

MidoNet Quick Start Guide

for RHEL 7 / Kilo (OSP)

2015.06 (2015-11-30 09:31 UTC)



MidoNet Quick Start Guide for RHEL 7 / Kilo (OSP)

2015.06 (2015-11-30 09:31 UTC)

Copyright © 2015 Midokura SARL All rights reserved.

MidoNet is a network virtualization software for Infrastructure-as-a-Service (IaaS) clouds.

It decouples your IaaS cloud from your network hardware, creating an intelligent software abstraction layer between your end hosts and your physical network.

This guide walks through the minimum installation and configuration steps necessary to use MidoNet with OpenStack.



Note

Please consult the [MidoNet Mailing Lists or Chat](#) if you need assistance.

Licensed under the Apache License, Version 2.0 (the "License"); you may not use this file except in compliance with the License. You may obtain a copy of the License at

<http://www.apache.org/licenses/LICENSE-2.0>

Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

Table of Contents

| | |
|--|----|
| Preface | iv |
| Conventions | iv |
| 1. Architecture | 1 |
| Hosts and Services | 2 |
| 2. Basic Environment Configuration | 4 |
| Networking Configuration | 4 |
| SELinux Configuration | 4 |
| Repository Configuration | 4 |
| 3. OpenStack Installation | 6 |
| Identity Service (Keystone) | 6 |
| Compute Services (Nova) | 6 |
| Networking Services (Neutron) | 10 |
| 4. MidoNet Installation | 16 |
| NSDB Nodes | 16 |
| Controller Node | 19 |
| Midolman Installation | 21 |
| MidoNet Host Registration | 22 |
| 5. Initial Network Configuration | 24 |
| 6. BGP Uplink Configuration | 25 |
| 7. Further Steps | 29 |

Preface

Conventions

The MidoNet documentation uses several typesetting conventions.

Notices

Notices take these forms:



Note

A handy tip or reminder.



Important

Something you must be aware of before proceeding.



Warning

Critical information about the risk of data loss or security issues.

Command prompts

\$ prompt

Any user, including the root user, can run commands that are prefixed with the \$ prompt.

prompt

The root user must run commands that are prefixed with the # prompt. You can also prefix these commands with the **sudo** command, if available, to run them.

1. Architecture

Table of Contents

| | |
|--------------------------|---|
| Hosts and Services | 2 |
|--------------------------|---|

This guide assumes the following example system architecture.

OpenStack Controller Node:

- Controller Node (**controller**)

Compute Node:

- Compute Node (**compute1**)

Since MidoNet is a distributed system, it does not have the concept of a Network Node as being used with the default OpenStack networking plugin. Instead it uses two or more Gateway Nodes that utilize [Quagga](#) to provide connectivity to external networks via the Border Gateway Protocol (BGP).

- Gateway Node 1 (**gateway1**)
- Gateway Node 2 (**gateway2**)

Three or more hosts are being used for the MidoNet Network State Database (NSDB) cluster which utilizes [ZooKeeper](#) and [Cassandra](#) to store virtual network topology and connection state information:

- NSDB Node 1 (**nsdb1**)
- NSDB Node 2 (**nsdb2**)
- NSDB Node 3 (**nsdb3**)



Important

Ideally, both the ZooKeeper transaction log and Cassandra data files need their own dedicated disks, with additional disks for other services on the host. However, for small POCs and small deployments, it is ok to share the Cassandra disk with other services and just leave the ZooKeeper transaction log on its own.

The *MidoNet Agent (Midolman)* has to be installed on all nodes where traffic enters or leaves the virtual topology. In this guide this are the **controller**, **gateway1**, **gateway2** and **compute1** hosts.

The *Midonet API* can be installed on a separate host, but this guide assumes it to be installed on the **controller** host.

The *Midonet Command Line Interface (CLI)* can be installed on any host that has connectivity to the MidoNet API. This guide assumes it to be installed on the **controller** host.

The *Midonet Neutron Plugin* replaces the ML2 Plugin and has to be installed on the **controller**.

Hosts and Services

Controller Node (controller)

- General
 - Database (MariaDB)
 - Message Broker (RabbitMQ)
- OpenStack
 - Identity Service (Keystone)
 - Image Service (Glance)
 - Compute (Nova)
 - Networking (Neutron)
 - Neutron Server
 - DHCP Agent
 - Metadata Agent
 - Dashboard (Horizon)
- MidoNet
 - API
 - CLI
 - Neutron Plugin

Compute Node (compute1)

- OpenStack
 - Compute (Nova)
 - Networking (Neutron)
- MidoNet
 - Agent (Midolman)

NSDB Nodes (nsdb1, nsdb2, nsdb3)

- Network State Database (NSDB)
 - Network Topology (ZooKeeper)
 - Network State Information (Cassandra)

Gateway Nodes (gateway1, gateway2)

- BGP Daemon (Quagga)

- MidoNet
 - Agent (Midolman)

2. Basic Environment Configuration

Table of Contents

| | |
|--------------------------------|---|
| Networking Configuration | 4 |
| SELinux Configuration | 4 |
| Repository Configuration | 4 |

Networking Configuration



Important

All hostnames must be resolvable, either via DNS or locally.

This guide assumes that you follow the instructions in [OpenStack Networking \(neutron\)](#) of the OpenStack Documentation.

SELinux Configuration



Important

This guide assumes that SELinux (if installed) is either in permissive state or disabled.

To change the mode, execute the following command:

```
# setenforce Permissive
```

To permanently change the SELinux configuration, edit the `/etc/selinux/config` file accordingly:

```
SELINUX=permissive
```

Repository Configuration

Configure necessary software repositories and update installed packages.

1. Enable Red Hat base repository

```
# subscription-manager repos --enable=rhel-7-server-rpms
```

2. Enable Red Hat OSP repository

```
# subscription-manager repos --enable=rhel-7-server-openstack-7.0-rpms
```

3. Enable DataStax repository

Create the `/etc/yum.repos.d/datastax.repo` file and edit it to contain the following:

```
# DataStax (Apache Cassandra)
[datastax]
name = DataStax Repo for Apache Cassandra
```



```
baseurl = http://rpm.datastax.com/community
enabled = 1
gpgcheck = 1
gpgkey = https://rpm.datastax.com/rpm/repo_key
```

4. Enable MidoNet repositories

Create the `/etc/yum.repos.d/midonet.repo` file and edit it to contain the following:

```
[midonet]
name=MidoNet
baseurl=http://repo.midonet.org/midonet/v2015.06/RHEL/7/stable/
enabled=1
gpgcheck=1
gpgkey=http://repo.midonet.org/RPM-GPG-KEY-midokura

[midonet-openstack-integration]
name=MidoNet OpenStack Integration
baseurl=http://repo.midonet.org/openstack-kilo/RHEL/7/stable/
enabled=1
gpgcheck=1
gpgkey=http://repo.midonet.org/RPM-GPG-KEY-midokura

[midonet-misc]
name=MidoNet 3rd Party Tools and Libraries
baseurl=http://repo.midonet.org/misc/RHEL/7/misc/
enabled=1
gpgcheck=1
gpgkey=http://repo.midonet.org/RPM-GPG-KEY-midokura
```

5. Install available updates

```
# yum clean all
# yum upgrade
```

6. If necessary, reboot the system

```
# reboot
```

3. OpenStack Installation

Table of Contents

| | |
|-------------------------------------|----|
| Identity Service (Keystone) | 6 |
| Compute Services (Nova) | 6 |
| Networking Services (Neutron) | 10 |



Important

Follow the [Installation Reference](#) documentation, but **note the following differences**.

Identity Service (Keystone)



Important

Follow the Red Hat documentation's [Chapter 3. Install The Identity Service](#) instructions, but **note the following additions**.

1. Create MidoNet API Service

As Keystone admin, execute the following command:

```
$ keystone service-create --name midonet --type midonet --description  
"MidoNet API Service"
```

2. Create MidoNet Administrative User

As Keystone admin, execute the following commands:

```
$ keystone user-create --name midonet --pass MIDONET_PASS --tenant  
services  
$ keystone user-role-add --user midonet --role admin --tenant services
```

Compute Services (Nova)



Important

Follow the Red Hat documentation's [Chapter 8. Install The Compute Service](#) instructions, but **note the following differences**.

Controller Node



Important

Follow the Red Hat documentation's [8.2. Install a Compute Node](#) instructions, but **note the following differences and additions**.

1. 8.2.1. Install the Compute Service Packages

Do **not** apply as is.

Instead, install only the following packages:

```
# yum install openstack-nova-api openstack-nova-conductor openstack-  
nova-scheduler python-cinderclient
```



Note

The `openstack-nova-compute` package is going to be installed on the Compute Node instead.

2. 8.2.2. Create the Compute Service Database

Apply as is.

3. 8.2.3. Configure the Compute Service Database Connection

Apply as is.

4. 8.2.4. Create the Compute Service Identity Records

Apply as is.

5. 8.2.5. Configure Compute Service Authentication

Apply as is.

6. 8.2.6. Configure the Firewall to Allow Compute Service Traffic

Apply as is.

7. 8.2.7. Configure the Compute Service to Use SSL

Apply as is.

8. 8.2.8. Configure RabbitMQ Message Broker Settings for the Compute Service

Apply as is.

9. 8.2.9. Enable SSL Communication Between the Compute Service and the Message Broker

Apply as is.

10. 8.2.10. Configure Resource Overcommitment

Apply as is.

11. 8.2.11. Reserve Host Resources

Apply as is.

12. 8.2.12. Configure Compute Networking

Apply as is, except the following topics:

a. 8.2.12.3. Configure the L2 Agent

Do not apply.

b. 8.2.12.4. Configure Virtual Interface Plugging

Configure the generic VIF driver.

13.8.2.13. Populate the Compute Service Database

Apply as is.

14.8.2.14. Launch the Compute Services

a. 1. Starting the Message Bus Service

Do **not** apply. Only required on the Compute Node.

b. 2. Starting the Libvirtd Service

Do **not** apply. Only required on the Compute Node.

c. 3. Starting the API Service

Apply as is.

d. 4. Starting the Scheduler

Apply as is.

e. 5. Starting the Conductor

Apply as is.

f. 6. Starting the Compute Service

Do **not** apply. Only required on the Compute Node.

Compute Node



Important

Follow the Red Hat documentation's [8.2. Install a Compute Node](#) instructions, but **note the following differences and additions**.

1. 8.2.1. Install the Compute Service Packages

Do **not** apply as is.

Instead, install only the following packages:

```
# yum install openstack-nova-compute openstack-utils
```

2. 8.2.2. Create the Compute Service Database

Do **not** apply. Has been done on the Controller Node.

3. 8.2.3. Configure the Compute Service Database Connection

Apply as is.

4. 8.2.4. Create the Compute Service Identity Records

Do **not** apply. Has been done on the Controller Node.

1. 8.2.5. Configure Compute Service Authentication

Apply as is.

1. 8.2.6. Configure the Firewall to Allow Compute Service Traffic

Apply as is.

2. 8.2.7. Configure the Compute Service to Use SSL

Apply as is.

3. 8.2.8. Configure RabbitMQ Message Broker Settings for the Compute Service

Apply as is.

4. 8.2.9. Enable SSL Communication Between the Compute Service and the Message Broker

Apply as is.

5. 8.2.10. Configure Resource Overcommitment

Apply as is.

6. 8.2.11. Reserve Host Resources

Apply as is.

7. 8.2.12. Configure Compute Networking

Apply as is, except the following topics:

a. 8.2.12.3. Configure the L2 Agent

Do not apply.

b. 8.2.12.4. Configure Virtual Interface Plugging

Do not apply.



Note

Use the same `METADATA_SECRET` as in the [Metadata Proxy configuration](#).

8. 8.2.13. Populate the Compute Service Database

Do not apply. Has been done on the Controller Node.

9. 8.2.14. Launch the Compute Services

a. 1. Starting the Message Bus Service

Apply as is.

b. 2. Starting the Libvirtd Service

Apply as is.

c. **3. Starting the API Service**

Do **not** apply. Only required on the Controller Node.

d. **4. Starting the Scheduler**

Do **not** apply. Only required on the Controller Node.

e. **5. Starting the Conductor**

Do **not** apply. Only required on the Controller Node.

f. **6. Starting the Compute Service**

Apply as is.

10 Additionally, perform the following steps

a. **Configure libvirt**

Edit the `/etc/libvirt/qemu.conf` file to contain the following:

```
user = "root"
group = "root"

cgroup_device_acl = [
    "/dev/null", "/dev/full", "/dev/zero",
    "/dev/random", "/dev/urandom",
    "/dev/ptmx", "/dev/kvm", "/dev/kqemu",
    "/dev/rtc", "/dev/hpet", "/dev/vfio/vfio",
    "/dev/net/tun"
]
```

b. **Restart the libvirt service**

```
# systemctl restart libvirtd.service
```

c. **Install nova-rootwrap network filters**

```
# yum install openstack-nova-network
# systemctl disable openstack-nova-network.service
```

d. **Restart the Compute service**

```
# systemctl restart openstack-nova-compute.service
```

Networking Services (Neutron)

Controller Node



Important

Follow the Red Hat documentation's [Chapter 7. Install OpenStack Networking](#) instructions, but **note the following differences**.

1. 7.1. Install the OpenStack Networking Packages

Do **not** apply as is.

Instead, install the following packages:

```
# yum install openstack-neutron openstack-utils openstack-selinux  
python-neutron-plugin-midonet
```

2. 7.2.1. Set the OpenStack Networking Plug-in

Do not apply. Instead, perform the following steps:

- a. Edit the `/etc/neutron/neutron.conf` file and add the following keys to the `[DEFAULT]` section:

```
[DEFAULT]  
...  
core_plugin = neutron.plugins.midonet.plugin.MidonetPluginV2  
allow_overlapping_ips = True
```

- b. Create the directory for the MidoNet plugin:

```
mkdir /etc/neutron/plugins/midonet
```

- c. Create the `/etc/neutron/plugins/midonet/midonet.ini` file and edit it to contain the following:

```
[DATABASE]  
sql_connection = mysql://neutron:NEUTRON_DBPASS@controller/neutron  
  
[MIDONET]  
# MidoNet API URL  
midonet_uri = http://controller:8080/midonet-api  
# MidoNet administrative user in Keystone  
username = midonet  
password = MIDONET_PASS  
# MidoNet administrative user's tenant  
project_id = services
```

- d. Create a symbolic link to direct Neutron to the MidoNet configuration:

```
# ln -s /etc/neutron/plugins/midonet/midonet.ini /etc/neutron/plugin.  
ini
```

3. 7.2.2. Create the OpenStack Networking Database

Do not apply.

Instead, create the database as follows:

```
$ mysql -u root -p  
CREATE DATABASE neutron character set utf8;  
GRANT ALL PRIVILEGES ON neutron.* TO 'neutron'@'localhost' IDENTIFIED BY  
'NEUTRON_DBPASS';  
GRANT ALL PRIVILEGES ON neutron.* TO 'neutron'@'%' IDENTIFIED BY  
'NEUTRON_DBPASS';  
FLUSH PRIVILEGES;  
quit
```

Afterwards, run the `neutron-db-manage` command:

```
# neutron-db-manage \  
--config-file /usr/share/neutron/neutron-dist.conf \  
--config-file /etc/neutron/neutron.conf \  
--config-file /etc/neutron/plugin.ini \  
upgrade head
```

4. 7.2.3. Configure the OpenStack Networking Database Connection

Apply as is.

5. 7.2.4. Create the OpenStack Networking Identity Records

Apply as is.

6. 7.2.5. Configure OpenStack Networking Authentication

Apply as is.

7. 7.2.6. Configure the Firewall to Allow OpenStack Networking Traffic

Apply as is.

8. 7.2.7. Configure RabbitMQ Message Broker Settings for OpenStack Networking

Apply as is.

9. 7.2.8. Enable SSL Communication Between OpenStack Networking and the Message Broker

Apply as is.

10. 7.2.9. Configure OpenStack Networking to Communicate with the Compute Service

Apply as is.

11. Configure Load-Balancer-as-a-Service (LBaaS)

Additionally to the Red Hat Installation Guide, configure Load-Balancer-as-a-Service (LBaaS) as described in [the section called "Configure Load-Balancer-as-a-Service \(LBaaS\)" \[13\]](#).

12. 7.2.10. Launch OpenStack Networking

Apply as is.

13. 7.3. Configure the DHCP Agent

See [the section called "DHCP Agent" \[13\]](#) for details about the DHCP Agent installation.

14. 7.4. Create an External Network

Do **not** apply.

Instead, create the Neutron networks after the OpenStack and MidoNet installation is completed.

Any networks that are created before the MidoNet plug-in is active will not be visible to MidoNet.

15. 7.5. Configure the Plug-in Agent

Do **not** apply.

16. 7.6. Configure the L3 Agent

See [the section called “Metadata Agent” \[14\]](#) for details about the Metadata Agent installation.

Configure Load-Balancer-as-a-Service (LBaaS)

1. Install Neutron Load-Balancing-as-a-Service

```
# yum install python-neutron-lbaas
```

2. Enable the MidoNet driver

Enable the MidoNet driver by using the `service_provider` option in the `/etc/neutron/neutron.conf` file:

```
[service_providers]
service_provider = LOADBALANCER:Midonet:midonet.neutron.services.
loadbalancer.driver.MidonetLoadbalancerDriver:default
```

3. Enable the LBaaS plug-in

Enable the LBaaS plug-in by using the `service_plugins` option in the `/etc/neutron/neutron.conf` file:

```
service_plugins = lbaas
```

4. Enable load balancing in the dashboard

Change the `enable_lb` option to `True` in the `/etc/openstack-dashboard/local_settings` file:

```
OPENSTACK_NEUTRON_NETWORK = {
    'enable_lb': True,
    ...
}
```

5. To finalize installation

Finalize the installation as described in [Neutron Controller Node Installation](#).

DHCP Agent



Note

Since MidoNet does not have the concept of a Network Node like with the default OpenStack networking plugin, the DHCP Agent is going to be installed on the Controller Node.



Important

Follow the Red Hat documentation's [7.3. Configure the DHCP Agent](#) instructions, but **note the following differences and additions**.

1. Configuring Authentication

Apply as is.

2. Configuring the Interface Driver

Do not apply.

Instead, edit the `/etc/neutron/dhcp_agent.ini` file to contain the following:

```
[DEFAULT]
interface_driver = neutron.agent.linux.interface.MidoNetInterfaceDriver
dhcp_driver = midonet.neutron.agent.midoNet_driver.DhcpNoOpDriver
use_namespaces = True
enable_isolated_metadata = True

[MIDONET]
# MidoNet API URL
midoNet_uri = http://controller:8080/midoNet-api
# MidoNet administrative user in Keystone
username = midoNet
password = MIDONET_PASS
# MidoNet administrative user's tenant
project_id = services
```

3. Starting the DHCP Agent

Apply as is.

Metadata Agent



Note

Since MidoNet does not have the concept of a Network Node like with the default OpenStack networking plugin, the Metadata Agent is going to be installed on the Controller Node.



Important

Follow the Red Hat documentation's [7.6. Configuring the L3 Agent](#) instructions, but **note the following differences**.

1. Configuring Authentication

Apply as is.

2. Configuring the Interface Driver

Do not apply.

3. Configuring External Network Access

Do not apply.

4. Starting the L3 Agent

Do not apply.

5. Starting the Metadata Agent

Apply as is.

6. Enable leastrouter scheduling

Do not apply.

1. Additional changes

Edit the `/etc/neutron/metadata_agent.ini` file to contain the following:

```
[DEFAULT]
[...]
nova_metadata_ip = controller
metadata_proxy_shared_secret = METADATA_SECRET
```



Note

Use the same **METADATA_SECRET** as in the [Nova configuration](#).

Restart the Metadata Agent:

```
# systemctl restart neutron-metadata-agent.service
```

4. MidoNet Installation

Table of Contents

| | |
|---------------------------------|----|
| NSDB Nodes | 16 |
| Controller Node | 19 |
| Midolman Installation | 21 |
| MidoNet Host Registration | 22 |

NSDB Nodes

ZooKeeper Installation

1. Install ZooKeeper packages

```
# yum install java-1.7.0-openjdk
# yum install zookeeper zkdump nmap-ncat
```

2. Configure ZooKeeper

a. Common Configuration

Edit the `/etc/zookeeper/zoo.cfg` file to contain the following:

```
server.1=nsdb1:2888:3888
server.2=nsdb2:2888:3888
server.3=nsdb3:2888:3888
```

Create data directory:

```
# mkdir /var/lib/zookeeper/data
# chown zookeeper:zookeeper /var/lib/zookeeper/data
```



Important

For production deployments it is recommended to configure the storage of snapshots in a different disk than the commit log. This can be set by changing the parameter `dataDir` in `zoo.cfg` to a different disk.

b. Node-specific Configuration

i. NSDB Node 1

Create the `/var/lib/zookeeper/data/myid` file and edit it to contain the host's ID:

```
# echo 1 > /var/lib/zookeeper/data/myid
```

ii. NSDB Node 2

Create the `/var/lib/zookeeper/data/myid` file and edit it to contain the host's ID:

```
# echo 2 > /var/lib/zookeeper/data/myid
```

iii. NSDB Node 3

Create the `/var/lib/zookeeper/data/myid` file and edit it to contain the host's ID:

```
# echo 3 > /var/lib/zookeeper/data/myid
```

3. Create Java Symlink

```
# mkdir -p /usr/java/default/bin/  
# ln -s /usr/lib/jvm/jre-1.7.0-openjdk/bin/java /usr/java/default/bin/  
java
```

4. Enable and start ZooKeeper

```
# systemctl enable zookeeper.service  
# systemctl start zookeeper.service
```

5. Verify ZooKeeper Operation

After installation of all nodes has been completed, verify that ZooKeeper is operating properly.

A basic check can be done by executing the `ruok` (Are you ok?) command on all nodes. This will reply with `imok` (I am ok.) if the server is running in a non-error state:

```
$ echo ruok | nc 127.0.0.1 2181  
imok
```

More detailed information can be requested with the `stat` command, which lists statistics about performance and connected clients:

```
$ echo stat | nc 127.0.0.1 2181  
Zookeeper version: 3.4.5--1, built on 06/10/2013 17:26 GMT  
Clients:  
 /127.0.0.1:34768[0](queued=0,recved=1,sent=0)  
 /192.0.2.1:49703[1](queued=0,recved=1053,sent=1053)  
  
Latency min/avg/max: 0/4/255  
Received: 1055  
Sent: 1054  
Connections: 2  
Outstanding: 0  
Zxid: 0x260000013d  
Mode: follower  
Node count: 3647
```

Cassandra Installation

1. Install Cassandra packages

```
# yum install java-1.7.0-openjdk  
# yum install dsc20
```

2. Configure Cassandra

a. Common Configuration

Edit the `/etc/cassandra/conf/cassandra.yaml` file to contain the following:

```
# The name of the cluster.
```

```
cluster_name: 'midonet'

...

# Addresses of hosts that are deemed contact points.
seed_provider:
  - class_name: org.apache.cassandra.locator.SimpleSeedProvider
    parameters:
      - seeds: "nsdb1,nsdb2,nsdb3"
```

b. Node-specific Configuration

i. NSDB Node 1

Edit the `/etc/cassandra/conf/cassandra.yaml` file to contain the following:

```
# Address to bind to and tell other Cassandra nodes to connect to.
listen_address: nsdb1

...

# The address to bind the Thrift RPC service.
rpc_address: nsdb1
```

ii. NSDB Node 2

Edit the `/etc/cassandra/conf/cassandra.yaml` file to contain the following:

```
# Address to bind to and tell other Cassandra nodes to connect to.
listen_address: nsdb2

...

# The address to bind the Thrift RPC service.
rpc_address: nsdb2
```

iii. NSDB Node 3

Edit the `/etc/cassandra/conf/cassandra.yaml` file to contain the following:

```
# Address to bind to and tell other Cassandra nodes to connect to.
listen_address: nsdb3

...

# The address to bind the Thrift RPC service.
rpc_address: nsdb3
```

3. Edit the service's init script

On installation, the `/var/run/cassandra` directory is created, but because it is located on a temporary file system it will be lost after system reboot. As a result it is not possible to stop or restart the Cassandra service anymore.

To avoid this, edit the `/etc/init.d/cassandra` file to create the directory on service start:

```
[...]
case "$1" in
  start)
```

```
# Cassandra startup
echo -n "Starting Cassandra: "
mkdir -p /var/run/cassandra
chown cassandra:cassandra /var/run/cassandra
su $CASSANDRA_OWNRR -c "$CASSANDRA_PROG -p $pid_file" > $log_file
2>&1
retval=$?
[...]
```

4. Enable and start Cassandra

```
# systemctl enable cassandra.service
# systemctl start cassandra.service
```

5. Verify Cassandra Operation

After installation of all nodes has been completed, verify that Cassandra is operating properly.



Important

If Cassandra fails to start and prints a "buffer overflow" error message in its log file, you may try associating 127.0.0.1 with the hostname in `etc/hosts` (so that `hostname -i` will show 127.0.0.1). This may solve the Cassandra start problem.

A basic check can be done by executing the `nodetool status` command. This will reply with `UN` (Up / Normal) in the first column if the servers are running in a non-error state:

```
$ nodetool -host 127.0.0.1 status
[...]
Status=Up/Down
|/ State=Normal/Leaving/Joining/Moving
-- Address      Load          Tokens      Owns    Host ID
   Rack
UN  192.0.2.1    123.45 KB    256         33.3%
    11111111-2222-3333-4444-555555555555  rack1
UN  192.0.2.2    234.56 KB    256         33.3%
    22222222-3333-4444-5555-666666666666  rack1
UN  192.0.2.3    345.67 KB    256         33.4%
    33333333-4444-5555-6666-777777777777  rack1
```

Controller Node

MidoNet API Installation

1. Install MidoNet API package

```
# yum install midonet-api
```

2. Configure MidoNet API

Edit the `/usr/share/midonet-api/WEB-INF/web.xml` file to contain the following:

```
<context-param>
  <param-name>rest_api-base_uri</param-name>
  <param-value>http://controller:8080/midonet-api</param-value>
</context-param>
```

```
<context-param>
  <param-name>keystone-service_host</param-name>
  <param-value>controller</param-value>
</context-param>
```

```
<context-param>
  <param-name>keystone-admin_token</param-name>
  <param-value>ADMIN_TOKEN</param-value>
</context-param>
```

```
<context-param>
  <param-name>zookeeper-zookeeper_hosts</param-name>
  <param-value>nsdb1:2181,nsdb2:2181,nsdb3:2181</param-value>
</context-param>
```

```
<context-param>
  <param-name>midocluster-properties_file</param-name>
  <param-value>/var/lib/tomcat/webapps/host_uuid.properties</param-
value>
</context-param>
```

3. Install Tomcat package

```
# yum install tomcat
```

4. Configure Tomcat's Maximum HTTP Header Size

Edit the `/etc/tomcat/server.xml` file and adjust the maximum header size for the HTTP connector:

```
<Connector port="8080" protocol="HTTP/1.1"
  connectionTimeout="20000"
  URIEncoding="UTF-8"
  redirectPort="8443"
  maxHttpHeaderSize="65536" />
```

5. Configure MidoNet API context

Create the `/etc/tomcat/Catalina/localhost/midonet-api.xml` file and edit it to contain the following:

```
<Context
  path="/midonet-api"
  docBase="/usr/share/midonet-api"
  antiResourceLocking="false"
  privileged="true"
/>
```

6. Start Tomcat

```
# systemctl enable tomcat.service
# systemctl start tomcat.service
```

MidoNet CLI Installation

1. Install MidoNet CLI package

```
# yum install python-midonetclient
```

2. Configure MidoNet CLI

Create the `~/.midonetrc` file and edit it to contain the following:


```
[cli]
api_url = http://controller:8080/midonet-api
username = admin
password = ADMIN_PASS
project_id = admin
```

Midolman Installation

The *MidoNet Agent (Midolman)* has to be installed on all nodes where traffic enters or leaves the virtual topology, in this guide this are the **controller**, **gateway1**, **gateway2** and **compute1** nodes.

1. Install Midolman package

```
# yum install midolman
```

2. Set up mn-conf

Edit `/etc/midolman/midolman.conf` to point mn-conf to the ZooKeeper cluster:

```
[zookeeper]
zookeeper_hosts = nsdb1:2181,nsdb2:2181,nsdb3:2181
```

3. Configure access to the NSDB for all agents

This step needs to happen only once, it will set up access to the NSDB for all MidoNet Agent nodes.

Run the following command to set the cloud-wide values for the ZooKeeper and Cassandra server addresses:

```
$ cat << EOF | mn-conf set -t default
zookeeper {
    zookeeper_hosts = "nsdb1:2181,nsdb2:2181,nsdb3:2181"
}

cassandra {
    servers = "nsdb1,nsdb2,nsdb3"
}
EOF
```

Run the following command to set the Cassandra replication factor:

```
$ echo "cassandra.replication_factor : 3" | mn-conf set -t default
```

4. Configure resource usage

Run these steps on **each agent host** in order to configure resource usage.



Important

For production environments the **large** templates are strongly recommended.

a. Midolman resource template

Run the following command to configure the Midolman resource template:

```
$ mn-conf template-set -h local -t TEMPLATE_NAME
```

Replace **TEMPLATE_NAME** with one of the following templates:

```
agent-compute-large
agent-compute-medium
agent-gateway-large
agent-gateway-medium
default
```

b. Java Virtual Machine (JVM) resource template

Replace the default `/etc/midolman/midolman-env.sh` file with one of the below to configure the JVM resource template:

```
/etc/midolman/midolman-env.sh.compute.large
/etc/midolman/midolman-env.sh.compute.medium
/etc/midolman/midolman-env.sh.gateway.large
/etc/midolman/midolman-env.sh.gateway.medium
```

5. Start Midolman

```
# systemctl start midolman.service
```

MidoNet Host Registration

1. Launch MidoNet CLI

```
$ midonet-cli
midonet>
```

2. Create tunnel zone

MidoNet supports the Virtual Extensible LAN (VXLAN) and Generic Routing Encapsulation (GRE) protocols to communicate to other hosts within a tunnel zone.

To use the VXLAN protocol, create the tunnel zone with type 'vxlan':

```
midonet> tunnel-zone create name tz type vxlan
tzone0
```

To use the GRE protocol, create the tunnel zone with type 'gre':

```
midonet> tunnel-zone create name tz type gre
tzone0
```



Important

Make sure to allow GRE/VXLAN traffic for all hosts that belong to the tunnel zone. For VXLAN MidoNet uses UDP port 6677 as default.

1. Add hosts to tunnel zone

```
midonet> list tunnel-zone
tzone tzone0 name tz type vxlan

midonet> list host
host host0 name controller alive true
host host1 name gateway1 alive true
host host2 name gateway2 alive true
host host3 name compute1 alive true

midonet> tunnel-zone tzone0 add member host host0
address ip_address_of_host0
zone tzone0 host host0 address ip_address_of_host0
```

```
midonet> tunnel-zone tzone0 add member host host1
address ip_address_of_host1
zone tzone0 host host1 address ip_address_of_host1

midonet> tunnel-zone tzone0 add member host host2
address ip_address_of_host2
zone tzone0 host host2 address ip_address_of_host2

midonet> tunnel-zone tzone0 add member host host3
address ip_address_of_host3
zone tzone0 host host3 address ip_address_of_host3
```

5. Initial Network Configuration



Important

Follow the Red Hat documentation's [Create an external network](#) instructions, but **note the following differences**.

1. Creating and Configuring an External Network

Use the following command to create the external network:

```
$ neutron net-create ext-net --router:external
```



Note

MidoNet will automatically create the MidoNet Provider Router when you create an external network in OpenStack. This is an internal router in MidoNet that acts as the gateway router of the cloud. There is always only one Provider Router, even if there are multiple external networks.

6. BGP Uplink Configuration

MidoNet utilizes the Border Gateway Protocol (BGP) for external connectivity.

For production deployments it is strongly recommended to use BGP due to its scalability and redundancy.

For demo or POC environments, alternatively static routing can be used. See the Operations Guide for details.

The following instructions assume below sample environment:

- One floating IP network
 - *192.0.2.0/24*
- Two MidoNet gateway nodes
 - *gateway1*, connecting to *bgp1* via *eth1*
 - *gateway2*, connecting to *bgp2* via *eth1*
- Two remote BGP peers
 - *bgp1*, *198.51.100.1*, AS *64513*
 - *bgp2*, *203.0.113.1*, AS *64513*
- Corresponding MidoNet BGP peers
 - *198.51.100.2*, AS *64512*
 - *203.0.113.2*, AS *64512*

Follow these steps to configure the BGP uplinks.

1. Determine the Keystone admin tenant ID

Use the `keystone` command to determine the Keystone admin tenant's ID:

```
$ keystone tenant-list
+-----+-----+-----+
| id | name | enabled |
+-----+-----+-----+
| 12345678901234567890123456789012 | admin | True |
+-----+-----+-----+
```

2. Launch the MidoNet CLI and find the MidoNet Provider Router

```
$ midonet-cli
midonet-cli>
```

Because the MidoNet Provider Router is not associated with a tenant, the active tenant has to be cleared (`clear`) first.

```
midonet-cli> clear

midonet-cli> router list
router router0 name MidoNet Provider Router state up
router router1 name Tenant Router state up infiltr chain0 outfilter
chain1
```

In this example the MidoNet Provider Router is **router0**.

3. Load the admin tenant

Before continuing with further configuration, the admin tenant has to be set (sett). Use the ID you got from Keystone above.

```
midonet-cli> sett 12345678901234567890123456789012
tenant_id: 12345678901234567890123456789012
```

4. Create virtual ports for the BGP sessions

For each remote BGP peer, create a port on the MidoNet Provider Router that is going to be used for BGP communication.

```
midonet> router router0 add port address 198.51.100.2 net
198.51.100.0/30
router0:port0

midonet> router router0 add port address 203.0.113.2 net 203.0.113.0/30
router0:port1

midonet> router router0 port list
port port0 device router0 state up mac ac:ca:ba:11:11:11
address 198.51.100.2 net 198.51.100.0/30
port port1 device router0 state up mac ac:ca:ba:22:22:22
address 203.0.113.1 net 203.0.113.0/30
[...]
```

In this example the created ports are **port0** and **port1**.

5. Configure BGP on the virtual ports

```
midonet> router router0 port port0 add bgp local-AS 64512 peer-AS 64513
peer 198.51.100.1
router0:port0:bgp0

midonet> router router0 port port0 list bgp
bgp bgp0 local-AS 64512 peer-AS 64513 peer 198.51.100.1

midonet> router router0 port port1 add bgp local-AS 64512 peer-AS 64513
peer 203.0.113.1
router0:port1:bgp0

midonet> router router0 port port1 list bgp
bgp bgp0 local-AS 64512 peer-AS 64513 peer 203.0.113.1
```

6. Add routes to the remote BGP peers

In order to be able to establish connections to the remote BGP peers, corresponding routes have to be added.

```
midonet> router router0 route add src 0.0.0.0/0 dst 198.51.100.0/30
port router0:port0 type normal
router0:route0

midonet> router router0 route add src 0.0.0.0/0 dst 203.0.113.0/30
port router0:port1 type normal
router0:route1
```

7. Advertise BGP routes

In order to provide external connectivity for hosted virtual machines, the floating IP network has to be advertised to the BGP peers.

```
midonet> router router0 port port0 bgp bgp0 add route net 192.0.2.0/24  
router0:port0:bgp0:ad-route0  
  
midonet> router router0 port port0 bgp bgp0 list route  
ad-route ad-route0 net 192.0.2.0/24  
  
midonet> router router0 port port1 bgp bgp0 add route net 192.0.2.0/24  
router0:port0:bgp0:ad-route0  
  
midonet> router router0 port port1 bgp bgp0 list route  
ad-route ad-route0 net 192.0.2.0/24
```

8. Bind virtual ports to physical network interfaces

Bind the MidoNet Provider Router's virtual ports to the physical network interfaces on the Gateway Nodes.



Important

Ensure that physical interfaces are in state UP and do not have an IP address assigned.

a. List the MidoNet hosts and find the Gateway Nodes:

```
midonet> host list  
host host0 name gateway1 alive true  
host host1 name gateway2 alive true  
[...]
```

In this example the hosts are **host0** and **host1**.

b. List the Gateway Nodes' physical interfaces:

```
midonet> host host0 list interface  
[...]  
iface eth1 host_id host0 status 3 addresses [] mac 01:02:03:04:05:06  
mtu 1500 type Physical endpoint PHYSICAL  
[...]  
  
midonet> host host1 list interface  
[...]  
iface eth1 host_id host0 status 3 addresses [] mac 06:05:04:03:02:01  
mtu 1500 type Physical endpoint PHYSICAL  
[...]
```

c. Bind the physical host interfaces to the MidoNet Provider Router's virtual ports:

```
midonet> host host0 add binding port router0:port0 interface eth1  
host host0 interface eth1 port router0:port0  
  
midonet> host host1 add binding port router0:port1 interface eth1  
host host1 interface eth1 port router0:port1
```

d. Configure a stateful port group:

```
midonet-cli> port-group create name uplink-spg stateful true  
pgroup0
```

e. Add the ports to the port group:

```
midonet> port-group pgroup0 add member port router0:port0  
port-group pgroup0 port router0:port0  
  
midonet> port-group pgroup0 add member port router0:port1  
port-group pgroup0 port router0:port1  
  
midonet> port-group pgroup0 list member  
port-group pgroup0 port router0:port0  
port-group pgroup0 port router0:port1
```


7. Further Steps

MidoNet installation and integration into OpenStack is completed.



Note

Consult the **Operations Guide** for further instructions on operating MidoNet.