Lab-report no: 01

**Name of the lab report:** Network configuration, Routing table and Virtual Interfaces

Objectives:
- ◆ Understanding of how to configure network.
- ◆ learn routing table.
- ◆ learn how to add an virtual interfaces.

1).If you have a network that ranges from 192.168.1.0 to 192.168.1.255 explain why individual devices in the network can only be assigned IP addresses in the ranges of 192.168.1.1 to 192.168.1.254.

Ans:
Network addresses that 32 bit numbers are usually writtenn in dotted decimal notation .In this format ,each of the 4 bytes is written in decimal ,from 0 to 255.
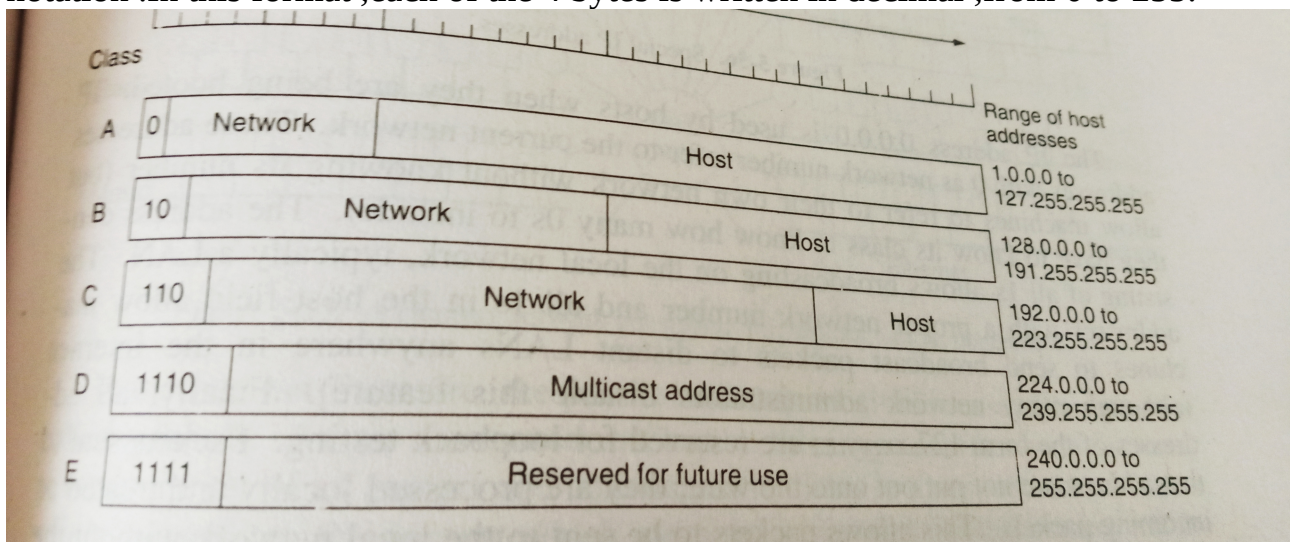
2.Find out about network and hardware information for the computer you are currently using.

  Ans:

To find the network and hardware information for the computer which I currently use need to write the following command in linux terminal:

  ifconfig ,will show the network information ip adress and mac address of my computer

 IP addresse: 10.25.163.3
mac address: 38:D5:47:90:E1:E2

```
                            abdullah@it-17015-x455lab: ~

 File  Edit  View  Search  Terminal  Help
abdullah@it-17015-x455lab:~$ ifconfig
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 2642  bytes 197252 (197.2 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 2642  bytes 197252 (197.2 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

wlp3s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.25.163.3  netmask 255.255.224.0  broadcast 10.25.191.255
        inet6 fe80::1cc3:d48f:3f4d:9cf  prefixlen 64  scopeid 0x20<link>
        ether 74:c6:3b:d7:57:7d  txqueuelen 1000  (Ethernet)
        RX packets 560095  bytes 59558032 (59.5 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 31017  bytes 4824622 (4.8 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

3. Now enter the command : netstat -r to print your computers routing table. Explan the different columns : Destination , Gateway , Genmask , Flags , MSS , window , irtt and Iface

```
                                    abdullah@abdullah-X455LAB: ~

 File  Edit  View  Search  Terminal  Help
abdullah@abdullah-X455LAB:~$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         gateway         0.0.0.0         UG        0 0          0 wlp3s0
10.25.160.0     0.0.0.0         255.255.224.0   U         0 0          0 wlp3s0
link-local      0.0.0.0         255.255.0.0     U         0 0          0 wlp3s0
abdullah@abdullah-X455LAB:~$
```

Destination:

The destination network or destination host.

Gateway:

The gateway address

Genmask:

The netmask for the destination net; 255.255.255.255 for a host destination and 0.0.0.0 for the default route.

Flags: Possible flags include

•U (route is up)

•H (target is a host)

•G (use gateway)

•R (reinstate route for dynamic routing)

•D (dynamically installed by daemon or redirect)

•M (modified from routing daemon or redirect)

•A (installed by addrconf)

•C (cache entry)

•! (reject route)

Iface:

Interface to which packets for this route will be sent.

MSS:

Default maximum segment size for TCP connections over this route.

Window:

Default window size for TCP connections over this route.

Irtt:

Initial RTT (Round Trip Time). The kernel uses this to guess about the best TCP

4)Virtual interface

a)
 Create a new virtual interface   with following IP address,192.168.2.32 and netmask 255.255.255.0 .

Before executing this command:

```
File  Edit  View  Search  Terminal  Help
abdullah@it-17015-x455lab:~$ ifconfig
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 574  bytes 40156 (40.1 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 574  bytes 40156 (40.1 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

wlp3s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.25.163.3  netmask 255.255.224.0  broadcast 10.25.191.255
        inet6 fe80::1cc3:d48f:3f4d:9cf  prefixlen 64  scopeid 0x20<link>
        ether 74:c6:3b:d7:57:7d  txqueuelen 1000  (Ethernet)
        RX packets 152806  bytes 8287274 (8.2 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1718  bytes 181957 (181.9 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

After executing the command:

sudo ifconfig emp2s0 192.168.2.32 netmask 255.255.255.0 up

```
File  Edit  View  Search  Terminal  Help
abdullah@it-17015-x455lab:~$ sudo ifconfig enp2s0 192.168.2.32 netmask 255.255.255.0 up
[sudo] password for abdullah:
abdullah@it-17015-x455lab:~$ ifconfig
enp2s0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 192.168.2.32  netmask 255.255.255.0  broadcast 192.168.2.255
        ether 38:d5:47:90:e1:e2  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        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 540  bytes 37856 (37.8 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 540  bytes 37856 (37.8 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

wlp3s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.25.163.3  netmask 255.255.224.0  broadcast 10.25.191.255
        inet6 fe80::1cc3:d48f:3f4d:9cf  prefixlen 64  scopeid 0x20<link>
        ether 74:c6:3b:d7:57:7d  txqueuelen 1000  (Ethernet)
        RX packets 149049  bytes 8101327 (8.1 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1619  bytes 169863 (169.8 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

b) Now,you need to set up a route for this interface so that your computer can see it. Otherwise, everyone else on the network will be able to reach the new interface except you. Issue the needed command, then issue the "$ netstat --r command and check if the route to your added interface is visible

```
abdullah@it-17015-x455lab: ~                                    ⊖ ⊡ ⊗

File  Edit  View  Search  Terminal  Help
abdullah@it-17015-x455lab:~$ sudo ifconfig enp2s0 192.168.2.32 netmask 255.255.2
55.0 up
[sudo] password for abdullah:
abdullah@it-17015-x455lab:~$ netstat -r
Kernel IP routing table
Destination     Gateway           Genmask          Flags   MSS Window   irtt Iface
default         gateway           0.0.0.0          UG        0 0           0 wlp3s0
10.25.160.0     0.0.0.0           255.255.224.0    U         0 0           0 wlp3s0
link-local      0.0.0.0           255.255.0.0      U         0 0           0 wlp3s0
192.168.2.0     0.0.0.0           255.255.255.0    U         0 0           0 enp2s0
abdullah@it-17015-x455lab:~$
```

c)command:
sudo ifcnfig emp2s0 192.168.2.32 netmask 255.255.255.0 down

```
                                        abdullah@abdullah-X455LAB: ~

File  Edit  View  Search  Terminal  Help
abdullah@abdullah-X455LAB:~$ netstat -r
Kernel IP routing table
Destination     Gateway           Genmask          Flags   MSS Window   irtt Iface
default         gateway           0.0.0.0          UG        0 0           0 wlp3s0
10.25.160.0     0.0.0.0           255.255.224.0    U         0 0           0 wlp3s0
link-local      0.0.0.0           255.255.0.0      U         0 0           0 wlp3s0
abdullah@abdullah-X455LAB:~$
```

d) Command:
sudo ifcnfig emp2s0 192.168.2.32 netmask 255.255.255.0 down

```
File  Edit  View  Search  Terminal  Help
abdullah@it-17015-x455lab:~$ sudo ifconfig enp2s0 192.168.2.32 netmask 255.255.255.0 down
abdullah@it-17015-x455lab:~$ ifconfig
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 616   bytes 43384 (43.3 KB)
        RX errors 0   dropped 0   overruns 0   frame 0
        TX packets 616   bytes 43384 (43.3 KB)
        TX errors 0   dropped 0 overruns 0   carrier 0   collisions 0

wlp3s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>   mtu 1500
        inet 10.25.163.3   netmask 255.255.224.0   broadcast 10.25.191.255
        inet6 fe80::1cc3:d48f:3f4d:9cf   prefixlen 64   scopeid 0x20<link>
        ether 74:c6:3b:d7:57:7d   txqueuelen 1000   (Ethernet)
        RX packets 168233   bytes 8996374 (8.9 MB)
        RX errors 0   dropped 0   overruns 0   frame 0
        TX packets 1840   bytes 194903 (194.9 KB)
        TX errors 0   dropped 0 overruns 0   carrier 0   collisions 0

abdullah@it-17015-x455lab:~$ netstat-r
netstat-r: command not found
abdullah@it-17015-x455lab:~$ netstat -r
Kernel IP routing table
Destination     Gateway           Genmask          Flags   MSS Window   irtt Iface
default         gateway           0.0.0.0          UG        0 0           0 wlp3s0
10.25.160.0     0.0.0.0           255.255.224.0    U         0 0           0 wlp3s0
link-local      0.0.0.0           255.255.0.0      U         0 0           0 wlp3s0
abdullah@it-17015-x455lab:~$
```
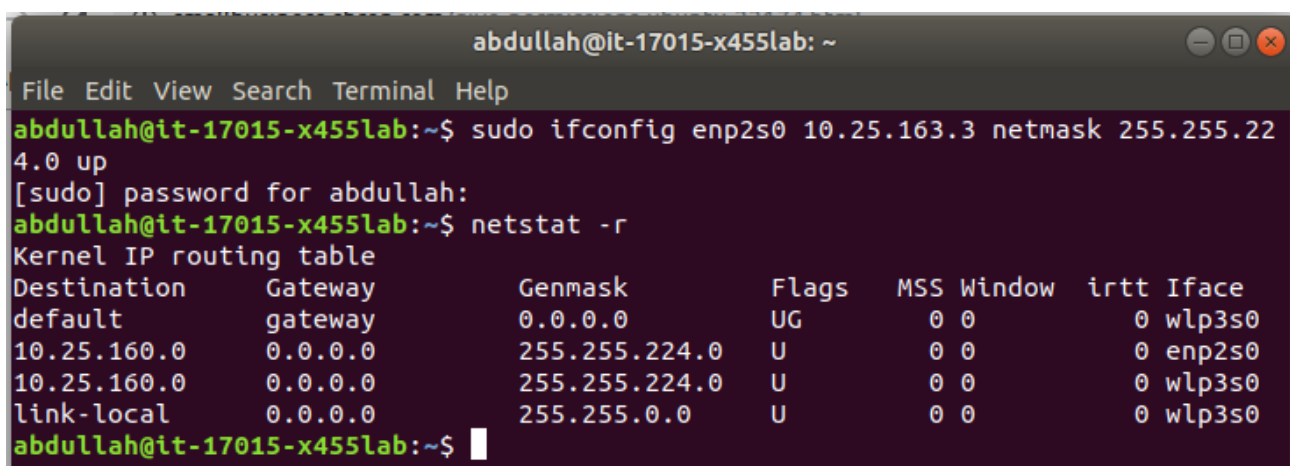
5) **Add a New Network**

a)**Enter the command needed to add another network with the same values as your primary network meaning(yourPrimaryNetworkAddress and netmaskForYourNetwork).**

Ans:
My network IP is 10.25.163.3 and netmask is 255.255.224.0

command:
sudo ifconfig enp2s0 10.25.163.3 netmask 255.255.224.0

b) Assign the default gateway for your newly added network (the same default value as your primary network)

Ans:
The command is:

route add default gw {IP-ADDRESS} {INTERFACE-NAME}

route add default gw 10.25.160.10 enp2s0

C) **Look for your newly added network in your routing table by issuing the netstat -r command.**

Ans:

d)**Now,remove your changers meaning the double routing table setup for your primary network. First issue the command needed for delete your newly added route and the issue the command to delete your newly default gateway.**

Ans:
Command to delete the route:
sudo ifconfig enp2s0 10.25.163.3 netmask 255.255.224.0 down

Command to delete the gateway:

route del default gw 10.25.160.10 enp2s0

6.
a) Assign the firewall IP addresses to eth1 and eth2.

Ans:
ifconfig eth1 10.0.2.1 up
ifconfig eth2 192.168.1.25 up

b)Add the routes for the networks, i.e., 192.168.1.0 on eth1 and 10.0.2.0 on eth0

Ans:
sudo ifcnfig eth0 10.0.2.0 netmask 255.0.0.0 up

 sudo ifcnfig eth1 192.168.1.0 netmask 255.255.255.0 down

C)Assign the Internet gateway (meaning:192.168.1.1) as the efault gateway.

 Ans:
 route add default gw 192.168.1.1

Conclusion:

The experiment help me to understand Network configuration, Routing table and Virtual Interfaces.I can be able set or add an ip addresses with netmask and can add their route .