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Lab Report

Department of Information and Communication Technology

Report No: 02

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

Course Title: Network Planning and designing Lab.

Course Code: ICT-3208

Submitted By	Submitted To
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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 : 192.168.56.1
   Physical address (MAC): 0a:00:27:00:00:0a

```
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ ifconfig -a
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
        inet6 fe80::153b:cca1:e7bc:dd1c  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:44:19:2e  txqueuelen 1000  (Ethernet)
        RX packets 2  bytes 1180 (1.1 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 66  bytes 7600 (7.6 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 1320  bytes 95004 (95.0 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1320  bytes 95004 (95.0 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$
```

3. Routing Table Basics

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

```
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ 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
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$
```

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?

```
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ sudo ifconfig enp0
s3 192.168.2.32 netmask 255.255.255.0
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ ifconfig
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::153b:cca1:e7bc:dd1c  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:44:19:2e  txqueuelen 1000  (Ethernet)
        RX packets 2  bytes 1180 (1.1 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 80  bytes 9840 (9.8 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 2627  bytes 187991 (187.9 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 2627  bytes 187991 (187.9 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

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?

Ans:

```
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         zafrul-hasan-na 0.0.0.0         UG        0 0          0 enp0s3
192.168.2.0     0.0.0.0         255.255.255.0   U         0 0          0 enp0s3
```

c) Next remove the route for this interface ?

Ans :

```
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
default         zafrul-hasan-na 0.0.0.0         UG    0      0        0 enp0s3
192.168.2.0     0.0.0.0         255.255.255.0   U     100    0        0 enp0s3
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ sudo route delete
-net 0.0.0.0 gw 192.168.2.32 netmask 0.0.0.0 dev enp0s3
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
192.168.2.0     0.0.0.0         255.255.255.0   U     100    0        0 enp0s3
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$
```

d) Then remove the interface completely .

Ans :

Command for removing the interface completely ----' Sudo ifconfig enp0s3 down'

```
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ sudo ifconfig enp0
s3 down
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ 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 5829  bytes 416441 (416.4 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 5829  bytes 416441 (416.4 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

5. Add a New Network

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

Ans:

```
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ sudo ifconfig enp0
s3 127.0.0.1  netmask 255.0.0.0
[sudo] password for zafrul_hasan_nasim:
```

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

Ans:

```
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
127.0.0.0       0.0.0.0         255.0.0.0       U         0 0          0 enp0s3
link-local      0.0.0.0         255.255.0.0     U         0 0          0 enp0s3
```

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

Ans:

```
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
127.0.0.0       0.0.0.0         255.0.0.0       U         0 0          0 enp0s3
link-local      0.0.0.0         255.255.0.0     U         0 0          0 enp0s3
```

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:

```
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         localhost       0.0.0.0         UG        0 0          0 enp0s3
127.0.0.0       0.0.0.0         255.0.0.0       U         0 0          0 enp0s3
link-local      0.0.0.0         255.255.0.0     U         0 0          0 enp0s3
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ sudo route del -ne
t 127.0.0.0 gw 0.0.0.0 netmask 255.0.0.0 dev enp0s3
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         localhost       0.0.0.0         UG        0 0          0 enp0s3
link-local      0.0.0.0         255.255.0.0     U         0 0          0 enp0s3
```

6) Multinetwork scenario configuration :

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

Ans :

```
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ sudo ip route add
 10.0.2.0  default via dev eth0
[sudo] password for zafrul_hasan_nasim:
```

```
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ 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:

```
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt
default         localhost       0.0.0.0         UG        0 0          0
10.0.2.0        0.0.0.0         255.255.255.255 UH        0 0          0
192.168.1.0     0.0.0.0         255.255.255.0   U         0 0          0
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~$
```

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

Ans:

```
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt
default         localhost       0.0.0.0         UG        0 0          0
10.0.2.0        0.0.0.0         255.255.255.255 UH        0 0          0
192.168.1.0     0.0.0.0         255.255.255.0   U         0 0          0
zafrul_hasan_nasim@zafrul-hasan-nasim-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.

Ans:

```
zafrul_hasan_nasim@zafrul-hasan-nasim-VirtualBox:~/IT-18003$ ip route list
default via 10.0.2.2 dev enp0s3 proto dhcp metric 20100
10.0.2.0/24 dev enp0s3 proto kernel scope link src 10.0.2.15 metric 100
169.254.0.0/16 dev enp0s3 scope link metric 1000
```

Conclusion: From this lab , I have known that how to design networks and understand how to configure networks. I also known how to manipulate routing table when configuring my computer talk to another computer across a network . I have tested to all networking configuring tools via command line in linux

terminal. I have discussed some commonly used commands which hopefully, will help me in configuring, managing and securing my network.