DHCP for multiple Vlans

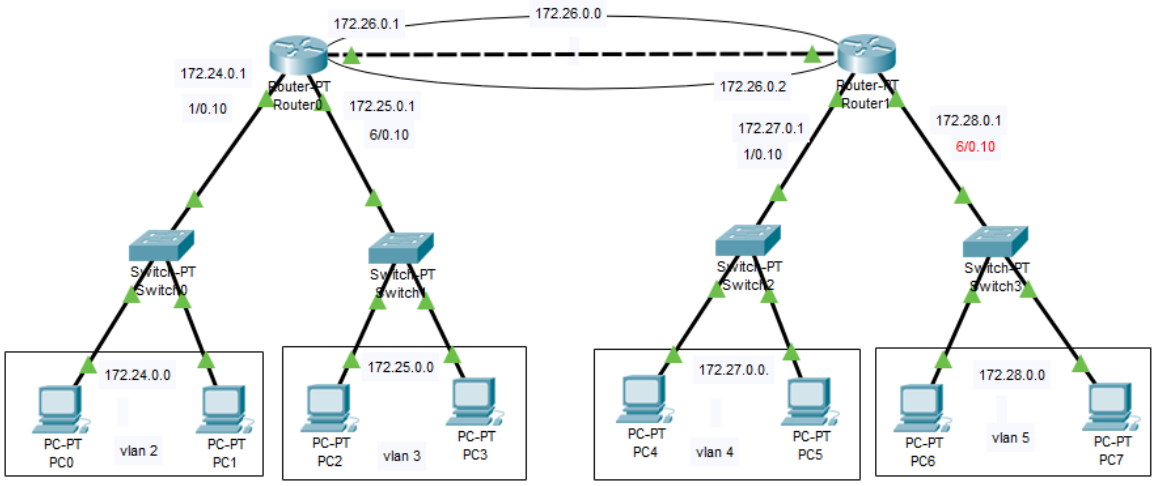
(Ip Address allocation using a DHCP server)

Kinshuk Jagdev

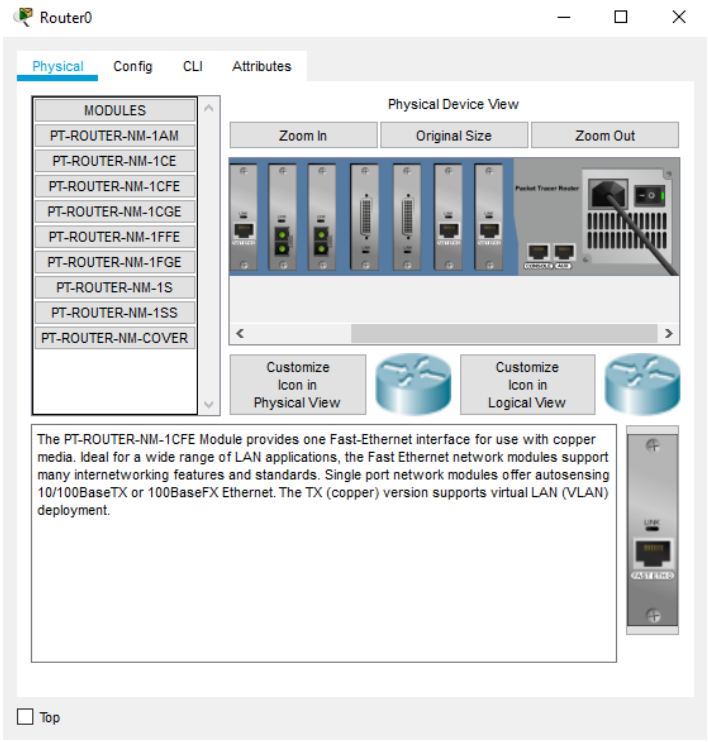
Steps

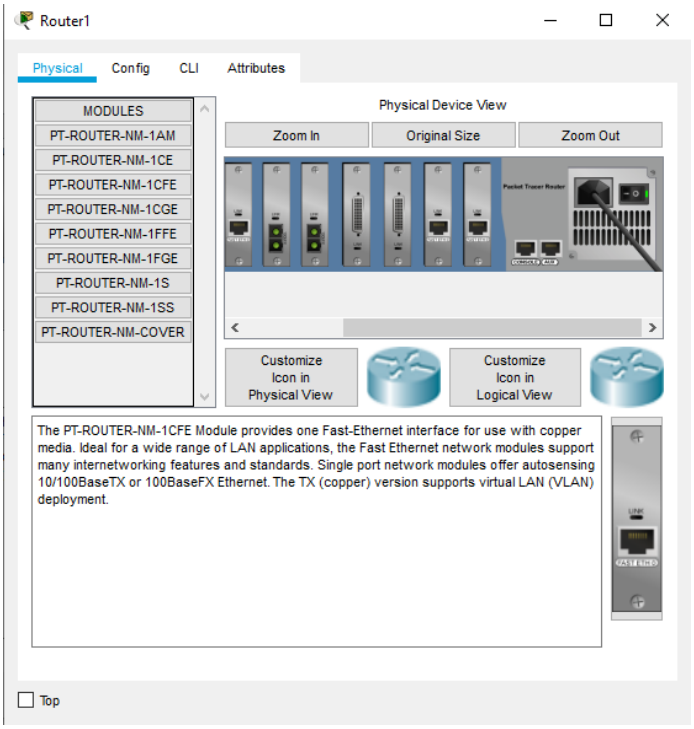
- Open a new file in Cisco Packet Tracer..
- Connect the devices as shown in figure.

- Building Topology:

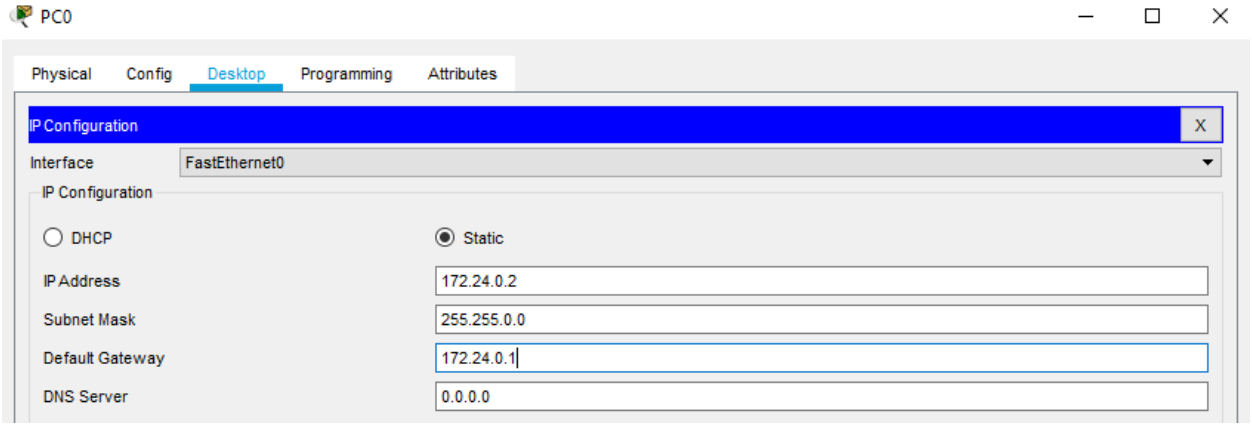


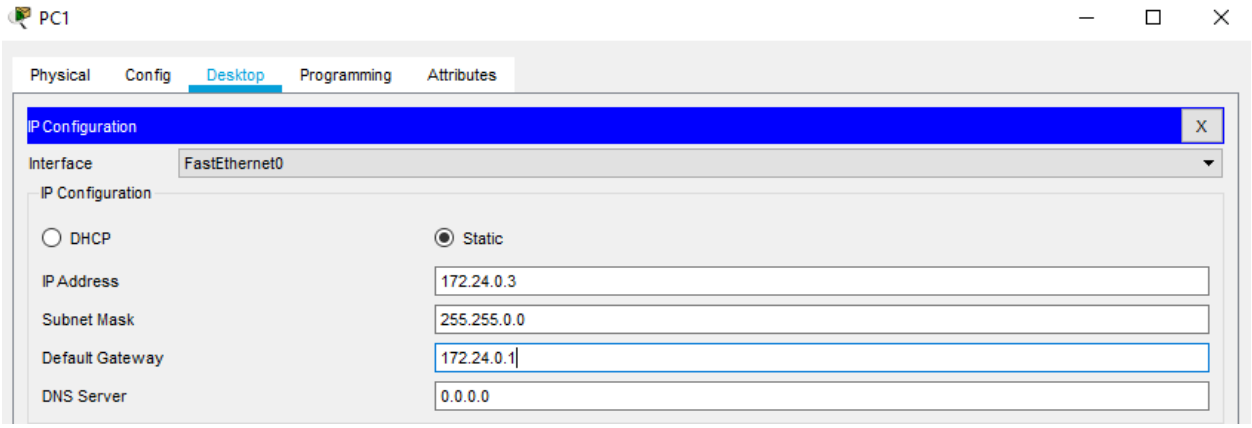
- Adding Additional F/A Ports for Routers:

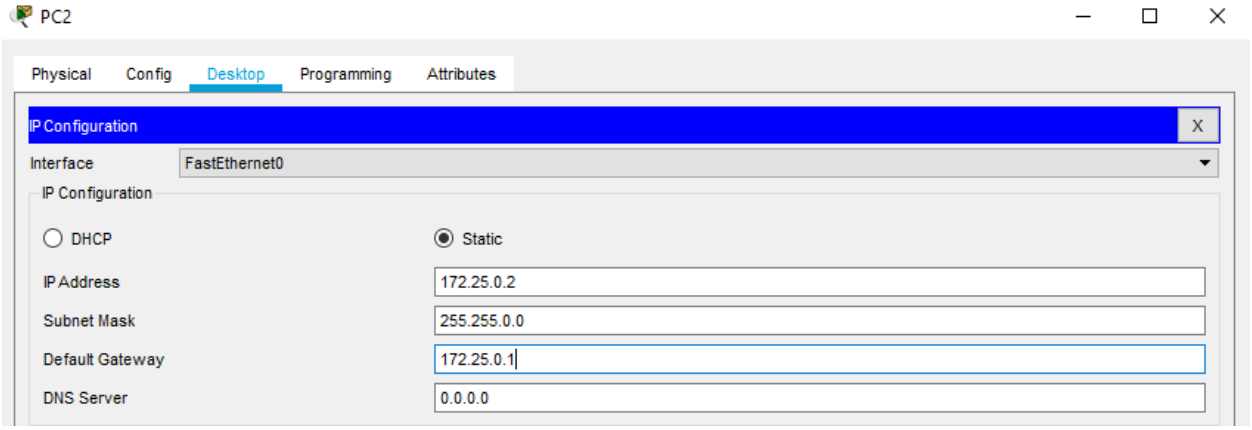


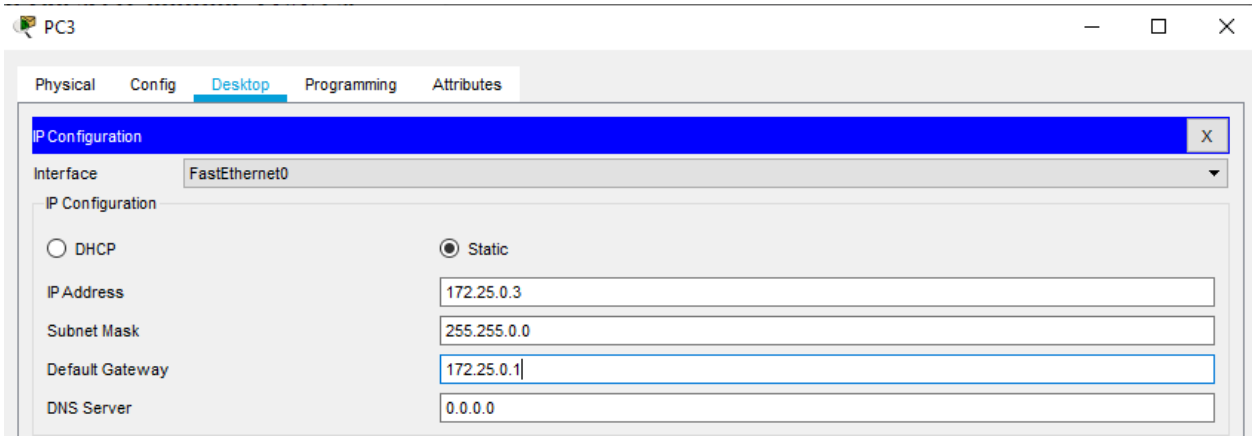


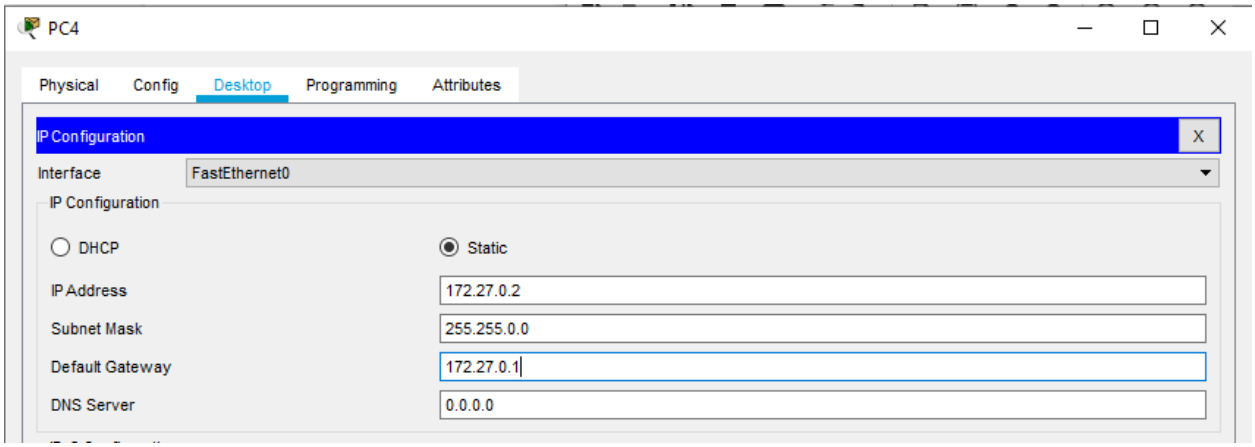
- Configuring PCs(Setting Temporary Addresses, will be changed after DHCP)

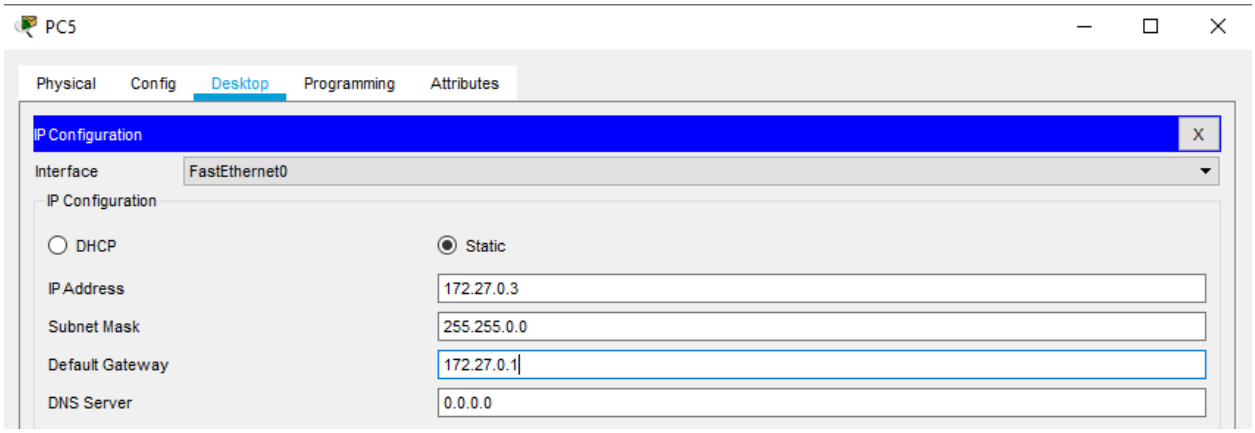


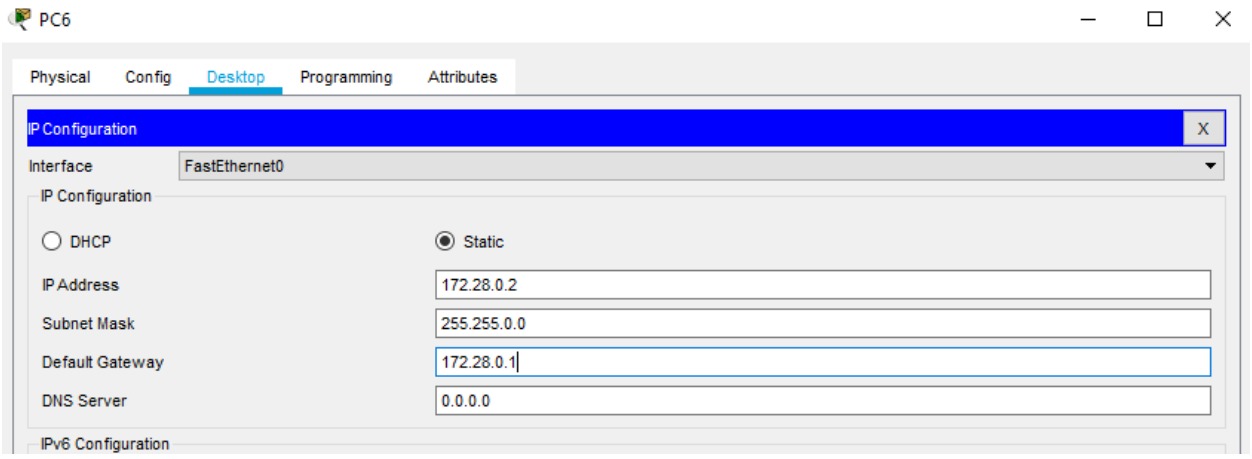


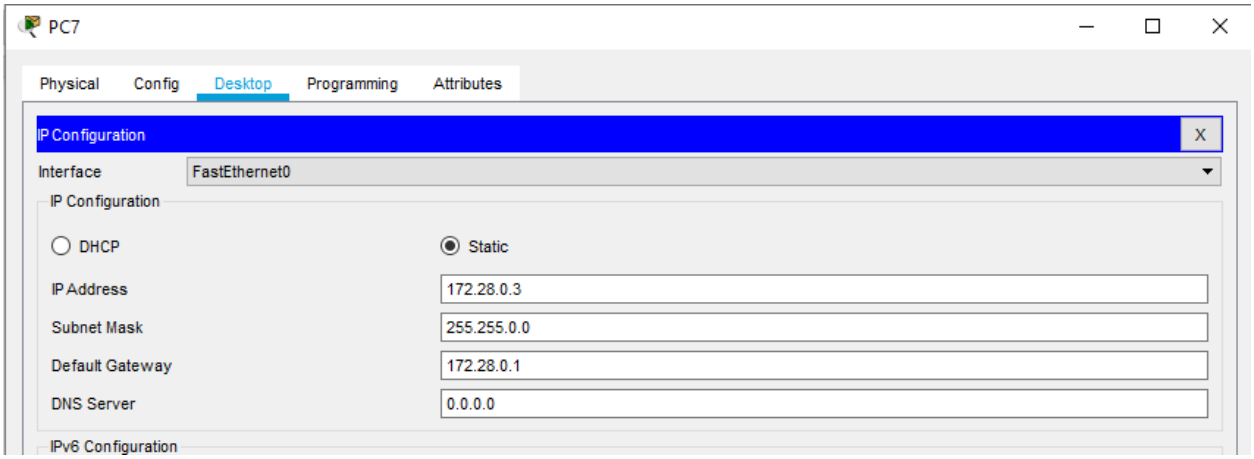



PC3
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IP Address
172.25.0.3
Subnet Mask
255.255.0.0
Default Gateway
172.25.0.1
DNS Server
0.0.0.0


PC4
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IP Address
172.27.0.2
Subnet Mask
255.255.0.0
Default Gateway
172.27.0.1
DNS Server
0.0.0.0


PC5
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IP Address
172.27.0.3
Subnet Mask
255.255.0.0
Default Gateway
172.27.0.1
DNS Server
0.0.0.0





- Router interconnection:

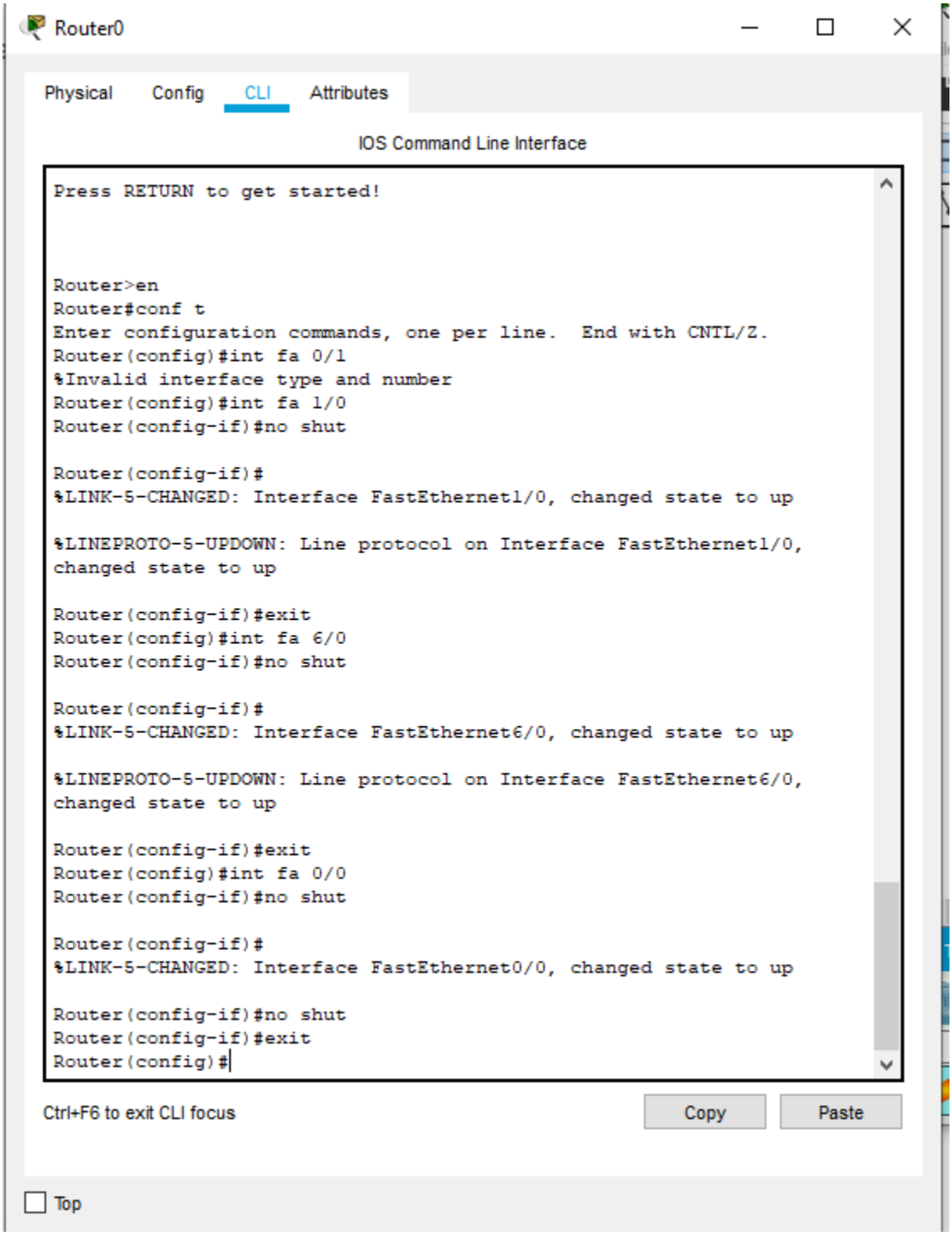
  (Router-0)

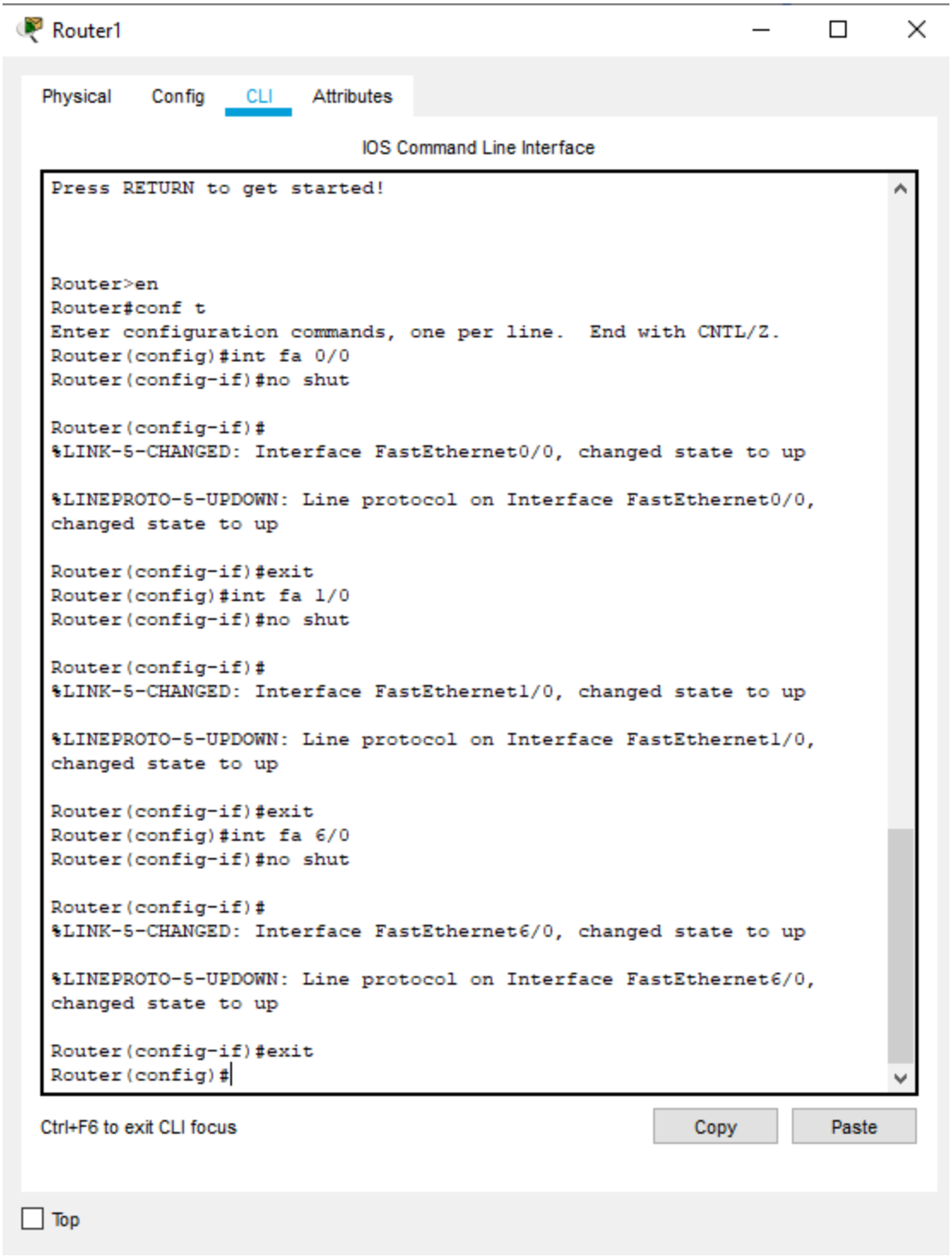
```
Router(config)#int fa 0/0
Router(config-if)#ip add
Router(config-if)#ip address 172.26.0.1 255.255.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up

Router(config-if)#exit
Router(config)#
```

(Router-1)

```
Router(config)#int fa 0/0
Router(config-if)#ip address 172.26.0.2 255.255.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up

Router(config-if)#exit
Router(config)#
```

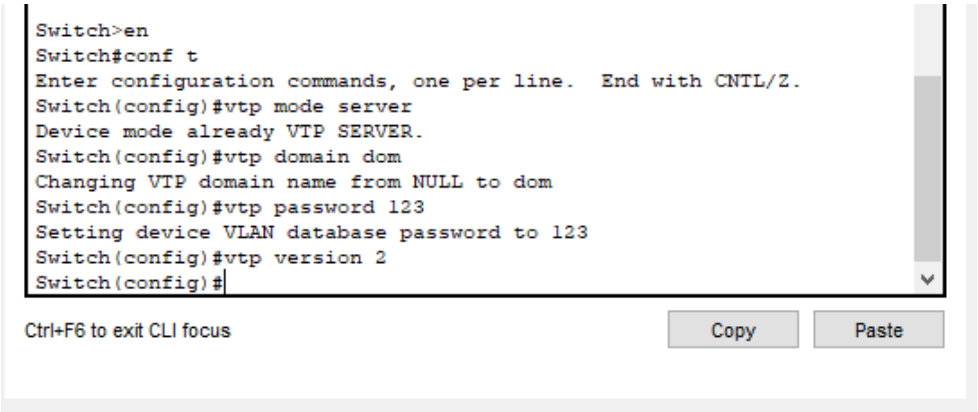
- Setting up ports for routers:



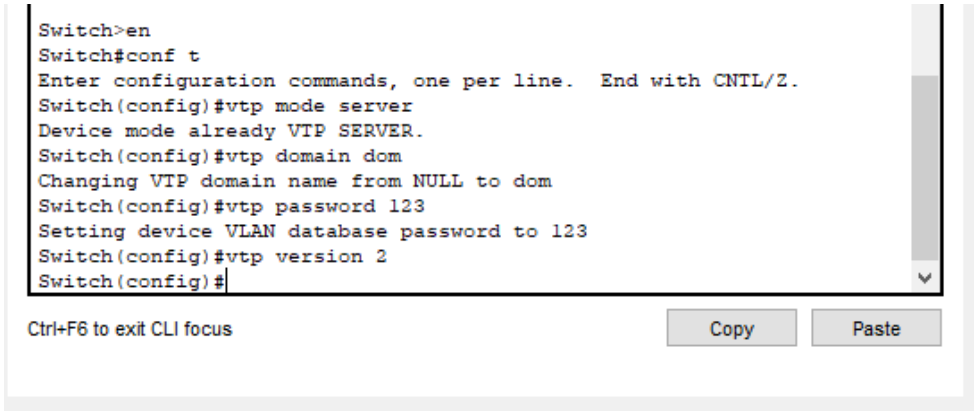

Router1
Physical
Config
CLI
Attributes
IOS Command Line Interface
Press RETURN to get started!
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa 0/0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up
Router(config-if)#exit
Router(config)#int fa 1/0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0,
changed state to up
Router(config-if)#exit
Router(config)#int fa 6/0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet6/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet6/0,
changed state to up
Router(config-if)#exit
Router(config)#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

- Setting VTP modes on switches:

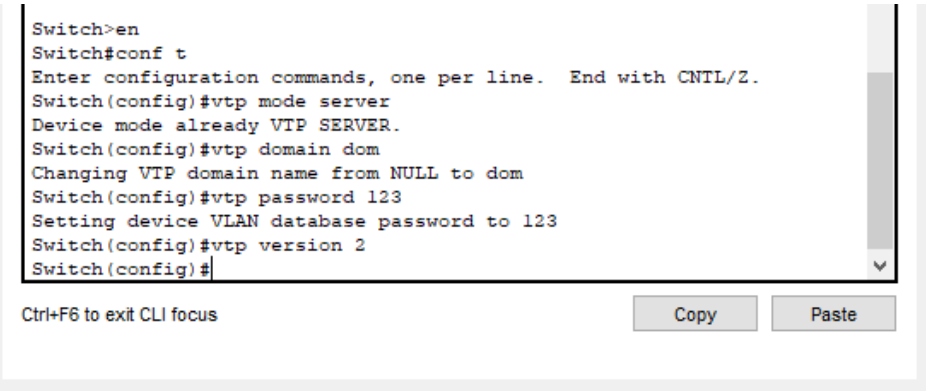
(Switch-0)



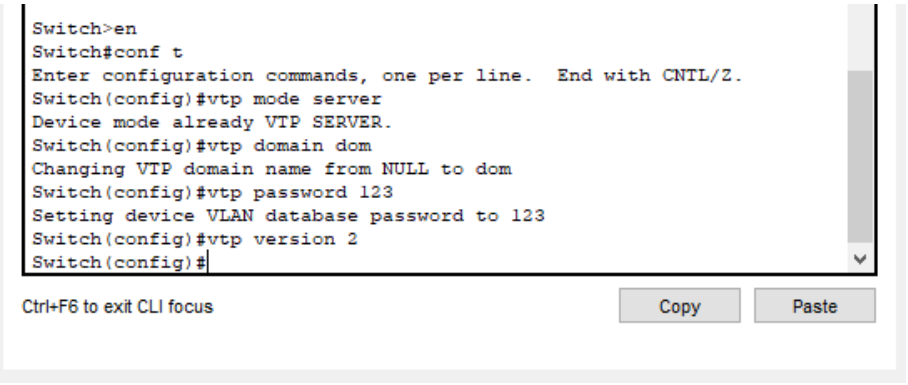
(Switch-1)



(Switch-2)

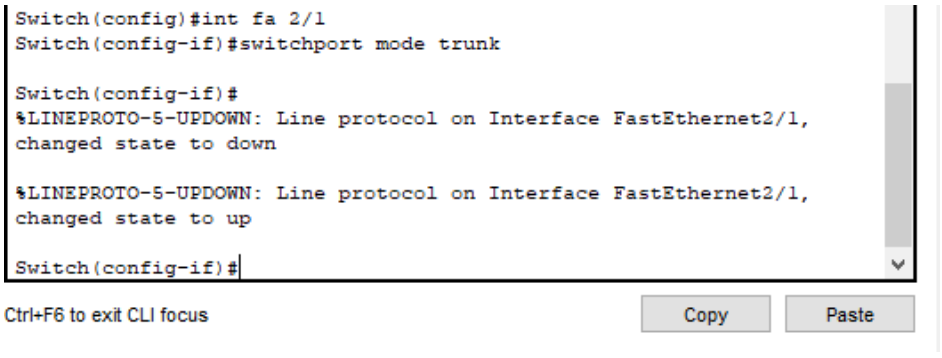


(Switch-3)



- Using trunk modes on Switches:

(Switch-0)



(Switch-1)

```
Switch(config)#int fa 2/1
Switch(config-if)#switchport mode trunk

Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet2/1,
changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet2/1,
changed state to up

Switch(config-if)#
```

Ctrl+F6 to exit CLI focus Copy Paste

(Switch-2)

```
Switch(config)#int fa 2/1
Switch(config-if)#switchport mode trunk

Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet2/1,
changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet2/1,
changed state to up

Switch(config-if)#
```

Ctrl+F6 to exit CLI focus Copy Paste

(Switch-3)

```
Switch(config)#int fa 2/1
Switch(config-if)#switchport mode trunk

Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet2/1,
changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet2/1,
changed state to up

Switch(config-if)#
```

Ctrl+F6 to exit CLI focus Copy Paste

- Creating Vlans:

(Switch-0)

```
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 2
Switch(config-vlan)#name v2
Switch(config-vlan)#exit
Switch(config)#
```

(Switch-1)

```
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 3
Switch(config-vlan)#name v3
Switch(config-vlan)#exit
Switch(config)#
```

(Switch-2)

```
Switch(config-vlan)#exit
Switch(config)#vlan 4
Switch(config-vlan)#name v4
Switch(config-vlan)#exit
Switch(config)#
```

Ctrl+F6 to exit CLI focus Copy Paste

(Switch-3)

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 5
Switch(config-vlan)#name v5
Switch(config-vlan)#exit
Switch(config)#
```

- Setting up Vlans in networks:

(Switch-0)

```
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 2
Switch(config-vlan)#name v2
Switch(config-vlan)#exit
Switch(config)#int fa 0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 2
Switch(config-if)#exit
Switch(config)#int fa 1/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 2
Switch(config-if)#exit
Switch(config)#
```

(Switch-1)

```
Switch(config)#int fa 0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 3
Switch(config-if)#exit
Switch(config)#int fa 1/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 3
Switch(config-if)#exit
Switch(config)#
```

(Switch-2)

```
Switch(config-vlan)#exit
Switch(config)#vlan 4
Switch(config-vlan)#name v4
Switch(config-vlan)#exit
Switch(config)#int fa 0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 4
Switch(config-if)#exit
Switch(config)#int fa 1/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 4
Switch(config-if)#exit
Switch(config)#
```

(Switch-3)

```
Switch(config)#int fa 0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 5
Switch(config-if)#exit
Switch(config)#int fa 1/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 5
Switch(config-if)#exit
Switch(config)#
```

- Creating dynamic routes for routers:

(Router-0)

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 172.26.0.0
Router(config-router)#network 172.27.0.0
Router(config-router)#network 172.28.0.0
Router(config-router)#
```

(Router-1)

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 172.26.0.0
Router(config-router)#network 172.27.0.0
Router(config-router)#network 172.28.0.0
Router(config-router)#
```

- Adding Logical Addresses to routers:

(Router-1)

```
Router(config)#int fa 1/0.10
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet1/0.10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0.10,
changed state to up

Router(config-subif)#encap
Router(config-subif)#encapsulation dot1q 2
Router(config-subif)#ip address 172.24.0.1 255.255.0.0
Router(config-subif)#no shut
Router(config-subif)#exit
Router(config)#int fa 6/0.10
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet6/0.10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet6/0.10,
changed state to up

Router(config-subif)#encap
Router(config-subif)#encapsulation dot1q 3
Router(config-subif)#ip address 172.25.0.1 255.255.0.0
Router(config-subif)#no shut
Router(config-subif)#exit
Router(config)#
```

(Router-2)

```
Router(config)#int fa 1/0.10
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet1/0.10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0.10,
changed state to up

Router(config-subif)#encap
Router(config-subif)#encapsulation dot1q 4
Router(config-subif)#ip address 172.27.0.1 255.255.0.0
Router(config-subif)#no shut
Router(config-subif)#exit
Router(config)#int fa 6/0.10
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet6/0.10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet6/0.10,
changed state to up

Router(config-subif)#encap
Router(config-subif)#encapsulation dot1q 5
Router(config-subif)#ip address 172.28.0.1 255.255.0.0
Router(config-subif)#no shut
Router(config-subif)#exit
Router(config)#
```

DHCP Implementation, Router 0 will be kept as main Server for all Vlans

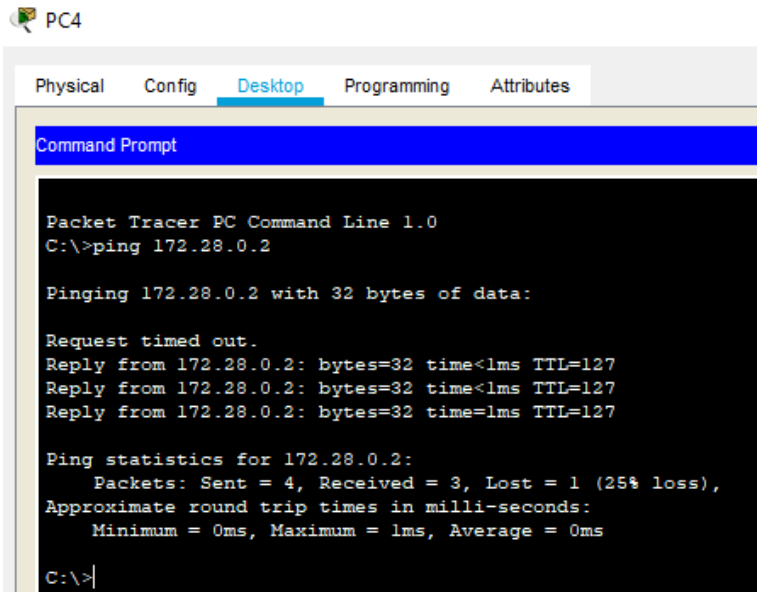
- Setting Router-0 as Helper Ip Address in Router-1:

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa 1/0
Router(config-if)#ip helper
Router(config-if)#ip helper-address 172.26.0.1
Router(config-if)#exit
Router(config)#int fa 6/0
Router(config-if)#ip helper
Router(config-if)#ip helper-address 172.26.0.1
Router(config-if)#exit
Router(config)#
```

- Adding Dhcp Pools in Router-0:

```
Router(config)#ip dhcp pool p1
Router(dhcp-config)#network 172.24.0.0 255.255.0.0
Router(dhcp-config)#defa
Router(dhcp-config)#default-router 172.24.0.1
Router(dhcp-config)#exit
Router(config)#ip dhcp pool p2
Router(dhcp-config)#network 172.25.0.0
% Incomplete command.
Router(dhcp-config)#network 172.25.0.0 255.255.0.0
Router(dhcp-config)#defa
Router(dhcp-config)#default-router 172.25.0.1
Router(dhcp-config)#exit
Router(config)#ip dhcp pool p3
Router(dhcp-config)#network 172.27.0.0 255.255.0.0
Router(dhcp-config)#defa
Router(dhcp-config)#default-router 172.27.0.1
Router(dhcp-config)#exit
Router(config)#ip dhcp pool p4
Router(dhcp-config)#network 172.28.0.0 255.255.0.0
Router(dhcp-config)#defa
Router(dhcp-config)#default-router 172.28.0.1
Router(dhcp-config)#exit
Router(config)#
```

- When a new communication is made between end devices, the first packet would get lost, but then further packets would reach successfully. It was observed that the 1st packet would always get lost in the transmission, but if connection is okay, the rest of the packets will always be delivered perfectly. In all ping attempts, packet loss was 25%.



- If DHCP fails in providing an address to the end device, APIPA would provide the IP address.