

# **IT Technology**

## **Networking**

### **Assignment 16, VMware Workstation and Installation**



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University College

Author

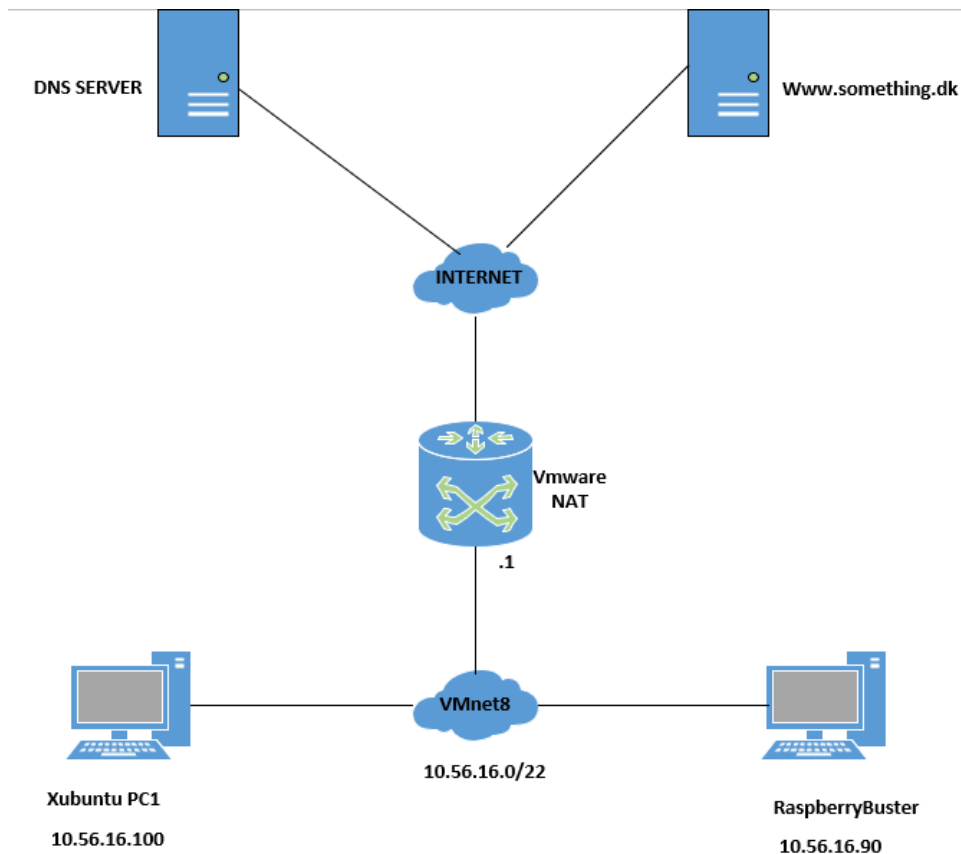
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#### **1. Introduction**

This assignment is using the VM Ware Workstation VMWW hardware and network virtualisation management tool.

First let's draw a diagram and cofigure our PC's



## 2. Routing table

Now we are going to draw and explain the Linux routing table

First, to check the routing table we need to use the command “ip route”

```

Terminal - bogdan7978@ubuntu: ~
File Edit View Terminal Tabs Help
bogdan7978@ubuntu:~$ ip route
default via 10.56.16.1 dev ens33 proto static metric 100
10.56.16.0/22 dev ens33 proto kernel scope link src 10.56.16.100 metric 100
169.254.0.0/16 dev ens33 scope link metric 1000
bogdan7978@ubuntu:~$
  
```

Now let's complete the table

Destination	Gateway	Iface
0.0.0.0	10.56.16.1	ens33
10.56.16.0/22	0.0.0.0	ens33
169.254.0.0/16	0.0.0.0	ens33

This will be our Routing table for the Xubuntu machine

Now let's make one for PC2, the RaspberryBuster. This time we will use a different command ("route -n") so you understand better the completion of the routing table.

```
pi@raspberrypi:~$ route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0 10.56.16.1 0.0.0.0 UG 100 0 0 eth0
10.56.16.0 0.0.0.0 255.255.252.0 U 100 0 0 eth0
169.254.0.0 0.0.0.0 255.255.0.0 U 1000 0 0 eth0
pi@raspberrypi:~$
```

So now you will understand from where you get the values for the table.

Destination	Gateway	Iface
0.0.0.0	10.56.16.1	eth0
10.56.16.0	0.0.0.0	eth0
169.254.0.0	0.0.0.0	eth0

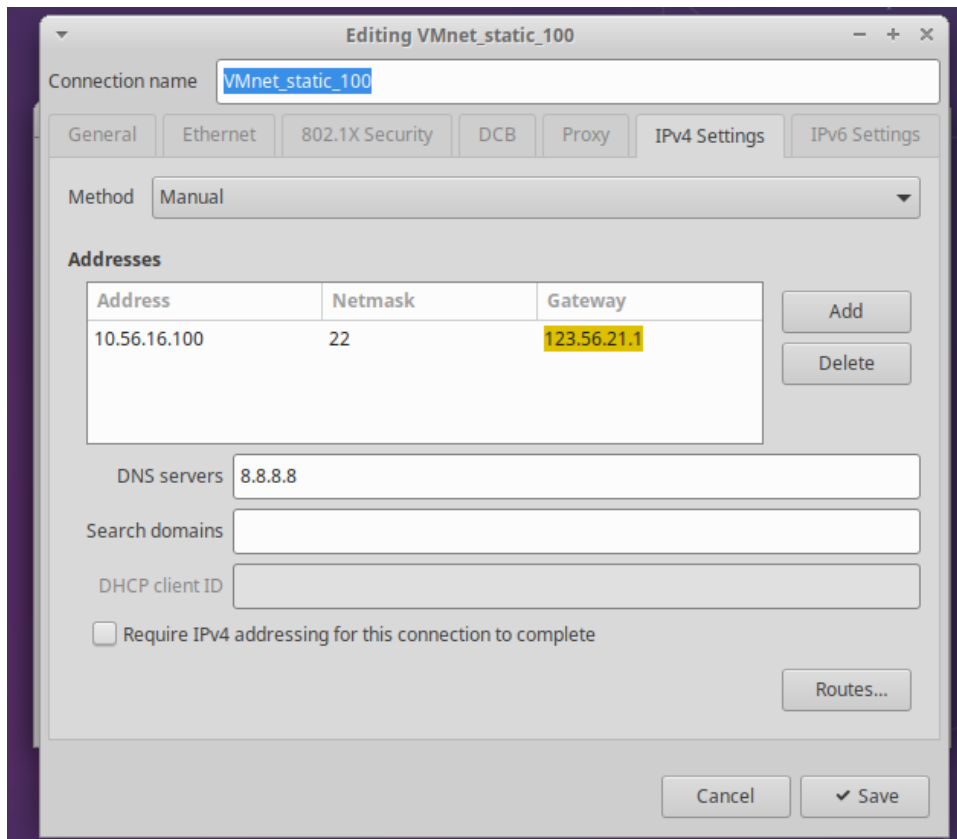
The **Default Gateway** is usually the router which forward data from one network to another. It let's devices communicate to each other from different networks.

The route to the directly connected network is:

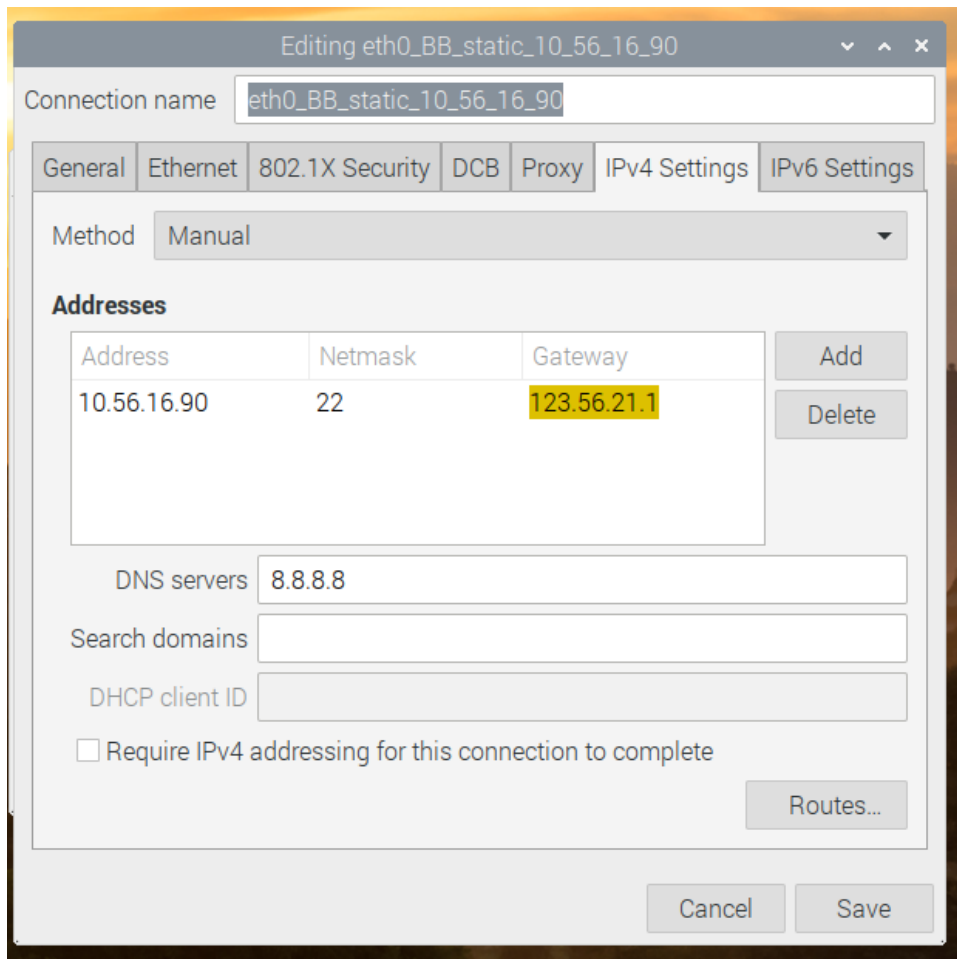
10.56.16.0/22	0.0.0.0	ens33
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### 3. Changing the Default Gateway

We will now change the default gateway of PC1



And PC2:



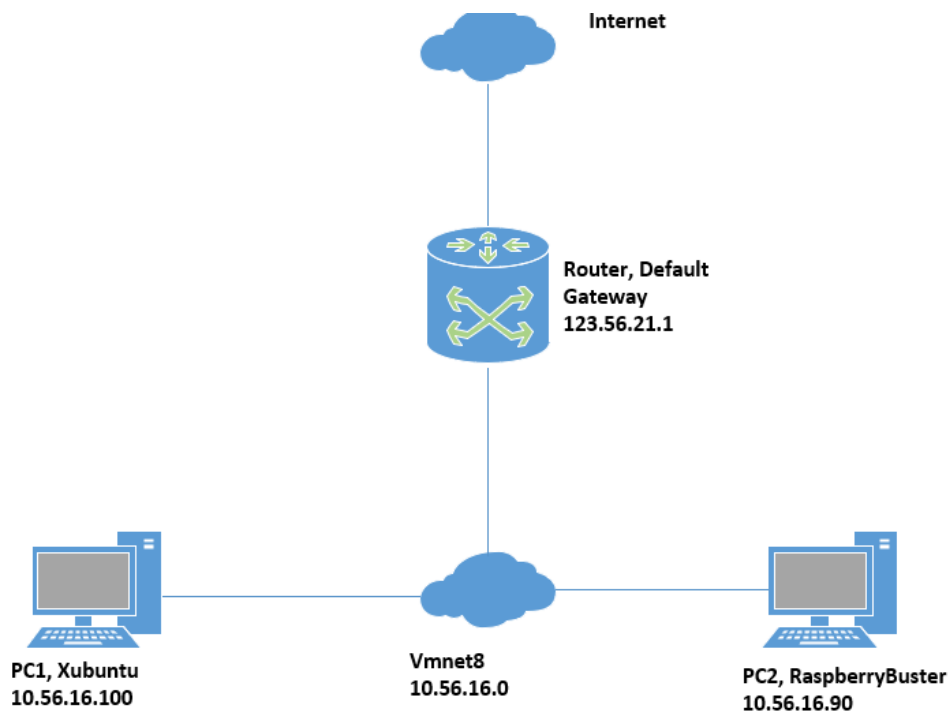
We will now try to ping from PC1 to PC2 to see if it works

```
Terminal - bogdan7978@ubuntu: ~
File Edit View Terminal Tabs Help
bogdan7978@ubuntu:~$ ping 10.56.16.90 -c 3
PING 10.56.16.90 (10.56.16.90) 56(84) bytes of data:
64 bytes from 10.56.16.90: icmp_seq=1 ttl=64 time=0.611 ms
64 bytes from 10.56.16.90: icmp_seq=2 ttl=64 time=0.376 ms
64 bytes from 10.56.16.90: icmp_seq=3 ttl=64 time=0.322 ms

--- 10.56.16.90 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2052ms
rtt min/avg/max/mdev = 0.322/0.436/0.611/0.125 ms
bogdan7978@ubuntu:~$
```

Looks like we were able to ping from PC1 to PC2 successfully.

The new **NETWORK DIAGRAM** should look like this:



And now to complete the new **Routing tables**:

### For PC1

```

Terminal - bogdan7978@ubuntu: ~
File Edit View Terminal Tabs Help
bogdan7978@ubuntu:~$ ip route
default via 123.56.21.1 dev ens33 proto static metric 100
10.56.16.0/22 dev ens33 proto kernel scope link src 10.56.16.100 metric 100
123.56.21.1 dev ens33 proto static scope link metric 100
169.254.0.0/16 dev ens33 scope link metric 1000
bogdan7978@ubuntu:~$ █

```

DESTINATION	GATEWAY	Iface
0.0.0.0	123.56.21.1	ens33
10.56.16.0/22	0.0.0.0	ens33
123.56.21.1	0.0.0.0	ens33
169.254.0.0/16	0.0.0.0	ens33

### For PC2

```

pi@raspberrypi: ~
File Edit Tabs Help
pi@raspberrypi:~ $ ip route
default via 123.56.21.1 dev eth0 proto static metric 100
10.56.16.0/22 dev eth0 proto kernel scope link src 10.56.16.90 metric 100
123.56.21.1 dev eth0 proto static scope link metric 100
169.254.0.0/16 dev eth0 scope link metric 1000
pi@raspberrypi:~ $ █

```

DESTINATION	GATEWAY	Iface
0.0.0.0	123.56.21.1	eth0

10.56.16.0/22	0.0.0.0	eth0
123.56.21.1	0.0.0.0	eth0
169.254.0.0/16	0.0.0.0	eth0

Now let's try and ping an ip outside of our local network through our new default gateway

```

pi@raspberrypi: ~
File Edit Tabs Help
pi@raspberrypi:~ $ ping 8.8.8.8 -c 3
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
From 10.56.16.90 icmp_seq=1 Destination Host Unreachable
From 10.56.16.90 icmp_seq=2 Destination Host Unreachable
From 10.56.16.90 icmp_seq=3 Destination Host Unreachable

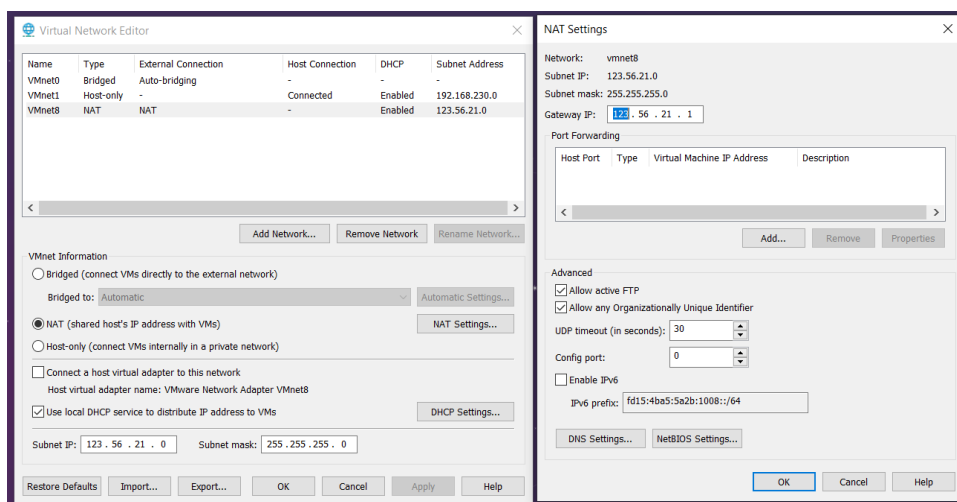
--- 8.8.8.8 ping statistics ---
3 packets transmitted, 0 received, +3 errors, 100% packet loss, time 44ms
pipe 3
pi@raspberrypi:~ $

```

Looks like it fails displaying the message “**Destination Host Unreachable**”

#### 4. Changing the Default Gateway from the VMW Network Editor

We will now also change the **Default Gateway IP**, set for our PC1 and PC2, in the Network Editor

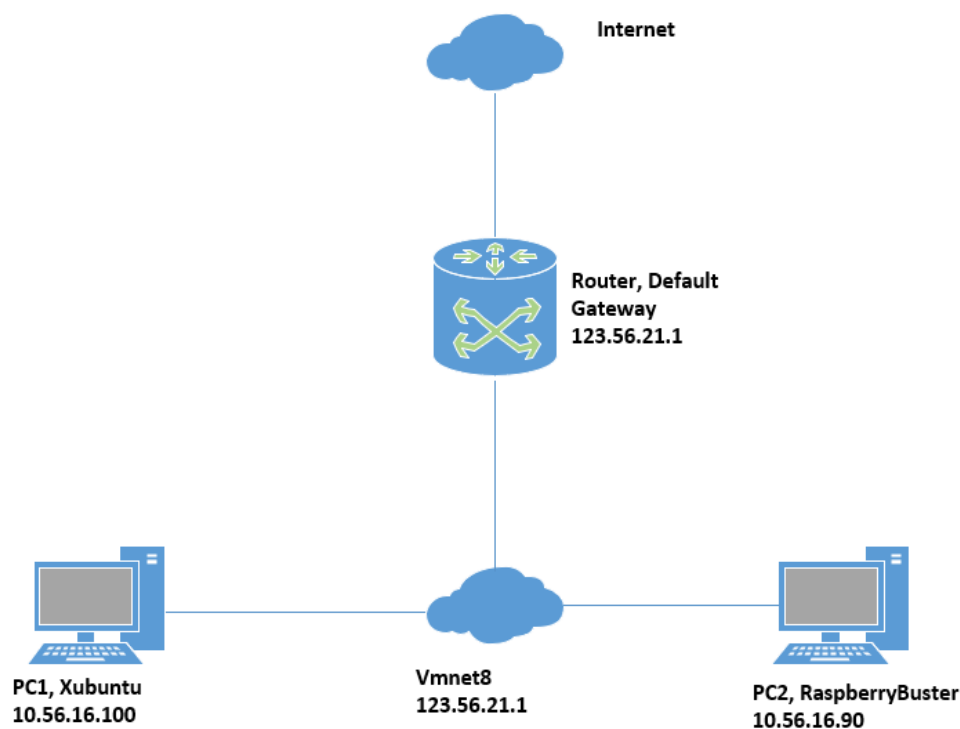


Now we will try and ping from PC1 to PC2 and also from PC1 to the internet(8.8.8.8)

```
Terminal - bogdan7978@ubuntu: ~
File Edit View Terminal Tabs Help
bogdan7978@ubuntu:~$ ping 10.56.16.90
PING 10.56.16.90 (10.56.16.90) 56(84) bytes of data.
64 bytes from 10.56.16.90: icmp_seq=1 ttl=64 time=0.544 ms
64 bytes from 10.56.16.90: icmp_seq=2 ttl=64 time=0.403 ms
64 bytes from 10.56.16.90: icmp_seq=3 ttl=64 time=0.399 ms
^C
--- 10.56.16.90 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2039ms
rtt min/avg/max/mdev = 0.399/0.448/0.544/0.067 ms
bogdan7978@ubuntu:~$ ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=128 time=60.8 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=128 time=46.7 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=128 time=48.9 ms
^C
--- 8.8.8.8 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2015ms
rtt min/avg/max/mdev = 46.694/52.120/60.790/6.194 ms
bogdan7978@ubuntu:~$
```

Great! It looks like we are now also connected to the internet after we changed our **Defalut Gateway IP**.

Our new **NETWORK DIAGRAM** should look like this:



## 5. Deleting the DGW on PC1 and PC2

We will now delete our Default Gateway using an ip command in the terminal



```
Terminal - bogdan7978@ubuntu: ~
File Edit View Terminal Tabs Help
bogdan7978@ubuntu:~$ sudo ip route del default
```

The **DGW** in the **Route Tables** is

0.0.0.0	123.56.21.1	ens33
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So the Tables will look the same except this line.

Let's ping from PC1 to PC2 and from PC1 to the internet

```
Terminal - bogdan7978@ubuntu: ~
File Edit View Terminal Tabs Help
bogdan7978@ubuntu:~$ ping 10.56.16.90
PING 10.56.16.90 (10.56.16.90) 56(84) bytes of data.
64 bytes from 10.56.16.90: icmp_seq=1 ttl=64 time=0.432 ms
64 bytes from 10.56.16.90: icmp_seq=2 ttl=64 time=0.446 ms
64 bytes from 10.56.16.90: icmp_seq=3 ttl=64 time=0.464 ms
^C
--- 10.56.16.90 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2058ms
rtt min/avg/max/mdev = 0.432/0.447/0.464/0.013 ms
bogdan7978@ubuntu:~$ ping 8.8.8.8
ping: connect: Network is unreachable
bogdan7978@ubuntu:~$
```

Looks like pinging from PC1 to PC2 works but from PC1 to the internet doesn't, showing us a new message "Network is unreachable"

Let's try to see the ip route

```
Terminal - bogdan7978@ubuntu: ~
File Edit View Terminal Tabs Help
bogdan7978@ubuntu:~$ ip route
10.56.16.0/22 dev ens33 proto kernel scope link src 10.56.16.100 metric 100
123.56.21.1 dev ens33 proto static scope link metric 100
169.254.0.0/16 dev ens33 scope link metric 1000
bogdan7978@ubuntu:~$
```

So if we delete the **DGW** we are not able to reach data outside our local networking area.

## 6. Reestablishing manually the DGWs on PC1 and PC2.

We will now reestablish the DGW using an ip command in the terminal

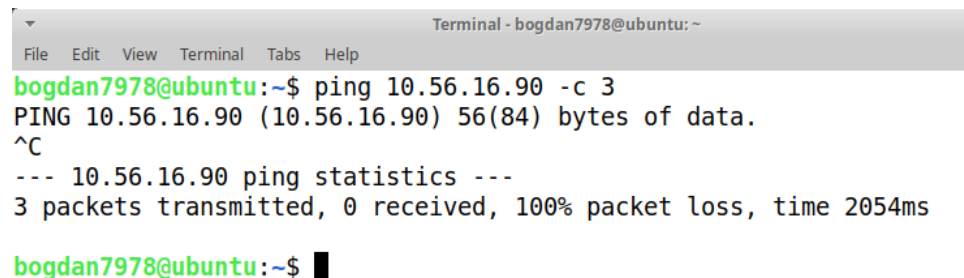
```
bogdan7978@ubuntu:~$ sudo ip route add default via 123.56.21.1 dev ens33
bogdan7978@ubuntu:~$ ip route
default via 123.56.21.1 dev ens33
10.56.16.0/22 dev ens33 proto kernel scope link src 10.56.16.100 metric 100
123.56.21.1 dev ens33 proto static scope link metric 100
169.254.0.0/16 dev ens33 scope link metric 1000
bogdan7978@ubuntu:~$ █
```

## 7. Misconfiguring the routing table on PC1

We will now delete the route to the 10.56.16.0/22 network and flush the ARP table with these 2 commands:

- `$ sudo ip route del 10.56.16.0/22`
- `$ sudo ip -s -s neigh flush all`

Now let's try and ping from PC1 to PC2



```
Terminal - bogdan7978@ubuntu: ~
File Edit View Terminal Tabs Help
bogdan7978@ubuntu:~$ ping 10.56.16.90 -c 3
PING 10.56.16.90 (10.56.16.90) 56(84) bytes of data.
^C
--- 10.56.16.90 ping statistics ---
3 packets transmitted, 0 received, 100% packet loss, time 2054ms

bogdan7978@ubuntu:~$ █
```

Looks like it is not working. Seems that the destination ip 10.56.16.0/22 is the connection between PC1 and PC2.