

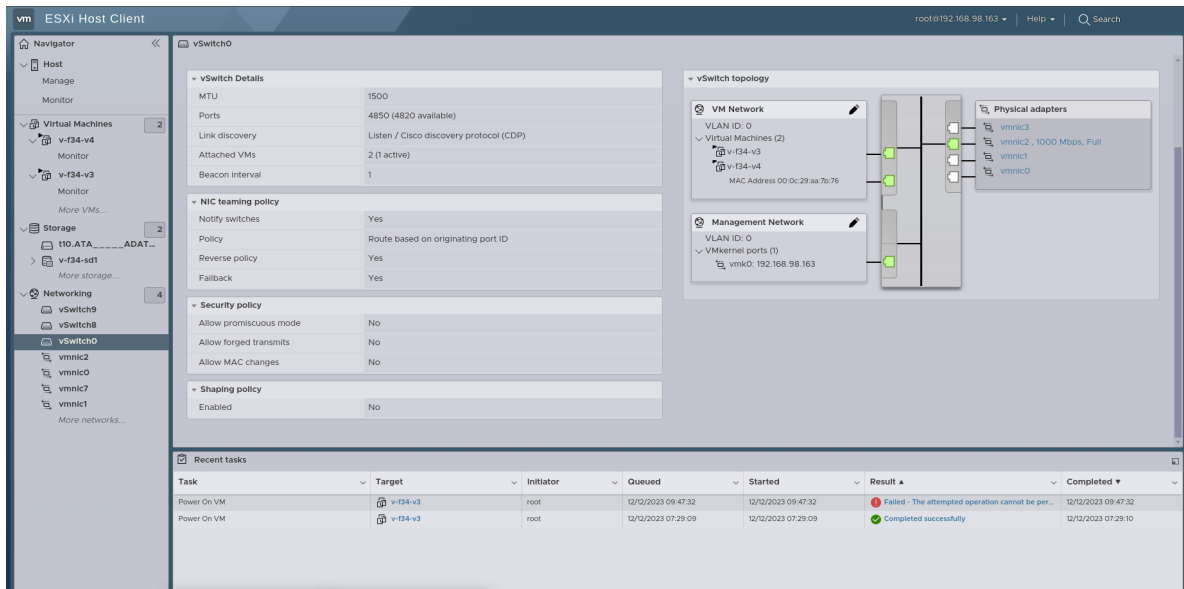
Install LANforge on ESXi Server (Version 8)

Goal: Install LANforge on an ESXi Server, and confirm DHCP can be served over VLANs.

In this test scenario, we use a system compatible with ESXi version 8. ESXi version 8 can run 2 lanforge VMs on 2 different VLANs, host DHCP on one VLAN, and acquire DHCP leases on the other VLAN through a WANlink. This outlines expected behavior and uses cases for VLANs and WANlinks between LANforge and ESXi version 8. Requires LANforge version 5.3.5 or higher.

1. Configuring ESXi Server ver. 8.02

- This scenario was built upon ESXi 8.02 build 23305546, using a CT-525 with a 4 port 1g nic as well as an accompanying TPLink SG105E Smart Switch.
- Log into TPLink SG105E 5 port Smart Switch (usually defaults to 192.168.0.1). Assign ports 2 and 3 to a VLAN, name 8 with ID 8. Assign ports 4 and 5 to a VLAN, name 9 with ID 9. Port 1 will be the assigned trunk port.
- In ESXi, create 3 vSwitches. vSwitch0, vSwitch8, vSwitch9. vSwitch0 should have been created and configured by default as the management switch. vSwitch8 connects to ports 1 and 2 on the host port, this corresponds to vmnic8 and vmnic9. vSwitch9 connects to ports 3 and 4 on the host port, which corresponds to vmnic 10 and 11. Vmnic numbers may vary.
- vSwitch0



The screenshot displays the ESXi Host Client interface for vSwitch0 configuration. The left sidebar shows the navigation tree with 'vSwitch0' selected under 'Networking'. The main panel shows the 'vSwitch Details' tab, which includes settings for MTU (1500), Ports (4850), Link discovery (Listen / Cisco discovery protocol (CDP)), Attached VMs (2 (1 active)), and Beacon interval (1). The 'NIC teaming policy' section shows 'Notify switches' set to Yes, 'Policy' set to 'Route based on originating port ID', 'Reverse policy' set to Yes, and 'Failback' set to Yes. The 'Security policy' section shows 'Allow promiscuous mode', 'Allow forged transmits', and 'Allow MAC changes' all set to No. The 'Shaping policy' section shows 'Enabled' set to No. The 'vSwitch topology' section shows a diagram of the vSwitch connected to physical adapters (vmnic3, vmnic2, vmnic1, vmnic0) and a 'VM Network' section showing 'VLAN ID: 0' and 'Virtual Machines (2)' (v-f34-v3, v-f34-v4) with their MAC addresses. A 'Management Network' section shows 'VLAN ID: 0' and 'VMkernel ports (1)' (vmk0: 192.168.98.163). The bottom section shows a 'Recent tasks' table with two entries: 'Power On VM' for v-f34-v3, which failed, and 'Power On VM' for v-f34-v3, which completed successfully.

Task	Target	Initiator	Queued	Started	Result	Completed
Power On VM	v-f34-v3	root	12/12/2023 09:47:32	12/12/2023 09:47:32	Failed - The attempted operation cannot be per...	12/12/2023 09:47:32
Power On VM	v-f34-v3	root	12/12/2023 07:29:09	12/12/2023 07:29:09	Completed successfully	12/12/2023 07:29:10

E. vSwitch8

The screenshot shows the vSphere ESXi Host Client interface with vSwitch8 selected in the left-hand navigation pane. The main panel displays the configuration for vSwitch8, including details, policies, and topology.

vSwitch Details

MTU	1500
Ports	4850 (4820 available)
Link discovery	Listen / Cisco discovery protocol (CDP)
Attached VMs	2 (1 active)
Beacon interval	1

NIC teaming policy

Notify switches	Yes
Policy	Route based on originating port ID
Reverse policy	Yes
Fallback	Yes

Security policy

Allow promiscuous mode	Yes
Allow forged transmits	Yes
Allow MAC changes	Yes

Shaping policy

Enabled	No
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vSwitch topology

The topology diagram shows vSwitch8 connected to physical adapters vmnic8 and vmnic9. A VLAN8 configuration box is visible, showing VLAN ID: 8, connected to two virtual machines (v-f34-v3 and v-f34-v4) with MAC addresses 00:0c:29:aa:7b:80 and 00:0c:29:aa:7b:81 respectively.

Recent tasks

Task	Target	Initiator	Queued	Started	Result	Completed
Power On VM	v-f34-v3	root	12/12/2023 09:47:32	12/12/2023 09:47:32	Failed - The attempted operation cannot be per...	12/12/2023 09:47:32
Power On VM	v-f34-v3	root	12/12/2023 07:29:09	12/12/2023 07:29:09	Completed successfully	12/12/2023 07:29:10

F. vSwitch9

The screenshot shows the vSphere ESXi Host Client interface with vSwitch9 selected in the left-hand navigation pane. The main panel displays the configuration for vSwitch9, including details, policies, and topology.

vSwitch Details

MTU	1500
Ports	4850 (4820 available)
Link discovery	Listen / Cisco discovery protocol (CDP)
Attached VMs	2 (1 active)
Beacon interval	1

NIC teaming policy

Notify switches	Yes
Policy	Route based on originating port ID
Reverse policy	Yes
Fallback	Yes

Security policy

Allow promiscuous mode	Yes
Allow forged transmits	Yes
Allow MAC changes	Yes

Shaping policy

Enabled	No
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vSwitch topology

The topology diagram shows vSwitch9 connected to physical adapters vmnic10 and vmnic11. A VLAN9 configuration box is visible, showing VLAN ID: 9, connected to two virtual machines (v-f34-v3 and v-f34-v4) with MAC addresses 00:0c:29:aa:7b:8a and 00:0c:29:aa:7b:8b respectively.

Recent tasks

Task	Target	Initiator	Queued	Started	Result	Completed
Power On VM	v-f34-v3	root	12/12/2023 09:47:32	12/12/2023 09:47:32	Failed - The attempted operation cannot be per...	12/12/2023 09:47:32
Power On VM	v-f34-v3	root	12/12/2023 07:29:09	12/12/2023 07:29:09	Completed successfully	12/12/2023 07:29:10

G. Next, create 2 port groups. First port group named VLAN8 with an ID of 8, assign vSwitch8 to it, inherit all settings from vSwitch8.

The screenshot shows the vSphere ESXi Host Client interface with VLAN8 selected in the left-hand navigation pane. The main panel displays the configuration for VLAN8, including details, topology, and policies.

VLAN8 Details

Accessible	Yes
Virtual machines	2
Virtual switch	vSwitch8
VLAN ID	8
Active ports	1

vSwitch topology

The topology diagram shows VLAN8 connected to physical adapters vmnic8 and vmnic9. A VLAN8 configuration box is visible, showing VLAN ID: 8, connected to two virtual machines (v-f34-v3 and v-f34-v4) with MAC addresses 00:0c:29:aa:7b:80 and 00:0c:29:aa:7b:81 respectively.

Security policy

Allow promiscuous mode	Yes
Allow forged transmits	Yes
Allow MAC changes	Yes

NIC teaming policy

Notify switches	Yes
Policy	Route based on originating port ID
Reverse policy	Yes
Fallback	Yes

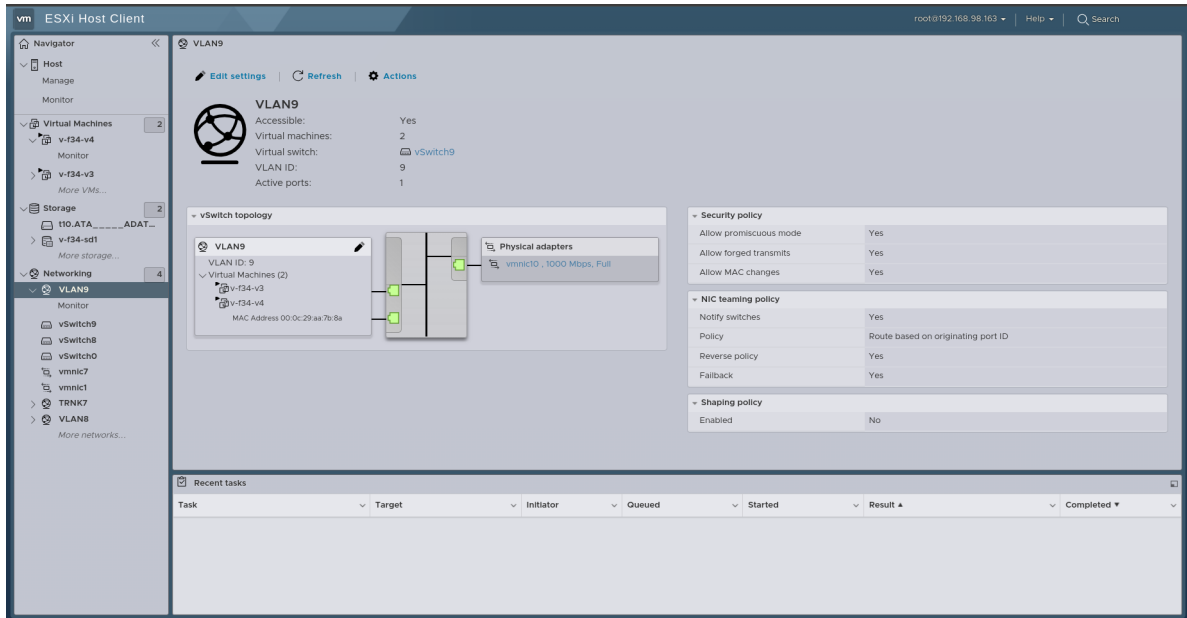
Shaping policy

Enabled	No
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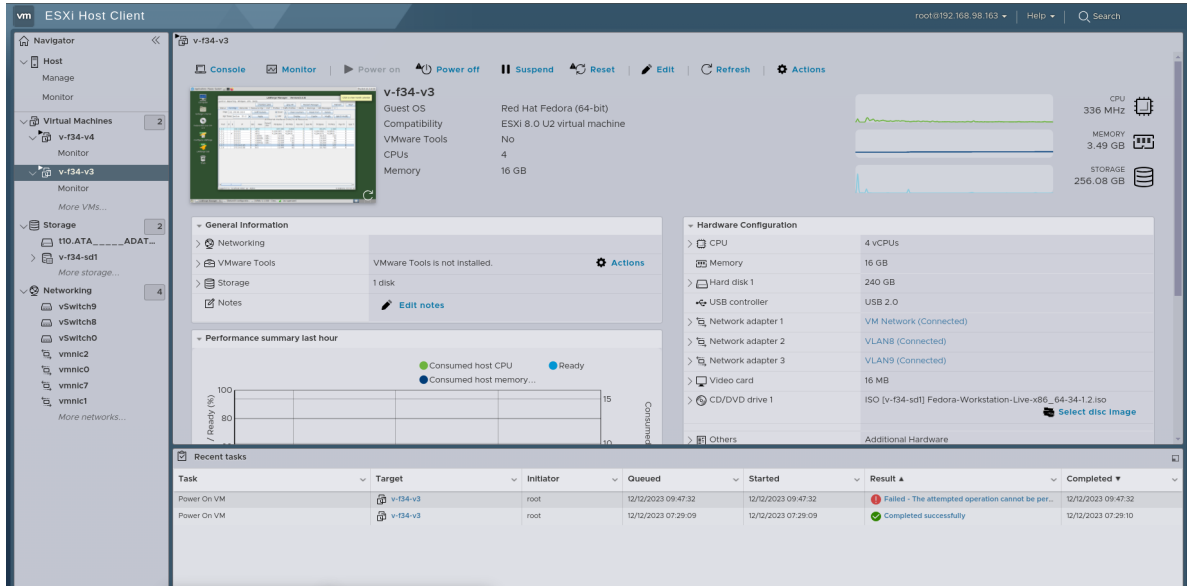
Recent tasks

Task	Target	Initiator	Queued	Started	Result	Completed
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- H. Create another port group named VLAN9, with an ID of 9, assign vSwitch9 to it as well, inherit all settings from vSwitch9.



- I. Create a LANforge VM.

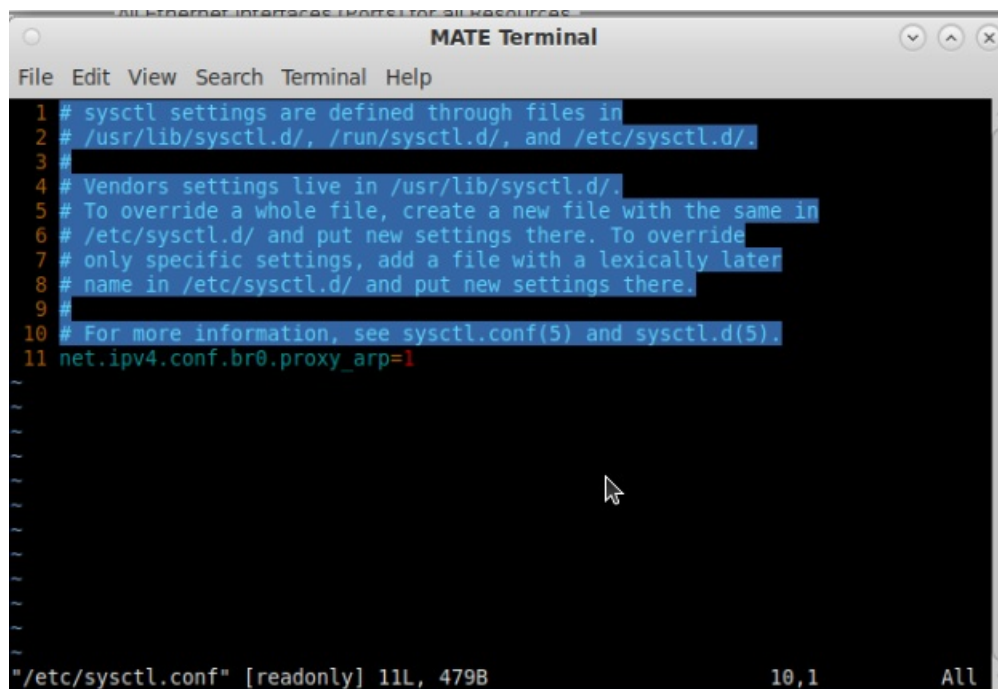


- J. Install Fedora and then LANforge on the VM. See also: [lfservr install](#).

- K. After successful VM creation and Fedora 34 install, power off the VM.

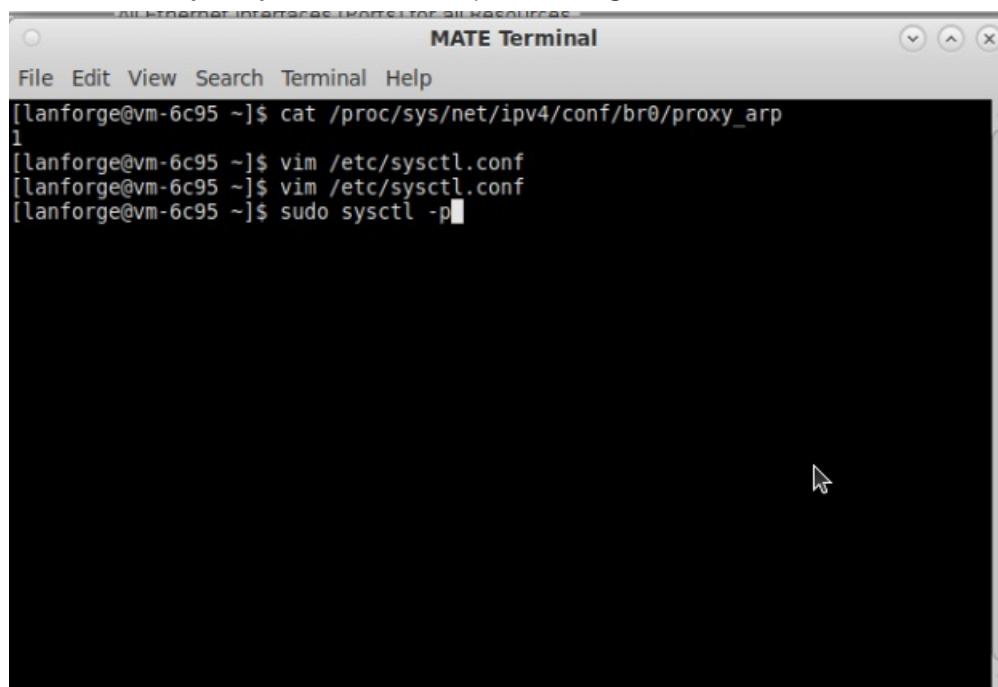
- L. Add network ports to the VM for VLAN8 and VLAN9.

2. Open the terminal and type: `vim /etc/sysctl.conf`



```
MATE Terminal
File Edit View Search Terminal Help
1 # sysctl settings are defined through files in
2 # /usr/lib/sysctl.d/, /run/sysctl.d/, and /etc/sysctl.d/.
3 #
4 # Vendors settings live in /usr/lib/sysctl.d/.
5 # To override a whole file, create a new file with the same in
6 # /etc/sysctl.d/ and put new settings there. To override
7 # only specific settings, add a file with a lexically later
8 # name in /etc/sysctl.d/ and put new settings there.
9 #
10 # For more information, see sysctl.conf(5) and sysctl.d(5).
11 net.ipv4.conf.br0.proxy_arp=1
"/etc/sysctl.conf" [readonly] 11L, 479B 10,1 All
```

3. Here, at the bottom of this file, we will add this line: `net.ipv4.conf.br0.proxy_arp=1`, this will keep proxy arps consistent across reboots.
4. Finally, run the command: **sysctl -p** to force reload system settings.



```
MATE Terminal
File Edit View Search Terminal Help
[lanforge@vm-6c95 ~]$ cat /proc/sys/net/ipv4/conf/br0/proxy_arp
1
[lanforge@vm-6c95 ~]$ vim /etc/sysctl.conf
[lanforge@vm-6c95 ~]$ vim /etc/sysctl.conf
[lanforge@vm-6c95 ~]$ sudo sysctl -p
```

5. Open LANforge GUI, and in Netsmith tab, right click -> new bridge.
6. Uncheck DHCP option for bridge, name it br0.

NetSmith configuration for Resource: vm-6c95(1.1) Version: 5.4.8

Virtual Routers and Connections

Create VLANs on Port:

- ☐ MAC-VLAN
 ☐ 802.1Q-VLAN
 ☐ Redirect
 ☒ Bridge
 ☐ Bond

☐ GRE Tunnel
 ☐ WiFi STA
 ☐ WiFi VAP
 ☐ WiFi Monitor
 ☐ WiFi Virtual Radio
- Shelf: Resource: Port:
- Quantity:
- Basic Settings

WiFi Settings

Advanced Settings

VLAN ID:

STA ID:

Parent MAC:

MAC Addr:

☐ DHCP-IPv4

☐ Multiple Subnets

IP Address:

IP Mask or Bits:

Gateway IP:

Bridge Name:

#2 Redir Name:
- ☐ Down

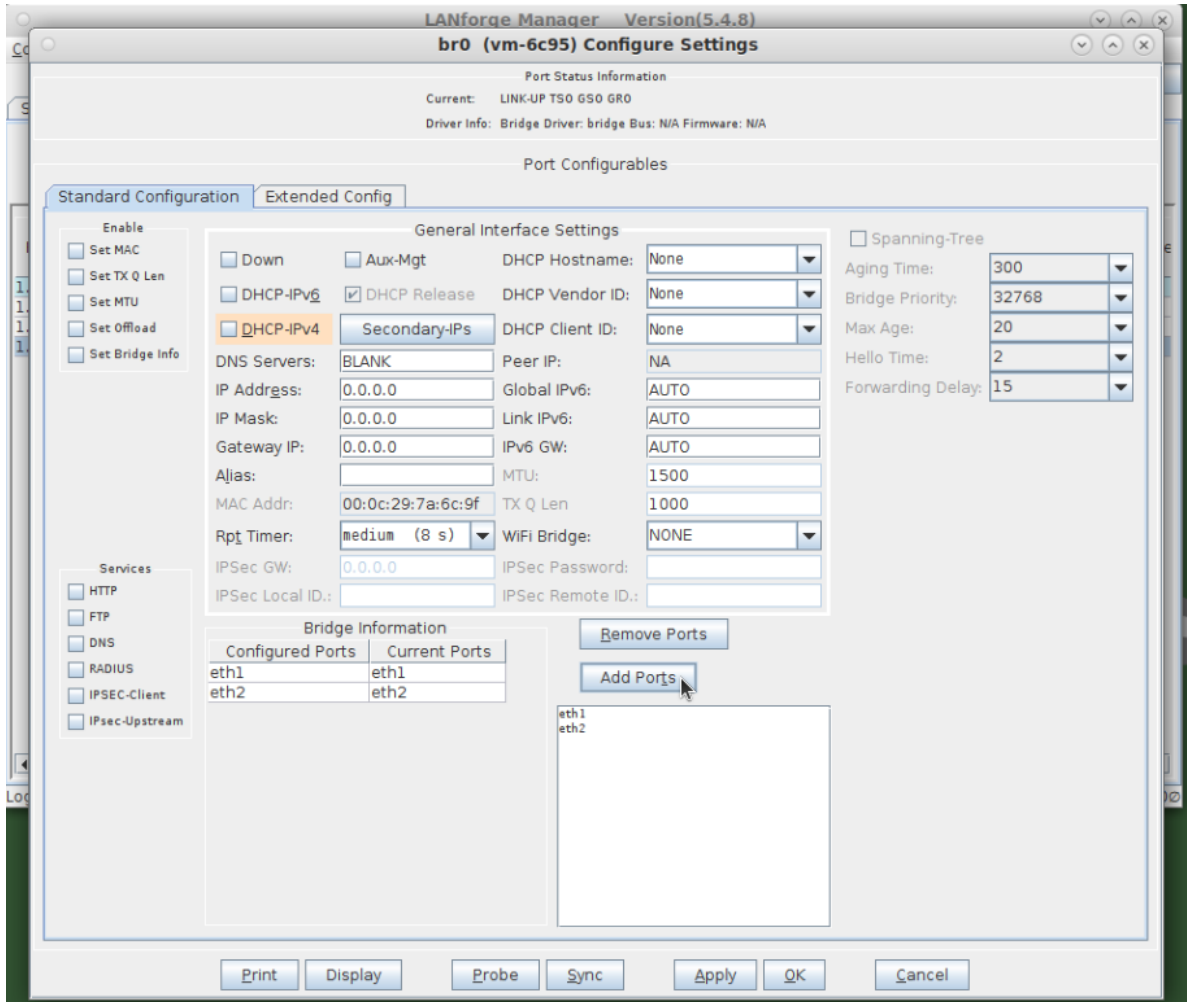
☒ WanLinks
 ☐ Show Legend
 ☒ Fire
 ☒ IPv4s

☒ WanLink Names
 ☒ Port Names
 ☒ Fire Names
 ☐ Zero-IPv4s
 Apply Progress: 100% Complete

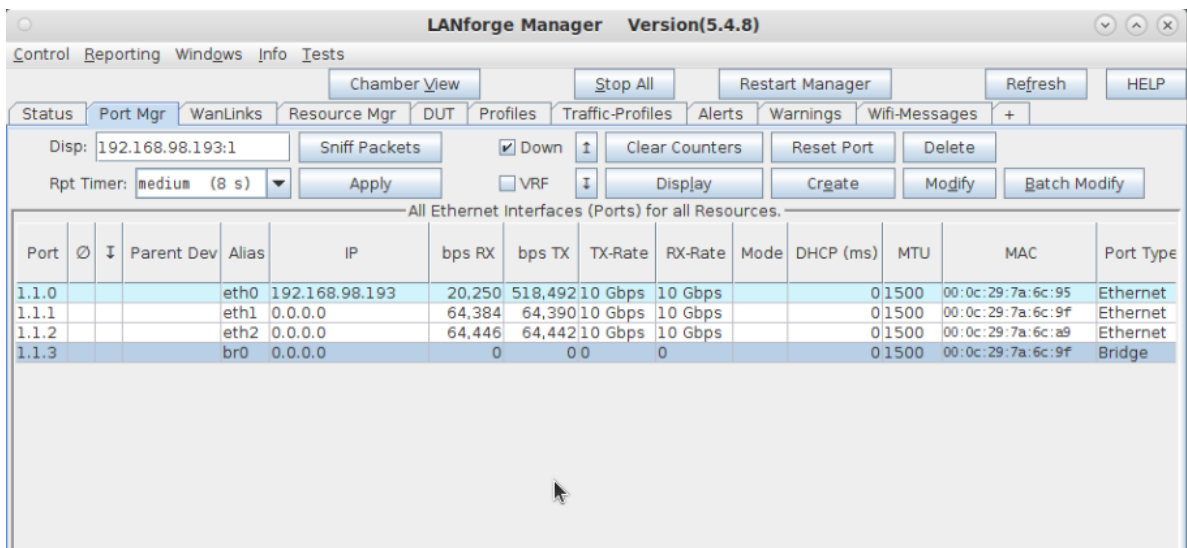
☒ Peer WanLinks
 ☒ Parents
 ☒ Col. Domains
 ☐ IPv6s
 NetSmith Status: OK

- Apply and Sync in NetSmith.
- In Port Mgr tab, double click the the newly created bridge (in this example, it is br0).
- Make sure DHCP is unchecked, and all Gateway, IP, DNS are set to 0.0.0.0.
- At the bottom, underneath the buttons that say Add Ports and Remove Ports, type eth1 and press enter, then eth2.

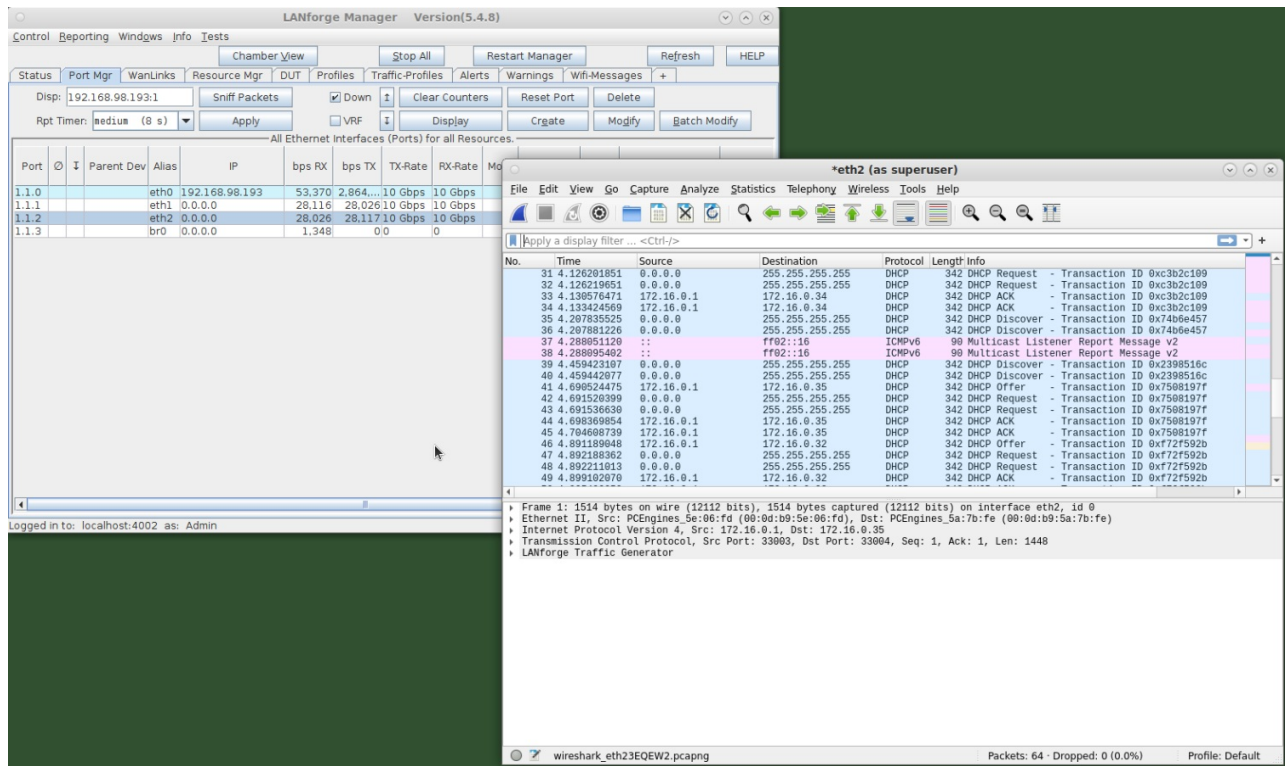
- E. Click `Add Ports`, Click Apply, then Sync. Once eth1 and eth2 show up under configured as well as current ports, then close the bridge editing tab.



- F. In Port Mgr, there will be no IP's showing up here. This is because we're simply redirecting traffic from one VLAN to the next VLAN. If we want IP's here, we need to make a redirect device to spawn off some IP's.



- Have devices (on VLAN9) request DHCP from the server so we can see DHCP crossing through LANforge.
- Highlight the downstream port, eth2, and click sniff packets. Here, we are looking for signs of a DHCP Request and a DHCP ACK external to this virtual lanforge.



A. Verify traffic flow with the ping command. Use external IPs to the virtual LANforge, because traffic originating within LANforge will only give a partial network traffic route between VLANs. Ping -I 172.16.0.1 172.16.0.32.

9. If we are not seeing anything relating to DHCP on wireshark, then check the VLAN configuration in ESXi. Neither VLAN should be configured with EST or VGT tagging modes. (VLAN IDs need to be between 1 and 4094).
10. When setting VLAN IDs to [0] you set the vSwitch to External Switch Tagging mode. When setting the VLAN IDs to [4095] you set the vSwitch to Virtual Guest Tagging mode. Please set the VLAN IDs to the corresponding incoming VLAN ID's. This sets the vSwitches to Virtual Switch Tagging mode. In our lab testing, an external switch was used and two tagged ports were created, one containing VLAN 8 and one containing VLAN 9. In ESXi, these port groups should be ID'd the same, 8 and 9.
11. Verify upstream and downstream ports.
 - A. Verify upstream port (this is eth2, on the QVLAN9 network) in LANforge with `sudo tcpdump -ni eth2`, the interface for the upstream port can be additionally verified in ESXi under Networking -> Port Groups -> VLAN8. vSwitch topology will show VM's the VLAN services, including the MAC ADDR of the upstream port, as well as the physical adapters on the otherside of the topology.
 - B. Verify downstream port (this is eth1 introducing DHCP to the LANforge and on the VLAN8 network), with `sudo tcpdump -ni eth1`, the interface for the upstream port can be additionally verified in ESXi under Networking -> Port Groups -> VLAN9. This is a similar process as the previous step.