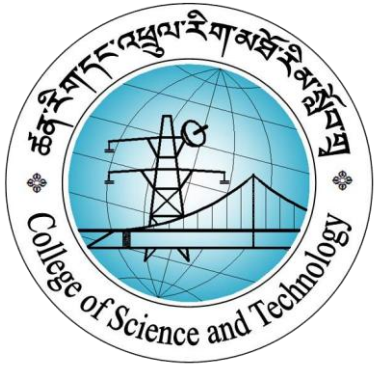


Royal University of Bhutan

LESSON – 18

CONFIGURING NETWORKING

LEARNING OUTCOMES

- Manage network interface
- Configure and validate network

Networking Fundamentals

- Currently two versions of IP addresses
  - IPv4 addresses -> 32-bit addresses (Format x.x.x.x)
  - IPv6 addresses -> 128-bit addresses (Format -> 8 hex written parts that are 16 bits each).
    Example: fe80:badb:abe01:45bc:34ad:6734:7898:df45
  - Focus on IPv4 addressing

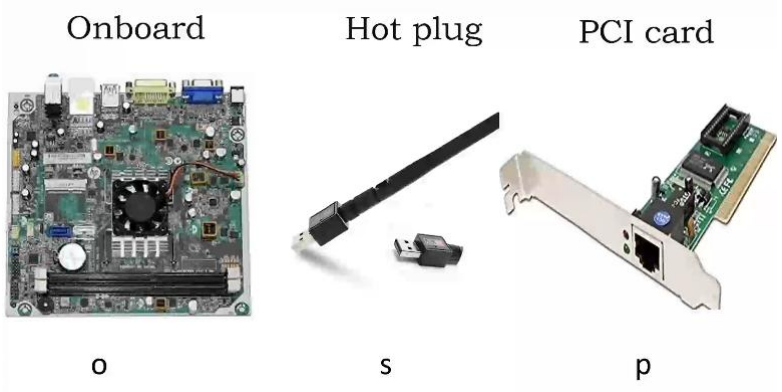
Managing Network Addresses and Interfaces

- As a Linux server administrator, you need to manage network addresses and network interfaces.

- Two ways to assign network addresses:
  - Fixed IP addresses (Static)
  - Dynamically assigned IP addresses (DHCP)

Managing Network Addresses and Interfaces

- In Ubuntu, the default names for network cards are based on firmware, device topology and device type (eno16777734)
- This leads to network card names consisting following parts:
  - Ethernet interface -> begins with en, WLAN interface à begins with wl, WWAN interface -> begins with ww
  - The next part of the name represents the type of adapter.
  - o->onboard, s->hotplug slot, p-> PCI location
  - Then follows a number, which represents index, ID, or port



Managing Network Addresses and Interfaces

- Other Network card names:
  - Network card can be also named based on the BIOS device name (biosdevname package must be installed).
    - em1 (embedded network card 1) or p4p1 (PCI slot 4, port 1) can be used.
  - Traditional names such as **eth0**

Managing Network Addresses and Interfaces

- Validating Network Address Configuration:
  - Use ip utility.
  - With this utility, many aspects of networking can be monitored:
    - Use ip addr -> To configure and monitor network address
    - Use ip route -> To configure and monitor routing information
    - Use ip link -> To configure and monitor network link state

Managing Network Addresses and Interfaces

- Validating Routing:
  - Every network has, at least, a default router (also called the default gateway)
  - Use **ip** utility to show default router
    - **Command:** *ip route show*

Managing Network Addresses and Interfaces

- Validating Routing:
  - Validating Routing
    - Output of ip route show:

jiwan@cst:~$ ip route show

default via 10.2.0.1 dev eth0 proto static
10.2.0.0/24 dev eth0 proto kernel scope link src 10.2.0.21

Managing Network Addresses and Interfaces

- Adding IP address:
  - **Command**
    # ip addr add <IP Address> dev <yourdevicename>
  - **Example**
    #ip addr add 10.20.1.10/24 dev eno16777736o
  - Verify ip address and routing information after adding IP.
  - Note:
    -> The **ifconfig** command will not display added information
    -> Temporary assignment of IP address

Managing Network Addresses and Interfaces

- Configuring Network with nmtui and nmcli:
  - Check the current state of network
    # ip l show
  - When NetworkManager comes up, it reads the network card configuration script, which is in:
    /etc/network/

Managing Network Addresses and Interfaces

- Configuring Network with nmtui and nmcli:
  - ip command is nonpersistent, to make your configuration persistence,use either **nmcli** or **nmtui**
  - When NetworkManager comes up, it reads the network card configuration script, which is in: **/etc/network/netplan**
  - To show connection properties use nmcli con show <deviceName>

Managing Network Addresses and Interfaces

- Configuring Network with nmcli :
  - To see the status of device:
  - **Command:**
    $nmcli dev status / nmcli con show / nmcli con show -a
  - When NetworkManager comes up, it reads the network card configuration script, which is in:
    /etc/network/

```
root@host01:/home/apnic# nmcli dev status
DEVICE  TYPE      STATE                   CONNECTION
ens32   ethernet  connected (externally)  ens32
lo      loopback  unmanaged               --
```

  - To show connection properties use nmcli con show <deviceName>

Managing Network Addresses and Interfaces

- To show the settings for a specified device:
  - **Command:**
    mcli dev show ens32:

When NetworkManager comes up, it reads the network card configuration script, which is in:
/etc/network/netplan

```
root@host01:/home/apnic# nmcli dev status
DEVICE  TYPE      STATE                   CONNECTION
ens32   ethernet  connected (externally)  ens32
lo      loopback  unmanaged               --
root@host01:/home/apnic# nmcli dev show ens32
GENERAL.DEVICE:                         ens32
GENERAL.TYPE:                           ethernet
GENERAL.HWADDR:                         00:0C:29:5C:B4:25
GENERAL.MTU:                            1500
GENERAL.STATE:                          100 (connected (externally))
GENERAL.CONNECTION:                     ens32
GENERAL.CON-PATH:                       /org/freedesktop/NetworkManager/ActiveConnection/13
WIRED-PROPERTIES.CARRIER:               on
IP4.ADDRESS[1]:                         10.2.1.1/24
IP4.GATEWAY:                            --
IP4.ROUTE[1]:                           dst = 10.2.1.0/24, nh = 0.0.0.0, mt = 0
IP6.GATEWAY:                            --
```

- To show connection properties use nmcli con show <deviceName>

Managing Network Addresses and Interfaces

- Create New connection and add IPv4 address:
  - **Command:**

nmcli connection add type ethernet ifname ens32 con-name my_eth_connection

#nmcli connection modify my_eth_connection ipv4.addresses "192.168.1.2/24" ipv4.gateway "192.168.1.1"

Managing Network Addresses and Interfaces

- Modify connection:
  - **Command:**

#nmcli con mod testing ipv4.dns “192.168.1.254, 8.8.8.8”

Managing Network Addresses and Interfaces

- Delete connection:
  - **Command:**

#nmcli con del testing

Managing Network Addresses and Interfaces

- Making network interface up and down:
  - **Command:**

#nmcli con down ens32

#nmcli con up ens32

#ip link set dev ens32 up

#ip link set dev ens32 down

Managing Network Addresses and Interfaces

- Configuring Network with nmtui:
- The nmcli has complicated syntax. Therefore, you can use nmtui for configuring network.
- The nmtui consist of 3 menu options:

1. Edit a Connection
2. Activate a Connection
3. Set System Hostname

- Usage of these three menus can be shown as demonstration

SUMMARY

- In this lesson, you have learnt that:

  - The network interface can be configured using tools such as ip, nmcli and nmtui tools
  - The ip utility to assign ip address is temporarily. It erases of when system reboot.
  - The nmtui and nmcli tools is used to persistently add ip address.