

# MidoNet Quick Start Guide

for RHEL 7 / Juno (OSP)

2015.01-SNAPSHOT (2015-04-09 03:43 UTC)

DRAFT



## MidoNet Quick Start Guide for RHEL 7 / Juno (OSP)

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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.



### Caution

This document is a DRAFT. It may be MISSING relevant information or contain UNTESTED information. Use it at your own risk.



### Note

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

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# 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

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### Important

This guide assumes the following system architecture, based on [Figure 2.1. Minimal architecture example with OpenStack Networking \(neutron\)—Network layout](#) of the OpenStack Documentation. This architecture consists of three hosts:

- Controller Node (**controller**)
- Network Node (**network**)
- Compute Node (**compute1**)

The *MidoNet Network State Database (NSDB)* uses [ZooKeeper](#) and [Cassandra](#) to store network topology and state information. The NSDB components can be installed on separate hosts, but this guide assumes them to be installed on all three nodes (**controller**, **network**, **compute1**).

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 **network** and **compute1** nodes.

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

The *Midonet Command Line Interface (CLI)* can be installed on a separate host, but this guide assumes it to be installed on the **controller** node.

The *Midonet Neutron Plugin* replaces the ML2 Plugin and has to be installed on all three nodes (**controller**, **network**, **compute1**).

## Hosts and Services

### Controller Node (**controller**)

- General
  - Database (MariaDB)
  - Message Broker (RabbitMQ)
- OpenStack
  - Identity Service (Keystone)
  - Image Service (Glance)
  - Compute (Nova)

- Networking (Neutron)
- Dashboard (Horizon)
- MidoNet
  - API
  - CLI
  - Neutron Plugin
  - Network State Database (NSDB)
    - Network Topology (ZooKeeper)
    - Network State Information (Cassandra)

### Network Node (network)

- OpenStack
  - Networking (Neutron)
    - DHCP Agent
    - Metadata Agent
- MidoNet
  - Agent (Midolman)
  - Neutron Plugin
  - Network State Database (NSDB)
    - Network Topology (ZooKeeper)
    - Network State Information (Cassandra)

### Compute Node (compute1)

- OpenStack
  - Compute (Nova)
  - Networking (Neutron)
- MidoNet
  - Agent (Midolman)
  - Neutron Plugin
  - Network State Database (NSDB)
    - Network Topology (ZooKeeper)
    - Network State Information (Cassandra)

## 2. Basic Environment Configuration

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### Networking Configuration



#### Important

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

### 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-6.0-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 = 0
```

```
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/v2015.01/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-juno/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
```





## 2. 8.3.2. Configure Compute Service Authentication

Apply as is.

## 3. 8.3.3. 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.

## 4. 8.3.4. Configure the Compute Service to Use SSL

Apply as is.

## 5. 8.3.5. Configure the Compute Service

Apply as is.

## 6. 8.3.6. Populate the Compute Service Database

Apply as is.

## 7. 8.3.7. 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.

## 1. Additional Changes

### a. Configure Metadata Proxy

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

```
[neutron]
...
service_metadata_proxy = true
metadata_proxy_shared_secret = METADATA_SECRET
```



### Note

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

Restart the Compute API service:

```
# systemctl restart openstack-nova-api
```

## Compute Node



### Important

Follow the Red Hat documentation's [8.3. Install a Compute Node](#) instructions, but **note the following differences and additions**.

#### 1. 8.3.1. Create the Compute Service Database

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

#### 2. 8.3.2. Configure Compute Service Authentication

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

#### 3. 8.3.3. Install the Compute Service Packages

Do **not** apply as is.

Instead, install only the following packages:

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

#### 4. 8.3.4. Configure the Compute Service to Use SSL

Apply as is.

#### 5. 8.3.5. Configure the Compute Service

Apply as is, except the following topics:

##### a. 8.3.5.6.3. Configure the L2 Agent

Do **not** apply.

##### b. 8.3.5.6.4. Configure Virtual Interface Plugging

Do **not** apply.

Additionally, edit the `/etc/nova/nova.conf` file and add the following key to the `[glance]` section:

```
[glance]
```

```
...  
host = controller
```

#### 6. 8.3.6. Populate the Compute Service Database

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

#### 7. 8.3.7. 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.

#### 8. 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 Service (Neutron)



### Important

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

#### 1. 7.3. Common Networking Configuration

Do **not** apply as is. Note the differences described in the following sections.

#### 2. 7.4. Configure the Networking Service

Do **not** apply as is. Note the differences described in the following sections.

#### 3. 7.5. Configure the DHCP Agent

Do **not** apply as is. Note the differences described in the following sections.

#### 4. 7.6. Create an External Network

Do **not** apply.

#### 5. 7.7. Configuring the Plug-in Agent

Do **not** apply.

#### 6. 7.8. Configure the L3 Agent

Do **not** apply as is. Note the differences described in the following sections.

#### 7. 7.9. Validate the OpenStack Networking Installation

Do **not** apply.

## Common



### Important

Follow the OpenStack documentation's [7.3 Common Networking Configuration](#) instructions, but **note the following difference**.

#### 1. 7.3.1. Disable Network Manager

Apply as is.

#### 2. 7.3.2. Disable firewalld

Apply as is.

#### 3. 7.3.3. Install the OpenStack Networking Service Packages

Do **not** apply as is.

Instead, install the following packages:

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

#### 4. 7.3.4. Configure the Firewall to Allow OpenStack Networking Traffic

Apply as is.

## Controller Node



### Important

Follow the Red Hat documentation's [7.4. Configure the Networking Service](#) instructions, but **note the following differences**.

#### 1. 7.4.1. Configure OpenStack Networking Service Authentication

Apply as is.

#### 2. 7.4.2. Configure RabbitMQ Message Broker Settings for the Networking Service

Apply as is.

#### 3. 7.4.3. Set the OpenStack Networking Service 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 = midonet.neutron.plugin.MidonetPluginV2
allow_overlapping_ips = True
```



### Note

Make sure to not leave any space at the starting of lines in any configuration file (this applies to all configuration files).

- 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
```

#### 4. 7.4.4. VXLAN and GRE tunnels

Do not apply.

#### 5. 7.4.5. Configure Open vSwitch tunneling

Do not apply.

#### 6. 7.4.6. Configure the OpenStack Networking SQL database connection

Do not apply.

#### 7. 7.4.7. Create the OpenStack Networking Database

Do not apply.

Instead, create the database as follows:

```
$ mysql -u root -p
CREATE DATABASE neutron;
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
```

#### 8. 7.4.8. Launch the OpenStack Networking Service

Apply as is.

## Network Node

### DHCP Agent



#### Important

Follow the Red Hat documentation's [7.5. 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



### Important

Follow the Red Hat documentation's [7.8. Configure 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 on the Controller Node](#).

Restart the Metadata Agent:

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



## 4. MidoNet Installation

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## NSDB Nodes

### ZooKeeper Installation

#### 1. Install ZooKeeper packages

```
# 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=controller:2888:3888
server.2=network:2888:3888
server.3=compute1:2888:3888
```

Create data directory:

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

##### b. Node-specific Configuration

##### i. Controller Node

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

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

##### ii. Network Node

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

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

##### iii. Compute Node

Create the `/var/lib/zookeeper/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 dsc20-2.0.10-1  
# echo "exclude=dsc20 cassandra20" >> /etc/yum.conf
```

#### 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: "controller,network,compute1"
```

## b. Node-specific Configuration

### i. Controller Node

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: controller

...

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

### ii. Network Node

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: network

...

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

### iii. Compute Node

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: compute1

...

# The address to bind the Thrift RPC service.
rpc_address: compute1
```

## 3. Enable and start Cassandra

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

## 4. Verify Cassandra Operation

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

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
```



## 5. 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 Midolman agent shall be installed on all network and compute nodes.

## 1. Install Midolman package

```
# yum install midolman
```

## 2. Configure NSDB

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

```
[zookeeper]  
zookeeper_hosts = controller:2181,network:2181,compute1:2181  
...  
[cassandra]  
servers = controller,network,compute1  
replication_factor = 3  
cluster = midonet
```

## 3. Start Midolman

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

# MidoNet Host Registration

## 1. Launch MidoNet CLI

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

## 2. Create tunnel zone

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

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

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

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

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

### 3. Add hosts to tunnel zone

```
midonet> list host
host host0 name network alive true
host host1 name compute1 alive true

midonet> tunnel-zone tzone0 add member host host0
address ip_address_host0
zone tzone0 host host0 address ip_address_host0

midonet> tunnel-zone tzone0 add member host host1
address ip_address_host1
zone tzone0 host host1 address ip_address_host1
```

## 5. Further Steps

MidoNet installation and integration into OpenStack is completed.

You can now continue with the creation of initial networks in Neutron.



### Note

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