# Network Management

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# Configuring your Networking

- It can be done in two ways:
  - Uses command to change current setting.
  - Edit some different files.

# Network Commands

- ifconfig
- route
- netstat
- ping
- traceroute

# ifconfig

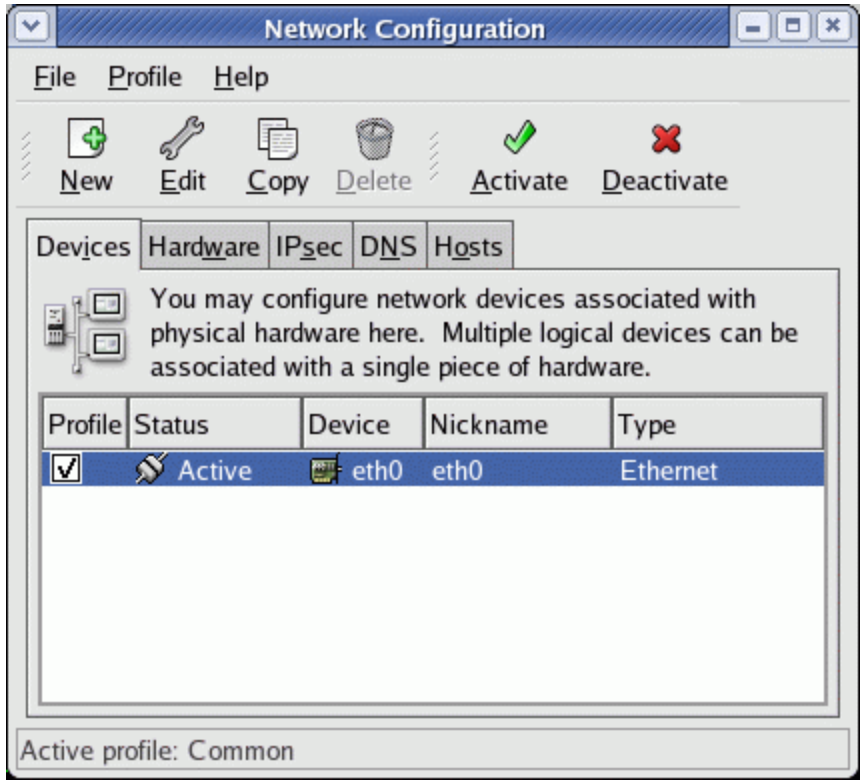
- Configure network interface: change alias, ip, netmask , broadcast , promiscuous ,...
- Note: The ifconfig command does NOT store this information permanently. Upon reboot this information is lost.
- No argument
  - Display the status of active interfaces
- Create alias
  - Ifconfig eth0:0 192.168.1.1
  - IP aliasing occurs when multiple IP addresses are assigned to the same physical network interface , With this, one node on a network can have multiple connections to a network, each serving a different purpose.

# ifconfig (cont.)

- Change IP address
  - Ifconfig eth0 192.168.1.2
- Change the netmask
  - Ifconfig eth0 netmask 255.255.255.0
- Change the broadcast
  - Ifconfig eth0 broadcast 192.168.1.255

# Configuring Networking Using Graphical Tools

**TCP/IP ethernet configuration:**
/usr/sbin/system-config-network



# System Networking Scripts

- Linux vendors have provided numerous scripts and configuration files to make complex networking easier to manage
  - Scripts follow the model used for most system services on UNIX-based computers
  - Scripts are found in the /etc/sysconfig/network-scripts subdirectory
  - Configuration files are found in the /etc/sysconfig/networking subdirectory

# Network Files

- /etc/sysconfig/network - Defines your network and some of its characteristics.
- /etc/HOSTNAME - Shows the host name of this host
- /etc/resolv.conf - Specifies the domain to be searched for host names to connect to, the nameserver address, and the search order for the nameservers.
- /etc/host.conf - Specifies the order nameservice looks to resolve names.
- /etc/hosts - Shows addresses and names of local hosts.
- /etc/networks - Provides a database of network names with network addresses similar to the /etc/hosts file.
- /etc/sysconfig/network-scripts/ifcfg-eth* - There is a file for each network interface. This file contains the IP address of the interface and many other setup variables.

# Network Files

- /etc/sysconfig/network
  - If you are using static IP address Configuration: (Configure gateway address)

```
NETWORKING=yes
HOSTNAME=my-hostname      - Hostname is defined here and by command hostname
FORWARD_IPV4=true         - True for NAT firewall gateways and linux routers.
                            False for everyone else - desktops and servers.
GATEWAY="XXX.XXX.XXX.YYY" - Used if your network is connected to another network
                            or the internet. Static IP configuration. Gateway not
                            defined here for DHCP client.
```

  - If you are using DHCP client configuration:

```
NETWORKING=yes
HOSTNAME=my-hostname - Hostname is defined here and by command hostname
```

# Network Files

- /etc/hosts
  - It is a map of IP to hostname.
  - locally resolve node names to IP addresses (not by DNS)
  - Red Hat/Fedora GUI:
    - /usr/sbin/system-config-network (select tab "Hosts".)

```
127.0.0.1 your-node-name.your-domain.com localhost.localdomain localhost
XXX.XXX.XXX.XXX node-name
```

- /etc/services
  - It maps port numbers to services (TCP and UDP).

# Network Files

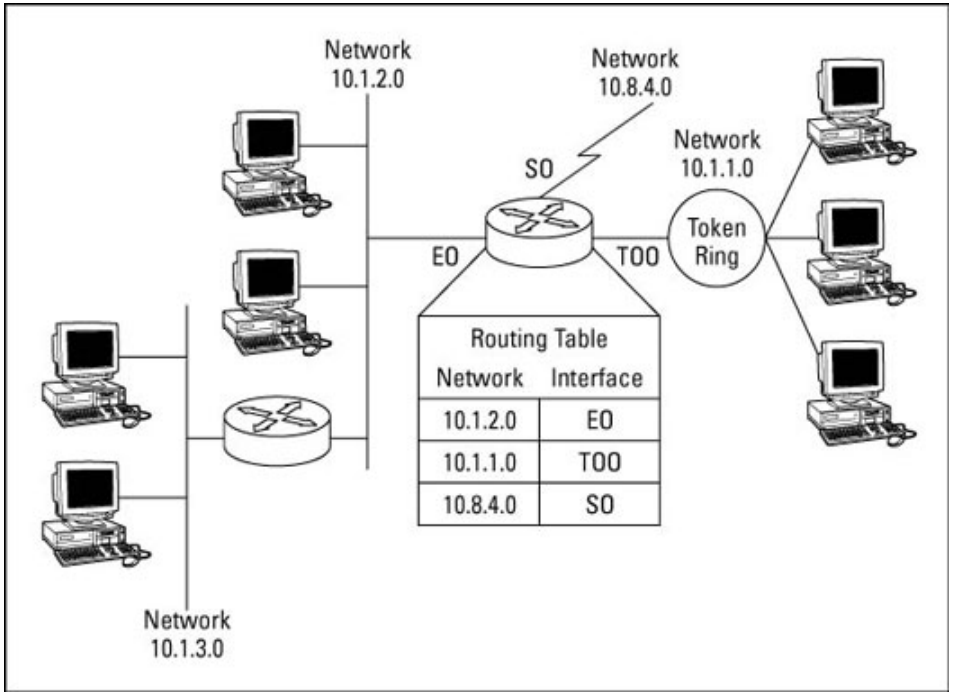
- /etc/resolv.conf
  - It is used by DNS, resolving domain names into IP addresses
  - Red Hat/Fedora GUI:
    - /usr/sbin/system-config-network (select tab "DNS".)

nameserver XXX.XXX.XXX.XXX - **IP address of primary name server**
nameserver XXX.XXX.XXX.XXX - **IP address of secondary name server**

# Routing

# Routing Basic

- A routing table
  - is a simple set of rules that tell what will be done with network packets.



# route

| Destination | Gateway | Genmask | Flags | Metric | Ref | Use | Iface |
|---|---|---|---|---|---|---|---|
| 192.168.2.2 | * | 255.255.255.255 | UH | 0 | 0 | 0 | eth0 |
| 192.168.2.0 | * | 255.255.255.0 | U | 0 | 0 | 0 | eth0 |
| 127.0.0.0 | * | 255.0.0.0 | U | 0 | 0 | 0 | lo |
| Default | 192.168.2.1 | 0.0.0.0 | UG | 0 | 0 | 0 | eth0 |

- Flags
  - U - Route is up
  - H - Target is a host
  - G - Use gateway
  - ...

# route

- Build routing table
- Samples:
  - route add –net 192.168.1.0 netmask 255.255.255.0 dev eth0
  - route add –host 192.168.1.1 gw 192.168.1.100
  - route add default gw 192.168.1.1

# Enable Forwarding

- Forwarding allows the network packets on one network interface (i.e. eth0) to be forwarded to another network interface (i.e. eth1).
- This will allow the Linux computer to conect ("ethernet bridge") or route network traffic.
  - echo 1 > /proc/sys/net/ipv4/ip_forward
  - In file etc/sysconfig/network
    - FORWARD_IPV4=true

# Network monitoring

# Analysis Tools

- netstat - Displays information about the systems network connections, including port connections, routing tables, and more. The command "netstar -r" will display the routing table.
  - -r show the routing table
  - -i shows the interfaces
  - -p what program is doing network stuff
  - No option: What is presently going on
- traceroute - This command can be used to determine the network route from your computer to some other computer on your network or the internet. To use it you can type "route IPaddress" of the computer you want to see the route to.
  - check the router path
- arp - This program lets the user read or modify their arp cache.

# Network monitoring…

- netstate
  - Display the status of network
  - Show network statistics:
    - netstat –s
  - Show routing table
    - netstat -r
- ping
  - Send ICMP ECHO-REQUEST to network host

# Network monitoring…

- traceroute
  - Print the route packets take to network host
    - traceroute IP-address-of-server
    - traceroute domain-name-of-server
  - Using traceroute to Examine Routing Patterns

- nslookup
  - Give a host name and the command will return IP address