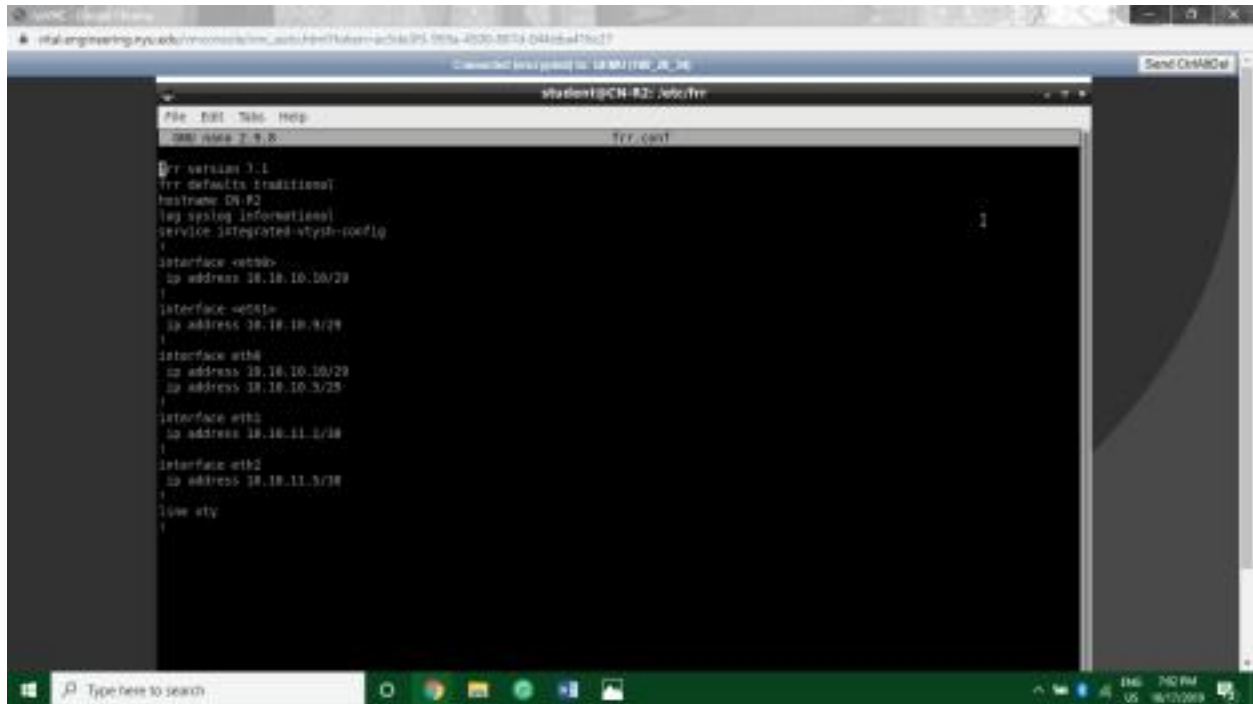


# IP interfaces Part 2

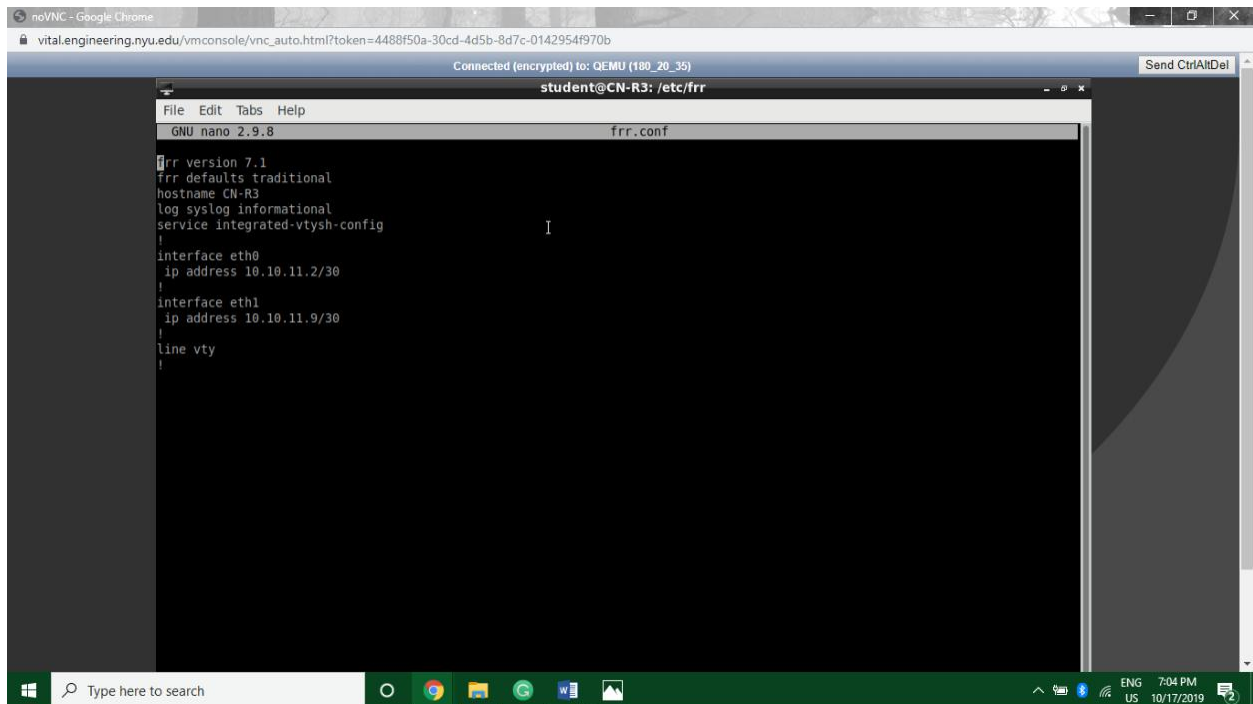
## Screenshots of frr.conf



A screenshot of a terminal window showing the configuration of a Juniper FRR (OpenWRT) router. The terminal is titled 'student@CN-R3: /etc/frr'. The configuration file 'frr.conf' is open in the nano editor. The configuration includes the following lines:

```
frr version 3.1
frr defaults traditional
hostname CN-R2
log syslog informational
service integrated-vtysh-config
!
interface eth0
 ip address 10.10.10.10/29
!
interface eth0/1
 ip address 10.10.10.9/29
!
interface eth0
 ip address 10.10.10.10/29
 ip address 10.10.10.3/25
!
interface eth1
 ip address 10.10.11.1/30
!
interface eth2
 ip address 10.10.11.3/30
!
line vty
!
```

R2 frr.conf file



A screenshot of a terminal window showing the configuration of a Juniper FRR (OpenWRT) router. The terminal is titled 'student@CN-R3: /etc/frr'. The configuration file 'frr.conf' is open in the nano editor. The configuration includes the following lines:

```
frr version 7.1
frr defaults traditional
hostname CN-R3
log syslog informational
service integrated-vtysh-config
!
interface eth0
 ip address 10.10.11.2/30
!
interface eth1
 ip address 10.10.11.9/30
!
line vty
!
```

R3 frr.conf file

```

student@CN-R4: /etc/frr
GNU nano 2.9.8      frr.conf

frr version 7.1
frr defaults traditional
hostname CN-R4
log syslog informational
service integrated-vtysh-config
!
interface eth0
 ip address 10.10.11.30/30
!
interface eth1
 ip address 10.10.11.6/30
!
interface eth2
 ip address 10.10.11.17/28
!
line vty
!

```

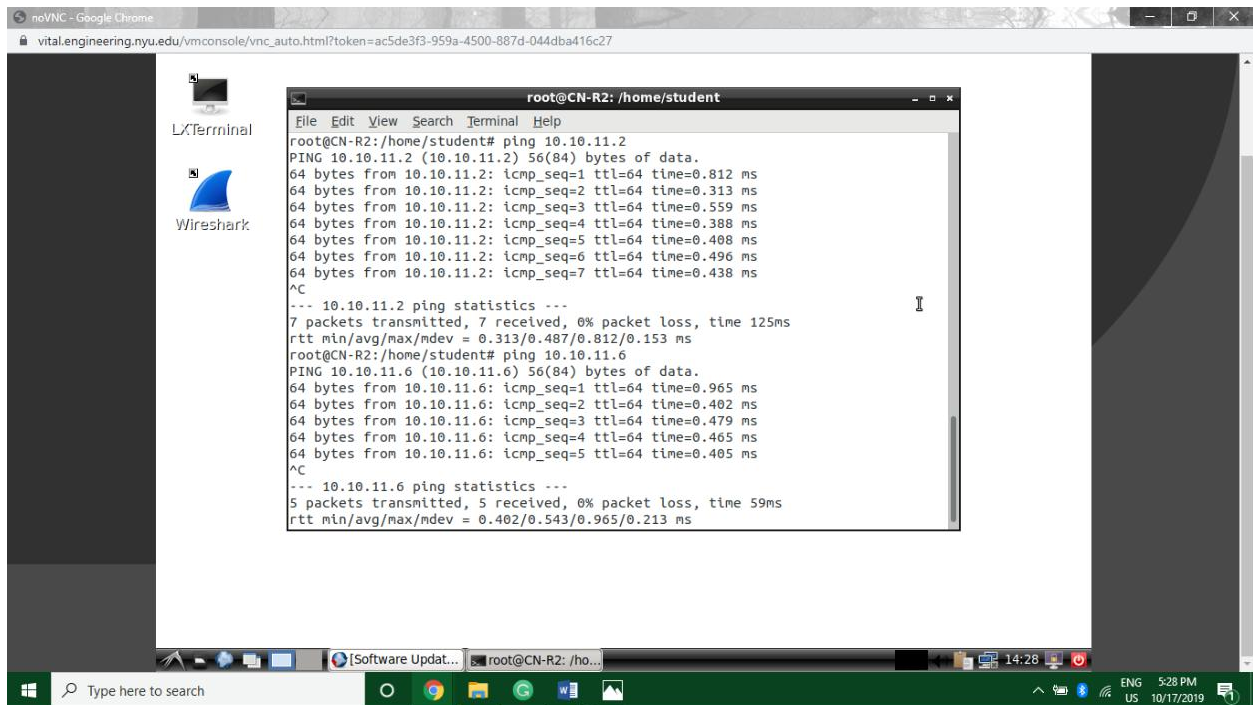
**R4 frr.conf file**

**IP Subnet Table:**

VM(Interface)	IP address	Network address	Broadcast address	Range(Usable Address)
R2(eth1)	10.10.11.1	10.10.11.0/30	10.10.11.3	10.10.11.1 – 10.10.11.2
R3(eth0)	10.10.11.2			
R2(eth2)	10.10.11.5	10.10.11.4/30	10.10.11.7	10.10.11.5 – 10.10.11.6
R4(eth1)	10.10.11.6			
R3(eth1)	10.10.11.9	10.10.11.8/30	10.10.11.11	10.10.11.9 – 10.10.11.10
R4(eth0)	10.10.11.10			
R4(eth2)	10.10.11.17	10.10.11.16/28	10.10.11.31	10.10.11.17 – 10.10.11.31

**IP SUBNET Table**

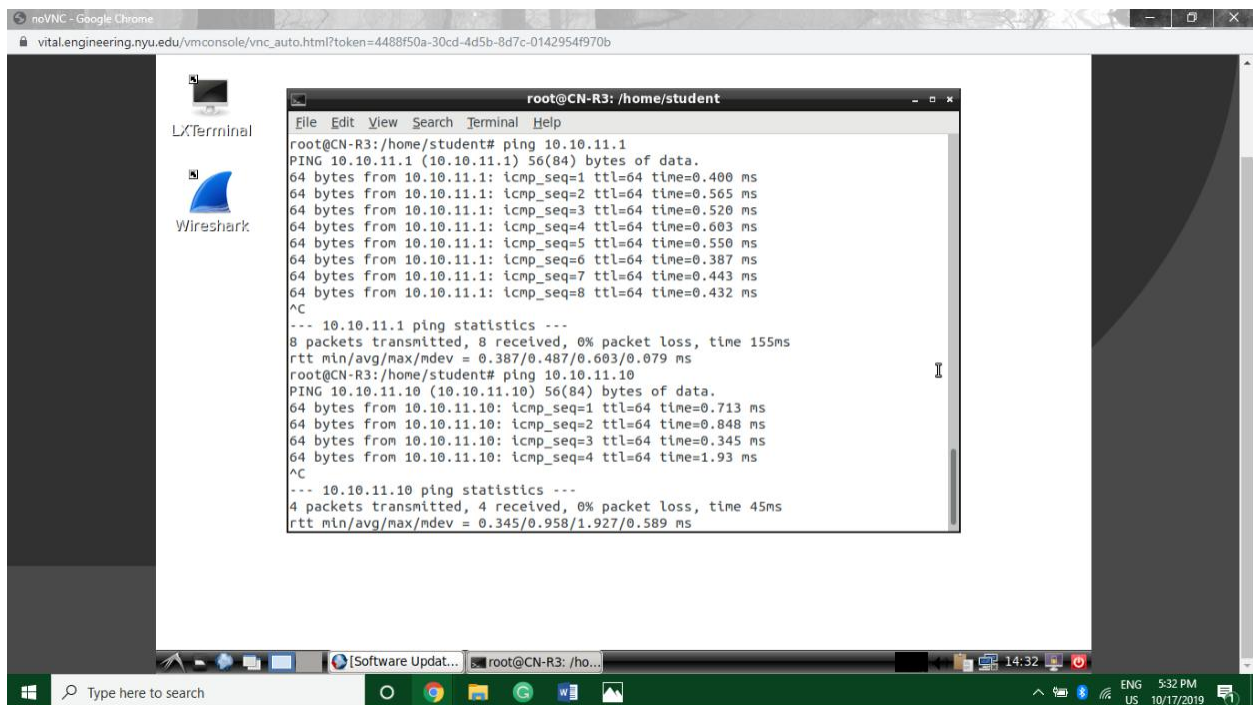
## Pings:



The screenshot shows a Windows desktop environment. On the left, there are icons for 'LXTerminal' and 'Wireshark'. The main area is occupied by a terminal window titled 'root@CN-R2: /home/student'. The terminal displays the output of two ping commands. The first command is 'ping 10.10.11.2', which shows 7 successful pings with varying response times (0.313 ms to 0.496 ms) and a summary: '7 packets transmitted, 7 received, 0% packet loss, time 125ms'. The second command is 'ping 10.10.11.6', which shows 5 successful pings with response times (0.402 ms to 0.465 ms) and a summary: '5 packets transmitted, 5 received, 0% packet loss, time 59ms'. The taskbar at the bottom shows the Windows search bar, task view button, and several application icons. The system clock indicates 14:28 on 10/17/2019.

```
root@CN-R2: /home/student
File Edit View Search Terminal Help
root@CN-R2: /home/student# ping 10.10.11.2
PING 10.10.11.2 (10.10.11.2) 56(84) bytes of data.
64 bytes from 10.10.11.2: icmp_seq=1 ttl=64 time=0.812 ms
64 bytes from 10.10.11.2: icmp_seq=2 ttl=64 time=0.313 ms
64 bytes from 10.10.11.2: icmp_seq=3 ttl=64 time=0.559 ms
64 bytes from 10.10.11.2: icmp_seq=4 ttl=64 time=0.388 ms
64 bytes from 10.10.11.2: icmp_seq=5 ttl=64 time=0.408 ms
64 bytes from 10.10.11.2: icmp_seq=6 ttl=64 time=0.496 ms
64 bytes from 10.10.11.2: icmp_seq=7 ttl=64 time=0.438 ms
^C
--- 10.10.11.2 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 125ms
rtt min/avg/max/mdev = 0.313/0.487/0.812/0.153 ms
root@CN-R2: /home/student# ping 10.10.11.6
PING 10.10.11.6 (10.10.11.6) 56(84) bytes of data.
64 bytes from 10.10.11.6: icmp_seq=1 ttl=64 time=0.965 ms
64 bytes from 10.10.11.6: icmp_seq=2 ttl=64 time=0.402 ms
64 bytes from 10.10.11.6: icmp_seq=3 ttl=64 time=0.479 ms
64 bytes from 10.10.11.6: icmp_seq=4 ttl=64 time=0.465 ms
64 bytes from 10.10.11.6: icmp_seq=5 ttl=64 time=0.405 ms
^C
--- 10.10.11.6 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 59ms
rtt min/avg/max/mdev = 0.402/0.543/0.965/0.213 ms
```

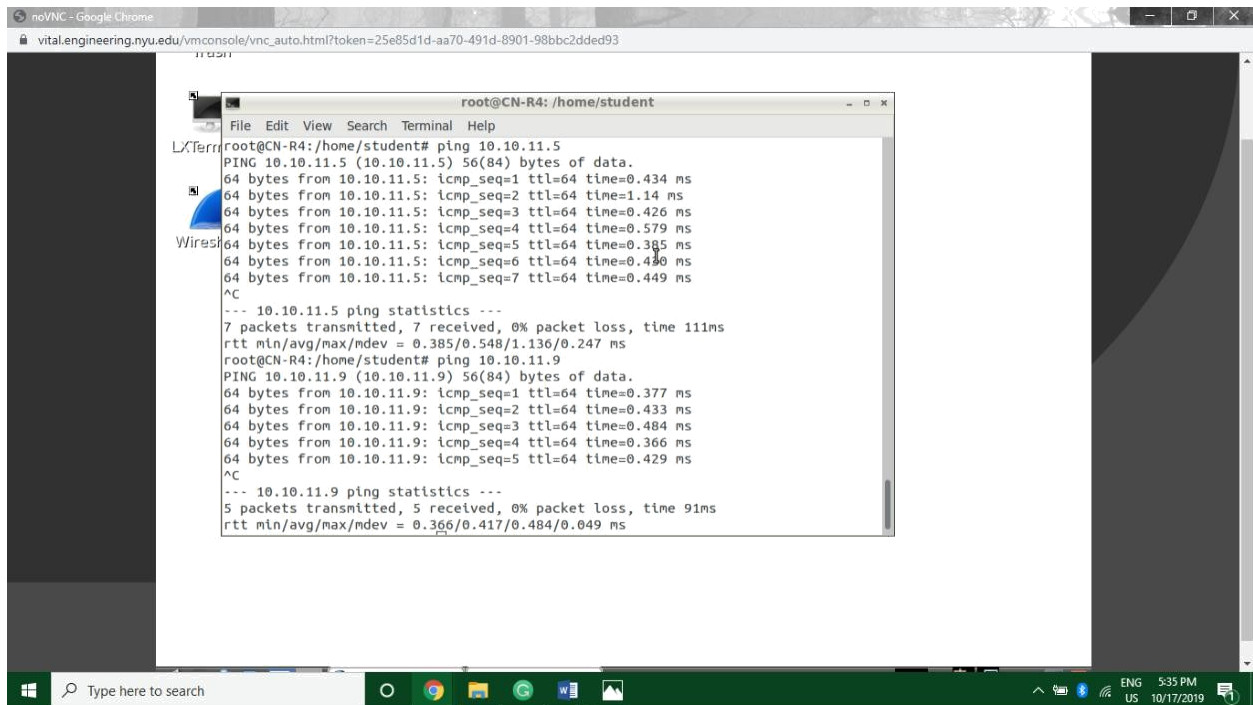
## Ping for R2



The screenshot shows a Windows desktop environment. On the left, there are icons for 'LXTerminal' and 'Wireshark'. The main area is occupied by a terminal window titled 'root@CN-R3: /home/student'. The terminal displays the output of two ping commands. The first command is 'ping 10.10.11.1', which shows 8 successful pings with response times (0.400 ms to 0.603 ms) and a summary: '8 packets transmitted, 8 received, 0% packet loss, time 155ms'. The second command is 'ping 10.10.11.10', which shows 4 successful pings with response times (0.713 ms to 1.93 ms) and a summary: '4 packets transmitted, 4 received, 0% packet loss, time 45ms'. The taskbar at the bottom shows the Windows search bar, task view button, and several application icons. The system clock indicates 14:32 on 10/17/2019.

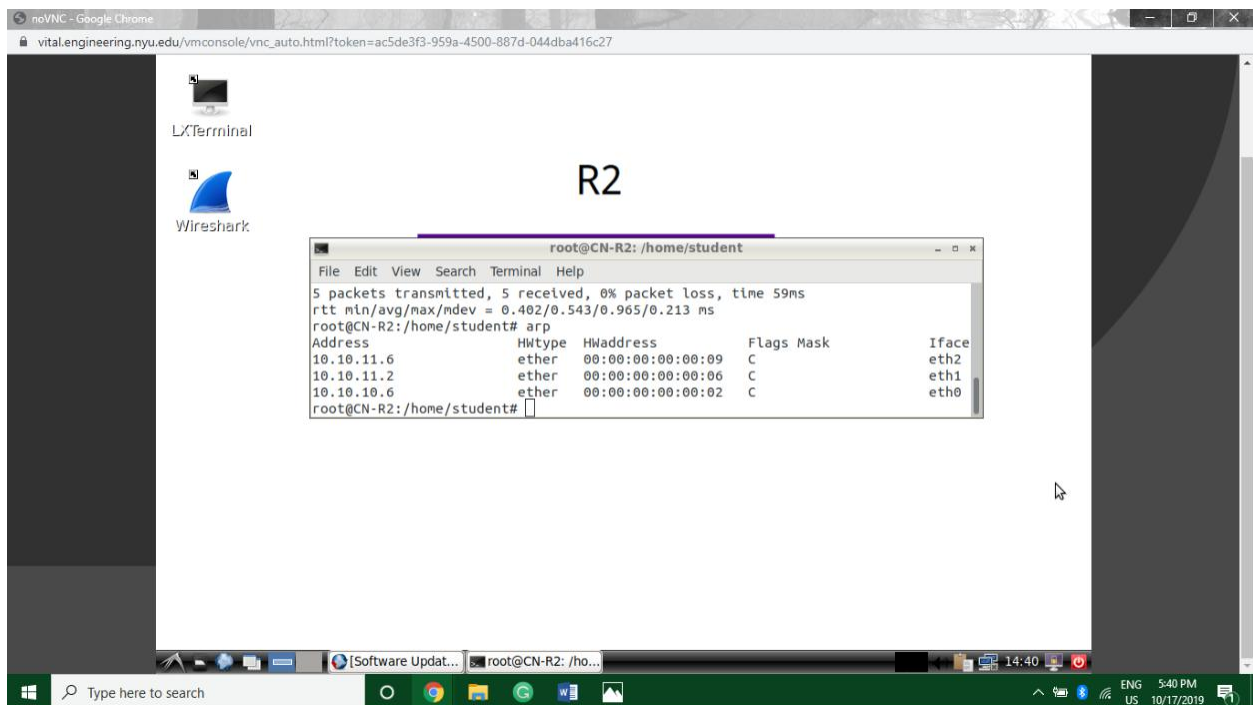
```
root@CN-R3: /home/student
File Edit View Search Terminal Help
root@CN-R3: /home/student# ping 10.10.11.1
PING 10.10.11.1 (10.10.11.1) 56(84) bytes of data.
64 bytes from 10.10.11.1: icmp_seq=1 ttl=64 time=0.400 ms
64 bytes from 10.10.11.1: icmp_seq=2 ttl=64 time=0.565 ms
64 bytes from 10.10.11.1: icmp_seq=3 ttl=64 time=0.520 ms
64 bytes from 10.10.11.1: icmp_seq=4 ttl=64 time=0.603 ms
64 bytes from 10.10.11.1: icmp_seq=5 ttl=64 time=0.550 ms
64 bytes from 10.10.11.1: icmp_seq=6 ttl=64 time=0.387 ms
64 bytes from 10.10.11.1: icmp_seq=7 ttl=64 time=0.443 ms
64 bytes from 10.10.11.1: icmp_seq=8 ttl=64 time=0.432 ms
^C
--- 10.10.11.1 ping statistics ---
8 packets transmitted, 8 received, 0% packet loss, time 155ms
rtt min/avg/max/mdev = 0.387/0.487/0.603/0.079 ms
root@CN-R3: /home/student# ping 10.10.11.10
PING 10.10.11.10 (10.10.11.10) 56(84) bytes of data.
64 bytes from 10.10.11.10: icmp_seq=1 ttl=64 time=0.713 ms
64 bytes from 10.10.11.10: icmp_seq=2 ttl=64 time=0.848 ms
64 bytes from 10.10.11.10: icmp_seq=3 ttl=64 time=0.345 ms
64 bytes from 10.10.11.10: icmp_seq=4 ttl=64 time=1.93 ms
^C
--- 10.10.11.10 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 45ms
rtt min/avg/max/mdev = 0.345/0.958/1.927/0.589 ms
```

## Ping for R3

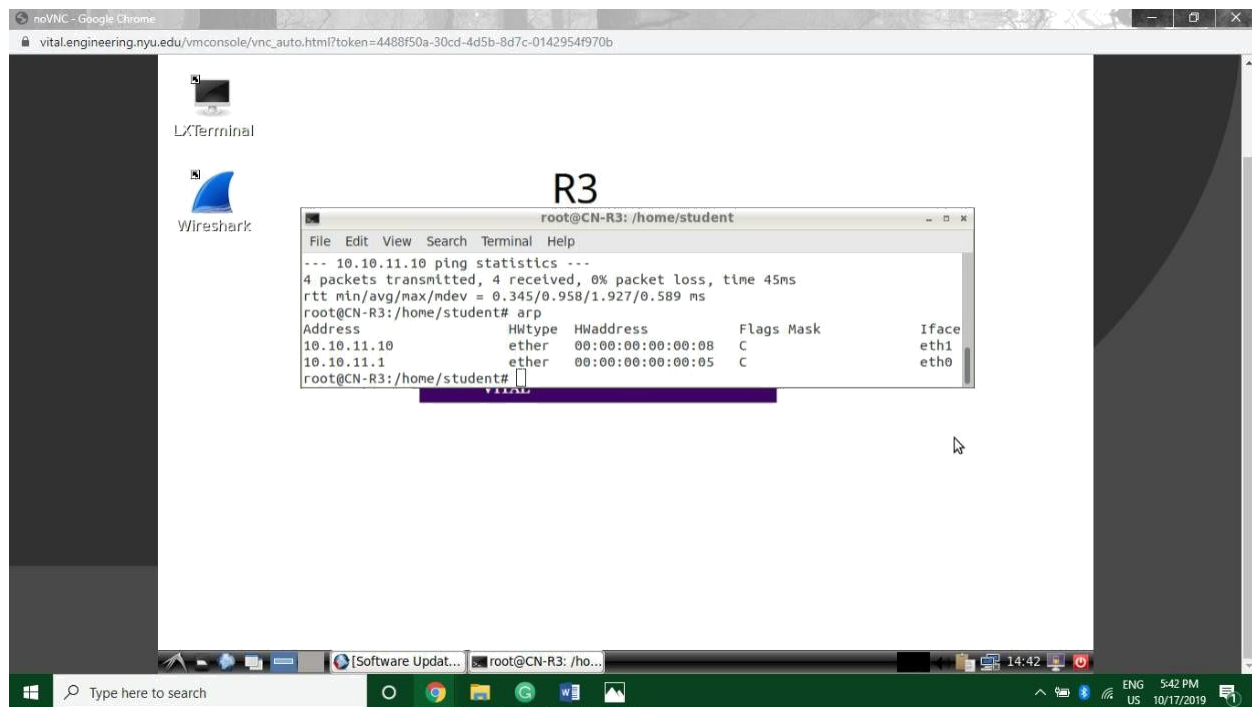


## Ping for R4

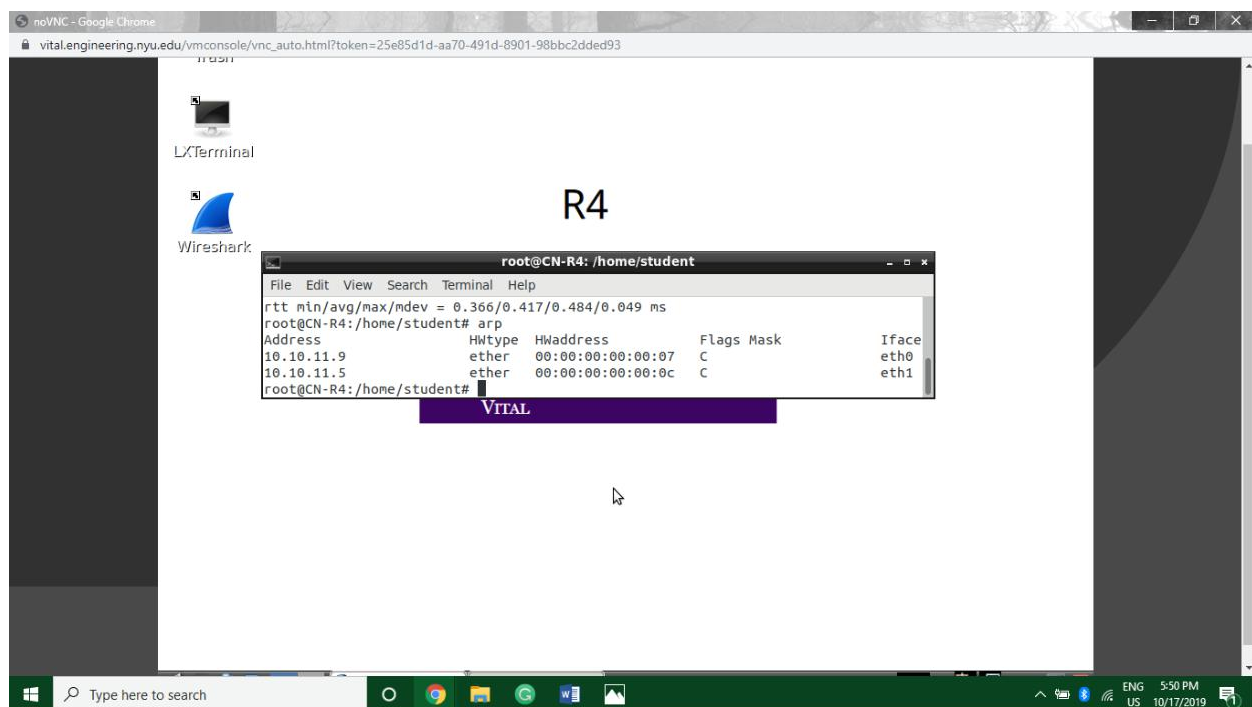
## ARP Tables:



## R2 ARP Table



**R3 ARP Table**



**R4 ARP Table**

**Part 2: Questions:**

**Ans 2 a)** If subnets overlap then messages can go to the wrong destination address. For e.g. Let us say that two routers R1 and R2 have different subnets but the same IP address and the subnets overlap. Then the message intended for R2 might go to R1 instead. In real world this might cause security breach.

**Ans 2 b)** Yes, we would need to reconfigure the subnets on R3 and R4 as the current subnets in order to communicate with R5 as our current configuration i.e. /30 only allows for 2 hosts. So, to accommodate another host we will have to change configuration to /29.

**Ans 2 c)** R2(eth1) is unable to reach R3(eth1) because they have different broadcast addresses. No packets are used in ping. When we try to connect to R3(eth1) we get Network is unreachable.

**Ans 2 d)** When we ping R3(eth0) from R2 unlike R3(eth1) we will get a successful connection as R2(eth1) and R3(eth0) have the same broadcast address. Looking at the Wireshark readings we notice that first R2(eth1) sends R3(eth0) an ARP request asking who has that IP address. When R3 detects that the request is meant for it, they start communicating using ICMP packets and R3 sends R2 its Mac address.