

# Contrail Networking Lab Tests\_v.4

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# 0. Intro & Revision history

This lab test is a series of “Learning Contrail-Networking”, which I posted at LinkedIn.

So, for the chapter, it's consecutive from “1. How to install Contrail-Networking v2005 + CentOS7.7”

## > Snipping from my post at LinkedIn.

'Contrail-Networking' is OpenStack based Juniper SDN solution for Private Cloud.

i want to share my knowledge below as a series.

Let's start it from there with me, with fun.

\* What i am going to post below as a series.

1. How to install Contrail-Networking v2005 + CentOS7.7
2. Lab tests based on 5 scienario easy step by step.
3. How to install RedHat Open Stack13 + contrail v2005
4. Docker network.
5. Finding Contrail vRouter NextHop
6. Common issues and Tips for troubleshooting in Contrail.

## > Document Revision History

Revision	Author	Date	Description of Changes
1.0	hkchoi	2/7 2021	Initial draft
2.0	hkchoi	2/17 2021	
3.0	Hkchoi	4/12 2021	
4.0	hkchoi	4/23 2021	Added lab test#5 (Spine & Leaf)

# 1. Before LAB testing

## 1.1. Tools useful for debugging.

Below tools useful for troubleshoot. Strongly recommend to install.

### 1. Install 'tcpdump'

```
# yum -y install tcpdump
```

#### > tcpdump options

- i : interface
- nn : Doesn't convert/resolve 'protocol' and 'port' to naming.
- e : when printing, it prints link-level header such as) mac address
- w : used to save to a file.
- D : list interfaces for tcpdump

#### > simple use

```
# tcpdump -i enp5s0f1 ←===recommend to use
# tcpdump -nnei enp5s0f1
# tcpdump -nnei enp5s0f1 -w hi.pcap
# tcpdump -D
```

### 2. "netstat -rn"

```
#yum -y install net-tools
```

## 1.2. MX and EX2200 basic configurations

For lab test#1,#2,#3 and #4, once physical & initial configuration done for underlayer, you don't need to modify that anymore.  
key point : for Internal network 100.0.0.0/24, ping must be reachable among nodes, even to the lo0 of MX/QFX.  
This is very important. I will mention it later again.

### > EX2200 config

```
set system host-name EX2200
set system services ftp
set system services ssh root-login allow
set system services telnet
set system services netconf ssh
set interfaces ge-0/0/0 unit 0 family ethernet-switching port-mode access
set interfaces ge-0/0/0 unit 0 family ethernet-switching vlan members CentOS_contrail
set interfaces ge-0/0/1 unit 0 family ethernet-switching port-mode access
set interfaces ge-0/0/1 unit 0 family ethernet-switching vlan members CentOS_contrail
set interfaces ge-0/0/4 unit 0 family inet address 100.1.0.1/24
set interfaces ge-0/0/12 unit 0 family ethernet-switching port-mode access
set interfaces ge-0/0/12 unit 0 family ethernet-switching vlan members CentOS_contrail
set interfaces ge-0/0/13 unit 0 family ethernet-switching port-mode access
set interfaces ge-0/0/13 unit 0 family ethernet-switching vlan members CentOS_contrail
set interfaces ge-0/0/23 unit 0 family ethernet-switching port-mode access
set interfaces ge-0/0/23 unit 0 family ethernet-switching vlan members CentOS_contrail
set interfaces ge-0/1/1 unit 0 family inet address 100.2.0.1/24
set interfaces me0 unit 0 family inet address 172.27.122.240/24
```

```
set interfaces vlan unit 100 family inet address 100.0.0.240/24 ←===== This is important. It used as virtual-gateway address during your setting.
```

```
set routing-options static route 172.27.0.0/16 next-hop 172.27.122.1
set routing-options static route 10.0.0.0/8 next-hop 172.27.122.1
set routing-options static route 3.3.3.71/32 next-hop 100.1.0.2
set routing-options static route 3.3.3.72/32 next-hop 100.2.0.2
set vlans CentOS_contrail vlan-id 100
set vlans CentOS_contrail l3-interface vlan.100
```

#### > MX960 config

```
set system host-name MX960_spine
set system services ftp connection-limit 10
deactivate system services ftp connection-limit
set system services ssh root-login allow
set system services telnet connection-limit 20
set system services netconf ssh
set system domain-name kornet.net
set system time-zone Asia/Seoul
set system dump-on-panic
set system internet-options no-tcp-reset drop-all-tcp
set system ports console type vt100
set system ports auxiliary type vt100
set system ntp server 172.27.122.253
set chassis fpc 3 pic 0 tunnel-services ←== enabling tunnel interface is very important. Please keep in mind that.
set chassis network-services enhanced-ip
set interfaces ge-3/0/0 unit 0 family inet address 100.1.0.2/24
set interfaces xe-3/2/0 unit 0 family inet address 200.0.0.2/24
set interfaces fxp0 unit 0 family inet address 172.27.122.195/24
set interfaces lo0 unit 0 family inet address 3.3.3.71/32
set routing-options static route 3.3.3.72/32 next-hop 100.1.0.1
set routing-options static route 100.0.0.0/24 next-hop 100.1.0.1
set routing-options static route 172.0.0.0/8 next-hop 172.27.122.1
set routing-options static route 10.0.0.0/8 next-hop 172.27.122.1
set routing-options static route 0.0.0.0/0 next-hop 172.27.122.1
set routing-options static route 201.0.0.0/24 next-hop 200.0.0.
```

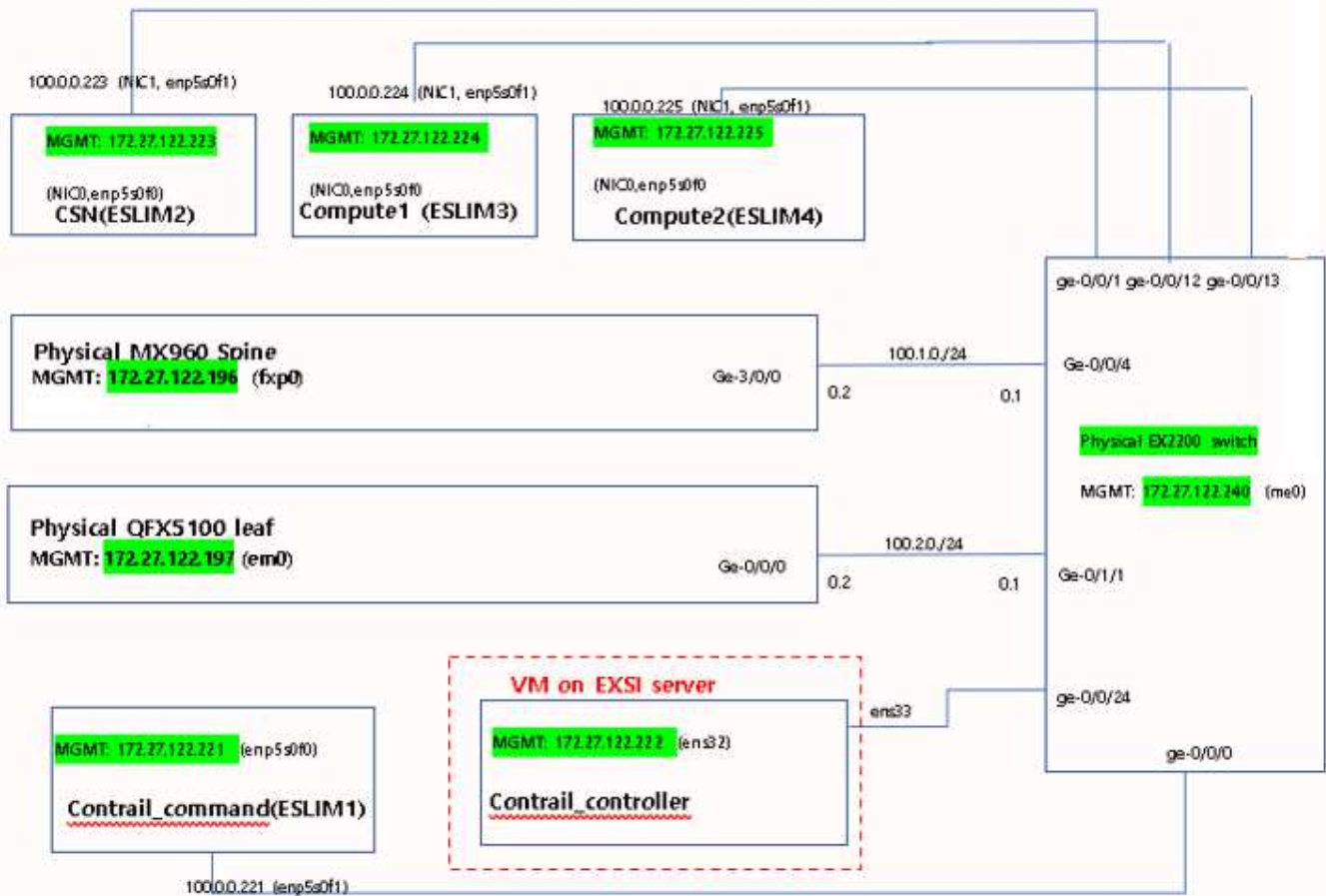
## 1.3. My lab info

> my lab spec & server naming used.

Device (Host NAME)	Servers	MGMT IP	Internal IP	CPU	RAM	HDD
contrail-command(contrailcommand-221)	Eslim server #1	172.27.122.221 (enp5s0f0)	100.0.0.221(enp5s0f1)	8	16GB	150GB
contrail-Controller (controller-222)	EXSI VM	172.27.122.222 (ens32)	100.0.0.222 (ens33)	8	32GB	100GB
contrail-service-node (CSN-223)	Eslim server #2	172.27.122.223 (enp5s0f0)	100.0..0.223(enp5s0f1)	8	16GB	150GB
Compute 1 (compute1-224)	Eslim server #3	172.27.122.224 (enp5s0f0)	100.0.0.224(enp5s0f1)	8	16GB	150GB
Compute 2 (compute2-225)	Eslim server #4	172.27.122.225 (enp5s0f0)	100.0.0.225(enp5s0f1)	8	16GB	150GB
MX960		172.27.122.195 (fxp0)				
QFX5110		172.27.122.197 (em0)				
EX2200		172.27.122.240 (me0)				

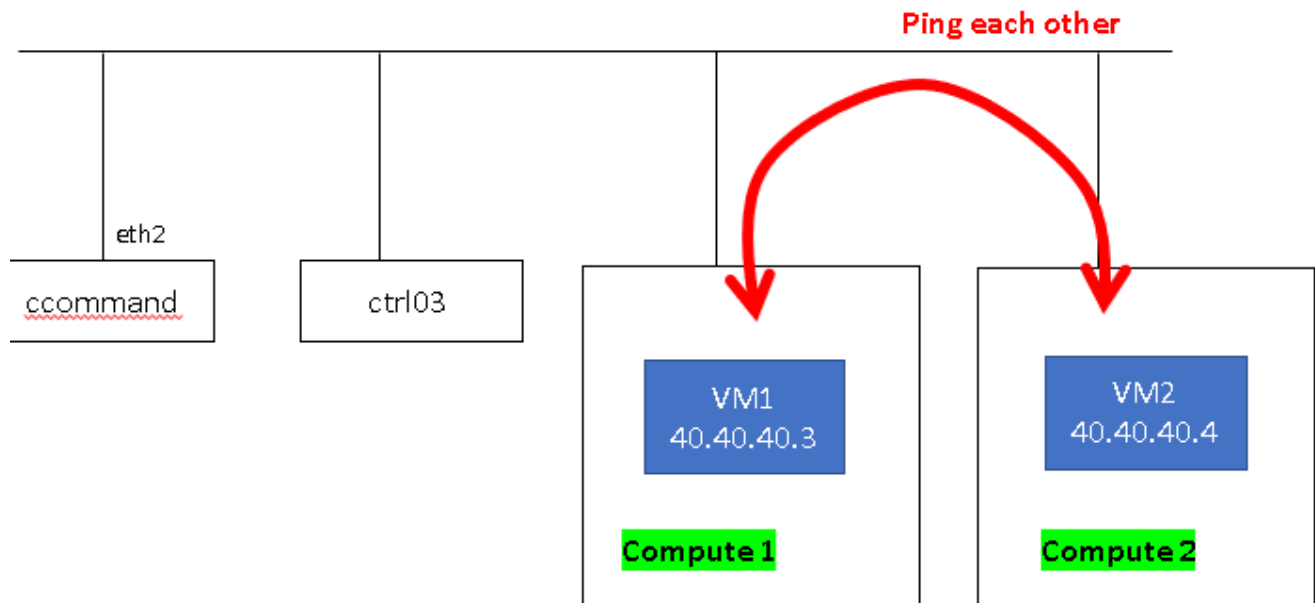
## 1.4 Basic lab topo

- For contrail installation, at least you need 2 ports.  
=> port1 : MGMT , port 2 : internal port for vhost0
- port1 (MGMT) used to install and download overall installation files. So it must be internet/DNS reachable



## 2. Lab test #1 : Creating 2 VMs and the same VNs (Virtual Network)

### > Lab Topo



### 2.1. image download : cirros for VM image.

> Download site: <http://download.cirros-cloud.net/0.5.1/>

<a href="#">cirros-0.5.1-source.tar.gz</a>	2020-03-06 10:53	542K
<a href="#">cirros-0.5.1-x86_64-disk.img</a>	2020-03-06 11:19	16M
<a href="#">cirros-0.5.1-x86_64-initramfs</a>	2020-03-06 11:18	6.2M
<a href="#">cirros-0.5.1-x86_64-kernel</a>	2020-03-06 11:19	8.7M
<a href="#">cirros-0.5.1-x86_64-lxc.tar.gz</a>	2020-03-06 11:18	5.5M

### 2.2. login to Contrail-Command GUI

**\*\* This Doc is a series of my 'Contrail' knowledge sharing. So to start this chapter, you have to do done the first chapter "How to install Contrail\_v2005 + CentOS 7.7". This goes on that.**

- if you are done 'Contrail' installation, please login to 'contrail-command' node, and all the settings will go on "contrail-command GUI"
- To access 'Contrail-command' server GUI, for web browser you have to use Chrome. Firefox and IE is not compatible.
- GUI : <https://<Contrail-command-server-ip>:9091> ex) <https://172.27.122.221:9091>



## 2.3. Create image.

- VM image which I used "cirros-0.4.0-x86\_64-disk.img".

WORKLOADS

Images

Edit Image

Image Name\*

Cirros

Image Description

Server Type

Baremetal Server

Virtual Machine

Image Source

Source Type

File

Select File

Drag file here or [browse](#)

Container Format

Bare

Disk Format

QCOW2 - QEMU Emulator

Image Requirements

Kernel

Choose an image

Architecture

Ramdisk

Choose an image

Minimum Disk (GB)

0

Minimum RAM (MB)

0

Visibility

Public

Private

Protected

Yes

No

## 2.4. Create Flavors.

WORKLOADS

Flavors

Flavors

	NAME	VCPUS	RAM (MB)
▼	Flavor_1	1	100

Details

ID

7ae7f8ce-7bf6-4616-89a3-cbcd7a5b3

Name

Flavor\_1

VCPUS

1

Ram

100

Root disk

1

Swap disk

-

RX/TX Factor

1

Public

true

OS-FLV-

DISABLED:disabled

Ephemeral Disk

0

Link

http://172.27.122.221:9091/v2.1/flavors/7ae7f8ce-7bf6-4616-89a3-cbcd7a5b3

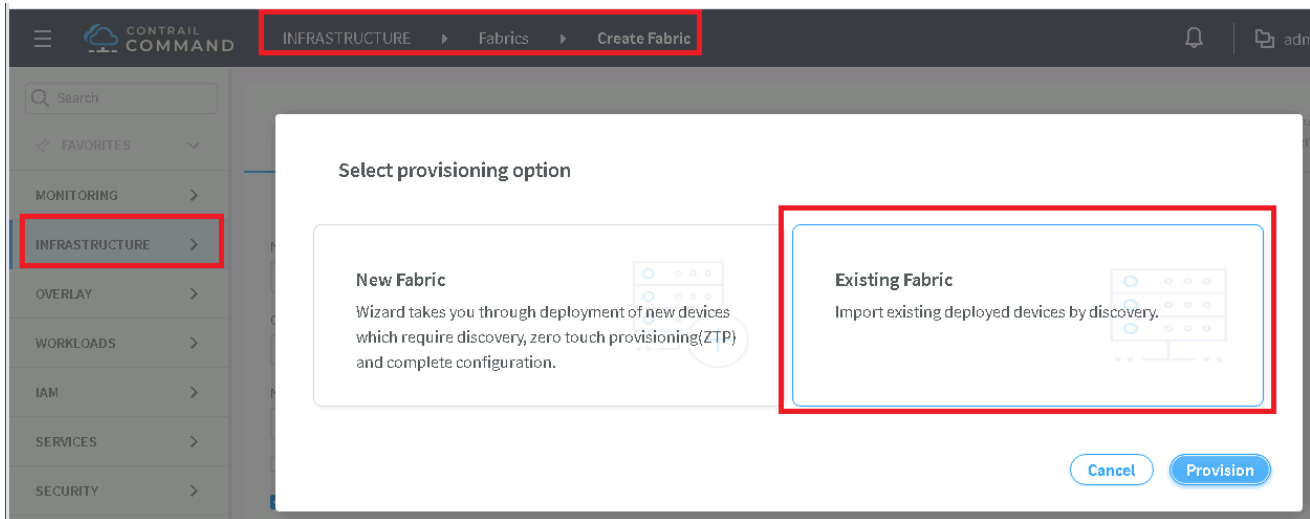
## 2.5. Create Fabric.

### \*\*Tips.

While setting up 'Fabric', sometimes you can face an issue due to several reason.  
In this case, for 'Debugging', you can do like that.

ex) In my case, controller IP is '172.27.122.222'. ssh [root@172.27.122.222](mailto:root@172.27.122.222), pw: contrail123  
Do login controller server.

```
[root@controller-222 ~]# tail -f /var/log/contrail/contrail-fabric-ansible-playbooks.log
```



### \*\*To remember TERMS (BrownField vs GreenField) \*\*\*

#### 1. The terms of "BrownField", "GreenField"

**Brownfield devices**—You can provision legacy devices or existing devices to form an IP Clos network. Unlike greenfield devices, brownfield devices are manually provisioned before device onboarding. The brownfield fabric workflow includes playbooks that automate the fabric data model creation in the database. You can perform basic device management functions such as image upgrade, device discovery, device underlay configuration, assign roles to devices, and view node profile information.

- operator must set Underlay environment and ping reachable among each contrail node and even lo0 of Router/Switch device.  
So contrail does only Overlay related settings.

**Greenfield devices**—You can provision new devices to form an IP Clos network. These devices are connected to a management network that is provisioned before device onboarding. The greenfield fabric workflow then zero-touch-provisions all factory-default devices to form an operational IP Clos network with underlay connectivity.

This greenfield fabric workflow includes playbooks that automate the fabric data model creation in the database, DHCP server configuration, generating device bootstrap configuration, uploading device bootstrap configuration to TFTP server, device discovery, node profile auto-assignment, device role assignment, and role-based auto configuration.

- It's like a ZTP configuration. Operator doesn't need to set underlay part. Contrail(GreenField) does set up everything for Fabric.

#### 2. Reference

[https://www.juniper.net/documentation/en\\_US/contrail19/topics/concept/ems-fabric-management-overview.html](https://www.juniper.net/documentation/en_US/contrail19/topics/concept/ems-fabric-management-overview.html)

#### 3. YouTUBE : Brownfield vs Greenfield

<https://www.youtube.com/watch?v=WEFQbzVF6rA>

STEP 1  
**Create Fabric**

STEP 2  
Device discovery

STEP 3  
Assign the roles

STEP 4  
Autoconfigure

STEP 5 (optional)  
Assign Telemetry Profiles

Name\* ⓘ  
Fabric

Overlay ASN ([BGP])\* ⓘ  
64512

Node profiles\* ⓘ  
device-functional-gr... ×  
juniper-mx ×  
juniper-qfx10k ×  
juniper-qfx10k-lean ×  
juniper-qfx5120 ×  
juniper-qfx5k ×  
juniper-qfx5k-lean ×  
juniper-srx ×

☐ Disable VLAN-VN Uniqueness Check

☒ VLAN-ID Fabric-Wide Significance ⓘ

**\*\* Here very important.**

- For Management CIDR, you must put both spine, leaf ip address, and it must be /32 (regardless of it's real subnet)
- Loopback address also must be written with /32
- Of course, you can put /24 instead, but if you do that, sometime you can face an error.

STEP 1  
**Create Fabric**

STEP 2  
Device discovery

▼ Management subnets

CIDR\* ⓘ  
172.27.122.195/32

Gateway ⓘ  
Enter valid IP

CIDR\* ⓘ  
172.27.122.197/32

Gateway ⓘ  
Enter valid IP

+ Add

▼ Loopback subnets

CIDR\* ⓘ  
3.3.3.71/32

CIDR\* ⓘ  
3.3.3.72/32

STEP 1 Create Fabric

**STEP 2 Device discovery**

STEP 3 Assign the roles

STEP 4 Autoconfigure

STEP 5 (optional) Assign Telemetry Profiles

**Discovered devices**

NAME	MANAGEMENT IP	PRODUCT NAME	STATUS	INTERFACES
v_16	172.27.122.195	mx960	ONBOARDED	24
QFX5100	172.27.122.197	qfx5100-48s...	ONBOARDED	4

**Device discovery progress**

Mon Jan 18 2021 03:42:57 GMT-0800 (북미 태평양 표준시)  
Starting execution for job template "discovering-fabric-onboard-template" and execution id

## 'Role'

1. CRB-Gateway (CRB-Centrally Routed Bridge)
  - This works as L3 Gateway/Router for internal network among same VN or different VN (virtual Network). That means to use the network internal only. With CRB-Gate Role, you can't send traffic internet (out of contrail network). Because with this role, for L3 Routing to the internet, 0.0.0.0/0 route is not imported.
2. DC-gateway :
  - This is to send traffic to internet. 0.0.0.0/0 default route on inet.0 is imported to VRF routing-instance with EVPN type5. Regarding this, It will be handled at lab test #4.

STEP 1 Create Fabric

**Assign role to 1 devices**

Physical Role \*   
 spine

Routing Bridging Roles   
 Route-Reflector x  
 CRB-Gateway x

Cancel Assign

STEP 5 (optional) Assign Telemetry Profiles

ROUTING ROLES	AUTOCONFIGURE
False	...
False	...

STEP 1 Create Fabric

STEP 2 Device discovery

**STEP 3 Assign the roles**

STEP 4 Autoconfigure

STEP 5 (optional) Assign Telemetry Profiles

**Assign to devices**

NAME	MANAGEMENT IP	NODE PROFILE	ROLE	ROUTING ROLES	AUTOCONFIGURE
v_16	172.27.122.195	juniper-mx	spine	Route-Reflector CRB-Gateway	True
QFX5100	172.27.122.197	juniper-qfx5k-lean	leaf	CRB-Access	True

> Telemetry skip

STEP 1 Create Fabric    STEP 2 Device discovery    STEP 3 Assign the roles    STEP 4 Autoconfigure    STEP 5 (optional) Assign Telemetry Profiles

### Assign Telemetry Profiles

<input type="checkbox"/> NAME	MANAGEMENT IP	ROLE	TELEMETRY PROFILE
<input type="checkbox"/> v_16	172.27.122.195	spine	- ...
<input type="checkbox"/> QFX5100	172.27.122.197	leaf	- ...

Previous Cancel Finish

## 2.6. After 'Fabric' registration done , creating VN (virtual network)

CONTRAIL COMMAND | INFRASTRUCTURE > Fabrics > FABRIC

Search

FAVORITES

MONITORING >

INFRASTRUCTURE >

OVERLAY >

**Fabric devices**

<input type="checkbox"/>	STATUS	NAME	MANAGEMENT IP	LOOPBACK	VENDOR	PRODUCT	ROLE
<input type="checkbox"/>	ACTIVE	v_16	172.27.122.195	3.3.3.71	Juniper	mx960	spine

OS Version 14.1X51-D65.21

OVERLAY > Virtual Networks > **Create Virtual Network**

Network Tags Permissions

Name\*

VN Fabric Type ☐ Routed ☒ Switched

Network Policies

Allocation Mode

VxLAN Network Identifier

Subnets

Network IPAM\*

CIDR\*

Allocation Pools

Gateway\*

Service Address

☒ Auto Gateway ☒ DHCP ☒ DNS

> DNS : if not needed, you can skip

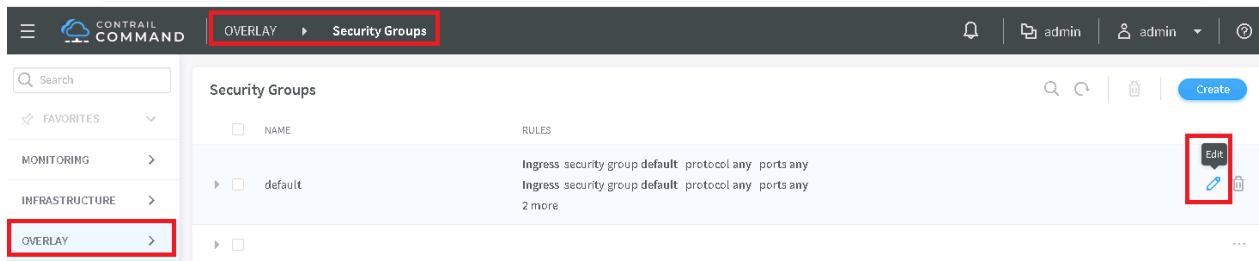
DNS Servers

DNS IP \*

168.126.63.1

+ Add

## 2.7. Create 'Security Group'



> Please set 'Security Group' like below.

Below parts are wrong. Later you are going to see, some problem related with ping failure.  
So later troubleshooting purpose, please set like below. And remember.

OVERLAY > Security Groups > Edit Security Group

Security Group

Tags

Permissions

Egress

IPv4

CIDR

0.0.0.0/0

Any

Port Range

0 - 65535

Direction

Ether Type

Type

Address

Protocol

Egress

IPv6

CIDR

::/0

Any

Port Range

0 - 65535

Direction

Ether Type

Type

Security Group \*

Ingress

IPv4

Security Group

default

Address

Protocol

Port Range

0.0.0.0/0

ICMP

0 - 65535

Direction

Ether Type

Type

Security Group \*

Egress

IPv4

Security Group

default

Address

Protocol

Port Range

0.0.0.0/0

ICMP

0 - 65535

> Actually below parts are correct settings. Later we will check it further.

Security Groups Rule(s) ⓘ

Direction ⓘ	EtherType ⓘ	Type ⓘ	Security Group* ⓘ	Address ⓘ	Protocol ⓘ
Ingress	IPv4	Security Group	default	0.0.0.0/0	Any
Port Range ⓘ 0 - 65535					

Direction ⓘ	EtherType ⓘ	Type ⓘ	Security Group* ⓘ	Address ⓘ	Protocol ⓘ
Ingress	IPv6	Security Group	default	::/0	Any
Port Range ⓘ 0 - 65535					

Direction ⓘ	EtherType ⓘ	Type ⓘ	Address ⓘ	Protocol ⓘ	Port Range ⓘ
Egress	IPv4	CIDR	0.0.0.0/0	Any	0 - 65535

Direction ⓘ	EtherType ⓘ	Type ⓘ	Address ⓘ	Protocol ⓘ	Port Range ⓘ
Egress	IPv6	CIDR	::/0	Any	0 - 65535

Direction ⓘ	EtherType ⓘ	Type ⓘ	Address ⓘ	Protocol ⓘ	Port Range ⓘ
Ingress	IPv4	CIDR	0.0.0.0/0	ICMP	0 - 65535

Direction ⓘ	EtherType ⓘ	Type ⓘ	Security Group* ⓘ	Address ⓘ	Protocol ⓘ
Egress	IPv4	Security Group	default	0.0.0.0/0	ICMP
Port Range ⓘ 0 - 65535					

[+ Add](#)

## 2.8. Create a VM instance, assign VN which you created above.

WORKLOADS ▶ Instances ▶ **Create Instance**

Server Type

☒ Virtual Machine ☐ New Baremetal Server ☐ Existing Baremetal Server

Instance Name\*

Green\_net\_40

Select Boot Source\*

Image

Select Image\*

Cirros

Select Flavor\*

Flavor\_1

Available Networks

Search networks

DISPLAY NAME

Create a network to allocate

Allocated Networks

Search Networks

DISPLAY NAME

VR-GREEN

security\_group

default ×

**Tips.**

Below “Availability Zone”, in drop box, you can see only ‘nova’. That means openstack create a VM instance in random compute node. If you want to point specific compute node to create a VM instance, there is a method. Login ‘OpenStack’ GUI, there is a option to name each compute node. After naming compute node, then go back to here “contrail-command GUI”, you can see the compute node you named..

Availability Zone\*

nova

Count (1-10)\*

1

Create

Cancel

## 2.9. Done creating 2 VMs.

WORKLOADS ▸ Instances

Instances

Create

	STATUS	NAME	STATE	SERVER TYPE	NETWORKS	IP ADDRESSES	CONSOLE
▶ <input type="checkbox"/>	<span></span>	Green_net_40_2	Power On: active	Virtual Server	VR-GREEN	40.40.40.4	...
▶ <input type="checkbox"/>	<span></span>	Green_net_40	Power On: active	Virtual Server	VR-GREEN	40.40.40.3	...

you created a VN (VR-GREEN) and assigned the VN to two VMs. On the right side, click on the icon of “compute” shape. Then do ping test between VM instances. You can see ping is reachable. That mean, they belong to the same network.

## 2.10. How to find VM Nex-Hop.

=> This topic will be handled at the next release. **“Finding Contrail vRouter NextHop.pdf”**



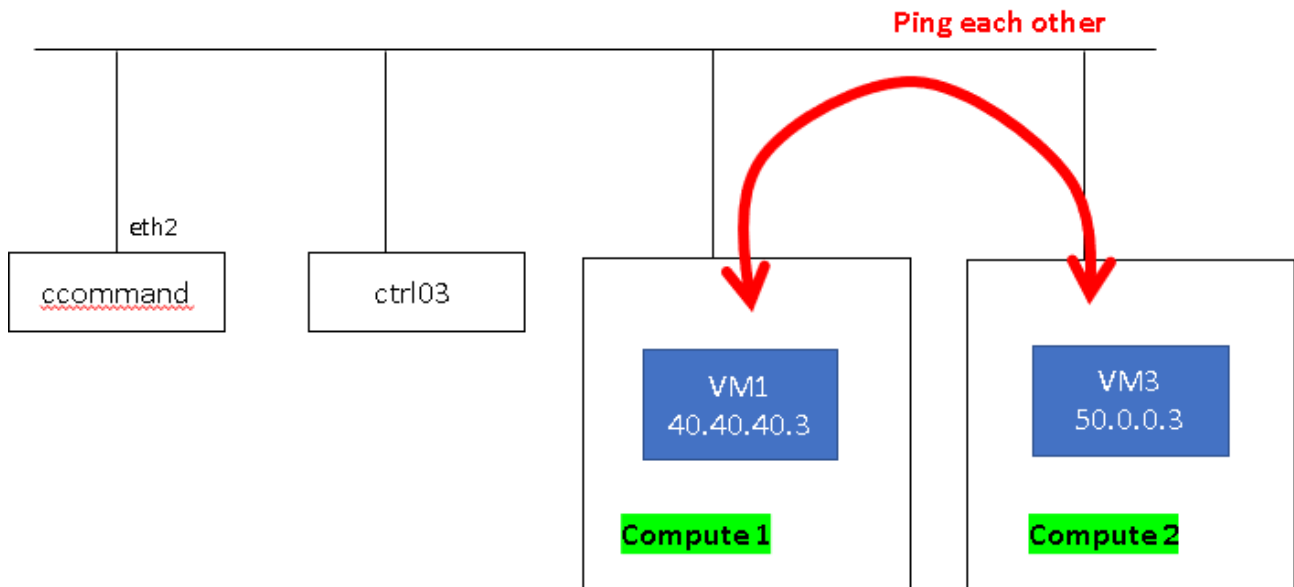
### 3. Lab test #2 : Creating 2 VMs and different VNs (Virtual Network)

**\*\* Key point : 2 VNs (Virtual-Network) are different network.**

**So to communicate different networks, you need a gateway. In contrail, it's called 'logical-router'.** In Contrail logical-router function consists of physical router or without physical router (just with contrail controller S/W function).

- At this time, we will do create a logical-router without physical router (just with contrail controller S/W function).
- It's easy. Create a new VN(Virtual Network 50.0.0.0/24), then create logical router and assign VNs (VN 40, VN 50) to the logical router.

#### > Lab Topo



### 3.1. Creating new VN (virtual Network) : 50-net

=> After you done creating new VN, the go/do 'Edit' mode, you can see VXLAN id automatically created.

OVERLAYVirtual NetworksEdit Virtual Networkadmin

NetworkTagsPermissions

Name \* VN\_50

VN Fabric Type RoutedSwitched

Network Policies Select Network Policies

Allocation Mode User defined subnet only

VxLAN Network Identifier 10

Subnets

Network IPAM \* default-domain:default...

CIDR \* 50.0.0.0/24

Allocation Pools xxx.xxx.xxx.xxx-xxx.xxx.xxx.xxx

Gateway \* 50.0.0.1

Service Address 50.0.0.2

☒ Auto Gateway☒ DHCP☐ DNS

+ Add

### 3.2. Creating new Instance, and associate VN 50-net

Instances

	STATUS	NAME	STATE	SERVER TYPE	NETWORKS	IP ADDRESSES	CONSOLE
		VM_50_net	Power On: active	Virtual Server	VN_50	50.0.0.3	
Details							
Name	VM_50_net			Disk Config	Manual		
Host	compute1-224.juniper.net			Status	active		
Config Drive	-			Event Type	-		
Created	01/21/2021 9:22:48 PM			Security Groups	default		
Availability Zone	nova			Networks	VN_50		
Launched at	01/22/2021 5:27:22 AM			Console			
		Green_net_40_2	Power On: active	Virtual Server	VR-GREEN	40.40.40.4	
		Green_net_40	Power On: active	Virtual Server	VR-GREEN	40.40.40.3	

### 3.3. Creating logical router and put 2 VNs (Net 40 and Net 50)

OVERLAY

Logical Routers

Edit Logical Router

Logical Router

Tags

Permissions

Name \*

Logical\_router\_1

Admin State

Up

Down

Logical Router Type

VXLAN Routing

Choose Fabric

Connected networks

VR-GREEN × VN\_50 ×

Extend to Physical Router

None

Reconfigure Physical Routers

Public Logical Router

NAT

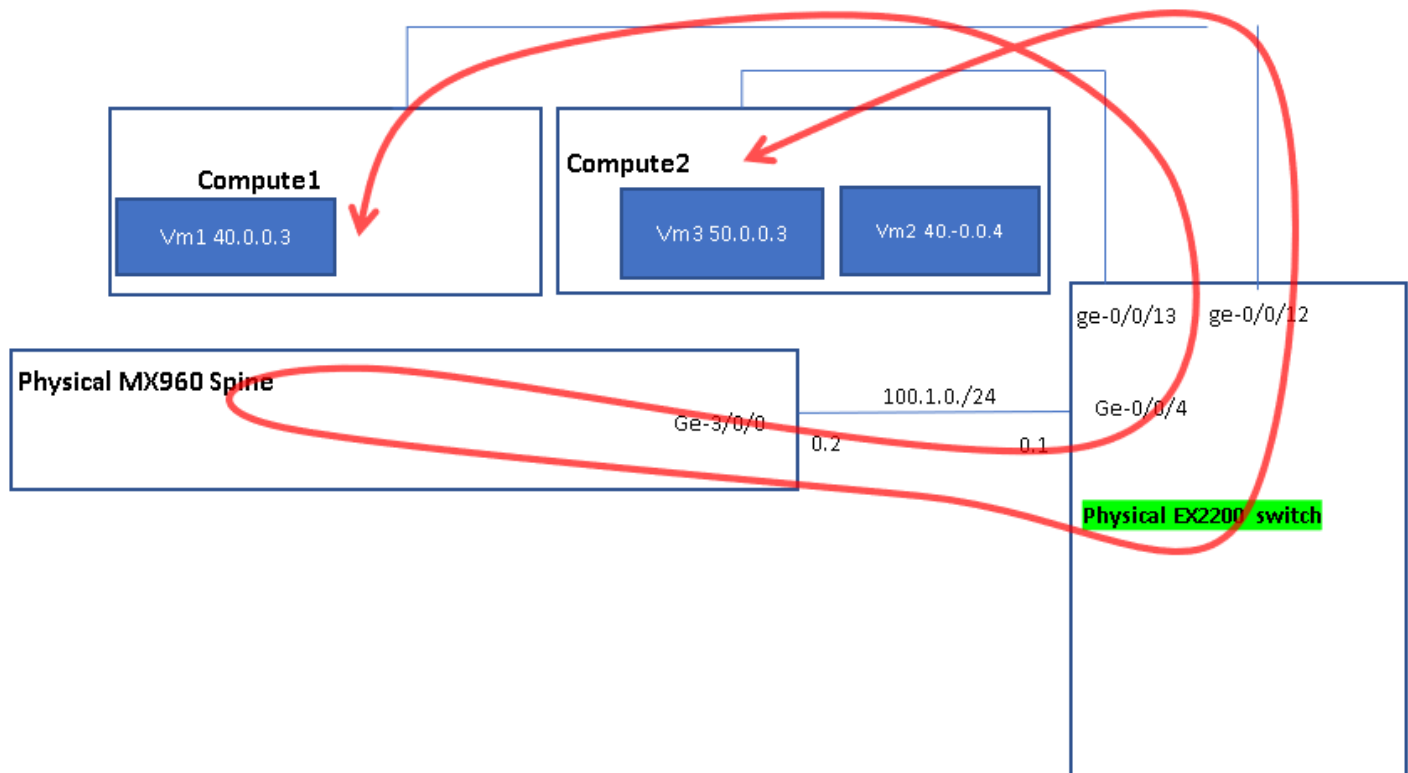
VxLAN Network Identifier

1 - 16777215

## 4. Lab test #3 : Central Routing for different VNs (Virtual Network)

=> implementing 'CRB-Gateway' function. That means with consisting logical-router function with Physical router

### > Lab Topo



### 4.1. Important & be minded for MX vs QFX spine role

When you use MX as Spine for CRB-Gateway or DC-Gateway Role, GRE tunnel interface creation needed, so relevant configuration ("set chassis fpc X pic X tunnel-services") required.

But in CASE QFX, GRE tunnel is not used, but VXLAN tunnel created via physical interface.

#### \* Dynamic-tunnel creation for Spine, below config being pushed by Contrail-Controller

For MX or vMX

```
lab@vmx_re# show | display set | match dyna
```

```
set groups __contrail_overlay_bgp__ routing-options dynamic-tunnels _contrail_udp_tunnel source-address 1.1.1.1
```

```
set groups __contrail_overlay_bgp__ routing-options dynamic-tunnels _contrail_udp_tunnel udp
```

```
set groups __contrail_overlay_bgp__ routing-options dynamic-tunnels _contrail_udp_tunnel destination-networks 192.168.200.0/24
```

#### \* For QFX

GRE tunnel interface not created, but VXLAN tunnel interface created via physical interface

## 4.2. What CRB-gateway (Central Routed Bridge) is

In Lab#2 we created a logical-router without Physical router.

At this time, we create Fabric with physical router and set physical router to logical-router.

So, for this task, please remove logical-router, which you created Lab#2, and create new logical-router for this chapter.

> For this task, When you set up Fabric (Lab#1 Fabric part), for roles, you have to set spine's role as to "Route-Reflector" and "CRB-Gateway". CRB(Centrally Routed Bridge)

> Please refer to YouTube

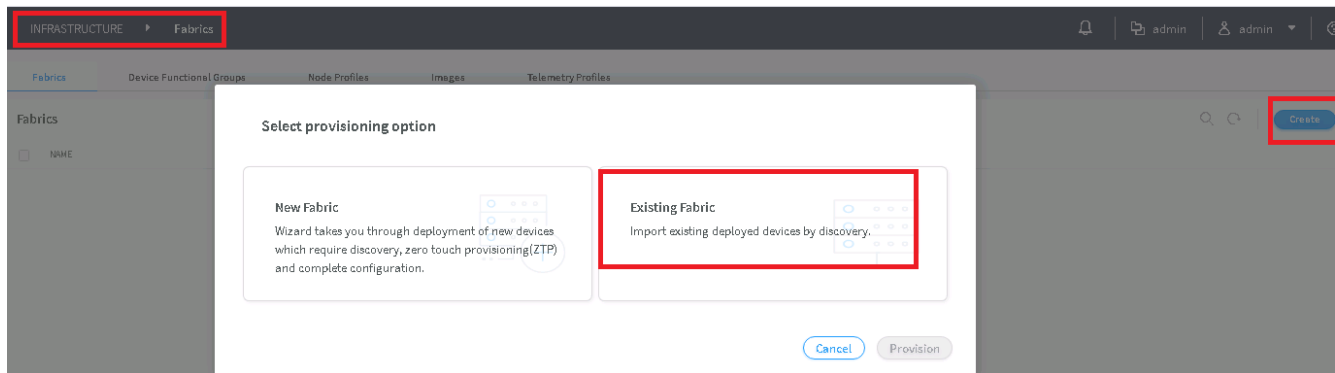
[Contrail Enterprise Multicloud: Central Routing - YouTube](#)

> From juniper web-site.

[https://www.juniper.net/documentation/en\\_US/release-independent/solutions/topics/task/configuration/existing-fabric-cem-configuring.html](https://www.juniper.net/documentation/en_US/release-independent/solutions/topics/task/configuration/existing-fabric-cem-configuring.html)

## 4.3. Create fabric & Create VN & Logical router

=> If you lookup the "Manual creating Fabric & enabling CRB-Gateway", you have to enable "vxlan routing". This option was in "Admin" page. But in contrailv2005, it moved to 'logical-router' configuring page.



STEP 1  
Create Fabric

STEP 2  
Device discovery

▼ Device credentials ⓘ

Username \*

root

Password \*

contrail123



+ Add

▼ Management subnets

CIDR \* ⓘ

172.27.122.195/32

Gateway ⓘ

Enter valid IPv4

+ Add

▼ Loopback subnets

CIDR \* ⓘ

3.3.3.71/32

+ Add

Assign role to 1 devices

Physical Role \* ⓘ

spine

Routing Bridging Roles ⓘ

CRB-Gateway ×

Route-Reflector ×

Cancel

Assign

OVERLAY
Logical Routers
Edit Logical Router

Logical Router
Tags
Permissions

Name \* ⓘ  
My-Logical router

Admin State ⓘ  
☒ Up ☐ Down

Logical Router Type ⓘ  
VXLAN Routing

Choose Fabric  
fabric

Connected networks ⓘ  
VN\_50 × VN\_40 ×

Extend to Physical Router ⓘ  
MX960\_spine ×

☐ Public Logical Router ⓘ

☒ NAT

VXLAN Network Identifier

Reconfigure Physical Routers ⓘ

OVERLAY
Virtual Networks

All networks

<input type="checkbox"/>	NAME ↕	VIRTUAL PORT ↕	INSTANCES ↕	SUBNETS	ROUTED	TAGS	
<input type="checkbox"/>	LR::My-Logical router	0	0	-	NO	-	...
<input type="checkbox"/>	VN_50	2	1	50.0.0.0/24	NO	-	...
<input type="checkbox"/>	VN_40	3	2	40.0.0.0/24	NO	-	...

## 4.4. Be cautious

### 1). While setting 'Logical Router'

checkbox option "Public Logical Router". For this task, PLEASE DO NOT select the box. Just be empty. That option means to use Fabric as to "DC-gateway" using EVPN type, So in Fabric DC-gateway role has to be added. If you see juniper web portal, officially it says "to use DC-gateway, please select that". But in my test it didn't work. For DC-gateway there is another method, we will cover that later Lab test.

> Please check if your Spine and Leaf device has right version installed.

Table 2: Supported MX Series Routers

Table 1: Supported QFX Series Switches[illegible]



## 4.4. If ping is not reachable between VM1(40 net) and VM3(50 net)

1). After you done setting above, if ping is unreachable, you have to check underlay environment. Maybe ping from compute node to MX/QFX loopback would be unreachable. One thing Important is when you set up contrail Fabric, it does for only overlay part. So for the underlay network, you have to set it properly so that among compute node and MX/QFX loopback must be reachable.

> On Compute2 node, do ping to MX960 loopback. If ping is unreachable, please adds Route properly.

```
[root@compute2-225 ~]# ping 3.3.3.71
```

```
[root@compute2-225 ~]# netstat -rn
```

Kernel IP routing table

Destination	Gateway	Genmask	Flags	MSS Window	irrt Iface
0.0.0.0	172.27.122.254	0.0.0.0	UG	0 0	0 enp5s0f0
100.0.0.0	0.0.0.0	255.255.255.0	U	0 0	0 vhost0
169.254.0.3	0.0.0.0	255.255.255.255	UH	0 0	0 vhost0
172.17.0.0	0.0.0.0	255.255.0.0	U	0 0	0 docker0
172.27.122.0	0.0.0.0	255.255.255.0	U	0 0	0 enp5s0f0

```
[root@compute2-225 ~]# ip route add 3.3.3.0/24 via 100.0.0.240 ←=== 100.0.0.240 is EX switch Vlan interface ip (gateway = irb ip address)
```

```
[root@compute2-225 ~]# netstat -rn
```

Kernel IP routing table

Destination	Gateway	Genmask	Flags	MSS Window	irrt Iface
0.0.0.0	172.27.122.254	0.0.0.0	UG	0 0	0 enp5s0f0
3.3.3.0	100.0.0.240	255.255.255.0	UG	0 0	0 vhost0
100.0.0.0	0.0.0.0	255.255.255.0	U	0 0	0 vhost0
169.254.0.3	0.0.0.0	255.255.255.255	UH	0 0	0 vhost0
172.17.0.0	0.0.0.0	255.255.0.0	U	0 0	0 docker0
172.27.122.0	0.0.0.0	255.255.255.0	U	0 0	0 enp5s0f0

```
[root@compute2-225 ~]# ping 3.3.3.71
```

```
PING 3.3.3.71 (3.3.3.71) 56(84) bytes of data.
```

```
64 bytes from 3.3.3.71: icmp_seq=1 ttl=62 time=5.01 ms
```

```
64 bytes from 3.3.3.71: icmp_seq=2 ttl=62 time=0.600 ms
```

2). If ping still not reachable, check if gre tunnel interface created properly.

For L2 network, vxlan tunnel used.

But L3 network (using 'Extending Physical Router'), GRE tunnel used. So gre interface has to be up and check it's status installed correctly. ("show dynamic-tunnels database")

> How to enable GRE interface.

```
test@MX960_spine# show chassis
```

```
fpc 3 {
```

```
  pic 0 {
```

```
    tunnel-services { ←=== please set tunnel service based on your FPC type properly.
```

```
      bandwidth 1g/10g;
```

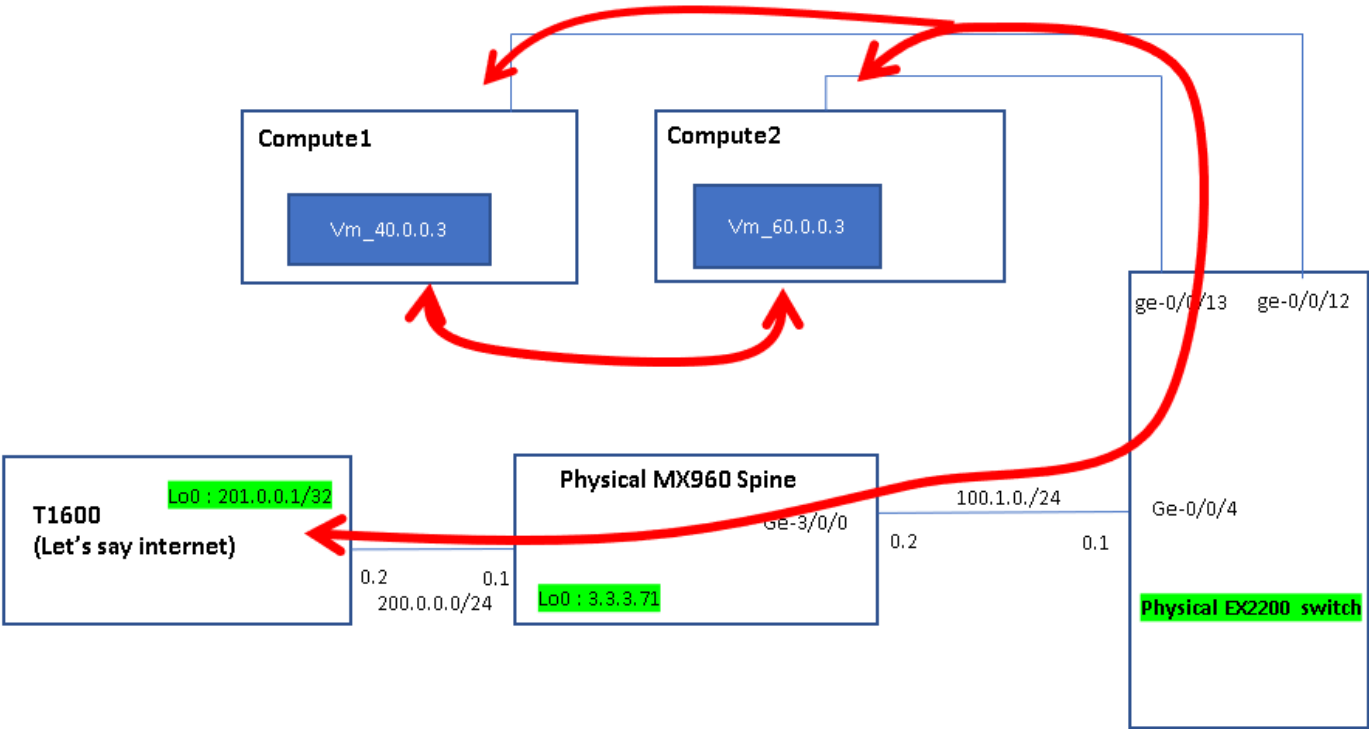
```
    }
```

```
  }
```

```
}
```

# 5. Lab test #4 : Ping to Internet and Ping between VMs (L3 Gateway)

> Lab Topo



## 5.1. Key points at this lab.

1. In Fabric spine, you should add roles “DC-Gateway” and “CRB-Gateway”.  
So remove Fabric set in Lab#3, add new roles “DC-Gateway” and “CRB-Gateway” to spine.
2. Logical-Router setting view in GUI, you have to select “Public logical Router” option box. This enables you to inet.0 FBF. So that you can do internet. Please refer to Youtube below reference.
3. Key important, for internet, EVPN type5 used, so under L3 VPN VRF instance, 0.0.0.0/0 next-table inet.0 imported, and return traffic from internet, Filter Based Forwarding applied and leaked to VRF instance.  
**Below picture shows importance concept, please reminded.**
4. There is another method to send traffic to internet. If you studied JNCIE-DC, There it’s addressed. For L2 switching instance virtual-switch used, for L3 routing, instance virtual-router used.
5. MX and QFX show different behavior regarding tunnel interface.

MX/vMX creates dynamic-tunnel interface for Spine, but vQFX doesn’t create instead VXLAN tunnel.

1) For MX or vMX : below config pushed. you have to set/enable tunnel interface.

```
lab@vmx_re# show | display set | match dyna
set groups __contrail_overlay_bgp__ routing-options dynamic-tunnels _contrail_udp_tunnel source-address 1.1.1.1
set groups __contrail_overlay_bgp__ routing-options dynamic-tunnels _contrail_udp_tunnel udp
set groups __contrail_overlay_bgp__ routing-options dynamic-tunnels _contrail_udp_tunnel destination-networks 192.168.200.0/24
```

```
test@MX960_spine# show chassis
fpc 3 {
  pic 0 {
    tunnel-services {
      bandwidth 1g;
    }
  }
}
```

2) For vQFX

Dynamic-tunnel not created, but VXLAN tunnel interface created via physical interface  
Please refer to “Lab test#5” below

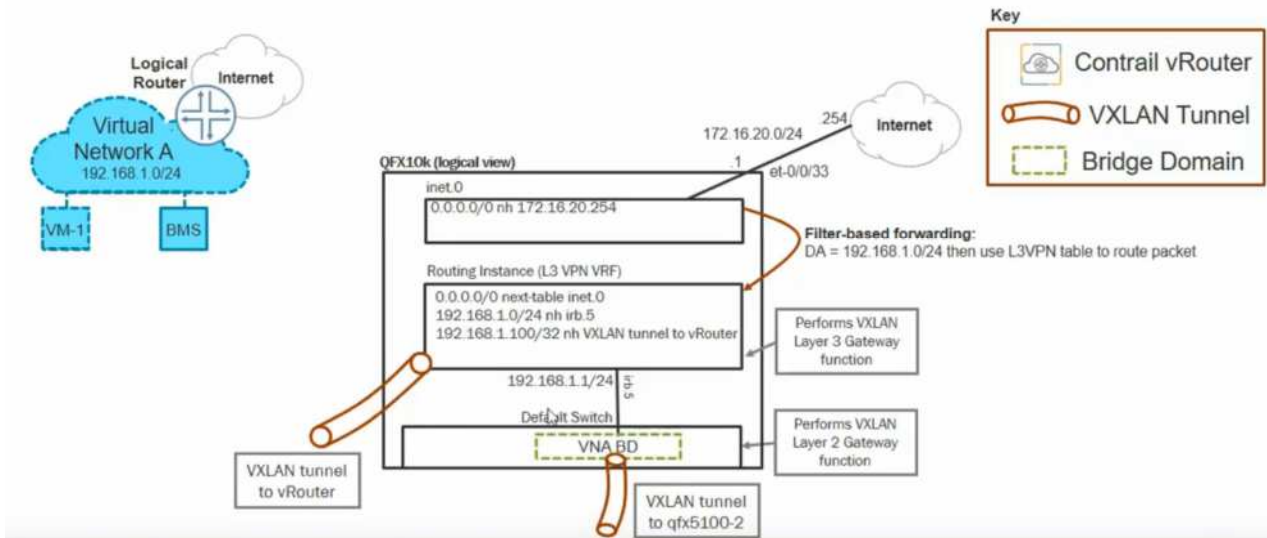
> Juniper Learning Byte. (How to set it up.)

<https://youtu.be/MgXbC1Ool7c>

## 5.2. Key functionality for DC-gateway

> Capture “Kye informatoin” from Juniper learning bye YouTube. (refer to above link)

- Forwarding path for publically routed traffic



- There must be existing...
  - Contrail cluster with Contrail Command user interface in place
  - VXLAN routing enabled
  - Onboarded IP fabric with EVPN/VXLAN overlay signaling established
    - Spine nodes assigned CRB-Gateway role and DC-Gateway role
    - Leaf nodes assigned CRB-Access role

## 5.3. Setting up Fabric configuration & correction

1). Remove 'Fabric' config of Contrail-command.

While you are Fabric setting up, please run Fabric ansible monitoring for debugging purpose.

```
[root@controller-222 ~]# tail -f /var/log/contrail/contrail-fabric-ansible-playbooks.log
```

2). For exist VM and VN, please keep them. You need to remove only 'Logical-Router' and 'Fabric' configuration.

### Fabric devices

								Action	
	STATUS	NAME	MANAGEMENT	LOOPBACK	VENDOR NAME	PRODUCT NAME	ROLE	ROUTING BFB	INTERFACES
▶	CHANGED	vmx_re		1.1.1.1	Juniper	mx480	spine	CRB-Gateway DC-Gateway 1 more	26 ...

**\*\* Please be aware of that.**

CIDR for Management and Loopback, please subnet '/32'. If you put /24, Fabric tries to discover all equip under /24. Sometimes, it causes Fabric registration failure. So please be specific.

Assign role to 1 devices

Physical Role\* ⓘ  
spine

Routing Bridging Roles ⓘ  
DC-Gateway ×  
CRB-Gateway ×  
Route-Reflector ×

Cancel

Assign

> Create just normal 2 Virtual Networks

All networks



Create

<input type="checkbox"/>	NAME	VIRTUAL PORTS	INSTANCES	SUBNETS	ROUTED
<input type="checkbox"/>	VN_60	2	0	60.0.0.0/24	NO
<input type="checkbox"/>	VN_40	2	0	40.0.0.0/24	NO

OVERLAY > Virtual Networks > Edit Virtual Network

Network Tags Permissions

Name\* ⓘ  
VN\_40

VN Fabric Type ⓘ  
Routed Switched

Network Policies ⓘ  
Select Network Policies

Allocation Mode ⓘ  
User defined subnet only

VxLAN Network Identifier ⓘ  
9

Subnets

Network IPAM\* ⓘ  
default-domain:default...

CIDR\* ⓘ  
40.0.0.0/24

Allocation Pools ⓘ  
xxx.xxx.xxx.xxx-xxx.xxx.xxx.xxx

Gateway\* ⓘ  
40.0.0.1

Service Address ⓘ  
40.0.0.2

☒ Auto Gateway ⓘ ☒ DHCP ⓘ

> Create 2 Logical-Router, and assign each VN to each Logical-Router

OVERLAY ▸ Logical Routers						
Logical Routers					🔍	🔄
<input type="checkbox"/>	NAME ▾	CONNECTED NETWORKS ▾	CONNECTED NETWORK COUNT ▾	ROUTED VIRTUAL NETWORKS ▾		
▶ <input type="checkbox"/>	LR-60	VN_60	1	0		
▶ <input type="checkbox"/>	LR-40	VN_40	1	0		
▶ <input type="checkbox"/>	fabric-master-LR		0	0		

OVERLAY ▸ Logical Routers ▸ Create Logical Router

Logical Router | Tags | Permissions

Name\* ⓘ

Admin State ⓘ  
☒ Up ☐ Down

Logical Router Type ⓘ

Choose Fabric

Connected networks ⓘ

Extend to Physical Router ⓘ

External Gateway











☒ Public Logical Router ⓘ

☒ NAT

VxLAN Network Identifier

Reconfigu


> Create 2 instances.

Instances 											
<input type="checkbox"/>	STATUS	NAME	STATE	SERVER TYPE	NETWORKS	IP ADDRESS	CONSOLE				
 <input type="checkbox"/>		VM_60	Power On: ac	Virtual Se...	VN_60	60.0.0.3					
 <input type="checkbox"/>		VM_40	Power On: ac	Virtual Se...	VN_40	40.0.0.3					

## 5.4. After all setting done, do ping test between VMs and to Internet

- 1). Once you done, ping test VMs(60.0.0/24, 40.0.0/24) to Internet(201.0.0.1 lo of T1600), it must be reachable.
- 2). If at Lab test#1, if you set 'Security group' like below, ping between VMs (60.0.0.3 <-->40.0.0.3) is unreachable.  
Please refer to below correct 'Security group' set.

> bad 'Security group' set

OVERLAY ▶ Security Groups ▶ Edit Security Group 

Security Group

Tags

Permissions


Egress


IPv4


CIDR


0.0.0.0/0


Any


Port Range   
0 - 65535

Direction 

Ether Type 

Type 

Address 

Protocol 


Egress


IPv6


CIDR


::/0


Any

Port Range   
0 - 65535

Direction 

Ether Type 

Type 


Security Group\* 


Ingress


IPv4

Security Group

default

Address 


Protocol 


Port Range 


0.0.0.0/0


ICMP

0 - 65535

Direction 

Ether Type 

Type 


Security Group\* 


Egress


IPv4

Security Group

default

Address 

Protocol 

Port Range 

0.0.0.0/0

ICMP

0 - 65535

## > Correct 'Security group'

Security Group Rule(s) ⓘ

Direction ⓘ Ingress	Ether Type ⓘ IPv4	Type ⓘ Security Group	Security Group * ⓘ default	Address ⓘ 0.0.0.0/0	Protocol ⓘ Any
Port Range ⓘ 0 - 65535					

Direction ⓘ Ingress	Ether Type ⓘ IPv6	Type ⓘ Security Group	Security Group * ⓘ default	Address ⓘ ::/0	Protocol ⓘ Any
Port Range ⓘ 0 - 65535					

Direction ⓘ Egress	Ether Type ⓘ IPv4	Type ⓘ CIDR	Address ⓘ 0.0.0.0/0	Protocol ⓘ Any	Port Range ⓘ 0 - 65535
-----------------------	----------------------	----------------	------------------------	-------------------	---------------------------

Direction ⓘ Egress	Ether Type ⓘ IPv6	Type ⓘ CIDR	Address ⓘ ::/0	Protocol ⓘ Any	Port Range ⓘ 0 - 65535
-----------------------	----------------------	----------------	-------------------	-------------------	---------------------------

Direction ⓘ Ingress	Ether Type ⓘ IPv4	Type ⓘ CIDR	Address ⓘ 0.0.0.0/0	Protocol ⓘ ICMP	Port Range ⓘ 0 - 65535
------------------------	----------------------	----------------	------------------------	--------------------	---------------------------

Direction ⓘ Egress	Ether Type ⓘ IPv4	Type ⓘ Security Group	Security Group * ⓘ default	Address ⓘ 0.0.0.0/0	Protocol ⓘ ICMP
Port Range ⓘ 0 - 65535					

+ Add

3). After correcting 'Security group' set, if ping still not reachable, please check Underlay between compute node and controller node.

Ping between controller/compute and lo0 of MX, must be reachable.

Contrail only cares for overlay. So underlay must be set implemented by operator manually.

> on Compute2, ping is not reachable to MX960 loopback. After adding route, ping successful

```
[root@test:test ~]# ping 1.1.1.1
```

```
[root@test:test ~]# yum -y install net-tools
```

```
[root@test:test ~]# netstat -rn
```

Kernel IP routing table

Destination	Gateway	Genmask	Flags	MSS Window	irrt Iface
0.0.0.0	10.49.127.254	0.0.0.0	UG	0 0	0 eth0
169.254.0.0	0.0.0.0	255.255.0.0	U	0 0	0 eth0
169.254.0.0	0.0.0.0	255.255.0.0	U	0 0	0 eth1
169.254.0.1	0.0.0.0	255.255.255.255	UH	0 0	0 vhost0
169.254.0.3	0.0.0.0	255.255.255.255	UH	0 0	0 vhost0
172.17.0.0	0.0.0.0	255.255.0.0	U	0 0	0 docker0
192.168.200.0	0.0.0.0	255.255.255.0	U	0 0	0 vhost0
192.168.255.0	0.0.0.0	255.255.255.0	U	0 0	0 eth1

```
[root@test:test ~]# ip route add 1.1.1.1/32 via 192.168.200.254 ←=== 192.168.200.254 is gateway ip addr
```

```
[root@test:test ~]# netstat -rn
```

Kernel IP routing table

Destination	Gateway	Genmask	Flags	MSS Window	irrt Iface
0.0.0.0	10.49.127.254	0.0.0.0	UG	0 0	0 eth0
1.1.1.1	192.168.200.254	255.255.255.255	UGH	0 0	0 vhost0
169.254.0.0	0.0.0.0	255.255.0.0	U	0 0	0 eth0
169.254.0.0	0.0.0.0	255.255.0.0	U	0 0	0 eth1
169.254.0.1	0.0.0.0	255.255.255.255	UH	0 0	0 vhost0
169.254.0.3	0.0.0.0	255.255.255.255	UH	0 0	0 vhost0
172.17.0.0	0.0.0.0	255.255.0.0	U	0 0	0 docker0



```
192.168.200.0 0.0.0.0 255.255.255.0 U 0 0 0 vhost0
192.168.255.0 0.0.0.0 255.255.255.0 U 0 0 0 eth1
```

```
[root@test:test ~]# ping 1.1.1.1
PING 1.1.1.1 (1.1.1.1) 56(84) bytes of data.
64 bytes from 1.1.1.1: icmp_seq=1 ttl=62 time=339 ms
64 bytes from 1.1.1.1: icmp_seq=2 ttl=62 time=124 ms
```

4). But if still, ping not reachable, check if gre tunnel interface created properly. It's only applicable to MX/vMX. For QFX you don't need gre tunnel interface. VXLAN tunnel interface used on physical interface.

At this lab, for L2 switching vxlan encapsulation used, but for L3 routing between vRouter and MX/vMX, gre tunnel interface used

**> for MX/vMX, please check if gre interface is up or not.**

```
test@MX960_spine# show chassis
fpc 3 {
  pic 0 {
    tunnel-services {
      bandwidth 1g;
    }
  }
}

test@MX960_spine#run show dynamic-tunnels database
```

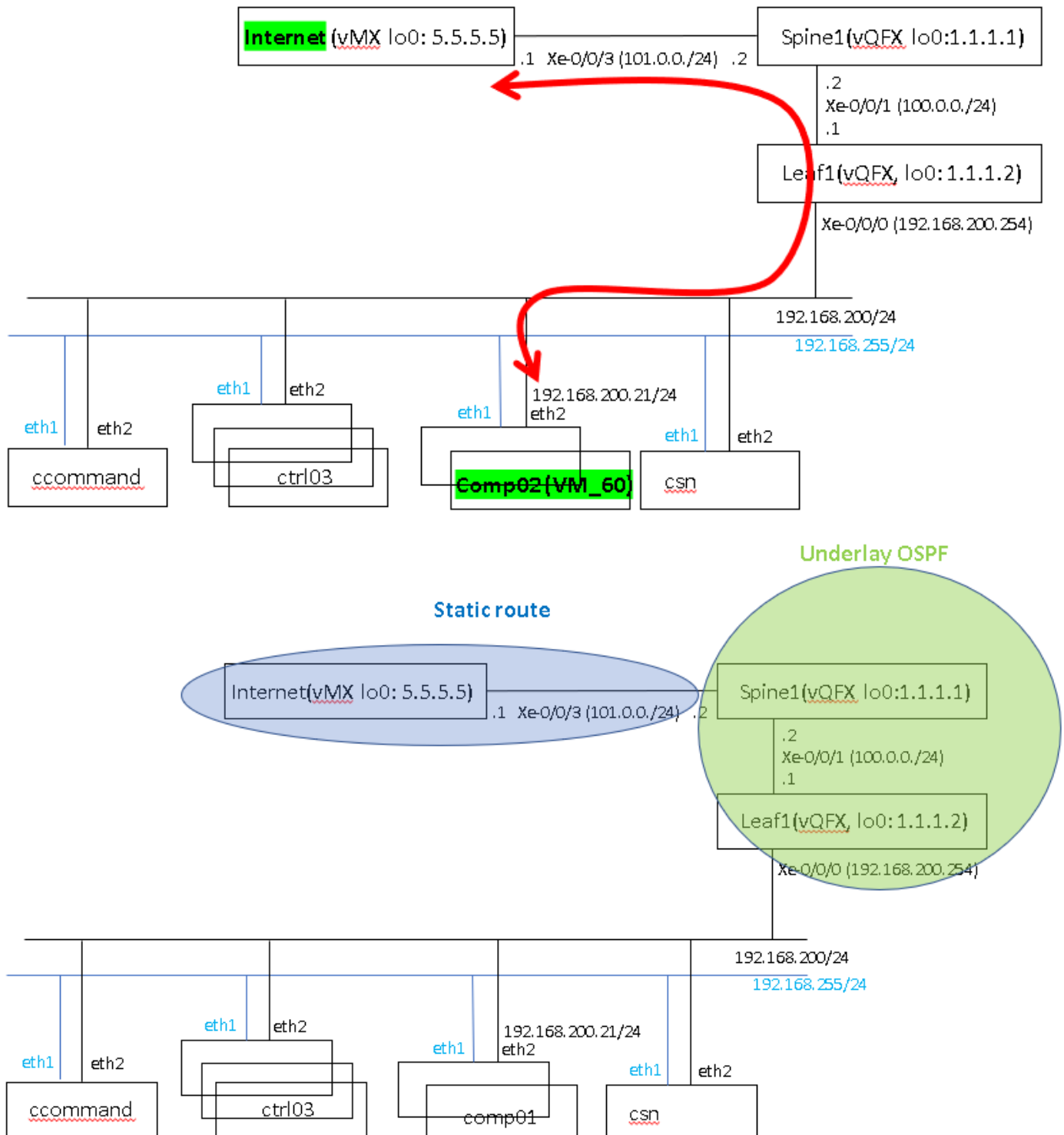
5). But ping still not reachable, for troubleshooting in detail, I will release next Doc 'Finding vRouter NH', and refer to that

## 6. Lab test #5 : Ping to Internet (Spine & leaf)

\*\* This is new lab environment, so different from previous Lab test#1,#2, #3,#4.

Basically not that much different on this test, but only Spine/Leaf used

### > Lab Topo



## 6.1. Important & be minded for MX vs QFX spine role.

When you use MX as Spine for CRB-Gateway or DC-Gateway Role, GRE tunnel interface creation needed, so relevant configuration (“ set chassis fpc X pic X tunnel-services”) required.

But in CASE QFX, GRE tunnel is not used, but VXLAN tunnel created via physical interface.

\* For MX or vMX, below config being pused by contrail-controller

```
lab@vmx_re# show | display set | match dyna
```

```
set groups __contrail_overlay_bgp__ routing-options dynamic-tunnels _contrail_udp_tunnel source-address 1.1.1.1
```

```
set groups __contrail_overlay_bgp__ routing-options dynamic-tunnels _contrail_udp_tunnel udp
```

```
set groups __contrail_overlay_bgp__ routing-options dynamic-tunnels _contrail_udp_tunnel destination-networks 192.168.200.0/24
```

\* For QFX

GRE tunnel interface not created, but VXLAN tunnel interface created via physical interface

## 6.2. Configurations for an infrastructure. (vMX, vQFX, Computes, Controllers)

### > vMX

```
set interfaces ge-0/0/3 unit 0 family inet address 101.0.0.1/24
```

```
set interfaces lo0 unit 0 family inet address 5.5.5.5/32
```

```
set routing-options static route 40.0.0.0/24 next-hop 101.0.0.2
```

```
set routing-options static route 60.0.0.0/24 next-hop 101.0.0.2
```

### > vQFX : Spine1

```
set interfaces xe-0/0/1 unit 0 family inet address 100.0.0.2/24
```

```
set interfaces xe-0/0/3 unit 0 family inet address 101.0.0.2/24
```

```
set interfaces lo0 unit 0 family inet address 1.1.1.1/32
```

```
set routing-options static route 1.1.1.3/32 next-hop 101.0.0.1
```

```
set routing-options static route 5.5.5.0/24 next-hop 101.0.0.1
```

```
set protocols ospf area 0.0.0.0 interface lo0.0
```

```
set protocols ospf area 0.0.0.0 interface xe-0/0/1.0
```

### > vQFX : leaf1

```
set interfaces xe-0/0/0 unit 0 family inet address 192.168.200.254/24
```

```
set interfaces xe-0/0/1 unit 0 family inet address 100.0.0.1/24
```

```
set interfaces lo0 unit 0 family inet address 1.1.1.2/32
```

```
set protocols ospf area 0.0.0.0 interface lo0.0
```

```
set protocols ospf area 0.0.0.0 interface xe-0/0/1.0
```

```
set protocols ospf area 0.0.0.0 interface xe-0/0/0.0
```

### > Compute node(comp01/02), Controller node (ctrl01/02/03)

```
[root@test:test ~]#ip route add 1.1.1.0/24 via 192.168.200.254
```

```
[root@test:test ~]# netstat -rn
```

Kernel IP routing table

Destination	Gateway	Genmask	Flags	MSS Window	irtt	Iface
~						
1.1.1.0	192.168.200.254	255.255.255.0	UG	0 0		0 vhost0
~						

```
[root@test:test ~]# ping 1.1.1.1    <== ping must be reachable to Spine/leaf lo0 address from compute and controller.
PING 1.1.1.1 (1.1.1.1) 56(84) bytes of data.
64 bytes from 1.1.1.1: icmp_seq=1 ttl=62 time=119 ms
```

## 6.3. Setting up Fabric configuration & correction

1) Add Fabric Spine and leaf, and assign each role properly.

**\*\* Then check IBGP connection properly established with Spine/Leaf and Controllers.**

**Fabric devices**

STATUS	NAME	MANAGEMENT IP	LOOPBACK IP	VENDOR NAME	PRODUCT NAME	ROLE	ROUTING BRIDGING	INTERFACES
ACTIVE	spine1_re		1.1.1.1	Juniper	vqfx-10000	spine	CRB-Gateway DC-Gateway 1 more	13

**Details**

Name	spine1_re	OS Version	19.4R1.10
Management IP		Serial Number	35486681751
Loopback IP	1.1.1.1	Management MAC	-
Vendor name	Juniper	Telemetry Profile	-
Role	spine		
Routing Bridging Roles	CRB-Gateway DC-Gateway Route-Reflector		

ACTIVE	leaf1_re		1.1.1.2	Juniper	vqfx-10000	leaf	CRB-Access	13
--------	----------	--	---------	---------	------------	------	------------	----

**Details**

Name	leaf1_re	OS Version	19.4R1.10
Management IP		Serial Number	44480155733
Loopback IP	1.1.1.2	Management MAC	-
Vendor name	Juniper	Telemetry Profile	-
Role	leaf		
Routing Bridging Roles	CRB-Access		

## 2). Create VN(Virtual Network)

Network

Tags

Permissions

Name\* ⓘ

vn\_60

VN Fabric Type ⓘ

Routed

Switched

Network Policies ⓘ

Select Network Policies

Allocation Mode ⓘ

User defined subnet only

VxLAN Network Identifier ⓘ

7

Subnets

Network IPAM\* ⓘ

default-domain:default...

CIDR\* ⓘ

60.0.0.0/24

Allocation Pools ⓘ

xxx.xxx.xxx.xxx-xxx.xxx.xxx.xxx

Gateway\* ⓘ

60.0.0.1

Service Address ⓘ

60.0.0.2

☒ Auto Gateway ⓘ

☒ DHCP ⓘ

☐ DNS ⓘ

## 3) Create logical-router

=> please be aware of “Public Logical Router” option below. That is for evpn-type5. So we can send traffic to internet by importing default route.

OVERLAY

Logical Routers

Create Logical Router

Logical Router

Tags

Permissions

Name\* ⓘ

lr-60

Admin State ⓘ

☒ Up ☐ Down

Logical Router Type ⓘ

VXLAN Routing

Choose Fabric

Fabric

Connected networks ⓘ

vn\_60 ×

Extend to Physical Router ⓘ

spine1\_re ×

☒ Public Logical Router ⓘ

☒ NAT

VxLAN Network Identifier

1 - 16777215

Reconfigure Physical Routers ⓘ

#### 4). Check "Security Group", allow Ingress/Egress

Security Group	Tags	Permissions
Auto		
Security Groups Rule(s) ?		
Direction ? Ingress	Ether Type ? IPv4	Type ? Security Group
Protocol ? Any	Port Range ? 0 - 65535	Security Group * ? default
Address ? 0.0.0.0/0		
Direction ? Egress	Ether Type ? IPv4	Type ? CIDR
Address ? 0.0.0.0/0		
Protocol ? Any		
Port Range ? 0 - 65535		
Direction ? Ingress	Ether Type ? IPv4	Type ? CIDR
Address ? 0.0.0.0/0		
Protocol ? Any		
Port Range ? 0 - 65535		
Direction ? Egress	Ether Type ? IPv4	Type ? Security Group
Protocol ? Any	Port Range ? 0 - 65535	Security Group * ? default
Address ? 0.0.0.0/0		

#### 5) create Instance "VM\_60"

WORKLOADS ▶ Instances ▶ Create Instance

Server Type ?  
☒ Virtual Machine ☐ New Baremetal Server ☐ Existing Baremetal Server

Instance Name \*  
VM\_60

Select Boot Source \*  
Image

Select Image \*  
cirros2

Select Flavor \* ?  
tiny-128

Available Networks

Allocated Networks

vn\_60  
security\_group  
default

## 6.3. What to check

### 1). Check Spine and Leaf node made IBGP connections with controllers.

```
lab@spine1_re# run show bgp summary
Threading mode: BGP I/O
Groups: 1 Peers: 4 Down peers: 0
Table          Tot Paths  Act Paths Suppressed    History Damp State    Pending
bgp.rtarget.0
                29         17         0         0         0         0
bgp.l3vpn.0
                8          6         0         0         0         0
bgp.l3vpn-inet6.0
                0          0         0         0         0         0
bgp.evpn.0
                32         16         0         0         0         0
Peer           AS      InPkt   OutPkt   OutQ   Flaps Last Up/Dwn State|#Active/Received/Accepted/Damped...
1.1.1.2        64512      276    284      0      0      2:01:57 Establ ←=== with Leaf
  __default_evpn__.evpn.0: 0/0/0/0
  bgp.evpn.0: 0/0/0/0
  bgp.rtarget.0: 0/1/1/0
  default-switch.evpn.0: 0/0/0/0
192.168.200.11 64512      239    263      0      0      1:47:48 Establ ←=== Controller1
  __contrail_LR-40_5dae0b2b-337f-4733-bbdc-21e66a5deae5.evpn.0: 1/1/1/0
  __contrail_lr-60_85a1c66c-dae4-4675-880b-c5d7d3f30cfa.evpn.0: 1/1/1/0
  __default_evpn__.evpn.0: 0/0/0/0
  bgp.evpn.0: 16/16/16/0
  bgp.l3vpn-inet6.0: 0/0/0/0
  bgp.l3vpn.0: 4/4/4/0
  bgp.rtarget.0: 7/12/12/0
  default-switch.evpn.0: 10/10/10/0
192.168.200.12 64512      239    276      0      0      1:47:32 Establ ←=== Controller2
  __contrail_LR-40_5dae0b2b-337f-4733-bbdc-21e66a5deae5.evpn.0: 0/1/1/0
  __contrail_lr-60_85a1c66c-dae4-4675-880b-c5d7d3f30cfa.evpn.0: 0/1/1/0
  __default_evpn__.evpn.0: 0/0/0/0
  bgp.evpn.0: 0/16/16/0
  bgp.l3vpn-inet6.0: 0/0/0/0
  bgp.l3vpn.0: 2/4/4/0
  bgp.rtarget.0: 7/12/12/0
  default-switch.evpn.0: 0/10/10/0
192.168.200.13 64512      220    255      0      0      1:47:09 Establ ←=== Controller3
  __default_evpn__.evpn.0: 0/0/0/0
  bgp.evpn.0: 0/0/0/0
  bgp.l3vpn-inet6.0: 0/0/0/0
  bgp.l3vpn.0: 0/0/0/0
  bgp.rtarget.0: 3/4/4/0
  default-switch.evpn.0: 0/0/0/0
```

> Check routing-instance , table and VXLAN tunnel created properly.

```
lab@spine1_re# run show route table ?
Possible completions:
<table>          Name of routing table
:vlan.inet.0
  __contrail_LR-40_5dae0b2b-337f-4733-bbdc-21e66a5deae5.evpn.0
  __contrail_LR-40_5dae0b2b-337f-4733-bbdc-21e66a5deae5.inet.0
  __contrail_LR-40_5dae0b2b-337f-4733-bbdc-21e66a5deae5.inet6.0
  __contrail_lr-60_85a1c66c-dae4-4675-880b-c5d7d3f30cfa.evpn.0 ←==== EVPN type5
  __contrail_lr-60_85a1c66c-dae4-4675-880b-c5d7d3f30cfa.inet.0 ←== vrf routing-instance for VM_60
  __contrail_lr-60_85a1c66c-dae4-4675-880b-c5d7d3f30cfa.inet6.0
```

```

__default_evpn__.evpn.0
bgp.evpn.0
bgp.l3vpn.0
bgp.rtarget.0
default-switch.evpn-mcsn.1
default-switch.evpn.0
inet.0
inet6.0
{master:0}[edit]
lab@spine1_re# run show route table __contrail_lr-60_85a1c66c-dae4-4675-880b-c5d7d3f30cfa.inet.0

__contrail_lr-60_85a1c66c-dae4-4675-880b-c5d7d3f30cfa.inet.0: 7 destinations, 7 routes (6 active, 0 holddown, 1 hidden)
@ = Routing Use Only, # = Forwarding Use Only
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0          *[Static/5] 00:25:28
                   to table inet.0
60.0.0.0/24        *[Direct/0] 00:25:28
                   > via irb.7
60.0.0.1/32        *[Local/0] 00:25:28
                   Local via irb.7
60.0.0.3/32        *[EVPN/170] 00:25:28
                   > to 100.0.0.1 via xe-0/0/1.0  ←=== xe-0/0/1 is Vxlan tunnel between Spine and Compute node vRouter
60.0.0.5/32        *[Local/0] 00:25:28
                   Local via irb.7
172.16.0.1/32      *[Static/5] 00:25:28
                   Discard

{master:0}[edit]
lab@spine1_re# run show route 60.0.0.3 table __contrail_lr-60_85a1c66c-dae4-4675-880b-c5d7d3f30cfa.inet.0

__contrail_lr-60_85a1c66c-dae4-4675-880b-c5d7d3f30cfa.inet.0: 7 destinations, 7 routes (6 active, 0 holddown, 1 hidden)
60.0.0.3/32 (1 entry, 1 announced)
TSI:
KRT in-kernel 60.0.0.3/32 -> {composite(1817)}
    *EVPN    Preference: 170/-201
             Next hop type: Indirect, Next hop index: 0
             Address: 0xc65fef0
             Next-hop reference count: 2
             Next hop type: Router, Next hop index: 1731
             Next hop: 100.0.0.1 via xe-0/0/1.0, selected
             Session Id: 0x0
             Protocol next hop: 192.168.200.21
             Composite next hop: 0xc3d81c0 1817 INH Session ID: 0x0
             VXLAN tunnel rewrite:
             MTU: 0, Flags: 0x0
             Encap table ID: 0, Decap table ID: 10
             Encap VNI: 12, Decap VNI: 12
             Source VTEP: 1.1.1.1, Destination VTEP: 192.168.200.21
             SMAC: 02:05:86:71:24:00, DMAC: 56:68:a3:16:17:e0
             Indirect next hop: 0xcb48904 131079 INH Session ID: 0x0
             State: <Active Int Ext>
             Age: 26:02      Metric2: 2
             Validation State: unverified
             Task: __contrail_lr-60_85a1c66c-dae4-4675-880b
             Announcement bits (1): 3-KRT
             AS path: ?
             Communities: target:64512:8000014 encapsulation:vxlan(0x8) mac-mobility:0x0 (sequence 1) router-
             mac:56:68:a3:16:17:e0 evpn-etree:0x0:root (label 0) unknown type 0x8004:0xfc00:0x7a1202 unknown type 0x8071:0xfc00:0xc
             Composite next hops: 1
             Protocol next hop: 192.168.200.21 Metric: 2

```



Composite next hop: 0xc3d81c0 1817 INH Session ID: 0x0

**VXLAN tunnel rewrite:**

←==== vxlan tunnel created between Spine and compute node

MTU: 0, Flags: 0x0

Encap table ID: 0, Decap table ID: 10

Encap VNI: 12, Decap VNI: 12

**Source VTEP: 1.1.1.1, Destination VTEP: 192.168.200.21**

←==== compute node : 192.168.200.21

SMAC: 02:05:86:71:24:00, DMAC: 56:68:a3:16:17:e0

Indirect next hop: 0xcb48904 131079 INH Session ID: 0x0

Indirect path forwarding next hops: 1

Next hop type: Router

Next hop: 100.0.0.1 via xe-0/0/1.0

Session Id: 0x0

192.168.200.0/24 Originating RIB: inet.0

Metric: 2 Node path count: 1

Forwarding nexthops: 1

Nexthop: 100.0.0.1 via xe-0/0/1.0

Session Id: 0

## 6.4. After all setting done, do ping test between VM\_60 and Internet

Connected (unencrypted) to: QEMU (instance-00000009)

```
$ ping 5.5.5.5
PING 5.5.5.5 (5.5.5.5): 56 data bytes
64 bytes from 5.5.5.5: seq=0 ttl=62 time=120.944 ms
64 bytes from 5.5.5.5: seq=1 ttl=62 time=127.143 ms
64 bytes from 5.5.5.5: seq=2 ttl=62 time=118.447 ms
64 bytes from 5.5.5.5: seq=3 ttl=62 time=124.334 ms
64 bytes from 5.5.5.5: seq=4 ttl=62 time=126.776 ms
64 bytes from 5.5.5.5: seq=5 ttl=62 time=124.621 ms
64 bytes from 5.5.5.5: seq=6 ttl=62 time=122.985 ms
```

# 7. Contrail Networking Overview <Figure>

Figure 1: Contrail Networking Overview

