High-availability for DHCP

UPDATED: 2018-03-07 21:05

This section describes how to use the agent management (alias agent) and scheduler (alias agent_scheduler) extensions for DHCP agents scalability and HA.
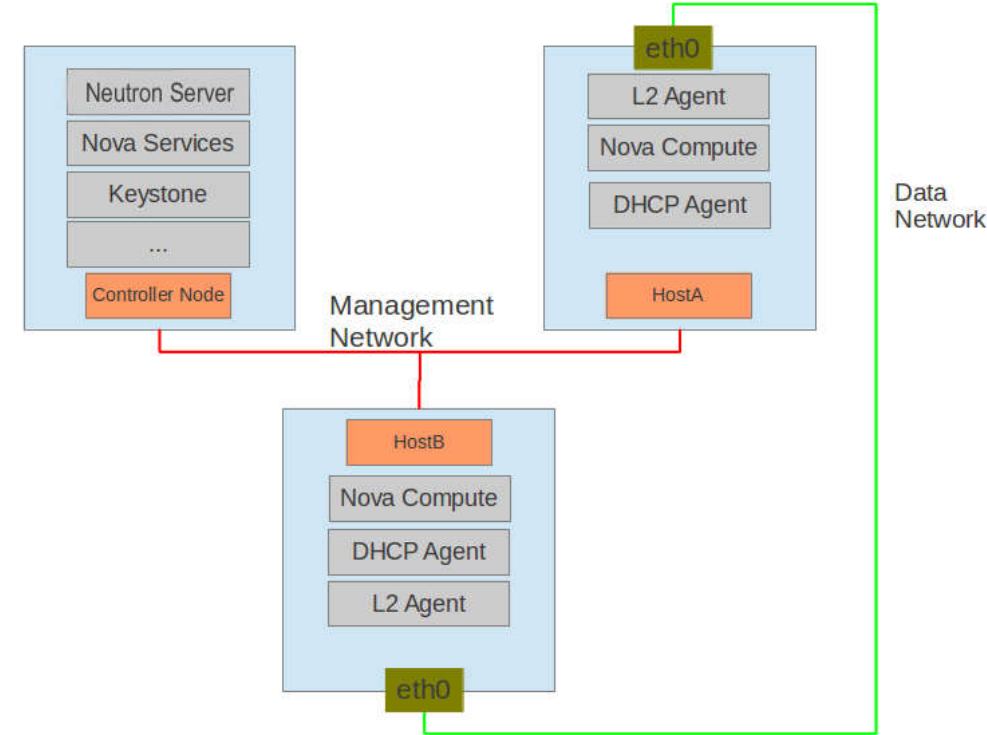
> **✔ Note**
>
> Use the **openstack extension list** command to check if these extensions are enabled. Check **agent** and **agent_scheduler** are included in the output.

```
$ openstack extension list --network -c Name -c Alias
+----------------------------------------------------------+-------------------------+
| Name                                                     | Alias                   |
+----------------------------------------------------------+-------------------------+
| Default Subnetpools                                      | default-subnetpools     |
| Network IP Availability                                  | network-ip-availability |
| Network Availability Zone                                | network_availability_zone |
| Auto Allocated Topology Services                         | auto-allocated-topology |
| Neutron L3 Configurable external gateway mode            | ext-gw-mode             |
| Port Binding                                             | binding                 |
| Neutron Metering                                         | metering                |
| agent                                                    | agent                   |
| Subnet Allocation                                        | subnet_allocation       |
| L3 Agent Scheduler                                       | l3_agent_scheduler      |
| Tag support                                              | tag                     |
| Neutron external network                                 | external-net            |
| Neutron Service Flavors                                  | flavors                 |
| Network MTU                                              | net-mtu                 |
| Availability Zone                                        | availability_zone       |
| Quota management support                                 | quotas                  |
| HA Router extension                                      | l3-ha                   |
| Provider Network                                         | provider                |
| Multi Provider Network                                   | multi-provider          |
| Address scope                                            | address-scope           |
| Neutron Extra Route                                      | extraroute              |
| Subnet service types                                     | subnet-service-types    |
| Resource timestamps                                      | standard-attr-timestamp |
| Neutron Service Type Management                          | service-type            |
| Router Flavor Extension                                  | l3-flavors              |
| Tag support for resources: subnet, subnetpool, port, router | tag-ext              |
| Neutron Extra DHCP opts                                  | extra_dhcp_opt          |
| Resource revision numbers                                | standard-attr-revisions |
| Pagination support                                       | pagination              |
| Sorting support                                          | sorting                 |
| security-group                                           | security-group          |
| DHCP Agent Scheduler                                     | dhcp_agent_scheduler    |
| Router Availability Zone                                 | router_availability_zone |
| RBAC Policies                                            | rbac-policies           |
| standard-attr-description                                | standard-attr-description |
| Neutron L3 Router                                        | router                  |
| Allowed Address Pairs                                    | allowed-address-pairs   |
| project_id field enabled                                 | project-id              |
| Distributed Virtual Router                               | dvr                     |
+----------------------------------------------------------+-------------------------+
```

Demo setup¶

There will be three hosts in the setup.

Host	Description
OpenStack controller host - controlnode	Runs the Networking, Identity, and Compute services that are required to deploy VMs. The node must have at least one network interface that is connected to the Management Network. Note that **nova-network** should not be running because it is replaced by Neutron.
HostA	Runs **nova-compute**, the Neutron L2 agent and DHCP agent
HostB	Same as HostA

Configuration¶

controlnode: neutron server

1. Neutron configuration file **/etc/neutron/neutron.conf**:

```
[DEFAULT]
core_plugin = linuxbridge
rabbit_host = controlnode
allow_overlapping_ips = True
host = controlnode
agent_down_time = 5
dhcp_agents_per_network = 1
```

> **⊘ Note**
>
> In the above configuration, we use **dhcp_agents_per_network = 1** for this demonstration. In usual deployments, we suggest setting **dhcp_agents_per_network** to more than one to match the number of DHCP agents in your deployment. See Enabling DHCP high availability by default.

2. Update the plug-in configuration file **/etc/neutron/plugins/linuxbridge/linuxbridge_conf.ini**:

```
[vlans]
tenant_network_type = vlan
network_vlan_ranges = physnet1:1000:2999
[database]
connection = mysql://root:root@127.0.0.1:3306/neutron_linux_bridge
retry_interval = 2
[linux_bridge]
physical_interface_mappings = physnet1:eth0
```

HostA and HostB: L2 agent

1. Neutron configuration file **/etc/neutron/neutron.conf**:

```
[DEFAULT]
rabbit_host = controlnode
rabbit_password = openstack
# host = HostB on hostb
host = HostA
```

2. Update the plug-in configuration file **/etc/neutron/plugins/linuxbridge/linuxbridge_conf.ini**:

```
[vlans]
tenant_network_type = vlan
network_vlan_ranges = physnet1:1000:2999
[database]
connection = mysql://root:root@127.0.0.1:3306/neutron_linux_bridge
retry_interval = 2
[linux_bridge]
physical_interface_mappings = physnet1:eth0
```

3. Update the nova configuration file **/etc/nova/nova.conf**:

```
[DEFAULT]
use_neutron=True
firewall_driver=nova.virt.firewall.NoopFirewallDriver

[neutron]
admin_username=neutron
admin_password=servicepassword
admin_auth_url=http://controlnode:35357/v2.0/
auth_strategy=keystone
admin_tenant_name=servicetenant
url=http://203.0.113.10:9696/
```

HostA and HostB: DHCP agent

- Update the DHCP configuration file **/etc/neutron/dhcp_agent.ini**:

```
[DEFAULT]
interface_driver = neutron.agent.linux.interface.BridgeInterfaceDriver
```

Prerequisites for demonstration¶

Admin role is required to use the agent management and scheduler extensions. Ensure you run the following commands under a project with an admin role.

To experiment, you need VMs and a neutron network:

```
$ openstack server list
+--------------------------------------+----------+--------+----------------+------------+
| ID                                   | Name     | Status | Networks       | Image Name |
+--------------------------------------+----------+--------+----------------+------------+
| c394fcd0-0baa-43ae-a793-201815c3e8ce | myserver1 | ACTIVE | net1=192.0.2.3 | cirros     |
| 2d604e05-9a6c-4ddb-9082-8a1fbdcc797d | myserver2 | ACTIVE | net1=192.0.2.4 | ubuntu     |
| c7c0481c-3db8-4d7a-a948-60ce8211d585 | myserver3 | ACTIVE | net1=192.0.2.5 | centos     |
+--------------------------------------+----------+--------+----------------+------------+

$ openstack network list
+--------------------------------------+------+------------------------------------+
| ID                                   | Name | Subnets                            |
+--------------------------------------+------+------------------------------------+
| ad88e059-e7fa-4cf7-8857-6731a2a3a554 | net1 | 8086db87-3a7a-4cad-88c9-7bab9bc69258 |
+--------------------------------------+------+------------------------------------+
```

Managing agents in neutron deployment¶

1. List all agents:

```
$ openstack network agent list
+--------------------------------------+-------------------+-------+-------------------+-------+-------+---------------------------+
| ID                                   | Agent Type        | Host  | Availability Zone | Alive | State | Binary                    |
+--------------------------------------+-------------------+-------+-------------------+-------+-------+---------------------------+
| 22467163-01ea-4231-ba45-3bd316f425e6 | Linux bridge agent | HostA | None              | True  | UP    | neutron-linuxbridge-agent |
| 2444c54d-0d28-460c-ab0f-cd1e6b5d3c7b | DHCP agent        | HostA | None              | True  | UP    | neutron-dhcp-agent        |
| 3066d20c-9f8f-440c-ae7c-a40ffb4256b6 | Linux bridge agent | HostB | nova              | True  | UP    | neutron-linuxbridge-agent |
| 55569f4e-6f31-41a6-be9d-526efce1f7fe | DHCP agent        | HostB | nova              | True  | UP    | neutron-dhcp-agent        |
+--------------------------------------+-------------------+-------+-------------------+-------+-------+---------------------------+
```

Every agent that supports these extensions will register itself with the neutron server when it starts up.

The output shows information for four agents. The **alive** field shows **True** if the agent reported its state within the period defined by the **agent_down_time** option in the **neutron.conf** file. Otherwise the **alive** is **False**.

2. List DHCP agents that host a specified network:

```
$ openstack network agent list --network net1
+--------------------------------------+-------------+----------------+-------+
| ID                                   | Host        | Admin State Up | Alive |
+--------------------------------------+-------------+----------------+-------+
| 22467163-01ea-4231-ba45-3bd316f425e6 | HostA       | UP             | True  |
+--------------------------------------+-------------+----------------+-------+
```

3. List the networks hosted by a given DHCP agent:

This command is to show which networks a given dhcp agent is managing.

```
$ openstack network list --agent 22467163-01ea-4231-ba45-3bd316f425e6
+-------------------------------+----------------------+-------------------------------+
| ID                            | Name                 | Subnets                       |
+-------------------------------+----------------------+-------------------------------+
| ad88e059-e7fa-                | net1                 | 8086db87-3a7a-4cad-           |
| 4cf7-8857-6731a2a3a554        |                      | 88c9-7bab9bc69258             |
+-------------------------------+----------------------+-------------------------------+
```

4. Show agent details.

The **openstack network agent show** command shows details for a specified agent:

```
$ openstack network agent show 2444c54d-0d28-460c-ab0f-cd1e6b5d3c7b
+--------------------+------------------------------------------------+
| Field              | Value                                          |
+--------------------+------------------------------------------------+
| admin_state_up     | UP                                             |
| agent_type         | DHCP agent                                     |
| alive              | True                                           |
| availability_zone  | nova                                           |
| binary             | neutron-dhcp-agent                             |
| configurations     | dhcp_driver='neutron.agent.linux.dhcp.Dnsmasq',|
|                    | dhcp_lease_duration='86400',                   |
|                    | log_agent_heartbeats='False', networks='1',    |
|                    | notifies_port_ready='True', ports='3',         |
|                    | subnets='1'                                    |
| created_at         | 2016-12-14 00:25:54                            |
| description        | None                                           |
| last_heartbeat_at  | 2016-12-14 06:53:24                            |
| host               | HostA                                          |
| id                 | 2444c54d-0d28-460c-ab0f-cd1e6b5d3c7b           |
| started_at         | 2016-12-14 00:25:54                            |
| topic              | dhcp_agent                                     |
+--------------------+------------------------------------------------+
```

In this output, **last_heartbeat_at** is the time on the neutron server. You do not need to synchronize all agents to this time for this extension to run correctly. **configurations** describes the static configuration for the agent or run time data. This agent is a DHCP agent and it hosts one network, one subnet, and three ports.

Different types of agents show different details. The following output shows information for a Linux bridge agent:

```
$ openstack network agent show 22467163-01ea-4231-ba45-3bd316f425e6
+--------------------+--------------------------------------+
| Field              | Value                                |
+--------------------+--------------------------------------+
| admin_state_up     | UP                                   |
| agent_type         | Linux bridge agent                   |
| alive              | True                                 |
| availability_zone  | nova                                 |
| binary             | neutron-linuxbridge-agent            |
| configurations     | {                                    |
|                    |      "physnet1": "eth0",             |
|                    |      "devices": "4"                  |
|                    | }                                    |
| created_at         | 2016-12-14 00:26:54                  |
| description        | None                                 |
| last_heartbeat_at  | 2016-12-14 06:53:24                  |
| host               | HostA                                |
| id                 | 22467163-01ea-4231-ba45-3bd316f425e6 |
| started_at         | 2016-12-14T06:48:39.000000           |
| topic              | N/A                                  |
+--------------------+--------------------------------------+
```

The output shows **bridge-mapping** and the number of virtual network devices on this L2 agent.

Managing assignment of networks to DHCP agent¶

A single network can be assigned to more than one DHCP agents and one DHCP agent can host more than one network. You can add a network to a DHCP agent and remove one from it.

1. Default scheduling.

   When you create a network with one port, the network will be scheduled to an active DHCP agent. If many active DHCP agents are running, select one randomly. You can design more sophisticated scheduling algorithms in the same way as nova-schedule later on.

   ```
   $ openstack network create net2
   $ openstack subnet create --network net2 --subnet-range 198.51.100.0/24 subnet2
   $ openstack port create port2 --network net2
   $ openstack network agent list --network net2
   +--------------------------------------+-----------+----------------+-------+
   | ID                                   | Host      | Admin State Up | Alive |
   +--------------------------------------+-----------+----------------+-------+
   | 2444c54d-0d28-460c-ab0f-cd1e6b5d3c7b | HostA     | UP             | True  |
   +--------------------------------------+-----------+----------------+-------+
   ```

   It is allocated to DHCP agent on HostA. If you want to validate the behavior through the **dnsmasq** command, you must create a subnet for the network because the DHCP agent starts the dnsmasq service only if there is a DHCP.

2. Assign a network to a given DHCP agent.

   To add another DHCP agent to host the network, run this command:

   ```
   $ openstack network agent add network --dhcp \
     55569f4e-6f31-41a6-be9d-526efce1f7fe net2
   $ openstack network agent list --network net2
   +--------------------------------------+-------+----------------+-------+
   | ID                                   | Host  | Admin State Up | Alive |
   +--------------------------------------+-------+----------------+-------+
   | 2444c54d-0d28-460c-ab0f-cd1e6b5d3c7b | HostA | UP             | True  |
   | 55569f4e-6f31-41a6-be9d-526efce1f7fe | HostB | UP             | True  |
   +--------------------------------------+-------+----------------+-------+
   ```

   Both DHCP agents host the **net2** network.

3. Remove a network from a specified DHCP agent.

   This command is the sibling command for the previous one. Remove **net2** from the DHCP agent for HostA:

   ```
   $ openstack network agent remove network --dhcp \
     2444c54d-0d28-460c-ab0f-cd1e6b5d3c7b net2
   $ openstack network agent list --network net2
   +--------------------------------------+-------+----------------+-------+
   | ID                                   | Host  | Admin State Up | Alive |
   +--------------------------------------+-------+----------------+-------+
   | 55569f4e-6f31-41a6-be9d-526efce1f7fe | HostB | UP             | True  |
   +--------------------------------------+-------+----------------+-------+
   ```

   You can see that only the DHCP agent for HostB is hosting the **net2** network.

HA of DHCP agents¶

Boot a VM on **net2**. Let both DHCP agents host **net2**. Fail the agents in turn to see if the VM can still get the desired IP.

1. Boot a VM on **net2**:

   ```
   $ openstack network list
   +--------------------------------------+------+--------------------------------------+
   | ID                                   | Name | Subnets                              |
   +--------------------------------------+------+--------------------------------------+
   | ad88e059-e7fa-4cf7-8857-6731a2a3a554 | net1 | 8086db87-3a7a-4cad-88c9-7bab9bc69258 |
   | 9b96b14f-71b8-4918-90aa-c5d705606b1a | net2 | 6979b71a-0ae8-448c-aa87-65f68eedcaaa |
   +--------------------------------------+------+--------------------------------------+
   $ openstack server create --image tty  --flavor 1 myserver4 \
     --nic net-id=9b96b14f-71b8-4918-90aa-c5d705606b1a
   ...
   $ openstack server list
   +--------------------------------------+-----------+--------+-------------------+-----------+
   | ID                                   | Name      | Status | Networks          | Image Name |
   +--------------------------------------+-----------+--------+-------------------+-----------+
   | c394fcd0-0baa-43ae-a793-201815c3e8ce | myserver1 | ACTIVE | net1=192.0.2.3    | cirros    |
   | 2d604e05-9a6c-4ddb-9082-8a1fbdcc797d | myserver2 | ACTIVE | net1=192.0.2.4    | ubuntu    |
   | c7c0481c-3db8-4d7a-a948-60ce8211d585 | myserver3 | ACTIVE | net1=192.0.2.5    | centos    |
   | f62f4731-5591-46b1-9d74-f0c901de567f | myserver4 | ACTIVE | net2=198.51.100.2 | cirros1   |
   +--------------------------------------+-----------+--------+-------------------+-----------+
   ```

2. Make sure both DHCP agents hosting **net2**:

Use the previous commands to assign the network to agents.

```
$ openstack network agent list --network net2
+--------------------------------------+-------+----------------+-------+
| ID                                   | Host  | Admin State Up | Alive |
+--------------------------------------+-------+----------------+-------+
| 2444c54d-0d28-460c-ab0f-cd1e6b5d3c7b | HostA | UP             | True  |
| 55569f4e-6f31-41a6-be9d-526efce1f7fe | HostB | UP             | True  |
+--------------------------------------+-------+----------------+-------+
```

To test the HA of DHCP agent:

1. Log in to the **myserver4** VM, and run **udhcpc**, **dhclient** or other DHCP client.
2. Stop the DHCP agent on HostA. Besides stopping the **neutron-dhcp-agent** binary, you must stop the **dnsmasq** processes.
3. Run a DHCP client in VM to see if it can get the wanted IP.
4. Stop the DHCP agent on HostB too.
5. Run **udhcpc** in the VM; it cannot get the wanted IP.
6. Start DHCP agent on HostB. The VM gets the wanted IP again.

Disabling and removing an agent¶

An administrator might want to disable an agent if a system hardware or software upgrade is planned. Some agents that support scheduling also support disabling and enabling agents, such as L3 and DHCP agents. After the agent is disabled, the scheduler does not schedule new resources to the agent.

After the agent is disabled, you can safely remove the agent. Even after disabling the agent, resources on the agent are kept assigned. Ensure you remove the resources on the agent before you delete the agent.

Disable the DHCP agent on HostA before you stop it:

```
$ openstack network agent set 2444c54d-0d28-460c-ab0f-cd1e6b5d3c7b --disable
$ openstack network agent list
+--------------------------------------+--------------------+-------+-------------------+-------+-------+---------------------------+
| ID                                   | Agent Type         | Host  | Availability Zone | Alive | State | Binary                    |
+--------------------------------------+--------------------+-------+-------------------+-------+-------+---------------------------+
| 22467163-01ea-4231-ba45-3bd316f425e6 | Linux bridge agent | HostA | None              | True  | UP    | neutron-linuxbridge-agent |
| 2444c54d-0d28-460c-ab0f-cd1e6b5d3c7b | DHCP agent         | HostA | None              | True  | DOWN  | neutron-dhcp-agent        |
| 3066d20c-9f8f-440c-ae7c-a40ffb4256b6 | Linux bridge agent | HostB | nova              | True  | UP    | neutron-linuxbridge-agent |
| 55569f4e-6f31-41a6-be9d-526efce1f7fe | DHCP agent         | HostB | nova              | True  | UP    | neutron-dhcp-agent        |
+--------------------------------------+--------------------+-------+-------------------+-------+-------+---------------------------+
```

After you stop the DHCP agent on HostA, you can delete it by the following command:

```
$ openstack network agent delete 2444c54d-0d28-460c-ab0f-cd1e6b5d3c7b
$ openstack network agent list
+--------------------------------------+--------------------+-------+-------------------+-------+-------+---------------------------+
| ID                                   | Agent Type         | Host  | Availability Zone | Alive | State | Binary                    |
+--------------------------------------+--------------------+-------+-------------------+-------+-------+---------------------------+
| 22467163-01ea-4231-ba45-3bd316f425e6 | Linux bridge agent | HostA | None              | True  | UP    | neutron-linuxbridge-agent |
| 3066d20c-9f8f-440c-ae7c-a40ffb4256b6 | Linux bridge agent | HostB | nova              | True  | UP    | neutron-linuxbridge-agent |
| 55569f4e-6f31-41a6-be9d-526efce1f7fe | DHCP agent         | HostB | nova              | True  | UP    | neutron-dhcp-agent        |
+--------------------------------------+--------------------+-------+-------------------+-------+-------+---------------------------+
```

After deletion, if you restart the DHCP agent, it appears on the agent list again.

Enabling DHCP high availability by default¶

You can control the default number of DHCP agents assigned to a network by setting the following configuration option in the file **/etc/neutron/neutron.conf**.

```
dhcp_agents_per_network = 3
```

≪ (config-bgp-dynamic-routing.html) ≫ (config-dns-int.html) 🐞 (https://bugs.launchpad.net/neutron/+filebug?field.title=High-availability%20for%20DHCP%20in%20Neutron&field.comment=%0A%0A%0AThis bug tracker is for errors with the documentation, use the following as a template and remove or add fields as you see fit. Convert [ ] into [x] to check boxes:%0A%0A- [ ] This doc is inaccurate in this way: _____%0A- [ ] This is a doc addition request.%0A- [ ] I have a fix to the document that I can paste below including example: input and output. %0A%0AIf you have a troubleshooting or support issue, use the following resources:%0A%0A - Ask OpenStack: http://ask.openstack.org%0A - The mailing list: http://lists.openstack.org%0A - IRC: 'openstack' channel on Freenode%0A%0A-------------------------------------%0ARelease:%2012.0.1.dev11%20on%202018-03-07%2021:05%0ASHA:%2043df2709acbdce86686a40b75fd34e96880427d0%0ASource:%20https://git.openstack.org/cgit/openstack/neutron/tree/doc/source/admin/config-dhcp-ha.rst%0AURL: https://docs.openstack.org/neutron/queens/admin/config-dhcp-ha.html&field.tags=doc)

⊖   OpenStack Documentation ▾

Neutron 12.0.1

(../index.html)

Page Contents

OpenStack

- Projects (http://openstack.org/projects/)
- OpenStack Security (http://openstack.org/projects/openstack-security/)
- Common Questions (http://openstack.org/projects/openstack-faq/)
- Blog (http://openstack.org/blog/)
- News (http://openstack.org/news/)

Community

- User Groups (http://openstack.org/community/)
- Events (http://openstack.org/community/events/)
- Jobs (http://openstack.org/community/jobs/)
- Companies (http://openstack.org/foundation/companies/)
- Contribute (http://docs.openstack.org/infra/manual/developers.html)

Documentation

- OpenStack Manuals (http://docs.openstack.org)
- Getting Started (http://openstack.org/software/start/)
- API Documentation (http://developer.openstack.org)
- Wiki (https://wiki.openstack.org)

Branding & Legal