

## Lab 3: Creating Isolated Networks VLAN

Version: 1.0

Date: November 28, 2020

### READ ME



World Domination One Beat At A Time

**BitBeat** is a new startup that is planning to take the record industry and the world by storm with its new product **BitBanger**, a web-based music mixer app. As a new member of the **BitBeat** infrastructure team, you will need a variety of skills to assist in the growth of the startup. As the startup grows, they will be creating a larger web presence.

Company is planning to create an isolated VLAN so that all network communications local to the IP subnet or the broadcast domain (such as Ethernet broadcast, ARP, IP broadcast, DHCP, etc.) will be restricted to the user-configured network and its associated VLAN. This feature allows running your own DHCP (Dynamic Host Configuration Protocol) server to configure virtual machines running on bare metal nodes, without impacting other users.

That's where you come in. **BitBeat** has hired you to setup their infrastructure, you've already gathered their requirements and are ready to get started.



### BEFORE GETTING STARTED

Here's some important information to know before starting this hands-on activity.

**Activity time:** 120 min

**Requirements:** You must have to be a part of a n active project in Chameleon cloud account. You can find the link for Chameleon Cloud portal here [link](#).

**Getting help:** If you experience any issues as you complete this activity, please ask your instructor for assistance.

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### DID YOU KNOW

Chameleon has the capability to create dynamically managed VLANs associated with user-configured private IP subnets as described on Isolated Network VLANs. Users can create a dedicated network associated with a dynamic VLAN, subnet with own DHCP server, and router for external connections. These networks can be created through the web as well as command line interface.

### Task overview:

By default, bare metal nodes on each Chameleon site share the same local network (shared VLAN and IP subnet). However, some experiments may require more network isolation. In this hands-on activity, you are going to create an isolated VLAN by using Network panel of GUI which allows running your own DHCP server to configure virtual machines running on bare metal nodes, without impacting other users.

### Task objectives:

- Configuring Networking using a Heat template
- Creating Network using GUI
- Creating a Router
- Adding a Router interface
- Launching instance in this network

### Learning outcomes-

Once you complete this activity, you should be able to:

- Create Network and Router using GUI.
- Add a router interface
- Launching instances in this network.



### Let's Get Started!

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### DID YOU KNOW

Strong network isolation is provided at network layer 2 only. Even using separate IP subnetworks, any bare metal node can still communicate with each other and with the Internet through the network's router. Chameleon team is investigating solutions to provide stronger isolation at network layer 3. Network isolation works on all nodes, including our low-power HP Moonshot nodes (low-power Xeon, Atom, ARM64).

Choose your project and select site.

#### 1. Configuring Networking using a Heat template

- a. Go to Project, select Orchestration, Stacks.
- b. Click the Launch Stack button to open an interactive dialog.
- c. Select URL as Template Source and paste below URL to Template URL.
- d. <https://raw.githubusercontent.com/ChameleonCloud/heat-templates/master/network-isolation/network-isolation.yaml>
- e. Click the Next button to navigate to the Launch Stack dialog, provide a name for your stack, and set a private IP range, such as 192.168.1.0/24.
- f. Start creating the network and router by clicking the Launch button.

#### 2. Creating Network using GUI

- a. To create a Network from either the **Network Topology** page or the Networks page, click the **Create Network** button to open the Create Network dialogue.
- b. In Create **Network dialog**, name your network. make sure Create Subnet should be checked to create a Subnet for this Network and click **Next**.
- c. Specify a **subnet name** and CIDR Network Address contains a private IP address and a subnet mask length e.g. 192.168.1.0/24. You may set a Gateway or leave it blank to use the default. Then, click the Next button.

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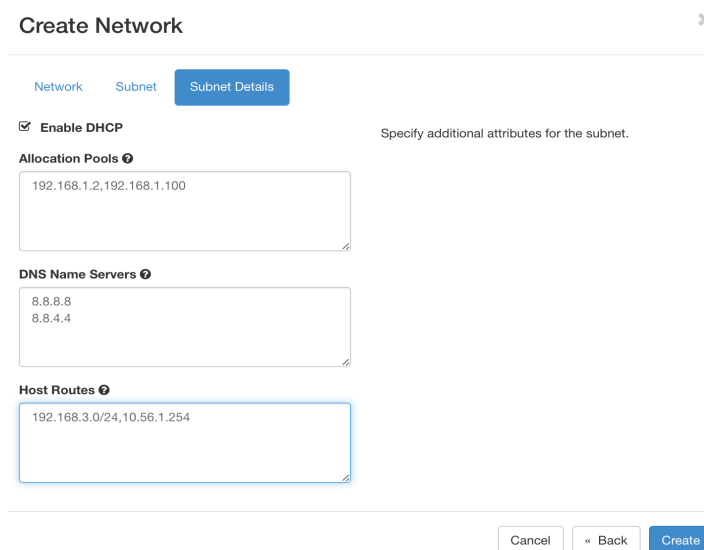
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- d. Allocation Pools section allows you to specify **DHCP address ranges** in the format of **<first address>,<last address>**. For example, entering **192.168.1.2,192.168.1.100** will create a subnet with IP ranges from 192.168.1.2 to 192.168.1.100.
- e. Enter **8.8.8.8** and **8.8.4.4** for DNS servers at **CHI@UC** or **129.114.97.1** and **129.114.97.2** for **CHI@TACC**.
- f. Host Routes section allows you to specify static routing information for the subnet in the format of **<subnet CIDR>,<router IP address>**. For example, **192.168.3.0/24,10.56.1.254** means all traffic from this Subnet to 192.168.3.0 will be forwarded to the Router Interface at 10.56.1.254.

Follow figure 1 for this configuration.



**Create Network** [X]

Network Subnet **Subnet Details**

☒ **Enable DHCP** Specify additional attributes for the subnet.

**Allocation Pools** ⓘ

192.168.1.2,192.168.1.100

**DNS Name Servers** ⓘ

8.8.8.8  
8.8.4.4

**Host Routes** ⓘ

192.168.3.0/24,10.56.1.254

Cancel Back Create

Figure: 1

### 3. Creating Router

- a. To create a Router from either the **Network Topology** page or the **Routers** page, click the **Create Router** button to open the Create Router dialog.
- b. In this **dialog** box, specify a **Router Name**. Select public as the External Network if you want to have external access. Click Create Router.

### 4. Adding a Router interface

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- a. You may add an Interface to an existing Router by clicking on **Add Interface** from either the **Network Topology page** or the **Routers page** to open the Add Interface dialog.
- b. The Interfaces tab in the Router detail page, First, select the subnet you have created. You can specify an IP address otherwise; Chameleon will attempt to assign an IP address automatically.

### 5. Launching instance in this network

- a. Create a Lease, click on **+Create Lease**, type **lease name**, and select the **Lease length days**, select **Create**.
- b. Select **instances** under **Compute**, click in **Launch** instance.
- c. Fill the details like **Instance Name**, choose the above created **Lease**, click on **Next**.
- d. Select the image name **centos7** from **source**, **Next**, **Next**.
- e. Select the above **created network**, Click on **Next**, **Next**.
- f. Choose **security group default**, then click on **Next**.
- g. If you are using Chameleon instance, create a **Key pair** and store it at safe place else use the available key pair.
- h. Add the below bash script in **Customization Script** box, Click **Next**, **Next** and **Launch instance**.

**Attention:** Do not select the Disable Gateway checkbox!

This is #bash

```
#!/bin/bash
yum -y install httpd
systemctl enable httpd
systemctl start httpd
echo '<html><h1>Hello Earthling, Take me to your
leader! </h1></html>' > /var/www/html/index.html
```



Wait for your new EC2 Instance State to display as **running**

**Attention:** The first IP address in the DHCP range should never be \*.1 and \*.2. The last IP address in the range must be less than \*.255.

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**Great job!**

### Let's review

You have completed the activity and have successfully created isolated VLAN with GUI and launched instances in this network.

In this Activity, you

- Created Network using GUI
- Created Router
- Created Router interface
- Launched baremetal instances in this network

### Important info

Network objects such as Routers and Networks must be deleted in the reverse order of which they were created. Objects can not be deleted while other objects are depending on them.

### Test your knowledge

1. Why did we use **VLAN**? \_\_\_\_\_
2. What is the full form of **DHCP**? \_\_\_\_\_
3. What is the purpose of **DHCP**? \_\_\_\_\_
4. Which DNS servers are used for CHI@TACC? \_\_\_\_\_
5. Which DNS servers are used for CHI@UC? \_\_\_\_\_
6. On which router interface, the traffic of 192.168.3.0 subnet is forwarded? \_\_\_\_\_

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**Bonus activity** – Before starting to delete network objects, make sure all instances using them are terminated!

- i. Select instance and click on **Delete Instances**.
- ii. Go to Project -> Network -> Routers and click on the router to delete.
- iii. Go to Static Routes tab and click on the Delete Static Routes button in the Action column. The Static Routes will be deleted after confirming.
- iv. Go to Instances tab, delete the Gateway interface by clicking on Delete Interface button in the Action column and confirm the deletion.
- v. Now you can safely delete the router by clicking on the dropdown on the upper right corner. Then, click on Delete Router. Finally, confirm your deletion of the router.
- vi. Go to Project -> Network -> Networks, and delete the network by using the dropdown in the Action column.

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