Bring your virtualized networking stack to the next level

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Agenda

- oVirt network configuration
- Neutron overview
  - Key features
  - Integration benefits
  - External providers
  - Neutron as an external provider
- Future work
oVirt Network Configuration
Network View

- Network - a logical entity that represents a layer 2 broadcast domain
- Defined within the scope of a data center
Adding a New Network

New Logical Network

**General**
- Data Center: dc3_0
- Name: myNet
- Description
- Comment

**Export**
- Create on external provider
- External Provider: Neutron

**Network Parameters**
- Enable VLAN tagging
- VM network
- Override MTU: 9000
- Network Label
- Host Network QoS: [Unlimited]
Adding a New Network

Name: myNet

Network Parameters:
- Enable VLAN tagging: 1500
- VM network
- Override MTU: 9000
- Network Label
- Host Network QoS: [Unlimited]
Adding a New Network
Host Level Configuration

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**Setup Host Networks**

**Interfaces**

- bond0
  - eth1
  - eth2

- bond1
  - eth3
  - eth4

- eth0

**Assigned Logical Networks**

- NOVM_VLAN_MTU_5 (VLAN 500)
- VLAN_MTU_5000 (VLAN 222)
- VLAN_MTU_5000_2 (VLAN 52)

**Unassigned Logical Networks**

**Required**

- NON_VM_MTU_5000

**Non Required**

- NON_VM_MTU_9000
- NOVM_VLAN_MTU_9 (VLAN 9)
- VLAN_MTU_9000 (VLAN 9)
- VLAN_MTU_9000_2 (VLAN 92)

-☑️ Verify connectivity between Host and Engine

-☐ Save network configuration

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```
Adding Networks to a VM
Adding Networks to a VM

VM has 2 network interfaces. Assign profiles to them.

nic1: blue/blue
nic2: green/green
nic3: None

Select profiles:
- green (green)
- ovirtmgmt (ovirtmgmt)
- red (red)

Do not assign any profile to this virtual network interface.
Integration Benefits

- Add support in oVirt for the various network technologies provided via Neutron plugins
- Leverage L3 services modeled in Neutron
- Enjoy both worlds:
  - Neutron for managing VM networks
  - oVirt for managing infrastructure networks (Migration network, storage network etc.)
- Neutron networks are exposed side by side with oVirt networks which allows the user to use oVirt mature implementation for network configuration
Neutron Overview
OpenStack Networking - Neutron

- Neutron provides network connectivity-as-a-service
- It offers a plug-in architecture designed to support various network technologies through vendor specific plug-ins and API extensions
- Exposes REST API for accessing the service
- Available plugins: Linux Bridge, OVS, ML2, Cisco Nexus, NVP, Ryu, NEC, etc...
Neutron high level architecture

API clients

Neutron API
- Create network
- Update network
- Delete network
- Create Port

Neutron Plugin
- Create network
- Update network
- Delete network
- Create Port
- Extensions

DB

API extensions

API + plugin = Neutron service

Compute nodes

Compute nodes configured according to selected plugin, by either:
* Agent at each node
* External network controller (e.g. UCSM)
Key features in Neutron

- Better network virtualization using Overlay networks
- IPAM - IP Address Management
- Security Groups
- Virtualized services
  - Virtual Routing
  - VPN as a Service
  - Firewall as a Service
  - Load Balancing as a Service
  - And many more, as a service..
Key features in Neutron

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Why overlay?

- VLAN as the most basic virtual networking
  - Very limited
  - Hard to maintain
  - “No brains”

- Overlay networks as the new virtual networking
  - “Unlimited”
  - Easy to maintain
  - Can be “smart” - SDN

- In the end, depends on the use case
Key features in Neutron

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- **IPAM - IP Address Management**
- Security Groups
- Virtualized services
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  - Firewall as a Service
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IPAM basics

- The cornerstones:
  - Network
  - Subnet
  - Port

- Port gets IP from a Subnet

- IP gets delivered via DHCP
  - Also gets other net info
Key features in Neutron

- Better network virtualization using Overlay networks
- IPAM - IP Address Management
- Security Groups
- Virtualized services
  - Virtual Routing
  - VPN as a Service
  - Firewall as a Service
  - Load Balancing as a Service
  - And many more, as a service..
Security Groups

- Segregate VMs from the world
- Allow in/outbound traffic
- One group to rule them all:
  - Security Group
    - Security rules
- Each port can have security group(s)
Integration bits
External Providers

- An external product that can be used to provide resources for oVirt
- Resources that can be provided: hosts, networks, etc..
- Configure once, use everywhere
The Neutron External Provider

- Created as an external network provider
- Can be deployed with the user's choice of plugin
- Can be used in either of the flavors:
  - oVirt centric – Neutron is an implementation detail, the networks are actually managed in oVirt.
  - Neutron centric – Existing Neutron installation, oVirt is just a “user” of some of the networks.
How to Use Neutron in oVirt?

- It's simple! Just follow these few steps:
  1. Install a Neutron instance
  2. Add the instance as an external provider
  3. Add networks on the provider:
     - 3.1. Add a new network on the provider
     - 3.2. Import networks
  4. Install host with the provider's agent
  5. Use the network in a VM's NIC
  6. Run the VM
Step 1: Installing Neutron

• Install Neutron service and configure your choice of plugin
• Install Keystone
  • Configure Keystone for the Neutron service
Step 2: Adding a Neutron Provider

- Name: My Neutron
- Type: OpenStack Network
- Networking Plugin: Linux Bridge
- Provider URL: http://localhost:9696
- Requires Authentication
- Test
- OK | Cancel
Step 2: Adding a Neutron Provider

Interface Mappings: red:eth1

QPID:
- Host: my.host fqdn
- Port: 5672
- Username: quantum
- Password: ********
Step 3 (1): Adding a New Network

New Logical Network

- Data Center: Default
- Name: exported_red
- Description:
- Comment:

Export

- Create on external provider
- External Provider: Neutron

Network Parameters

- Enable VLAN tagging: checked
- VM network: checked
- Override MTU:
- Network Label: red
- Host Network QoS: [Unlimited]
Step 3 (1): Adding a New Network

**New Logical Network**

<table>
<thead>
<tr>
<th>General</th>
<th>Data Center</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster</td>
<td>Name</td>
<td>exported_red</td>
</tr>
</tbody>
</table>

**Export**

- **Create on external provider**
- **External Provider**: Neutron

**Network Parameters**

- **Enable VLAN tagging**: Enable
- **VM network**: Enable
- **Override MTU**: Disable
- **Network Label**: red
- **Host Network QoS**: Unlimited
Step 3 (1): Adding a New Network

Name: ext_red_subnet
CIDR: 10.0.0.0/24
IP Version: IPv4
Step 3 (2): Importing Networks

### Import Networks

**Network Provider:** Neutron

#### Provider Networks

<table>
<thead>
<tr>
<th>Name</th>
<th>Provider Network ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>external_red</td>
<td>91680074-3299-401b-bde4-228bbe09e67c</td>
</tr>
<tr>
<td>nicless</td>
<td>cd3e23fa-ca33-4d74-as1a-b1c59987614d</td>
</tr>
<tr>
<td>test</td>
<td>54b37199-203b-48fd-897a-edc74a56188e</td>
</tr>
<tr>
<td>test2</td>
<td>da4e5bf0-848f-4551-8234-87d97e0aab5e</td>
</tr>
<tr>
<td>test3</td>
<td>af5ef1ca-a9d9-4cec-8562-a75447108618</td>
</tr>
</tbody>
</table>

#### Networks to Import

<table>
<thead>
<tr>
<th>Name</th>
<th>Provider Network ID</th>
<th>Data Center</th>
<th>Allow All</th>
</tr>
</thead>
<tbody>
<tr>
<td>newnet</td>
<td>7a75f104-7c08-4e3b-bb82-5d68e5c9def8</td>
<td>oVirt</td>
<td>✓</td>
</tr>
<tr>
<td>foo</td>
<td>a072f05d-0ab6-4205-a406-c4aed41238bc</td>
<td>Default</td>
<td>✓</td>
</tr>
</tbody>
</table>
Step 4: Installing Host With Agent
Step 4: Installing Host With Agent

- **External Provider**: Neutron
- **Type**: OpenStack Network
- **Networking Plugin**: Open vSwitch
- **Bridge Mappings**: red:eth1
- **Username**: quantum
- **Password**: •••••••
Step 4: Installing Host With Agent
Step 5: Adding Network to a vNIC
Step 6: Running the VM
Future Work
Future Work

- Integrate advanced services
- Improve VM scheduling, taking into account the networks availability on the host
  - Which host has access to which network
- Monitor vNIC connectivity after VM/vNIC started
- Integrate Security Group management
- Integrate L3 functionality
- Support more Plugin types
In Conclusion

- oVirt network configuration
- Neutron overview
  - Key features
  - Integration benefits
  - External providers
  - Neutron as an external provider
- Future work
More info

- Neutron
  - https://wiki.openstack.org/Neutron
- oVirt
  - http://www.ovirt.org/Network_Provider
- Mailing lists
  - users@ovirt.org
  - arch@ovirt.org
  - engine-devel@ovirt.org
  - vdsdm-devel@lists.fedorahosted.org
- IRC Channel
  - #ovirt channel on irc.OFTC.net
THANK YOU!

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