OpenStack NFV

Network Service Chains

Provisioning Proposal

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# Introduction to NFV

Network Functions Virtualization is transforming how network operators architect networks by enabling the consolidation of network services onto industry standard servers, which can be located in Data Centers, on Network Nodes or at the user premises.

## **Why Do We Need NFV?**

As Service Providers are faced with increased competition from Over the Top Providers they are seeking new markets to enter. However, as they look to create and launch new services they must grapple with the growing number and complexity of hardware devices in their networks.

This creates challenges due to the time it takes to certify equipment and with staffing and training of skilled operators for many devices. It also creates cost pressure with the need for more space and power at a time when these resources are becoming ever more expensive.

Making upfront capital outlays for equipment in anticipation of revenue that ramps up over time can stress budgets. As a result Service Providers are looking to change how network services are deployed and some are finding Network Functions Virtualization (NFV) as the answer to their problems.

NFV involves delivering network functions as software that can run as virtualized instances and that can be deployed at locations in the network as required, without the need to install equipment for each new service. Network Functions Virtualization is applicable to any network function in both mobile and fixed networks.

Network Functions Virtualization is complementary to Software Defined Networking (SDN) but not dependant on it. Virtual appliances might be configured using SDN capabilities and they might be connected via overlay network tunnels in clusters based on an application or based on the needs of an organization.

# Translation of NFV to OpenStack

A Quantum Extension API is defined.

* For Managing the Service Repository
* For managing bindings between images and services – Service binding repository
* For binding set of services and corresponding images.
* L2 bundles
* L3 bundles
* Brining up a L2 bundle for a given network – Instantiate one image for each service in the bundle.
* Bringing up a L3 bundle and associating networks to it – Instantiate one image for each service in the bundle.

Open Stack Dashboard (Horizon) is updated with the screens to handle the NFV functionality.

Compute Agents get the Service infrastructure information

* If a service VM is instantiated in a compute node, this agent on the compute node would need get information about it first. Which bundle it corresponds to and based on the bundle it corresponds, it should get configuration specific to that bundle and that service. Note that there could be multiple bundles and each bundle might have its own services. That is, SLB can be there in two bundles. SLB configuration of one bundle is different from SLB configuration of another bundle. Hence it is important to know the bundle before getting the configuration.

Using Service Infrastructure, Project owners, will be able to add:

* New services such as DHCP, SLB, WAF, Firewall, IPSec, UTM etc and any other in future without changing the service infrastructure.
* For each service, project owner should be able to upload new images.
* Project owner can create bundles, and associate set of services and corresponding image in the bundle.

APIs are derived from the work done by Ravi and details can be found at the below URL.

<https://github.com/kumarcv/openstack-nf/blob/master/README.md>.

# API Details

## Network Service Chain API

### List all Categories

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/categories | List all Network Service Categories |

**JSON Response:**

{

 "categories":

 [

 {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "EUTM",

 "description": "Enterprise UTM",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "shared":True

 },

 {

 "id": "493454534-8b69-11e0-9b19-74f6af672345",

 "name": "SPUTM",

 "description": "SPUTM",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "shared":False

 }

 ]

}

### Retrieve a Category details

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/categories/{category\_id} | Get Network Service Category Details |

**JSON Response:**

{

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "EUTM",

 "description": "Enterprise UTM",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "shared":True

 },

### Create a Category

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| POST | /nsappliances/categories | Create a Network Service Category |

{

 "category": {

 "name": "EUTM",

 "description": "Enterprise UTM",

 "shared":True

 }

}

**JSON Response:**

{

 "category": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "EUTM",

 "description": "Enterprise UTM",

 "shared":True

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 }

}

### Update a Category

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| PUT | /nsappliances/categories/{category\_id} | Update a Network Service Category Details |

{

 "category": {

 "name": "SPUTM",

 "description": "Description here…",

 }

}

**JSON Response:**

{

 "category": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "SPUTM",

 "description": "Description here…",

 "shared":True

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 }

}

### Deleting a Category

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| DELETE | /nsappliances/categories/{category\_id} | Delete a Network Service Category |

This operation does not require a request body or return a response body.

### List all Network Functions

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/networkfunctions | List all Network Functions |

**JSON Response:**

{

 "networkfunctions":

 [

 {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "firewall",

 "description": "Firewall Security appliance",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "shared":True

 },

 {

 "id": "493454534-8b69-11e0-9b19-74f6af672345",

 "name": "IPS",

 "description": "Intrusion Prevention Appliance",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "shared":False

 }

 ]

}

### Retrieve a Network Function details

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/ networkfunctions/{netwotkfunction\_id} | Get Network Function Details |

**JSON Response:**

{

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "firewall",

 "description": "Firewall Security appliance",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "shared":True

},

### Create a Network Function

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| POST | /nsappliances/networkfunctions | Create a Network Function |

{

 "networkfunction": {

 "name": "firewall",

 "description": "Firewall",

 "shared":True

 }

}

**JSON Response:**

{

 "networkfunction": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "firewall",

 "description": "Firewall",

 "shared":True

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 }

}

### Update a Network Function

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| PUT | /nsappliances/networkfunctions/{networkfunction\_id} | Update a Network Function Details |

{

 "networkfunction": {

 "name": "firewall\_updated",

 "description": "Description here…",

 }

}

**JSON Response:**

{

 "networkfunction": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "firewall\_updated",

 "description": "Description here…",

 "shared":True

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 }

}

### Deleting a Network Function

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| DELETE | /nsappliances/networkfunctions/{networkfunction\_id} | Delete a Network Function |

This operation does not require a request body or return a response body.

### List all Category - Network Function Maps

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/category\_networkfunction | List all Network Service Category to Network Function mappings |

**JSON Response:**

{

 "category\_networkfunctions":

 [

 {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "category\_id": "0a007628-a65c-4ba6-b347-f140df7c789d",

 "networkfunction\_id": "953dbd54-70bc-44a6-9e77-28a985588d3b",

 },

 {

 "id": "a1aeffbd-2ddf-48c2-b63b-90150b5cc563",

 "category\_id": "b91a0f02-ad45-4a6c-8f72-cae03f344abb",

 "networkfunction\_id": "953dbd54-70bc-44a6-9e77-28a985588d3b",

 },

 ]

}

### Create a Category – Network Function Map

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| POST | /nsappliances/category\_networkfunctions | Create a Network Service Category – Network Function Map |

{

 "category\_networkfunction": {

 "category\_id": "b91a0f02-ad45-4a6c-8f72-cae03f344abb",

 "networkfunction\_id": "953dbd54-70bc-44a6-9e77-28a985588d3b"

 }

}

**JSON Response:**

{

 "category\_networkfunction": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "category\_id": "b91a0f02-ad45-4a6c-8f72-cae03f344abb",

 "networkfunction\_id": "953dbd54-70bc-44a6-9e77-28a985588d3b"

 }

}

### Deleting a Category – Network Function Map

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| DELETE | /nsappliances/category\_networkfunctions/{category\_networkfunction\_id} | Delete a Network Service Category – Network Function Map |

This operation does not require a request body or return a response body.

### List all Vendors

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/vendors | List all Vendors |

**JSON Response:**

{

 "vendors":

 [

 {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "Freescale",

 "description": "Freescale Semiconductors",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "shared":True

 },

 {

 "id": "493454534-8b69-11e0-9b19-74f6af672345",

 "name": "Cisco",

 "description": "Cisco",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "shared":False

 }

 ]

}

### Retrieve a Vendor details

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/vendors/{vendor\_id} | Get Vendor Details |

**JSON Response:**

{

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "Freescale",

 "description": "Freescale",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "shared":True

 },

### Create a Vendor

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| POST | /nsappliances/vendors | Create a Vendor |

{

 "vendor": {

 "name": "Test",

 "description": "Description Here",

 "shared":True

 }

}

**JSON Response:**

{

 "vendor": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "Test",

 "description": "Description Here",

 "shared":True

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 }

}

### Update a Vendor

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| PUT | /nsappliances/vendors/{vendor\_id} | Update a Vendor Details |

{

 "vendor": {

 "name": "Juniper",

 "description": "Description here…",

 }

}

**JSON Response:**

{

 "vendor": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "juniper",

 "description": "Description here…",

 "shared":True

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 }

}

### Deleting a Vendor

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| DELETE | /nsappliances/vendors/{vendor\_id} | Delete a Vendor |

This operation does not require a request body or return a response body.

### List all Service Images

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/images | List all Service Images |

**JSON Response:**

{

 "images":

 [

 {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "P4080-SLB-VM",

 "category\_id": "ad6a59a0-ee74-454c-8ae1-ff51c2939c4a",

 "vendor\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "image\_id": "e374df75-c40a-4d18-a0fe-1f58fddd650b",

 "flavor\_id": 1,

 "security\_group\_id": 7,

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "shared":True

 },

 {

 "id": "493454534-8b69-11e0-9b19-74f6af672345",

 "name": "p4080-Test1",

 "category\_id": "0a007628-a65c-4ba6-b347-f140df7c789d",

 "vendor\_id": "4fd07386-f870-402e-8c64-1ef2317a66ca",

 "image\_id": "2d830c53-5761-403d-9645-3ce0b7b96d2f",

 "flavor\_id": 1,

 "security\_group\_id": 7,

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "shared":True

 }

 ]

}

### Retrieve a Service Image details

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/images/{image\_id} | Get Service Image Details |

**JSON Response:**

{

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "P4080-SLB-VM",

 "category\_id": "ad6a59a0-ee74-454c-8ae1-ff51c2939c4a",

 "vendor\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "image\_id": "e374df75-c40a-4d18-a0fe-1f58fddd650b",

 "flavor\_id": 1,

 "security\_group\_id": 7,

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "shared":True

},

### Create a Service Image

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| POST | /nsappliances/images | Create a Service Image |

{

 "image": {

 "name": "P4080-SLB-VM",

 "category\_id": "ad6a59a0-ee74-454c-8ae1-ff51c2939c4a",

 "vendor\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "image\_id": "e374df75-c40a-4d18-a0fe-1f58fddd650b",

 "flavor\_id": 1,

 "security\_group\_id": 7,

 "shared":True

 }

}

**JSON Response:**

{

 "image": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "P4080-SLB-VM",

 "category\_id": "ad6a59a0-ee74-454c-8ae1-ff51c2939c4a",

 "vendor\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "image\_id": "e374df75-c40a-4d18-a0fe-1f58fddd650b",

 "flavor\_id": 1,

 "security\_group\_id": 7,

 "shared":True

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 }

}

### Update a Service Image

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| PUT | /nsappliances/images/{image\_id} | Update a Service Image Details |

{

 "image": {

 "name": "P4080-Image",

 }

}

**JSON Response:**

{

 "image": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "P4080-Image",

 "category\_id": "ad6a59a0-ee74-454c-8ae1-ff51c2939c4a",

 "vendor\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "image\_id": "e374df75-c40a-4d18-a0fe-1f58fddd650b",

 "flavor\_id": 1,

 "security\_group\_id": 7,

 "shared":True

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 }

}

### Deleting a Service Image

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| DELETE | /nsappliances/images/{image\_id} | Delete a Service Image |

This operation does not require a request body or return a response body.

### Add metadata to a Service Image

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| POST | /nsappliances/metadatas | Add metadata to a Service Image |

{

 "metadata": {

 "name": "My Server Name",

 "value": "p4080\_slb\_vm",

 "image\_map\_id": "310df60f-2a10-4ee5-9554-98393092194c"

 }

}

**JSON Response:**

{

 "metadata": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "My Server Name",

 "value": "p4080\_slb\_vm",

 "image\_map\_id": "310df60f-2a10-4ee5-9554-98393092194c"

 }

}

### Add personality to a Service Image

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| POST | /nsappliances/personalities | Add personality to a Service Image |

{

 "personality": {

 "file\_path": "/tmp/test.out",

 "file\_content": "p4080\_slb\_vm",

 "image\_map\_id": "310df60f-2a10-4ee5-9554-98393092194c"

 }

}

**JSON Response:**

{

 "personality": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "file\_path": "/tmp/test.out",

 "file\_content": "p4080\_slb\_vm",

 "image\_map\_id": "310df60f-2a10-4ee5-9554-98393092194c"

 }

}

### List all Chains

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/chains | List all Chains |

**JSON Response:**

{

 "chains":

 [

 {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "Chain1",

 "type": "L2-Mode",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "auto\_boot":True

 },

 {

 "id": "493454534-8b69-11e0-9b19-74f6af672345",

 "name": "Chain2",

 "description": "L3-Mode",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "auto\_boot":True

 }

 ]

}

### Retrieve a Chain details

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/chains/{chain\_id} | Get Chain Details |

**JSON Response:**

{

 "id": "493454534-8b69-11e0-9b19-74f6af672345",

 "name": "Chain2",

 "description": "L3-Mode",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "auto\_boot":True

},

### Create a Chain

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| POST | /nsappliances/chains | Create a Chain |

{

 "chain": {

 "name": "Chain2",

 "description": "L3-Mode",

 "auto\_boot":True

 }

}

**JSON Response:**

{

 "chain": {

 "id": "493454534-8b69-11e0-9b19-74f6af672345",

 "name": "Chain2",

 "description": "L3-Mode",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "auto\_boot":True

 }

}

### Update a Chain

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| PUT | /nsappliances/chains/{chain\_id} | Update a Chain Details |

{

 "chain": {

 "name": "Chain23",

 }

}

**JSON Response:**

{

 "chain": {

 "id": "493454534-8b69-11e0-9b19-74f6af672345",

 "name": "Chain2",

 "description": "L3-Mode",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "auto\_boot":True

 }

}

### Deleting a Chain

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| DELETE | /nsappliances/chain/{chain\_id} | Delete a Chain |

This operation does not require a request body or return a response body.

### List all Chain – Service Image Associations

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/chain\_images | List all Chain – Service Image Associations |

**JSON Response:**

{

 "chain\_images":

 [

 {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "P4080-SLB-VM",

 "chain\_id": "64bd0659-f30c-4481-a278-22315a1c1336",

 "image\_map\_id": "610fedd2-600b-43e7-89f3-4addcb7b036d",

 "sequence\_number": 1,

 "instance\_uuid": "e5246685-7763-40b3-babb-c9443f4b0138",

 "instance\_id": 33

 },

 {

 "id": "56415800-8b69-11e0-9b19-734f6af17583",

 "name": "P4080-SLB-VM1",

 "chain\_id": "64bd0659-f30c-4481-a278-22315a1c1234",

 "image\_map\_id": "610fedd2-600b-43e7-89f3-4addcb7b837d",

 "sequence\_number": 1,

 "instance\_uuid": "e5246685-7763-40b3-babb-c9443f4b4532",

 "instance\_id": 45

 }

 ]

}

### Retrieve a Chain – Service Image Association details

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/chain\_images/{chain\_image\_id} | Get Chain – Service Image Association Details |

**JSON Response:**

{

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "P4080-SLB-VM",

 "chain\_id": "64bd0659-f30c-4481-a278-22315a1c1336",

 "image\_map\_id": "610fedd2-600b-43e7-89f3-4addcb7b036d",

 "sequence\_number": 1,

 "instance\_uuid": "e5246685-7763-40b3-babb-c9443f4b0138",

 "instance\_id": 33

 },

### Create a Chain –Service Image Association

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| POST | /nsappliances/chain\_images | Create a Chain – Service Image Association |

{

 "chain\_image": {

 "name": "P4080-SLB-VM",

 "chain\_id": "64bd0659-f30c-4481-a278-22315a1c1336",

 "image\_map\_id": "610fedd2-600b-43e7-89f3-4addcb7b036d",

 "sequence\_number": 1,

 }

}

**JSON Response:**

{

 "chain\_image": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "P4080-SLB-VM",

 "chain\_id": "64bd0659-f30c-4481-a278-22315a1c1336",

 "image\_map\_id": "610fedd2-600b-43e7-89f3-4addcb7b036d",

 "sequence\_number": 1,

 "instance\_uuid": "",

 "instance\_id":

 }

}

### Update a Chain –Service Image Association

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| PUT | /nsappliances/chain\_images/{chain\_image\_id} | Update a Chain –Service Image Association Details |

{

 "chain\_image": {

 "name": "P4080-SLB-VM",

 "sequence\_number": 1,

 "instance\_uuid": "e5246685-7763-40b3-babb-c9443f4b0138",

 "instance\_id": 33

 }

}

**JSON Response:**

{

 "chain\_image": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "P4080-SLB-VM",

 "chain\_id": "64bd0659-f30c-4481-a278-22315a1c1336",

 "image\_map\_id": "610fedd2-600b-43e7-89f3-4addcb7b036d",

 "sequence\_number": 1,

 "instance\_uuid": "e5246685-7763-40b3-babb-c9443f4b0138",

 "instance\_id": 33

 }

}

### Disassociating Chain – Service Image Mapping

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| DELETE | /nsappliances/chain\_images/{chain\_image\_id} | Delete a Chain – Service Image Association |

This operation does not require a request body or return a response body.

### List all Chain Service Image Map – Network Associations

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/chain\_image\_networks | List all Chain Service Image Map – Network Associations |

**JSON Response:**

{

 "chain\_image\_networks":

 [

 {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "Association Name",

 "chain\_map\_id": "15876d84-d4a6-4174-9687-265ce912f105",

 "network\_id": "310df60f-2a10-4ee5-9554-98393092194c"

 },

 {

 "id": "e2c50725-8ea8-4e15-9aca-a865d1c0f120",

 "name": "Association Name1",

 "chain\_map\_id": "64bd0659-f30c-4481-a278-22315a1c1336",

 "network\_id": "310df60f-2a10-4ee5-9554-98393092194c"

 },

 ]

}

### Retrieve a Chain Service Image - Network Association details

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/chain\_image\_networks/{chain\_network\_id} | Get Chain Service Image - Network Association details |

**JSON Response:**

{

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "Association Name",

 "chain\_map\_id": "15876d84-d4a6-4174-9687-265ce912f105",

 "network\_id": "310df60f-2a10-4ee5-9554-98393092194c"

 },

### Create a Chain Service Image - Network Association

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| POST | /nsappliances/chain\_image\_networks | Create a Chain Service Image - Network Association |

{

 "chain\_image\_network": {

 "chain\_map\_id": "15876d84-d4a6-4174-9687-265ce912f105",

 "network\_id": "310df60f-2a10-4ee5-9554-98393092194c"

 }

}

**JSON Response:**

{

 "chain\_image\_network": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "ksd43324",

 "chain\_map\_id": "15876d84-d4a6-4174-9687-265ce912f105",

 "network\_id": "310df60f-2a10-4ee5-9554-98393092194c"

 }

}

### Disassociating Chain Service Image - Network Mapping

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| DELETE | /nsappliances/chain\_image\_networks/{chain\_network\_id} | Delete a Chain Service Image - Network Association |

This operation does not require a request body or return a response body.

### List all Chain Service Image Map – Configuration Associations

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/chain\_image\_confs | List all Chain Service Image Map – Configuration Associations |

**JSON Response:**

{

 "chain\_image\_confs":

 [

 {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "Association Name",

 "chain\_map\_id": "15876d84-d4a6-4174-9687-265ce912f105",

 "networkfunction\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "config\_handle\_id": "458a3e1e-1197-46e8-896d-b09c4ab3199d",

 },

 {

 "id": "e2c50725-8ea8-4e15-9aca-a865d1c0f120",

 "name": "Association Name",

 "chain\_map\_id": "15876d84-d4a6-4174-9687-265ce912f105",

 "networkfunction\_id": "16490979-dee8-4b16-a196-7a5e0ed39876",

 "config\_handle\_id": "fb1f3190-ea06-4d7a-8c9f-bc09aabd549b",

 },

 ]

}

### Retrieve a Chain Service Image Map – Configuration Association details

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| GET | /nsappliances/chain\_image\_confs/{chain\_conf\_id} | Get Chain Service Image - configuration Association details |

**JSON Response:**

{

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "Association Name",

 "chain\_map\_id": "15876d84-d4a6-4174-9687-265ce912f105",

 "networkfunction\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "config\_handle\_id": "458a3e1e-1197-46e8-896d-b09c4ab3199d",

 },

### Create a Chain Service Image - Configuration Association

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| POST | /nsappliances/chain\_image\_confs | Create a Chain Service Image - Configuration Association |

{

 "chain\_image\_conf": {

 "chain\_map\_id": "15876d84-d4a6-4174-9687-265ce912f105",

 "networkfunction\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "config\_handle\_id": "458a3e1e-1197-46e8-896d-b09c4ab3199d",

 }

}

**JSON Response:**

{

 "chain\_image\_conf": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "Association Name",

 "chain\_map\_id": "15876d84-d4a6-4174-9687-265ce912f105",

 "networkfunction\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "config\_handle\_id": "458a3e1e-1197-46e8-896d-b09c4ab3199d",

 }

}

### Update a Chain Service Image - Configuration Association

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| PUT | /nsappliances/chain\_image\_confs/{chain\_conf\_id} | Update a Chain Service Image - Configuration Association Details |

{

 "chain\_image\_conf": {

 "config\_handle\_id": "458a3e1e-1197-46e8-896d-b09c4ab3199d",

 }

}

**JSON Response:**

{

 "chain\_image\_conf": {

 "id": "52415800-8b69-11e0-9b19-734f6af67565",

 "name": "P4080-SLB-VM",

 "chain\_id": "64bd0659-f30c-4481-a278-22315a1c1336",

 "image\_map\_id": "610fedd2-600b-43e7-89f3-4addcb7b036d",

 "sequence\_number": 1,

 "instance\_uuid": "e5246685-7763-40b3-babb-c9443f4b0138",

 "instance\_id": 33

 }

}

### Disassociating Chain Service Image - Configuration Mapping

**JSON Request:**

|  |  |  |
| --- | --- | --- |
| **Verb** | **URI** | **Description** |
| DELETE | /nsappliances/chain\_image\_confs/{chain\_conf\_id} | Delete a Chain Service Image - Configuration Association |

This operation does not require a request body or return a response body.

## Server Loadbalancer API

### List all VIPs

**JSON Request:**

GET /v1.0/vips

Host: openstack-slb-cloud:8651

Accept: application/json

X-Auth-Token:887665443383838

**JSON Response:**

HTTP/1.1 200 OK

Content-Type: application/json

Content-Length: 384

{

 "vips":[

 {

 "id": "db902c0c-d5ff-4753-b465-668ad9656918",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "name": "web\_vip",

 "description": "lb config for the web tier",

 "subnet\_id": "96a4386a-f8c3-42ed-afce-d7954eee77b3",

 "address" : "10.30.176.47",

 "protocol": "HTTP",

 "port": 80,

 "pool\_id" : "cfc6589d-f949-4c66-99d2-c2da56ef3764",

 "admin\_state\_up": true,

 "status": "ACTIVE",

 "logical\_device\_uuid": "56e08e3e-a78f-4b40-a229-1e7e23eee1ab"

 },

 {

 "id": "36e08a3e-a78f-4b40-a229-1e7e23eee1ab",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "name": "db\_vip",

 "subnet\_id": "9cedb85d-0759-4898-8a4b-fa5a5ea10086",

 "address" : "10.30.176.48",

 "protocol": "TCP",

 "port": 3306,

 "pool\_id" : "41efe233-7591-43c5-9cf7-923964759f9e",

 "session\_persistence" : {"type" : "SOURCE\_IP"},

 "connection\_limit" : 2000,

 "admin\_state\_up": true,

 "status": "INACTIVE",

 "logical\_device\_uuid": "56e08e3e-a78f-4b40-a229-1e7e23eee1ab"

 }

 ]

}

### Retrieve a VIP details

**JSON Request:**

GET /v1.0/vips/36e08a3e-a78f-4b40-a229-1e7e23eee1ab

Host: openstack-slb-cloud:8651

Accept: application/json

X-Auth-Token:887665443383838

**JSON Response:**

HTTP/1.1 200 OK

Content-Type: application/json

Content-Length: 156

{

 "vip": {

 "id": "36e08a3e-a78f-4b40-a229-1e7e23eee1ab",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "name": "db\_vip",

 "description": "lb config for the MYSQL db tier",

 "subnet\_id": "9cedb85d-0759-4898-8a4b-fa5a5ea10086",

 "address" : "10.30.176.47",

 "protocol": "TCP",

 "port": 3306,

 "pool\_id" : "41efe233-7591-43c5-9cf7-923964759f9e",

 "session\_persistence" : {"type" : "SOURCE\_IP"},

 "connection\_limit" : 2000,

 "admin\_state\_up": true,

 "status": "INACTIVE",

 "logical\_device\_uuid": "56e08e3e-a78f-4b40-a229-1e7e23eee1ab"

 }

}

### Create a VIP

**JSON Request:**

POST /v1.0/vips

Host: openstack-slb-cloud:8651

Content-Type: application/json

Accept: application/json

X-Auth-Token:887665443383838

Content-Length: 463

{

 "vip": {

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "name": "web\_vip",

 "subnet\_id": "96a4386a-f8c3-42ed-afce-d7954eee77b3",

 "protocol": "HTTP",

 "port": 80,

 "pool\_id" : "cfc6589d-f949-4c66-99d2-c2da56ef3764",

 "session\_persistence" : {"type":"APP\_COOKIE", "cookie\_name":"jsessionid"},

 "logical\_device\_uuid": "56e08e3e-a78f-4b40-a229-1e7e23eee1ab"

 }

}

**JSON Response:**

HTTP/1.1 202 Accepted

Content-Type: application/json

Content-Length: 213

{

 "vip": {

 "id": "02b1fef7-16f5-4917-bf19-c40a9af805ed",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "name": "web\_vip",

 "subnet\_id": "96a4386a-f8c3-42ed-afce-d7954eee77b3",

 "address" : "10.30.176.47",

 "protocol": "HTTPS",

 "port": 443,

 "pool\_id" : "cfc6589d-f949-4c66-99d2-c2da56ef3764",

 "session\_persistence" : {"type":"APP\_COOKIE", "cookie\_name":"jsessionid"},

 "admin\_state\_up": true,

 "status": "PENDING\_CREATE",

 "logical\_device\_uuid": "56e08e3e-a78f-4b40-a229-1e7e23eee1ab"

 }

}

### Update a VIP

**JSON Request:**

PUT /v1.0/vips/02b1fef7-16f5-4917-bf19-c40a9af805ed

Host: openstack-slb-cloud:8651

Content-Type: application/json

Accept: application/json

X-Auth-Token:887665443383838

Content-Length: 75

{

 "vip": {

 "name": "ssl\_vip\_1",

 "description": "this VIP is used for secure web connections",

 "session\_persistence": { "type": "HTTP\_COOKIE" }

 }

}

**JSON Response:**

HTTP/1.1 202 Accepted

Content-Type: application/json

Content-Length: 282

{

 "vip": {

 "id": "02b1fef7-16f5-4917-bf19-c40a9af805ed",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "name": "ssl\_vip\_1",

 "subnet\_id": "96a4386a-f8c3-42ed-afce-d7954eee77b3",

 "address" : "10.30.176.47",

 "protocol": "HTTPS",

 "port": 443,

 "pool\_id" : "cfc6589d-f949-4c66-99d2-c2da56ef3764",

 "session\_persistence": { "type": "HTTP\_COOKIE" },

 "admin\_state\_up": true,

 "status": "PENDING\_UPDATE",

 "logical\_device\_uuid": "56e08e3e-a78f-4b40-a229-1e7e23eee1ab"

 }

}

### Deleting a VIP

**JSON Request:**

DELETE /v1.0/vips/02b1fef7-16f5-4917-bf19-c40a9af805ed

Host: lbaas-service.cloudX.com:8651

Accept: application/json

X-Auth-Token:887665443383838

**JSON Response:**

HTTP/1.1 204 No Content

### List Pools

**JSON Request:**

GET /v1.0/pools.json

Host: lbaas-service.cloudX.com:8651

X-Auth-Token:887665443383838

**JSON Response:**

HTTP/1.1 200 OK

Content-Type: application/json

Content-Length: 628

{

 "pools" : [

 {

 "id":"cfc6589d-f949-4c66-99d2-c2da56ef3764",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "vip\_id": "db902c0c-d5ff-4753-b465-668ad9656918",

 "name": "web\_pool",

 "protocol": "HTTP",

 "lb\_method": "ROUND\_ROBIN",

 "subnet\_id" : "e2a7a228-8fd1-4aa8-8d0c-4023a68e1c92",

 "members" : [

 "c57f581b-c834-408f-93fa-30543cf30618",

 "f2e37304-e3c1-4f96-9201-dd57a16adb75",

 "cd701b32-7f55-4e8b-94a0-756cd85a684d"

 ],

 "health\_monitors" : [

 "954171e2-8816-4d59-a9d5-c85310b4508d"

 ],

 "admin\_state\_up" : true,

 "status" : "ACTIVE"

 },

 {

 "id":"91c20e53-96cd-4476-8efc-627f398773bb",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "vip\_id": "02b1fef7-16f5-4917-bf19-c40a9af805ed",

 "protocol": "HTTPS",

 "subnet\_id" : "e2a7a228-8fd1-4aa8-8d0c-4023a68e1c92",

 "lb\_method" : "LEAST\_CONNECTIONS",

 "members" : [

 "fcbf4e80-2fc7-4c7a-8a2e-8ea929620df9",

 "6ea4761c-f571-4ec8-a6ae-6a4baf7e49d",

 "26c49527-999c-4ef5-9484-5c065414d3db"

 ],

 "health\_monitors" : [

 "3b4ee887-fff5-4e45-ac55-c34ee599061a"

 ],

 "admin\_state\_up" : true,

 "status" : "ACTIVE"

 },

 {

 "id":"41efe233-7591-43c5-9cf7-923964759f9e",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "vip\_id": "36e08a3e-a78f-4b40-a229-1e7e23eee1ab",

 "protocol": "TCP",

 "subnet\_id" : "ddc3ab81-1dac-4be3-a340-c7b7b5d89beb",

 "lb\_method": "ROUND\_ROBIN",

 "members" : [

 "a24a6159-fc0f-4f42-ab10-5fe8763fef6e",

 "8c65956d-8f3c-41a4-abc3-5311eb3b4ba9"

 ],

 "health\_monitors" : [

 "65479d91-36f4-4651-89c2-2daee22a3c78",

 "441d3298-bf31-4c3b-8433-7e93a7a3db16"

 ],

 "admin\_state\_up" : true,

 "status" : "ACTIVE"

 }

 ]

}

### Retrieve a specific Pool

**JSON Request:**

GET /v1.0/pools/cfc6589d-f949-4c66-99d2-c2da56ef3764

Host: lbaas-service.cloudX.com:8651

Accept: application/json

X-Auth-Token:887665443383838

**JSON Response:**

HTTP/1.1 200 OK

Content-Type: application/json

Content-Length: 628

{

 "pool" : {

 "id":"cfc6589d-f949-4c66-99d2-c2da56ef3764",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "vip\_id": "db902c0c-d5ff-4753-b465-668ad9656918",

 "name": "web\_pool",

 "protocol": "HTTP",

 "lb\_method": "ROUND\_ROBIN",

 "subnet\_id" : "e2a7a228-8fd1-4aa8-8d0c-4023a68e1c92",

 "members" : [

 "c57f581b-c834-408f-93fa-30543cf30618",

 "f2e37304-e3c1-4f96-9201-dd57a16adb75",

 "cd701b32-7f55-4e8b-94a0-756cd85a684d"

 ],

 "health\_monitors" : [

 "f784c3a7-c4e8-44da-bf12-5ff417d27555"

 ],

 "admin\_state\_up" : true,

 "status" : "ACTIVE"

 }

}

### Creating a pool

**JSON Request:**

POST /v1.0/pools

Host: lbaas-service.cloudX.com:8651

Accept: application/json

Content-Type: application/json

X-Auth-Token:887665443383838

Content-Length: 194

{

 "pool" : {

 "name": "web\_pool",

 "protocol": "HTTP",

 "lb\_method" : "ROUND\_ROBIN",

 "subnet\_id" : "e2a7a228-8fd1-4aa8-8d0c-4023a68e1c92",

 }

}

**JSON Response:**

HTTP/1.1 202 Accepted

Content-Type: application/json

Content-Length: 275

{

 "pool" : {

 "id":"cfc6589d-f949-4c66-99d2-c2da56ef3764",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "name": "web\_pool",

 "protocol": "HTTP",

 "subnet\_id" : "e2a7a228-8fd1-4aa8-8d0c-4023a68e1c92",

 "lb\_method": "ROUND\_ROBIN",

 "admin\_state\_up" : true,

 "status" : "PENDING\_CREATE"

 }

}

### Update pool

**JSON Request:**

PUT /v1.0/pools/cfc6589d-f949-4c66-99d2-c2da56ef3764

Host: lbaas-service.cloudX.com:8651

Accept: application/json

Content-Type: application/json

X-Auth-Token:887665443383838

Content-Length: 194

{

 "pool" : {

 "name": "web\_pool\_1"

 }

}

**JSON Response:**

HTTP/1.1 202 Accepted

Content-Type: application/json

Content-Length: 269

{

 "pool" : {

 "id":"cfc6589d-f949-4c66-99d2-c2da56ef3764",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "vip\_id": "db902c0c-d5ff-4753-b465-668ad9656918",

 "name": "web\_pool\_1",

 "protocol": "HTTP",

 "subnet\_id" : "e2a7a228-8fd1-4aa8-8d0c-4023a68e1c92",

 "lb\_method": "ROUND\_ROBIN",

 "members" : [

 "c57f581b-c834-408f-93fa-30543cf30618",

 "f2e37304-e3c1-4f96-9201-dd57a16adb75"

 ],

 "admin\_state\_up" : true,

 "status" : "PENDING\_UPDATE"

 }

}

### Removing a pool

**JSON Request:**

DELETE /v1.0/pools/cfc6589d-f949-4c66-99d2-c2da56ef3764

Host: lbaas-service.cloudX.com:8651

Accept: application/json

X-Auth-Token:887665443383838

**JSON Response:**

HTTP/1.1 204 No Content

### Listing all members

**JSON Request:**

GET /v1.0/members

Host: lbaas-service.cloudX.com:8651

Accept: application/json

X-Auth-Token:887665443383838

**JSON Response:**

HTTP/1.1 200 OK

Content-Type: application/json

Content-Length: 917

{

 "members" : [

 {

 "id":"c57f581b-c834-408f-93fa-30543cf30618",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "pool\_id": "cfc6589d-f949-4c66-99d2-c2da56ef3764",

 "address": "192.168.224.31",

 "port": 8080,

 "weight" : 1,

 "admin\_state\_up" : true,

 "status" : "ACTIVE"

 },

 {

 "id":"f2e37304-e3c1-4f96-9201-dd57a16adb75",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "pool\_id": "cfc6589d-f949-4c66-99d2-c2da56ef3764",

 "address": "192.168.224.32",

 "port" : 8081,

 "weight": 2,

 "admin\_state\_up" : true,

 "status" : "ACTIVE"

 }

 ]

}

### Retrieve a pool member

**JSON Request:**

GET /v1.0/members/c57f581b-c834-408f-93fa-30543cf30618

Host: lbaas-service.cloudX.com:8651

Accept: application/json

X-Auth-Token:887665443383838

JSON Response:

HTTP/1.1 200 OK

Content-Type: application/json

Content-Length: 917

{

 "member" : {

 "id":"c57f581b-c834-408f-93fa-30543cf30618",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "pool\_id": "cfc6589d-f949-4c66-99d2-c2da56ef3764",

 "address": "192.168.224.31",

 "port": 8080,

 "weight" : 1,

 "admin\_state\_up" : true,

 "status" : "ACTIVE"

 }

}

### Create a pool member

**JSON Request:**

POST /v1.0/members

Host: lbaas-service.cloudX.com:8651

Accept: application/json

Content-Type: application/json

X-Auth-Token:887665443383838

Content-Length: 826

{

 "member" : {

 "address": "192.168.224.31",

 "port": 8080,

 "pool\_id": "cfc6589d-f949-4c66-99d2-c2da56ef3764"

 }

}

**JSON Response:**

HTTP/1.1 202 Accepted

Content-Type: application/json

Content-Length: 917

{

 "member" : {

 "id":"c57f581b-c834-408f-93fa-30543cf30618",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "pool\_id": "cfc6589d-f949-4c66-99d2-c2da56ef3764",

 "address": "192.168.224.31",

 "port": 8080,

 "weight" : 1,

 "admin\_state\_up" : true,

 "status" : "PENDING\_CREATE"

 }

}

### Update a pool member

**JSON Request:**

PUT /v1.0/members/c57f581b-c834-408f-93fa-30543cf30618

Host: lbaas-service.cloudX.com:8651

Accept: application/json

Content-Type: application/json

X-Auth-Token:887665443383838

Content-Length: 826

{

 "member" : {

 "admin\_state\_up": false

 }

}

 **JSON Response:**

HTTP/1.1 202 ACCEPTED

Content-Type: application/json

Content-Length: 917

{

 "member" : {

 "id":"c57f581b-c834-408f-93fa-30543cf30618",

 "tenant\_id": "310df60f-2a10-4ee5-9554-98393092194c",

 "pool\_id": "cfc6589d-f949-4c66-99d2-c2da56ef3764",

 "address": "192.168.224.31",

 "port": 8080,

 "weight" : 1,

 "admin\_state\_up" : false,

 "status" : "PENDING\_UPDATE"

 }

}

### Remove Pool Member

**JSON Request:**

DELETE /v1.0/members/c57f581b-c834-408f-93fa-30543cf30618

Host: lbaas-service.cloudX.com:8651

Accept: application/json

X-Auth-Token:887665443383838

**JSON Response:**

HTTP/1.1 204 No Content

###

### List all health monitors

**JSON Request:**

GET /v1.0/health\_monitors

Host: lbaas-service.cloudX.com:8651

Accept: application/json

X-Auth-Token:887665443383838

**JSON Response:**

HTTP/1.1 200 OK

Content-Type: application/json

Content-Length: 114

{

 "health\_monitors" : [

 {

 "id" : "e5069610-744b-42a7-8bd8-ceac1a229cd4",

 "type" : "TCP",

 "delay" : 30,

 "timeout": 10,

 "max\_retries": 2,

 "admin\_state\_up": true,

 "status": "ACTIVE"

 },

 {

 "id" : "f3eeab00-8367-4524-b662-55e64d4cacb5",

 "type" : "HTTP",

 "delay" : 20,

 "timeout": 10,

 "max\_retries": 3,

 "http\_method" : "GET",

 "url\_path" : "/check",

 "expected\_codes" : "200,202",

 "admin\_state\_up": true,

 "status": "PENDING\_CREATE"

 }

 ]

}

### Create a Health Monitor

**JSON Request:**

POST /v1.0/health\_monitors

Host: lbaas-service.cloudX.com:8651

Accept: application/json

Content-Type: application/json

X-Auth-Token:887665443383838

Content-Length: 91

{

 "health\_monitor" :

 {

 "type" : "TCP",

 "delay" : 20,

 "timeout": 10,

 "max\_retries": 3

 }

}

**JSON Response:**

HTTP/1.1 202 Accepted

Content-Type: application/json

Content-Length: 114

{

 "health\_monitor" :

 {

 "id" : "e5069610-744b-42a7-8bd8-ceac1a229cd4",

 "type" : "TCP",

 "delay" : 20,

 "timeout": 10,

 "max\_retries": 3,

 "admin\_state\_up": true,

 "status": "PENDING\_CREATE"

 }

}

### Update a Health Monitor

**JSON Request:**

PUT /v1.0/health\_monitors/e5069610-744b-42a7-8bd8-ceac1a229cd4

Host: lbaas-service.cloudX.com:8651

Accept: application/json

Content-Type: application/json

X-Auth-Token:887665443383838

Content-Length: 41

{

 "health\_monitor" :

 {

 "delay" : 30,

 "max\_retries": 2

 }

}

**JSON Response:**

HTTP/1.1 202 Accepted

Content-Type: application/json

Content-Length: 114

{

 "health\_monitor" :

 {

 "id" : "e5069610-744b-42a7-8bd8-ceac1a229cd4",

 "type" : "TCP",

 "delay" : 30,

 "timeout": 10,

 "max\_retries": 2,

 "admin\_state\_up": true,

 "status": "PENDING\_UPDATE"

 }

}

### Delete a Health Monitor

**JSON Request:**

DELETE /v1.0/health\_monitors/e5069610-744b-42a7-8bd8-ceac1a229cd4

Host: lbaas-service.cloudX.com:8651

Accept: application/json

X-Auth-Token:887665443383838

**JSON Response:**

HTTP/1.1 204 No Content

### Associate Health Monitors with a Pool

**JSON Request:**

POST /v1.0/pools/cfc6589d-f949-4c66-99d2-c2da56ef3764/health\_monitors

Host: lbaas-service.cloudX.com:8651

Accept: application/json

X-Auth-Token:887665443383838

{

 "id" : "f3eeab00-8367-4524-b662-55e64d4cacb5"

}

**JSON Response:**

HTTP/1.1 202 Accepted

Content-Type: application/json

Content-Length: 114

{

 "id" : "f784c3a7-c4e8-44da-bf12-5ff417d27555",

}

### Dissociate Health Monitors from a Pool

**JSON Request:**

DELETE /v1.0/pools/cfc6589d-f949-4c66-99d2-c2da56ef3764/health\_monitors/f3eeab00-8367-4524-b662-55e64d4cacb5

Host: lbaas-service.cloudX.com:8651

Accept: application/json

X-Auth-Token:887665443383838

**JSON Response:**

HTTP/1.1 204 No Content

# Architecture

## Network Service Infrastructure

### Overview

Network services Infrastructure modules are the core infrastructure components which are modular and pluggable components which can be integrated with any other modules and Network Services. OpenStack Controller Dashboard Horizon has the changes for Network Service GUI which showcases the configuration of HAProxy NFV, Firewall NFV etc.

Network Services Infra Plug-in, using the Scheduler and Driver, communicates with the Relay Config Agent of Compute Node for configuration relay from Controller and other information related to VM.

Architecture overview of Network Function Virtualization using Network Service Chains:



The high level block diagram above represents the Controller and Compute Node components for Network Function Virtualization using Network Service Chains.

### Extensions Plug-in

Network Service Infra is an Extension Plug-in for Quantum which queries the Quantum database for Network Service Infra like chain details, image detail, and Configuration, Vendors details.

The Extension plug-in chooses the appropriate driver, based on the scheduler configuration.

All the Network services use the Network service Driver like FSL Driver, to communicate with the Compute Node.



### Network Service Scheduler

The Network Service Scheduler uses the configured Network Services driver to communicate with the Compute Node.

Network Service Chain infrastructure will have the following blocks as Infrastructure:

**FSL Network Services Driver:**



1. Quantum API updates the Quantum V2 Resource Monitor about the New VM Instance.
2. Quantum V2 Resource Monitor updates App VM Monitor with the new VM instance ID.
3. App VM Monitor updates from NOVA about the spawn status of the New VM. If this VM is of Network Service interest, App VM Monitor informs, NS Service VM manager
4. NS Service Manager notifies the Relay Config agent in the compute node about the New NS VM.
5. NS Infra Database Monitor is updated when a config change occurs. On update, NS Infra Database Monitor updates, App VM monitor which in turn updates the NS Service VM Manager for notification to the relay config agent in the compute node.
6. NS VM Load Monitor monitors the VM load.

### Compute Node Architecture

Compute Node will have Relay configuration Agent and Relay RPC receiver.

The Configuration daemons in the VMs communicate with the Relay configuration Agent.

An overview of the Compute Node Architecture is shown below.



1. RPC Request from FSL Network Service Driver
2. JSON message from RPC receiver transferred to Relay Config Manager.
3. JSON message after stripping instance and Node related information pushed to Config Daemon through Virtio-serial
4. Configuration Modification Cast to corresponding Network Function(NF) is passed from Config Daemon
5. Delta Configuration data request from NF via Config Daemon through virtio-serial
6. Quantum RESTful request for Delta Configuration through Quantum Client.
7. Quantum RESTful response with Delta Configuration Data
8. Delta Configuration Data pushed to Config Daemon through virtio-serial
9. Applying Delta Configuration to NF, restart service if required

### VM Architecture

The Network Service VMs [NFV] contain a generic configuration daemon processes the incoming requests from VIRTIO-Serial communication from Compute Node to Network Service VM.

The Configuration daemon updates the Network Functions configuration in VM and restarts the Network Application.

Virtual Machine

SLB NF

Firewall NF

Configuration Daemon

## Example Network Service – Service Loadbalancer (HAProxy)

### Overview

The Loadbalancer instance contains ‘Haproxy’, which can be configured using several options through Horizon.

The Loadbalancer Plug-in uses scheduler options and configured driver for pushing the configuration updates of the Haproxy configuration to Network Service VM.

The configured load balancer driver, using the Network Service Infra Driver informs the Compute Node about the changes to the load balancer configuration.

An overview of the Service Loadbalancer Architecture is shown below:



1. Quantum API updates the Quantum V2 Resource Monitor about the New VM Instance, which updates SLB Config Monitor with the new SLB VM instance ID.
2. SLB Config Monitor updates the App VM monitor which using NS Service VM manager notifies the Relay Config Agent in the compute node about the new VM.

### Plug-in, Scheduler, and FSL Scheduler

Loadbalancer plug-in manages the database, and using the scheduler and the appropriate driver using the Network Services Infra Driver, updates the compute node with the changes to the Haproxy configuration.

### VM Related Architecture

Network Service VM will have Configuration daemon for receiving the configuration relay from Controller to Network Service VM through Relay Configuration Agent on Compute Node.

Configuration daemon in Network Service VM updates the Haproxy configuration like Pools, members, health monitors etc, and restarts the Haproxy Network Service.