Mawlana Bhashani Science and Technology University

Department of Information and Communication Technology

Course Code : ***ICT-3208***

Course Name : ***Network Planning and Designing Lab***

Name of the Lab : ***Laboratory on Linux Basics***

Lab No. : ***01***

Submitted to:
Mr. Nazrul Islam
Assistant Professor,
Dept. of ICT, MBSTU

Submitted by:
Md. Nazmul Hasan
ID: IT-17005
Session: 2016-17
3rd Year 2nd Semester

Date of Submission: 05-March-2020

Network Configuration, Routing Table and Virtual Interfaces

1. Introduction:

Solution: Each device connected to a computer network that uses the Internet Protocol for communication is assigned a numerical label, an Internet Protocol address, or IP address for short. An IP address identifies the device an establishes a path to it. But not all IP addresses can be reached through the public internet, and 192.168.1.1 is among them. This default IP address of most Linksys routers is one of 65,536 IP addresses in the 16-bit block of the private IPv4 address space, which includes addresses from 192.168.0.0 to 192.168.255.255. Private IP addresses are used for local area networks (LANs), and they were defined in an effort to delay IPv4 address exhaustion. Because private IP addresses can be used without approval from a regional Internet registry, they allow anyone from individual home users to organizations to readily deploy internet-connected devices using Network Address Translation (NAT), a method of assigning a public address to a computer inside a private network. Manufacturers of home routers use private IP addresses, including 192.168.1.1, as the default gateway, allowing users to type http://192.168.1.1 into a web browser to access the router admin panel and change router settings.

2. Find IP and MAC:

Write down the IP and MAC address of your computer?

Solution:

```
ruhan@ruhan-HP-Notebook:~$ ifconfig
enp2s0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        ether 98:e7:f4:8a:30:5f  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 2916  bytes 258718 (258.7 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 2916  bytes 258718 (258.7 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

wlo1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.0.101  netmask 255.255.255.0  broadcast 192.168.0.255
        inet6 fe80::d1dd:a317:ba8a:81fa  prefixlen 64  scopeid 0x20<link>
        ether cc:b0:da:66:c1:a7  txqueuelen 1000  (Ethernet)
        RX packets 30218  bytes 31636252 (31.6 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 22800  bytes 3272023 (3.2 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

3. Routing Table basics:

Solution:

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

```
ruhan@ruhan-HP-Notebook:~$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         _gateway        0.0.0.0         UG        0 0          0 wlo1
link-local      0.0.0.0         255.255.0.0     U         0 0          0 wlo1
192.168.0.0     0.0.0.0         255.255.255.0   U         0 0          0 wlo1
ruhan@ruhan-HP-Notebook:~$
```

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

```
ruhan@ruhan-HP-Notebook:~$ netstat -nr
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
0.0.0.0         192.168.0.1     0.0.0.0         UG        0 0          0 wlo1
169.254.0.0     0.0.0.0         255.255.0.0     U         0 0          0 wlo1
192.168.0.0     0.0.0.0         255.255.255.0   U         0 0          0 wlo1
```

The –n option makes **netstat** print addresses as dotted quad IP numbers rather than the symbolic host and network names. This option is especially useful when you want to avoid address lookups over the network (e.g., to a DNS or NIS server). The second column of **netstat** 's output shows the gateway to which the routing entry points. If no gateway is used, an asterisk is printed instead. The third column shows the “generality” of the route, i.e., the network mask for this route. When given an IP address to find a suitable route for, the kernel steps through each of the routing table entries, taking the bitwise AND of the address and the genmask before comparing it to the target of the route.

4. **Virtual Interfaces:**

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

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.

```
ruhan@ruhan-HP-Notebook:~$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         _gateway        0.0.0.0         UG        0 0          0 wlo1
link-local      0.0.0.0         255.255.0.0     U         0 0          0 wlo1
192.168.0.0     0.0.0.0         255.255.255.0   U         0 0          0 wlo1
ruhan@ruhan-HP-Notebook:~$
```

c) Next remove the route for this interface.

d) Then remove the interface completely.

5. **Add a New Network:**

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

b) Assign the default gateway for your newly added network (tip the same default gateway as your primary network), (Your default gateway address).

c) Look for your newly added network in your routing table by issuing the "$ netstar-r" command. You should now have a double setup of your primary network in the table.

d) Now, remove your changes 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 your newly added default gateway.

6. **Multi network scenario Configuration:**
Provide the necessary commands to route on the firewall/router system:
a) Assign the firewall IP addresses to eth1 and eth2.

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

c) Assign the Internet gateway (meaning: 192.168.1.1) as the default gateway. (write down the command(s) in your written report)

d) Enter the necessary command(s) 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, ie., your firewall/router. You do not need to worry about the route back configuration it is enough to assign the proper default gateway for the 10.0.2.0 network. (write down the command(s) in your written report)

Conclusion: From this lab, I've solved only a few of these problems. Because we don't learn the advanced networking with basic Linux commands.