CISCO VIRTUAL INTERNSHIP

ASSIGNMENT

SUBMITTED BY:

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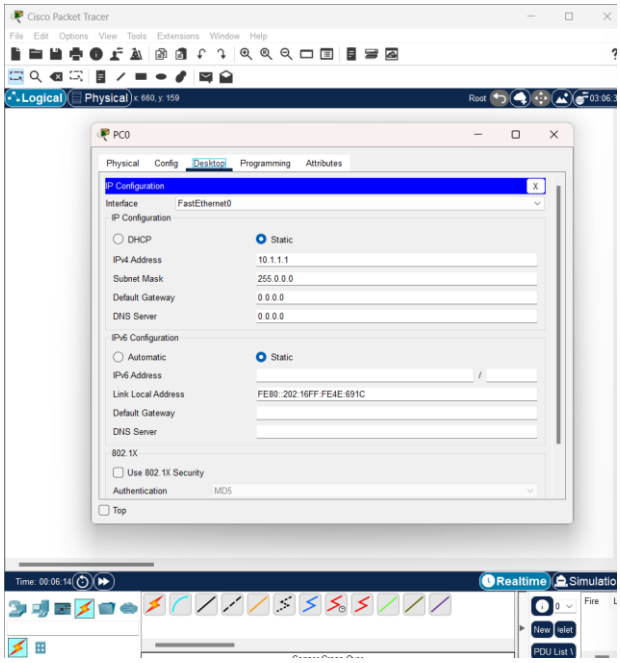
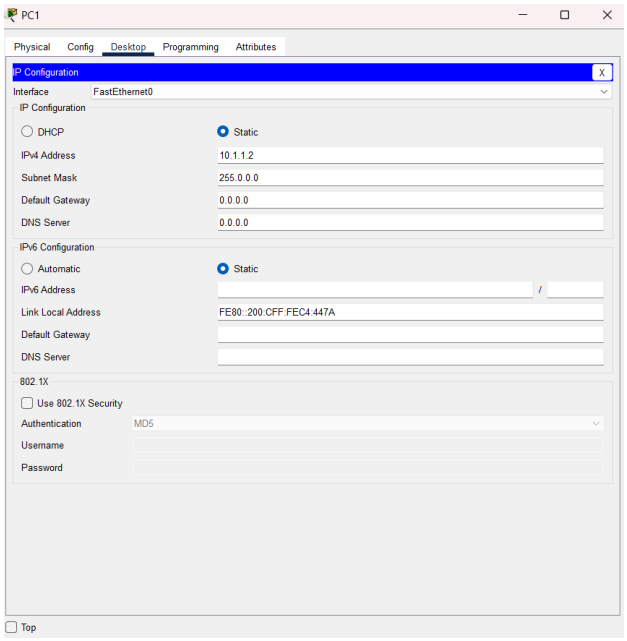
LEVEL 1 : Steps to Establish Connection and Test Communication

1. Assign IP Addresses:

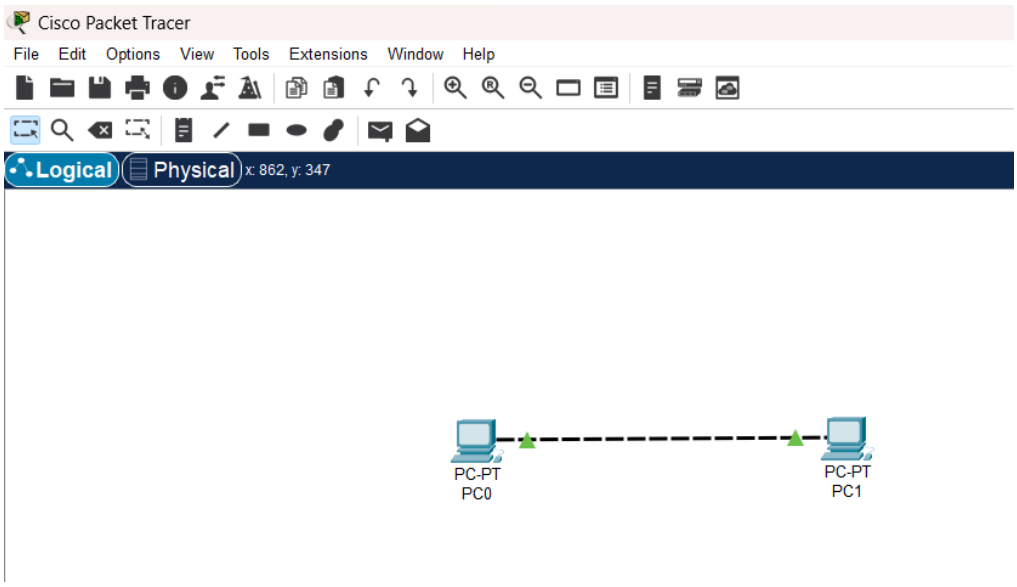
    - PC0: 10.1.1.1
    - PC1: 10.1.1.2





2. Configure IP Addresses:

    - Set IPs through network settings on both PCs.



3. Test Communication:

- On PC0, open Command Prompt and type ping 10.1.1.2.

Understanding ARP

- **ARP** maps IP addresses to MAC addresses.
- **IP Address**: Logical identifier (Layer 3).
- **MAC Address**: Physical identifier (Layer 2).

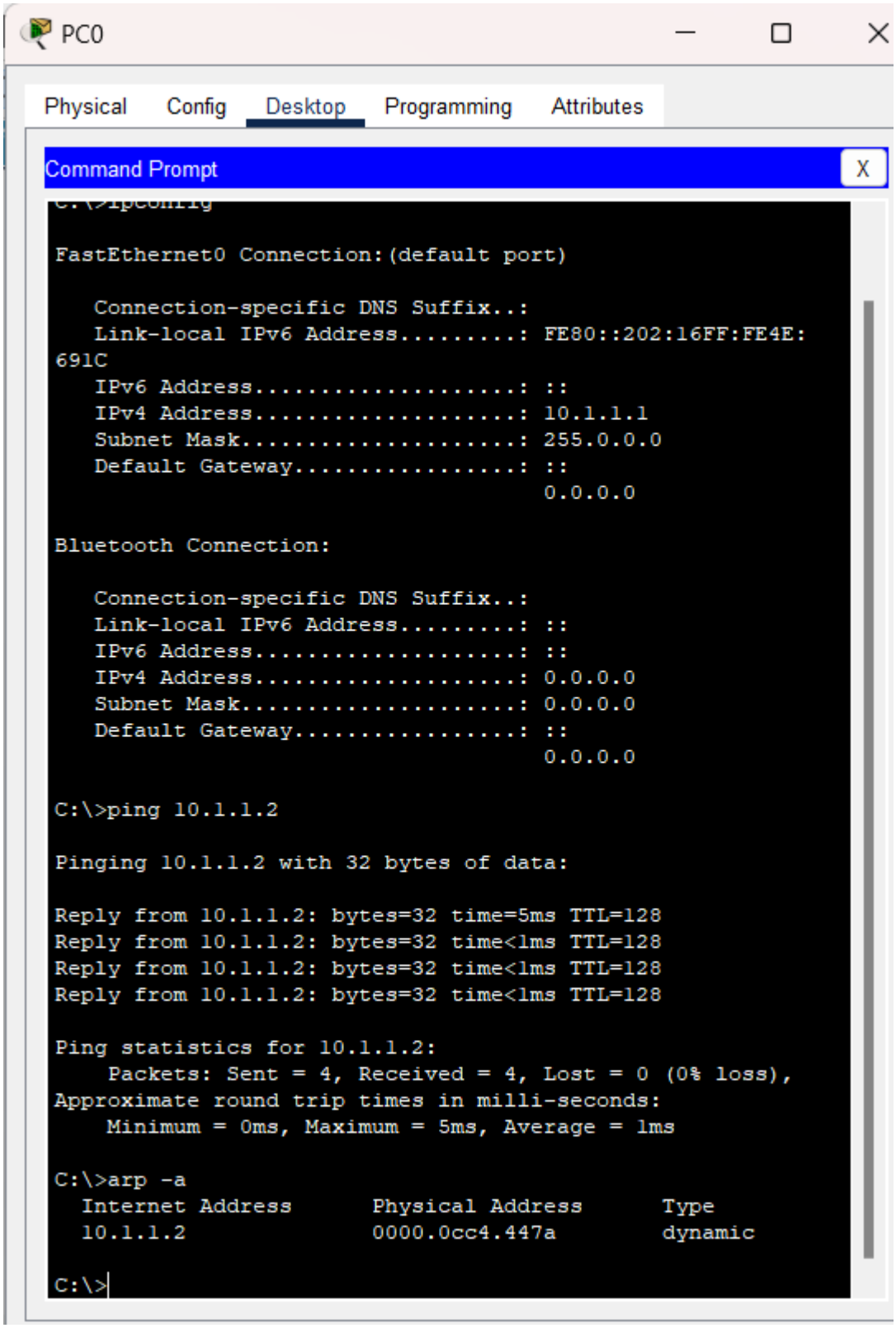
ARP Table Commands

- **View ARP Table**: arp -a
- **Delete ARP Entry**: arp -d <IP address>

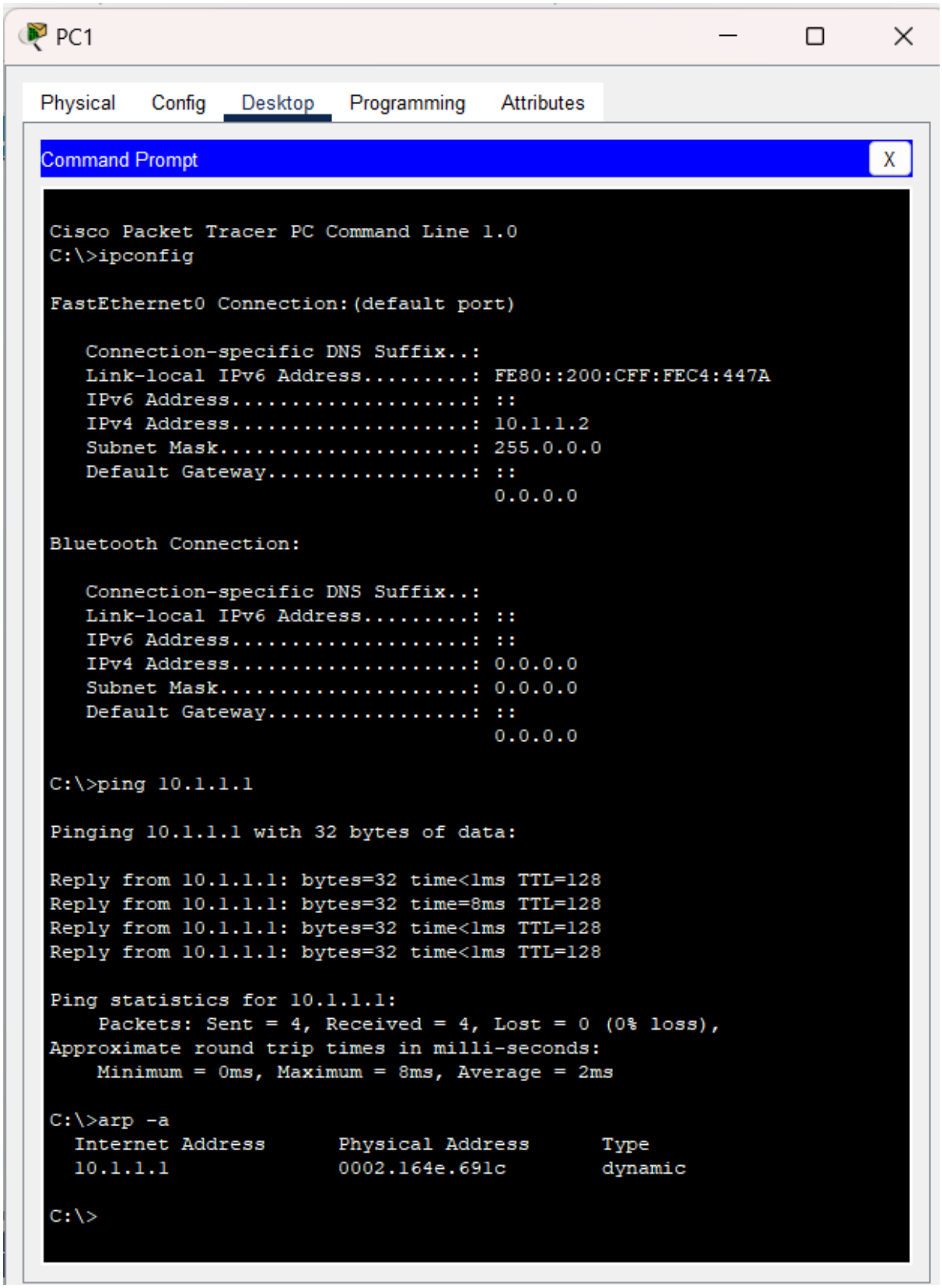
Cisco Packet Tracer

- Use `arp -d` to delete ARP cache entries.
- Use `arp -a` to view ARP cache contents.

For PC0


PC0
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
FastEthernet0 Connection:(default port)
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: FE80::202:16FF:FE4E:
691C
IPv6 Address.....: ::
IPv4 Address.....: 10.1.1.1
Subnet Mask.....: 255.0.0.0
Default Gateway.....: ::
0.0.0.0
Bluetooth Connection:
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway.....: ::
0.0.0.0
C:\>ping 10.1.1.2
Pinging 10.1.1.2 with 32 bytes of data:
Reply from 10.1.1.2: bytes=32 time=5ms TTL=128
Reply from 10.1.1.2: bytes=32 time<1ms TTL=128
Reply from 10.1.1.2: bytes=32 time<1ms TTL=128
Reply from 10.1.1.2: bytes=32 time<1ms TTL=128
Ping statistics for 10.1.1.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 5ms, Average = 1ms
C:\>arp -a
Internet Address
Physical Address
Type
10.1.1.2
0000.0cc4.447a
dynamic
C:\>

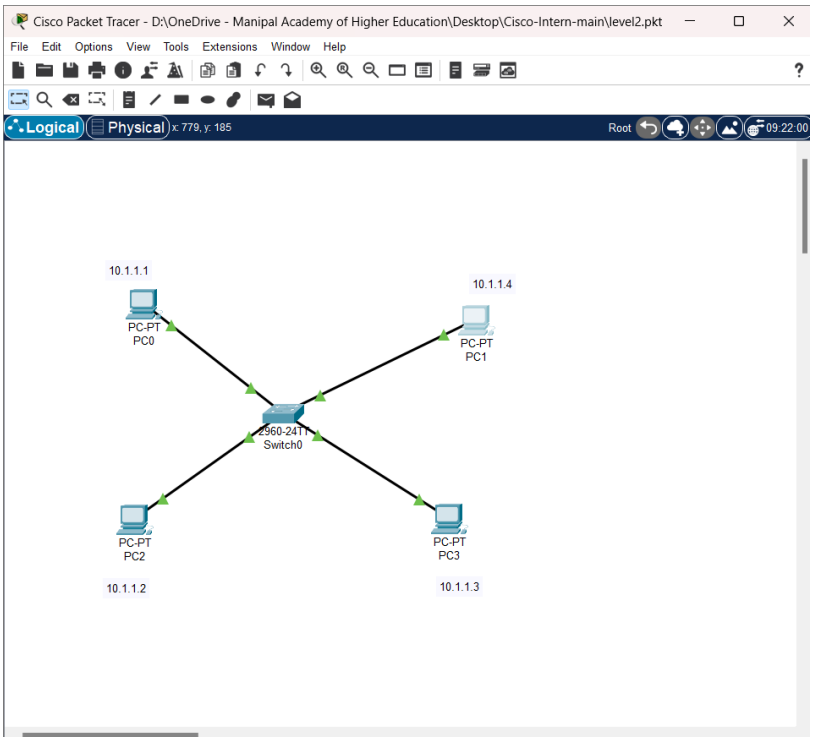
For PC1:


PC1
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig
FastEthernet0 Connection:(default port)
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: FE80::200:CFF:FEC4:447A
IPv6 Address.....: ::
IPv4 Address.....: 10.1.1.2
Subnet Mask.....: 255.0.0.0
Default Gateway.....: ::
0.0.0.0
Bluetooth Connection:
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway.....: ::
0.0.0.0
C:\>ping 10.1.1.1
Pinging 10.1.1.1 with 32 bytes of data:
Reply from 10.1.1.1: bytes=32 time<1ms TTL=128
Reply from 10.1.1.1: bytes=32 time=8ms TTL=128
Reply from 10.1.1.1: bytes=32 time<1ms TTL=128
Reply from 10.1.1.1: bytes=32 time<1ms TTL=128
Ping statistics for 10.1.1.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 8ms, Average = 2ms
C:\>arp -a
Internet Address
Physical Address
Type
10.1.1.1
0002.164e.691c
dynamic
C:\>

LEVEL 2 : Steps to Establish a Connection Between Multiple Computers Using a Switch

Step 1: Physical Setup

1. **Connect Computers to the Switch**:
    - Connect each computer to the switch using Ethernet cables.
    - Plug one end of the Ethernet cable into the computer's Ethernet port and the other end into a switch port.



Step 2: Assign Unique IP Addresses

1. **Open Network Settings**:

    - On Windows, go to Control Panel > Network and Sharing Center > Change adapter settings.
    - Right-click on the Ethernet adapter and select Properties.
    - Select Internet Protocol Version 4 (TCP/IPv4) and click Properties.

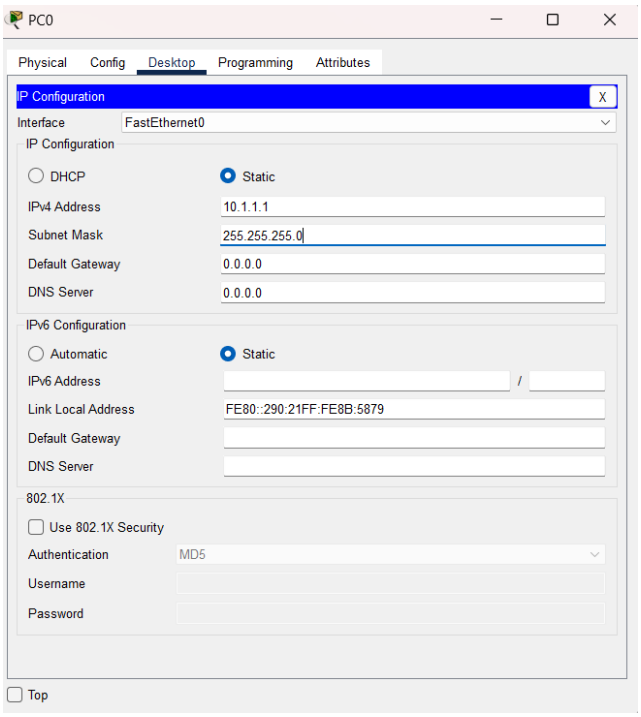
2. **Assign IP Address to Each Computer**:

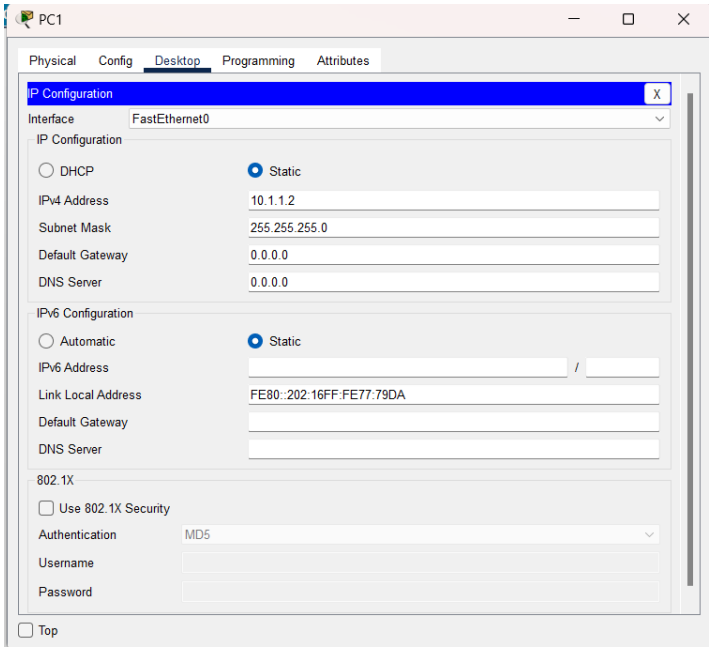
    - Enter the following information for each computer:

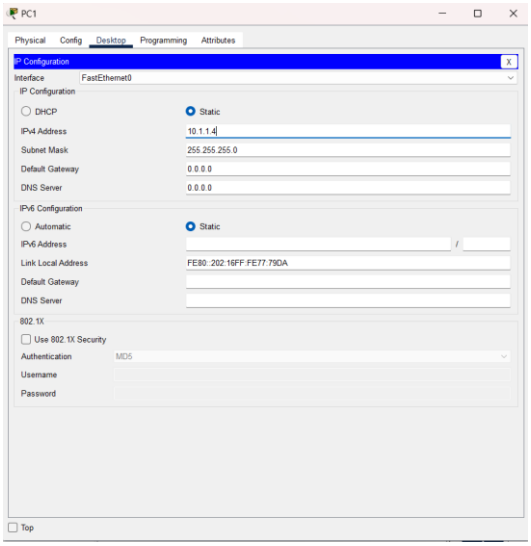
        - PC0: IP address 10.1.1.1, Subnet mask 255.255.255.0
        - PC1: IP address 10.1.1.2, Subnet mask 255.255.255.0
        - PC2: IP address 10.1.1.3, Subnet mask 255.255.255.0

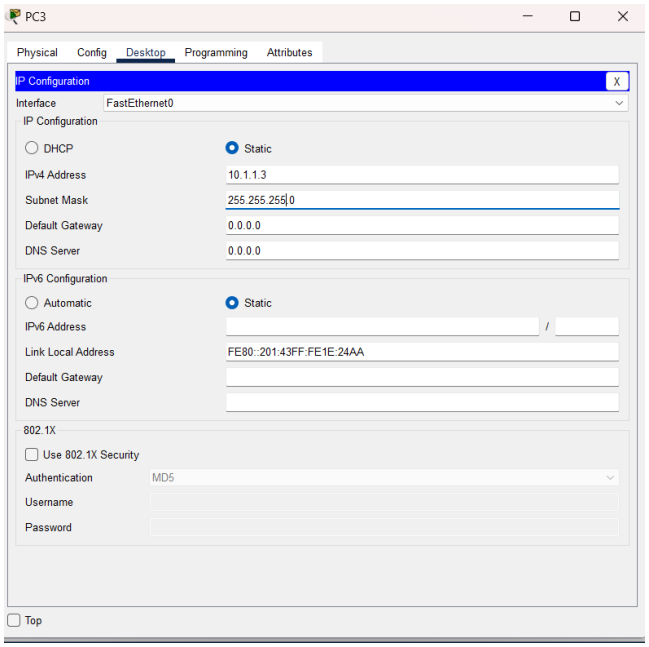
- PC2: IP address 10.1.1.3, Subnet mask 255.255.255.0

- Click OK to save the settings.









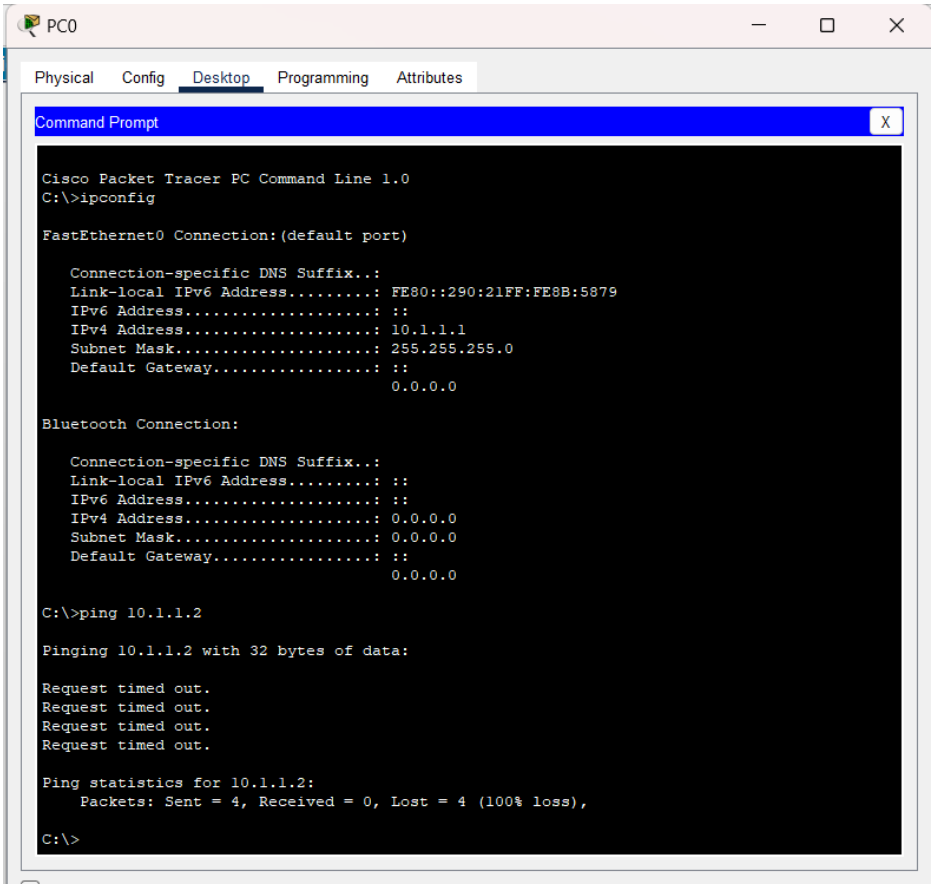
3. **Verify IP Configuration**:

- Open Command Prompt on each computer.
- Type ipconfig and press Enter to verify the assigned IP addresses.

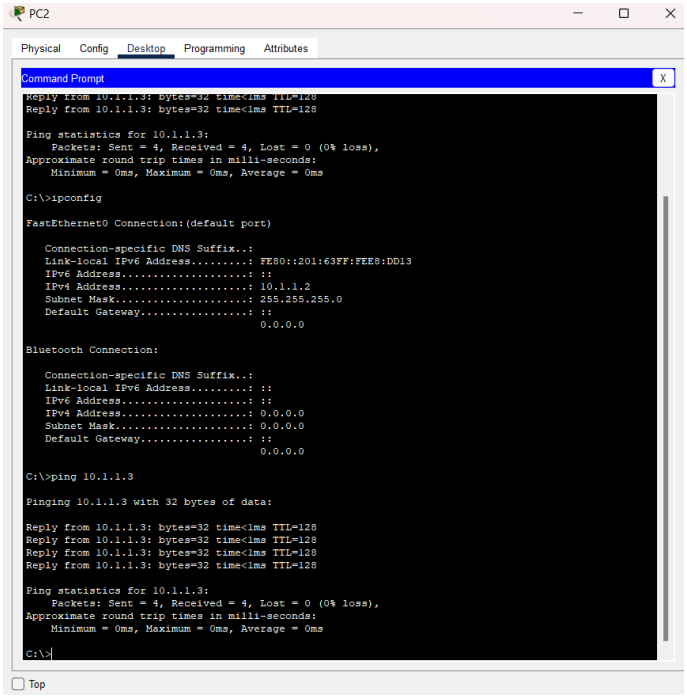
Step 3: Test Connectivity Using "ping"

1. **Test Communication**:

   - On PC0, open Command Prompt and type ping 10.1.1.2 to ping PC2.

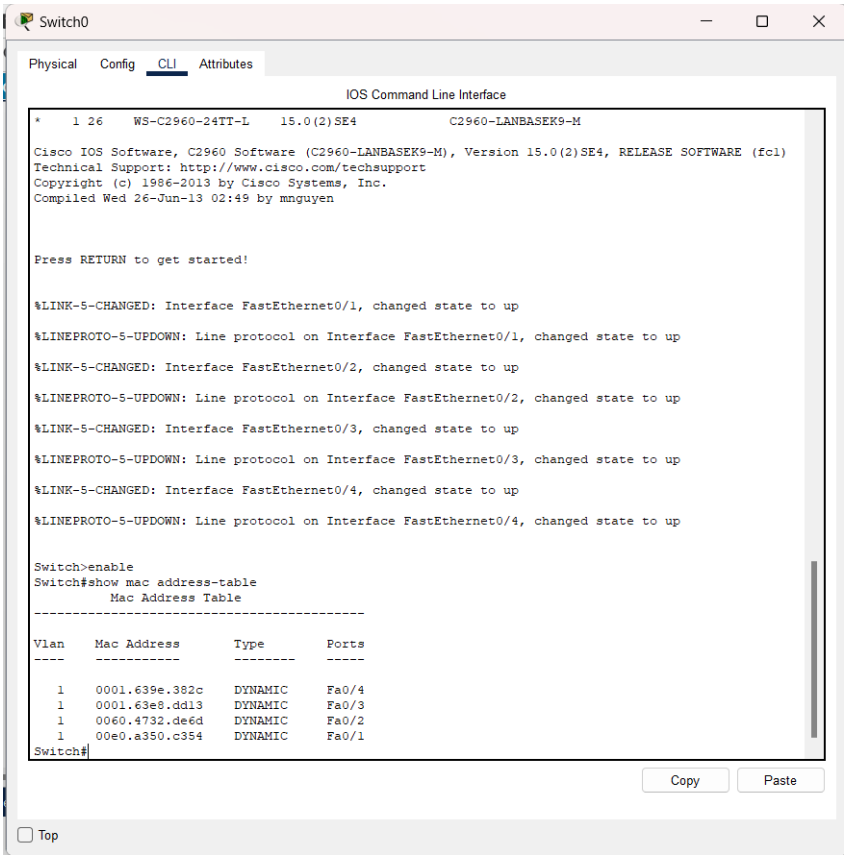


   - On PC2, open Command Prompt and type ping 10.1.1.3 to ping PC3.



Step 4: Access the Switch and View the MAC Table

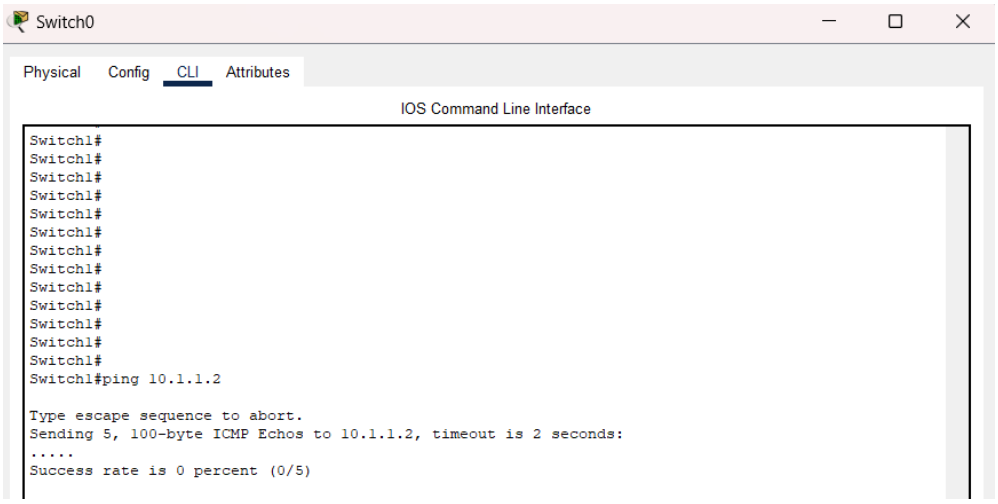
1. **Connect to the Switch**:
    - Use a console cable to connect a computer to the switch's console port.
    - Alternatively, use SSH if the switch is configured for remote access.
2. **Enter User EXEC Mode**:
    - Open a terminal or command prompt on the connected computer.
    - Access the switch's console.
    - You should see a prompt like Switch>.
3. **Enter Privileged EXEC Mode**:
    - Type enable and press Enter.
    - You should see a prompt like Switch#.
4. **View the MAC Address Table**:
    - Type show mac address-table and press Enter.
    - Observe the MAC addresses associated with each port.



```
Switch>enable
Switch#show mac address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    0001.639e.382c    DYNAMIC     Fa0/4
   1    0001.63e8.dd13    DYNAMIC     Fa0/3
   1    0060.4732.de6d    DYNAMIC     Fa0/2
   1    00e0.a350.c354    DYNAMIC     Fa0/1
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname Switch1
Switch1(config)#interface FastEthernet0/1
Switch1(config-if)#exit
Switch1(config)#
```

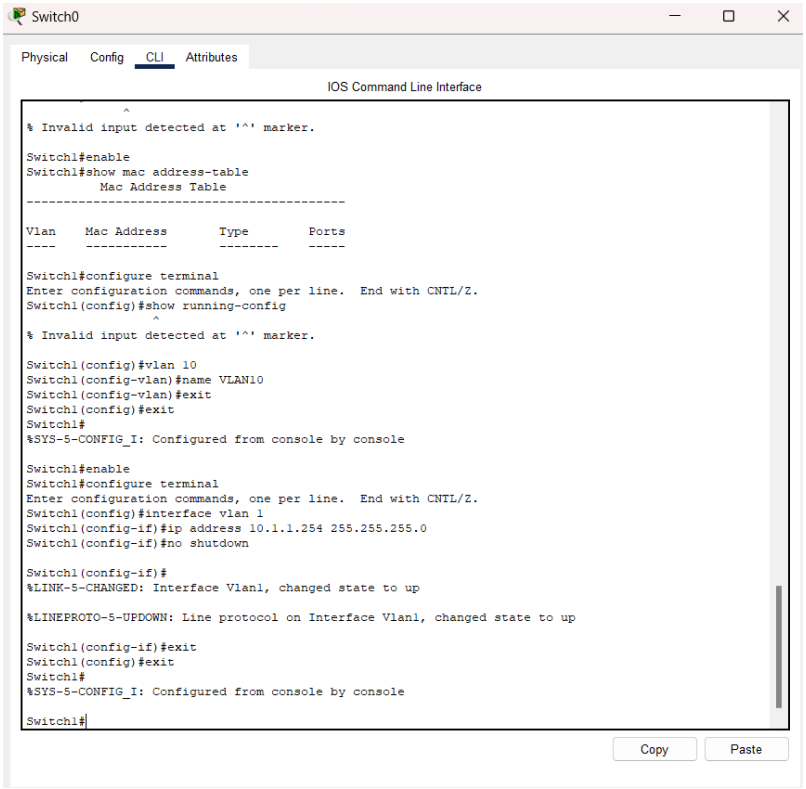
Copy Paste

Top



Step 5: Basic Switch Configuration

1. **Enter Global Configuration Mode**:
    - From Privileged EXEC mode, type configure terminal and press Enter.
    - You should see a prompt like Switch(config)#.
2. **Set the Switch Name**:
    - Type hostname Switch1 and press Enter.
    - The prompt should now display Switch1(config)#.
3. **Configure Specific Interfaces**:
    - Type interface FastEthernet0/1 and press Enter (replace FastEthernet0/1 with the appropriate interface name).
    - You should see a prompt like Switch1(config-if)#.



4. **Exit Interface Configuration Mode**:

   Type exit to return to Global Configuration mode.

Step 6: Verify and Explore Switch Functionalities

1. **Learning**:

   - The switch automatically learns MAC addresses by examining incoming frames on each port.

2. **Flooding**:

    - If the switch receives a frame with an unknown destination MAC address, it floods the frame out of all ports except the one it was received on.

3. **Forwarding**:

    - Once the switch learns the MAC addresses, it forwards frames directly to the appropriate port based on the MAC address table.

Step 7: Additional Commands and Modes

1. **Show Running Configuration**:

    - From Privileged EXEC mode, type show running-config and press Enter to display the current configuration of the switch.

2. **Ping from the Switch**:

    - Type ping 10.1.1.2 and press Enter to test connectivity from the switch to a computer.

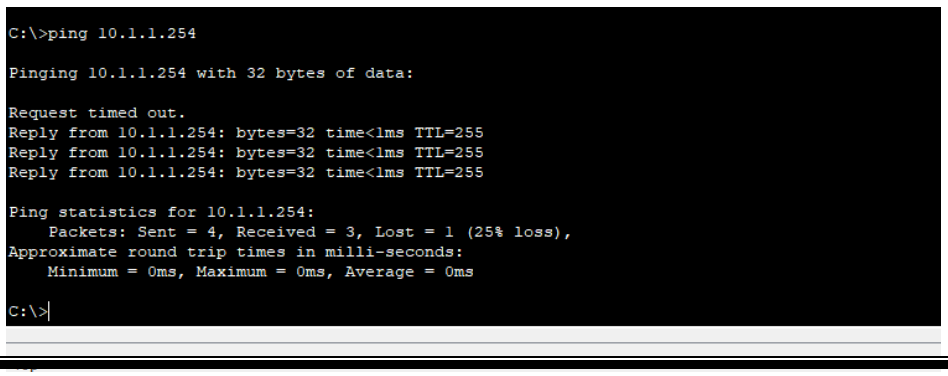
3. **Create and Configure VLANs**:

    - From Global Configuration mode, type vlan 10 and press Enter.
    - Type name VLAN10 and press Enter.
    - Type exit to return to Global Configuration mode.

4. **Understand Aging Timers**:

    - Aging timers determine how long an entry remains in the MAC address table before it is removed if not refreshed by new frames.

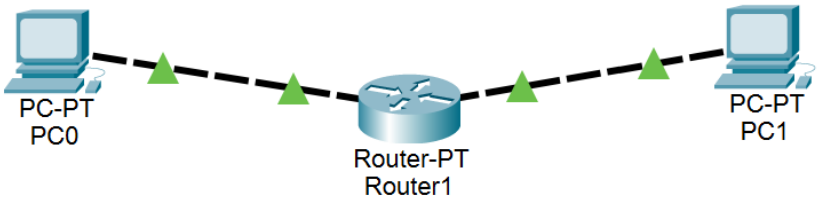
Now , ping the pc to the switch:



LEVEL 3 :

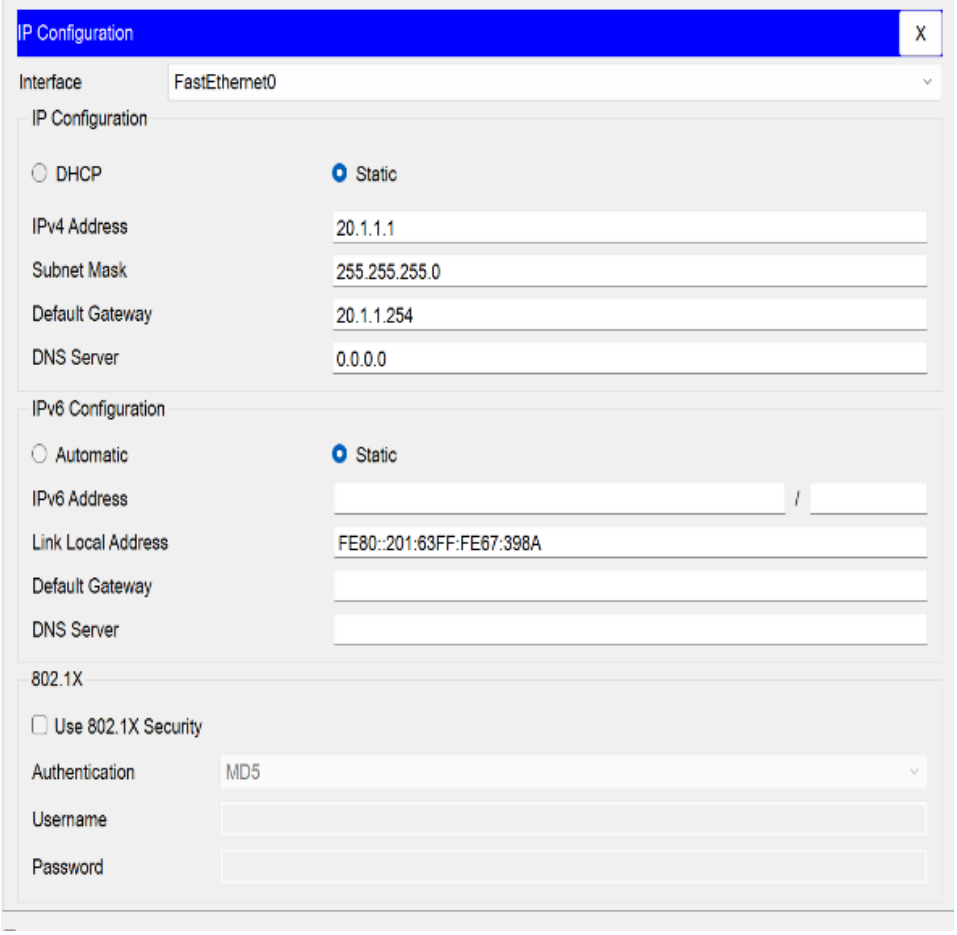
Step 1: Connect the PCs to the Router

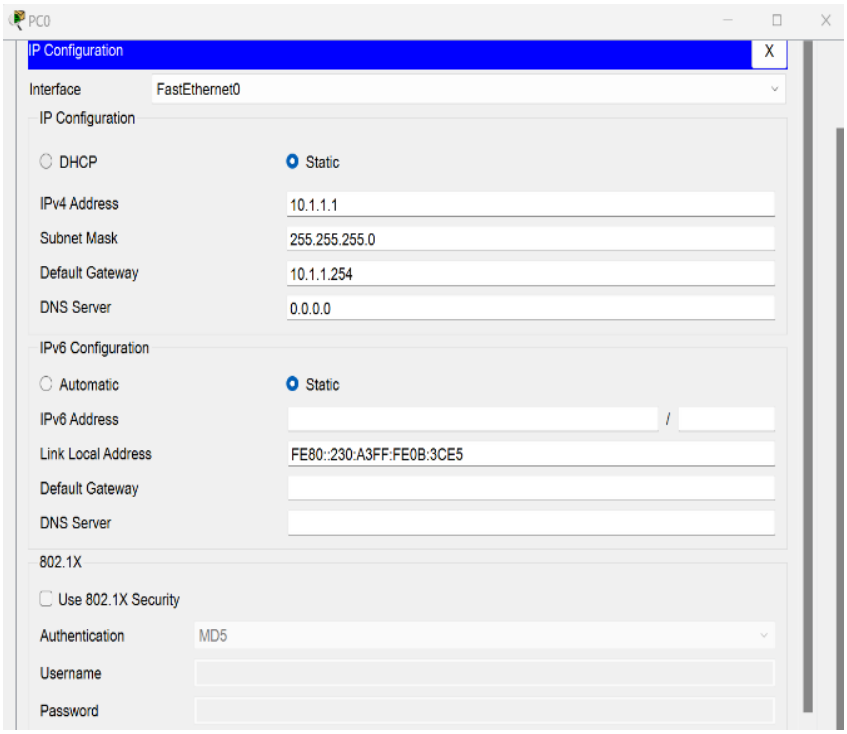
1. Physically connect PC0 to Router's interface Fa0/0.
2. Physically connect PC1 to Router's interface Fa0/1.



Step 2: Configure the Router Interfaces

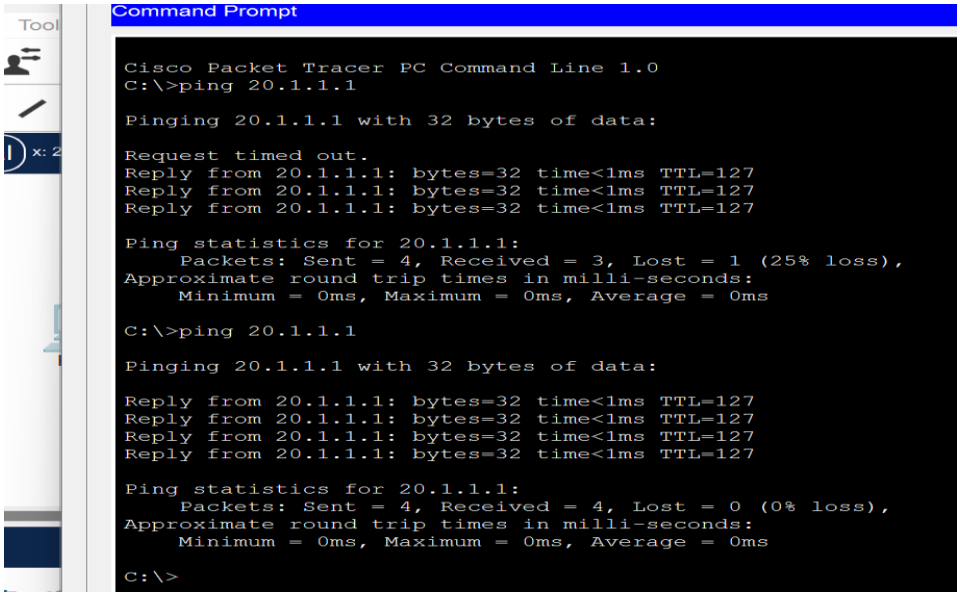
Step 3: Configure the PCs. Assign IP Address, Subnet Mask and Default Gateway Address





Step 4: Test Connectivity

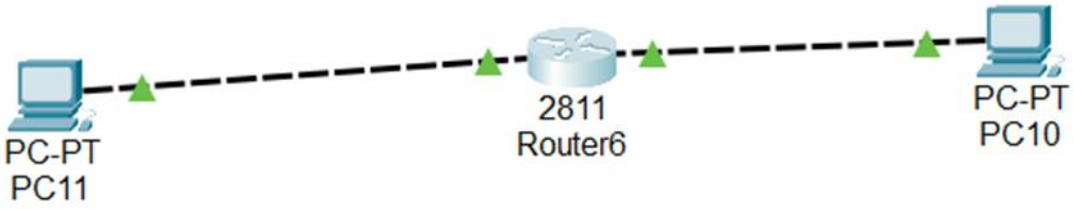
Ping from PC0 to PC1



Level 4:

Step 1: Setting Up the Network Devices

- Add the router and two PCs (PC11 and PC10) to the workspace.
- Connect the devices: Connect PC11 to the FastEthernet0/0 interface of the router and the computer using a straight-through cable. Connect PC10 to the FastEthernet0/1 interface of the router using a straight-through cable.



Step 2: Assigning IP addresses to PCs

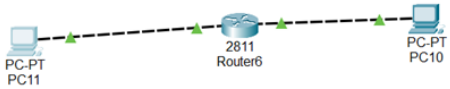
PC 11

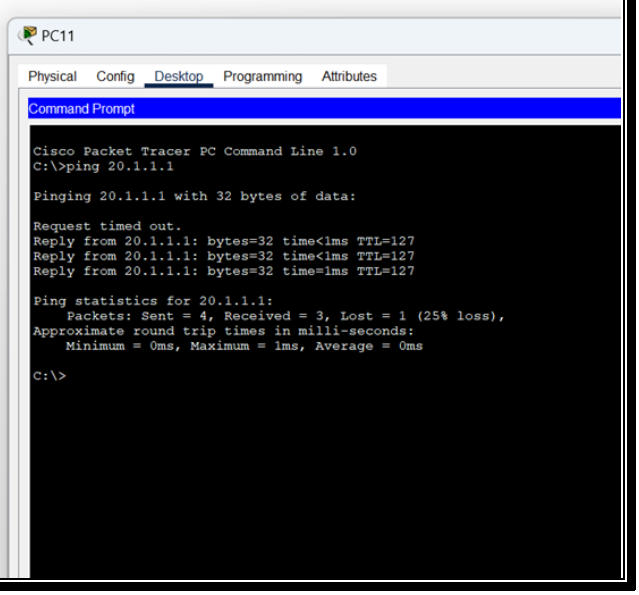
- IP Address: 10.1.1.1
- Subnet Mask: 255.255.255.0
- Default Gateway: 10.1.1.100 (Router's interface on the 10.1.1.0 network)

PC 10

- IP Address: 20.1.1.1
- Subnet Mask: 255.255.255.0
- Default Gateway: 20.1.1.100 (Router's interface on the 20.1.1.0 network)

Step 3:





- Above replies indicating the successful communication between the two networks.

- Summary of the router's interfaces, including their IP addresses and status.

STEP 4 :

When PC11 sends a packet to PC10, it forwards the packet to its default gateway (10.1.1.100). The router then routes the packet to the appropriate interface (FastEthernet0/1) to reach PC10, demonstrating how routers facilitate inter-network communication.

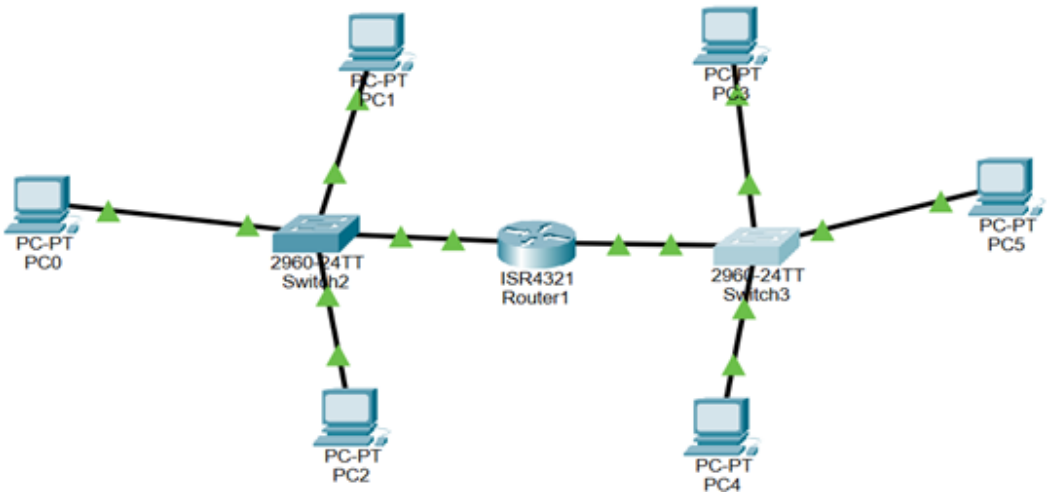
```
Router#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/0        10.1.1.100      YES manual up                    up
FastEthernet0/1        20.1.1.100      YES manual up                    up
Vlan1                  unassigned      YES unset  administratively down down
Router#
```

LEVEL 5 :

Step 1: Network Setup

1. **Hardware Setup**:

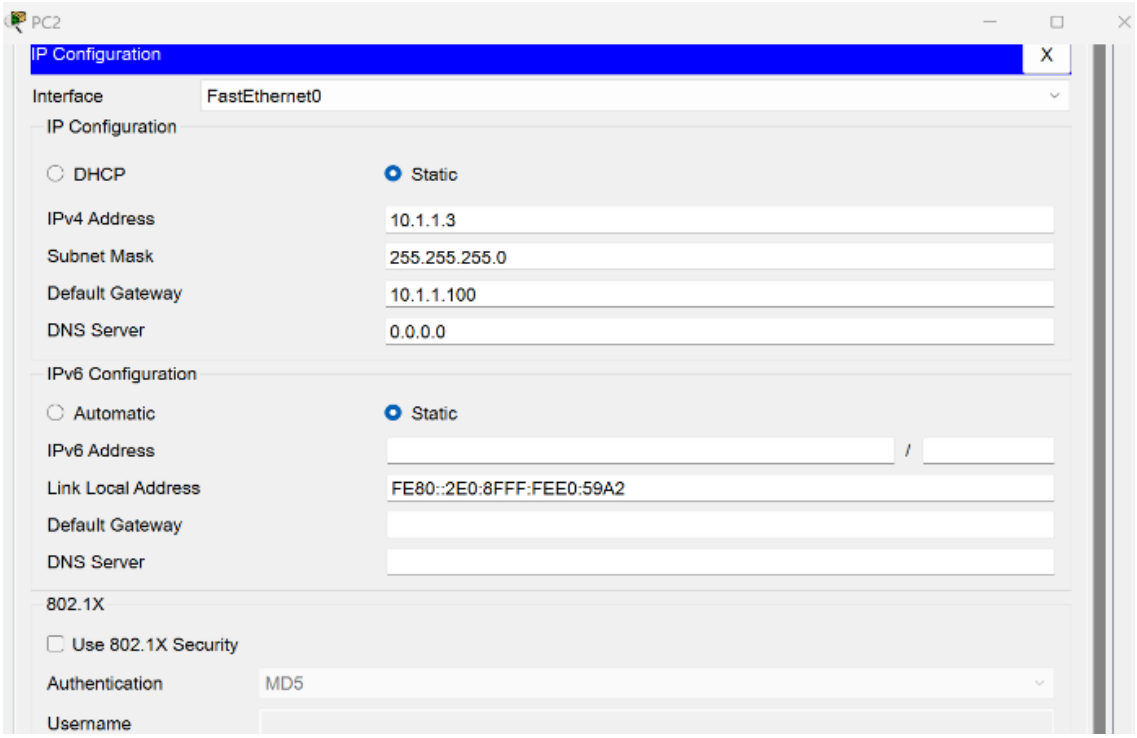
    - **Router**: Connect the router to the switch.
    - **Switch**: Connect the computers to the switch.

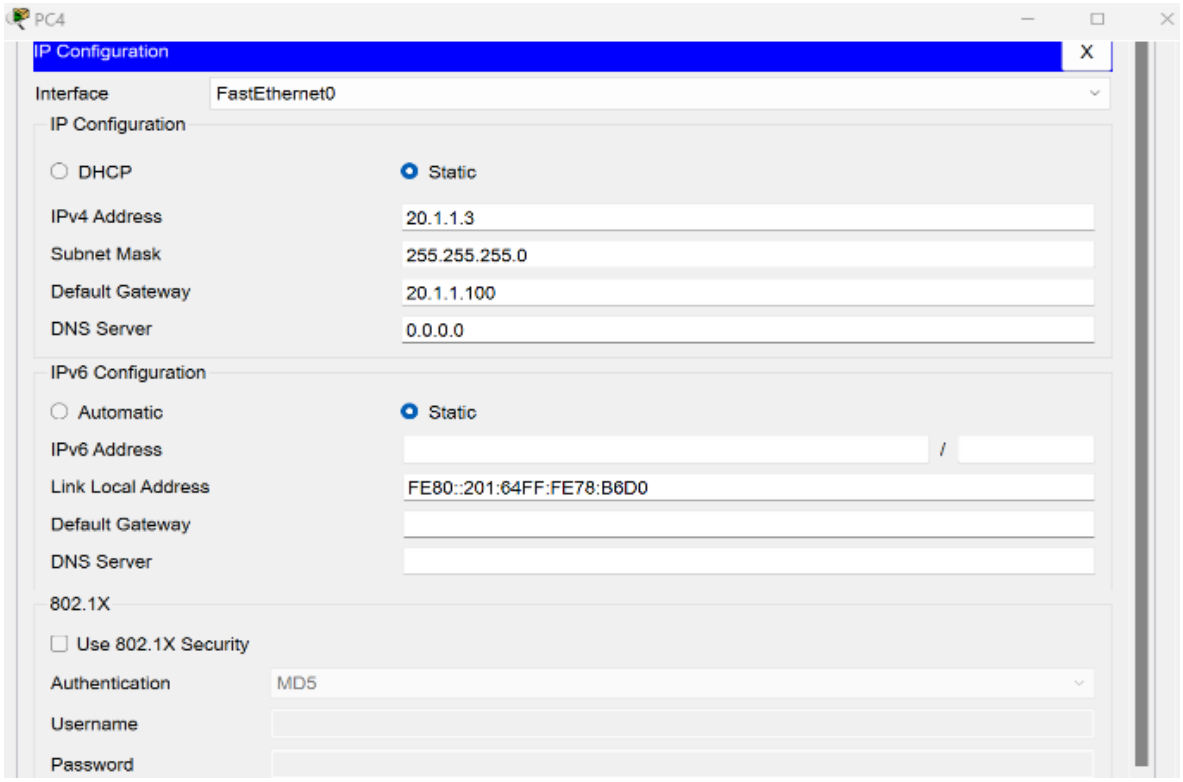


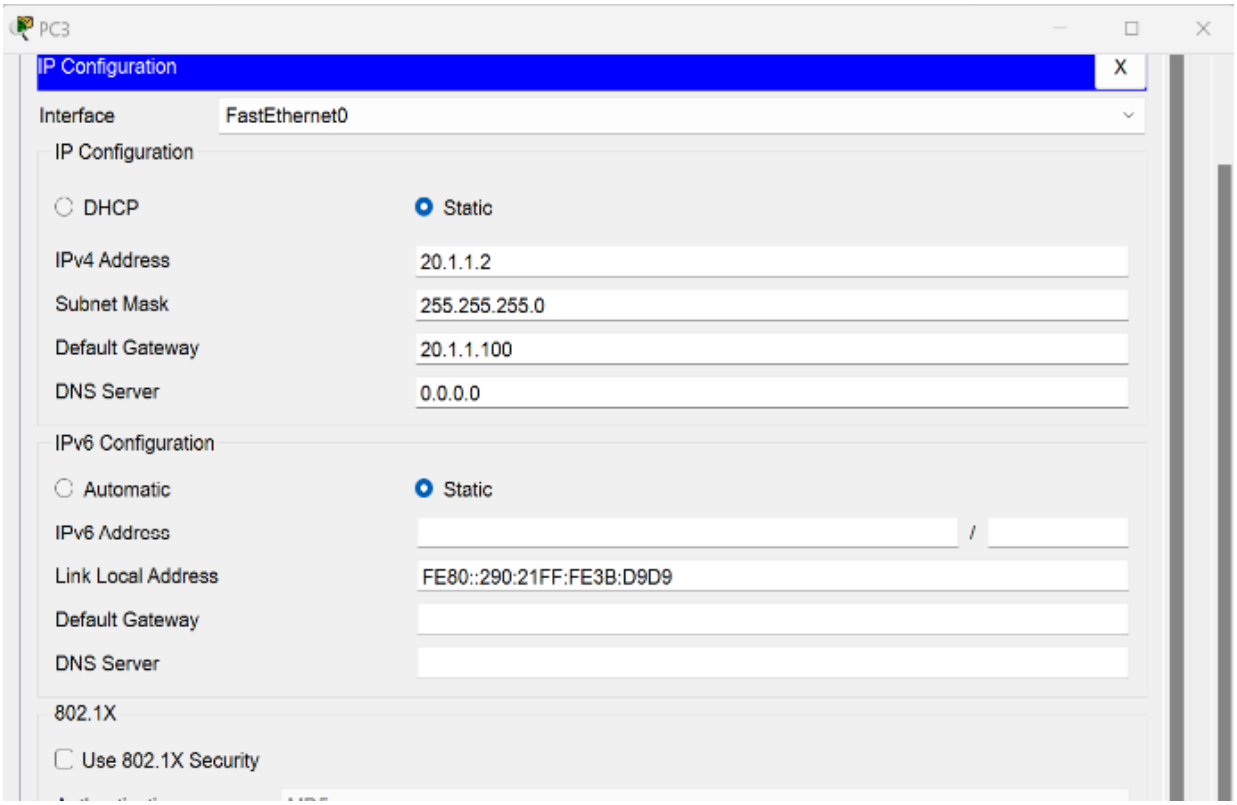
Step 2: Configuring the Router

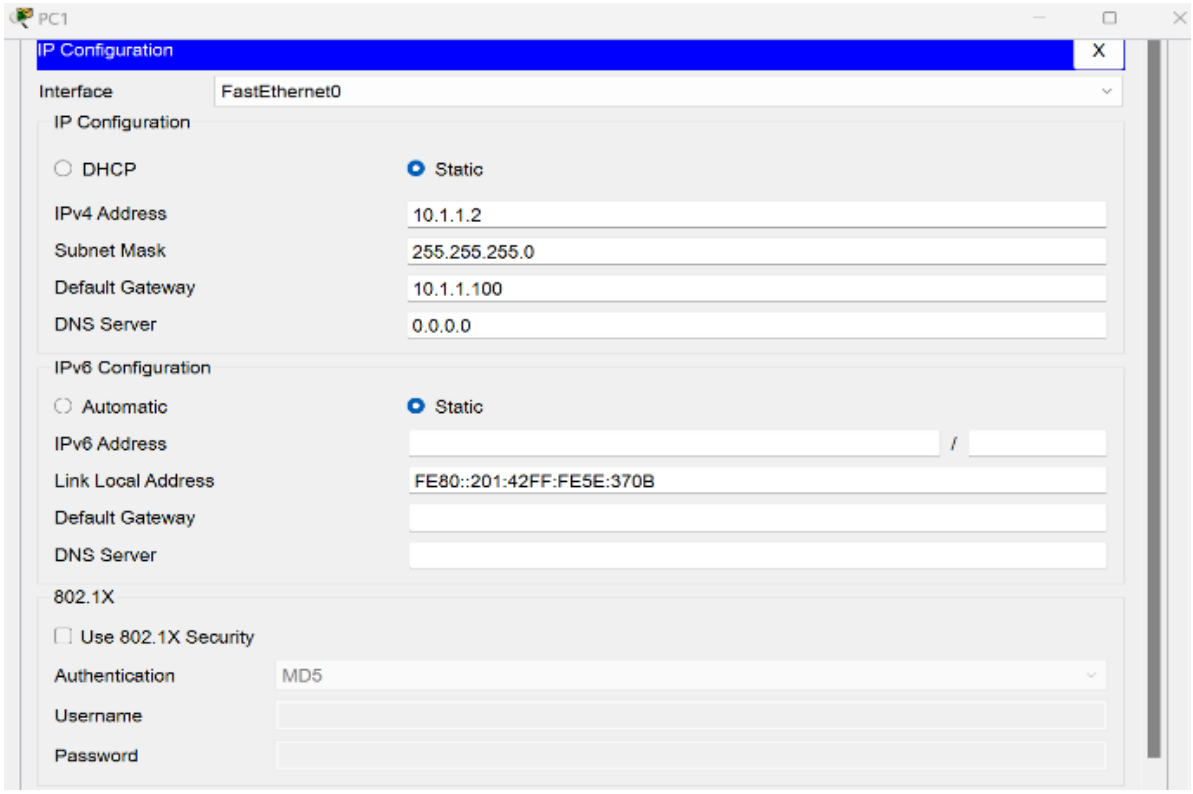
```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
%Invalid interface type and number
Router(config)#interface GigabitEthernet0/0/0
Router(config-if)#ip address 10.1.1.100 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up

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

Router(config-if)#interface GigabitEthernet0/0/1
Router(config-if)#ip address 20.1.1.100 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up

Router(config-if)#exit
Router(config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#write memory
Building configuration...
```

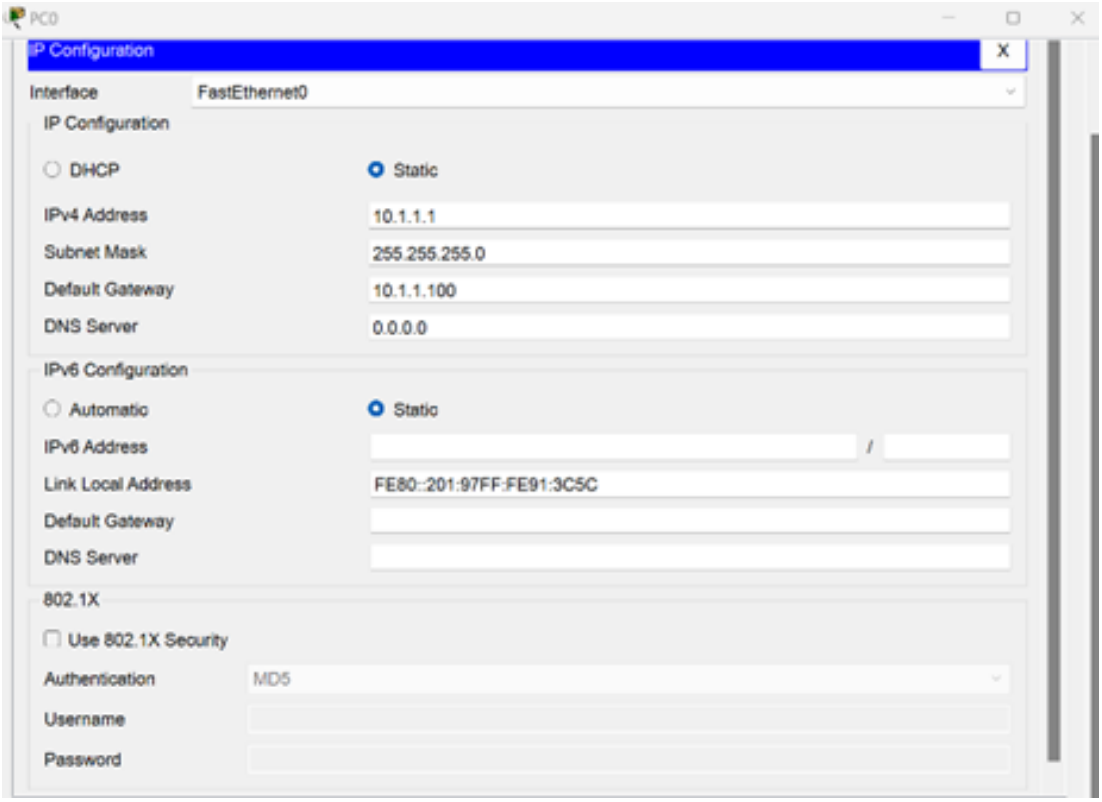
Step 3: Configuring the PCs

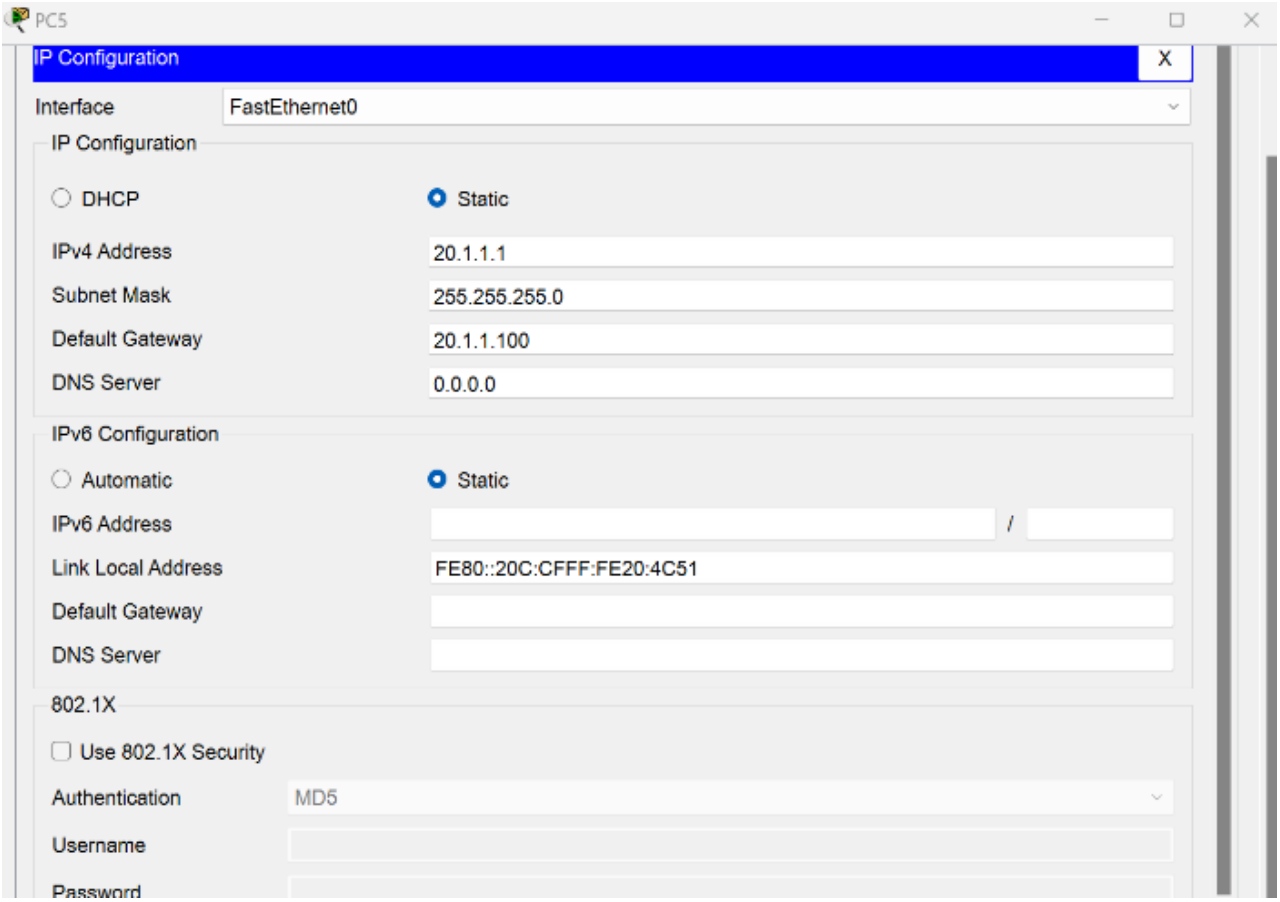





PC3
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
20.1.1.2
Subnet Mask
255.255.255.0
Default Gateway
20.1.1.100
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::290:21FF:FE3B:D9D9
Default Gateway
DNS Server
802.1X
Use 802.1X Security

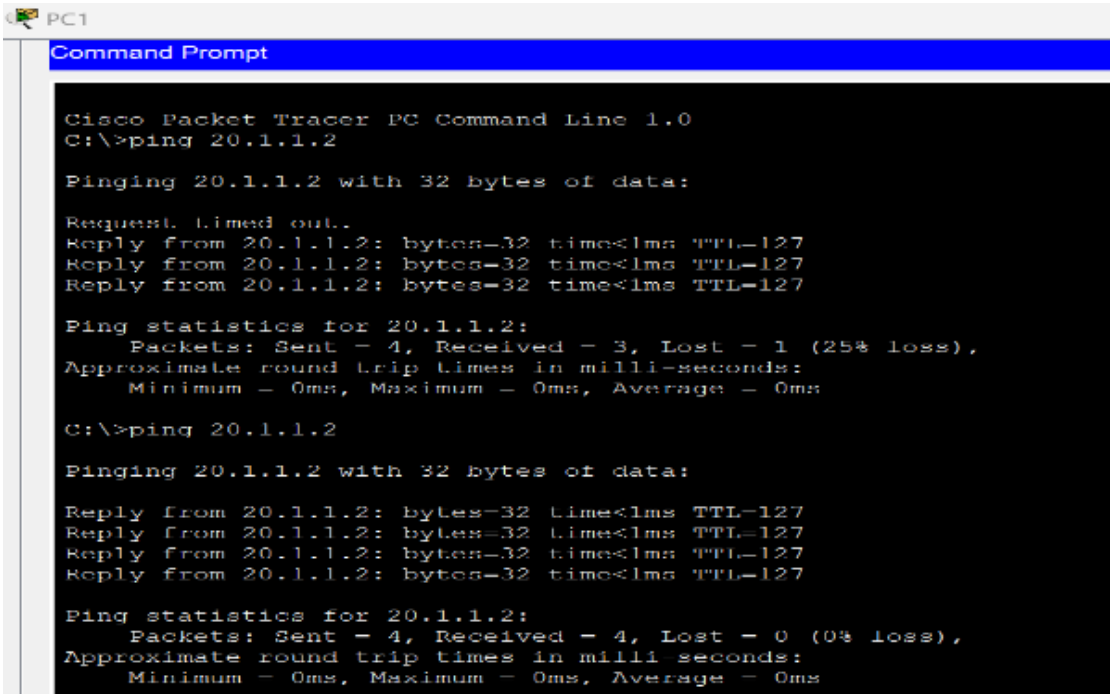

PC1
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
10.1.1.2
Subnet Mask
255.255.255.0
Default Gateway
10.1.1.100
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::201:42FF:FE5E:370B
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password


PC0
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
10.1.1.1
Subnet Mask
255.255.255.0
Default Gateway
10.1.1.100
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::201:97FF:FE91:3C5C
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password

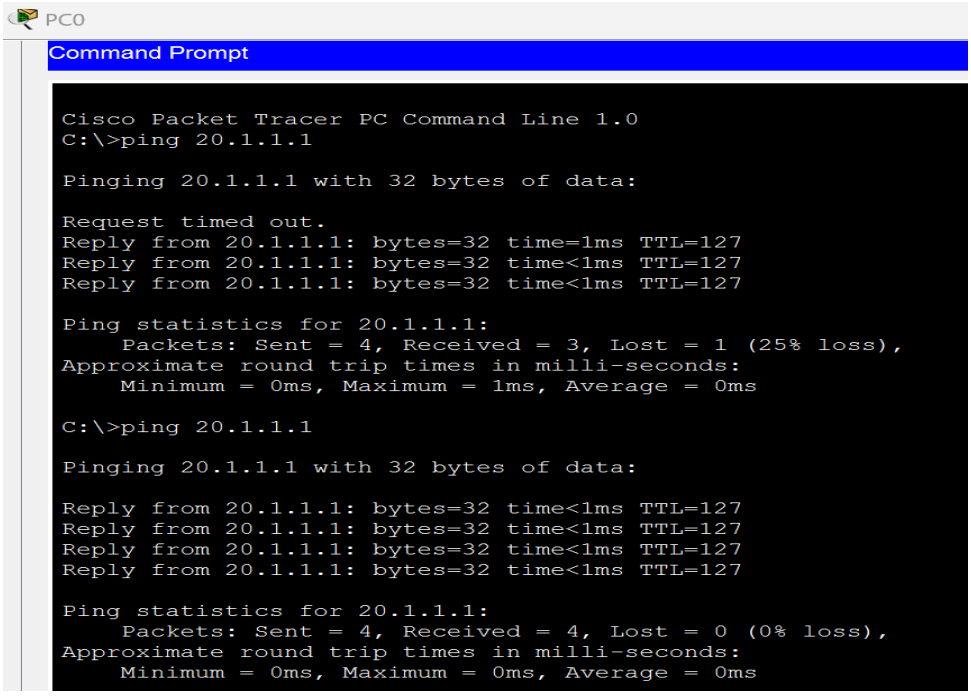

PC5
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
20.1.1.1
Subnet Mask
255.255.255.0
Default Gateway
20.1.1.100
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::20C:CFFF:FE20:4C51
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password

Step 4: Testing Connectivity

1. **Ping from PC1 to PC3:**



2. **Ping from PC0 to PC5:**



Step 5: Analyzing Network Tables

- The routing table contains information about network routes and determines the best path for forwarding packets between the networks.

ARP Table on the Router:

```
Router>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
S       10.1.1.0 [1/0] via 20.1.1.1
     20.0.0.0/24 is subnetted, 1 subnets
C       20.1.1.0 is directly connected, FastEthernet1/0
     30.0.0.0/24 is subnetted, 1 subnets
C       30.1.1.0 is directly connected, FastEthernet2/0
     40.0.0.0/24 is subnetted, 1 subnets
C       40.1.1.0 is directly connected, FastEthernet0/0
     50.0.0.0/24 is subnetted, 1 subnets
S       50.1.1.0 [1/0] via 40.1.1.2
```

```
Router>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
S       10.1.1.0 [1/0] via 40.1.1.1
     20.0.0.0/24 is subnetted, 1 subnets
S       20.1.1.0 [1/0] via 40.1.1.1
     30.0.0.0/24 is subnetted, 1 subnets
S       30.1.1.0 [1/0] via 40.1.1.1
     40.0.0.0/24 is subnetted, 1 subnets
C       40.1.1.0 is directly connected, FastEthernet0/0
     50.0.0.0/24 is subnetted, 1 subnets
C       50.1.1.0 is directly connected, FastEthernet1/0
```

MAC Table on the Switch:

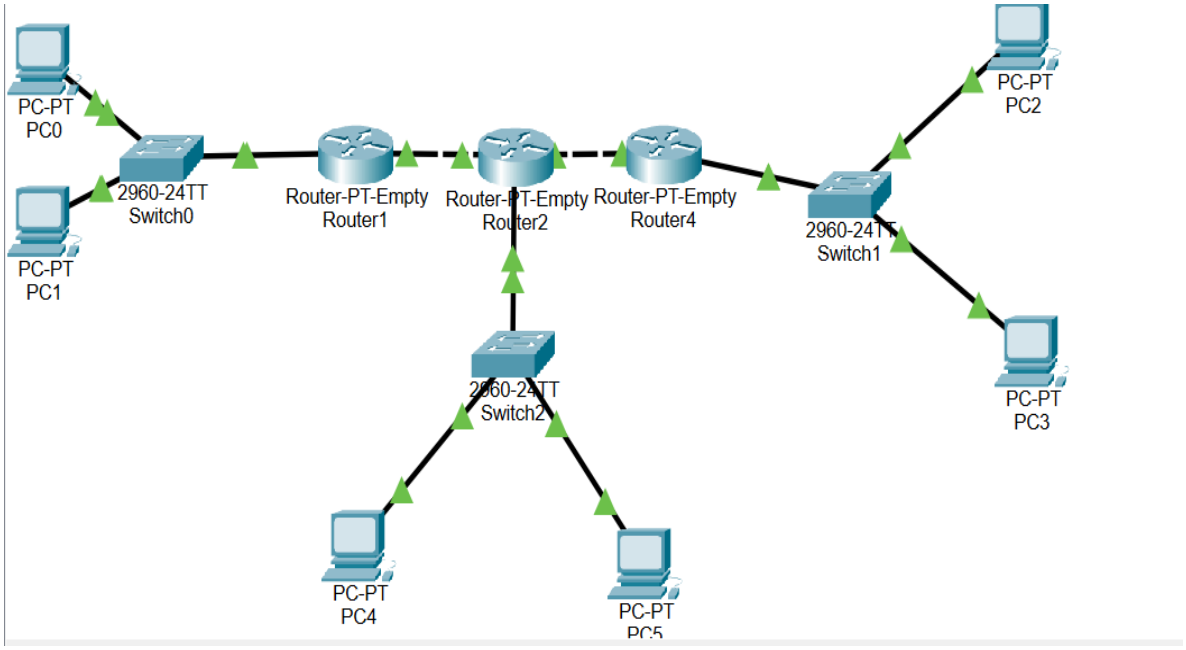
```
Switch>show mac address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    0001.425e.370b    DYNAMIC     Fa0/1
   1    0001.9791.3c5c    DYNAMIC     Fa0/2
   1    0060.5c76.1701    DYNAMIC     Gig0/1
   1    00e0.8fe0.59a2    DYNAMIC     Fa0/3
```

```
Switch>show mac address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    0001.6478.b6d0    DYNAMIC     Fa0/2
   1    000c.cf20.4c51    DYNAMIC     Fa0/3
   1    0060.5c76.1702    DYNAMIC     Gig0/1
   1    0090.213b.d9d9    DYNAMIC     Fa0/1
```

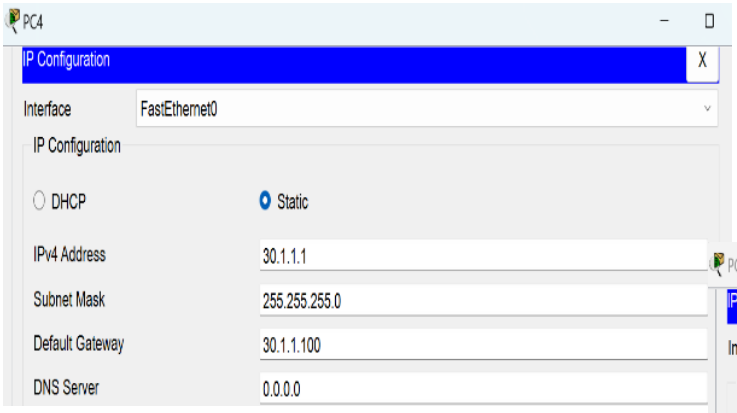
LEVEL 6: Configuring Static Routes and Examining the RIB

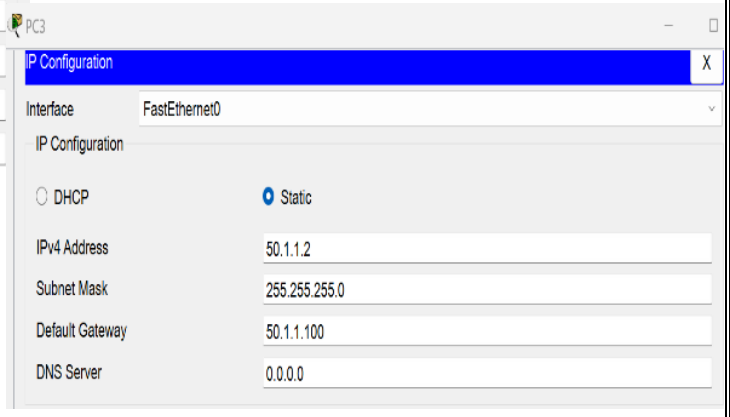
1. Establishing Initial Network Setup

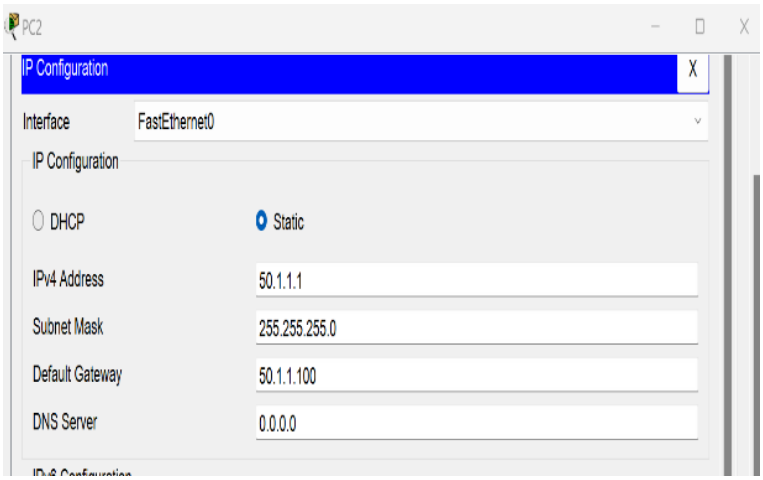
- Connect the devices (routers, switches, and end devices) using Cisco Packet Tracer.
- Assign IP addresses to the interfaces on each router and end device according to the network design.

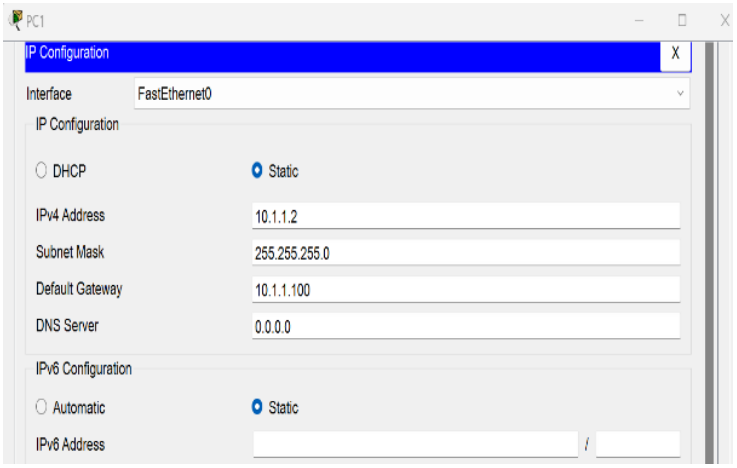


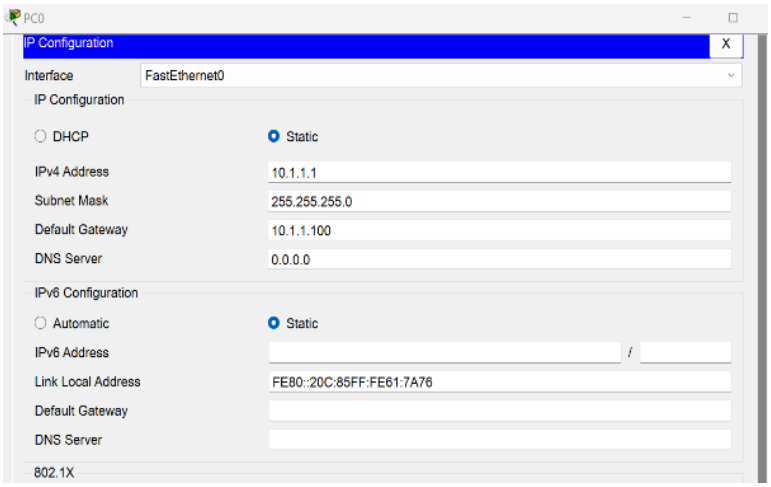
Step 2: Configuring the PCs

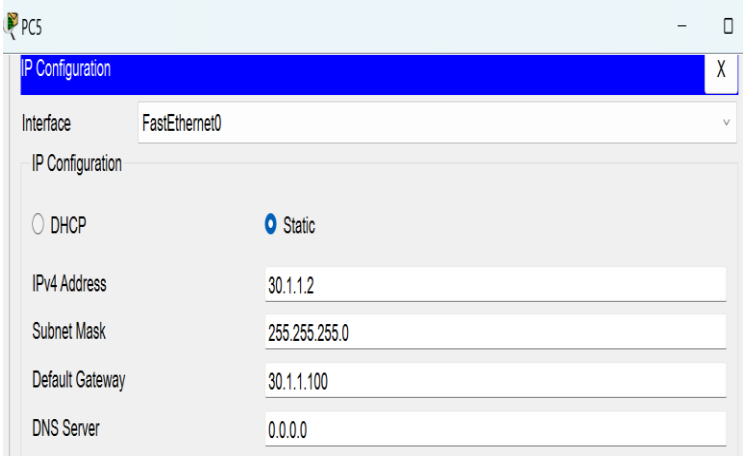




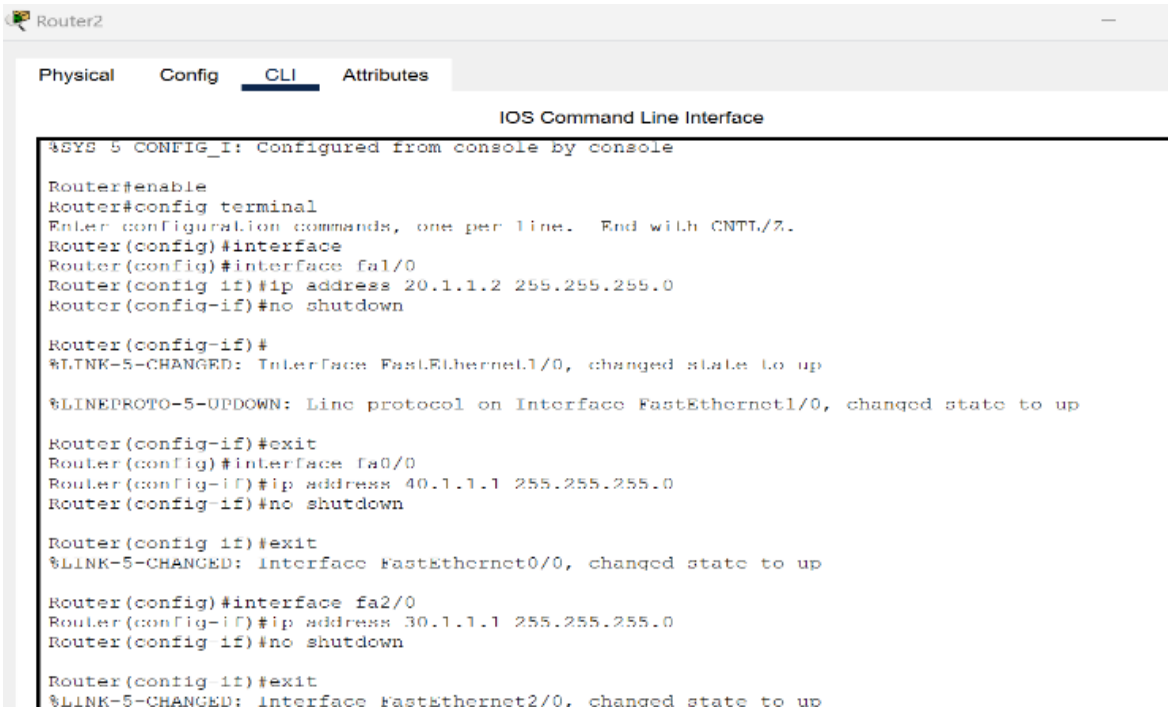

PC2
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
50.1.1.1
Subnet Mask
255.255.255.0
Default Gateway
50.1.1.100
DNS Server
0.0.0.0

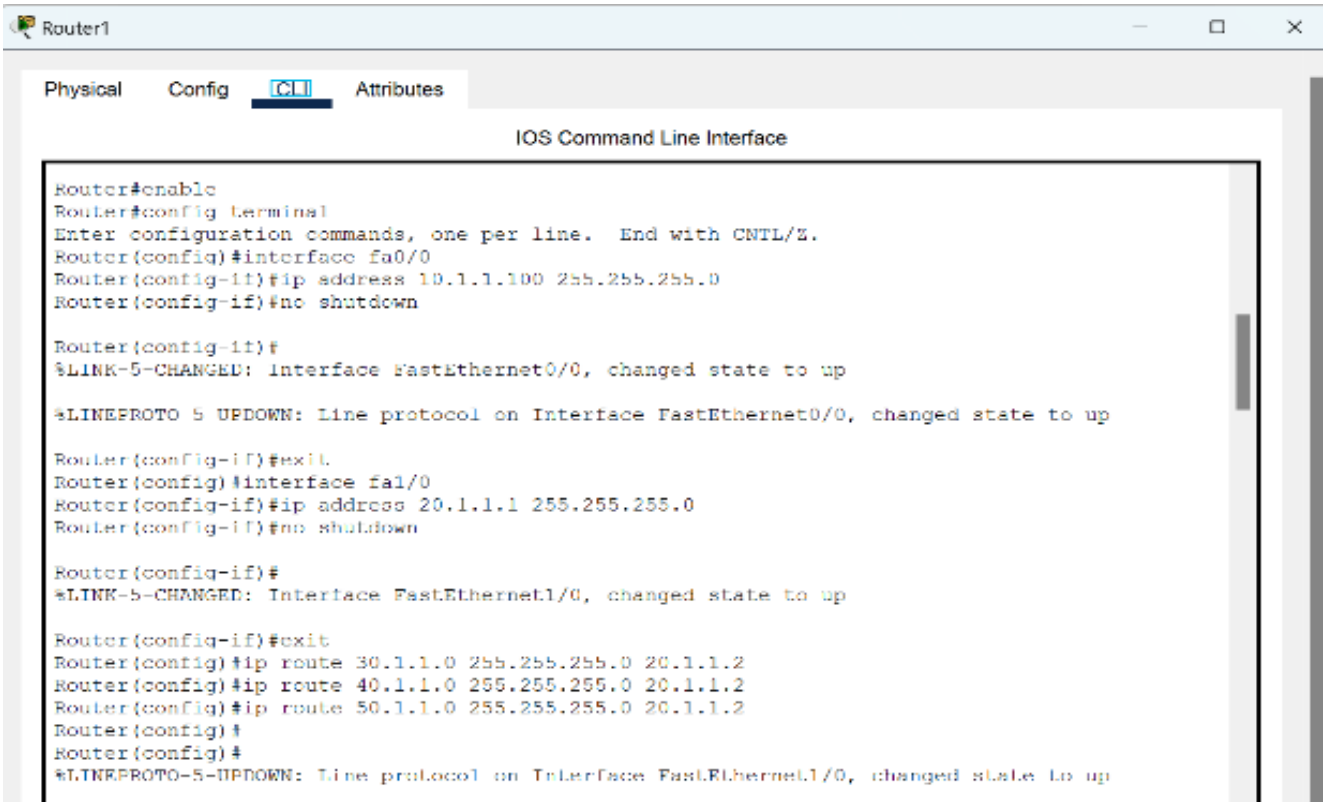

PC1
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
10.1.1.2
Subnet Mask
255.255.255.0
Default Gateway
10.1.1.100
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address


PC0
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
10.1.1.1
Subnet Mask
255.255.255.0
Default Gateway
10.1.1.100
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::20C:85FF:FE61:7A76
Default Gateway
DNS Server
802.1X


PC5
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
30.1.1.2
Subnet Mask
255.255.255.0
Default Gateway
30.1.1.100
DNS Server
0.0.0.0

STEP 3 : Configuring Static Routes





```
Router>enable
Router#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface fa0/0
Router(config-if)#ip address 40.1.1.2 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#exit
%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)#interface fa1/0
Router(config-if)#ip address 50.1.1.100 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#exit
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up
```

STEP 4 :

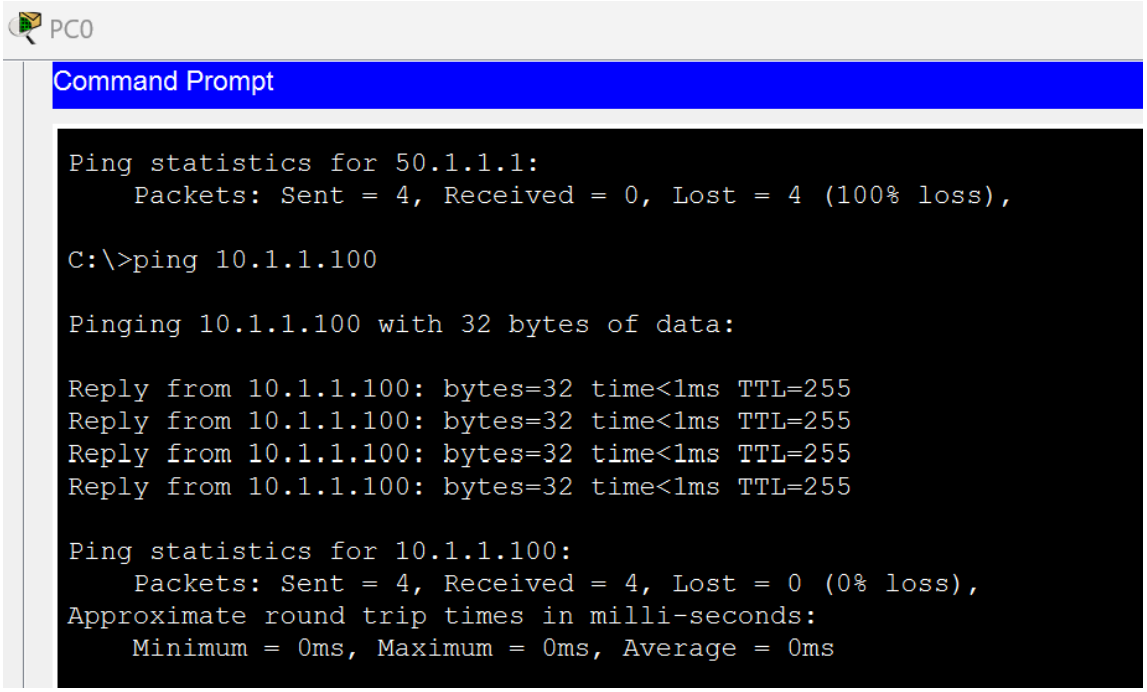
Use the show ip route command to display the routing table.

```
Router>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
S       10.1.1.0 [1/0] via 20.1.1.1
     20.0.0.0/24 is subnetted, 1 subnets
C       20.1.1.0 is directly connected, FastEthernet1/0
     30.0.0.0/24 is subnetted, 1 subnets
C       30.1.1.0 is directly connected, FastEthernet2/0
     40.0.0.0/24 is subnetted, 1 subnets
C       40.1.1.0 is directly connected, FastEthernet0/0
     50.0.0.0/24 is subnetted, 1 subnets
S       50.1.1.0 [1/0] via 40.1.1.2
```

```
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
C       10.1.1.0 is directly connected, FastEthernet0/0
     20.0.0.0/24 is subnetted, 1 subnets
C       20.1.1.0 is directly connected, FastEthernet1/0
     30.0.0.0/24 is subnetted, 1 subnets
S       30.1.1.0 [1/0] via 10.1.1.100
                 [1/0] via 20.1.1.2
     40.0.0.0/24 is subnetted, 1 subnets
S       40.1.1.0 [1/0] via 10.1.1.100
                 [1/0] via 20.1.1.2
     50.0.0.0/24 is subnetted, 1 subnets
S       50.1.1.0 [1/0] via 10.1.1.100
                 [1/0] via 20.1.1.2
```

```
Router>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
S       10.1.1.0 [1/0] via 40.1.1.1
     20.0.0.0/24 is subnetted, 1 subnets
S       20.1.1.0 [1/0] via 40.1.1.1
     30.0.0.0/24 is subnetted, 1 subnets
S       30.1.1.0 [1/0] via 40.1.1.1
     40.0.0.0/24 is subnetted, 1 subnets
C       40.1.1.0 is directly connected, FastEthernet0/0
     50.0.0.0/24 is subnetted, 1 subnets
C       50.1.1.0 is directly connected, FastEthernet1/0
```

STEP 5: Testing Connectivity

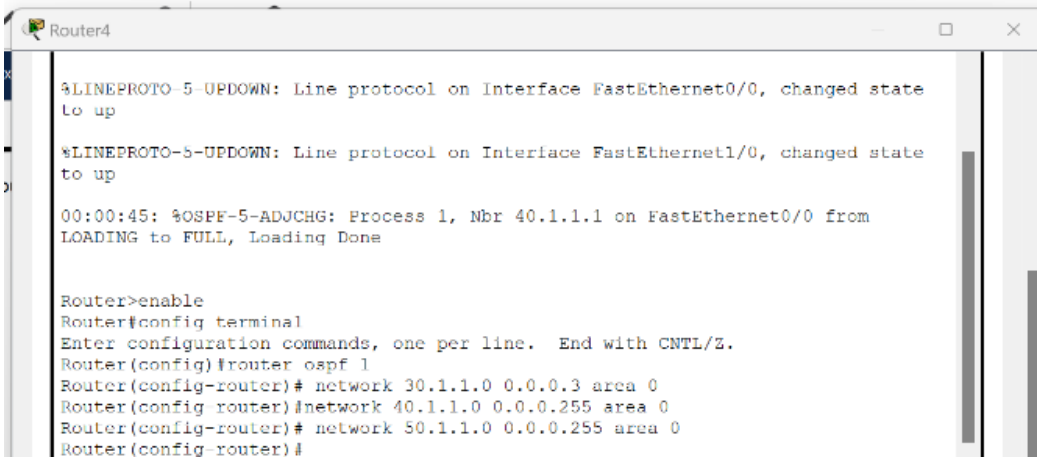


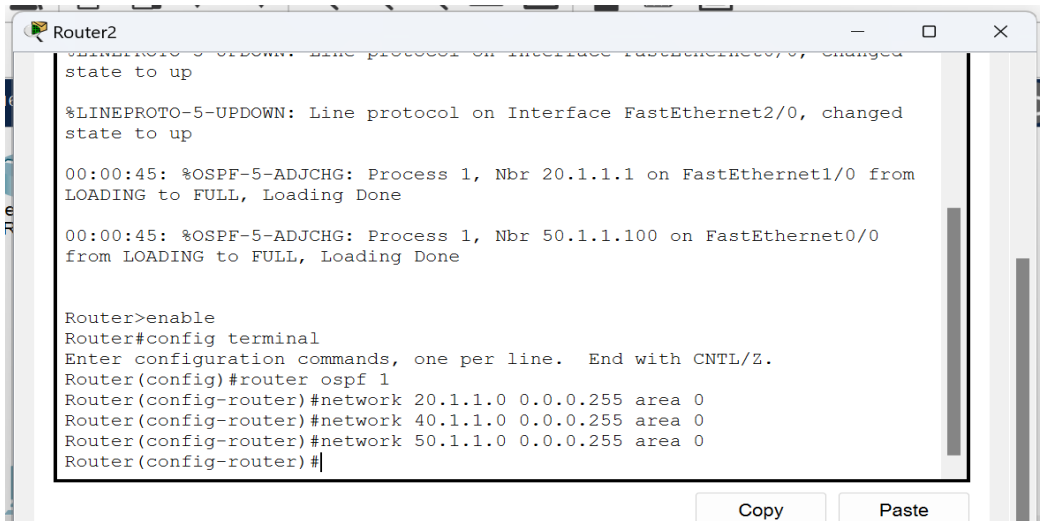
LEVEL 7: Network Topology

The network topology remains the same as in Level 6. Refer to the provided network diagram for the IP addressing and network structure.

Step 1: Enable OSPF on Each Router

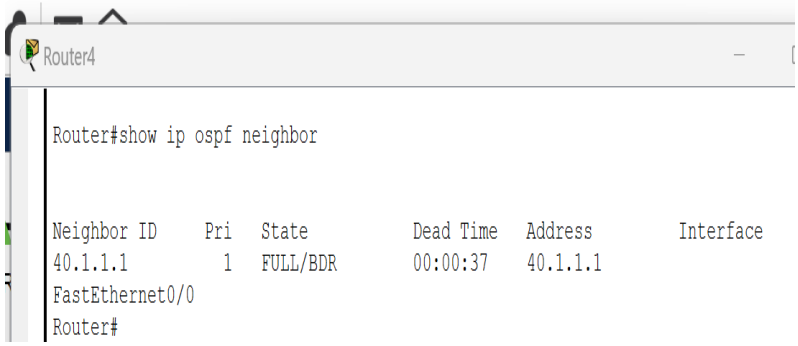
```
Router(config)#router ospf 1
Router(config-router)#network 10.1.1.0 0.0.0.255 area 0
Router(config-router)#network 30.1.1.0 0.0.0.3 area 0
Router(config-router)#network 20.1.1.0 0.0.0.255 area 0
```

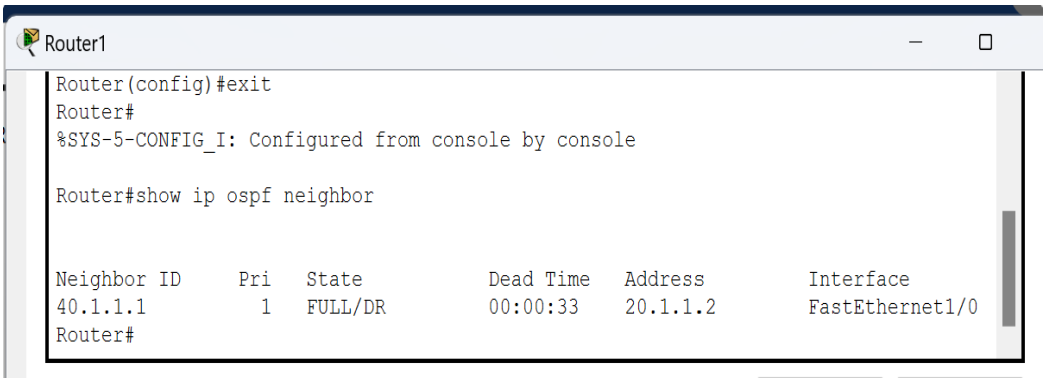


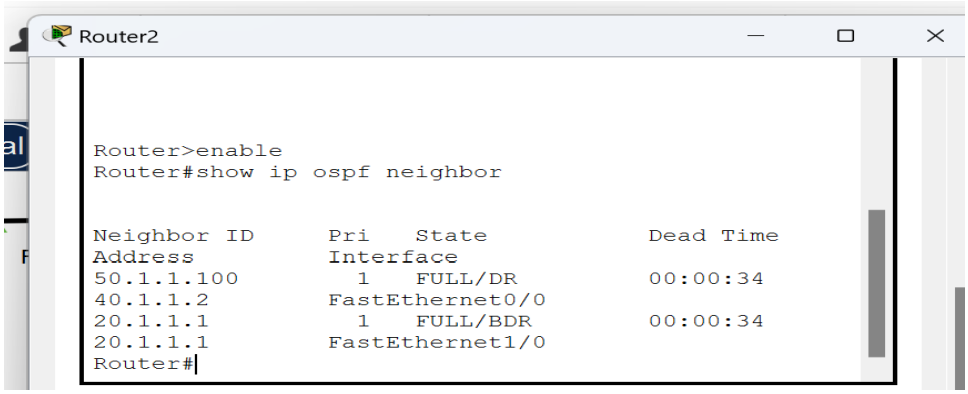


Step 2: Verify OSPF Configuration

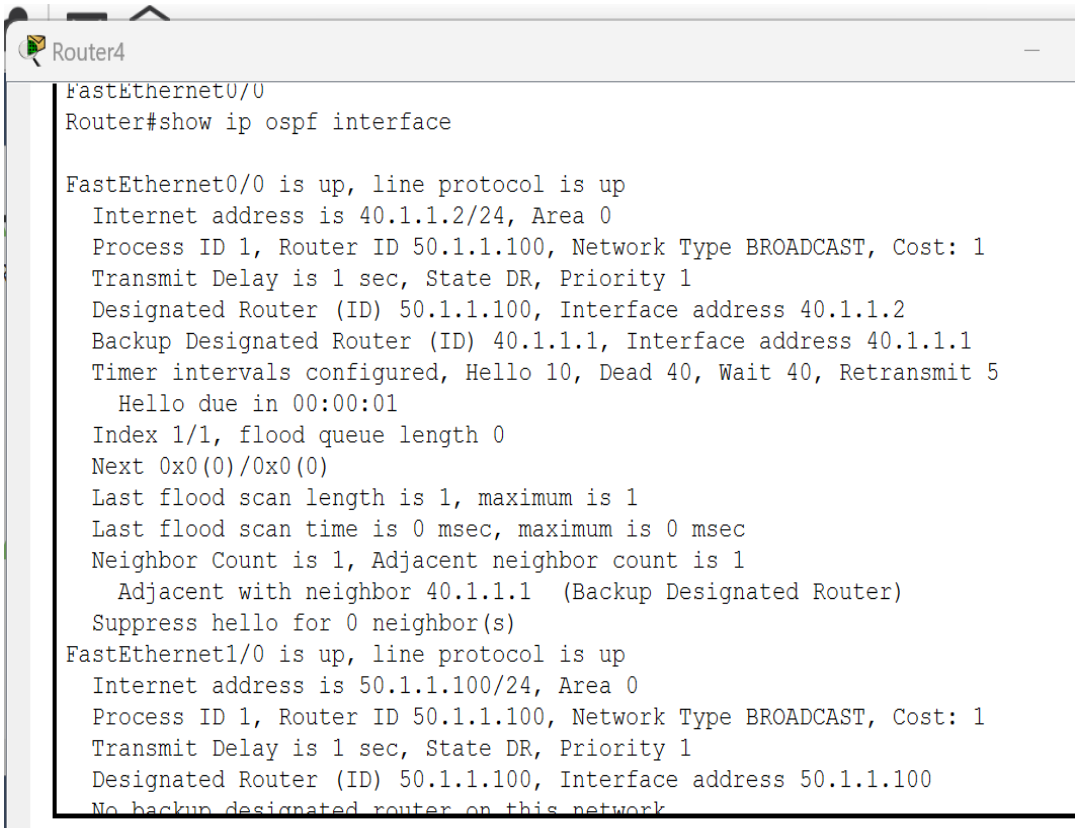
1. Check OSPF Neighbors

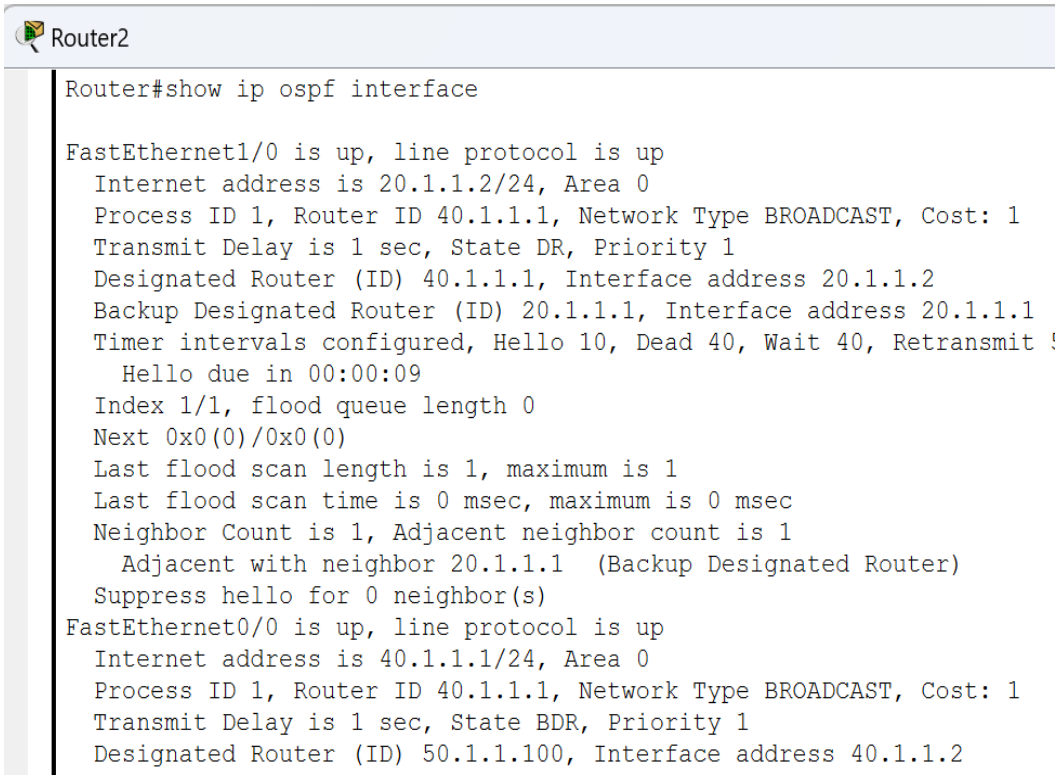


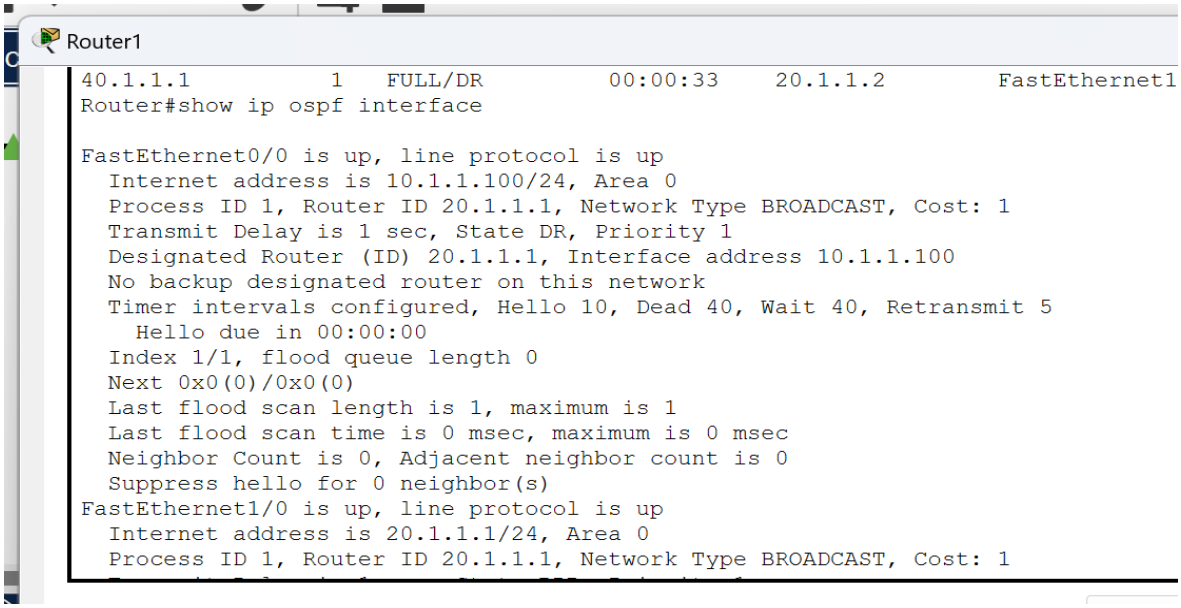




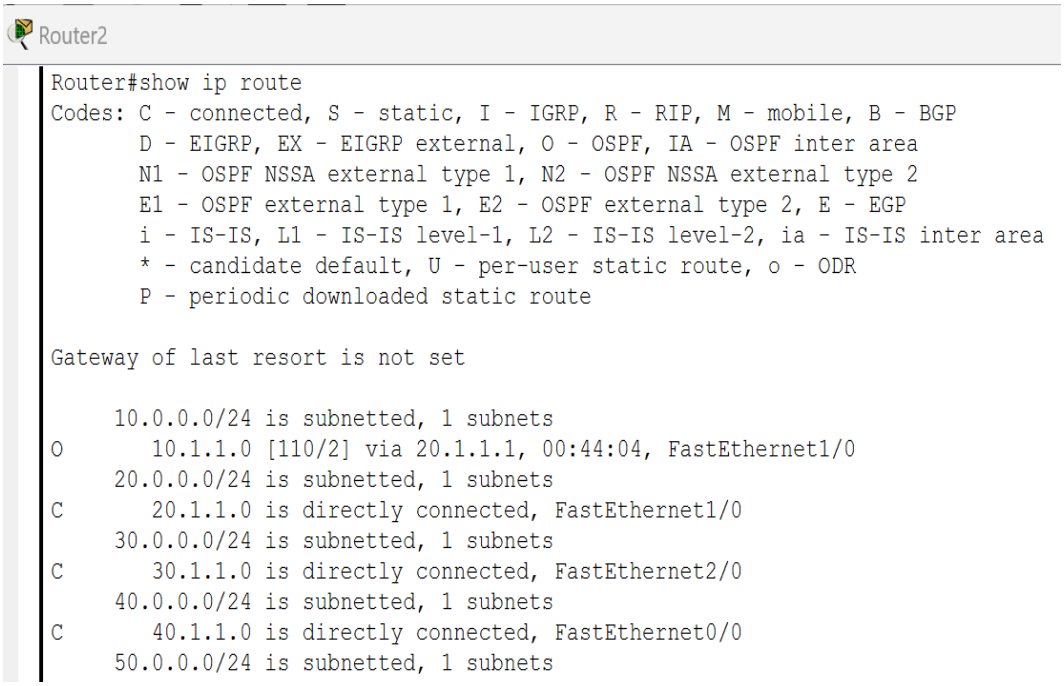
2. Check OSPF Interface States







3. Check the Routing Table



Router4

```
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter
area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
O       10.1.1.0 [110/3] via 40.1.1.1, 00:44:45, FastEthernet0/0
     20.0.0.0/24 is subnetted, 1 subnets
O       20.1.1.0 [110/2] via 40.1.1.1, 00:44:45, FastEthernet0/0
     40.0.0.0/24 is subnetted, 1 subnets
C       40.1.1.0 is directly connected, FastEthernet0/0
     50.0.0.0/24 is subnetted, 1 subnets
C       50.1.1.0 is directly connected, FastEthernet1/0
```

Router1

```
Router>enable
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
C       10.1.1.0 is directly connected, FastEthernet0/0
     20.0.0.0/24 is subnetted, 1 subnets
C       20.1.1.0 is directly connected, FastEthernet1/0
     40.0.0.0/24 is subnetted, 1 subnets
O       40.1.1.0 [110/2] via 20.1.1.2, 00:43:14, FastEthernet1/0
     50.0.0.0/24 is subnetted, 1 subnets
O       50.1.1.0 [110/3] via 20.1.1.2, 00:43:14, FastEthernet1/0
```

Step 3: Testing Connectivity

PC0

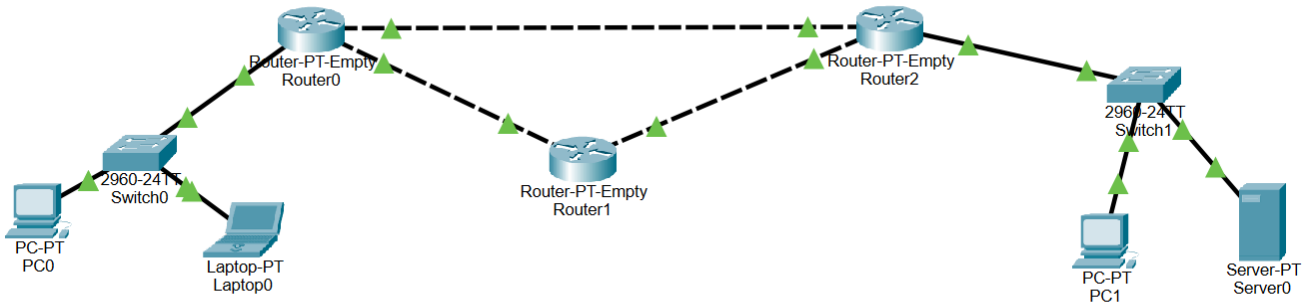
Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 50.1.1.1

Pinging 50.1.1.1 with 32 bytes of data:

Request timed out.
Reply from 50.1.1.1: bytes=32 time<1ms TTL=125
Reply from 50.1.1.1: bytes=32 time<1ms TTL=125
Reply from 50.1.1.1: bytes=32 time<1ms TTL=125

Ping statistics for 50.1.1.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

LEVEL 8 :

1. Establishing Initial Network Setup

- Connect the devices (routers, switches, and end devices) using Cisco Packet Tracer.
- Assign IP addresses to the interfaces on each router and end device according to the network design.



Step 1: Configure OSPF on Each Router

1. Router R1 Configuration

```
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 0.0.0.3 area 0
Router(config-router)# network 172.16.0.0 0.0.0.3 area 0
```

2. Router R2 Configuration

```
Router(config)# router ospf 1
Router(config-router)# network 172.16.0.0 0.0.0.3 area 0
Router(config-router)# network 192.168.2.0 0.0.0.255 area 0
Router(config-router)# network 10.0.0.4 0.0.0.3 area 0
```

3. Router R3 Configuration

```
Router(config)# router ospf 1
```

```
Router(config-router)# network 192.168.2.0 0.0.0.255 area 0
Router(config-router)# network 192.168.3.0 0.0.0.255 area 0
Router(config-router)# network 10.0.0.4 0.0.0.3 area 0
```

Step 2: Configure OSPF Cost for Primary and Backup Paths

1. Router R1 Configuration

```
Router(config)# interface Fa0/1
Router(config-if)# ip ospf cost 10
```

2. Router R2 Configuration

```
Router(config)# interface Fa1/1
Router(config-if)# ip ospf cost 100
```

Step 3: Verify OSPF Configuration

Use the following commands to verify the OSPF configuration and routing table.

1. Check OSPF Neighbors

```
Router# show ip ospf neighbor
```

2. Check OSPF Interface States

```
Router# show ip ospf interface
```

3. Check the Routing Table

```
Router# show ip route
```

Step 4: Capture Packet Flow

Before shutting down the primary link, capture the packet flow using a packet capture tool like Wireshark or the built-in capture feature in network simulation tools.

Step 5: Simulate Primary Path Failure

1. Shutdown Interface Fa0/1 on Router R1

Router(config)# interface Fa0/1
Router(config-if)# shutdown

Step 6: Observe Dynamic Rerouting

After shutting down the primary path, observe the packet flow and routing table to verify that OSPF has dynamically rerouted packets through the backup path.

1. Check the Updated Routing Table

Router# show ip route

2. Ping to Verify Connectivity

PC0> ping 192.168.3.1
PC1> ping 192.168.1.1