


# Availability zones

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An availability zone groups network nodes that run services like DHCP, L3, FW, and others. It is defined as an agent's attribute on the network node. This allows users to associate an availability zone with their resources so that the resources get high availability.

## Use case

An availability zone is used to make network resources highly available. The operators group the nodes that are attached to different power sources under separate availability zones and configure scheduling for resources with high availability so that they are scheduled on different availability zones.

## Required extensions

The core plug-in must support the **availability\_zone** extension. The core plug-in also must support the **network\_availability\_zone** extension to schedule a network according to availability zones. The **M12Plugin** supports it. The router service plug-in must support the **router\_availability\_zone** extension to schedule a router according to the availability zones. The **L3RouterPlugin** supports it.

```
$ openstack extension list --network -c Alias -c Name
+-----+-----+
| Name           | Alias           |
+-----+-----+
...
| Network Availability Zone | network_availability_zone |
...
| Availability Zone         | availability_zone         |
...
| Router Availability Zone  | router_availability_zone  |
...
+-----+-----+
```

## Availability zone of agents

The **availability\_zone** attribute can be defined in **dhcp-agent** and **l3-agent**. To define an availability zone for each agent, set the value into **[AGENT]** section of **/etc/neutron/dhcp\_agent.ini** or **/etc/neutron/l3\_agent.ini**:

```
[AGENT]
availability_zone = zone-1
```

To confirm the agent's availability zone:

```
$ openstack network agent show 116cc128-4398-49af-a4ed-3e95494cd5fc
+-----+
| Field          | Value                                     |
+-----+
| admin_state_up | UP                                       |
| agent_type     | DHCP agent                             |
| alive          | True                                    |
| availability_zone | zone-1                                 |
| binary         | neutron-dhcp-agent                     |
| configurations | dhcp_driver='neutron.agent.linux.dhcp.Dnsmasq', |
|                | dhcp_lease_duration='86400',           |
|                | log_agent_heartbeats='False', networks='2', |
|                | notifies_port_ready='True', ports='6', subnets='4' |
| created_at     | 2016-12-14 00:25:54                     |
| description    | None                                    |
| heartbeat_timestamp | 2016-12-14 06:20:24                     |
| host           | ankur-desktop                           |
| id             | 116cc128-4398-49af-a4ed-3e95494cd5fc   |
| started_at     | 2016-12-14 00:25:54                     |
| topic          | dhcp_agent                             |
+-----+

$ openstack network agent show 9632309a-2aa4-4304-8603-c4de02c4a55f
+-----+
| Field          | Value                                     |
+-----+
| admin_state_up | UP                                       |
| agent_type     | L3 agent                               |
| alive          | True                                    |
| availability_zone | zone-1                                 |
| binary         | neutron-l3-agent                       |
| configurations | agent_mode='legacy', ex_gw_ports='2', |
|                | external_network_bridge='', floating_ips='0', |
|                | gateway_external_network_id='',         |
|                | handle_internal_only_routers='True',    |
|                | interface_driver='openvswitch', interfaces='4', |
|                | log_agent_heartbeats='False', routers='2' |
| created_at     | 2016-12-14 00:25:58                     |
| description    | None                                    |
| heartbeat_timestamp | 2016-12-14 06:20:28                     |
| host           | ankur-desktop                           |
| id             | 9632309a-2aa4-4304-8603-c4de02c4a55f   |
| started_at     | 2016-12-14 00:25:58                     |
| topic          | l3_agent                               |
+-----+
```

Availability zone related attributes

The following attributes are added into network and router:

Attribute name	Access	Required	Input type	Description
availability_zone_hints	RW(POST only)	No	list of string	availability zone candidates for the resource
availability_zones	RO	N/A	list of string	availability zones for the resource

Use **availability\_zone\_hints** to specify the zone in which the resource is hosted:

```
$ openstack network create --availability-zone-hint zone-1 \
--availability-zone-hint zone-2 net1
```

Field	Value
admin_state_up	UP
availability_zone_hints	zone-1
	zone-2
availability_zones	
created_at	2016-12-14T06:23:36Z
description	
headers	
id	ad88e059-e7fa-4cf7-8857-6731a2a3a554
ipv4_address_scope	None
ipv6_address_scope	None
mtu	1450
name	net1
port_security_enabled	True
project_id	cfd1889ac7d64ad891d4f20aef9f8d7c
provider:network_type	vxlan
provider:physical_network	None
provider:segmentation_id	77
revision_number	3
router:external	Internal
shared	False
status	ACTIVE
subnets	
tags	[]
updated_at	2016-12-14T06:23:37Z

```
$ openstack router create --ha --availability-zone-hint zone-1 \
--availability-zone-hint zone-2 router1
```

Field	Value
admin_state_up	UP
availability_zone_hints	zone-1
	zone-2
availability_zones	
created_at	2016-12-14T06:25:40Z
description	
distributed	False
external_gateway_info	null
flavor_id	None
ha	False
headers	
id	ced10262-6cfe-47c1-8847-cd64276a868c
name	router1
project_id	cfd1889ac7d64ad891d4f20aef9f8d7c
revision_number	3
routes	
status	ACTIVE
tags	[]
updated_at	2016-12-14T06:25:40Z

Availability zone is selected from **default\_availability\_zones** in **/etc/neutron/neutron.conf** if a resource is created without **availability\_zone\_hints**:

```
default_availability_zones = zone-1,zone-2
```

To confirm the availability zone defined by the system:

```
$ openstack availability zone list
```

Zone Name	Zone Status
zone-1	available
zone-2	available
zone-1	available
zone-2	available

Look at the **availability\_zones** attribute of each resource to confirm in which zone the resource is hosted:

```
$ openstack network show net1
```

Field	Value
admin_state_up	UP
availability_zone_hints	zone-1
	zone-2
availability_zones	zone-1
	zone-2
created_at	2016-12-14T06:23:36Z
description	
headers	
id	ad88e059-e7fa-4cf7-8857-6731a2a3a554
ipv4_address_scope	None
ipv6_address_scope	None
mtu	1450
name	net1
port_security_enabled	True
project_id	cfd1889ac7d64ad891d4f20aef9f8d7c
provider:network_type	vxlan
provider:physical_network	None
provider:segmentation_id	77
revision_number	3
router:external	Internal
shared	False
status	ACTIVE
subnets	
tags	[]
updated_at	2016-12-14T06:23:37Z

```
$ openstack router show router1
```

Field	Value
admin_state_up	UP
availability_zone_hints	zone-1
	zone-2
availability_zones	zone-1
	zone-2
created_at	2016-12-14T06:25:40Z
description	
distributed	False
external_gateway_info	null
flavor_id	None
ha	False
headers	
id	ced10262-6cfe-47c1-8847-cd64276a868c
name	router1
project_id	cfd1889ac7d64ad891d4f20aef9f8d7c
revision_number	3
routes	
status	ACTIVE
tags	[]
updated_at	2016-12-14T06:25:40Z

#### Note

The **availability\_zones** attribute does not have a value until the resource is scheduled. Once the Networking service schedules the resource to zones according to **availability\_zone\_hints**, **availability\_zones** shows in which zone the resource is hosted practically. The **availability\_zones** may not match **availability\_zone\_hints**. For example, even if you specify a zone with **availability\_zone\_hints**, all agents of the zone may be dead before the resource is scheduled. In general, they should match, unless there are failures or there is no capacity left in the zone requested.

## Availability zone aware scheduler

## Network scheduler

Set **AZAwareWeightScheduler** to **network\_scheduler\_driver** in **/etc/neutron/neutron.conf** so that the Networking service schedules a network according to the availability zone:

```
network_scheduler_driver = neutron.scheduler.dhcp_agent_scheduler.AZAwareWeightScheduler
dhcp_load_type = networks
```

The Networking service schedules a network to one of the agents within the selected zone as with **WeightScheduler**. In this case, scheduler refers to **dhcp\_load\_type** as well.

## Router scheduler¶

Set `AZLeastRoutersScheduler` to `router_scheduler_driver` in file `/etc/neutron/neutron.conf` so that the Networking service schedules a router according to the availability zone:

```
router_scheduler_driver = neutron.scheduler.l3_agent_scheduler.AZLeastRoutersScheduler
```

The Networking service schedules a router to one of the agents within the selected zone as with `LeastRouterScheduler`.

## Achieving high availability with availability zone¶

Although, the Networking service provides high availability for routers and high availability and fault tolerance for networks' DHCP services, availability zones provide an extra layer of protection by segmenting a Networking service deployment in isolated failure domains. By deploying HA nodes across different availability zones, it is guaranteed that network services remain available in face of zone-wide failures that affect the deployment.

This section explains how to get high availability with the availability zone for L3 and DHCP. You should naturally set above configuration options for the availability zone.

## L3 high availability¶

Set the following configuration options in file `/etc/neutron/neutron.conf` so that you get L3 high availability.

```
l3_ha = True
max_l3_agents_per_router = 3
```

HA routers are created on availability zones you selected when creating the router.

## DHCP high availability¶

Set the following configuration options in file `/etc/neutron/neutron.conf` so that you get DHCP high availability.

```
dhcp_agents_per_network = 2
```

DHCP services are created on availability zones you selected when creating the network.

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