

# vMX-Nutanix Quick Start Guide

Rev #	Date	Revised by	Comments
1.0	04/20/18	Pratik Maru	Initial Draft for vMX support on Nutanix AHV

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## Introduction

The purpose of this document is to help users in launching vMX on Nutanix AHV cluster.

The document doesn't detail into configurations required to bring up Nutanix cluster and an assumption has been made that a working Nutanix cluster is up and running, and accessible via Prism web GUI and 'acropolis' cli.

This document will be updated with relevant information as needed.

## Test Setup Details

For our testing, we have used Nutanix AHV 5.5 (hypervisor based on KVM) cluster provided by Nutanix team. This cluster has 4 host, with total of 23 SSD drives. These hosts are connected via TOR switch.

For Networking, this cluster is using OVS, and provisions VLAN based networks. For traffic from a given network to flow across the nodes, a specific VLAN used by that network has to be configured and allowed on TOR switch.

We have tested vMX in Lite mode using VirtIO, but we should be able to deploy vMX in performance mode with VirtIO given the availability of RAM and CPU cores.

Currently, we have NOT tested SRIOV, and we are in discussion with Nutanix team about supporting SRIOV.

For all our tests, we have tested the traffic between VMs. We have NOT tested traffic between vMX and Physical machines, as didn't have resources to test this scenario.

## Hardware Diagram and Summary



## Summary

HARDWARE SUMMARY	
Blocks	1
Hosts	4
Total Memory	1.48 TiB
Total CPU Capacity	220.77 GHz
Disks	SSD: 23 disks
Network Switches	0

## Important Links

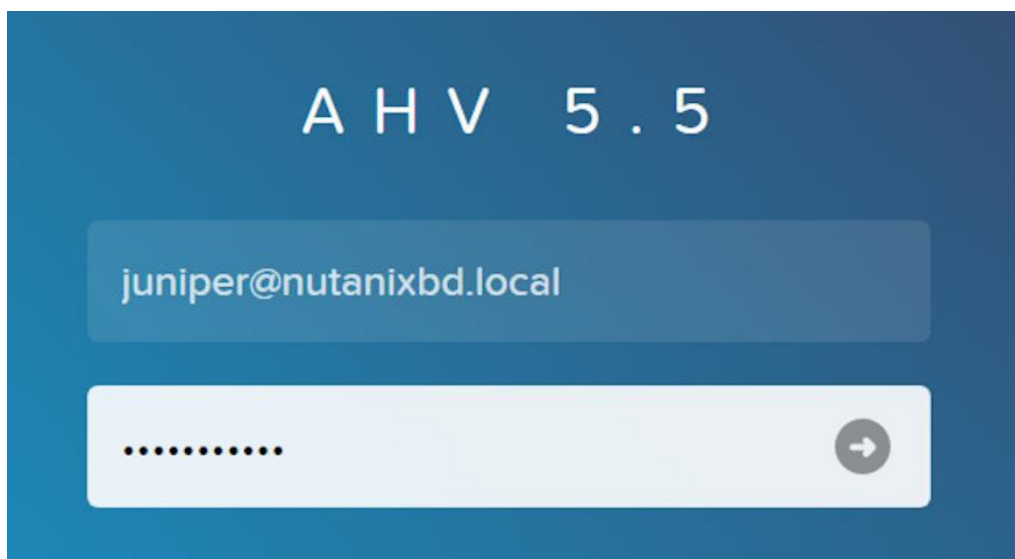
- Link to Nutanix Bible, this guide has complete details about Nutanix cluster.  
<http://nutanixbible.com/>

## Login into Nutanix setup

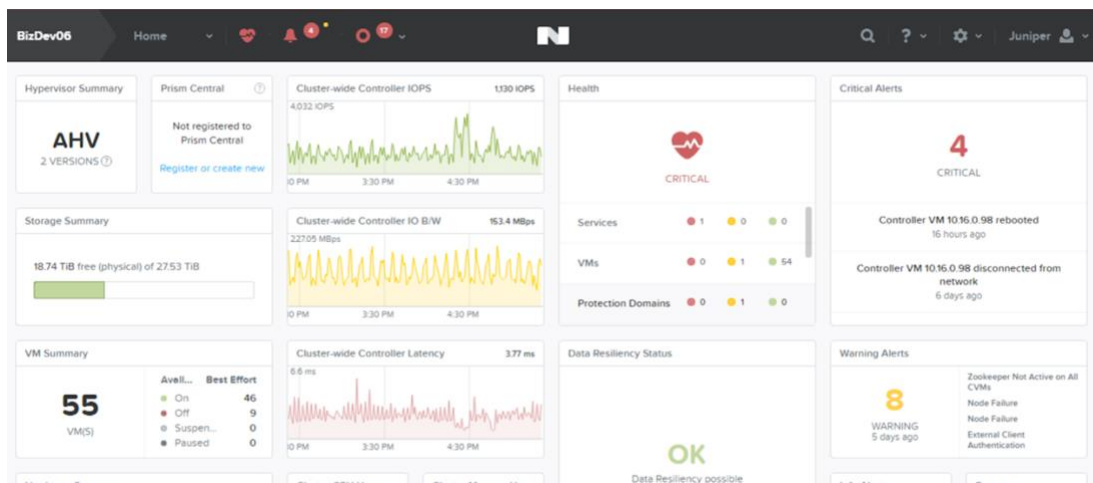
- I was provided remote access to windows machine in Nutanix lab. Details about enabling the remote access are captured in the document provided by Nutanix team. Will attach the same document.

I am not specifying the details about accessing here, as these details may change as per the setup configurations.

- Once logged into remote windows machine, I was able to access the Nutanix Prims Enable using web browser. Will provide login details separately.



- After providing login details, we will land up on home screen for Nutanix prism.



## Image Creation

Before starting with Image creation, copy the images in local machine from where it can be accessed by Nutanix Prism Element. After copying, locally source the images from Prism GUI.

All the required images are available in vmx-bundle, once you copy and untar the vmx bundle on local machine, you should be able to execute below steps to upload the image in Nutanix.

For bringing up vMX Chassis, we need to upload three image as mentioned below.

- vMX RE Image
- vMX Metadata Image
- vMX FPC Image

## RE Image

- Go to 'Image configuration' from tool knob on top-left corner.

The screenshot shows the Nutanix Prism GUI interface. At the top, a red banner indicates "This cluster has multiple licensing violations. View licensing details". Below this, the "BizDev06" cluster is selected. The "VM" tab is active, displaying a table of virtual machines. The table has columns for VM NAME, HOST, IP ADDRESS, CORES, MEMORY CAPACITY, STORAGE, CPU USAGE, and MEM. The VMs listed are Jun-C1, Jun-C2, juniper-fcp-3, juniper-fpc-1, and juniper-fpc-2. On the right side, the "Image Configuration" menu is open, showing various options including Cluster Details, Connect to Citrix Cloud, Convert Cluster, Create Storage Container, Expand Cluster, Life Cycle Management, Request Reboot, Upgrade Software, Data at Rest Encryption, SSL Certificate, Alert Email Configuration, Alert Policies, Configure CVM, HTTP Proxy, Name Servers, Network Switch, NTP Servers, SMTP Server, Cluster Lockdown, Configure Witness, Degraded Node Settings, Filesystem Whitelists, Image Configuration (highlighted), Language Settings, Licensing, Manage VM High Availability, Network Configuration, Prism Central Registration, Pulse, Redundancy State, Remote Support, SNMP, UI Settings, and Welcome Banner.

VM NAME	HOST	IP ADDRESS	CORES	MEMORY CAPACITY	STORAGE	CPU USAGE	MEM
Jun-C1	NTNX-155M60330167-D/AHV		2	2 GiB	1.03 GiB / 50 GiB	0.07%	11
Jun-C2	NTNX-155M60330167-A/AHV		2	2 GiB	1.07 GiB / 50 GiB	0.02%	11
juniper-fcp-3	NTNX-155M60330167-B/AHV		3	4 GiB	935.75 MiB / 2.15 GiB	10.73%	65
juniper-fpc-1	NTNX-155M60330167-A/AHV	10.16...	3	4 GiB	364.76 MiB / 2.15 GiB	10.11%	66
juniper-fpc-2	NTNX-155M60330167-A/AHV		3	4 GiB	356.14 MiB / 2.15 GiB	10.08%	65

- Click on 'Upload Image' tab

The screenshot shows the "Image Configuration" dialog box. It has a title bar with "Image Configuration" and a close button. Below the title bar, there is a subtitle "Manage the images to be used for creating virtual disks." and a button labeled "+ Upload Image".

- Enter RE image details as shown in below screenshot. Please provide local file path under “Image source”.

The screenshot shows the 'Create Image' dialog box with the following fields and options:

- NAME:** Juniper-RE-test
- ANNOTATION:** (empty)
- IMAGE TYPE:** DISK
- STORAGE CONTAINER:** default-container-33605
- IMAGE SOURCE:**
  - ☐ From URL
  - ☒ Upload a file [?](#) Choose File junos-vmx-x86-64-17.4R116.qcow2

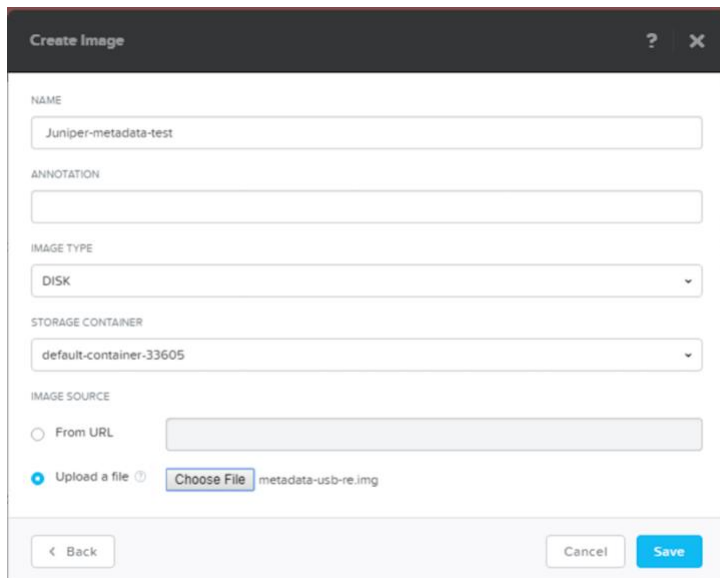
At the bottom, there are three buttons: '< Back', 'Cancel', and 'Save'.

- Wait for Image file to get successfully uploaded 100%.

The screenshot shows the 'Create Image' dialog box during the upload process. A blue progress bar at the top indicates 'Uploading file 10.0%'. A dark grey confirmation message box is overlaid on the form, stating: '✓ Received operation to create Image Juniper-RE-test. View the task details.' The form fields and options are the same as in the previous screenshot, but the 'Save' button has been replaced with a 'Saving...' button.

## Metadata Image

- Similarly upload metadata image

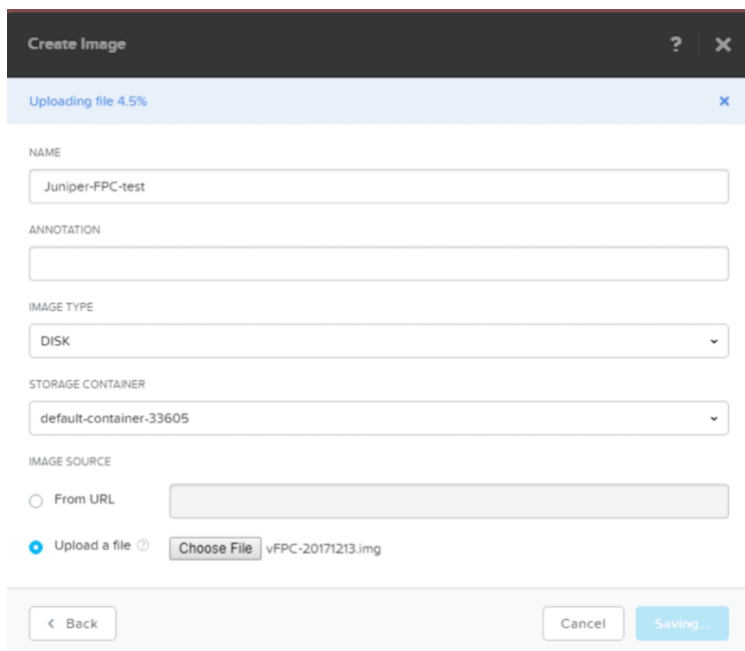


The 'Create Image' dialog box is shown with the following fields and options:

- NAME:** Text input field containing 'Juniper-metadata-test'.
- ANNOTATION:** Empty text input field.
- IMAGE TYPE:** Dropdown menu set to 'DISK'.
- STORAGE CONTAINER:** Dropdown menu set to 'default-container-33605'.
- IMAGE SOURCE:** Two options: 'From URL' (radio button) and 'Upload a file' (radio button, selected). The 'Upload a file' option has a 'Choose File' button and the filename 'metadata-usb-re.img'.
- Buttons:** '< Back', 'Cancel', and 'Save'.

## FPC Image

- Similarly upload FPC Image



The 'Create Image' dialog box is shown with the following fields and options:

- NAME:** Text input field containing 'Juniper-FPC-test'.
- ANNOTATION:** Empty text input field.
- IMAGE TYPE:** Dropdown menu set to 'DISK'.
- STORAGE CONTAINER:** Dropdown menu set to 'default-container-33605'.
- IMAGE SOURCE:** Two options: 'From URL' (radio button) and 'Upload a file' (radio button, selected). The 'Upload a file' option has a 'Choose File' button and the filename 'vFPC-20171213.img'.
- Progress Bar:** A blue progress bar at the top indicates 'Uploading file 4.5%'.
- Buttons:** '< Back', 'Cancel', and 'Saving...'.



## Network

To deploy vMX, below is list of bare minimum networks we attach to a give VM

- RE – 2 networks
  - Mgmt Interface (fxp0)
  - RE-FPC Internal network (em1).
- FPC – Minimum 3 networks
  - Mgmt Interface (ext)
  - RE-FPC Internal network (int)
  - JUNIPER\_WAN1 (ge-0/0/0)

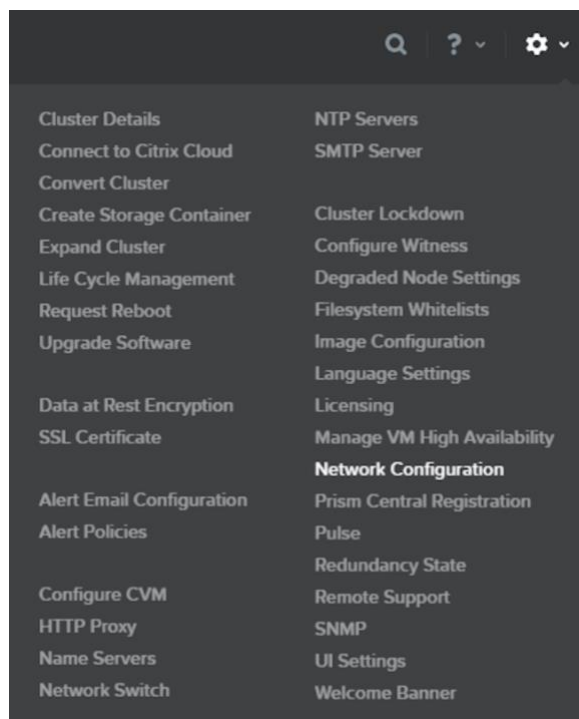
Depending on requirements, you can increase the number of WAN ports.

The mgmt network we used was provided to us by Nutanix Team, with a range of routable IPs to use on these networks. We did not create this network.

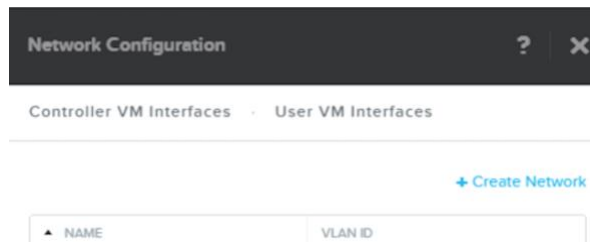
## Network Creation Steps

The RE-FPC Internal network was created (or any other network we created) using below steps.

- Go to “Network Configuration” from tool know on top-right corner.



- Click on 'Create Network' button.



- Creating Internal network for RE-FPC communication.

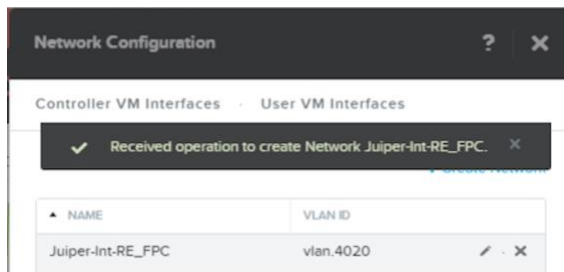
A screenshot of a 'Create Network' dialog box. It has a dark header with the title 'Create Network' and icons for help (?) and close (X). The main area contains two input fields: 'NAME' with the value 'Juiper-Int-RE\_FPC' and 'VLAN ID' with the value '4020'. Below the 'VLAN ID' field, there is a checkbox labeled 'Enable IP address management' which is currently unchecked. A note below the checkbox states: 'This gives AHV control of IP address assignments within the network.' At the bottom right, there are two buttons: 'Cancel' and 'Save'.

**Note:**

All the networks created on Nutanix setup were VLAN based networks. So, in case you are deploying RE and FPC on different host (compute nodes), the vlan which has been used by the RE-FPC-Internal networks should be part of allowable vlan range configured on TOR switch connecting the two machines.

Though, we have tested the use case where RE and FPC were deployed on different hosts, but for all our other tests we have deployed RE and FPC on the same host, as we had limited set of switches vlans.

- Successful creation of RE-FPC internal network



- Creating WAN network

The screenshot shows a 'Create Network' dialog box with a dark header. It contains the following fields and options:

- NAME:** JUNIPER\_WAN1-GE000
- VLAN ID:** 3000
- ☐ Enable IP address management

Below the checkbox, a note states: 'This gives AHV control of IP address assignments within the network.' At the bottom right, there are 'Cancel' and 'Save' buttons.

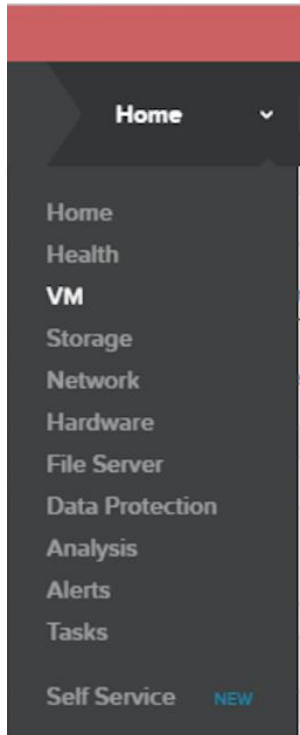
**Note:**

For creating WAN port (ge-\*) networks, please ensure that vlan configured on these ports are part of allowed vlan range configured on switch, otherwise, traffic across nodes won't pass.

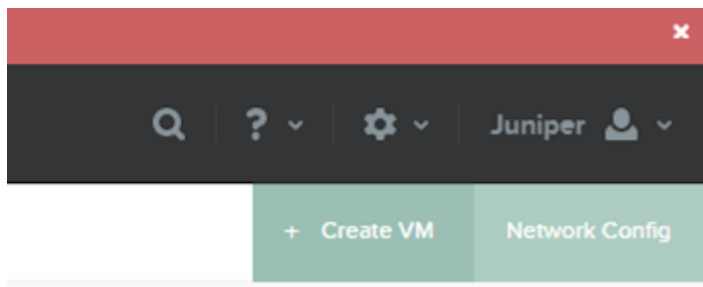
In this case, I have used vlan 3000, as this configured on TOR switch, connecting various hosts.

## Deploying vMX

- Go to 'VM' option under 'Home' tab (top-left corner)

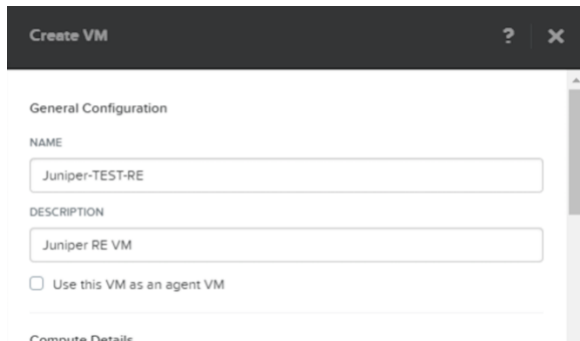


- Create VM (Click 'Create VM' top right)



## RE VM Creation

- RE VMs configuration details, starting with Name and Description



The screenshot shows the 'Create VM' dialog box with the 'General Configuration' tab selected. The 'NAME' field contains 'Juniper-TEST-RE' and the 'DESCRIPTION' field contains 'Juniper RE VM'. There is an unchecked checkbox labeled 'Use this VM as an agent VM'. The 'Compute Details' tab is visible at the bottom.

Create VM

General Configuration

NAME

Juniper-TEST-RE

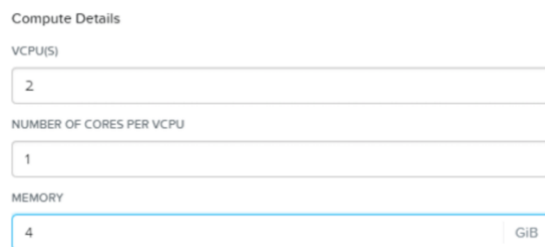
DESCRIPTION

Juniper RE VM

☐ Use this VM as an agent VM

Compute Details

- RE Compute details



The screenshot shows the 'Compute Details' section. The 'VCPUS' field is set to '2'. The 'NUMBER OF CORES PER VCPU' field is set to '1'. The 'MEMORY' field is set to '4' with a unit dropdown menu showing 'GiB'.

Compute Details

VCPUS

2

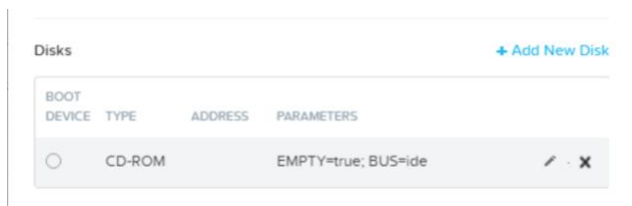
NUMBER OF CORES PER VCPU

1

MEMORY

4 GiB

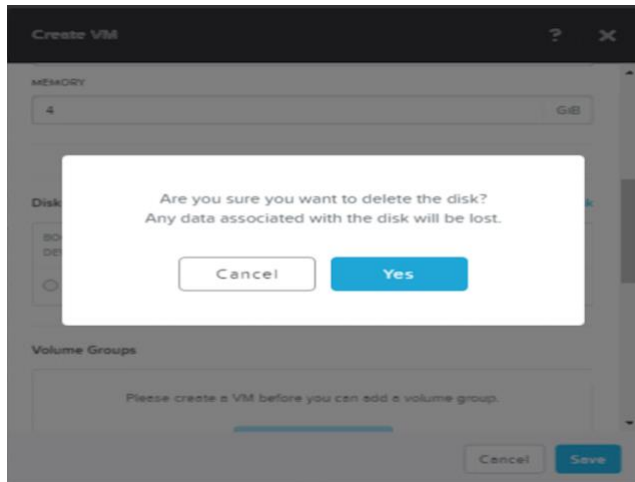
- RE VM will require two disks to be added. One is main Junos image and another disk contains metadata information. Before adding, delete the default CD-ROM disk. Use below steps to do the same.



The screenshot shows the 'Disks' section with a table containing one entry. The entry is a CD-ROM with parameters 'EMPTY=true; BUS=ide'. There is a '+ Add New Disk' button and edit/delete icons for the entry.

Disks + Add New Disk

BOOT	DEVICE	TYPE	ADDRESS	PARAMETERS
<input type="radio"/>	CD-ROM			EMPTY=true; BUS=ide



- Adding Junos disk to RE VM

A screenshot of the 'Add Disk' dialog box. It contains the following fields:

- TYPE: DISK
- OPERATION: Clone from Image Service
- BUS TYPE: IDE
- IMAGE: Juniper-RE-test
- SIZE (GiB): 25

Below the size field is a note: 'Please note that changing the size of an image is not allowed.' At the bottom right are 'Cancel' and 'Add' buttons.

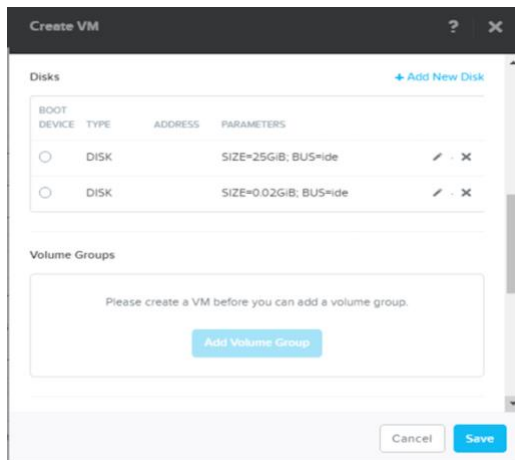
- Adding metadata disk to RE VM

A screenshot of the 'Add Disk' dialog box. It contains the following fields:

- TYPE: DISK
- OPERATION: Clone from Image Service
- BUS TYPE: IDE
- IMAGE: Juniper-metadata-test
- SIZE (GiB): 0.02

Below the size field is a note: 'Please note that changing the size of an image is not allowed.' At the bottom right are 'Cancel' and 'Add' buttons.

- After adding disks, it should look like below



The 'Create VM' dialog box shows the 'Disks' section with a table of disks. The table has columns for BOOT, DEVICE, TYPE, ADDRESS, and PARAMETERS. Two disks are listed: one with SIZE=25GiB and another with SIZE=0.02GiB, both with BUS=ide. Below the table is a 'Volume Groups' section with a message 'Please create a VM before you can add a volume group.' and an 'Add Volume Group' button. At the bottom are 'Cancel' and 'Save' buttons.

BOOT	DEVICE	TYPE	ADDRESS	PARAMETERS
<input type="radio"/>		DISK		SIZE=25GiB; BUS=ide
<input type="radio"/>		DISK		SIZE=0.02GiB; BUS=ide

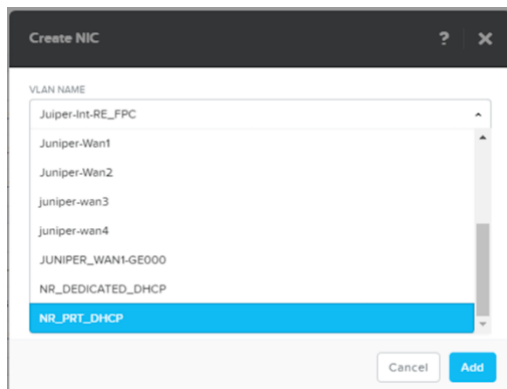
Volume Groups

Please create a VM before you can add a volume group.

[Add Volume Group](#)

[Cancel](#) [Save](#)

- Add NICs to RE VM. The NIC networks should be added in the order of NICs appear inside guest. For example, fxp0 should be first one to be added.  
Creating NIC for fxp0



The 'Create NIC' dialog box shows the 'VLAN NAME' dropdown menu with a list of options: Juiper-Int-RE\_FPC, Juniper-Wan1, Juniper-Wan2, juniper-wan3, juniper-wan4, JUNIPER\_WAN1-GE000, NR\_DEDICATED\_DHCP, and NR\_PRT\_DHCP. The 'NR\_PRT\_DHCP' option is selected. At the bottom are 'Cancel' and 'Add' buttons.

VLAN NAME

Juiper-Int-RE\_FPC

Juniper-Wan1

Juniper-Wan2

juniper-wan3

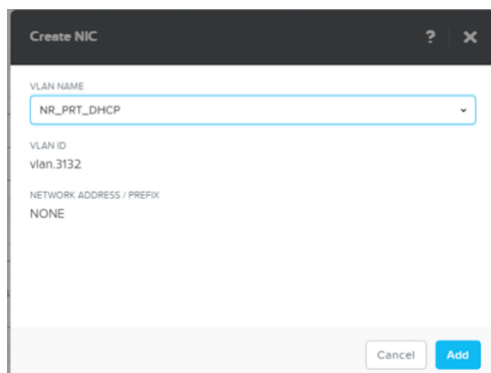
juniper-wan4

JUNIPER\_WAN1-GE000

NR\_DEDICATED\_DHCP

NR\_PRT\_DHCP

[Cancel](#) [Add](#)



The 'Create NIC' dialog box shows the 'VLAN ID' field with the value 'vlan.3132' and the 'NETWORK ADDRESS / PREFIX' field with the value 'NONE'. At the bottom are 'Cancel' and 'Add' buttons.

VLAN NAME

NR\_PRT\_DHCP

VLAN ID

vlan.3132

NETWORK ADDRESS / PREFIX

NONE

[Cancel](#) [Add](#)

- Order of NICs seen in 'Create VM'.  
Note: order seen here will be reverse of appearance of NICs inside guest VM.

Create VM

Network Adapters (NIC) [+ Add New NIC](#)

VLAN ID	VLAN NAME	MAC	REQUESTED IP
vlan.4020	Juiper-Int-RE_FPC		>
vlan.3132	NR_PRT_D HCP		>

- If host affinity needed, setting the affinity to appropriate host and click on 'save' to create VM.

Create VM

Network Adapters (NIC) [+ Add New NIC](#)

VLAN ID	VLAN NAME	MAC	REQUESTED IP
vlan.4020	Juiper-Int-RE_FPC		>
vlan.3132	NR_PRT_D HCP		>

VM Host Affinity [+ Set Affinity](#)

HOST

NTNX-15SM60330167-A ✕

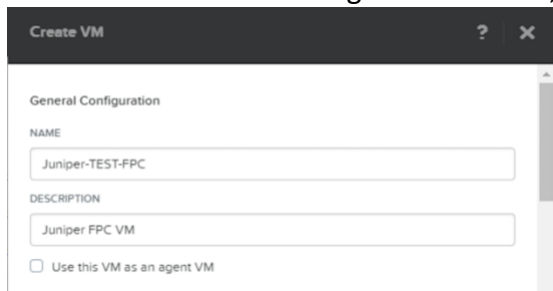
☐ Custom Script

Cancel Save



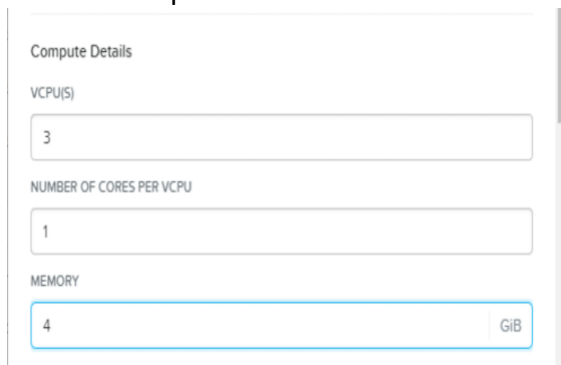
## FPC VM Creation

- Provide FPC VMs configuration details, starting with Name and Description



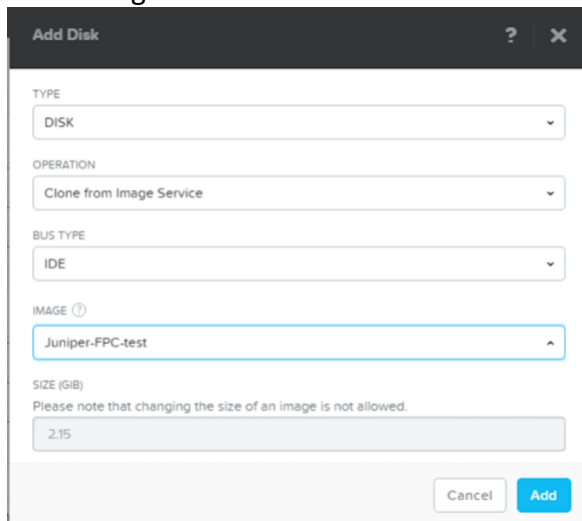
The 'Create VM' dialog box has a dark header with a question mark and a close button. The 'General Configuration' section contains a 'NAME' field with 'Juniper-TEST-FPC', a 'DESCRIPTION' field with 'Juniper FPC VM', and an unchecked checkbox labeled 'Use this VM as an agent VM'.

- FPC Compute details

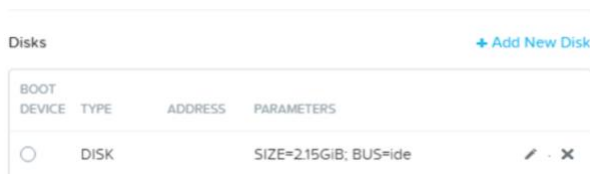


The 'Compute Details' form includes three input fields: 'VCPUS' with the value '3', 'NUMBER OF CORES PER VCPU' with the value '1', and 'MEMORY' with the value '4' and a 'GiB' unit label.



- Adding disk for FPC VM



The 'Add Disk' dialog box features several dropdown menus: 'TYPE' set to 'DISK', 'OPERATION' set to 'Clone from Image Service', and 'BUS TYPE' set to 'IDE'. The 'IMAGE' dropdown is set to 'Juniper-FPC-test'. The 'SIZE (GiB)' field is set to '2.15' with a note below it stating 'Please note that changing the size of an image is not allowed.' At the bottom are 'Cancel' and 'Add' buttons.



The 'Disks' section includes a '+ Add New Disk' link and a table with columns: BOOT, DEVICE, TYPE, ADDRESS, and PARAMETERS.

BOOT	DEVICE	TYPE	ADDRESS	PARAMETERS
		DISK	SIZE=2.15GiB; BUS=ide	 

- Add NICs for FPC VM

Network Adapters (NIC) [+ Add New NIC](#)

VLAN ID	VLAN NAME	MAC	REQUESTED IP
vlan.3000	JUNIPER_WAN1-GE000		
vlan.4020	Juiper-Int-RE_FPC		
vlan.3132	NR_PRT_D HCP		

- If host affinity needed, setting the affinity to appropriate host and click on 'save' to create VM.

VM Host Affinity [+ Set Affinity](#)

HOST

NTNX-15SM60330167-A

☐ Custom Script

Cancel Save

## Powering ON VMs

- Search for VM's under "Table"

Overview · Table + Create VM Network Config

VM Include Controller VMs · 2 VMs (filtered from 55) Juniper-TEST

VM NAME	HOST	IP ADDRESS	CORES	MEMORY CAPACITY	STORAGE	CPU USAGE	MEMORY USAGE	CONTROLLER READ IOPS	CONTROLLER WRITE IOPS	CONTROLLER IO BANDWIDTH	CONTROLLER AVG IO LATENCY	BACKU...	FLASH MODE
Juniper-TEST-FPC			3	4 GiB	104.25 MiB / 2.15 GiB	-	0%	-	-	-	-	Yes	No
Juniper-TEST-RE			2	4 GiB	1.2 GiB / 25.02 GiB	-	0%	-	-	-	-	Yes	No

- Apply "Power on" button (seen at the bottom of below screenshot) for each VM

VM 2 VMs (filtered from 55) Juniper-TEST

VM NAME	HOST	IP ADDRESS	CORES	MEMORY CAPACITY	STORAGE	CPU USAGE	MEMORY USAGE	CONTROLLER READ IOPS	CONTROLLER WRITE IOPS	CONTROLLER IO BANDWIDTH	CONTROLLER AVG IO LATENCY	BACKU...	FLASH MODE
Juniper-TEST-FPC			3	4 GiB	104.25 MiB / 2.15 GiB	-	0%	-	-	-	-	Yes	No
Juniper-TEST-RE			2	4 GiB	1.2 GiB / 25.02 GiB	-	0%	-	-	-	-	Yes	No

Summary > Juniper-TEST-FPC Manage Guest Tools Launch Console Power on Take Snapshot Migrate Pause Clone Update Delete

- Notice all the VMs turning ON

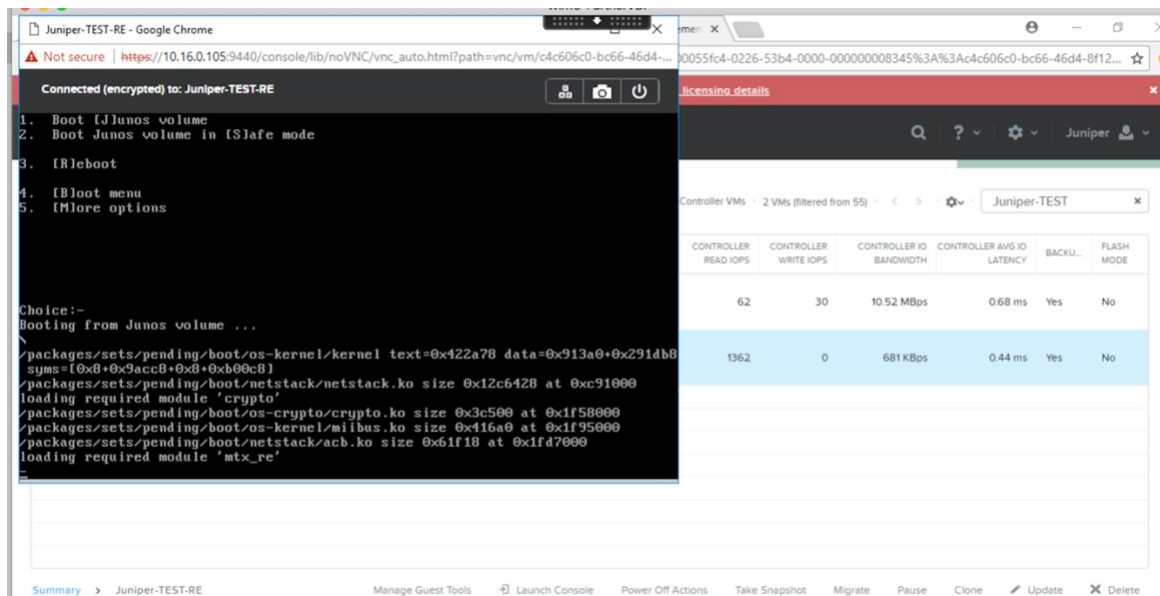
"Host" column in below screenshot tells about the hosts the VM are launched on. As, we have set affinity to Host A while launching these VMs, both the RE and FPC VMs are launched on Host A.

VM Include Controller VMs · 2 VMs (filtered from 55) Juniper-TEST

VM NAME	HOST	IP ADDRESS	CORES	MEMORY CAPACITY	STORAGE	CPU USAGE	MEMORY USAGE	CONTROLLER READ IOPS	CONTROLLER WRITE IOPS	CONTROLLER IO BANDWIDTH	CONTROLLER AVG IO LATENCY	BACKU...	FLASH MODE
Juniper-TEST-FPC	NTNX-15SM6033016 7-A/AHV		3	4 GiB	104.25 MiB / 2.15 GiB	6.31%	-	62	30	10.52 MBps	0.68 ms	Yes	No
Juniper-TEST-RE	NTNX-15SM6033016 7-A/AHV		2	4 GiB	1.2 GiB / 25.02 GiB	18.27%	-	1362	0	681 KBps	0.44 ms	Yes	No

## VM Console

- VM Console can be launched by using “Launch Console” button seen at the bottom of below Screenshot. After RE VM is up, you should be able to see FPC/PICs and Interfaces Online.



Note: Upon boot Junos won't be having mgmt interface configured, so for now, you have to configure the mgmt interface from the provided subnet after that you should be able to reach the VM from that network.

## VLAN and Multicast

To make VLAN and Multicast (OSPF) work on Nutanix setup, you have to configure ports in kTrunk and KDirect mode.

Steps to configure the same are provided below:

- Login to Nutanix Controller VM (IP can found from setup details).
- Once inside the controller VM, execute “accli” to switch to acropolis cli.
- To change the port configuration from KAccess (AHV Default) to kTrunked

```
vm.nic_update <vm-name> <mac of the interface>  
update_vlan_trunk_info=true vlan_mode=kTrunked  
trunked_networks=2900
```

Note: Above 2900 is the vlan tag we are trying to pass from the Guest VM (Junos). This tag could be anything but Native vlan configured for that network. In our case, we have configured Native vlan as 3000 for Juniper\_WAN1-GE000

- To change the port nic type from kNormal (Default) to kDirect

```
vm.nic_update <vm_name> <mac of interface> type=kDirectNic
```

Note: Multicast will work when both the VMs communicating via multicast are on different nodes with kNormalNic configuration. If both the components are on same node then the VM interface has to be made kDirectNic. This is open issue with Nutanix and being addressed (Ref: <https://jira.nutanix.com/browse/TH-99>)

## VM-Network Diagram

- The various networks and their connections among VMs can be visualized using “Network” tab (Top Left). Select given network and search for VMs.

For example, in below case, we can see VMs are connected to Juniper-Int-RE\_FPC and searching for “Juniper-TEST\*” VMs. Similarly, we can also VM connections to various WAN ports.

