Network Configurations & Troubleshooting

Networking:

It is a connection between two or more machines to communicate with each other.

The basic requirements for Networking are:

1. NIC (Network Interface Controller or Card)
2. Media
3. Topology
4. Protocol
5. IP Address
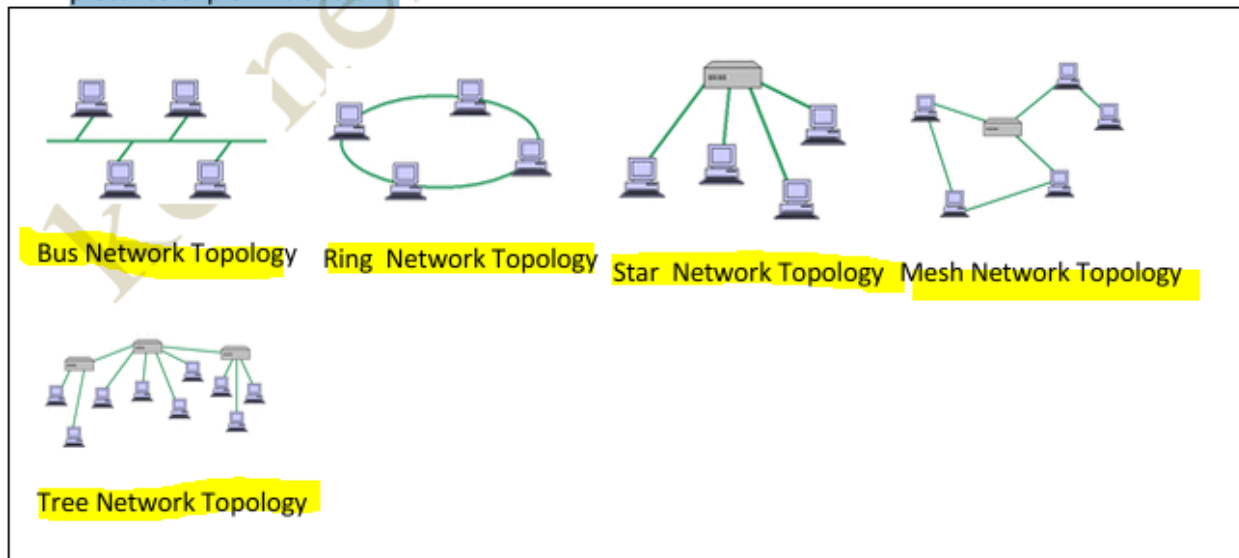
NIC (Network Interface Controller or Card):

A **network interface controller** (also known as a **network interface card, network adapter, LAN adapter** and by similar terms) is a computer hardware component that connects a computer to a computer network. Each NIC will be having a unique MAC addresses **(Media Access Control address)** to avoid conflicts between same NIC adapters. In Linux these NIC adapter is represented by the word "**eth**". Example if there are two Ethernet adapters in the system then it will be denoted as eth0, eth1, etc.

Media:

Media is the medium via which two different computer's NIC card will be connected. The best example for media is Cable. Example RJ 45, CAT 5 etc.

Topology:

Topology is the scheme or design in which the computers in the network will be connected to each other. Example for topology is Bus, Ring, star, mesh, tree topologies. The following pictures explain it better.

Bus Network Topology   Ring Network Topology   Star Network Topology   Mesh Network Topology

Tree Network Topology

Protocol:

TCP/IP	UDP
Transmission Control Protocol	User Datagram Protocol
It is connection Oriented	Connectionless
Reliable	Non-Reliable
TCP Acknowledgement will be sent/received	No Acknowledgement for UDP
Slow Communication	Faster Communication
Protocol Number for TCP is **6**	Protocol Number for UDP is **17**
HTTP, FTP, SMTP uses TCP	DNS, DHCP uses UDP

IP ADDRESS:

An IP address can be thought of as being similar to a phone number. Just as every person who communicates with a telephone is using a phone with a unique phone number, every computer that is on the Internet has a unique IP address. Not only on internet but within an organization every computer is assigned an IP address so that they can communicate with each other.

IP Address Classes • Subnet mask • Gateway

IP Address Classes: CIDR

RFC1918 Address:

10.0.0.0   to   10.255.255.255

172.16.0.0   to   172.31.255.255

192.168.0.0   to   192.168.255.255

Subnet Mask:

A subnet mask allows users to identify which part of an IP address is reserved for the network and which part is available for host use. By looking at the IP address alone, especially now with classless inter-domain routing, users cannot tell which part of the address is which. Adding the subnet mask or netmask gives users all the information needed to calculate network and host portions of the address with ease. In summary, knowing the subnet mask can allow users to easily calculate whether IP addresses are on the same subnet or not. A commonly used netmask is a 24-bit netmask as seen below.

Netmask:	255.	255.	255.	0
Binary:	11111111	11111111	11111111	00000000
Netmask length	8	16	24	--

Gateway:

A gateway is a network point that provides entrance into another network. On the Internet, a node or stopping point can be either a gateway node or a host (end-point) node. Both the computers of Internet users and the computers that serve pages to users are host nodes. The computers that control traffic within your company's network or at your local Internet service provider (ISP) are gateway nodes. For example let's say our network is 192.168. something and we want to send a file to other computer on 10.10.network, so we need a gateway to communicate between two computers of different networks.

Some Important configuration files/directories of network configurations

#/etc/sysconfig/network-scripts is the directory which keeps the configuration of network devices connected to the system.

#/etc/sysconfig/network is a file which keeps the information about the hostname assigned to the system. If you want to change the hostname permanently, you need to change the hostname in this file.

#/etc/hosts a file which is responsible for resolving hostname into IP locally, in other word it acts as local DNS if DNS server is not accessible.

```
root@yallareddy:/etc/sysconfig/network-scripts
[root@yallareddy network-scripts]# cat /etc/hosts
127.0.0.1    localhost localhost.localdomain localhost4 localhost4.localdomain4
::1          localhost localhost.localdomain localhost6 localhost6.localdomain6
[root@yallareddy network-scripts]#
```

#/etc/resolv.conf is a file which keeps the address of DNS server to which the clients will be accessing to resolve IP to hostname and hostname to IP.

```
root@yallareddy:/etc/sysconfig/network-scripts
[root@yallareddy network-scripts]# cat /etc/resolv.conf
# Generated by NetworkManager
domain localdomain
search localdomain
nameserver 192.168.111.2
[root@yallareddy network-scripts]#
```

➔ To check the ip address assign to all the interfaces

```
root@yallareddy:~
[root@yallareddy ~]# ifconfig
eth1      Link encap:Ethernet  HWaddr 00:0C:29:2A:BD:12
          inet addr:192.168.111.133  Bcast:192.168.111.255  Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fe2a:bd12/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:526 errors:0 dropped:0 overruns:0 frame:0
          TX packets:363 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:49659 (48.4 KiB)  TX bytes:46345 (45.2 KiB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:18 errors:0 dropped:0 overruns:0 frame:0
          TX packets:18 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1548 (1.5 KiB)  TX bytes:1548 (1.5 KiB)

[root@yallareddy ~]#
```

➢ To check the ip of a particular interface

#ifconfig < adapter name >

#ifconfig eth0

➜ To check the hostname of the system.

➜ To check whether DNS is resolving or not

#host <ip address>

#host 192.168.111.133

- **To check whether DNS is resolving or not**
  #host < ip address >
  #host 192.168.10.95

```
[root@ktlinux ~]# host 192.168.10.98
98.10.168.192.in-addr.arpa domain name pointer linux.kt.com.
```

➜ Same with "nslookup" command

#nslookup < ip address >

#nslookup < hostname >

```
root@yallareddy:~
[root@yallareddy ~]# nslookup 192.168.111.133
Server:         192.168.111.2
Address:        192.168.111.2#53

** server can't find 133.111.168.192.in-addr.arpa.: NXDOMAIN

[root@yallareddy ~]#
```

#nslookup < hostname >

```
[root@ktlinux ~]# nslookup 192.168.10.98
Server:         192.168.10.98
Address:        192.168.10.98#53

98.10.168.192.in-addr.arpa      name = kt.com.
98.10.168.192.in-addr.arpa      name = linux.kt.com.

[root@ktlinux ~]# nlookup ktlinux.kt.com
bash: nlookup: command not found
[root@ktlinux ~]# nslookup ktlinux.kt.com
Server:         192.168.10.98
Address:        192.168.10.98#53

Name:   ktlinux.kt.com
Address: 192.168.10.98
```

> Checking network connectivity using ping command

#ping < ip address >

Changing the hostname:

➔ Check the current hostname with hostname command
➔ The syntax for changing the hostname is

#hostname <newhostname>

#hostname <yallareddy.linux.com>

Note: The above change is temporary and will be last only till you are logged in, if you want to change it permanently edit the **/etc/sysconfig/network** file and then logout and login to confirm the change.

#vim /etc/sysconfig/network delete the previous hostname and add the new name.

Note: Once you logout and login again the change will be permanent, observe the highlighted region above.

Assigning /Changing the IP Address :

Note: with **#setup** command also we can set the IP. But we should do from **CLI** only.

Keep this below entries in this below configuration file

➔ Now restart the network service and check for the ip address
➔ #service network restart
➔ If the change is not reflected with above service restart, restart the network manager
➔ #service NetworkManager restart (N and M are case sensitive)

```
 ⊡            root@master-server:~/Desktop                   _ □

 File  Edit  View  Search  Terminal  Help

[root@master-server Desktop]# service NetworkManager restart
Stopping NetworkManager daemon:                          [  OK  ]
Setting network parameters...                            [  OK  ]
Starting NetworkManager daemon:                          [  OK  ]
[root@master-server Desktop]# ▮
```

Now you can see your own IP

```
 ⊡            root@master-server:~/Desktop               _ □ ✕

 File  Edit  View  Search  Terminal  Help

[root@master-server Desktop]# ifconfig                              ︿
eth1      Link encap:Ethernet  HWaddr 00:0C:29:51:DB:9C
          inet addr:192.168.10.10  Bcast:192.168.10.255  Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fe51:db9c/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:1003 errors:0 dropped:0 overruns:0 frame:0
          TX packets:734 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:85809 (83.7 KiB)  TX bytes:120003 (117.1 KiB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:20 errors:0 dropped:0 overruns:0 frame:0
          TX packets:20 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1932 (1.8 KiB)  TX bytes:1932 (1.8 KiB)

[root@master-server Desktop]# ▮                                     ≡
```