Assignment # 1
Info8490

Keyur Patel
8133001

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Part 1

The Organization ABC has been provided with address 172.18.40.0 /21 from the ISP. You will develop the IP address plan for the organization which needs to meet the following requirements:

- Human Resources department consists of 50 employees
- Accounting and Finance department consists of 70 employees
- IT department Consists of 30 employees
- Marketing and Sales department consists of 500 employees
- Production department consists of 100 employees
- Manufacturing department consists of 400 employees

Calculation:

- IP address: 172.18.40.0 /21.
- It is supporting the classless interdomain routing system.

Subnet Mask Calculation

- As Per CIDR /21 subnet mask is

11111111.11111111.11111000.00000000

255 . 255 . 248 . 0

(Explanation of Third Octet 128+64+32+16+8 = **248**)

- I have Separated the **network** and **host** portion from given IP address.
- In subnet mask, there are five bits are on in third octet.
- Then, I Converted third octet of my IP address, Decimal to binary.
- Took **Five** bit as network Represent.

Just for Check

- Decimal to Binary (40 = 00101000)

172 . 18 . 40 . 0

172 . 18 . 00101000 . 0

- So, Subnet mask is **255.255.248.0**
- **172.18.40.0 /21** is my IP address as per Given.

As Per Host Calculation

1. **Marketing and Sales department consists of 500 employees**

   IP address   : 172.18.40.0 /21
   Subnet Mask   : 255.255.248.0

   Host = 500

   Host $>=$ $2^n - 2$
   500    $>=$ $2^n - 2$
   $2^n - 2$ $>=$ 500
   2^n $>=$ 500+2
   2^n $>=$ 502
           N = **9**

   New Subnet mask as per host requirements

   11111111.11111111.11111110.00000000

   255 . 255 . 254 . 0

- Total 512 Hosts Allocated.
- Total 23 bits are present so current CIDR is 23.

   S.R = 172.18.40.0 /23
   E.R = 172.18.41.255 /23

Subnet Range   = 172.18.40.0 /23   to   172.18.41.255 /23
Network Address   = 172.18.40.0 /23
Broadcast Address   = 172.18.41.255 /23
Host Range   = 172.18.40.1 /23   to   172.18.41.254 /23

2. Manufacturing department consists of 400 employees

Given IP Address   : 172.18.42.0 /21
Subnet mask   : 255.255.248.0

Host = 400

Host   >= 2^n - 2
400   >= 2^n – 2
2^n – 2 >=   400
2^n >=   400+2
2^n >=   402

(512 >= 402)

  N = **9**

New Subnet mask as per host requirements

11111111.11111111.11111110.00000000

255 .   255 .   254   .   0

- Total 512 Hosts Allocated.
- Total 23 bits are Present So CIDR is /23.

S.R = 172.18.42.0 /23
E.R = 172.18.43.255 /23

Subnet Range   = 172.18.42.0 /23   to   172.18.43.255 /23
Network Address   = 172.18.42.0 /23

Broadcast Address   =172.18.43.255 /23
Host Range   =172.18.42.1 /23   to   172.18.43.254 /23

3. Production department consists of 100 employees

IP Address = 172.18.44.0 /21
Subnet Mask = 255.255.248.0

Host = 100

$$\text{Host} >= 2^n - 2$$
$$100 >= 2^n - 2$$
$$2^n >= 100 + 2$$
$$2^n >= 102$$
$$N = \mathbf{7}$$

$$2^7 = 128$$
$$(128 >= 102)$$

New Subnet Mask as Per Host Requirements

11111111.11111111.11111111.10000000

255 . 255 . 255 . 128

- Total 128 Hosts Allocated.
- Total 25 bits are Present So, CIDR is /25.

S.R = 172.18.44.0 /25

E.R = 172.18.44.127 /25

Subnet Range   = 172.18.44.0 /25 to 172.18.44.127 /25
Network Address   = 172.18.44.0 /25
Broadcast Address   =172.18.44.127 /25
Host Range   =172.18.44.1 /25 to 172.18.44.126 /25

4. Accounting and Finance department consists of 70 employees

IP address   : 172.18.44.128 /21
Subnet Mask   : 255.255.248.0

Host = 70

$$Host >= 2^n - 2$$
$$70 >= 2^n - 2$$
$$2^n - 2 >= 70$$
$$2^n >= 70+2$$
$$2^n >= 72$$
$$N = 7$$

$(2^7 = 128)$
$(128 >= 72)$

New Subnet mask as per host requirements

11111111.11111111.11111111.10000000

255 . 255 . 255 . 128

- Total 128 hosts Allocated.
- Total 23 bits are present so current CIDR is /25.

S.R = 172.18.44.128 /25
E.R = 172.18.44.255 /25

Subnet Range   = 172.18.44.128 /25   to   172.18.44.255 /25
Network Address   = 172.18.44.128 /25
Broadcast Address = 172.18.44.255 /25
Host Range   = 172.18.44.129 /25   to   172.18.44.254 /25

5 Human Resources department consists of 50 employees

IP address   : 172.18.45.0 /21
Subnet Mask   : 255.255.248.0

Host = 50

Host $>=$ $2^n - 2$
50 $>=$ $2^n - 2$
$2^n - 2$ $>=$ 50
2^n $>=$ 50+2
2^n $>=$ 52
N = **6**
($2^6 = 64$)

(64 $>=$ 52)

New Subnet mask as per host requirements

11111111.11111111.11111111.11000000

255 . 255 . 255 . 192

- Total 64 hosts Allocated.
- Total 26 bits are present so current CIDR is /26.

S.R = 172.18.45.0 /26
E.R = 172.18.45.63 /26

Subnet Range = 172.18.45.0 /26 to 172.18.45.63 /26
Network Address = 172.18.45.0 /26
Broadcast Address = 172.18.45.63 /26
Host Range = 172.18.45.1 /26 to 172.18.45.62 /26

6 IT department Consists of 30 employees

IP address : 172.18.45.64 /21
Subnet Mask : 255.255.248.0
Host = 30

Host $>=$ $2^n - 2$
30 $>=$ $2^n - 2$
$2^n - 2$ $>=$ 30
2^n $>=$ 30+2
2^n $>=$ 32

N = **5**

$(2^5 = 32)$
$(32 >= 32)$

New Subnet mask as per host requirements

11111111.11111111.11111111.11100000

255 . 255 . 255 . 224

- Total 32 hosts Allocated.
- Total 26 bits are present so current CIDR is /27.

S.R = 172.18.45.64 /27
E.R = 172.18.45.95 /27

Subnet Range   = 172.18.45.64 /27 to 172.18.45.95 /27
Network Address   = 172.18.45.64 /27
Broadcast Address   = 172.18.45.95 /27
Host Range   = 172.18.45.65 /27   to 172.18.45.95 /27

Part #2 (Assignment = 1)

Question:

You will be configuring all cisco device using basic commands. The desktop system should be able to connect with each other. Also, the desktop systems must be able to remotely Connect the default gateway. Finally, you will be configuring the basic authentication on all the cisco devices.

Answer: -

Topology

- In this case, I used two switches in order to connect for desktop system. I also used One Router to Connect them together. each switch is connected with two desktop systems.
- KP_Rouge_Router is connected with two switches respectively KP_Rouge1 switch and KP_Rouge2 Switch.
- KP_Rouge1 switch is connected with the router's Gigabit Ethernet port 0/0 and it is in the network 192.168.10.0 /24 and KP_Rouge2 Switch is connected with the router's Gigabit Ethernet port 0/1 and it is in the network 172.16.30.0 /24.

Requirements

- For making this kind of topology I used 1 Router, 2 Switches and 4 Desktop Systems.
- I also used Straight through cable for physical connection of devices.
- We use telnet command for this assignment. So, we can also use console cable for configuration of switch and router from one PC. This Configuration is done only once.
- Require Two Network Addresses for connect four systems into one router.

Configurations

- For making this Design in Packet tracer I used some Command which I will describe in this assignment.
- First and foremost, I used Command "**Hostname**" for unique identification of each and every device.
- Here is the example of switch

  Switch > **enable** (Technically Switch ON)
  Switch # **config t** (Configuration in terminal)
  Switch (Config)# **hostname** KP_Rouge1

- Then I have done Some System Configuration in 4 physical devices. (Desktop)
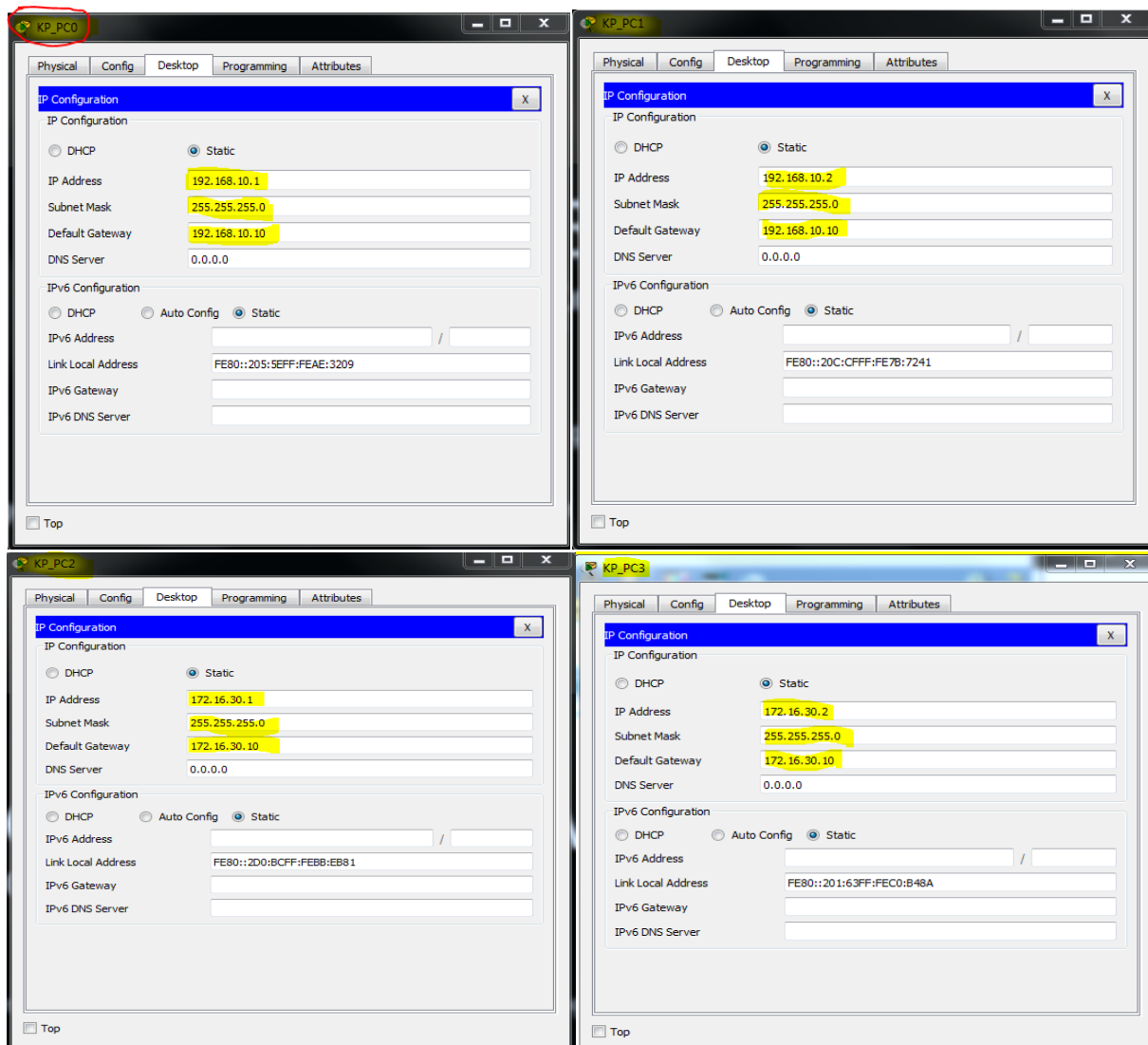
- **To Protect user mode**

KP_Rouge_router(config)#**line** console 0
KP_Rouge_router(config-line) #**password** <mark>keyur</mark>
KP_Rouge_router(config-line) #**login**

- **To Protect Privilege mode**

KP_Rouge_router(config)# **enable password** <mark>enable</mark> (Here, enable is Password)

- For Connecting with the router, we need IP address for each port.

  Commands:

  (switch is connected to router)

  For Switch # 1

  - **interface** GigabitEthernet0/0
  - **ip address 192.168.10.10 255.255.255.0**
  - **no Shutdown**

  For Switch # 2

  - **interface** GigabitEthernet0/1
  - **ip address 172.16.30.10 255.255.255.0**
  - **no shutdown**

- Another command is telnet. It is used to **remotely access of router** after configuration.

  In router **Configuration** Mode **Commands**

  - **line vty 0 4**
  - **password telnet**
  - **login**

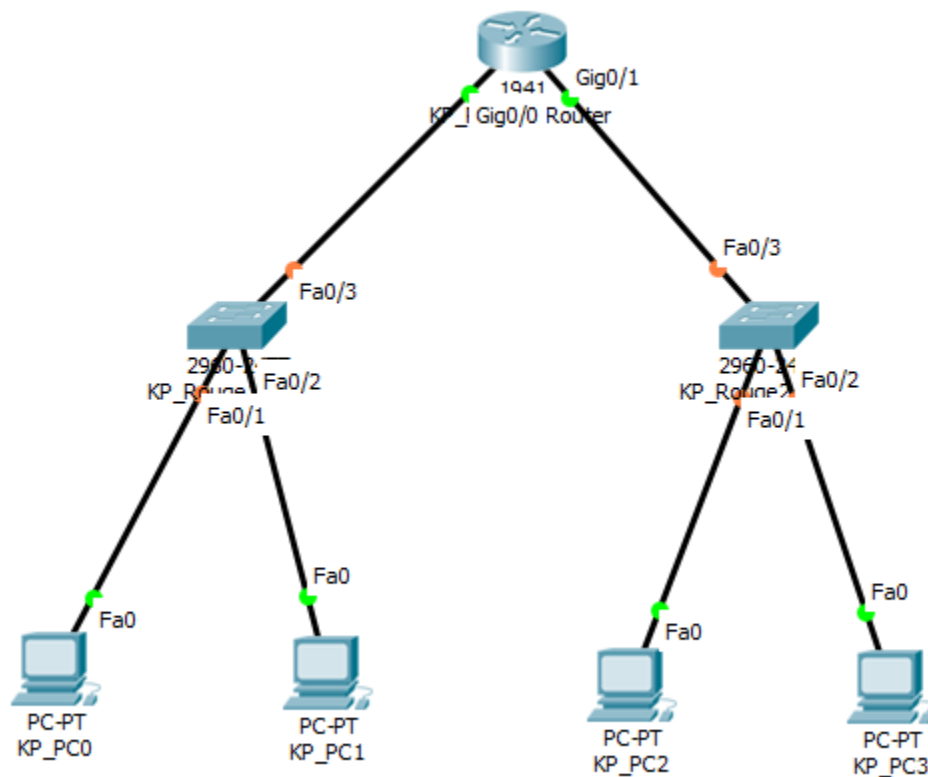- You can access wireless connectivity using this command in command prompt

- **telnet 192.168.10.10 (Remotely Access)**

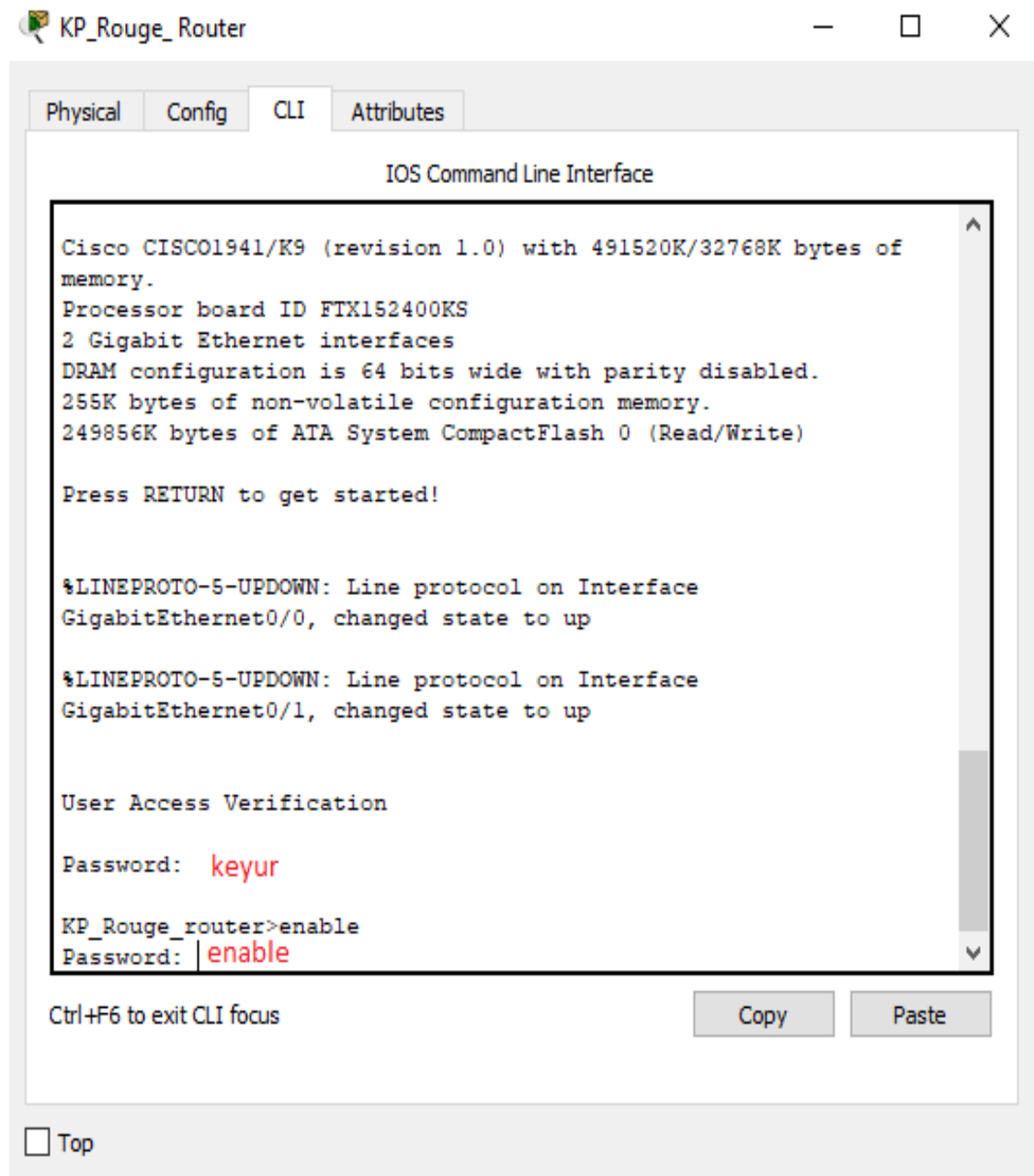Then System will ask for **password**

- Password: **telnet**

Screenshot

- **<u>Packet Tracer</u>**

- **Security**

KP_Rouge_ Router — ☐ ✕

Physical   Config   CLI   Attributes

IOS Command Line Interface

```
Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of
memory.
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!


%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/1, changed state to up


User Access Verification

Password:   keyur

KP_Rouge_router>enable
Password: |enable
```

Ctrl+F6 to exit CLI focus   Copy   Paste

☐ Top

- **Remotely Access using telnet**