



**SWE2002 - Computer Networks**

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**Slot - L23+L24**

**Class Number - CH2022232500855**

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**Assessment - 5**

## **1) Design a Client-Server LAN with Mesh Topology using Cisco Packet**

**Tracer and check the PDU transmission between the nodes**

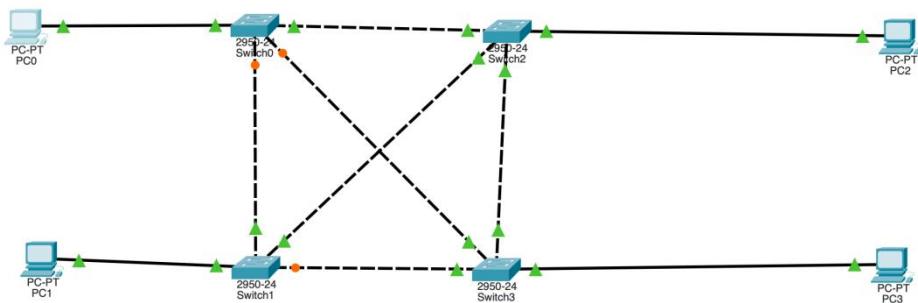
### **Aim:**

To design a Client-Server LAN with Mesh Topology using Cisco Packet Tracer and check the PDU transmission between the nodes

### **Algorithm:**

- a) First, open the Cisco packet tracer desktop
- b) Then, create a network topology
- c) Use an Automatic connecting cable to connect the devices with others.
- d) Configure the PCs (hosts) with IPv4 address and Subnet Mask.
  - To assign an IP address in PC0, click on PC0.
  - Then, go to desktop and then IP configuration and there you will IPv4 configuration.
  - Fill IPv4 address and subnet mask.
- e) Assigning IP address using the ipconfig command.
- f) Also, we can also assign an IP address with the help of a command.
- g) Go to the command terminal of the PC.
- h) Then, type ipconfig <IPv4 address><subnet mask><default gateway>
- i) Verify the connection by pinging the IP address of any host in PC0.
  - Use the ping command to verify the connection.
  - We will check if we are getting any replies or not.
  - Here we get replies from a targeted node on both PCs.
  - Hence the connection is verified.

### **CPT:**



## Output:

### PC0:

IP Configuration

Interface	FastEthernet0
IP Configuration	
<input type="radio"/> DHCP	<input checked="" type="radio"/> 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	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	
Link Local Address	FE80::290:CFF:FE11:B216
Default Gateway	
DNS Server	

### PC1:

IP Configuration

Interface	FastEthernet0
IP Configuration	
<input type="radio"/> DHCP	<input checked="" type="radio"/> 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
IP v6 Configuration	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	
Link Local Address	FE80::2D0:D3FF:FE79:B3E1
Default Gateway	
DNS Server	

## PC2:

Physical Config Desktop **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

IP v6 Configuration

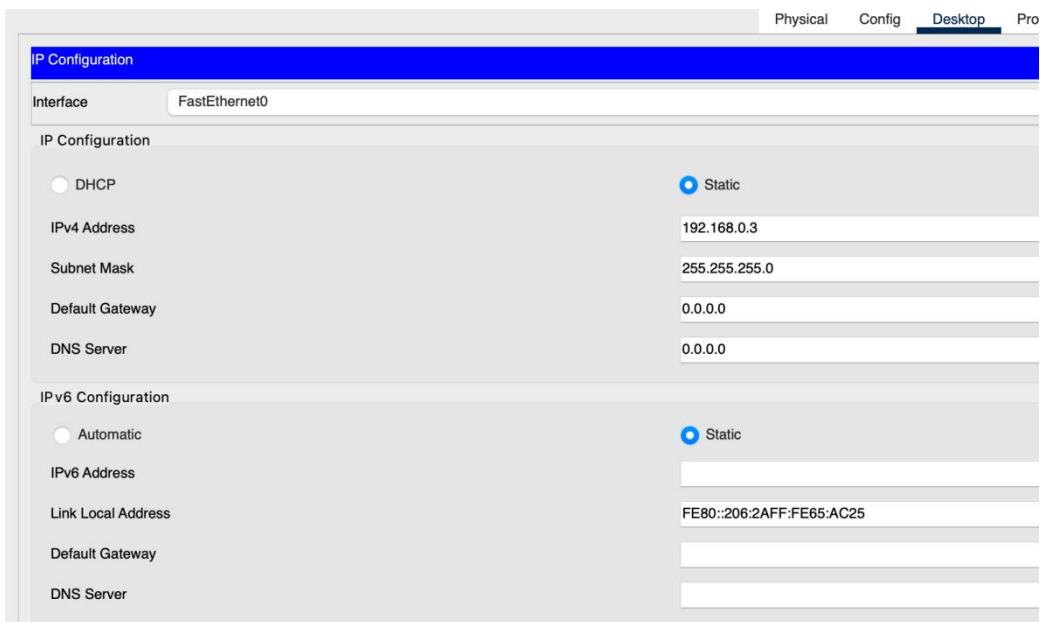
Automatic  Static

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

IP v6 Configuration

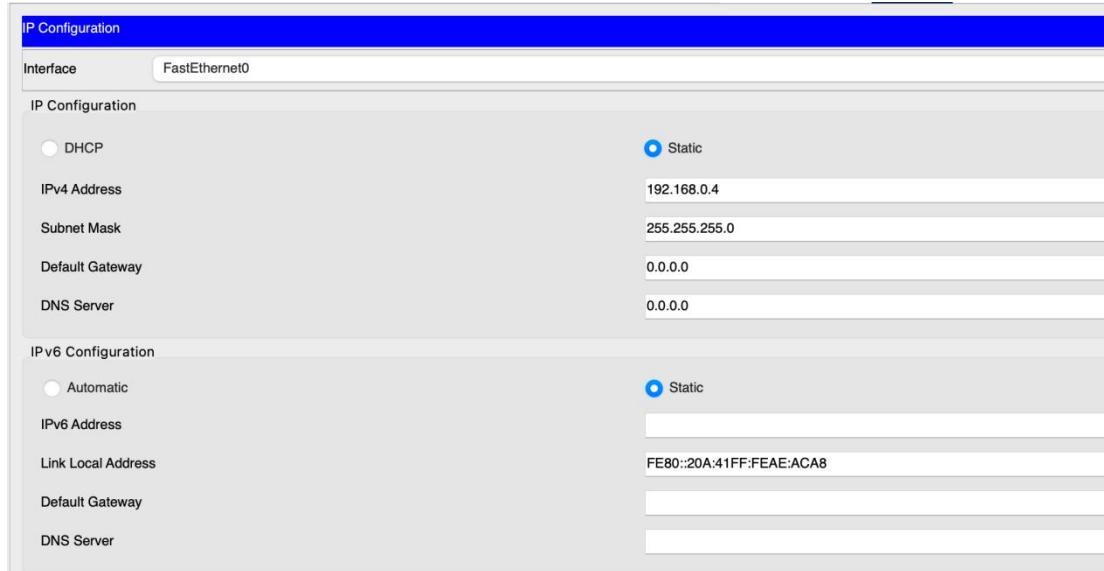
Automatic  Static

IPv6 Address

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

Default Gateway

DNS Server



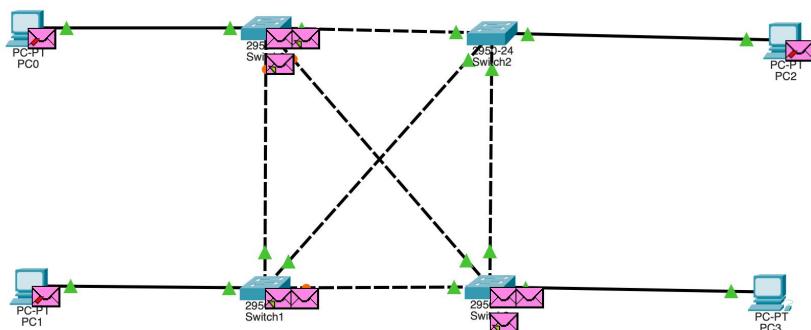
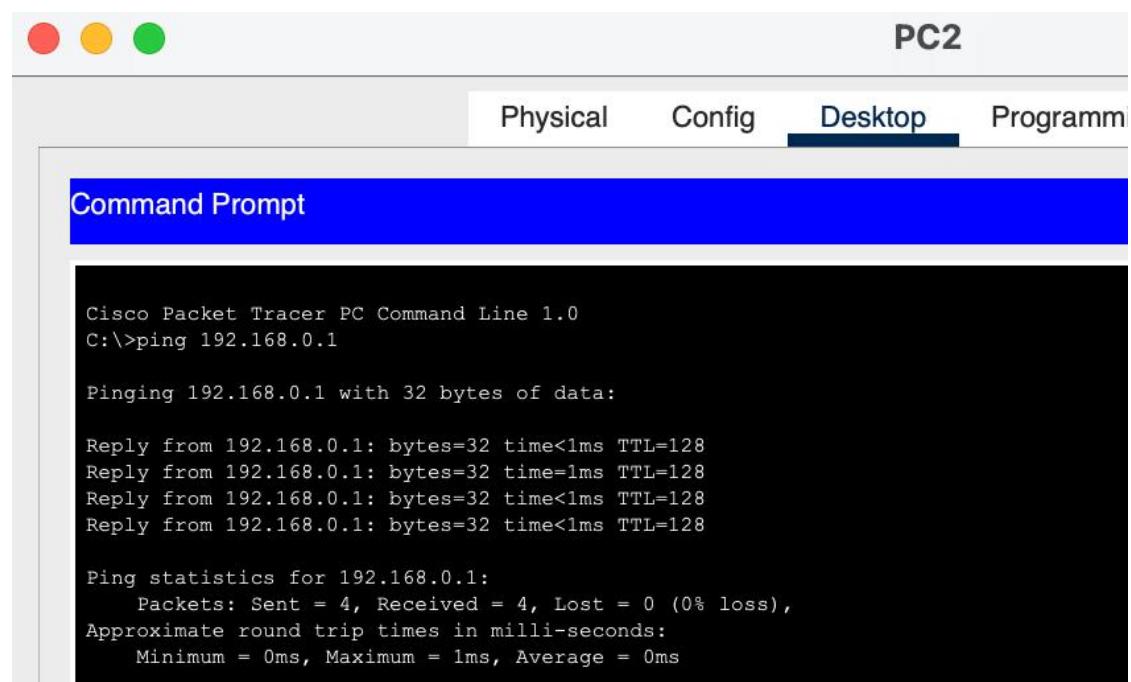
## Command prompt:

```
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
```



## **2) Configure ARP using CPT**

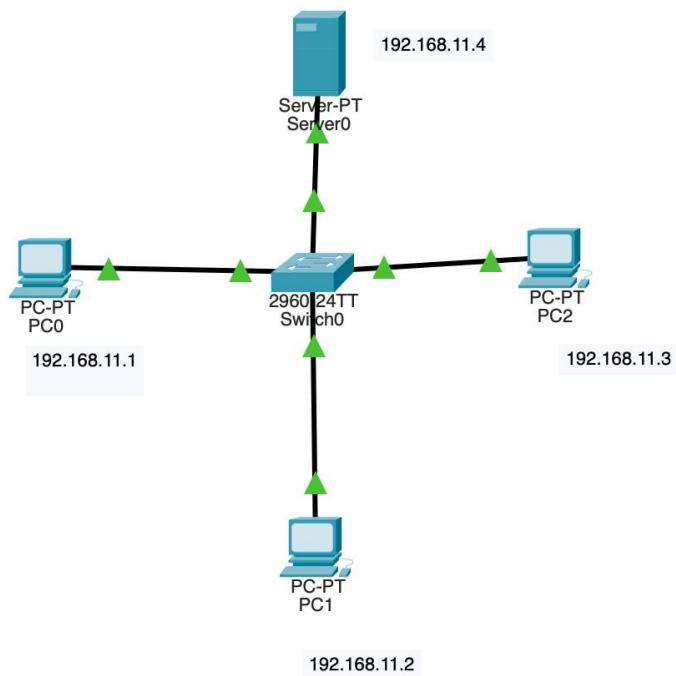
### **Aim:**

To configure ARP(Address Resolution Protocol) using Cisco packet tracer

### **Algorithm:**

- a) Open Cisco Packet Tracer and create a new project.
- b) Add the necessary devices to your network topology. At a minimum, you will need two devices: a switch and a router. You can add more devices as needed.
- c) Connect the devices using appropriate cables. For example, connect a FastEthernet port on the switch to a FastEthernet port on the router.
- d) Configure the IP addresses on the devices.
- e) Configure ARP on the devices. By default, Cisco devices have ARP enabled. You don't need to explicitly enable it.
- f) Verify the ARP table on the devices
- g) Test ARP functionality. Ping from one device to another device using their IP addresses. PC> ping <IP\_ADDRESS>
  
- h) Verify connectivity. Ensure that the ping is successful and that the devices can communicate with each other

## CPT:



## Output:

### PC0:

IP Configuration

Interface	FastEthernet0
IP Configuration	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	192.168.11.1
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DNS Server	0.0.0.0
IPv6 Configuration	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	/
Link Local Address	FE80::201:97FF:FE04:5565

## PC1:

IP Configuration

Interface: FastEthernet0

IP Configuration

DHCP       Static

IPv4 Address: 192.168.11.2

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::201:C7FF:FE49:E084

Default Gateway:

## PC2:

Physical    Config    **Desktop**    Programming    Attributes

IP Configuration

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

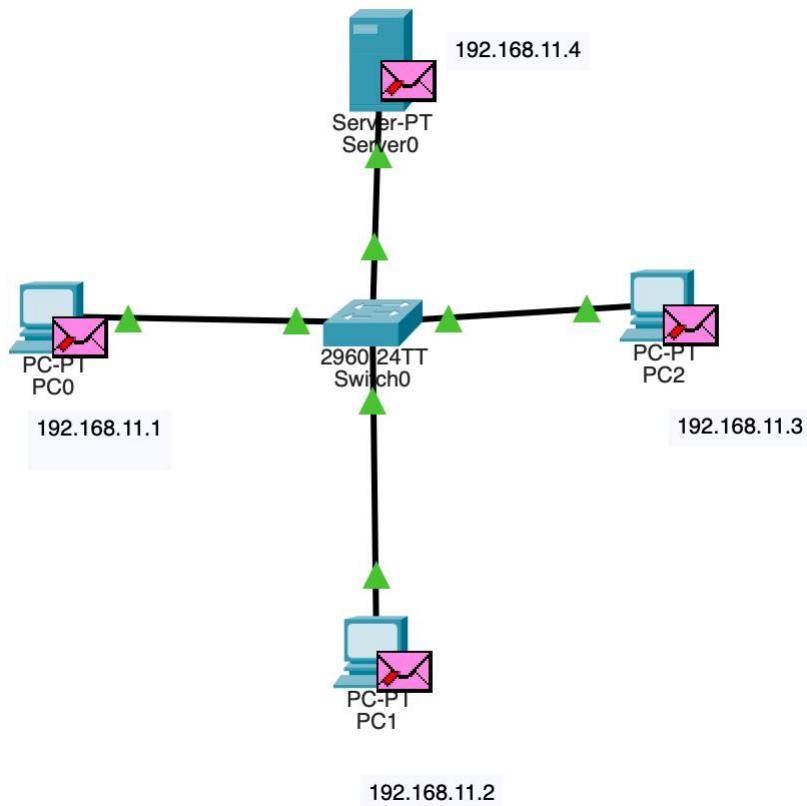
IPv6 Configuration

Automatic       Static

IPv6 Address: /

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

Default Gateway:



### ARP TABLE FOR PC0:

ARP Table for PC0		
IP Address	Hardware Address	Interface
192.168.11.4	0003.E401.D8AA	FastEthernet0

### ARP TABLE FOR SERVER:

ARP Table for Server0		
IP Address	Hardware Address	Interface
192.168.11.1	0001.9704.5565	FastEthernet0

## **Command prompt:**

```
Cisco Packet Tracer PC Command Line 1.0
C:\>PING 192.168.11.4

Pinging 192.168.11.4 with 32 bytes of data:

Reply from 192.168.11.4: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.11.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

## **3) Design a network with OSPF using CPT**

### **Aim:**

To design a network with OSPF using CPT

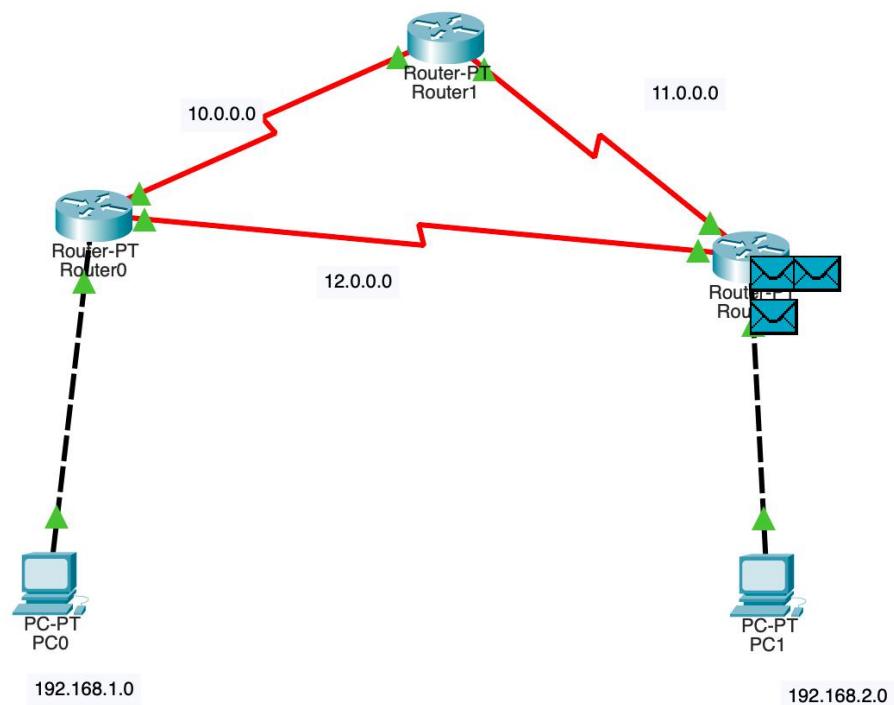
### **Algorithm:**

- A. Open Cisco Packet Tracer and create a new project.
- B. Add the necessary devices to your network topology. At a minimum, you will need routers that will participate in the OSPF routing process. You can add additional devices such as switches and PCs as needed.
- C. Connect the devices using appropriate cables. Connect the router interfaces to form the desired network topology.
- D. Configure IP addresses on the router interfaces. Assign IP addresses to the router interfaces connected to the OSPF network  
Router(config-if)# ip address <IP\_ADDRESS> <SUBNET\_MASK>
- E. Enable OSPF on the routers  
Router(config)# router ospf <PROCESS\_ID>

```
Router(config-router)# network <NETWORK_ADDRESS>
<WILDCARD_MASK> area <AREA_ID>
```

- F. Test OSPF routing. Configure a PC or another device connected to the network to use an IP address within the OSPF network. Use the ping command to test connectivity between devices.
- G. Monitor OSPF routing updates
- H. Verify connectivity and routing. Ensure that devices can communicate with each other using OSPF for routing and that the OSPF routing table is correctly populated.

**CPT:**



## Output:

### PC0:

IP Configuration

Interface	FastEthernet0
IP Configuration	
<input type="radio"/> DHCP	<input checked="" type="radio"/> 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	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	/
Link Local Address	FE80::260:2FFF:FEAD:E5B9

### PC1:

IP Configuration

Interface	FastEthernet0
IP Configuration	
<input type="radio"/> DHCP	<input checked="" type="radio"/> 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	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	/
Link Local Address	FE80::2E0:8FFF:FEDE:7366

## 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
```

## Router 2

```

Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#no ip address
Router(config-if)#ip address 11.11.0.3 255.0.0.0
Router(config-if)#ip address 11.11.0.3 255.0.0.0
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
ip address 12.12.0.3 255.0.0.0
Router(config-if)#ip address 12.12.0.3 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

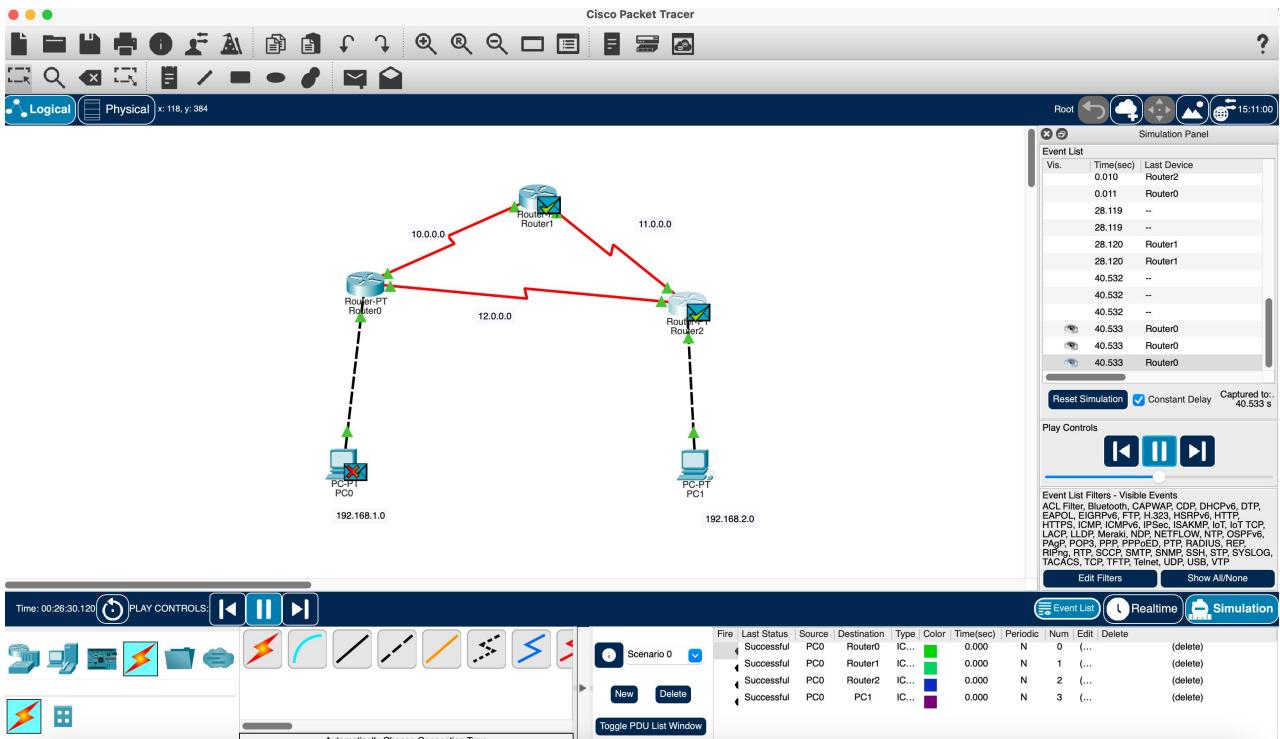
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

Router(config-if)#exit
Router(config)#router ospf 1
Router(config-router)#network 192.168.2.0 0.0.0.255 area 0
Router(config-router)#network 11.0.0.0 0.255.255.255 area 0
Router(config-router)#network 11.0.0.0 0.255.255.255 area 0
00:19:52: %OSPF-5-ADJCHG: Process 1, Nbr 11.11.0.2 on Serial2/0 from LOADING to FULL, Loading Done

Router(config-router)#network 12.0.0.0 0.255.255.255 area 0
Router(config-router)#
00:20:07: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on Serial3/0 from LOADING to FULL, Loading Done

Router(config-router)#network 12.0.0.0 0.255.255.255 area 0
Router(config-router)#exit
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

```



**4) Implement a Packet Tracer script that configures a DHCP server and multiple DHCP clients. The DHCP server should provide IP addresses, subnet masks, and default gateways to the clients dynamically**

**Aim:**

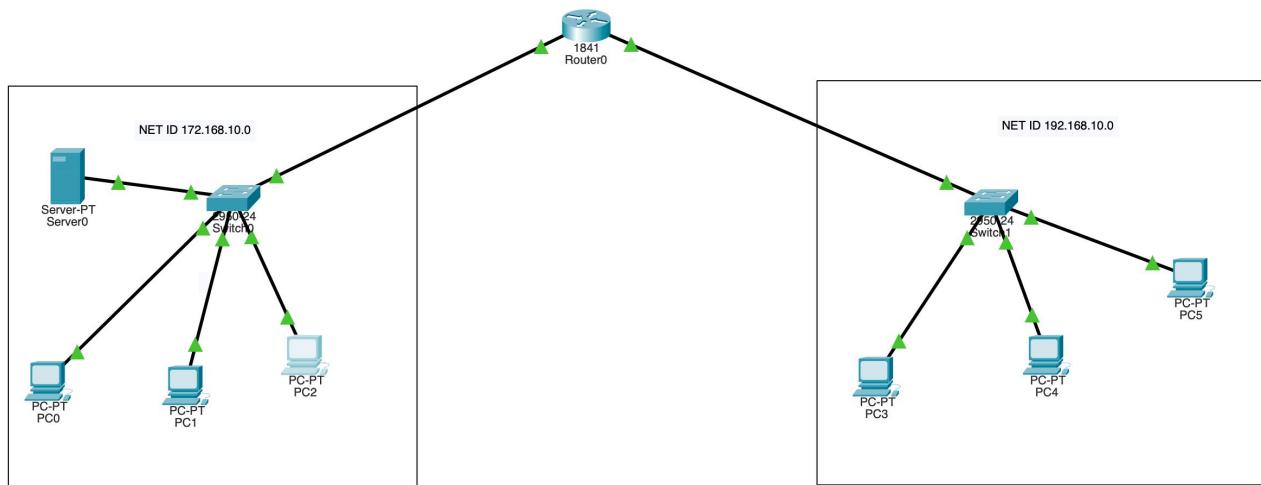
To Implement a Packet Tracer script that configures a DHCP server and multiple DHCP clients and the DHCP server should provide IP addresses, subnet masks, and default gateways to the clients dynamically

**Algorithm:**

- a) Open Cisco Packet Tracer and create a new project.
- b) Add the necessary devices to your network topology. You will need a router, a switch, a DHCP server, and multiple DHCP clients (e.g., PCs). Connect them using appropriate cables.
- c) Configure IP addresses on the router interfaces. Assign IP addresses to the router interfaces connected to the DHCP server and DHCP clients.
- d) Enable IP routing on the router
- e) Configure the switch. Assign a VLAN and IP address to the switch
- f) Configure the DHCP server. Assign an IP address and DHCP pool settings to the DHCP server.
- g) Configure DHCP clients. Configure the DHCP clients to obtain IP addresses dynamically from the DHCP server.
- h) Verify DHCP configuration. Use the following command on the DHCP server to check the DHCP pool configuration.

- i) Test DHCP functionality. Start the DHCP clients and verify that they receive dynamic IP addresses, subnet masks, and default gateways from the DHCP server.
- j) Verify connectivity. Ensure that the DHCP clients can communicate with each other and with other devices in the network using the assigned IP addresses, subnet masks, and default gateways

### CPT:



### Output:

#### Router 0:

Physical	Config	CLI	Attributes
FastEthernet0/1			
Port Status	<input checked="" type="checkbox"/> On		
Bandwidth	<input type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto		
Duplex	<input type="radio"/> Half Duplex <input checked="" type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto		
MAC Address	0007.ECB0.2A02		
IP Configuration			
IPv4 Address	192.168.10.1		
Subnet Mask	255.255.255.0		
Tx Ring Limit	10		

## DHCP(SERVER SERVICES):

DHCP

Interface	FastEthernet0	<input checked="" type="radio"/>	Service	<input checked="" type="radio"/> On	<input type="radio"/> 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				

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

## SERVER IP CONFIG:

IP Configuration

<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	172.168.10.2
Subnet Mask	255.255.255.0
Default Gateway	172.168.10.1
DNS Server	0.0.0.0

IPv6 Configuration

<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	/
Link Local Address	FE80::205:5EFF:FE77:1128
Default Gateway	
DNS Server	

## **ROUTER CONFIG(FAST ETHERNET 0/1)**

Physical	Config	CLI	Attributes
FastEthernet0/1			
Port Status			<input checked="" type="checkbox"/> On
Bandwidth		<input type="radio"/> 100 Mbps <input checked="" type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto	
Duplex		<input type="radio"/> Half Duplex <input checked="" type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto	
MAC Address	0007.ECBO.2A02		
IP Configuration			
IPv4 Address	192.168.10.1		
Subnet Mask	255.255.255.0		
Tx Ring Limit	10		
Equivalent IOS Commands			
<pre>Router#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)# </pre>			

## **ROUTER CONFIG (FAST ETHERNET 0/0)**

	Physical	Config	CLI	Attributes			
<b>FastEthernet0/0</b>							
Port Status				<input checked="" type="checkbox"/> On			
Bandwidth				<input checked="" type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto			
Duplex				<input type="radio"/> Half Duplex <input checked="" type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto			
MAC Address		0007.ECB0.2A01					
IP Configuration							
IPv4 Address							
172.168.10.1							
Subnet Mask							
255.255.255.0							
Tx Ring Limit		10					
<b>Equivalent IOS Commands</b>							
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)#							

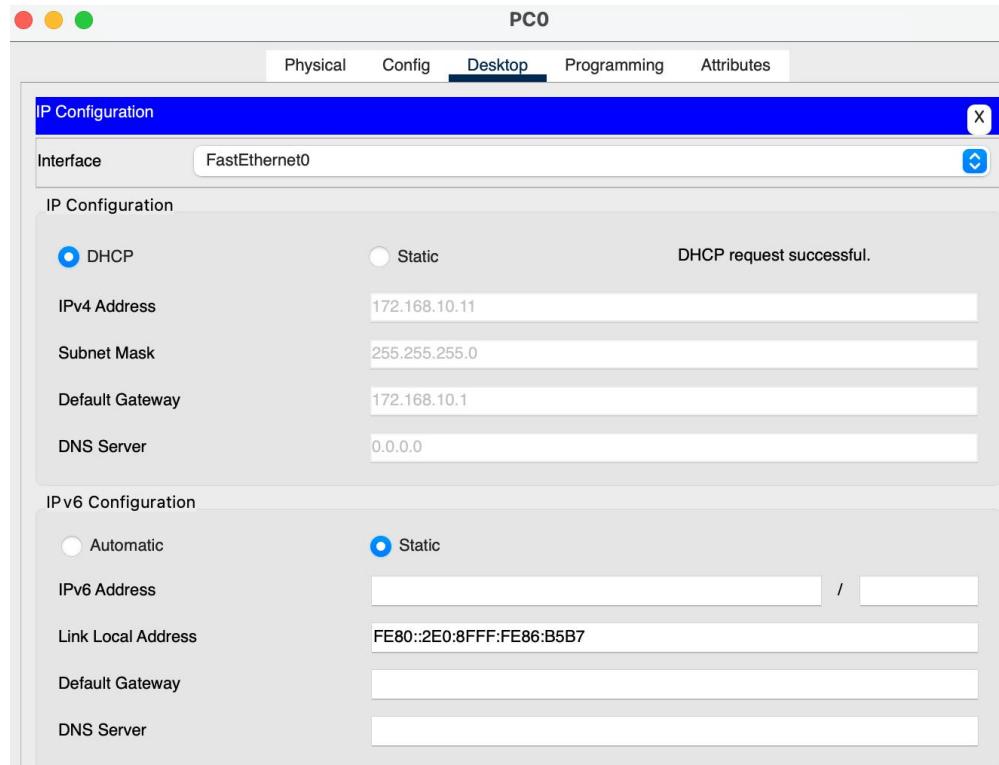
## **ROUTER (CLI)**

```
%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"
Router(config-if)#
^
% 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
```

## PC0:



## PC1:

PC1

Physical Config Desktop Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

DHCP  Static      DHCP request successful.

IPv4 Address: 172.168.10.12  
Subnet Mask: 255.255.255.0  
Default Gateway: 172.168.10.1  
DNS Server: 0.0.0.0

IPv6 Configuration

Automatic  Static  
IPv6 Address: /  
Link Local Address: FE80::205:5EFF:FE96:55D9  
Default Gateway:  
DNS Server:  
802.1X:

## PC2:

PC2

Physical Config Desktop Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

DHCP  Static      DHCP request successful.

IPv4 Address: 172.168.10.13  
Subnet Mask: 255.255.255.0  
Default Gateway: 172.168.10.1  
DNS Server: 0.0.0.0

IPv6 Configuration

Automatic  Static  
IPv6 Address: /  
Link Local Address: FE80::209:7CFF:FE72:3E8C  
Default Gateway:  
DNS Server:  
802.1X:

## PC3:

PC3

Physical Config Desktop Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

DHCP (selected) Static DHCP request successful.

IPv4 Address: 192.168.10.13

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.10.1

DNS Server: 0.0.0.0

IPv6 Configuration

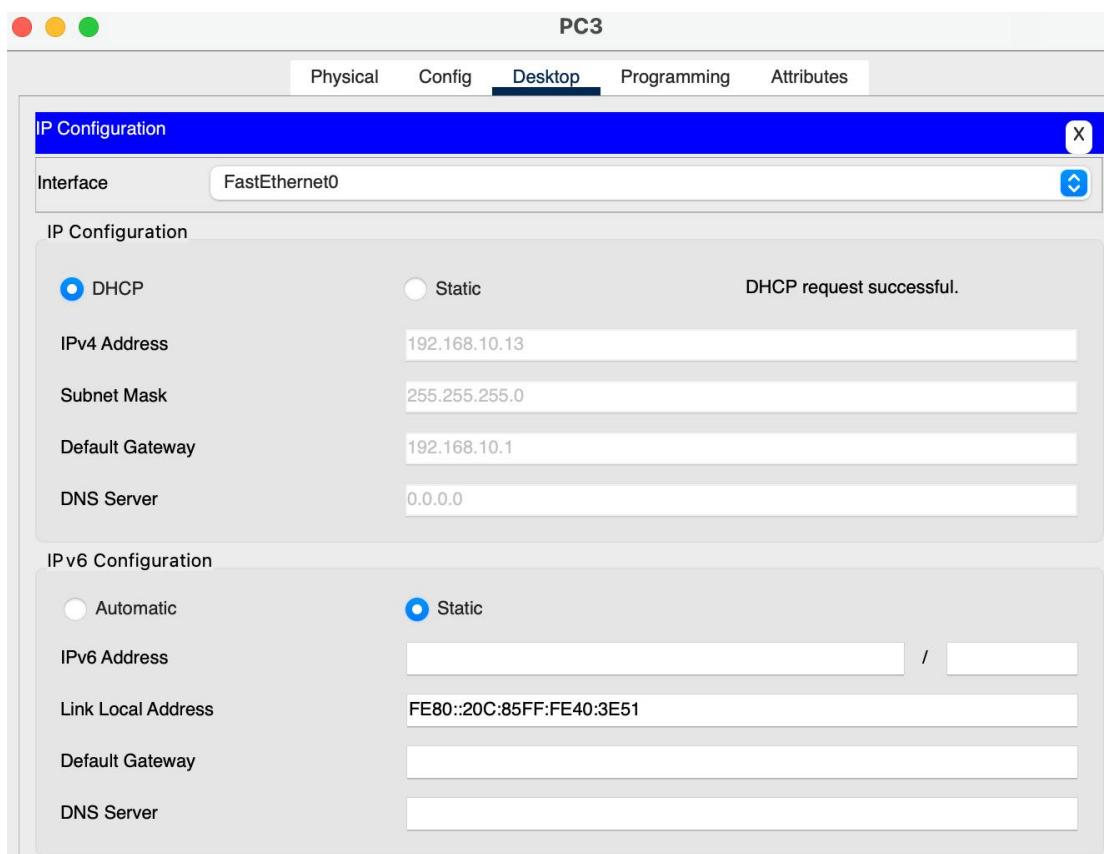
Automatic (unchecked) Static (selected)

IPv6 Address: /

Link Local Address: FE80::20C:85FF:FE40:3E51

Default Gateway:

DNS Server:



## PC4:

PC4

Physical Config Desktop Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

DHCP (selected) Static DHCP request successful.

IPv4 Address: 192.168.10.11

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.10.1

DNS Server: 0.0.0.0

IPv6 Configuration

Automatic (unchecked) Static (selected)

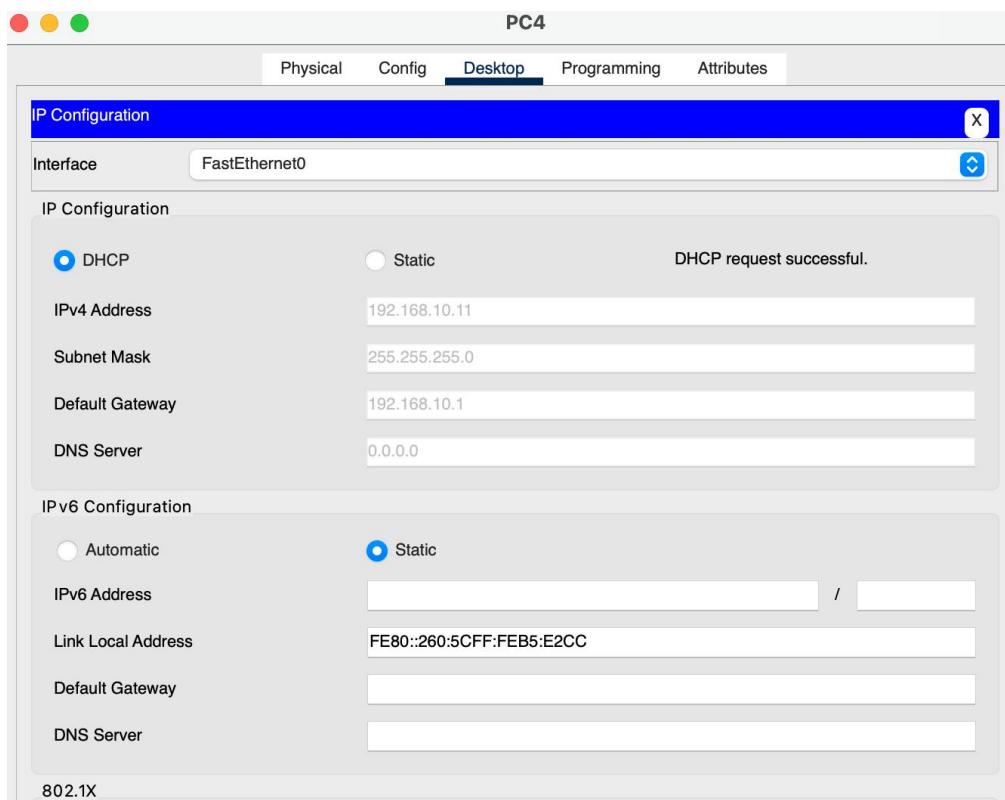
IPv6 Address: /

Link Local Address: FE80::260:5CFF:FEB5:E2CC

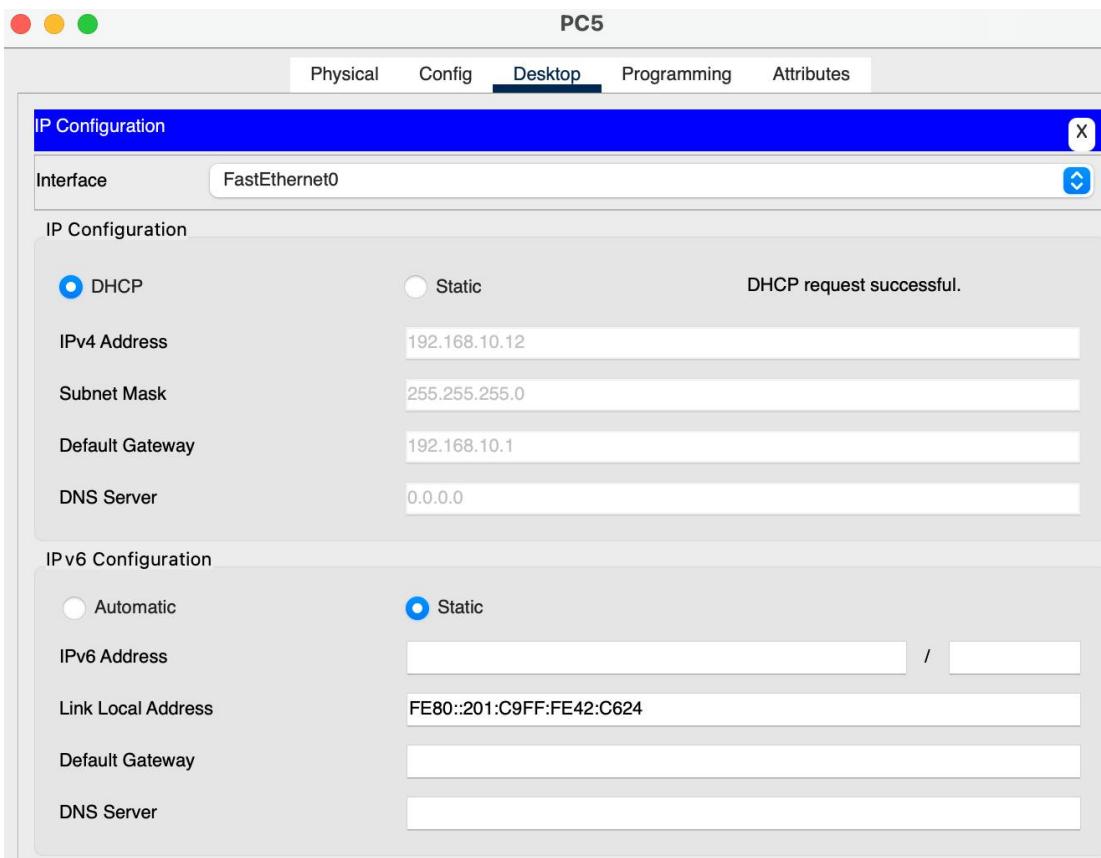
Default Gateway:

DNS Server:

802.1X



## **PC5:**



**5) Write a Packet Tracer script that simulates a network with a virtual private network (VPN) connection. Configure a VPN tunnel between two routers and verify the connectivity between the networks**

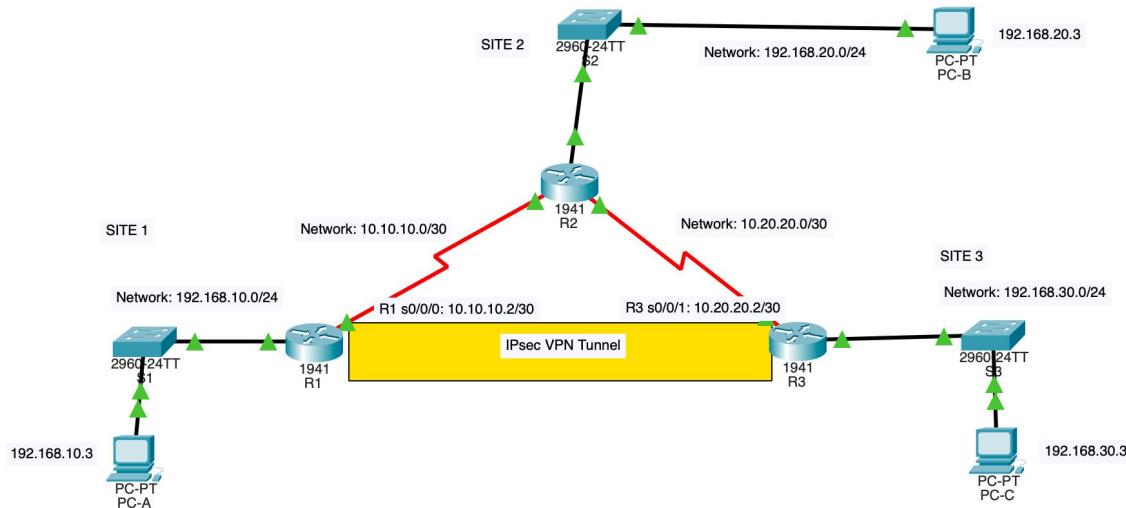
## **Aim:**

To implement a Packet Tracer script that simulates a network with a virtual private network (VPN) connection. Configure a VPN tunnel between two routers and verify the connectivity between the networks

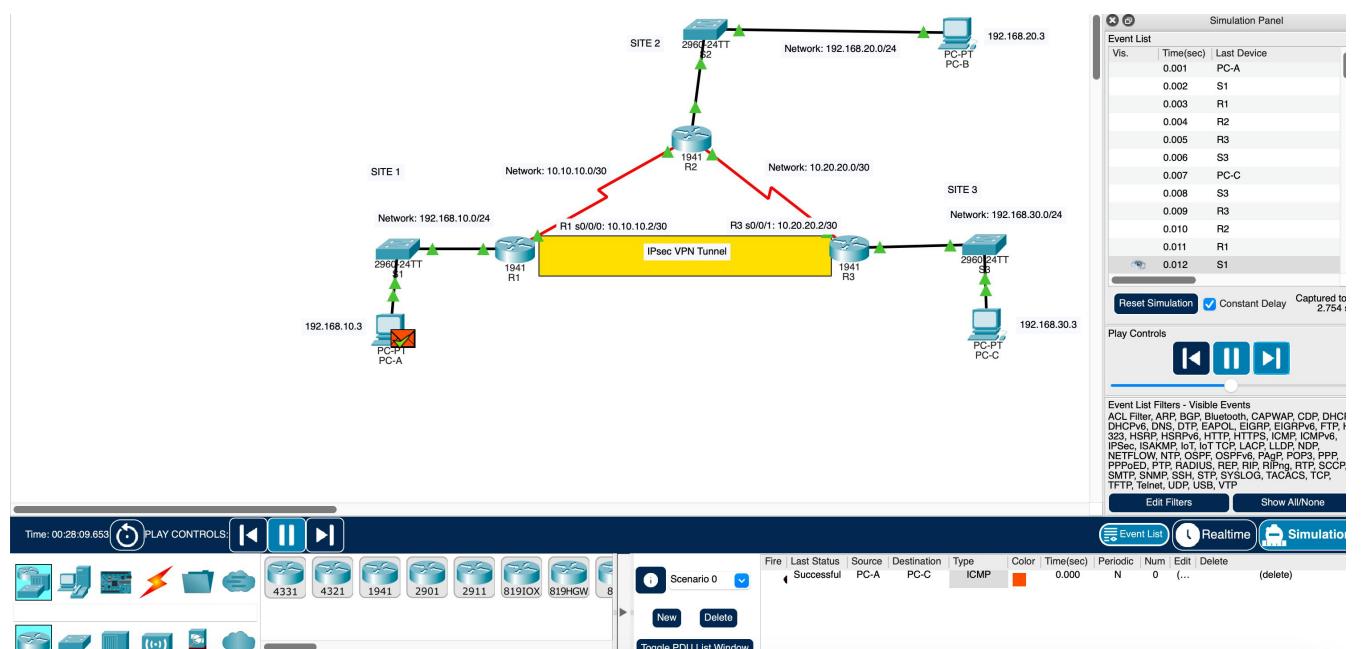
**Algorithm:**

- A. Open Cisco Packet Tracer and create a new project.
- B. Add the necessary devices to your network topology. You will need two routers, each representing a network, and a switch to connect the routers. Connect the devices using appropriate cables.
- C. Configure IP addresses on the router interfaces. Assign IP addresses to the router interfaces connected to the switch
- D. Enable IP routing on both routers
- E. Configure the VPN tunnel on both routers
- F. Create an access list on both routers to define the traffic that will be sent through the VPN tunnel.
- G. Verify the VPN configuration on both routers
- H. Test VPN connectivity. Configure a device connected to each router's network (e.g., a PC) to communicate with each other using their respective IP addresses. Test connectivity between the networks and verify that the traffic is tunneled through the VPN connection.
- I. Verify connectivity between the networks. Use the following commands on each router to check the routing table and verify connectivity

## CPT:



## Output:



## **R3:**

```
R3>en
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#show version
Cisco IOS Software, C1900 Software (C1900-UNIVERSALK9-M), Version 15.1(4)M4, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 23-Feb-11 14:19 by pt_team

ROM: System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
cisco1941 uptime is 16 minutes, 18 seconds
System returned to ROM by power-on
System image file is "flash0:c1900-universalk9-mz.SPA.151-1.M4.bin"
Last reload type: Normal Reload

This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wlc/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.
Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
4 Low-speed serial(sync/async) network interface(s)
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)

License Info:

License UDI:

License UDI:
-----
Device#    PID          SN
-----
*0        CISCO1941/K9      FTX152435I1-


Technology Package License Information for Module:'c1900'
-----
Technology   Technology-package      Technology-package
             Current       Type        Next reboot
-----
ipbase      ipbasek9     Permanent    ipbasek9
security    securityk9    Evaluation   securityk9
data        disable      None        None

Configuration register is 0x2102

R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#access-list 100 permit ip 192.168.30.0 0.0.0.255 192.168.10.0 0.0.0.255
R3(config)#crypto isakmp policy 10
R3(config-isakmp)#encryption aes 128
R3(config-isakmp)#authentication pre-share
R3(config-isakmp)#group 5
R3(config-isakmp)#exit
R3(config)#crypto isakmp vpn address
^
% Invalid input detected at '^' marker.

R3(config)#crypto isakmp key vpn address 10.10.10.2
R3(config)#crypto ipsec transform-set VPN-P2 esp-aes esp-sha-hmac
R3(config)#crypto map VPN-MAP 10 ipsec-isakmp
% NOTE: This new crypto map will remain disabled until a peer
and a valid access list have been configured.
R3(config-crypto-map)#description VPN connection to R1
```

```

R3(config)#crypto isakmp key vpn address 10.10.10.2
R3(config)#crypto ipsec transform-set VPN-P2 esp-aes esp-sha-hmac
R3(config)#crypto map VPN-MAP 10 ipsec-isakmp
% NOTE: This new crypto map will remain disabled until a peer
      and a valid access list have been configured.
R3(config-crypto-map)#description VPN connection to R1
R3(config-crypto-map)#set peer 10.10.10.2
R3(config-crypto-map)#set transform-set VPN-P2
R3(config-crypto-map)#match address 100
R3(config-crypto-map)#exit
R3(config)#interface s0/0/0
R3(config-if)#crypto map VPN-MAP
*Jan  3 07:16:26.785: %CRYPTO-6-ISAKMP_ON_OFF: ISAKMP is ON
R3(config-if)#
R3(config-if)#
R3(config-if)#exit
R3(config)#interface Serial0/0/1
R3(config-if)#
R3(config-if)#exit
R3(config)#interface Serial0/0/0
R3(config-if)#
R3(config-if)#exit
R3(config)#interface Serial0/0/1

```

## **R1:**

```

R1>en
R1#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
00:00:20: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.20.1 on Serial0/0/0 from LOADING to FULL, Loading Done

R1#en
R1#show version
Cisco IOS Software, C1900 Software (C1900-UNIVERSALK9-M), Version 15.1(4)M4, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 23-Feb-11 14:19 by pt_team

ROM: System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
cisc01941 uptime is 28 seconds
System returned to ROM by power-on
System image file is "flash0:c1900-universalk9-mz.SPA.151-1.M4.bin"
Last reload type: Normal Reload

This product contains cryptographic features and is subject to United
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2 Gigabit Ethernet interfaces
4 Low-speed serial(sync/async) network interface(s)
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)

License Info:

License UDI:
-----
Device#    PID          SN
-----
*0        CISCO1941/K9    FTX1524627S-
-----
```

### **Command prompt:(verification)**

```
C:\>tracert 192.168.30.3

Tracing route to 192.168.30.3 over a maximum of 30 hops:

  1  4 ms        4 ms        4 ms      192.168.10.1
  2  8 ms        8 ms        8 ms      10.20.20.2
  3  12 ms       12 ms       12 ms    192.168.30.3

Trace complete.
```

## Command prompt:(PC-A):

```
C:\>ping 192.168.30.3

Pinging 192.168.30.3 with 32 bytes of data:

Reply from 192.168.30.3: bytes=32 time=28ms TTL=125
Reply from 192.168.30.3: bytes=32 time=2ms TTL=125
Reply from 192.168.30.3: bytes=32 time=2ms TTL=125
Reply from 192.168.30.3: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.30.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 28ms, Average = 8ms

C:\>tracert 192.168.30.3

Tracing route to 192.168.30.3 over a maximum of 30 hops:

  1  0 ms      0 ms      0 ms      192.168.10.1
  2  1 ms      0 ms      3 ms      10.10.10.1
  3  18 ms     10 ms     1 ms      10.20.20.2
  4  1 ms      1 ms      0 ms      192.168.30.3

Trace complete.
```