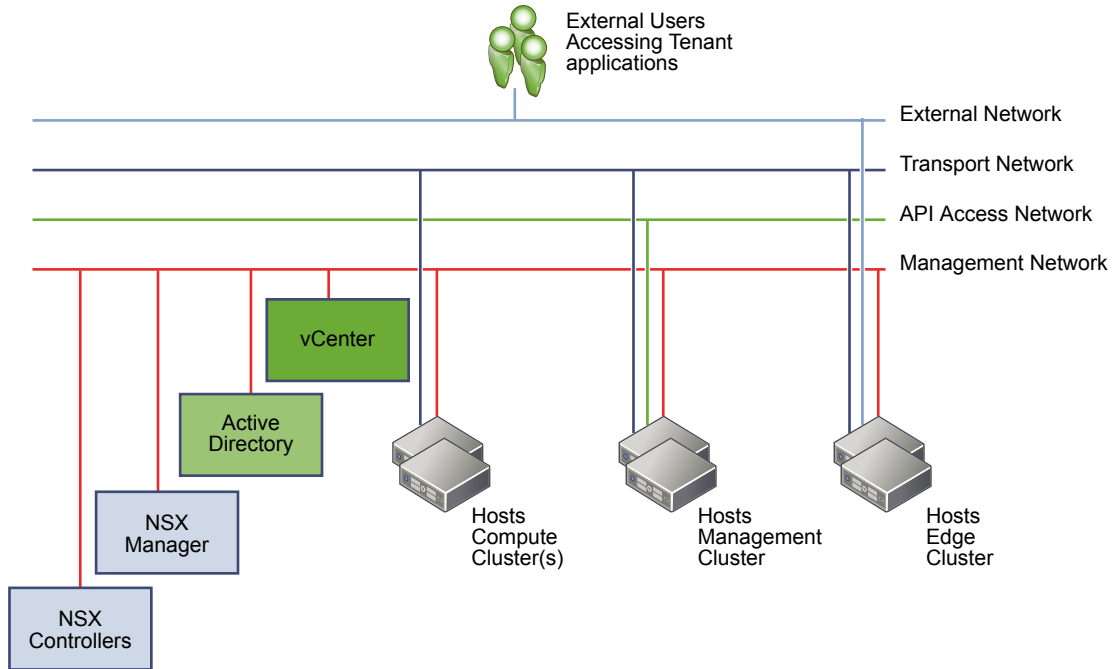
## Physical NSX-V Network

For NSX-V-based VMware Integrated OpenStack deployments, you need four separate VLANs. The API access, Management, Transport, and External network each require a separate and dedicated VLAN.

Request your network administrator to prepare the following VLANs.

VLAN	Description
API Access network	<p>The API Access network provide access for users to the OpenStack services through APIs or the VMware Integrated OpenStack dashboard .</p> <ul style="list-style-type: none"> <li>■ Trunk all hosts in the Management cluster to this VLAN.</li> <li>■ Make externally accessible.</li> <li>■ Requires 3 or more continuous IP addresses.</li> </ul>
Management network	<p>The Management network carries traffic among the management components.</p> <ul style="list-style-type: none"> <li>■ Trunk all hosts in the Management cluster to this VLAN.</li> <li>■ Trunk all hosts in the Compute cluster to this VLAN.</li> <li>■ Requires 18 or more continuous IP addresses.</li> <li>■ Enable L2 or L3 access to this VLAN for the following components:                             <ul style="list-style-type: none"> <li>■ vCenter server</li> <li>■ NSX-V Manager</li> <li>■ NSX-V Controller</li> </ul> </li> </ul> <p>If you are deploying the NSX-V Manager and NSX-V Controller VMs on the Management cluster, you must trunk their hosts to the Management network.</p>
Transport	<p>The Transport network carries traffic among the OpenStack instances.</p> <ul style="list-style-type: none"> <li>■ Trunk all hosts in the Management cluster to this VLAN.</li> <li>■ Trunk all hosts in the Compute cluster to this VLAN.</li> <li>■ Trunk all hosts in the NSX-V Edge cluster to this VLAN.</li> </ul>
External	<p>The External network provides external user access to the instances.</p> <ul style="list-style-type: none"> <li>■ Trunk all hosts in the NSX-V Edge cluster to this VLAN.</li> </ul>

**Figure 2-1. Network Map for NSX-V Deployments**



# VMware Integrated OpenStack Deployments with VDS

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# 3

VMware Integrated OpenStack can use vSphere Distributed Switch (VDS) to provide basic L2 networking for tenant workloads.

In this model, the VMware Integrated OpenStack administrator creates a set of provider networks and shares them with tenants, who then connect their VMs to these networks.

This chapter includes the following topics:

- [“Limitations of VDS Networking,”](#) on page 13
- [“Architectural Overview of VDS Deployments,”](#) on page 13
- [“VMware Integrated OpenStack System Requirements,”](#) on page 16
- [“Physical VDS Network Overview,”](#) on page 17

## Limitations of VDS Networking

VDS-based networking has limitations, including the inability of tenants to create their own private L2 networks, and the inability to deliver L3 and higher networking services such as virtual routers, security groups, and floating IPs.

If such features are important for your VMware Integrated OpenStack deployment, consider using NSX-V for Neutron networking.

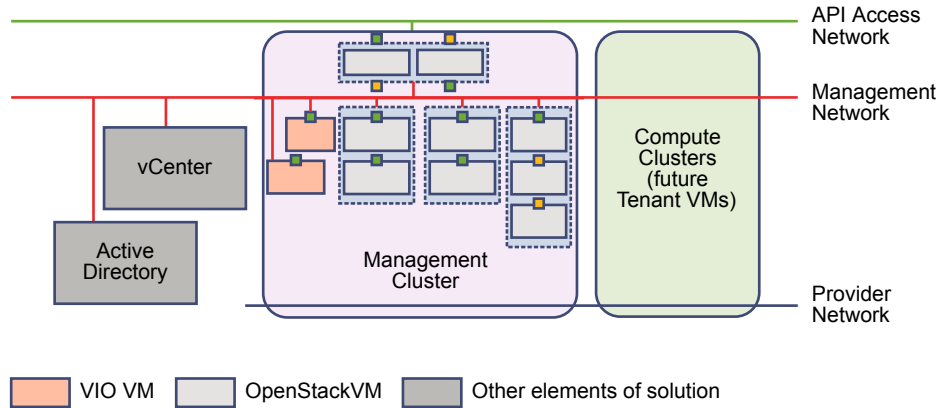
## Architectural Overview of VDS Deployments

A VMware Integrated OpenStack VDS deployment includes management and compute clusters with three principal networks.

### Cluster and Component Architecture

A typical VDS deployment architecture consists of two clusters and three separate VLANs. For details about the VLANs, see [Physical Network Overview](#).

**Figure 3-1.**



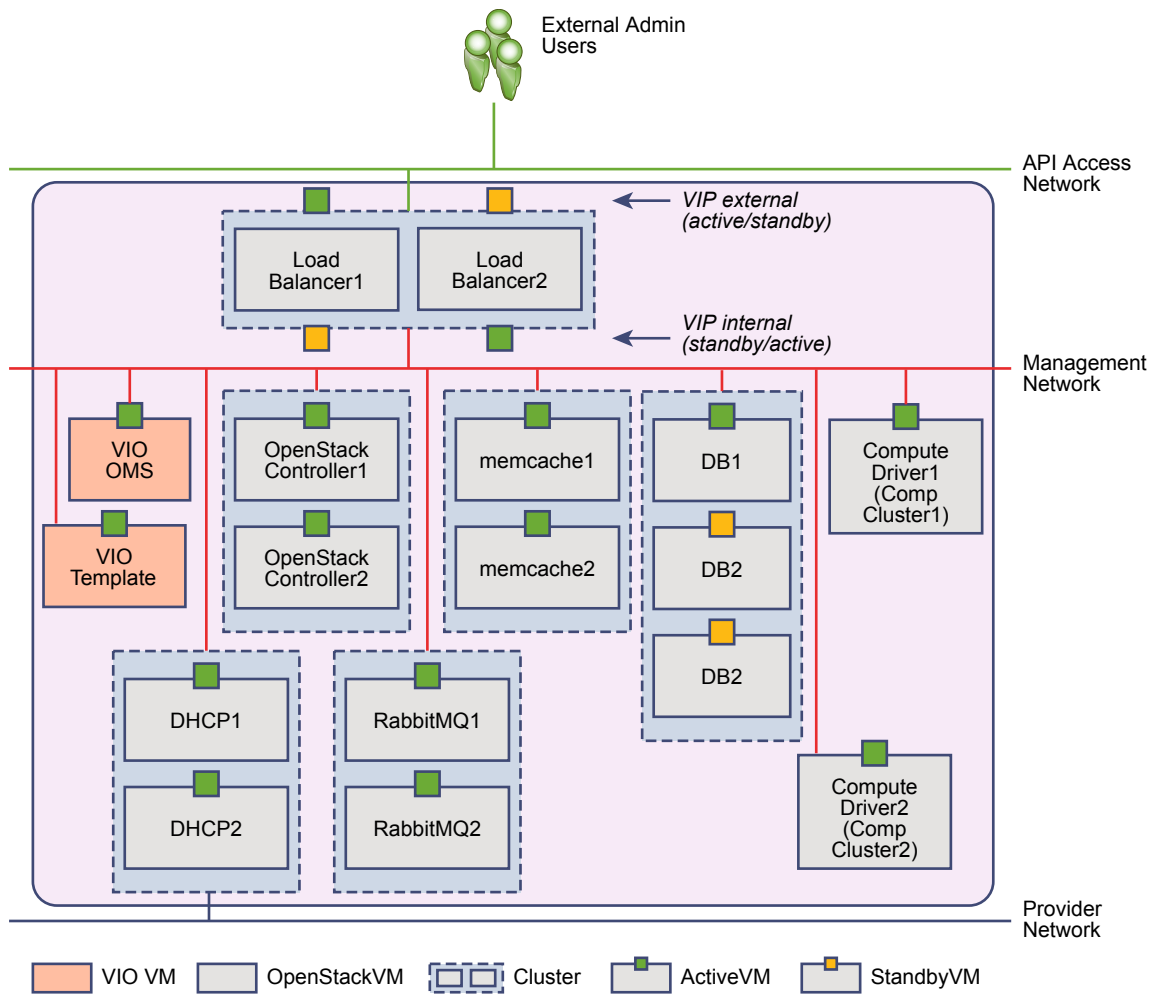
The VMware Integrated OpenStack architecture includes the following clusters and components.

Cluster or Component	Description
vCenter instance	Configure a vCenter dedicated to your VMware Integrated OpenStack deployment. This is not required but optimizes deployment.
Active Directory	For user authentication by the OpenStack Identity Service.
Management cluster	Contains all the deployed OpenStack component and management VMs. See the <a href="#">Management Cluster</a> below for a detailed description of the management cluster and its components.
Compute cluster	Compute resources for Nova. All tenant VMs are created on these compute clusters.
Management network	Carries traffic among the management components.
API access network	Exposes the VMware Integrated OpenStack dashboard and provides access for tenants to the OpenStack APIs and services.
Provider network	Connects the DHCP nodes in the management cluster with the compute clusters. See <a href="#">Management Cluster</a> below.

## Management Cluster

The Management Cluster contains all the deployed OpenStack component and management VMs.

The DHCP nodes in the VDS-based deployment architecture are the principal distinction from a VDS-based deployment architecture. The DHCP nodes manage the IP addresses for tenant VMs and connect them to the Provider network.



The management cluster contains the following components.

Component	Description	Nodes
Load Balancers	Provide HA and enable horizontal scale-out architecture.	2 (1 active, 1 standby)
Databases (DBs)	Instances of the MariaDB that store the OpenStack metadata.	3 (1 active, 2 standby)
VMware Integrated OpenStack Controller	Contains all the OpenStack services, including Compute, Block Storage, Image Service, Identity Service, and Object Storage.	2 (both active)
DHCP	Provide IP addresses to the instances connected to the Provider network.	2 (both active)
Memcache	Enables production-grade performance for the Identity Service.	2 (both active)
Rabbit MQ	The message queue service used by all OpenStack services.	2 (both active)
Compute Driver	Contains a subset of Compute processes that interact with the compute clusters to manage VMs.	1 per compute cluster
VMware Integrated OpenStack Manager Service (OMS)	The vApp that you use to manage your VMware Integrated OpenStack vApp.	1
VMware Integrated OpenStack Template	Template for redeploying failed OpenStack deployments. This template preserves the configuration settings to facilitate redeployment.	1

The DHCP nodes in the VDS-based deployment architecture are the principal distinction from a VDS-based deployment architecture. differs from that of an NSX-V-based deployment is the two DHCP VMs. These DHCP nodes manage the IP addresses for tenant VMs and connect them to the Provider network.

## VMware Integrated OpenStack System Requirements

Before you begin the VMware Integrated OpenStack deployment tasks, your system must comply with all hardware, software, networking, and storage requirements.

### Hardware Requirements for VDS Deployments

The hardware requirements are based on the number of VMs used for each component. For example, two VMs are used for load balancing, each of which requires two CPUs for a total requirement of four CPUs.

#### Core VMware Integrated OpenStack Components

Component	VMs	CPU	RAM (GB)	Disk Space (GB)
Integrated OpenStack Manager	1	2 (2 per VM)	4 (4 per VM)	25
Load balancing service	2	4 (2 per VM)	8 (4 per VM)	40 (20 per VM)
Database service	3	12 (4 per VM)	48 (16 per VM)	240 (80 per VM)
Memory cache service	2	4 (2 per VM)	32 (16 per VM)	40 (20 per VM)
Message queue service	2	8 (4 per VM)	32 (16 per VM)	40 (20 per VM)
Controllers	2	16 (8 per VM)	32 (16 per VM)	160 (80 per VM)
Compute service (Nova CPU)	1	2 (2 per VM)	4 (4 per VM)	20 (20 per VM)
DHCP service	2	8 (4 per VM)	32 (16 per VM)	40 (20 per VM)
TOTAL	15	56	192	605

### Software Requirements for VDS Deployments

Before you begin the VMware Integrated OpenStack deployment tasks, the software components must meet all of the version prerequisites for vSphere, ESXi hosts.

Requirement	Description
vSphere version	<ul style="list-style-type: none"> <li>■ vSphere 5.5 Update 2 Enterprise Plus</li> <li>■ vSphere 6 Enterprise Plus</li> </ul>
ESXi hosts	<ul style="list-style-type: none"> <li>■ Version 5.5 Update 2</li> <li>■ Eight or more logical processes on each host.</li> <li>■ The vCenter and all ESXi hosts intended for the VMware Integrated OpenStack deployment must use the same Network Time Protocol (NTP) server. For details about configuring NTP on ESX servers, see the VMware knowledge base article at <a href="http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&amp;cmd=displayKC&amp;externalId=1003063">http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&amp;cmd=displayKC&amp;externalId=1003063</a>.</li> <li>■ The ESXi host firewalls must be configured to allow gdbserver access. Typically, the port range is 5900-5964.</li> </ul>



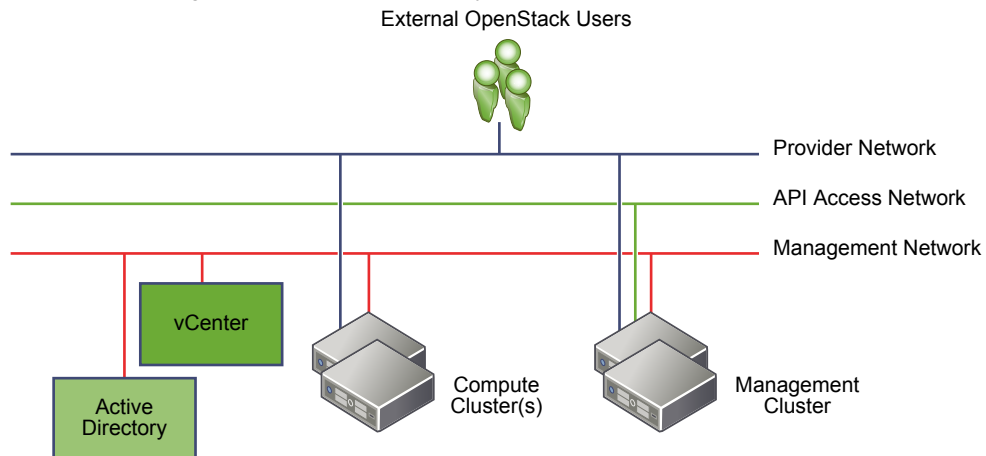
## Physical VDS Network Overview

A VMware Integrated OpenStack deployment with VDS networking requires three VLANs.

Request your network administrator to prepare the following VLANs.

VLAN	Description
API Access network	<p>The API Access network provide access for users to the OpenStack services through APIs or the VMware Integrated OpenStack dashboard .</p> <ul style="list-style-type: none"> <li>■ Trunk all hosts in the Management cluster to this VLAN.</li> <li>■ Make externally accessible.</li> <li>■ Requires 5 or more continuous IP addresses.</li> </ul>
Management network	<p>The Management network carries traffic among the management components.</p> <ul style="list-style-type: none"> <li>■ Trunk all hosts in the Management cluster to this VLAN.</li> <li>■ Trunk all hosts in the Compute cluster to this VLAN.</li> <li>■ The vCenter server needs to be connected to this network over L2 or L3.</li> <li>■ Requires 18 or more continuous IP addresses.</li> </ul>
Provider	<p>The Provider network connects DHCP services with the OpenStack instances in the Compute cluster.</p> <ul style="list-style-type: none"> <li>■ Trunk all hosts in the Management cluster to this VLAN.</li> <li>■ Trunk all hosts in the Compute cluster to this VLAN.</li> </ul>

**Figure 3-2.** VMware Integrated OpenStack VDS Physical Network





# Preparing the Dedicated vCenter Instance

---

# 4

Before you install and deploy VMware Integrated OpenStack, prepare your vCenter instance by setting up the necessary clusters, firewall, and network resources.

The procedure is different depending on whether you are using NSX-V or VDS for the Neutron networking component.

This chapter includes the following topics:

- [“Prepare the vCenter Instance for VDS Deployment,”](#) on page 19
- [“Prepare the vCenter Instance for NSX-V-Based Deployment,”](#) on page 20

## Prepare the vCenter Instance for VDS Deployment

Before you install and deploy VMware Integrated OpenStack, prepare your vCenter instance by setting up the necessary clusters, firewall, and network resources.

For details about working with vCenter Server, see the vSphere documentation.

For details about working with datacenters, see the vSphere documentation.

### Prerequisites

Verify that the required VLANs are configured. See [“Physical VDS Network Overview,”](#) on page 17.

### Procedure

- 1 (Optional) Configure a vCenter instance dedicated to your VMware Integrated OpenStack deployment.

A dedicated vCenter instance is not required but optimizes deployment.

- 2 Create a vCenter Server.
- 3 Define a datacenter in vCenter.
- 4 Create a vSphere Distributed Switch.
- 5 Create the Management cluster.

The management cluster contains VMware Integrated OpenStack management operations and the Integrated OpenStack Manager used to deploy and manage the Integrated OpenStack deployment.

- a Name the cluster.
- b Assign at least three hosts to the management cluster.
- c Attach one or more datastores to the management cluster to store images for the Image Service component.

- 6 Create the Compute cluster.
  - a Name the cluster.
  - b Assign at least one host to the compute cluster.
  - c Attach one or more datastores to each Compute cluster.
- 7 Configure all clusters with the following settings.

Option	Action
<b>VMware vSphere Distributed Resource Scheduler (DRS)</b>	Enable.
<b>Host Monitoring</b>	Enable.
<b>Admission Control</b>	Enable and set the policy. The default policy is to tolerate one host failure.
<b>Virtual machine restart policy</b>	Set to High.
<b>Virtual machine monitoring</b>	Set to virtual machine and Application Monitoring.
<b>Monitoring sensitivity</b>	Set to High.
<b>vMotion and Fault Tolerance Logging</b>	Enable.
<b>Hardware VT in the BIOS of all hosts in the cluster</b>	Enable.
<b>vMotion and Fault Tolerance Logging for the management network VMkernel port</b>	Enable.

- 8 Create a VDS, and add all hosts in the Management and Compute clusters to this VDS.
- 9 Create the Management port group on the VDS and tag it with the VLAN ID assigned to the Management network.
- 10 Create the API Access port group on the VDS and tag it with the VLAN ID assigned to the API Access network.

## Prepare the vCenter Instance for NSX-V -Based Deployment

Before you install and deploy VMware Integrated OpenStack, prepare your vCenter instance by setting up the necessary clusters, firewall, and network resources.

For details about working with vCenter Server, see the vSphere documentation at <http://pubs.vmware.com/vsphere-55/index.jsp#com.vmware.vsphere.install.doc/GUID-55F7FFDB-01B8-4C18-AA89-DC28BD9B1E9F.html>.

For details about working with datacenters, see the vSphere documentation at <http://pubs.vmware.com/vsphere-55/index.jsp#com.vmware.vsphere.vcenterhost.doc/GUID-7FDFBDBE-F8AC-4D00-AE5E-3F14D7472FAF.html>.

### Prerequisites

Verify that the required VLANs are configured. See “Physical NSX-V Network,” on page 11.

### Procedure

- 1 (Optional) Configure a vCenter instance dedicated to your VMware Integrated OpenStack deployment.  
A dedicated vCenter instance is not required but optimizes deployment.
- 2 Create a vCenter Server.
- 3 Define a datacenter in the vCenter instance.

## 4 Create the Management cluster.

The management cluster contains VMware Integrated OpenStack management operations and the Integrated OpenStack Manager used to deploy and manage the Integrated OpenStack deployment.

- a Name the cluster.
- b Assign at least three hosts to the management cluster.
- c Attach one or more datastores to the management cluster to store images for the Image Service component.

## 5 Create the Compute cluster.

- a Name the cluster.
- b Assign at least one host to the compute cluster.
- c Attach one or more datastores to each Compute cluster.

## 6 Create the Edge cluster.

The recommended architecture separates the NSX-V Edge nodes into a dedicated cluster to ensure optimal performance. NSX-V Edge nodes provide DHCP and support for routing, and floating IP addresses.

- a Name the cluster.
- b Assign at least one host to the Edge cluster.
- c Attach one or more datastores to the Edge cluster.

## 7 Configure all clusters with the following settings.

- Enable VMware vSphere Distributed Resource Scheduler (DRS).
- Enable Host Monitoring.
- Enable Admission Control and set the policy. The default policy is to tolerate one host failure.
- Set virtual machine restart policy to High.
- Set virtual machine monitoring to virtual machine and Application Monitoring.
- Set monitoring sensitivity to High.
- Enable vMotion and Fault Tolerance Logging.
- Enable Hardware VT enabled in the BIOS of all hosts in the cluster.
- Enable vMotion and Fault Tolerance Logging for the management network VMkernel port.

## 8 Create the Management VDS, and add all hosts in the Management cluster to this VDS.

## 9 Create the Edge VDS, and add all hosts in the Edge cluster to this VDS.

## 10 Create the Compute VDS, and add all hosts in the Compute cluster to this VDS.

## 11 Create a management port group on each VDS (Management, Edge, and Compute), and tag them with the VLAN ID assigned to the Management network.

## 12 Create the API Access port group on the Management VDS, and tag it with the VLAN ID assigned to the API Access network.

## 13 Create the External port group on the Edge VDS, and tag it with the VLAN ID assigned to the External network.



# Installing VMware Integrated OpenStack

# 5

To install VMware Integrated OpenStack, you must obtain and install the VMware Integrated OpenStack OVA package in vSphere. You use the Integrated OpenStack Manager to configure your OpenStack components.

This chapter includes the following topics:

- [“Deploy the VMware Integrated OpenStack OVA in the vSphere Web Client,”](#) on page 23
- [“Deploy a New OpenStack Instance by Using the Integrated OpenStack Manager,”](#) on page 24

## Deploy the VMware Integrated OpenStack OVA in the vSphere Web Client

Before you can install VMware Integrated OpenStack, you must deploy the VMware Integrated OpenStack OVA. The VMware Integrated OpenStack OVA installs the Integrated OpenStack Manager in the Inventories panel of the **Home** tab in your vSphere Web Client. The Integrated OpenStack Manager is the vApp through which you configure and implement an OpenStack cloud infrastructure integrated with your vSphere deployment.

### Prerequisites

Verify that your vSphere instance is correctly prepared. See [“Prepare the vCenter Instance for VDS Deployment,”](#) on page 19.

- Install and configure vSphere. See [“VMware Integrated OpenStack System Requirements,”](#) on page 9.
- Install the Client Integration plug-in for the vSphere Web Client. See the vSphere documentation at [http://pubs.vmware.com/vsphere-55/index.jsp?topic=%2Fcom.vmware.vsphere.vm\\_admin.doc%2FGUID-3FC8F86B-7F4A-450C-9D1F-0275E403F71C.html](http://pubs.vmware.com/vsphere-55/index.jsp?topic=%2Fcom.vmware.vsphere.vm_admin.doc%2FGUID-3FC8F86B-7F4A-450C-9D1F-0275E403F71C.html).
- Obtain the VMware Integrated OpenStack OVA from VMware.

---

**NOTE** The OVA requires 4 GB on your local disk.

---

### Procedure

- 1 Download the VMware Integrated OpenStack OVA file from the VMware Integrated OpenStack download page.
- 2 Login to the vSphere Web Client.
- 3 Go to the vCenter Hosts and Clusters view.
- 4 Choose the management cluster previously configured for the VMware Integrated OpenStack deployment.

- 5 Right-click the management cluster and select **Deploy OVF Template** from the pop-up menu.
- 6 Access the downloaded VMware Integrated OpenStack OVA.
- 7 Specify the destination and configure the OVA deployment.
  - a (Optional) Specify a name for the Integrated OpenStack Manager vApp.  
The only valid characters for the Integrated OpenStack Manager vApp names are alphanumeric and underscores. The vApp name must be fewer than 60 characters. When you choose the vApp name, also consider how you will name your clusters. Together the vApp and cluster names can have a maximum of 80 characters.
  - b Select the target datacenter created specifically for the VMware Integrated OpenStack OVA, and click **Next**.
  - c Select your storage options and click **Next**.
  - d To set up your networks, select the management port group for the OpenStack Manager Server and the previously configured management port group for the openstack-template Network 1 setting and click **Next**.
  - e Customize the deployment properties by configuring the management server properties.
- 8 Click **Next**.
- 9 Verify that the vApp can bind to the vService, and click **Next**.
- 10 Review the deployment settings and select **Power on after deployment**.
- 11 Click **Finish** to deploy the Integrated OpenStack Manager.

The Integrated OpenStack Manager icon now appears in the Home Inventories panel.

---

**NOTE** If the icon does not appear, log out of vCenter and log back in. The icon should appear.

---

### What to do next

Use the Integrated OpenStack Manager to deploy OpenStack services in your vSphere environment. See [“Deploy a New OpenStack Instance by Using the Integrated OpenStack Manager,”](#) on page 24.

## Deploy a New OpenStack Instance by Using the Integrated OpenStack Manager

You deploy the VMware Integrated OpenStack cloud by using the Integrated OpenStack Manager in your dedicated vCenter instance.

### Prerequisites

Verify that you have prepared the required clusters and networks. See [“Prepare the vCenter Instance for VDS Deployment,”](#) on page 19.

Verify that the Integrated OpenStack Manager OVA was correctly deployed. See [“Deploy the VMware Integrated OpenStack OVA in the vSphere Web Client,”](#) on page 23.

### Procedure

- 1 In the vSphere Web Client, select **Home > Inventories** and click the Integrated OpenStack Manager icon.
- 2 Click **Deploy OpenStack** in the lower panel to start the deployment wizard.



- 3 On the Deployment type page, select the type of deployment.

Option	Description
<b>Deploy a new OpenStack instance</b>	Deploys a new OpenStack instance.
<b>Deploy an OpenStack instance from template file</b>	Populates the deployment wizard with settings by using a template exported from a previous OpenStack instance. For example, if a previous deployment failed, you can export the configuration settings into a JSON file, then use that file as the template.

**NOTE** The rest of the procedure assumes this is a new OpenStack instance.

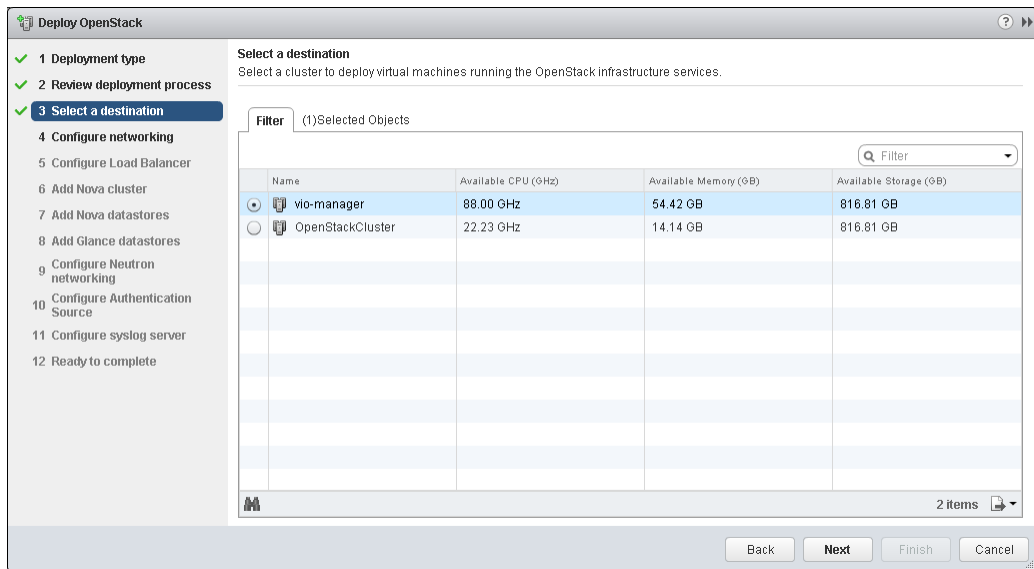
- 4 Click **Next**.
- 5 Review the deployment process and provide the administrative credentials for the vCenter instance, and click **Next**.

VMware Integrated OpenStack requires this authorization to access the vCenter instance for management services.

- 6 In the Select a destination screen, select the cluster for the OpenStack management components.

This is the Management cluster you created when you prepared the vCenter instance for the VMware Integrated OpenStack deployment.

**Figure 5-1.** Select the Management Cluster



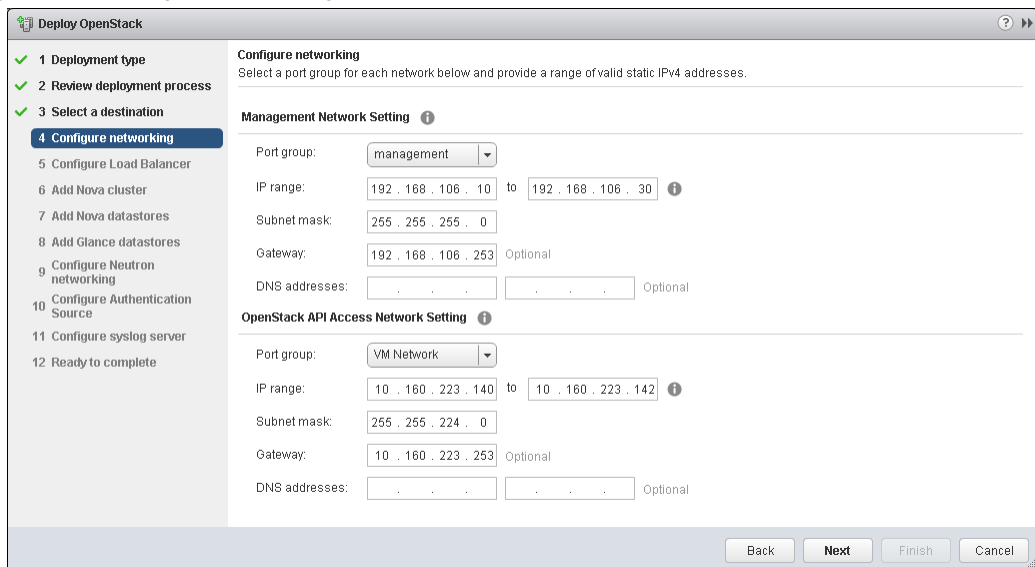
- 7 Click **Next**.

- In the Configure networking screen, provide the following settings for both the Management network and OpenStack API Access network.

You prepared the network settings and resources in advance. The Management network connects the VIO Manager and all OpenStack VMs with the vCenter Server. If applicable, all NSX-V Controller nodes also connect to this network. The API Access network is for user access to the OpenStack APIs and the OpenStack dashboard.

Setting	Description
<b>Port group</b>	Select the port group you configured in preparation for the VMware Integrated OpenStack deployment.
<b>IP range</b>	Specify the range of IP addresses as determined during the network preparation. The Management network requires a minimum of eighteen continuous IP addresses. The API Access network requires a minimum of five continuous IP addresses.
<b>Subnet mask</b>	Provide the subnet mask.
<b>Gateway</b>	Provide the gateway.
<b>DNS addresses</b>	Provide the addresses for the domain name servers.

**Figure 5-2.** Configure Networking



- Click **Next**.
- Provide the name and VIP settings for the load balancer service, and click **Next**.

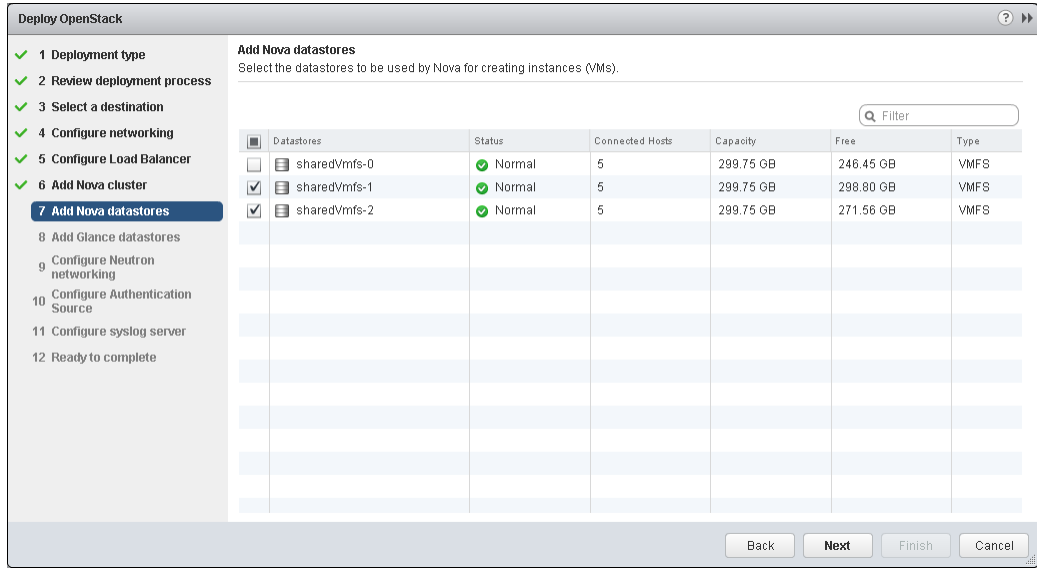
Option	Description
<b>Public Hostname</b>	FQDN value of the public VIP.
<b>Public Virtual IP</b>	Public VIP address.

**NOTE** The public VIP address for the load balancer VM also connects to the API Access network.

- Select the cluster for the Nova (Compute) component.  
This is the Compute cluster you created when you prepared the vCenter instance for the VMware Integrated OpenStack deployment.
- Click **Next**.

- 13 Select the datastores for the Nova (Compute) component to consume, and click **Next**.

**Figure 5-3. Add Nova Datastores**



- 14 Select the datastores for the Glance (Image Service) component to consume, and click **Next**.
- 15 Configure the Neutron (Network) component.

You can select either vSphere Distributed Switch Networking or NSX-V Networking.

**IMPORTANT** After deploying VMware Integrated OpenStack, you cannot change this selection. For example, if you choose the vSphere Distributed Switch Networking option, you cannot later upgrade or modify to an NSX-V configuration without redeploying.

Option	Action														
<b>vSphere Distributed Switch Networking</b>	Select the dedicated VDS you previously configured for the VMware Integrated OpenStack deployment. The port groups backing the provider networks will map to this VDS.														
<b>NSX-V Networking</b>	Complete the settings based on your NSX-V deployment. <table border="0" style="margin-left: 20px;"> <tr> <td><b>Manager Address</b></td> <td>IP address or FQDN of the NSX-V Manager.</td> </tr> <tr> <td><b>Username</b></td> <td>Username for the NSX-V Manager.</td> </tr> <tr> <td><b>Password</b></td> <td>Password for the NSX-V Manager.</td> </tr> <tr> <td><b>Transport Zone</b></td> <td>From the drop-down menu, select the Transport Zone that will carry traffic between OpenStack instances.</td> </tr> <tr> <td><b>Edge Cluster</b></td> <td>From the drop-down menu, select the cluster where the NSX-V Edge instances will be deployed.</td> </tr> <tr> <td><b>vSphere Distributed Switch</b></td> <td>From the drop-down menu, select the VDS from the NSX-V configuration.</td> </tr> <tr> <td><b>External Network</b></td> <td>From the drop-down menu, select the port group designated for the external network. Instances can be uplinked to this external network via a virtual router.</td> </tr> </table>	<b>Manager Address</b>	IP address or FQDN of the NSX-V Manager.	<b>Username</b>	Username for the NSX-V Manager.	<b>Password</b>	Password for the NSX-V Manager.	<b>Transport Zone</b>	From the drop-down menu, select the Transport Zone that will carry traffic between OpenStack instances.	<b>Edge Cluster</b>	From the drop-down menu, select the cluster where the NSX-V Edge instances will be deployed.	<b>vSphere Distributed Switch</b>	From the drop-down menu, select the VDS from the NSX-V configuration.	<b>External Network</b>	From the drop-down menu, select the port group designated for the external network. Instances can be uplinked to this external network via a virtual router.
<b>Manager Address</b>	IP address or FQDN of the NSX-V Manager.														
<b>Username</b>	Username for the NSX-V Manager.														
<b>Password</b>	Password for the NSX-V Manager.														
<b>Transport Zone</b>	From the drop-down menu, select the Transport Zone that will carry traffic between OpenStack instances.														
<b>Edge Cluster</b>	From the drop-down menu, select the cluster where the NSX-V Edge instances will be deployed.														
<b>vSphere Distributed Switch</b>	From the drop-down menu, select the VDS from the NSX-V configuration.														
<b>External Network</b>	From the drop-down menu, select the port group designated for the external network. Instances can be uplinked to this external network via a virtual router.														

- 16 Click **Next**.

17 Set the VMware Integrated OpenStack authentication source.

You can specify either Database or Active Directory as a LDAP Server.

- If you select the **Database** option, create and confirm the administrator credentials in the Setup OpenStack admin user panel. These are the credentials the OpenStack administrator will use to log into the VMware Integrated OpenStack dashboard.

Option	Description
<b>OpenStack admin user</b>	Define the OpenStack administrative user name. This is the default administrative user name for logging in to the VMware Integrated OpenStack dashboard.
<b>OpenStack admin password</b>	Define the OpenStack administrative user password. This is the default administrative user password for logging in to the VMware Integrated OpenStack dashboard.
<b>Confirm password</b>	Reenter the password for confirmation.

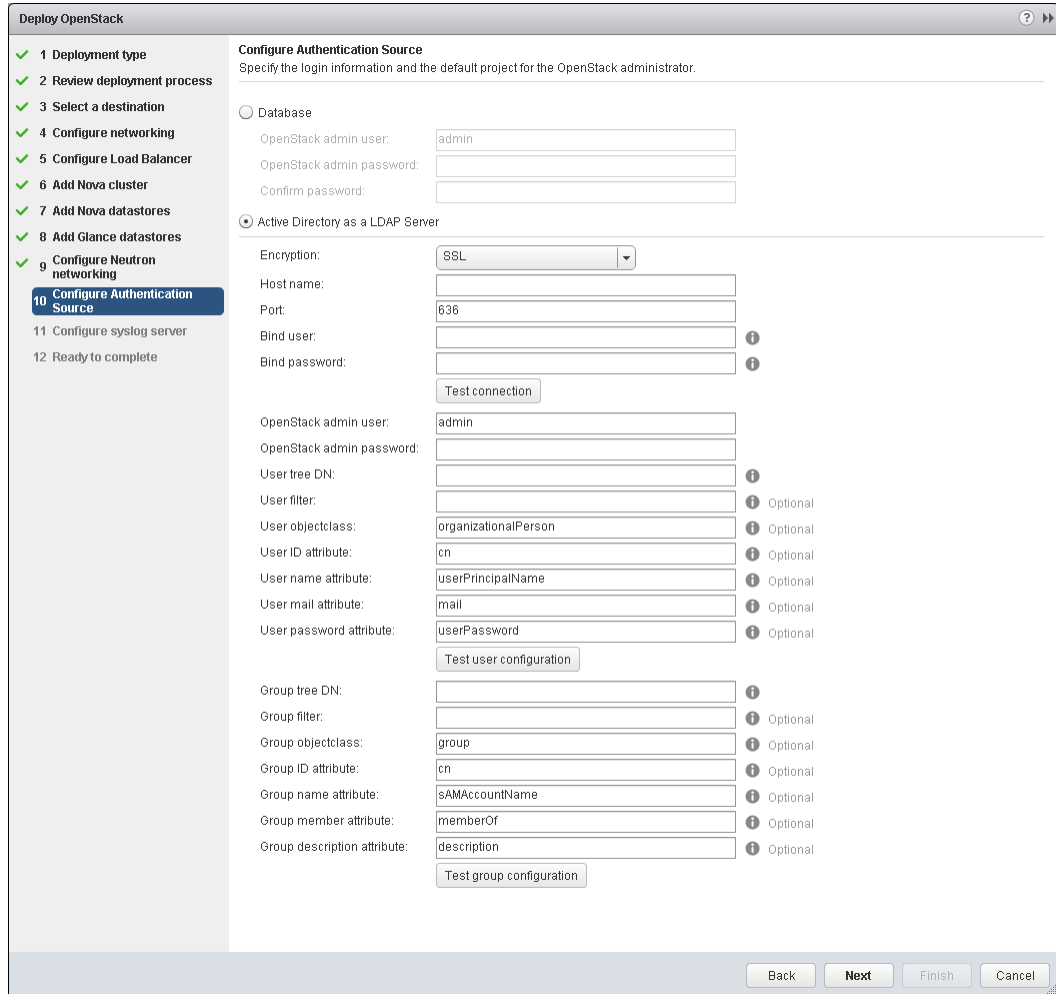
- If you select the **Active Directory as a LDAP Server** option, complete the LDAP server configuration, user query, and group query parameters. Each category includes a test button that enables you to validate your setting.

Category	Description														
<b>LDAP Server</b>	Complete the following parameters to establish the LDAP session. <table border="0" style="margin-left: 20px;"> <tr> <td><b>Encryption</b></td> <td>Select encryption type from the drop-down menu.</td> </tr> <tr> <td><b>Host name</b></td> <td>Provide the host name for the LDAP server.</td> </tr> <tr> <td><b>Port</b></td> <td>Specify the port on the host. The default is 636 for SSL.</td> </tr> <tr> <td><b>Bind user</b></td> <td>Provide the user name to allow the LDAP client access to the LDAP server.</td> </tr> <tr> <td><b>Bind password</b></td> <td>Provide the password to allow the LDAP client access to the LDAP server.</td> </tr> <tr> <td><b>Test connection</b></td> <td>Click to test the connection credentials. If the test fails, check the query values and try again.</td> </tr> </table>	<b>Encryption</b>	Select encryption type from the drop-down menu.	<b>Host name</b>	Provide the host name for the LDAP server.	<b>Port</b>	Specify the port on the host. The default is 636 for SSL.	<b>Bind user</b>	Provide the user name to allow the LDAP client access to the LDAP server.	<b>Bind password</b>	Provide the password to allow the LDAP client access to the LDAP server.	<b>Test connection</b>	Click to test the connection credentials. If the test fails, check the query values and try again.		
<b>Encryption</b>	Select encryption type from the drop-down menu.														
<b>Host name</b>	Provide the host name for the LDAP server.														
<b>Port</b>	Specify the port on the host. The default is 636 for SSL.														
<b>Bind user</b>	Provide the user name to allow the LDAP client access to the LDAP server.														
<b>Bind password</b>	Provide the password to allow the LDAP client access to the LDAP server.														
<b>Test connection</b>	Click to test the connection credentials. If the test fails, check the query values and try again.														
<b>User Query</b>	Provide the user query settings. <table border="0" style="margin-left: 20px;"> <tr> <td><b>OpenStack admin user</b></td> <td>Define the OpenStack administrative user name. This is the default administrative user name for logging in to the VMware Integrated OpenStack dashboard.</td> </tr> <tr> <td><b>OpenStack admin password</b></td> <td>Define the OpenStack administrative user password. This is the default administrative user password for logging in to the VMware Integrated OpenStack dashboard.</td> </tr> <tr> <td><b>User tree DN</b></td> <td>Search base for users.</td> </tr> <tr> <td><b>User filter</b></td> <td>LDAP search filter for users.</td> </tr> <tr> <td><b>User objectclass</b></td> <td>LDAP objectclass for users.</td> </tr> <tr> <td><b>User ID attribute</b></td> <td>LDAP attribute mapped to the user ID. This value must not be a multivalued attribute.</td> </tr> <tr> <td><b>User name attribute</b></td> <td>LDAP attribute mapped to the user name.</td> </tr> </table>	<b>OpenStack admin user</b>	Define the OpenStack administrative user name. This is the default administrative user name for logging in to the VMware Integrated OpenStack dashboard.	<b>OpenStack admin password</b>	Define the OpenStack administrative user password. This is the default administrative user password for logging in to the VMware Integrated OpenStack dashboard.	<b>User tree DN</b>	Search base for users.	<b>User filter</b>	LDAP search filter for users.	<b>User objectclass</b>	LDAP objectclass for users.	<b>User ID attribute</b>	LDAP attribute mapped to the user ID. This value must not be a multivalued attribute.	<b>User name attribute</b>	LDAP attribute mapped to the user name.
<b>OpenStack admin user</b>	Define the OpenStack administrative user name. This is the default administrative user name for logging in to the VMware Integrated OpenStack dashboard.														
<b>OpenStack admin password</b>	Define the OpenStack administrative user password. This is the default administrative user password for logging in to the VMware Integrated OpenStack dashboard.														
<b>User tree DN</b>	Search base for users.														
<b>User filter</b>	LDAP search filter for users.														
<b>User objectclass</b>	LDAP objectclass for users.														
<b>User ID attribute</b>	LDAP attribute mapped to the user ID. This value must not be a multivalued attribute.														
<b>User name attribute</b>	LDAP attribute mapped to the user name.														

Category	Description	
	<b>User mail attribute</b>	LDAP attribute mapped to the user email.
	<b>User password attribute</b>	LDAP attribute mapped to the user password.
	<b>Test user configuration</b>	Click to test the user query vlaues. If the test fails, check the query values and try again.
<b>Group Query</b>	Provide the group query settings.	
	<b>Group tree DN</b>	Search base for groups.
	<b>Group filter</b>	LDAP search filter for groups.
	<b>Group objectclass</b>	LDAP objectclass for groups.
	<b>Group ID attribute</b>	LDAP attribute mapped to the group ID.
	<b>Group name attribute</b>	LDAP attribute mapped to the group name.
	<b>Group member attribute</b>	LDAP attribute mapped to show group membership.

Category	Description
<b>Group description attribute</b>	LDAP attribute mapped to group description.
<b>Test group configuration</b>	Click to test the group query values. If the test fails, check the query values and try again.

**Figure 5-4.** Configuring Authentication

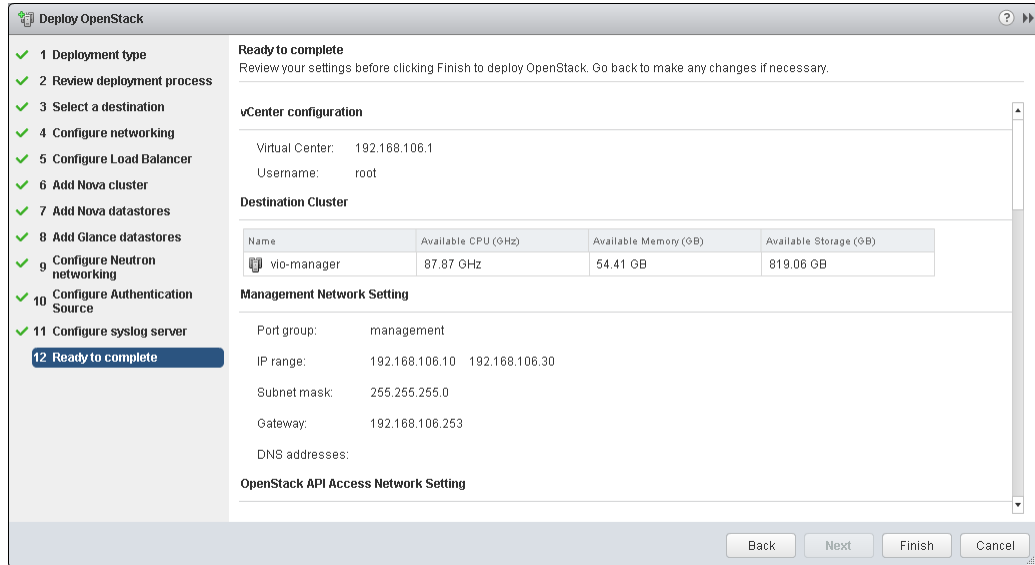


18 (Optional) Provide the IP address for the Log Insight server to configure the syslog server, and click **Next**.

19 Review the configuration settings, and click **Finish**.

The deployment process can take several minutes to complete.

Figure 5-5. Review Installation Configuration



- 20 Confirm that VMware Integrated OpenStack successfully deployed.
  - a In the vSphere Web Client, go to the **Home > Inventories** panel, click the VMware Integrated OpenStack icon.
  - b Expand the Inventory view and click OpenStack Deployments.  
The OpenStack Deployment tab shows the current status and if it is running.
  - c (Optional) Click the deployment name to view detailed status of each service node in the OpenStack deployment.
- 21 Confirm that you can access the VMware Integrated OpenStack dashboard.
  - a In a Web browser, navigate to the VMware Integrated OpenStack dashboard.  
The URL is the Public Virtual IP address configured the deployment process.
  - b Log in as administrator to the VMware Integrated OpenStack dashboard.  
The default administrative username and password were configured during the deployment process.

If the login is successful, VMware Integrated OpenStack was successfully deployed.

The Integrated OpenStack Manager implements the configuration to deploy your VMware Integrated OpenStack cloud. Optionally, you can review the deployment in vCenter by drilling down into the OpenStack Cluster.

### What to do next

You can add OpenStack components and datastores to your VMware Integrated OpenStack cloud deployment. See the *VMware Integrated OpenStack Administrator Guide*.

## Exclude the VMware Integrated OpenStack VMs from Firewall Protection

For NSX-V based deployments, you must exclude the VMware Integrated OpenStack management VMs from firewall protection to ensure the free flow of traffic.

NSX-V Manager, NSX-V Controller, and NSX-V Edge VMs are excluded from firewall protection. You must manually exclude the VMware Integrated OpenStack and vCenter server VMs by placing them in the Exclusion List to allow traffic to flow freely.

The cluster that contains vCenter Server can be protected by a firewall, but the vCenter Server must also be in the exclusion list to avoid connectivity issues.

For more information about the exclusion list, see the NSX-V product documentation.

### Procedure

- 1 In the vSphere Web Client, click **Networking & Security**.
- 2 In **Networking & Security Inventory**, click **NSX Managers**.
- 3 In the Name column, click the NSX-V Manager for VMware Integrated OpenStack.
- 4 Click the **Manage** tab and click the **Exclusion List** tab.
- 5 Click the **Add (+)** icon.
- 6 Select the OpenStack VMs in the Available Objects column and use the arrows buttons to move them to the Selected Objects column.
- 7 Click **OK** when you are finished.

If a VM has multiple vNICs, all of them are excluded from protection. If you add vNICs to a VM after it is added to the exclusion list, a firewall is deployed on the newly added vNICs. To exclude these vNICs from firewall protection, remove the VM from the exclusion list and add it back to the exclusion list.

## Create the Provider Network in OpenStack

For VMware Integrated OpenStack deployments that use VDS for networking, you must complete the deployment process by creating the Provider network in OpenStack.

### Prerequisites

Verify that VMware Integrated OpenStack was successfully deployed. You can do so by logging into the VMware Integrated OpenStack dashboard.

### Procedure

- 1 In a Web browser, navigate to the VMware Integrated OpenStack dashboard.  
The URL is the Public Virtual IP address configured the deployment process.
- 2 Log in as administrator.  
The default administrative username and password were configured during the deployment process.
- 3 Select the default admin project from the drop-down menu in the title bar.
- 4 Select **Admin > System Panel > Networks**.  
The Networks page lists the networks that are currently configured.
- 5 Click **Create Network**.
- 6 In the Create Network dialog box, configure the Provider network

Option	Description
<b>Name</b>	Enter a name for the network.
<b>Project</b>	Select the default admin project from the drop-down menu.
<b>Provider Network Type</b>	Select <b>VLAN</b> from the drop-down menu.
<b>Physical Network</b>	Enter <b>dvs</b> .
<b>Segmentation ID</b>	Enter the ID of the Provider VLAN. Contact your network administrator for this value.



- 7 Select the **Admin State** option.
- 8 Click **Create Network**.

The Provider network now appears on the Networks page. This completes the VMware Integrated OpenStack deployment process.



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