Linux Servers

Classroom Assignment 5 – Network, routing and NAT

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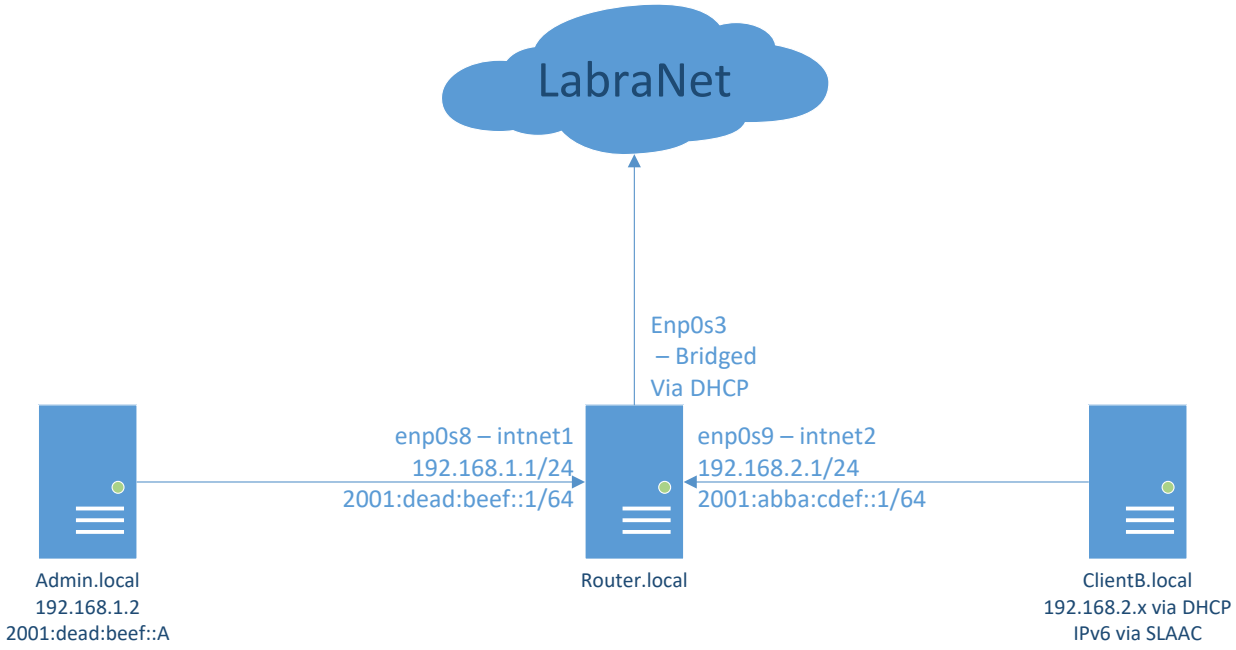
Document your commands or take screenshots. Answer questions in english or finnish.

The following assignment uses the same topology and network settings as the Lab1 assignment later on the course. Document all your commands with extra care so you can use them in the Lab1.



1. Interfaces

If you haven't already, configure the VM network interfaces so they match the topology picture. We don't have DHCP server yet, so you can configure the ClientB with static IP (any IP in the range is okay).

The interface names may not match as they may be enp0s3, ens0 or something else. Check the MAC addresses and compare them to VirtualBox settings. Fix the names in the topology above.

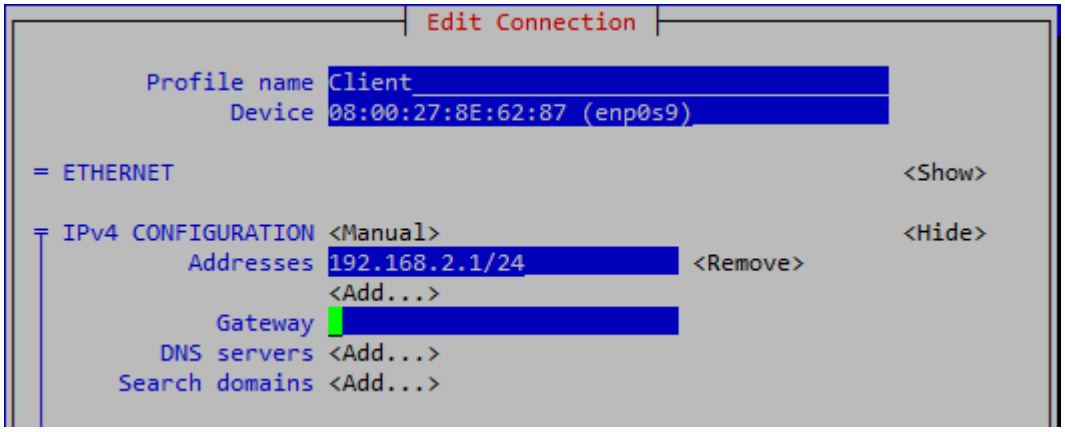
You can configure the IP addresses directly in network-scripts or use nmtui. You can use nmcli if you want to be a badass. But nmtui is much easier. Try to configure at least one interface directly in network-scripts so you have a grasp of how the file works.

```
[admin@localhost media]$ sudo nano /etc/sysconfig/network-scripts/ifcfg-enp0s3
[sudo] password for admin:
```

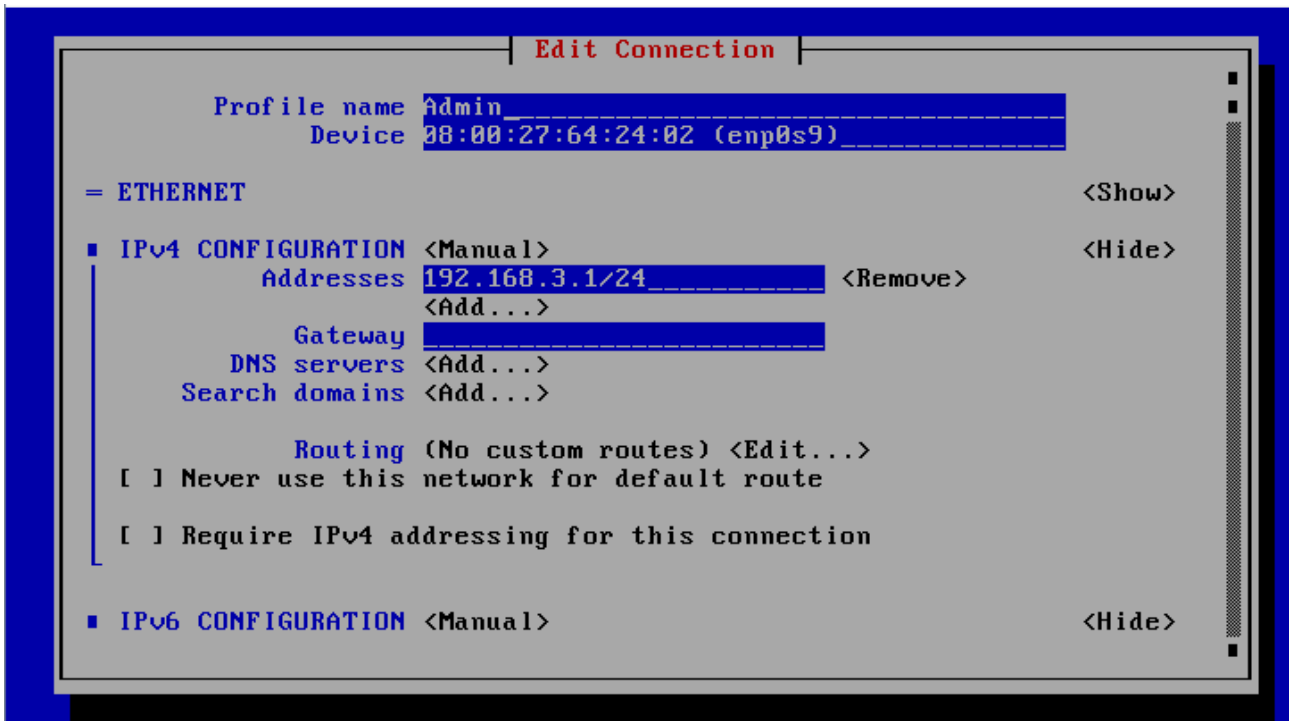
On the admin /etc/sysconfig/network-scripts/ifcfg-enp0s3 :

```
TYPE=Ethernet
BOOTPROTO=dhcp
DEFROUTE=yes
IPV4_FAILURE_FATAL=no
IPV6INIT=yes
IPV6_AUTOCONF=yes
IPV6_DEFROUTE=yes
IPV6_FAILURE_FATAL=no
NAME=enp0s3
UUID=67771043-7e7b-47f1-b0c0-41a5d7f18889
DEVICE=enp0s3
ONBOOT=yes
PEERDNS=yes
PEERROUTES=yes
IPV6_PEERDNS=yes
IPV6_PEERROUTES=yes
IPADDR=192.168.1.2
SUBNET=255.255.255.0
GATEWAY=192.168.1.1
IPV6ADDR=2001:dead:beef::A
IPV6_DEFAULTGW=2001:dead:beef::1/64
```

Router-Client interface:



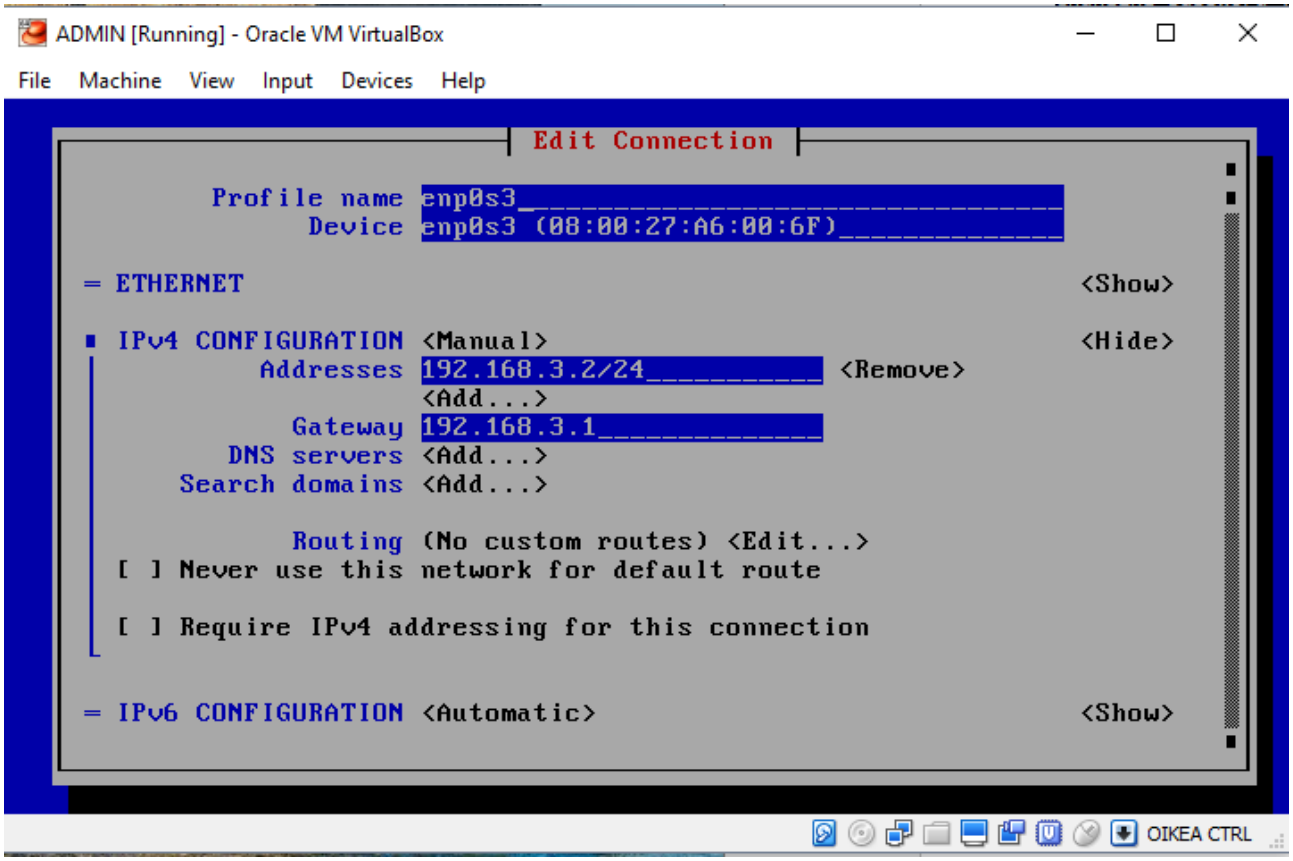
Router-Admin interface:

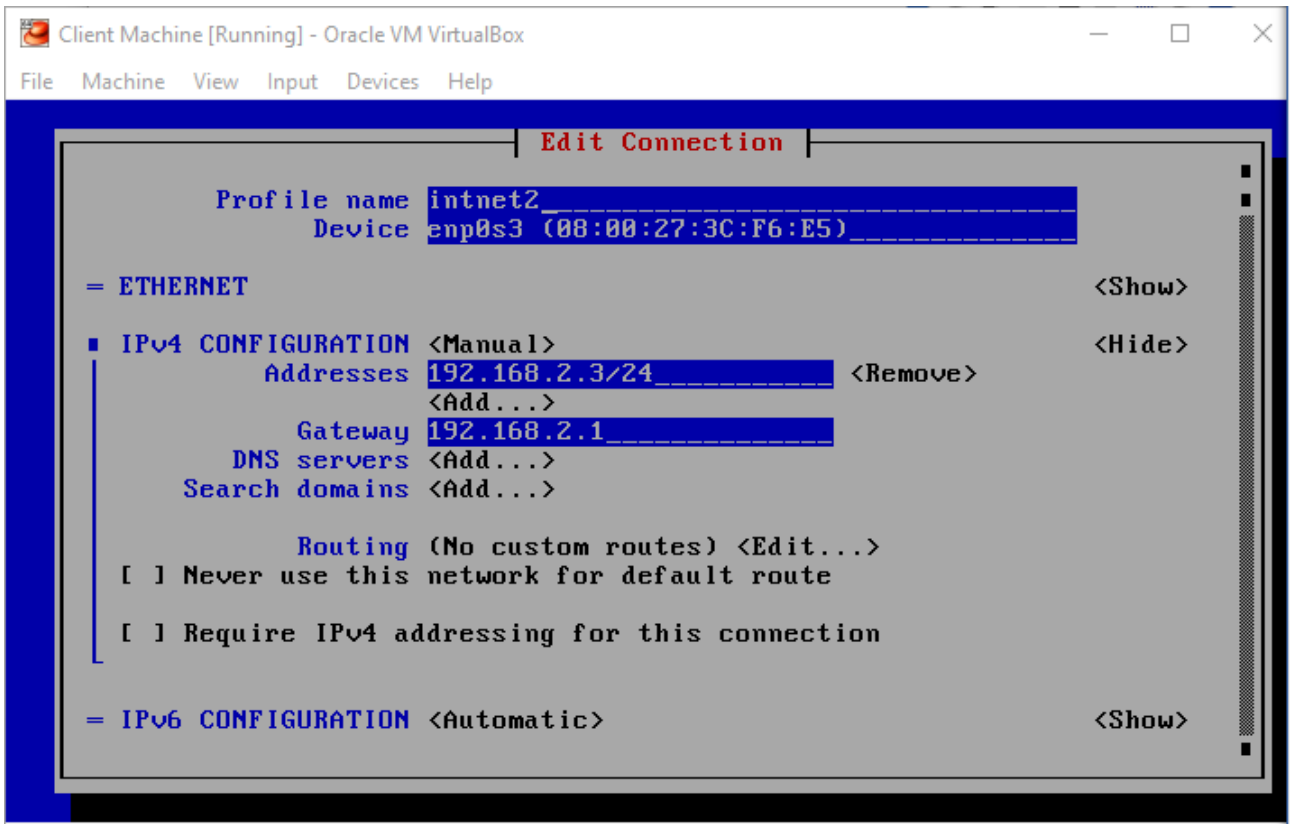


2. Routing

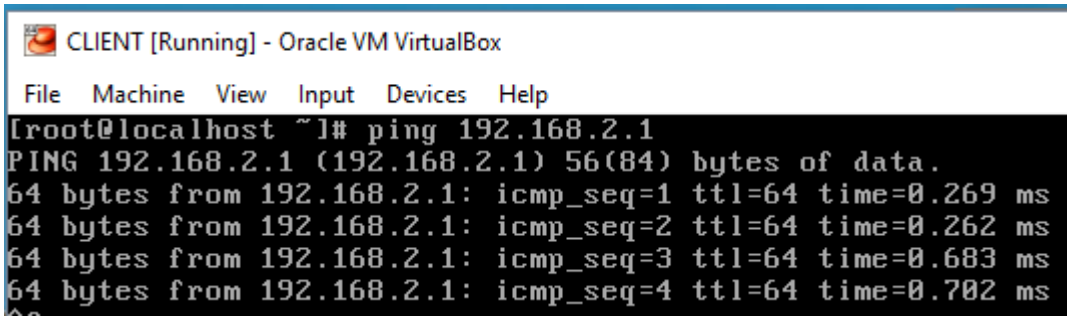
Set the default gateway for Admin and ClientB (Admin will have 192.168.1.1 as GW). Use the corresponding router interface. DO NOT set the default gateway in the Router side! (why not?)

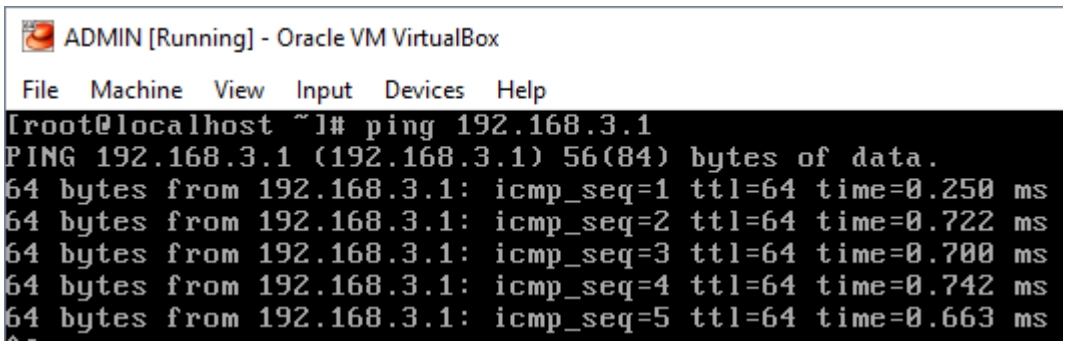
Admin koneen nmtui asetus. I had to change the interface address because it was conflicting with my dns server which is 192.168.1.1


ADMIN [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Edit Connection
Profile name enp0s3
Device enp0s3 (08:00:27:A6:00:6F)
= ETHERNET <Show>
IPv4 CONFIGURATION <Manual> <Hide>
Addresses 192.168.3.2/24 <Remove>
<Add...>
Gateway 192.168.3.1
DNS servers <Add...>
Search domains <Add...>
Routing (No custom routes) <Edit...>
[ ] Never use this network for default route
[ ] Require IPv4 addressing for this connection
= IPv6 CONFIGURATION <Automatic> <Show>
OIKEA CTRL


Client Machine [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Edit Connection
Profile name intnet2
Device enp0s3 (08:00:27:3C:F6:E5)
= ETHERNET <Show>
IPv4 CONFIGURATION <Manual> <Hide>
Addresses 192.168.2.3/24 <Remove>
<Add...>
Gateway 192.168.2.1
DNS servers <Add...>
Search domains <Add...>
Routing (No custom routes) <Edit...>
[ ] Never use this network for default route
[ ] Require IPv4 addressing for this connection
= IPv6 CONFIGURATION <Automatic> <Show>

Try to ping everything from everywhere. You should ONLY be able to ping Router from both Admin and ClientB. Why can't you ping ClientB from the Admin VM, what is missing?





Correct this problem and test that you can now ping each other. Use arp and route –commands if necessary to troubleshoot. Note that you cannot ping LabraNet from Admin or ClientB as you need NAT.

3. NAT

Configure NAT (masquerade) for the firewall in Router.local. Note the correct outgoing interface. Try pinging Google DNS (8.8.8.8) or some other Internet resource.

Here I'm making nat rules to the router interface so client and admin can ping each other and ping network.

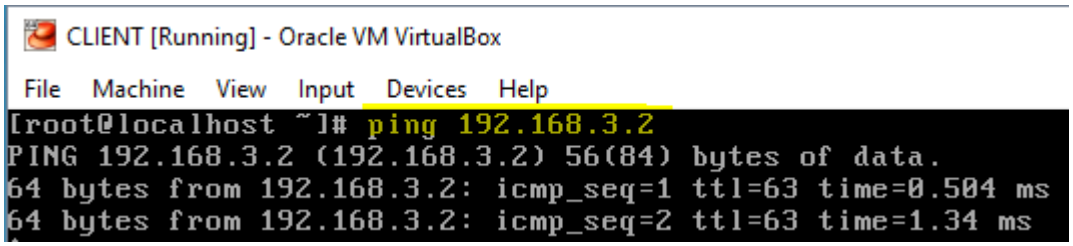
This will add permanent rules, not the runtime rules.

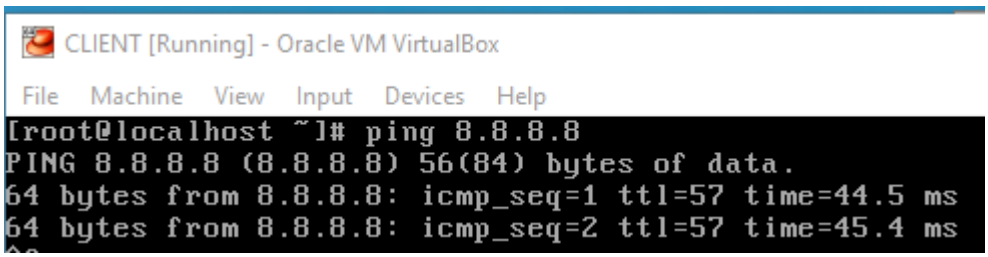
```
[root@localhost media]# firewall-cmd --permanent --direct --add-rule ipv4 nat POSTROUTING 0 -o enp0s3 -j MASQUERADE
success
[root@localhost media]#
[root@localhost media]#
[root@localhost media]# firewall-cmd --permanent --direct --add-rule ipv4 filter FORWARD 0 -j ACCEPT
success
[root@localhost ~]# sysctl -w net.ipv4.ip_forward=1
net.ipv4.ip_forward = 1
```

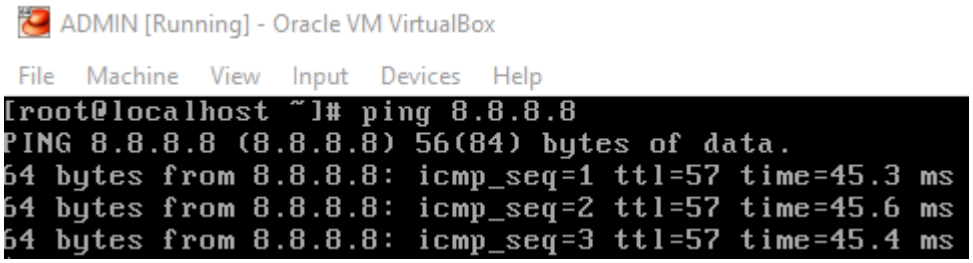
You will need to reload permanent rules so they become runtime rules

```
[root@localhost media]# firewall-cmd --reload
success
```

After the rules Admin and Client were able to communicate with each other and also ping websites:







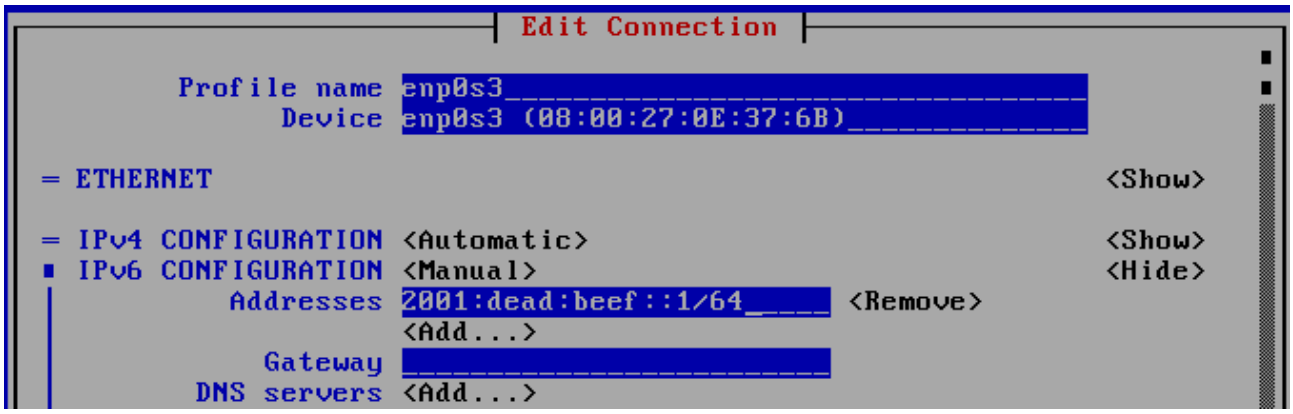
4. IPv6

Set IPv6 connectivity between Admin VM and Router as shown in topology picture. The router will have the ip :1 and the Admin VM will have :A. Remember to set the default IPv6 gateway also as :1.

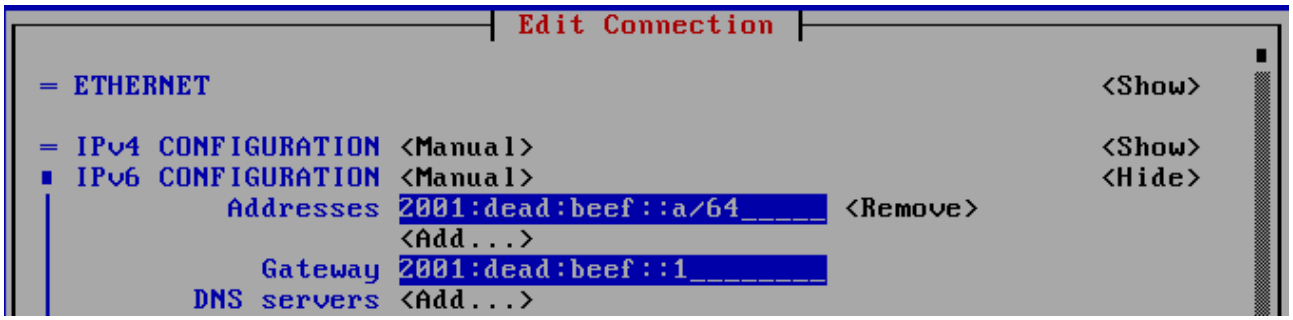
Test connectivity with ping6. If the classroom has IPv6, test pinging some IPv6 address (For example he.net 2001:470:0:76::2 or ftp.funet.fi 2001:708:10:9::20:2). This might be filtered also.

Note: You will not have total connectivity yet as we did not set DNS servers. These will be done in the next assignment, but if you want, you can set them already and test Internet connectivity.

ROUTER:



ADMIN:



Ping6 works like a charm

```
[root@admin ~]# ping6 2001:dead:beef::1
PING 2001:dead:beef::1(2001:dead:beef::1) 56 data bytes
64 bytes from 2001:dead:beef::1: icmp_seq=1 ttl=64 time=0.285 ms
64 bytes from 2001:dead:beef::1: icmp_seq=2 ttl=64 time=0.544 ms
64 bytes from 2001:dead:beef::1: icmp_seq=3 ttl=64 time=0.456 ms
```

Ping6 also work to the network.