

CN Assignment- DHCP Server Lab

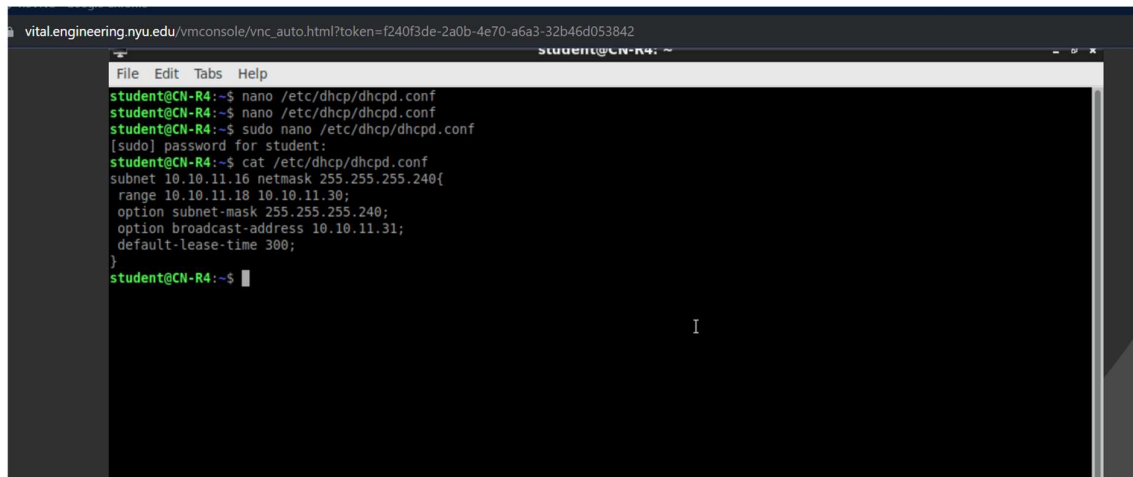
Part 1: Configuring DHCP

In order to configure the dhcpd.conf (DHCP daemon configuration) file in router R4, I opened the file present in the /etc/dhcp directory and made edits to set default-lease-time to 300.

IP assigned to R4: 10.10.11.17/28

Subnet mask: 10.10.11.16 broadcast address: 10.10.11.31

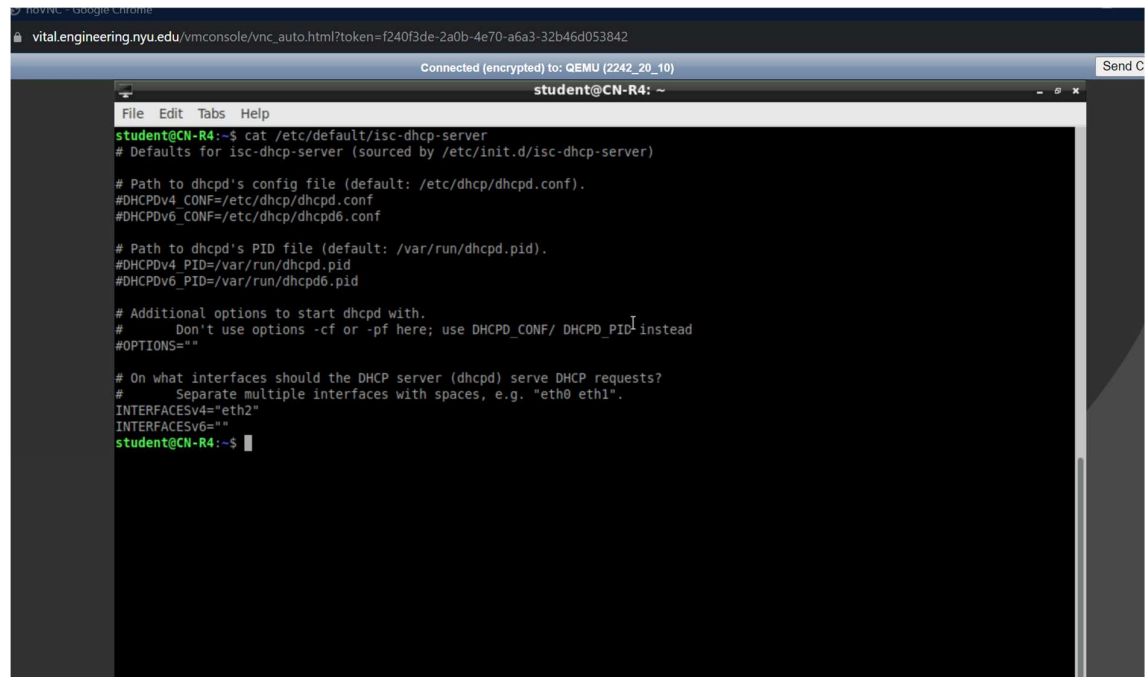
Usable range: 10.10.11.17 - 10.10.11.30



```
vital.engineering.nyu.edu/vmconsole/vnc_auto.html?token=f240f3de-2a0b-4e70-a6a3-32b46d053842
student@CN-R4: ~
File Edit Tabs Help
student@CN-R4:~$ nano /etc/dhcp/dhcpd.conf
student@CN-R4:~$ nano /etc/dhcp/dhcpd.conf
student@CN-R4:~$ sudo nano /etc/dhcp/dhcpd.conf
[sudo] password for student:
student@CN-R4:~$ cat /etc/dhcp/dhcpd.conf
subnet 10.10.11.16 netmask 255.255.255.240 {
    range 10.10.11.18 10.10.11.30;
    option subnet-mask 255.255.255.240;
    option broadcast-address 10.10.11.31;
    default-lease-time 300;
}
student@CN-R4:~$
```

Part 2: Server Interface

Gave the command cat /etc/default/isc-dhcp-server



```
vital.engineering.nyu.edu/vmconsole/vnc_auto.html?token=f240f3de-2a0b-4e70-a6a3-32b46d053842
Connected (encrypted) to: QEMU (2242_20_10)
student@CN-R4: ~
File Edit Tabs Help
student@CN-R4:~$ cat /etc/default/isc-dhcp-server
# Defaults for isc-dhcp-server (sourced by /etc/init.d/isc-dhcp-server)

# Path to dhcpd's config file (default: /etc/dhcp/dhcpd.conf).
#DHCPDv4_CONF=/etc/dhcp/dhcpd.conf
#DHCPDv6_CONF=/etc/dhcp/dhcpd6.conf

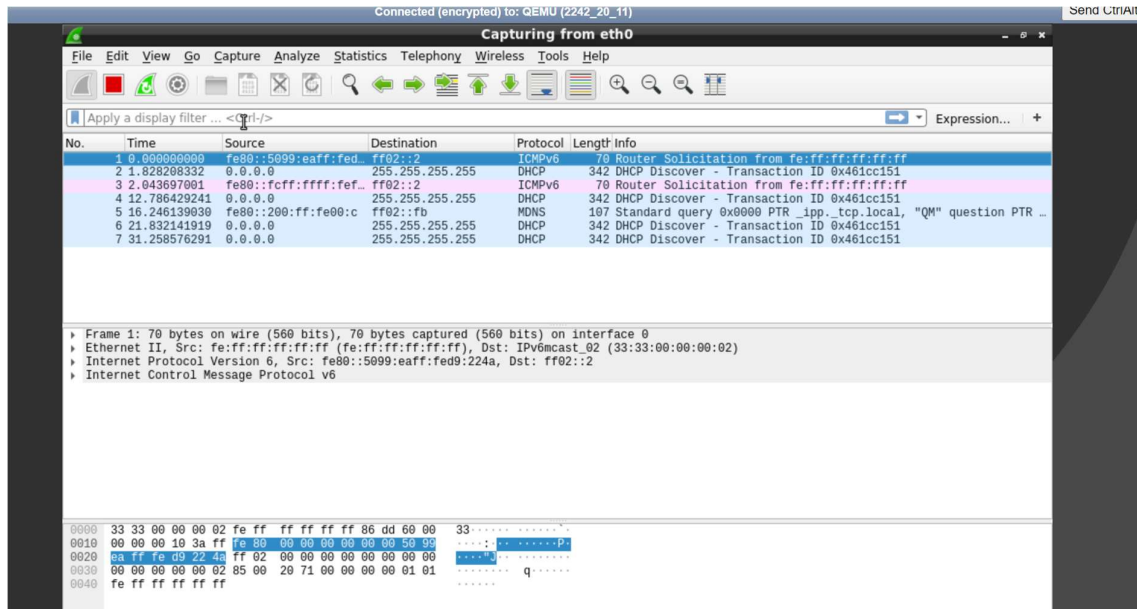
# Path to dhcpd's PID file (default: /var/run/dhcpd.pid).
#DHCPDv4_PID=/var/run/dhcpd.pid
#DHCPDv6_PID=/var/run/dhcpd6.pid

# Additional options to start dhcpd with.
# Don't use options -cf or -pf here; use DHCPD_CONF/ DHCPD_PID instead
#OPTIONS=""

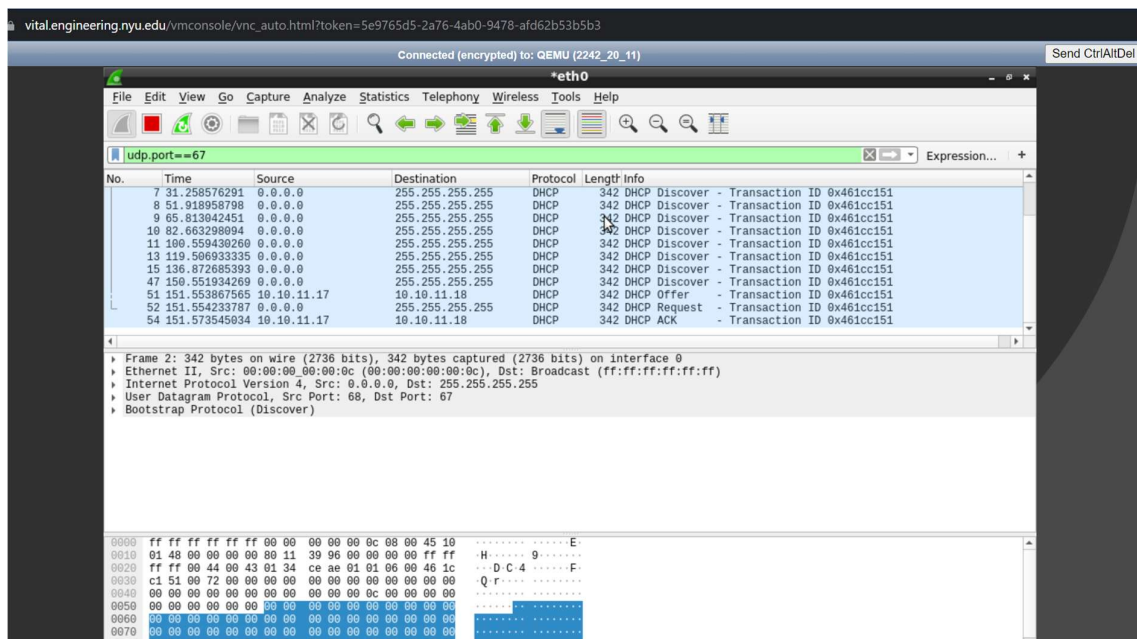
# On what interfaces should the DHCP server (dhcpd) serve DHCP requests?
# Separate multiple interfaces with spaces, e.g. "eth0 eth1".
INTERFACESv4="eth2"
INTERFACESv6=""
student@CN-R4:~$
```

Part 3: Verifying DHCP and Wireshark

Wireshark packets before R4 was powered on

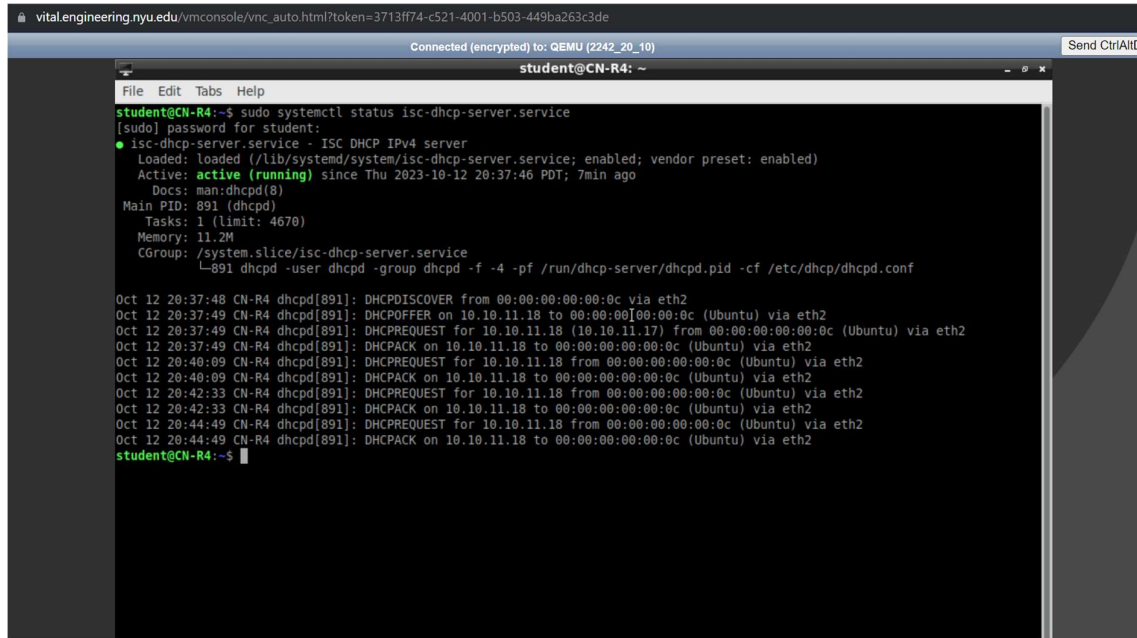


Wireshark screenshot after R4 is powered ON. We can see all 4 - Discover, Offer, Request, ACK



Verification that the DHCP server is running properly on R4 by using the following command:

`sudo systemctl status isc-dhcp-server.service`



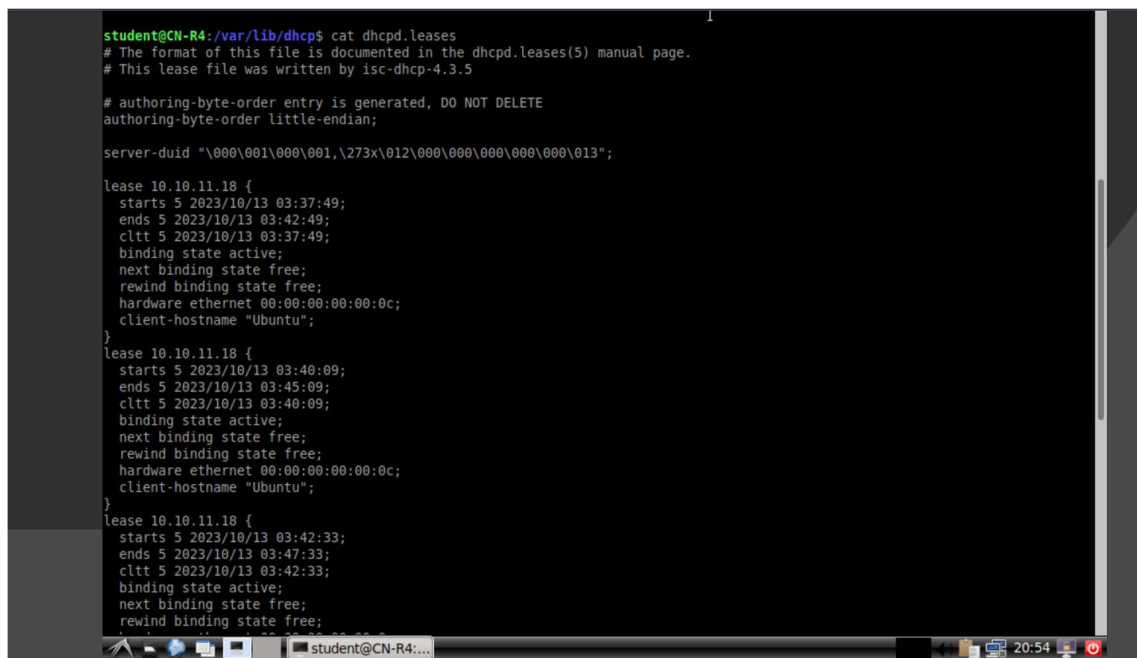
```
vital.engineering.nyu.edu/vmconsole/vnc_auto.html?token=3713ff74-c521-4001-b503-449ba263c3de
Connected (encrypted) to: QEMU (2242_20_10)
Send Ctrl+Alt

student@CN-R4: ~
File Edit Tabs Help
student@CN-R4:~$ sudo systemctl status isc-dhcp-server.service
[sudo] password for student:
● isc-dhcp-server.service - ISC DHCP IPv4 server
   Loaded: loaded (/lib/systemd/system/isc-dhcp-server.service; enabled; vendor preset: enabled)
   Active: active (running) since Thu 2023-10-12 20:37:46 PDT; 7min ago
     Docs: man:dhcpd(8)
    Main PID: 891 (dhcpd)
      Tasks: 1 (limit: 4670)
     Memory: 11.2M
    CGroup: /system.slice/isc-dhcp-server.service
            └─891 dhcpd -user dhcpd -group dhcpd -f -4 -pf /run/dhcp-server/dhcpd.pid -cf /etc/dhcp/dhcpd.conf

Oct 12 20:37:48 CN-R4 dhcpd[891]: DHCPDISCOVER from 00:00:00:00:00:0c via eth2
Oct 12 20:37:49 CN-R4 dhcpd[891]: DHCPOFFER on 10.10.11.18 to 00:00:00:00:00:0c (Ubuntu) via eth2
Oct 12 20:37:49 CN-R4 dhcpd[891]: DHCPREQUEST for 10.10.11.18 (10.10.11.17) from 00:00:00:00:00:0c (Ubuntu) via eth2
Oct 12 20:37:49 CN-R4 dhcpd[891]: DHCPACK on 10.10.11.18 to 00:00:00:00:00:0c (Ubuntu) via eth2
Oct 12 20:40:00 CN-R4 dhcpd[891]: DHCPREQUEST for 10.10.11.18 from 00:00:00:00:00:0c (Ubuntu) via eth2
Oct 12 20:40:00 CN-R4 dhcpd[891]: DHCPACK on 10.10.11.18 to 00:00:00:00:00:0c (Ubuntu) via eth2
Oct 12 20:42:33 CN-R4 dhcpd[891]: DHCPREQUEST for 10.10.11.18 from 00:00:00:00:00:0c (Ubuntu) via eth2
Oct 12 20:42:33 CN-R4 dhcpd[891]: DHCPACK on 10.10.11.18 to 00:00:00:00:00:0c (Ubuntu) via eth2
Oct 12 20:44:49 CN-R4 dhcpd[891]: DHCPREQUEST for 10.10.11.18 from 00:00:00:00:00:0c (Ubuntu) via eth2
Oct 12 20:44:49 CN-R4 dhcpd[891]: DHCPACK on 10.10.11.18 to 00:00:00:00:00:0c (Ubuntu) via eth2
student@CN-R4:~$
```

Submissions

1. The leases file on R4 found in `/var/lib/dhcp/dhcpd.leases`



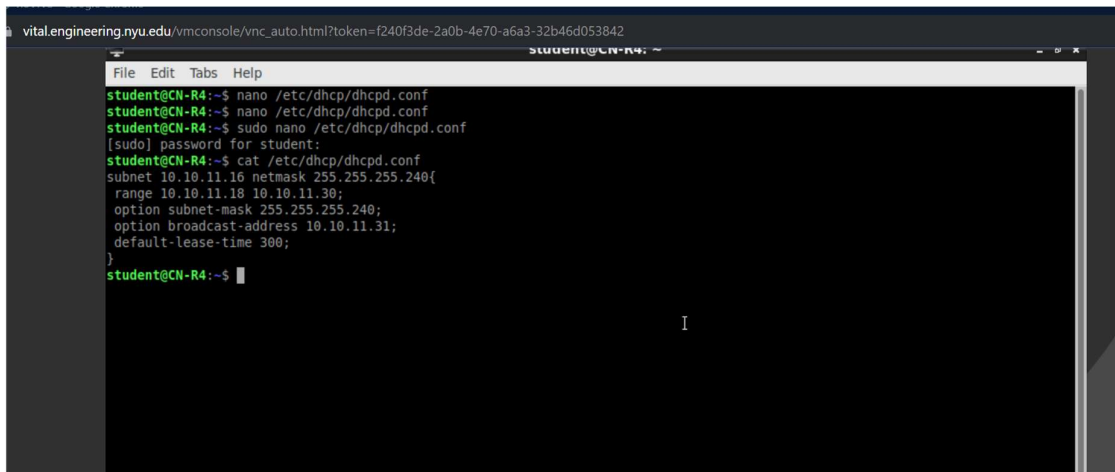
```
student@CN-R4:/var/lib/dhcp$ cat dhcpd.leases
# The format of this file is documented in the dhcpd.leases(5) manual page.
# This lease file was written by isc-dhcp-4.3.5

# authoring-byte-order entry is generated, DO NOT DELETE
authoring-byte-order little-endian;

server-uid "\000\001\000\001,\273x\012\000\000\000\000\000\013";

lease 10.10.11.18 {
    starts 5 2023/10/13 03:37:49;
    ends 5 2023/10/13 03:42:49;
    cltt 5 2023/10/13 03:37:49;
    binding state active;
    next binding state free;
    rewind binding state free;
    hardware ethernet 00:00:00:00:00:0c;
    client-hostname "Ubuntu";
}
lease 10.10.11.18 {
    starts 5 2023/10/13 03:40:09;
    ends 5 2023/10/13 03:45:09;
    cltt 5 2023/10/13 03:40:09;
    binding state active;
    next binding state free;
    rewind binding state free;
    hardware ethernet 00:00:00:00:00:0c;
    client-hostname "Ubuntu";
}
lease 10.10.11.18 {
    starts 5 2023/10/13 03:42:33;
    ends 5 2023/10/13 03:47:33;
    cltt 5 2023/10/13 03:42:33;
    binding state active;
    next binding state free;
    rewind binding state free;
    hardware ethernet 00:00:00:00:00:0c;
    client-hostname "Ubuntu";
}
```

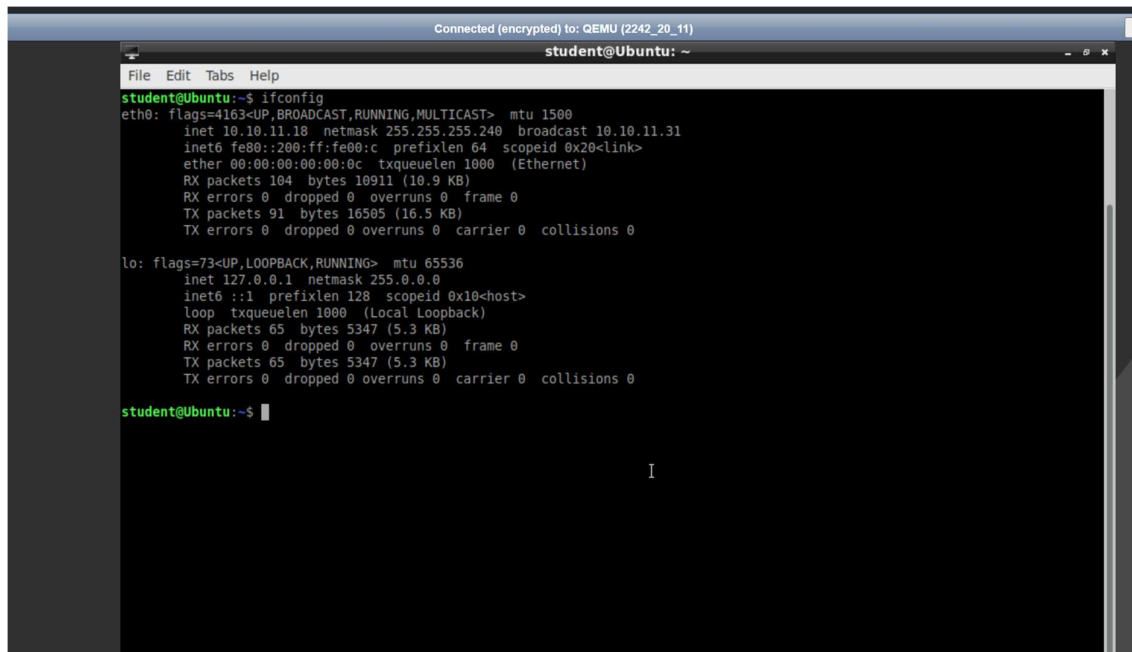
2. Your configuration for the DHCP server.



A terminal window titled 'student@CN-R4: ~' showing the configuration of a DHCP server. The user runs 'nano /etc/dhcp/dhcpd.conf' and then 'cat /etc/dhcp/dhcpd.conf' to display the configuration. The configuration defines a subnet 10.10.11.16 with a netmask of 255.255.255.240, a range of 10.10.11.18 to 10.10.11.30, a subnet mask option, a broadcast address of 10.10.11.31, and a default lease time of 300 seconds.

```
vital.engineering.nyu.edu/vmconsole/vnc_auto.html?token=f240f3de-2a0b-4e70-a6a3-32b46d053842
student@CN-R4: ~
File Edit Tabs Help
student@CN-R4:~$ nano /etc/dhcp/dhcpd.conf
student@CN-R4:~$ nano /etc/dhcp/dhcpd.conf
student@CN-R4:~$ sudo nano /etc/dhcp/dhcpd.conf
[sudo] password for student:
student@CN-R4:~$ cat /etc/dhcp/dhcpd.conf
subnet 10.10.11.16 netmask 255.255.255.240{
  range 10.10.11.18 10.10.11.30;
  option subnet-mask 255.255.255.240;
  option broadcast-address 10.10.11.31;
  default-lease-time 300;
}
student@CN-R4:~$
```

3. Screenshot of ifconfig on Ubuntu.



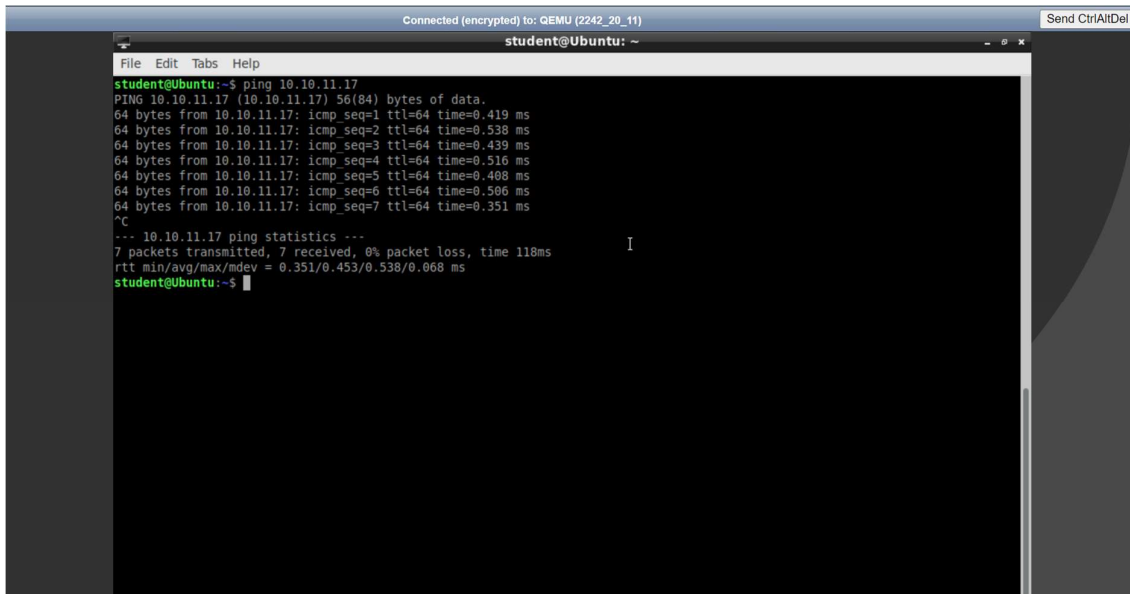
A terminal window titled 'student@Ubuntu: ~' showing the output of the 'ifconfig' command. It displays details for the 'eth0' interface (Ethernet) and the 'lo' interface (Local Loopback). The 'eth0' interface has an IP of 10.10.11.18 and a netmask of 255.255.255.240. The 'lo' interface has an IP of 127.0.0.1 and a netmask of 255.0.0.0.

```
Connected (encrypted) to: QEMU (2242_20_11)
student@Ubuntu: ~
File Edit Tabs Help
student@Ubuntu:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.10.11.18 netmask 255.255.255.240 broadcast 10.10.11.31
    inet6 fe80::200:ff:fe00:c prefixlen 64 scopeid 0x20<link>
    ether 00:00:00:00:00:0c txqueuelen 1000 (Ethernet)
    RX packets 104 bytes 10911 (10.9 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 91 bytes 16505 (16.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 65 bytes 5347 (5.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 65 bytes 5347 (5.3 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

student@Ubuntu:~$
```

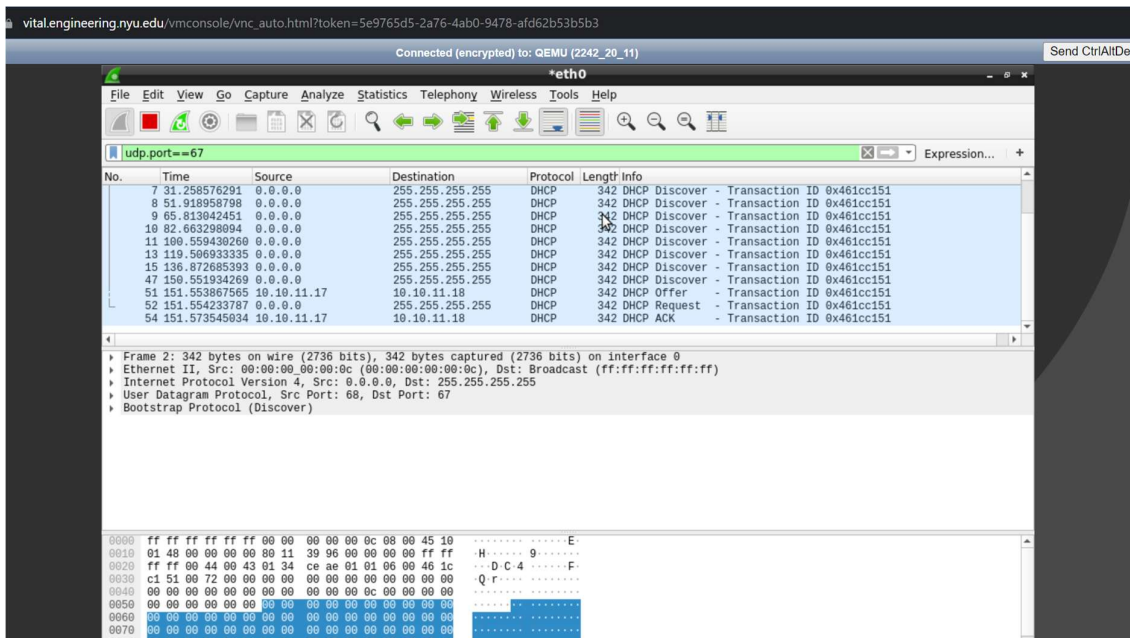
4. Screenshot showing Ubuntu ping R4.



```
student@Ubuntu:~$ ping 10.10.11.17
PING 10.10.11.17 (10.10.11.17) 56(84) bytes of data:
64 bytes from 10.10.11.17: icmp_seq=1 ttl=64 time=0.419 ms
64 bytes from 10.10.11.17: icmp_seq=2 ttl=64 time=0.538 ms
64 bytes from 10.10.11.17: icmp_seq=3 ttl=64 time=0.439 ms
64 bytes from 10.10.11.17: icmp_seq=4 ttl=64 time=0.516 ms
64 bytes from 10.10.11.17: icmp_seq=5 ttl=64 time=0.408 ms
64 bytes from 10.10.11.17: icmp_seq=6 ttl=64 time=0.506 ms
64 bytes from 10.10.11.17: icmp_seq=7 ttl=64 time=0.351 ms
^C
--- 10.10.11.17 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 118ms
rtt min/avg/max/mdev = 0.351/0.453/0.538/0.068 ms
student@Ubuntu:~$
```

5. Screenshot showing Wireshark DHCP messages (4 Types).

In this screenshot, we can see 4: DHCP Discover, DHCP Offer, DHCP Request, DHCP ACK.



No.	Time	Source	Destination	Protocol	Length	Info
7	31.258576291	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x461cc151
8	51.918958798	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x461cc151
9	65.813042451	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x461cc151
10	82.663298094	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x461cc151
11	100.559430260	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x461cc151
13	119.506933395	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x461cc151
15	136.872685393	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x461cc151
47	150.551934269	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x461cc151
51	151.553867565	10.10.11.17	10.10.11.18	DHCP	342	DHCP Offer - Transaction ID 0x461cc151
52	151.554233787	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0x461cc151
54	151.573545034	10.10.11.17	10.10.11.18	DHCP	342	DHCP ACK - Transaction ID 0x461cc151

Frame 2: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface 0
Ethernet II, Src: 00:00:00:00:00:0c (00:00:00:00:00:0c), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
User Datagram Protocol, Src Port: 68, Dst Port: 67
Bootstrap Protocol (Discover)