MAWLANA BHASHANI SCIENCE AND TECHNOLOGY UNIVERSITY

DEPARTMENT OF ICT

LAB REPORT NO : 03

Course Code : ICT-3208

Course Title : Network Planning and designing Lab.

Report Name: Network configuration , Routing table , Virtual interfaces & Multinetwork.

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Objectives:

To learn how to design networks and understand how to configure networks. Beside , Setting a networks controls, flow and operation to support the network communications of an organization and network owner. To know how to manipulate routing table when configuring my computer talk to another computer across a network .

1. Introduction :

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 range of 192.168.1.1 to 192.168.1.254.

Ans: Firstly **,** we can not use the first address is called network address and last address is called broadcast address . Ipv4-addresses are internally 32 bits, they're often divided into 4 groups of 8 bits. An octet can only be variety from 0 – 255, so as that leaves 256 possibilities for that last number. All addresses within the range of 192.168.1.0 to 192.168.1.255 are within an equivalent network. There are only 254 possibilities for variety . The addresses 192.168.1.0 and 192.168.1.255 are reserved for the network. 192.168.1.0, is reserved for the “network address.” 192.168.1.255, is that the “broadcast” address. In an IP address, you've some dedicated to the network and a few of the address dedicated to the hosts. during a /24 network, meaning the first 3 octets are for the network. 192.168.1.0 is that the subsequent in binary: 11000000.10101000.00000001.00000000 A /24 subnet mask in binary looks like this: 11111111.11111111.11111111.00000000 In decimal, this is: 255.255.255.0. so the first usable address is 192.168.1.1 and thus the last is 192.168.1.254. Since all devices within the network need to have unique addresses meaning that you simply simply can have 254 devices therein network.

2. Find IP and MAC :

Write down the IP and MAC address of your computer ?

Ans :
IP address : 127.0.0.1
Physical address (MAC): 0A-00-27-00-00-08.

```
sohan18011@sohan18011-VirtualBox:~$ ip -c address
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:d5:a4:0f brd ff:ff:ff:ff:ff:ff
    inet 127.2.0.1/8 brd 127.255.255.255 scope host noprefixroute enp0s3
       valid_lft forever preferred_lft forever
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
       valid_lft 80984sec preferred_lft 80984sec
    inet6 fe80::4bab:debe:da58:a8e8/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
sohan18011@sohan18011-VirtualBox:~$
```

```
Connection-specific DNS Suffix  . :
Description . . . . . . . . . . . : VirtualBox Host-Only Ethernet Adapter
Physical Address. . . . . . . . . : 0A-00-27-00-00-08
DHCP Enabled. . . . . . . . . . . : No
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::850:1370:ff72:5130%8(Preferred)
IPv4 Address. . . . . . . . . . . : 192.168.56.1(Preferred)
Subnet Mask . . . . . . . . . . . : 255.255.255.0
Default Gateway . . . . . . . . . :
DHCPv6 IAID . . . . . . . . . . . : 705298471
DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-24-F5-1D-10-B0-5A-DA-37-C1-E3
DNS Servers . . . . . . . . . . . : fec0:0:0:ffff::1%1
                                    fec0:0:0:ffff::2%1
                                    fec0:0:0:ffff::3%1
NetBIOS over Tcpip. . . . . . . . : Enabled
```

3. Routing Table Basics

Enter the command: "$ netstat -r" to print your computers routing table.

```
sohan18011@sohan18011-VirtualBox:~$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         _gateway        0.0.0.0         UG        0 0          0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0   U         0 0          0 enp0s3
link-local      0.0.0.0         255.255.0.0     U         0 0          0 enp0s3
sohan18011@sohan18011-VirtualBox:~$
```

The output of the kernel routing table is organized in the following columns:

Destination : The destination network or destination host.
Gateway : The gateway address or â€™*â€™ if none set.
Genmask : The netmask for the destination net; 255.255.255.255 for a host destination and 0.0.0.0 for the default route.

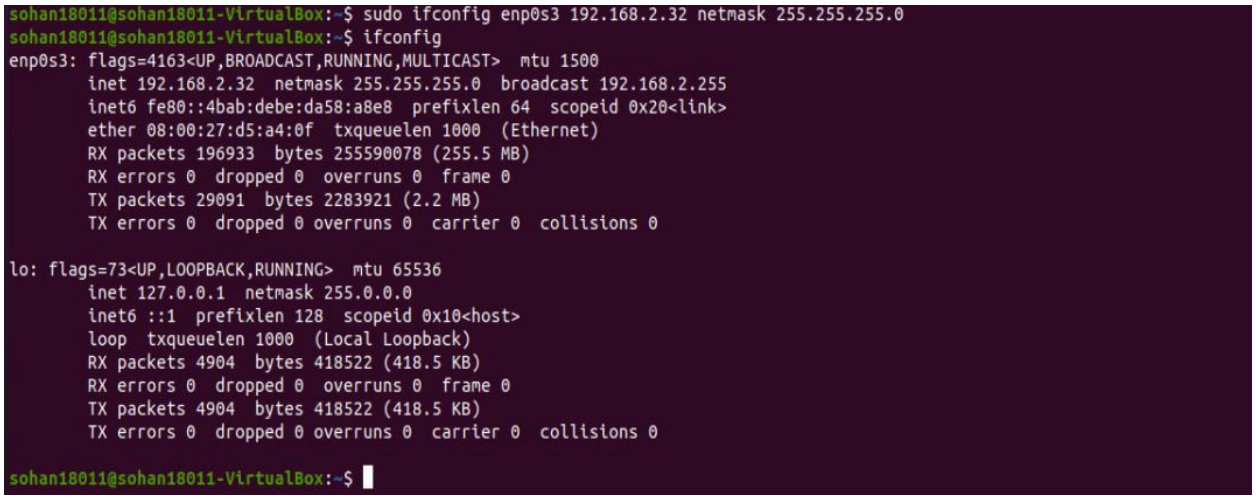
Flags : Possible flags include
U (route is up)
H (target is a host)
G (use gateway)
R (reinstate route for dynamic routing)
D (dynamically installed by daemon or redirect)
M (modified from routing daemon or redirect)
A (installed by addrconf)
C (cache entry)

! (reject route)

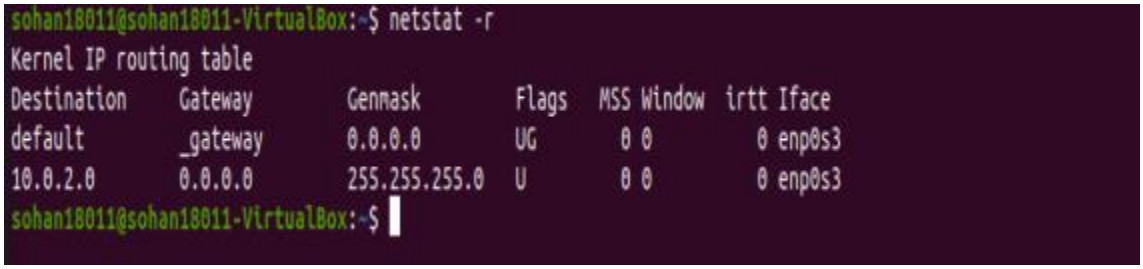
MSS : Default maximum segment size for TCP connections over this route.
Window : Default window size for TCP connections over this route.
irtt : Initial RTT (Round Trip Time). The kernel uses this to guess about the best TCP protocol parameters without waiting on (possibly slow) answers.
Iface : Interface to which packets for this route will be sent.

4. Virtual interfaces :

a) Create a new virtual interface with the following IP address , 192.168.2.32 and netmask 255.255.255.0 then check to see if the interface was created successfully?



b) You need to set up a route for this interface so that your computer can see it.Issue the needed command ,then issue the “$ netstat -r” command and check if the route to your added interface is visible?



c) Next remove the route for this interface ?
Ans :

d) Then remove the interface completely .
Ans :
Command for removing the interface completely ----' Sudo ifconfig enp0s3 down’

```
sohan18011@sohan18011-VirtualBox:~$ sudo ifconfig
[sudo] password for sohan18011:
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.2.32  netmask 255.255.255.0  broadcast 192.168.2.255
        inet6 fe80::4bab:debe:da58:a8e8  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:d5:a4:0f  txqueuelen 1000  (Ethernet)
        RX packets 199067  bytes 257397471 (257.3 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 30123  bytes 2410935 (2.4 MB)
        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 5161  bytes 445070 (445.0 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 5161  bytes 445070 (445.0 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

sohan18011@sohan18011-VirtualBox:~$
```

5. Add a New Network

a) Enter the command needed to add another network with the same values as your primary network meaning.

Ans:

```
sohan18011@sohan18011-VirtualBox:~$ sudo ifconfig enp0s3 127.2.0.1 netmask 255.0.0.0
[sudo] password for sohan18011:
sohan18011@sohan18011-VirtualBox:~$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         _gateway        0.0.0.0         UG        0 0          0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0   U         0 0          0 enp0s3
sohan18011@sohan18011-VirtualBox:~$
```

b) Assign the default gateway for newly added network(Your default Gateway Address):
Ans:

```
sohan18011@sohan18011-VirtualBox:~$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         _gateway        0.0.0.0         UG        0 0          0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0   U         0 0          0 enp0s3
sohan18011@sohan18011-VirtualBox:~$
```

c) Look for your newly added network in your routing table by issuing the "$ netstat -r " command.
Ans:

```
sohan18011@sohan18011-VirtualBox:~$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         _gateway        0.0.0.0         UG        0 0          0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0   U         0 0          0 enp0s3
sohan18011@sohan18011-VirtualBox:~$
```

d) Now remove your chaneges meaning the double routing table setup for your primary network . First issue the command needed to delete your newly added route then issue the command to delete you newly added default gateway.
Ans:

```
sohan18011@sohan18011-VirtualBox:~$ sudo route del -net 127.0.0.1 gw 0.0.0.0 netmask 255.0.0.0 dev enp0s3
[sudo] password for sohan18011:
route: netmask doesn't match route address
Usage: inet_route [-vF] del {-host|-net} Target[/prefix] [gw Gw] [metric M] [[dev] If]
       inet_route [-vF] add {-host|-net} Target[/prefix] [gw Gw] [metric M]
                          [netmask N] [mss Mss] [window W] [irtt I]
                          [mod] [dyn] [reinstate] [[dev] If]
       inet_route [-vF] add {-host|-net} Target[/prefix] [metric M] reject
       inet_route [-FC] flush      NOT supported
sohan18011@sohan18011-VirtualBox:~$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         _gateway        0.0.0.0         UG        0 0          0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0   U         0 0          0 enp0s3
sohan18011@sohan18011-VirtualBox:~$
```

6) Multinetwork scenario configuration :

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

Ans :

```
sohan18011@sohan18011-VirtualBox:~$ sudo ip route add 10.0.2.0 default via dev eth0
[sudo] password for sohan18011:
```

```
sohan18011@sohan18011-VirtualBox:~$ sudo ip route add 192.168.1.0/255.255.255.0 default via dev eth1
```

b) Add the routes for the networks , 192.168.1.0 on eth1 and 10.0.2.0 on eth0.
Ans:

```
sohan18011@sohan18011-VirtualBox:~$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         _gateway        0.0.0.0         UG        0 0          0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0   U         0 0          0 enp0s3
link-local      0.0.0.0         255.255.0.0     U         0 0          0 enp0s3
sohan18011@sohan18011-VirtualBox:~$
```

c) Assign the internet gateway(meaning : 192.168.1.1) as the default gateway .
Ans:

```
sohan18011@sohan18011-VirtualBox:~$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         _gateway        0.0.0.0         UG        0 0          0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0   U         0 0          0 enp0s3
sohan18011@sohan18011-VirtualBox:~$
```

d) Enter the necessary commands in order for packets belonging to computers in the 10.0.2.0 network to be routed to the 192.168.1.0 network and the internet . In other words this should tell each computer on the 10.0.2.0 , which the default gateway is , i.e.., your firewall/router. You do not need to be worry about the route back configuration it is enough to assign the proper default gateway for the 10.0.2.0 network.

Conclusion:

I have successfully known how to configure and desighn the networks from this lab..I also known how to manipulate routing table,add networks,delete network,and most interesting is when my computer is talk to another computer across network.I try to tested all configuring tools via command line in linux. I face some problem to run command then I take help from my friends.