Name: Raj Koyani
Reg no: 21MIS1017
(LAB:5)

(a) Design a Client-Server LAN with Mesh Topology using Cisco Packet Tracer and check the PDU transmission between the nodes.

Steps:

Step 1: Launch Cisco Packet Tracer and create a new network topology.

Step 2: Drag and drop the devices onto the workspace. For a Client-Server LAN with a Mesh Topology, you will need multiple PCs (clients) and servers connected to each other.

Step 3: Connect the devices using appropriate cables. In a Mesh Topology, each device should have a direct connection to every other device.

Step 4: Double-click on each device to open the configuration dialog box. Assign IP addresses and subnet masks to each device in the network. Ensure that each device has a unique IP address within the same subnet.

Step 5: Configure the default gateway for each device. The default gateway IP address should be the IP address of the router or switch interface that connects to the same subnet as the devices.

Step 6: Save the configurations of all devices in the network.

Step 7: Test PDU transmission between the nodes. Open a command prompt on any PC and use the ping command to send a test ICMP packet to the IP address of another device in the network. For example, if PC1 wants to ping PC2, open the command prompt on PC1 and enter the following command:

ping <PC2_IP_Address>

Step 8: Repeat Step 7 for different combinations of devices to test PDU transmission between various nodes in the network.

Output:
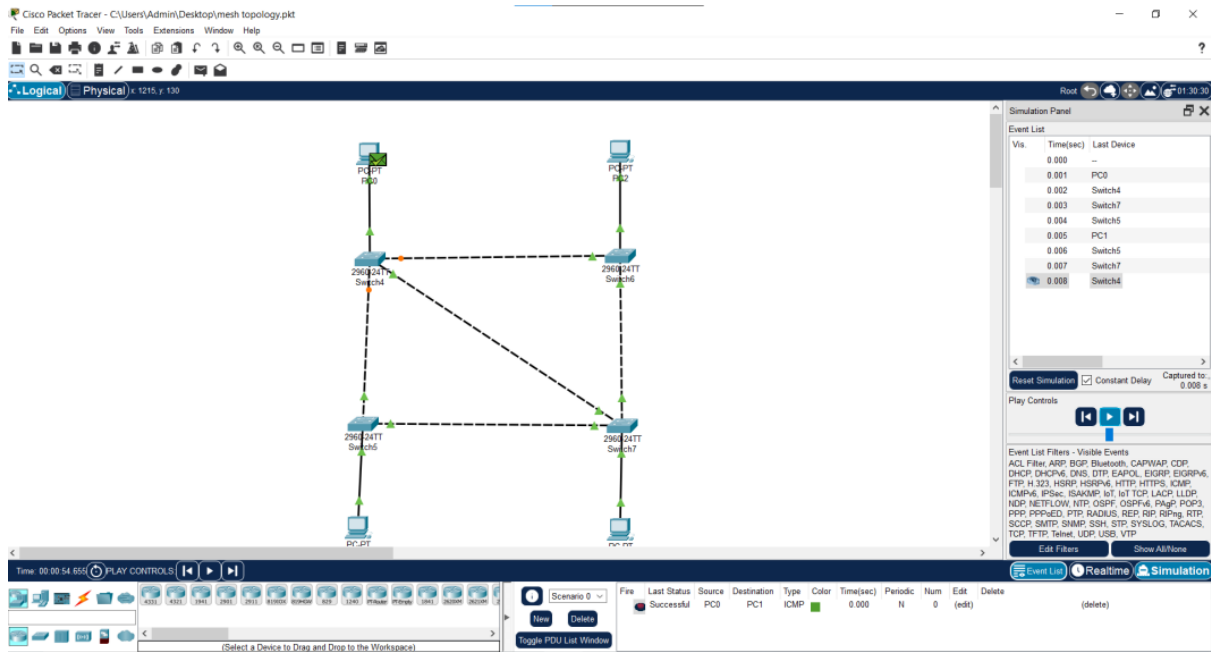
PC0:

IP Configuration	
Interface	FastEthernet0

IP Configuration

◯ DHCP	🔘 Static
IPv4 Address	192.168.0.1
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DNS Server	0.0.0.0

IP v6 Configuration

◯ Automatic	🔘 Static
IPv6 Address	
Link Local Address	FE80::290:CFF:FE11:B216
Default Gateway	
DNS Server	

PC1:

IP Configuration

Interface	FastEthernet0

IP Configuration

◯ DHCP	🔵 Static
IPv4 Address	192.168.0.2
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DNS Server	0.0.0.0

IPv6 Configuration

◯ Automatic	🔵 Static
IPv6 Address	
Link Local Address	FE80::2D0:D3FF:FE79:B3E1
Default Gateway	
DNS Server	

PC2:

Physical   Config   Desktop   Pro

IP Configuration

Interface	FastEthernet0

IP Configuration

◯ DHCP	🔵 Static
IPv4 Address	192.168.0.3
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DNS Server	0.0.0.0

IPv6 Configuration

◯ Automatic	🔵 Static
IPv6 Address	
Link Local Address	FE80::206:2AFF:FE65:AC25
Default Gateway	
DNS Server	

PC3:

IP Configuration

Interface: FastEthernet0

IP Configuration

- ( ) DHCP   (●) Static

IPv4 Address	192.168.0.4
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DNS Server	0.0.0.0

IPv6 Configuration

- ( ) Automatic   (●) Static

IPv6 Address	
Link Local Address	FE80::20A:41FF:FEAE:ACA8
Default Gateway	
DNS Server	

```
C:\>ipconfig 192.168.0.1 255.255.255.0
C:\>ping 192.168.0.3

Pinging 192.168.0.3 with 32 bytes of data:

Reply from 192.168.0.3: bytes=32 time=16ms TTL=128
Reply from 192.168.0.3: bytes=32 time=8ms TTL=128
Reply from 192.168.0.3: bytes=32 time=8ms TTL=128
Reply from 192.168.0.3: bytes=32 time=8ms TTL=128

Ping statistics for 192.168.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 16ms, Average = 10ms
```

PC2

| Physical | Config | Desktop | Programmi |

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.1

Pinging 192.168.0.1 with 32 bytes of data:

Reply from 192.168.0.1: bytes=32 time<1ms TTL=128
Reply from 192.168.0.1: bytes=32 time=1ms TTL=128
Reply from 192.168.0.1: bytes=32 time<1ms TTL=128
Reply from 192.168.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

(b) Configure ARP using CPT

Steps:

Step 1: Launch Cisco Packet Tracer and create a new network topology.

Step 2: Drag and drop the desired devices onto the workspace, such as routers and PCs, and connect them using appropriate cables.

Step 3: Double-click on a PC to open the configuration dialog box. Assign IP addresses and subnet masks to each PC in the network. For example, you can assign IP address 192.168.1.1 to PC1 and 192.168.1.2 to PC2.

Step 4: Configure the default gateway for each PC. The default gateway IP address should be the IP address of the router interface that connects to the same subnet as the PCs. For example, if PC1 is connected to Router1 on interface GigabitEthernet0/0, and the IP address of that interface is 192.168.1.254, then set the default gateway of PC1 as 192.168.1.254.

Step 5: Configure the router interfaces. Double-click on a router to open the configuration dialog box. Assign IP addresses and subnet masks to the router interfaces connected to the PC subnet and any other subnets in the network.

Step 6: Enable ARP on each router interface. In the router configuration dialog box, go to the interface connected to the PC subnet and enter the following command:

arp -a

This command enables ARP on the interface.

Step 7: Save the configurations of all devices in the network.

Step 8: Test ARP functionality. Open a command prompt on each PC and use the arp -a command to view the ARP cache. It should display the MAC addresses and corresponding IP addresses of the devices in the network.

Output:

PC0:

PC1:

PC3:

(c) Design a network with OSPF using CPT

Steps:

Step 1: Launch Cisco Packet Tracer and create a new network topology.

Step 2: Drag and drop the devices onto the workspace, such as routers and switches, and connect them using appropriate cables.

Step 3: Double-click on each device to open the configuration dialog box. Assign IP addresses and subnet masks to each device in the network. Ensure that each device has a unique IP address within the same subnet.

Step 4: Configure OSPF on the routers. In each router configuration dialog box, follow these steps:

a. Enable OSPF routing protocol using the following command:

router ospf <process_ID>

b. Configure OSPF areas using the following command:

network <network_address> <wildcard_mask> area <area_ID>

Replace <network_address> with the network address of the connected interface, <wildcard_mask> with the inverse of the subnet mask, and <area_ID> with the desired OSPF area ID.

c. Optionally, configure OSPF authentication, metrics, or other OSPF parameters as needed.

Step 5: Save the configurations of all devices in the network.

Step 6: Test OSPF routing. Open a command prompt on any device and use the show ip route command to display the routing table. Verify that OSPF has successfully learned and propagated the routes in the network.

Step 7: Repeat Step 6 for different devices to ensure OSPF routing is functioning correctly across the network.
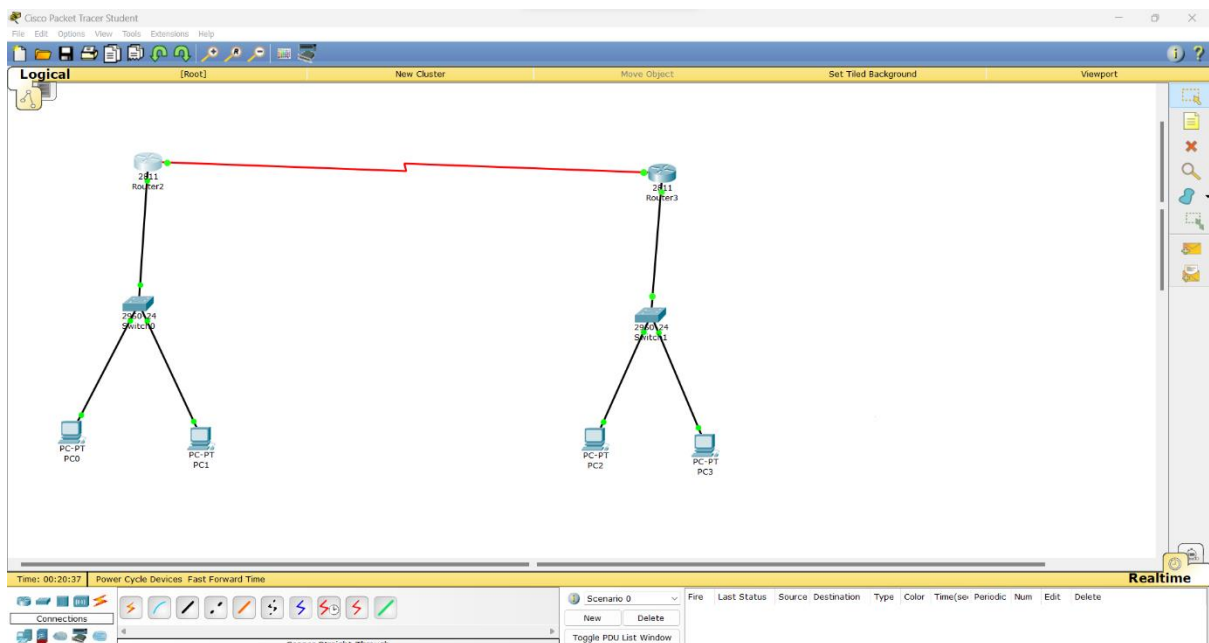
PC0:

IP Configuration   X

Interface   FastEthernet0   ⬍

IP Configuration

    ◯ DHCP   🔘 Static

    IPv4 Address   192.168.1.2

    Subnet Mask   255.255.255.0

    Default Gateway   192.168.1.1

    DNS Server   0.0.0.0

IPv6 Configuration

    ◯ Automatic   🔘 Static

    IPv6 Address   /

    Link Local Address   FE80::260:2FFF:FEAD:E5B9

PC1:

IP Configuration   X

Interface   FastEthernet0   ⬍

IP Configuration

    ◯ DHCP   🔘 Static

    IPv4 Address   192.168.2.2

    Subnet Mask   255.255.255.0

    Default Gateway   192.168.2.1

    DNS Server   0.0.0.0

IPv6 Configuration

    ◯ Automatic   🔘 Static

    IPv6 Address   /

    Link Local Address   FE80::2E0:8FFF:FEDE:7366

PC2:

| Physical | Config | Desktop | Programming | Attributes |

IP Configuration   X

Interface   FastEthernet0   ⇅

IP Configuration

　　○ DHCP   ● Static

IPv4 Address   192.168.11.3

Subnet Mask   255.255.255.0

Default Gateway   0.0.0.0

DNS Server   0.0.0.0

IPv6 Configuration

　　○ Automatic   ● Static

IPv6 Address   /

Link Local Address   FE80::206:2AFF:FE09:3636

Default Gateway

PC3:

IP Configuration

Interface   FastEthernet0

IP Configuration

　　○ DHCP   ● Static

IPv4 Address   192.168.0.4

Subnet Mask   255.255.255.0

Default Gateway   0.0.0.0

DNS Server   0.0.0.0

IPv6 Configuration

　　○ Automatic   ● Static

IPv6 Address

Link Local Address   FE80::20A:41FF:FEAE:ACA8

Default Gateway

DNS Server

Router :0

```
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)#interface Serial2/0
Router(config-if)#ip address 10.10.0.2 255.0.0.0
Router(config-if)#ip address 10.10.0.2 255.0.0.0
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown
Router(config-if)#ip address 12.12.0.2 255.0.0.0
Router(config-if)#ip address 12.12.0.2 255.0.0.0
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

Router(config-if)#exit
Router(config)#router ospf 1
Router(config-router)#network 192.168.1.0 0.0.0.255 area 0
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0
Router(config-router)#exenetwork 12.0.0.0 0.255.255.255 area 0
Router(config-router)#exit
Router(config)#
Router(config)#
Router(config)#end
Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router#
%SYS-5-CONFIG_I: Configured from console by console

00:17:21: %OSPF-5-ADJCHG: Process 1, Nbr 11.11.0.2 on Serial2/0 from LOADING to FULL, Loading Done

00:20:24: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on Serial3/0 from LOADING to FULL, Loading Done
```

Router :1

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#ip address 10.10.0.3 255.0.0.0
Router(config-if)#ip address 10.10.0.3 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
clock rate 64000
Router(config-if)#ip address 11.11.0.2 255.0.0.0
Router(config-if)#ip address 11.11.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

Router(config-if)#exit
Router(config)#router ospf 1
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0
Router(config-router)#network 11.0.0.0 0.255.255.255 area 0
00:17:07: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on Serial2/0 from LOADING to FULL, Loading Done

Router(config-router)#network 11.0.0.0 0.255.255.255 area 0
Router(config-router)#exit
Router(config)#
Router(config)#
Router(config)#end
Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router#
%SYS-5-CONFIG_I: Configured from console by console

00:19:55: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on Serial3/0 from LOADING to FULL, Loading Done
```

(d) Configure DHCP using CPT

Steps:

Step 1: Launch Cisco Packet Tracer and create a new network topology.

Step 2: Drag and drop the devices onto the workspace, such as routers, switches, and PCs.

Step 3: Connect the devices using appropriate cables.

Step 4: Double-click on a router to open the configuration dialog box. Assign IP addresses and subnet masks to the router interfaces connected to the networks where DHCP will be enabled. For example, if you want to enable DHCP on the interface connected to the PC subnet, assign an IP address and subnet mask to that interface.

Step 5: Double-click on a switch to open the configuration dialog box. Enable the switch's interfaces connected to the networks where DHCP will be enabled.

Step 6: Double-click on a PC to open the configuration dialog box. Select the "DHCP" tab and configure the PC to obtain an IP address automatically via DHCP.

Step 7: Configure DHCP on the router. In the router configuration dialog box, follow these steps:

a. Enter the global configuration mode using the command:

configure terminal

b. Create a DHCP pool using the following command:

ip dhcp pool <pool_name>

Replace <pool_name> with the desired name for the DHCP pool.

c. Configure the network and subnet mask for the DHCP pool using the following command:

network <network_address> <subnet_mask>

Replace <network_address> with the network address and <subnet_mask> with the subnet mask of the network where DHCP will be enabled.

d. Optionally, configure additional DHCP parameters such as default gateway, DNS server, lease duration, etc., using specific DHCP pool commands.

Step 8: Save the configurations of all devices in the network.

Step 9: Test DHCP functionality. Power on the PCs and verify that they obtain IP addresses automatically from the DHCP server (router). You can check the PC's IP configuration using the "ipconfig" command on the PC's command prompt.

Output:
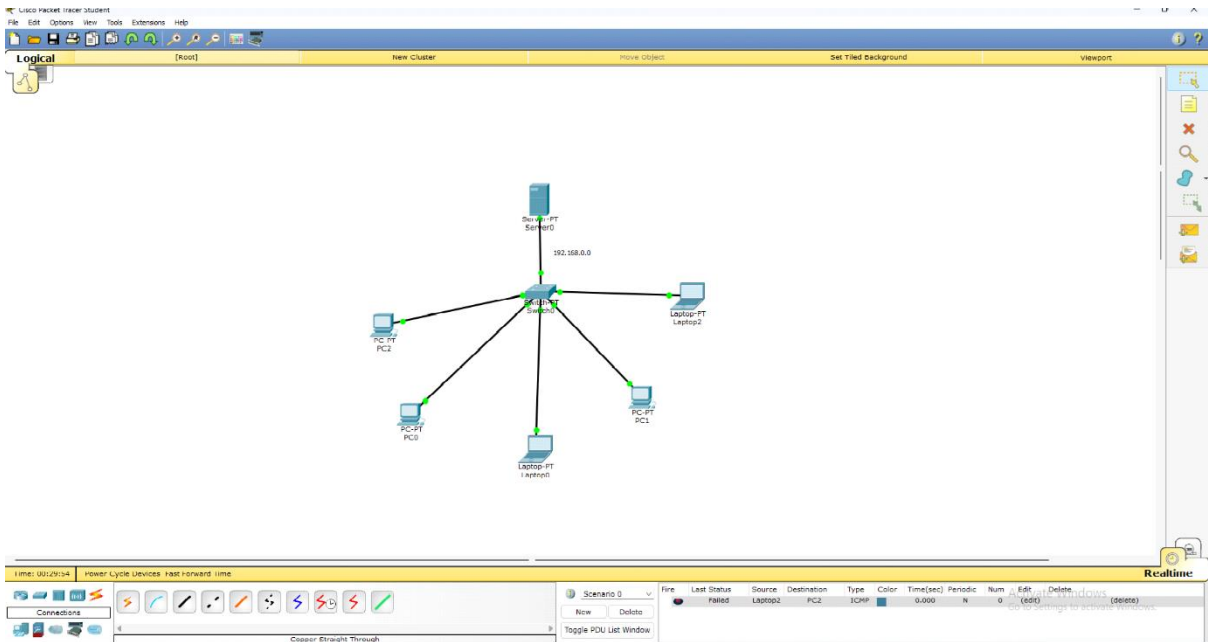
DHCP

Interface	FastEthernet0	Service ● On ○ Off	
Pool Name	pool1		
Default Gateway	172.168.10.1		
DNS Server	0.0.0.0		
Start IP Address :	172	168	10	11
Subnet Mask:	255	255	255	0
Maximum Number of Users :	245		
TFTP Server:	0.0.0.0		
WLC Address:	0.0.0.0		

Add	Save	Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server
pool1	172.168.10.1	0.0.0.0	172.168.10.11	255.255.255.0	245	0.0.0.0
pool2	192.168.10.1	0.0.0.0	192.168.10.11	255.255.255.0	245	0.0.0.0
serverPool	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	512	0.0.0.0

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

FastEthernet0/0

FastEthernet0/1

FastEthernet0/0

Port Status		☑ On
Bandwidth	○ 100 Mbps ○ 10 Mbps	☑ Auto
Duplex	○ Half Duplex ● Full Duplex	☑ Auto
MAC Address	0007.ECB0.2A01	

IP Configuration
IPv4 Address   172.168.10.1
Subnet Mask   255.255.255.0

Tx Ring Limit   10

Equivalent IOS Commands

```
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
ip address 192.168.10.1 255.255.255.0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#
Router(config-if)#"en"
                  ^
% Invalid input detected at '^' marker.

Router(config-if)#en
% Ambiguous command: "en"
Router(config)#
Router(config)#
Router(config)#config terminal
%Invalid hex value
Router(config)#int fa0/1
Router(config-if)#ip helper-address 172.168.10.2
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
```