

Now with extra
Edge ;)

Juniper Open Learning

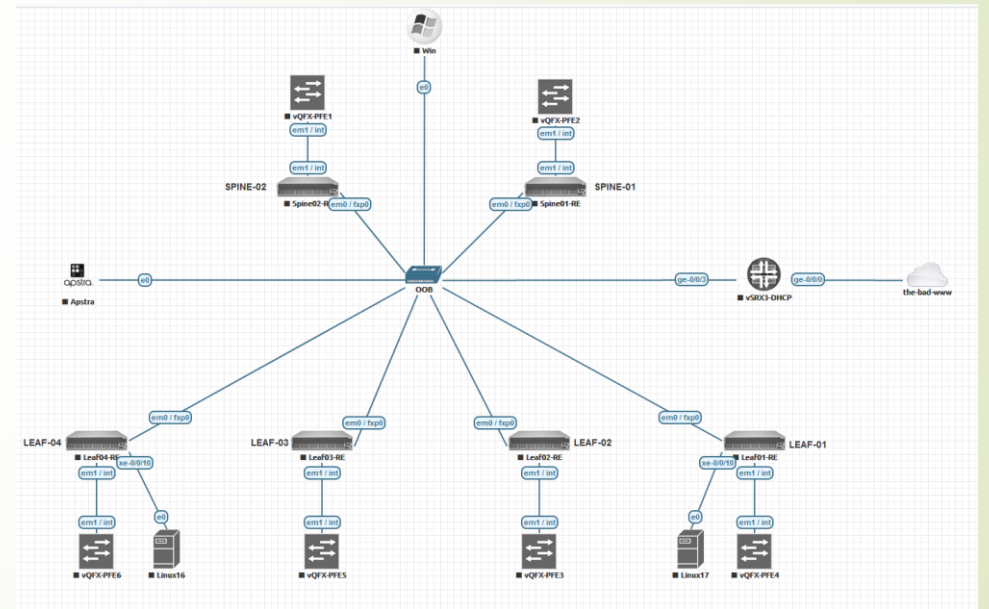
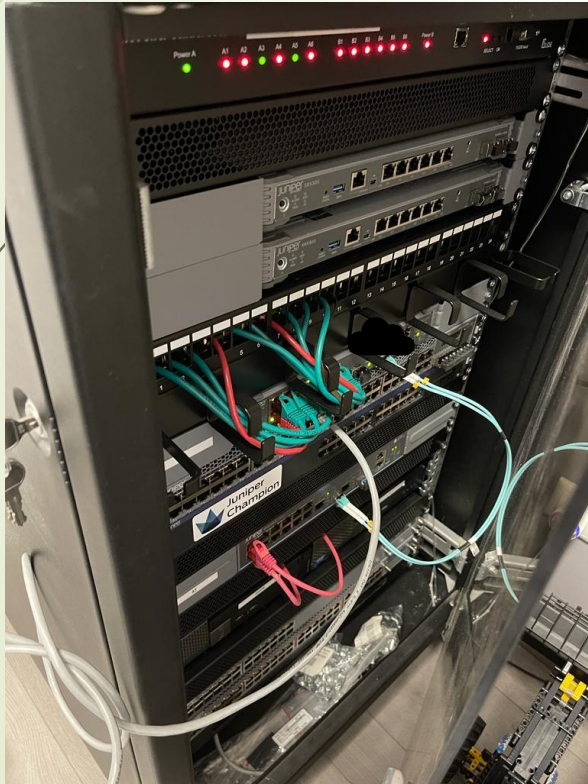
Building a Juniper Lab Environment with EVE-NG for Daily Usage



June 18th
2 PM Pacific Time

Why Virtual Labs

Save Power / Rackspace / Hardware Costs



What is EVE-NG?



Emulated Virtual Environment
Next Generation



Why EVE-NG | Why Virtual Labs

- Quickly Lab / Test a new Design
- No additional Hardware Costs for Equipment
- GREAT for Certification → Combine with vLabs and AATP
- Get started for free with the Community Edition
- Vendor-Neutral! Great for Migrations / Interop Tests
- Extremely Flexible (Bare-Metal, VM | On-Prem | Colocation | Cloud)

EVE-NG Flavors

- Bare-Metal (best performance)
Needed for some vDevices
- VMware (best flexibility)
- Cloud (best „power-boost“ option)



EVE-NG Installation, Setup and more

- 3-Part Video Series
- https://learningportal.juniper.net/juniper/user_activity_info.aspx?id=EDU-JUN-WBT-JOL-EVENG

Course Modules

#	Module	Duration	Lab	Required	Status
1	Module 01: Building a Juniper EVE-NG Lab Environment for Daily Usage Part 1: EVE-NG Overview	52m		<input checked="" type="radio"/>	Not Started
2	Module 02: Building a Juniper EVE-NG Lab Environment for Daily Usage Part 2: Overview of vMX, vSRX, and vQFX	59m		<input checked="" type="radio"/>	Not Started
3	Module 03: Building a Juniper EVE-NG Lab Environment for Daily Usage Part 3: Overview of Clustering	50m		<input checked="" type="radio"/>	Not Started

Course Details

Juniper Ambassador Christian Scholtz teams up with the Juniper Open Learning to teach you how to build virtual lab environments to help with your preparation for Juniper Networks certification. The video starts with an overview of EVE-NG. It then details how to perform the initial setup of EVE-NG with a demonstration. Basic and advanced lab actions are then covered. If you plan to pursue Juniper certification, this video will help you build a virtual lab for practice.

Difficulty: Foundational
Last Updated: Wednesday, October 26, 2022

[Copy Shortcut](#)

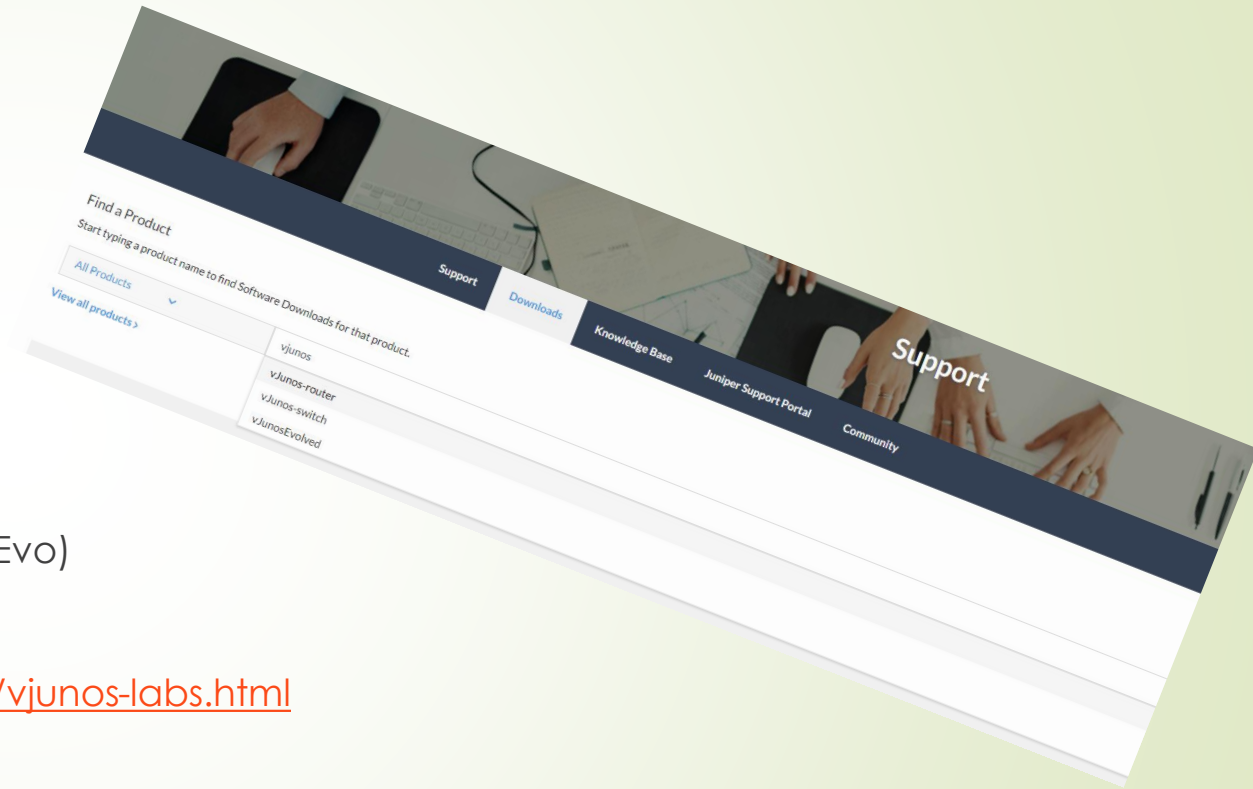


Lab Environment Considerations

- DHCP needed?
- DNS needed?
- AD? Management-PC's? Clients? Test-Servers? (commit Feature in EVE-NG)
- Outside Network? Test-Lab (Hardware) needed? Interface-Cards in Server?
- Firewalls / NAT?
- VPN / MIST-Edge into your Lab?
- Traffic-Generators? Tip: <https://ostinato.org/>
- Your own „Chaos-Monkey“ / „Break-Fix-Tools“?
- One Big Topology VS multiple smaller ones?

Fetching images

- 3 „base“ v-Images:
- vJunOS-Switch (virtual EX9214)
- vJunOS-Router (virtual MX304)
- vJunOS-Evolved (based on JunOS Evo)
- <https://www.juniper.net/us/en/dm/vjunos-labs.html>





Fetching images

- ▶ „Specialized“ images:
- ▶ 128T:
Reach out to your Juniper SE
- ▶ APSTRA + APSTRA-ZTP + APSTRA-Flow (4.2.1):
<https://support.juniper.net/support/downloads/?p=apstra>
- ▶ JSA:
<https://support.juniper.net/support/downloads/?p=juniper-secure-analytics>
- ▶ vRR:
<https://support.juniper.net/support/downloads/?p=virtual-route-reflector>



MIST-Edge



- This service lets you make a seamless transition, moving from an existing centralized data plane with legacy controller architectures to the modern Juniper Mist microservices cloud, without affecting network design.
- For large campus networks, Edge provides seamless roaming through on-premises tunnel termination of traffic to and from access points.
- Juniper Mist Edge supports an elastically scalable cluster (with options for backup clusters) composed of an unlimited number of nodes within a cluster.
- <https://www.juniper.net/us/en/products/access-points/edge.html>

MIST-Edge

- Hardware-Appliance or VM
- Subscription needed (1 per AP tunneling Traffic)
- Easy to deploy



MIST-Edge

➤ Requirements

Hardware Specifications for a Mist Edge Virtual Machine

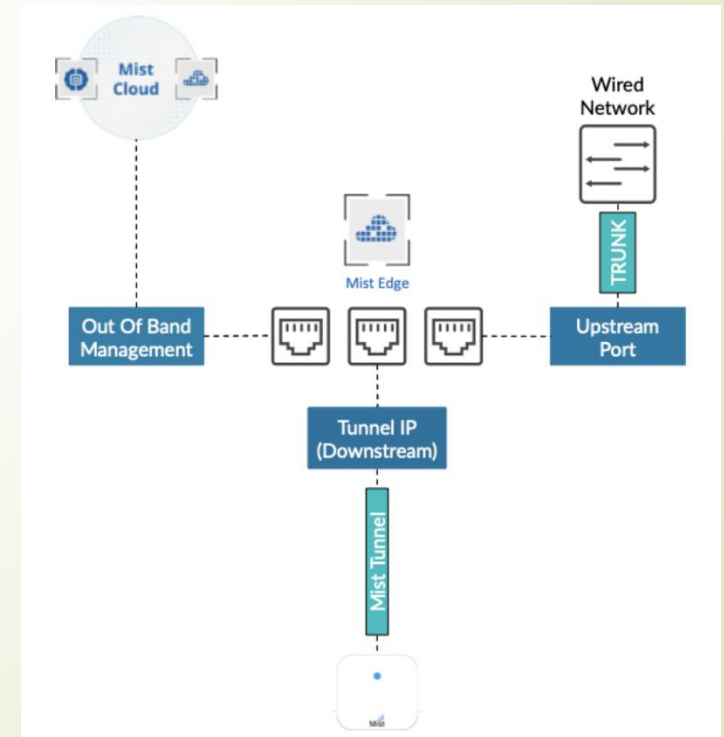
The following are the minimum hardware requirements to implement a Mist Edge VM.

Table 1: Hardware Specifications for a Mist Edge VM

Hardware Component	Quantity or Capacity
CPU	4 vCPUs
RAM	32 GB
Hard disk	100 GB (thick provisioned)
NIC	Three virtual NICs

MIST-Edge

- Create a new Edge-VM in MIST and configure it (including WLAN's to MIST-Tunnel mapping)!!!
- Download the iso for MIST-Edge (select VM and download the iso)
- Upload the iso into EVE-NG
- Create a new Linux-based-Template for MIST-Edge with iso mapped as cdrom-file
<https://www.eve-ng.net/index.php/documentation/howtos/howto-create-own-linux-host-image/>
- Deploy one or more Edge-VM's in EVE-NG
- Assign Interfaces
- Start labbing 😊



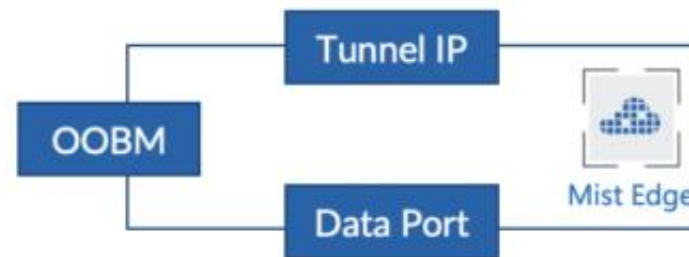
MIST-Edge

- 3 Interfaces: Upstream (Tunnel), Downstream (Switch), OOB
- **Note: Tunnel IP SVI on Mist Edge is a protected interface, so even if it is not connected to a firewall, it is only open for ports UDP: 1701 (L2TPv3), 500 and 4500 (IPsec) and TCP port 2083 for RADSEC.**

The Out-of-Band-Management (OOBM)

Interface communicates with the Mist cloud and is there to configure, send stats and check status of Mist Edge, Mist Edge Cluster and AP Tunnels.

Interface expects a DHCP IP address by default and can be configured with static IP address



Tunnel IP is the interface where AP communicates with to setup the L2TPv3 Tunnel between AP and Mist Edge. This IP needs to be configured from Tunnel IP section on Mist UI. If there is a firewall between AP management subnet and Mist Edge Tunnel IP, traffic destined to Tunnel IP on port 1701 needs to be allowed.

Data Port is connected to a trunk port that has all the VLANs configured where the WLAN need to be mapped to

MIST-Edge

- Use the Linux-Template for Mist-Edge
- Official Template will follow soon
- `/opt/qemu/bin/qemu-img create -f qcow2 hda.qcow2 100G`
- **DO NOT USE VIRTIOA.QCOW2!** The Installer will FAIL!

Edit node

Template

Linux

ID

1

Node instance path

/opt/unetlab/tmp/0/35f7dc0c-549e-4525-85fa-091d7f71e191/1

Image

linux-mistedge-deb11

Name/prefix

MistEdge

Icon

Switch-2D-L2-Generic-S.svg

UUID

103233e4-281c-4bb7-97ee-6146c0e72cec

CPU Limit

CPU

4

RAM (MB)

32768

Ethernets

3

First Eth MAC Address

50:00:00:01:00:00

QEMU Version

6.0.0

QEMU Arch

x86_64

QEMU Nic

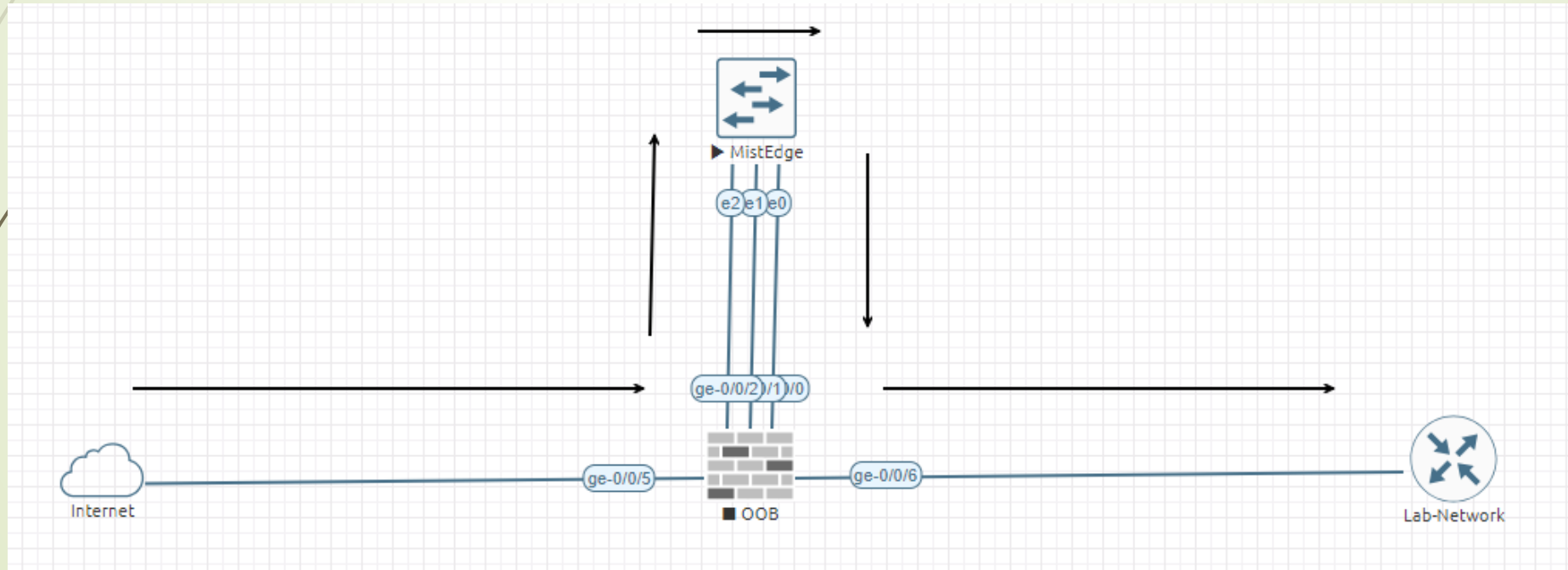
virtio-net-pci

QEMU custom options

-machine type=pc,accel=kvm -vga std -usbdevice tablet -boot order=cd -cpu host

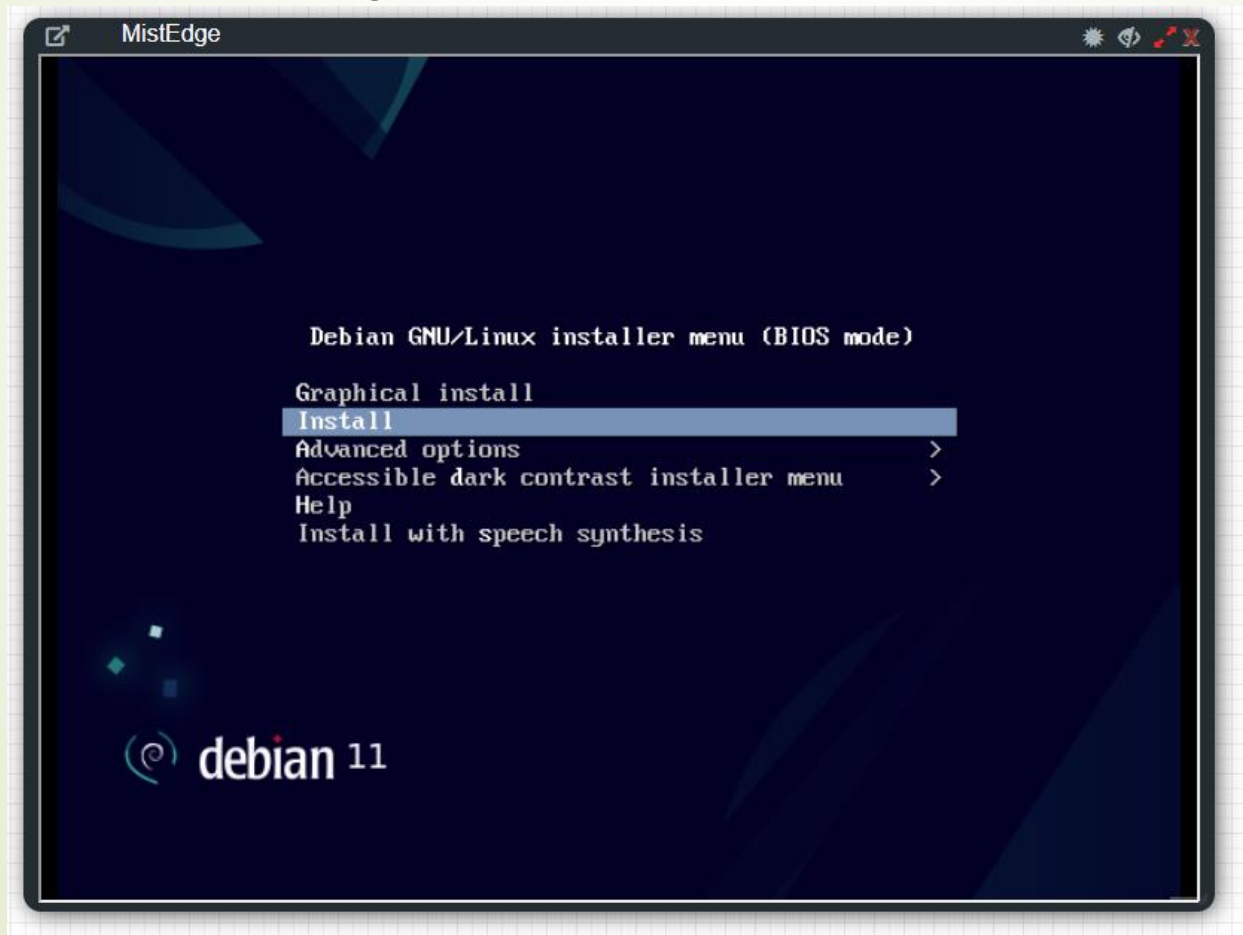
MIST-Edge

- Create a Topology utilizing all 3 Interfaces
- This can be 3 separate links to 3 separate devices
- Or it can be 3 Links towards a central firewall in your lab-environment



MIST-Edge

- Install MIST-Edge by selecting „Install“ (NOT Graphical install)!
- OOB-Interface grabs a DHCP-Address by default



MIST-Edge

- The MIST-Edge will take care of everything for you – lean back and enjoy 😊

```
OOB
root@vSRX# run show dhcp server binding
IP address      Session Id  Hardware address  Expires  State  Interface
172.16.40.100    1          50:00:00:01:00:00  86313   BOUND  ge-0/0/0.0

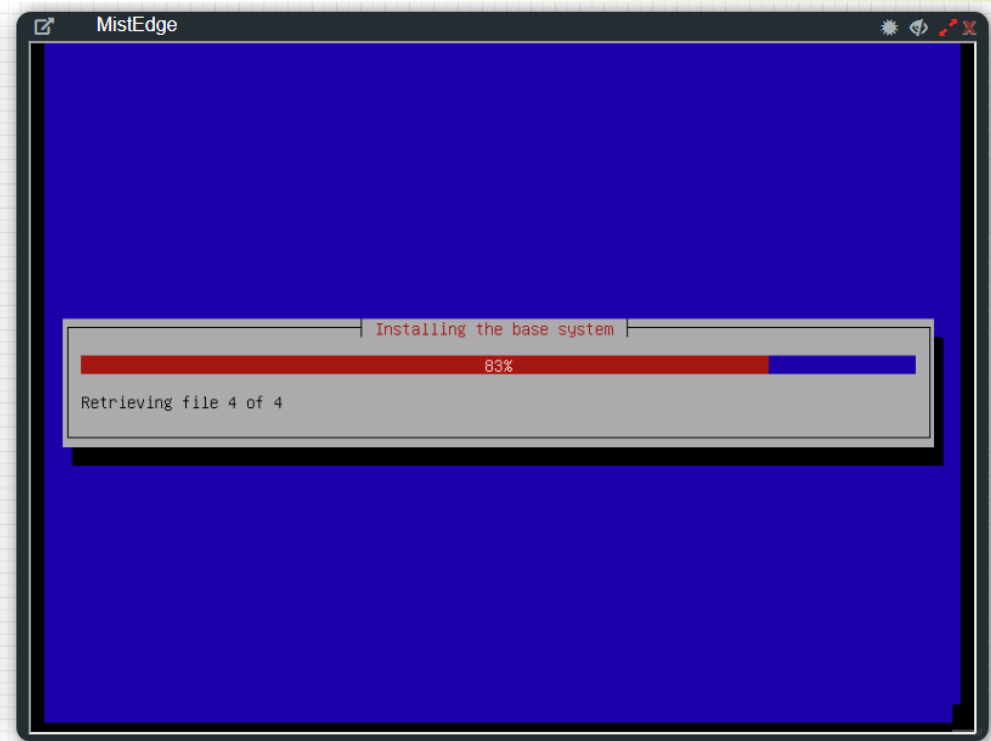
[edit]
root@vSRX# run show dhcp server binding
IP address      Session Id  Hardware address  Expires  State  Interface
172.16.40.100    1          50:00:00:01:00:00  86353   BOUND  ge-0/0/0.0

[edit]
root@vSRX# run show dhcp server binding
IP address      Session Id  Hardware address  Expires  State  Interface
172.16.40.100    1          50:00:00:01:00:00  86352   BOUND  ge-0/0/0.0

[edit]
root@vSRX# run show dhcp server binding
IP address      Session Id  Hardware address  Expires  State  Interface
172.16.40.100    1          50:00:00:01:00:00  86352   BOUND  ge-0/0/0.0

[edit]
root@vSRX# run show dhcp server binding
IP address      Session Id  Hardware address  Expires  State  Interface
172.16.40.100    1          50:00:00:01:00:00  86351   BOUND  ge-0/0/0.0

[edit]
root@vSRX#
```



MIST-Edge

- ssh into the Edge (from your Lab / Firewall)

```
172.16.40.101      2          50:00:00:01:00:00  86261      BOUND      ge-0/0/0.0

[edit]
root@vSRX# run ssh mist@172.16.40.101
The authenticity of host '172.16.40.101 (172.16.40.101)' can't be established.
ECDSA key fingerprint is SHA256:kd9bitkqfdtzIvajDsoUw2py15cluPrJA+RxkmT9n+E.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '172.16.40.101' (ECDSA) to the list of known hosts.
mist@172.16.40.101's password:
Linux mxedge 5.10.0-26-amd64 #1 SMP Debian 5.10.197-1 (2023-09-29) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
sourced /etc/skel/.mxagent_aliases
mist@mxedge:~$ █
```

MIST-Edge

➤ JNPR MIST-Edge Docs:

<https://www.juniper.net/documentation/us/en/software/mist/mist-edge-virtual-solution/mist-edge/topics/topic-map/vm-deployment-example.html>

Use SSH to connect to the Juniper Mist Edge with the username `mist`

`ssh mist@OOBM-IP`. Enter `Mist@1234` as the password.

Switch to root by issuing the command `su -`. Enter `mist` as the password.

To bootstrap the device and onboard it to the Mist Cloud, issue the following commands from CLI:

```
mist@mxedge:~$ su - Password: mist root@mxedge:~# apt-get update
```

After the update, register the device. Enter the command `mxagent-helper configure ----claim-code REGISTRATION CODE`.

At the end of the process, you see the following message:

```
registration finished successfully. (regfile at /var/lib/mxagent/mxagent.reg)
```

After the process is complete, the Juniper Mist Edge reboots automatically. At this point, you do not need SSH to connect to the Juniper Mist Edge. The device pulls the configuration from the Juniper Mist cloud.

After the reboot, the Juniper Mist Edge appears as connected on the Mist Edge Inventory page. An orange dot also indicates the connected status of the device.

Mist Edge Inventory

Filter

1 of 1 (1/1)

	Status	Name	Registration	Cluster	Serial ID	Site	Model	Configuration	Uptime	Last Seen	Version	Management IP Address
<input type="checkbox"/>	Connected	MistEdge1	Registered	-	702.148.18.06	Unassigned	21	0	0%	2019-08-14 PM 3:21	4.0.0-0.1.1903	28.702.41.114

MIST-Edge

- JNPR MIST-Edge Docs:
<https://www.juniper.net/documentation/us/en/software/mist/mist-edge-virtual-solution/mist-edge/topics/topic-map/vm-deployment-example.html>

- `mxagent register -- registration-code <CODE>`

Registration Code

EggwJH-yi-1EAfbFJgvsmYaAL6rr7Zloqsr1



- Wait 5min, then Reboot once

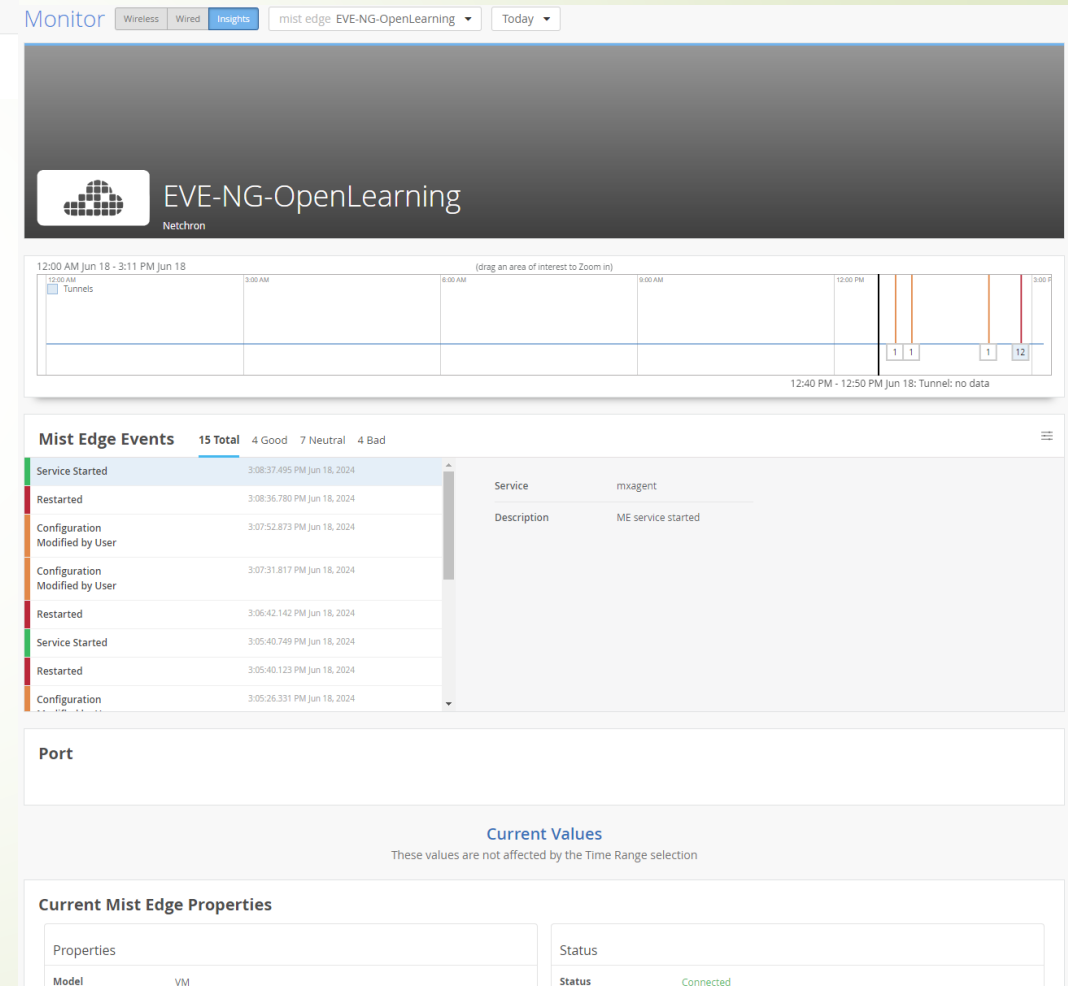
MIST-Edge

Mist Edge Inventory org Entire Org

Filter

<input type="checkbox"/>	Status	Name	Registration	Cluster	Tunnel IP	OOBM IP Address	OOBM MAC Address	Site	Model
<input type="checkbox"/>	Connected	EVE-NG-OpenLearning	Registered	-	172.16.40.201	172.16.40.101	-	Unassigned	VM

- The Edge will be shown as registered and „connected“
- Assign your Edge to a Site ;)
- Your AP's can now connect to it (Template)



MIST-Edge

- Custom Forwarding to „Site Edge“

SSID

MistEdge-WiFi

WLAN ID

523ac467-14aa-4bf5-b9b7-1277e9227862

Labels

DEMO

WLAN Status

☒ Enabled ☐ Disabled

☐ Hide SSID

☐ Broadcast AP name

Radio Band

☒ 2.4 GHz ☒ 5 GHz ☐ 6 GHz

Band Steering

☐ Enable

Client Inactivity

Drop inactive clients after seconds: 1800

Security

Security Type

WPA3

WPA2

OWE

Open Access

Enterprise (802.1X)

Personal (PSK)

☒ Passphrase

.....

[Reveal](#)

☐ Multiple passphrases

☐ MAC address authentication by RADIUS lookup

☐ Prevent banned clients from associating

Edit banned clients in [Network Security Page](#)

Fast Roaming

☒ Default

☐ .11r

VLAN

☐ Untagged ☒ Tagged ☐ Pool ☐ Dynamic

VLAN ID

400

(1 - 4094)

Apply to Access Points

All APs

AP Labels

Specific APs

AP43-Scholz-1OG

Isolation

Prohibit peer to peer communication

☒ Disabled ☐ Same AP ☐ Same Subnet

Filtering (Wireless)

☐ ARP

☒ Broadcast/Multicast

☐ Allow mDNS

☐ Allow SSDP

☐ Allow IPv6 Neighbor Discovery

☐ Ignore Broadcast SSID Probe Requests

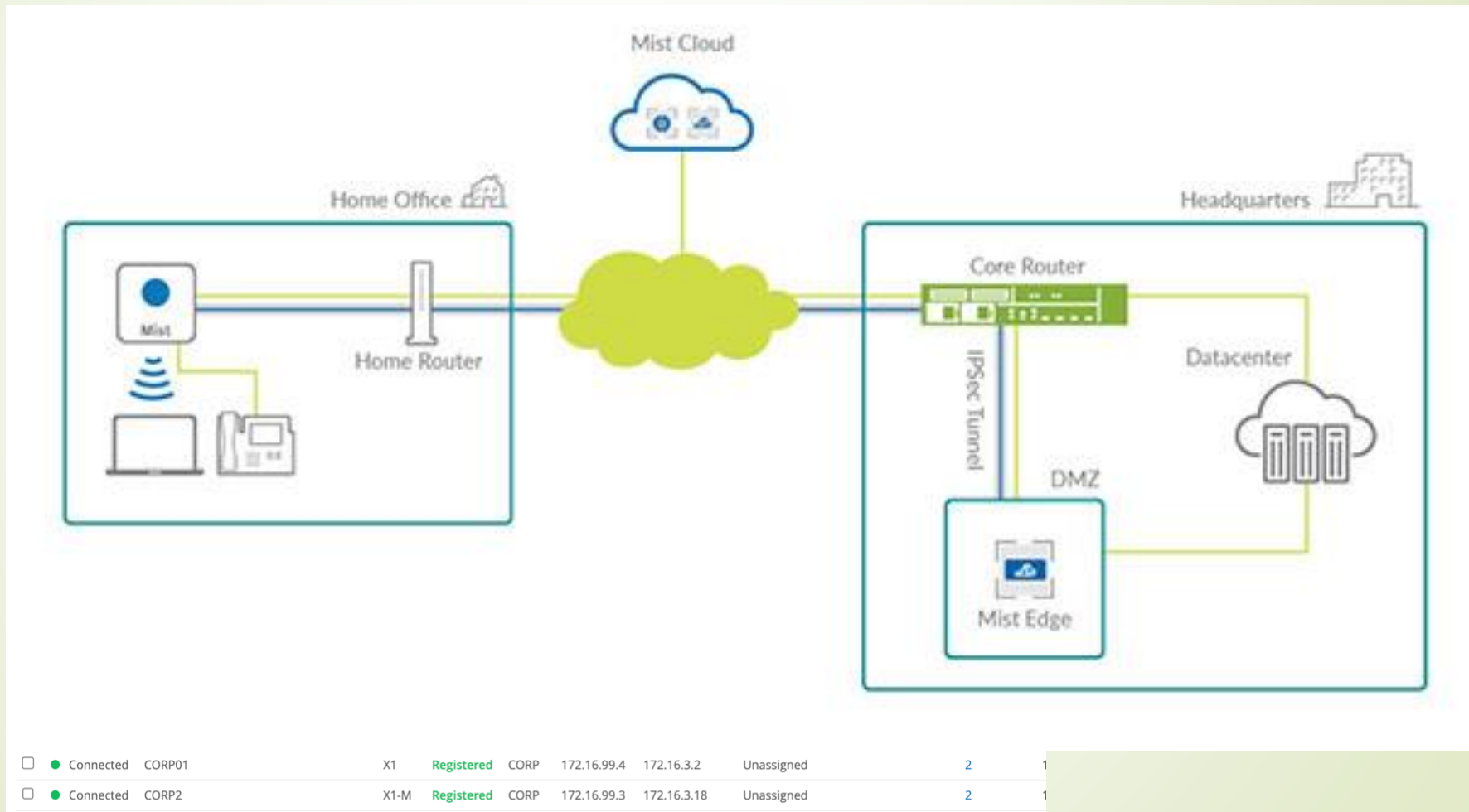
Custom Forwarding

☒ Custom Forwarding to

Site Edge

MIST-Edge

- Congrats – your Lab can now be accessed via your Home-WiFi ☺



MIST-Edge





MIST-Edge

- The Mist APs and Mist Edge support IPv6 only and dual stack environments.

- **For AP's:**

The AP supports DHCPv6 and SLAAC for address assignment

Global 02 and Global 04 cloud environments support AP to cloud connectivity over IPv6.
For ALL other cloud environments, you will need to perform NAT64.

APs support RADIUS and Mist Edge connectivity over IPv6

- **For Mist Edge:**

The Mist Edge supports DHCPv6 and SLAAC for OOBM address assignment

The tunnel IP address supports IPv6 assignment

Global 02 and Global 04 cloud environments support ME to cloud connectivity over IPv6.
For ALL other cloud environments, you will need to perform NAT64.

Mist Edge tunnel/AP connectivity over IPv6 supported

- **For Wi-Fi Clients**

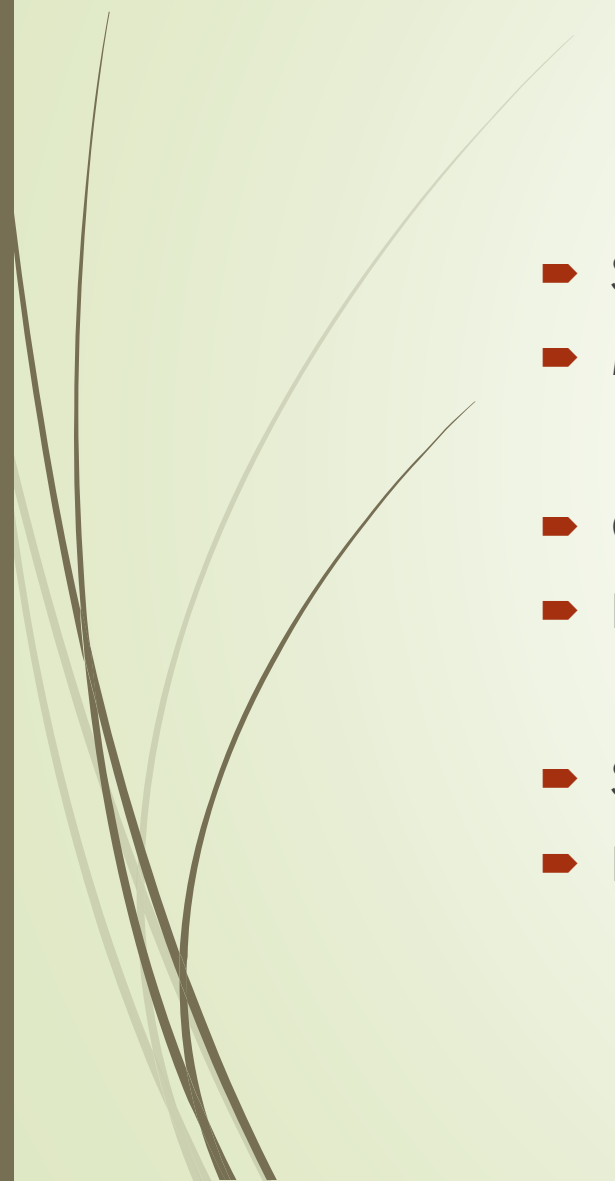
Several policy related features such as WxLAN support of IPv6 and Mist guest portal support of IPv6 are still in development.

What to do in case something goes wrong?





Pitfall: not enough resources (CPU / RAM)

- Symptom:
 - Multiple unexplainable errors / strange behavior in multiple ways
 - Cause:
 - Device has not enough CPU / RAM to perform basic tasks
 - Solution:
 - NEVER go below the recommendation from the template
- 

Pitfall: booting up everything at once

- Symptom:
- Lab takes literally forever to start
- Cause:
- Device takes WAY more resources during bootup and CPU is overwhelmed
- Solution:
- Use the „delay“-option to start the devices one after another



Startup configuration	Satellite
None	master
Delay (s)	
0	

Pitfall: eve-ception

- Symptom:
- Running EVE-NG on your Laptop in vmware Workstation and starting a lab is not working

- Cause:



- Solution:
- Don't use EVE-NG on your Laptop
Use a proper Server (Vmware, Cloud or Bare-Metal)
and access it via your Webbrowser
Usually cheap to fetch on eBay



More Infos

- YouTube Video Series covering EVE-NG and Juniper:
<https://www.youtube.com/netchron>
- EVE-NG YouTube Channel:
<https://www.youtube.com/@eve-ng-emulatedvirtualenvi9759>
- EVE-NG Website:
<https://www.eve-ng.net/>
- EVE-NG Forum:
<https://www.eve-ng.net/forum/>
- EVE-NG Helpdesk (Live-Chat):
<https://www.eve-ng.net/index.php/live-helpdesk/>

KAHOOT Time!



Q&A



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