

CISCO VIRTUAL INTERNSHIP

ASSIGNMENT

SUBMITTED BY:

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BRANCH: COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)

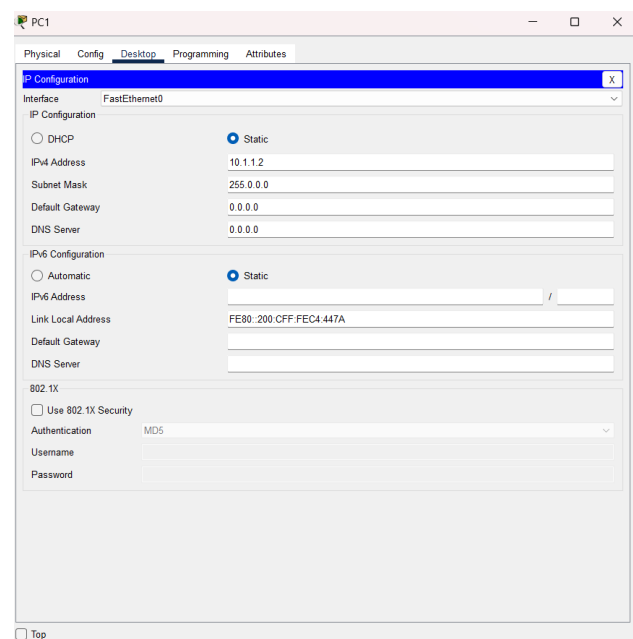
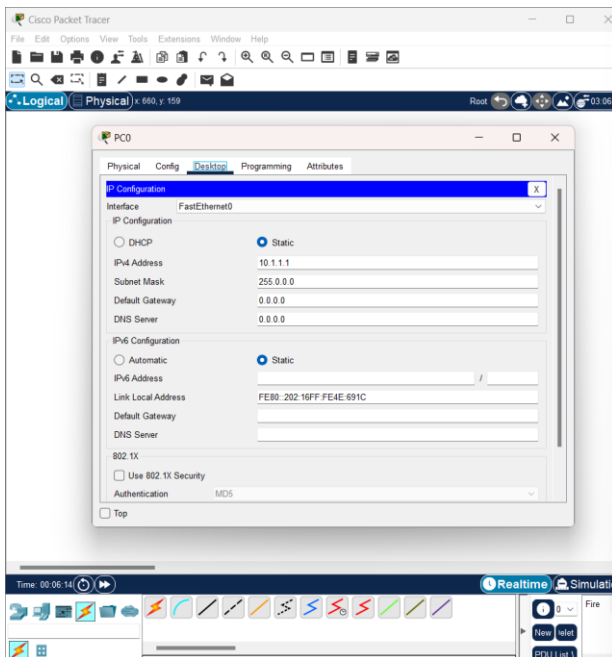
AICTE ID : STU626a5ceb752081651137771

STUDENT NETACAD ID : 1058951630

LEVEL 1 : Steps to Establish Connection and Test Communication

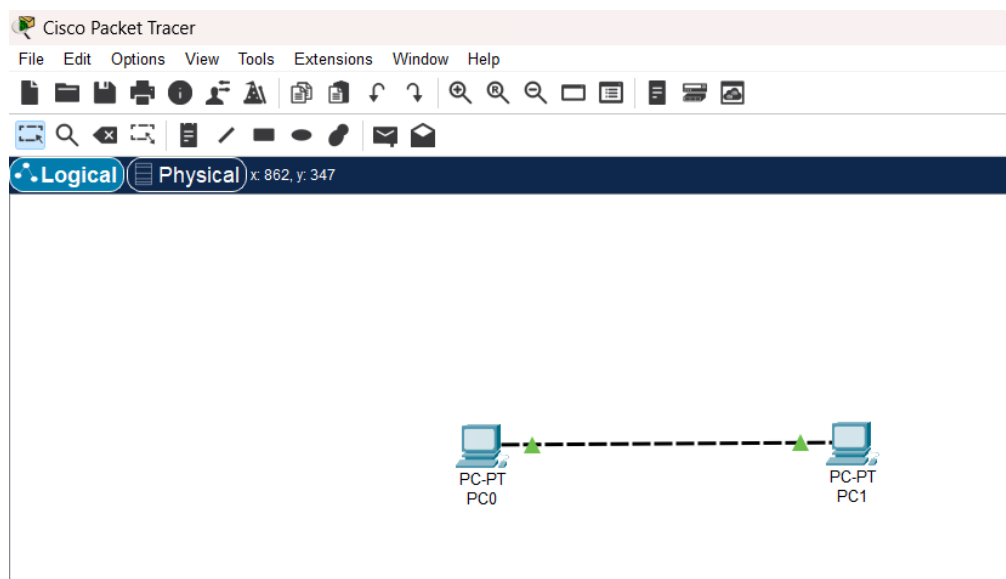
1. Assign IP Addresses:

- 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).

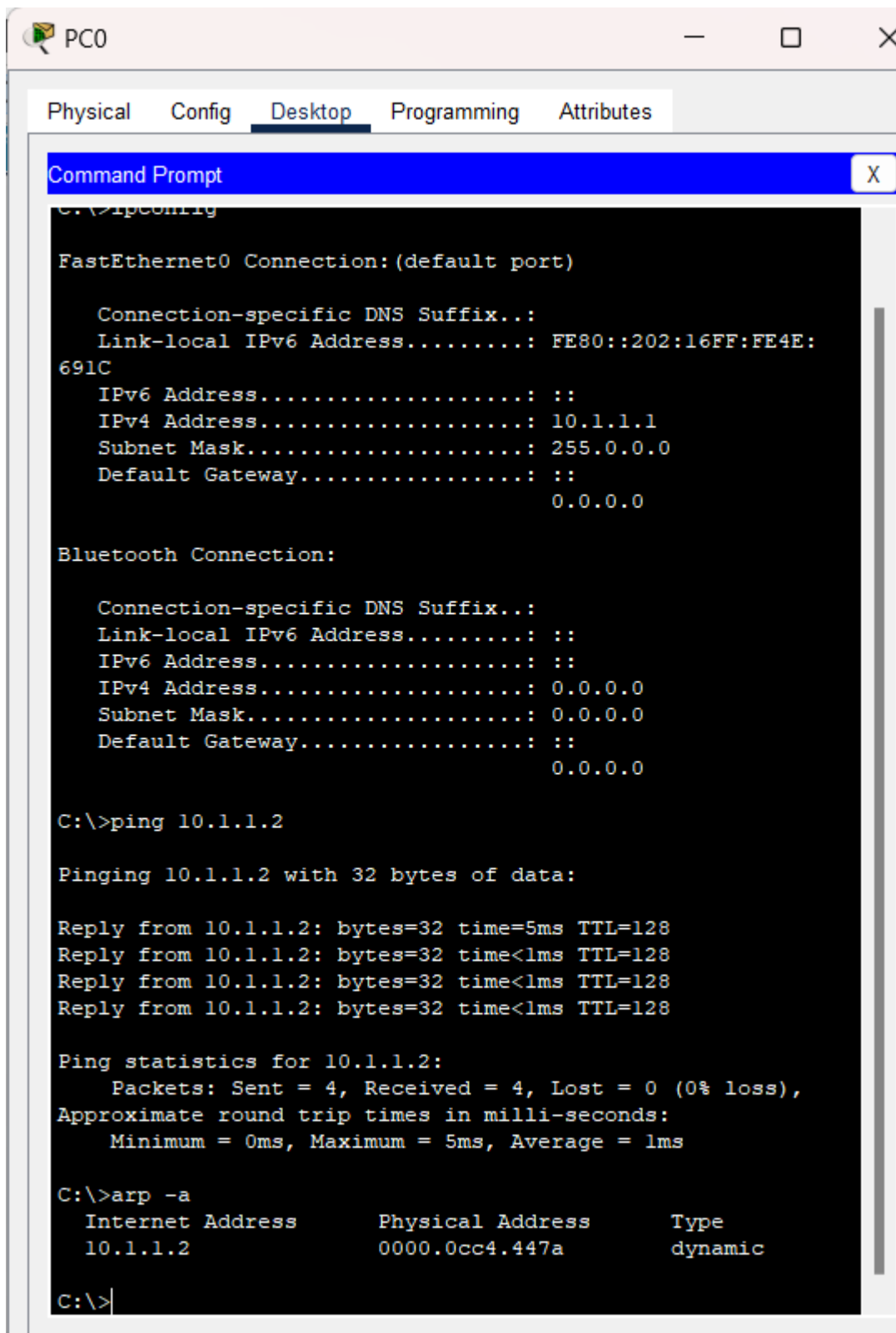
ARP Table Commands

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

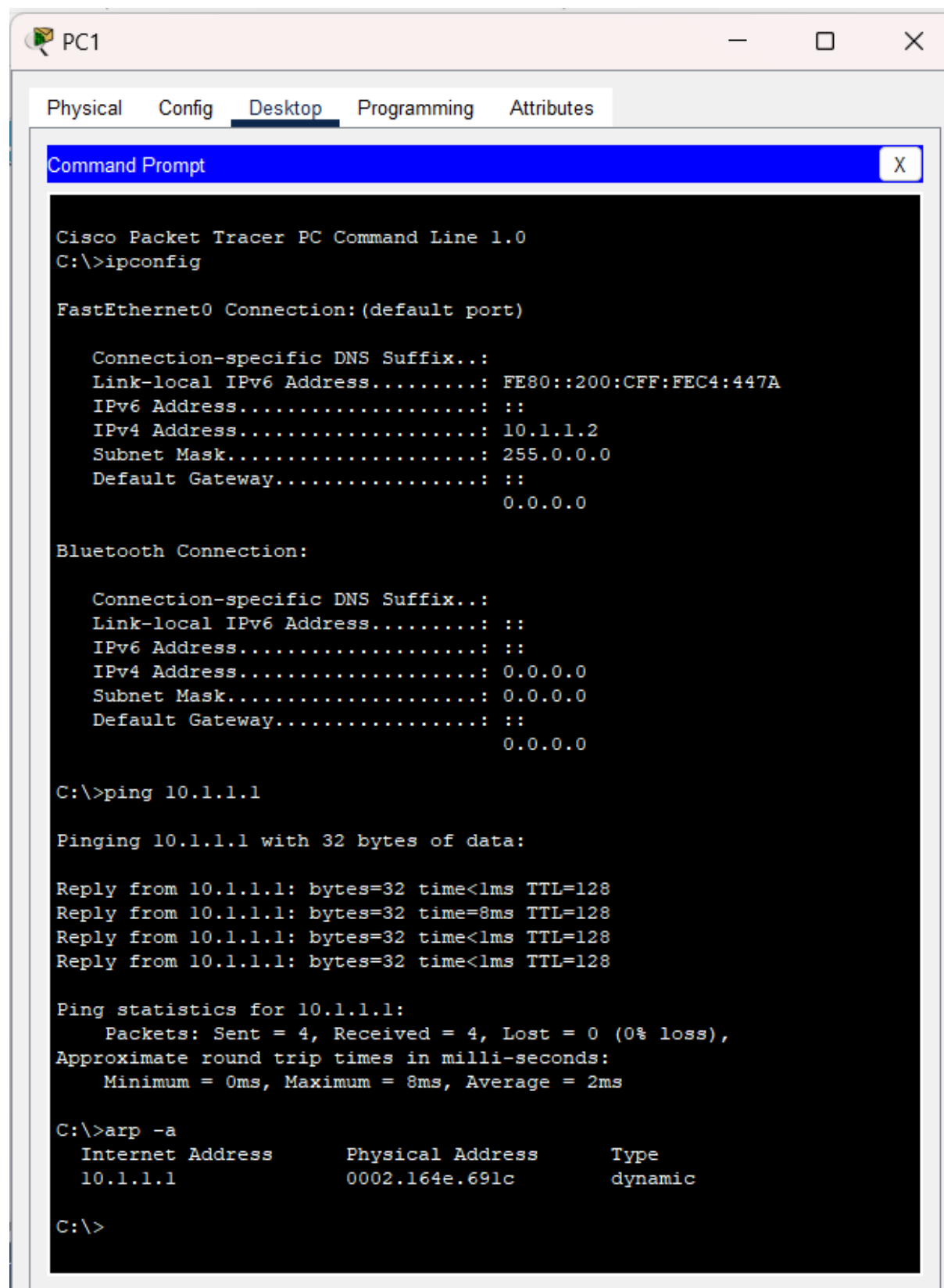
Cisco Packet Tracer

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

For PC0



For PC1:



The screenshot shows a PC1 window with a 'Desktop' tab selected. Inside the Desktop tab is a 'Command Prompt' window. The Command Prompt displays the output of the 'ipconfig' command, showing IPv4 and IPv6 addresses for the FastEthernet0 interface. It then shows the output of a 'ping 10.1.1.1' command, displaying four successful replies with 32 bytes of data and a TTL of 128. Finally, it shows the output of the 'arp -a' command, displaying a table of ARP entries.

```
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:\>
```

- 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.

PC0 configuration window showing IP Configuration for FastEthernet0. The interface is set to Static. The IPv4 Address is 10.1.1.1, Subnet Mask is 255.255.255.0, Default Gateway is 0.0.0.0, and DNS Server is 0.0.0.0. The IPv6 Configuration is set to Static with a Link Local Address of FE80::290:21FF:FE8B:5879. The 802.1X Security is disabled, and the Authentication is set to MD5.

PC1 configuration window showing IP Configuration for FastEthernet0. The interface is set to Static. The IPv4 Address is 10.1.1.2, Subnet Mask is 255.255.255.0, Default Gateway is 0.0.0.0, and DNS Server is 0.0.0.0. The IPv6 Configuration is set to Static with a Link Local Address of FE80::202:16FF:FE77:79DA. The 802.1X Security is disabled, and the Authentication is set to MD5.

PC1 configuration window showing IP Configuration for FastEthernet0. The interface is set to Static. The IPv4 Address is 10.1.1.4, Subnet Mask is 255.255.255.0, Default Gateway is 0.0.0.0, and DNS Server is 0.0.0.0. The IPv6 Configuration is set to Static with a Link Local Address of FE80::202:16FF:FE77:79DA. The 802.1X Security is disabled, and the Authentication is set to MD5.

PC3 configuration window showing IP Configuration for FastEthernet0. The interface is set to Static. The IPv4 Address is 10.1.1.3, Subnet Mask is 255.255.255.0, Default Gateway is 0.0.0.0, and DNS Server is 0.0.0.0. The IPv6 Configuration is set to Static with a Link Local Address of FE80::201:43FF:FE1E:24AA. The 802.1X Security is disabled, and the Authentication is set to MD5.

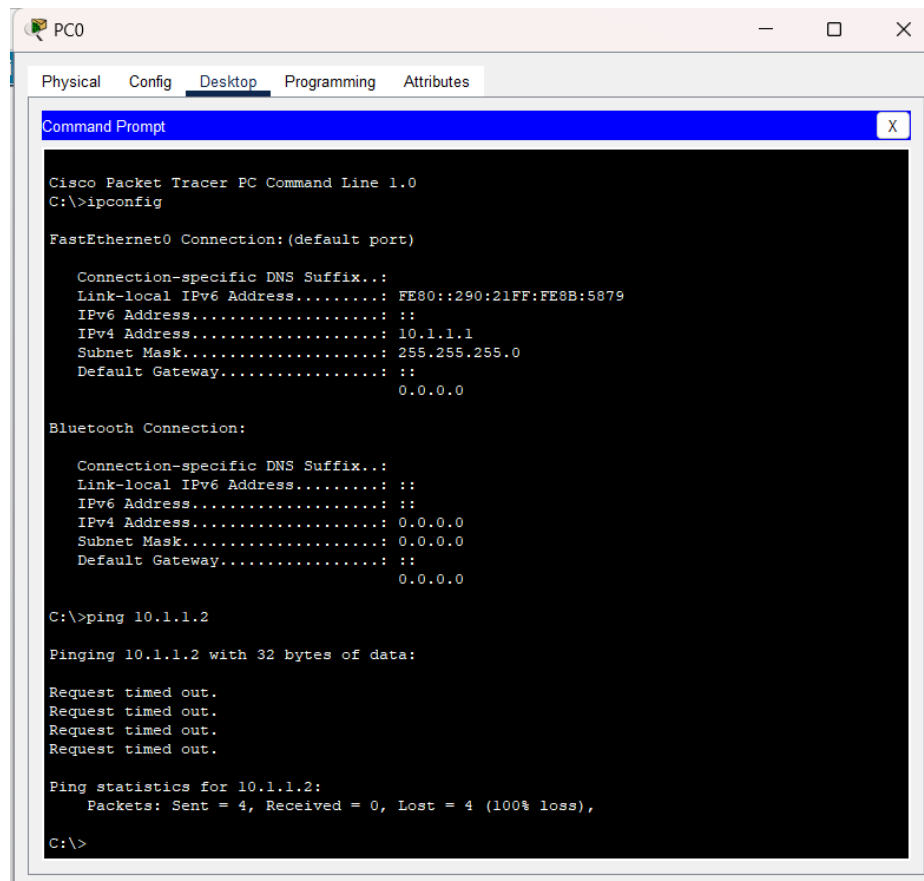
3. Verify IP Configuration:

- 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.



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

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::290:21FF:FE8B:5879
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 10.1.1.1
    Subnet Mask . . . . .: 255.255.255.0
    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

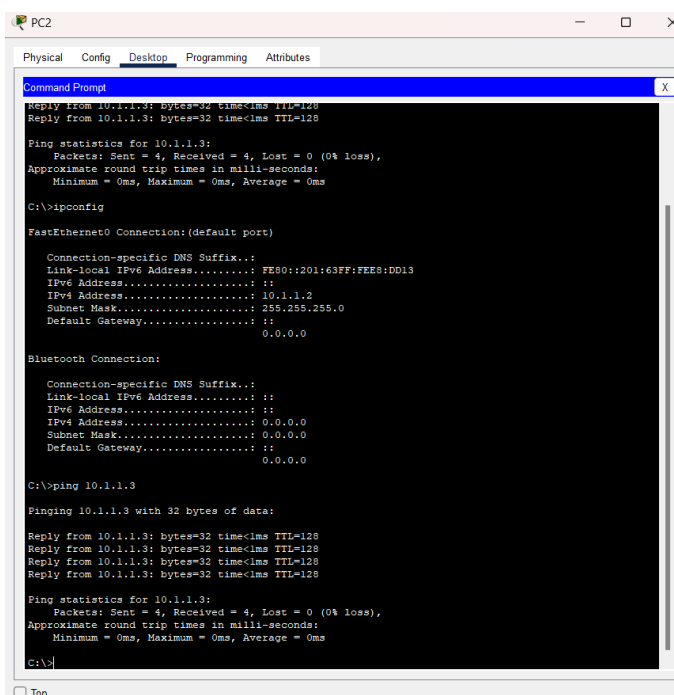
Pinging 10.1.1.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.1.1.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

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



```
PC2
Physical Config Desktop Programming Attributes

Command Prompt

Reply from 10.1.1.3: bytes=32 time=1ms TTL=128
Reply from 10.1.1.3: bytes=32 time<1ms TTL=128

Ping statistics for 10.1.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::201:63FF:FE08:DD13
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 10.1.1.2
    Subnet Mask . . . . .: 255.255.255.0
    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 10.1.1.3

Pinging 10.1.1.3 with 32 bytes of data:

Reply from 10.1.1.3: bytes=32 time<1ms TTL=128
Reply from 10.1.1.3: bytes=32 time<1ms TTL=128
Reply from 10.1.1.3: bytes=32 time<1ms TTL=128
Reply from 10.1.1.3: bytes=32 time<1ms TTL=128

Ping statistics for 10.1.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```


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:

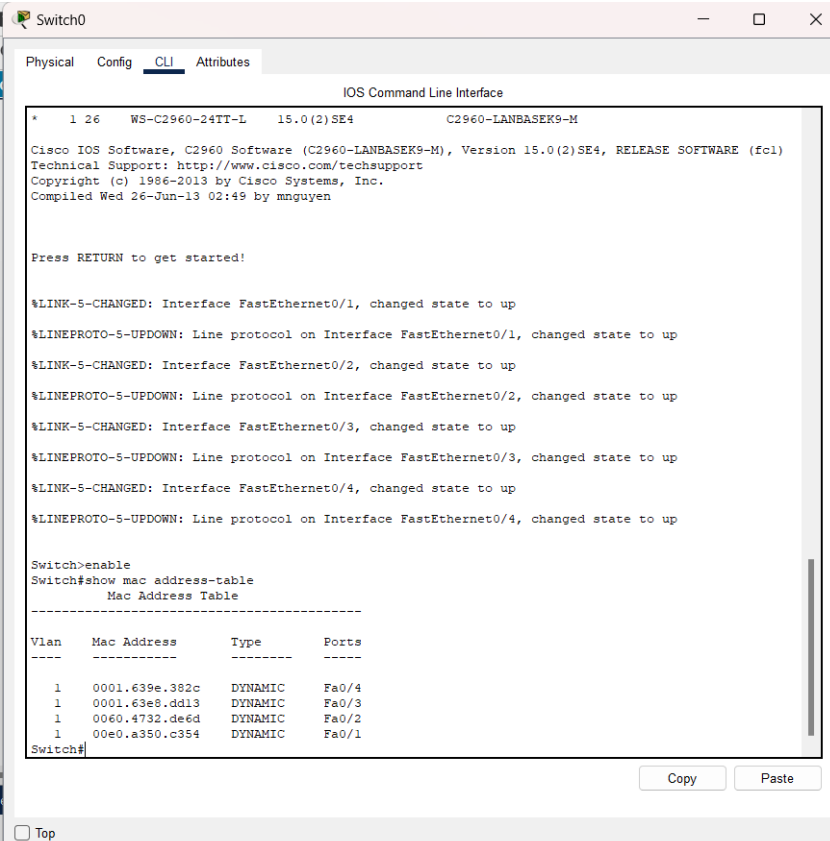
- Open a terminal or command prompt on the connected computer.
- Access the switch's console.
- You should see a prompt like Switch>.

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.



The screenshot shows a terminal window titled "Switch0" with tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, displaying the IOS Command Line Interface. The prompt is Switch>. The user has entered the command "enable", and the prompt has changed to Switch#. The user has then entered the command "show mac address-table", and the output is displayed below. The output shows the MAC address table for Vlan 1, listing four entries with their Mac Addresses, Types, and Ports.

```
Switch0
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#
```

```

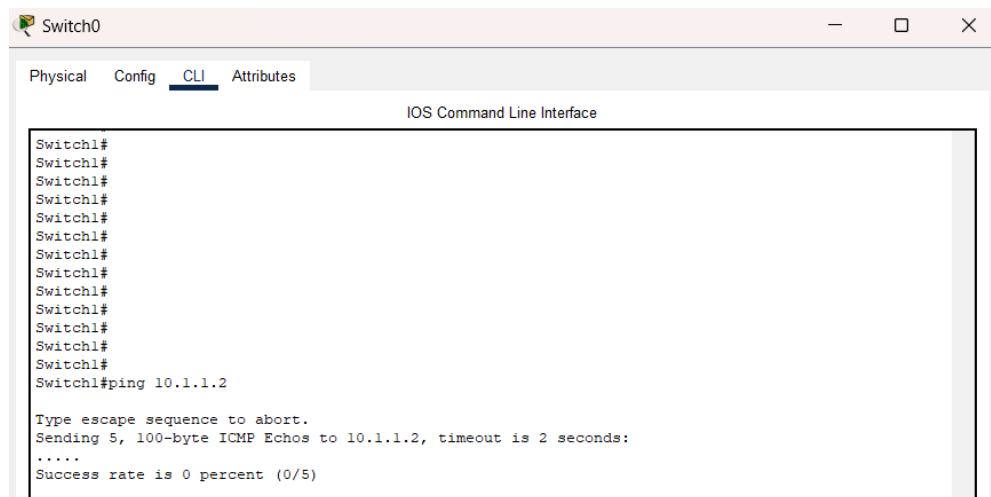
Switch>enable
Switch#show mac address-table
      Mac Address Table
-----
Vlan    Mac Address      Type    Ports
----    -
1       0001.639e.382c   DYNAMIC Fa0/4
1       0001.63e8.dd13   DYNAMIC Fa0/3
1       0060.4732.de6d   DYNAMIC Fa0/2
1       00e0.a350.c354   DYNAMIC Fa0/1
Switch#configure terminal
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)#

```

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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)#.

Switch0

Physical Config CLI Attributes

IOS Command Line Interface

```
Switch0>
% Invalid input detected at '^' marker.

Switch0#enable
Switch0#show mac address-table
Mac Address Table
-----
Vlan    Mac Address      Type      Ports
----    -
Switch0#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch0(config)#show running-config

% Invalid input detected at '^' marker.

Switch0(config)#vlan 10
Switch0(config-vlan)#name VLAN10
Switch0(config-vlan)#exit
Switch0(config)#exit
Switch0#
%SYS-5-CONFIG_I: Configured from console by console

Switch0#enable
Switch0#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch0(config)#interface Vlan 1
Switch0(config-if)#ip address 10.1.1.254 255.255.255.0
Switch0(config-if)#no shutdown

Switch0(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

Switch0(config-if)#exit
Switch0(config)#exit
Switch0#
%SYS-5-CONFIG_I: Configured from console by console

Switch0#
```

Copy Paste

4. Exit Interface Configuration Mode:

Type exit to return to Global Configuration mode.

```
Switch0#show running-config
Building configuration...

Current configuration : 1081 bytes
!
version 15.0
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Switch1
!
!
!
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
!
interface FastEthernet0/2
!
interface FastEthernet0/3
!
interface FastEthernet0/4
!
interface FastEthernet0/5
--More--
```

Copy Paste

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.

```
witch1(config)#vlan 10
witch1(config-vlan)#name VLAN10
witch1(config-vlan)#exit
witch1(config)#
```

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Paste

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:

```
C:\>ping 10.1.1.254

Pinging 10.1.1.254 with 32 bytes of data:

Request timed out.
Reply from 10.1.1.254: bytes=32 time<1ms TTL=255
Reply from 10.1.1.254: bytes=32 time<1ms TTL=255
Reply from 10.1.1.254: bytes=32 time<1ms TTL=255

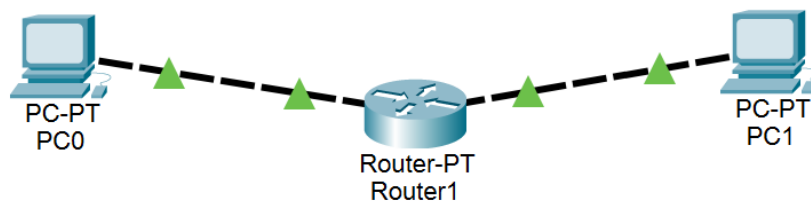
Ping statistics for 10.1.1.254:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>|
```

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

IP Configuration

X

InterfaceFastEthernet0

IP Configuration

☐ DHCP

☒ Static

IPv4 Address

20.1.1.1

Subnet Mask

255.255.255.0

Default Gateway

20.1.1.254

DNS Server

0.0.0.0

IPv6 Configuration

☐ Automatic

☒ Static

IPv6 Address

/

Link Local Address

FE80::201:63FF:FE67:398A

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: 10.1.1.254

DNS Server: 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address: /

Link Local Address: FE80::230:A3FF:FE0B:3CE5

Default Gateway:

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

Step 4: Test Connectivity

Ping from PC0 to PC1

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 20.1.1.1

Pinging 20.1.1.1 with 32 bytes of data:

Request timed out.
Reply from 20.1.1.1: bytes=32 time<1ms TTL=127
Reply from 20.1.1.1: bytes=32 time<1ms TTL=127
Reply from 20.1.1.1: bytes=32 time<1ms TTL=127

Ping statistics for 20.1.1.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 20.1.1.1

Pinging 20.1.1.1 with 32 bytes of data:

Reply from 20.1.1.1: bytes=32 time<1ms TTL=127
Reply from 20.1.1.1: bytes=32 time<1ms TTL=127
Reply from 20.1.1.1: bytes=32 time<1ms TTL=127
Reply from 20.1.1.1: bytes=32 time<1ms TTL=127

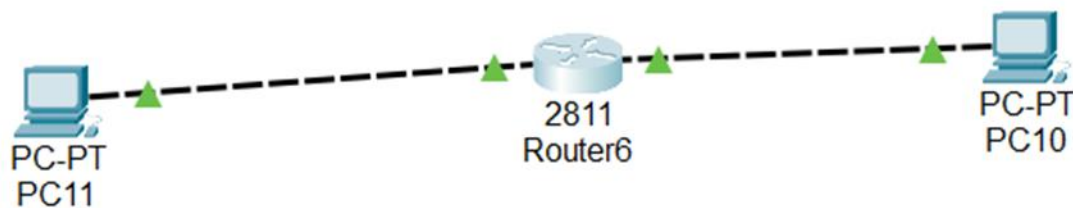
Ping statistics for 20.1.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

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

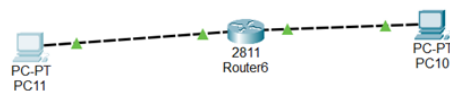
PC 11

- 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:



```
PC11
Physical Config Desktop Programming Attributes
Command Prompt

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 20.1.1.1

Pinging 20.1.1.1 with 32 bytes of data:

Request timed out.
Reply from 20.1.1.1: bytes=32 time<1ms TTL=127
Reply from 20.1.1.1: bytes=32 time<1ms TTL=127
Reply from 20.1.1.1: bytes=32 time=1ms TTL=127

Ping statistics for 20.1.1.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

- 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.

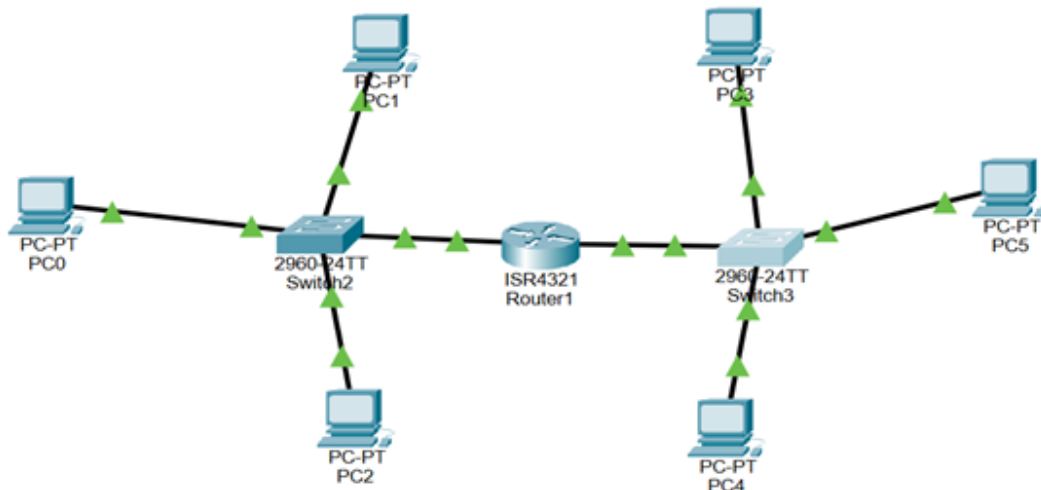
```
Router#show ip interface brief
Interface          IP-Address      OK? Method Status      Protocol
FastEthernet0/0    10.1.1.100      YES manual  up          up
FastEthernet0/1    20.1.1.100      YES manual  up          up
Vlan1               unassigned      YES unset   administratively down down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

PC2

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 10.1.1.3

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::2E0:8FFF:FEE0:59A2

Default Gateway:

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

PC4

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 20.1.1.3

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::201:64FF:FE78:B6D0

Default Gateway:

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

PC3

IP Configuration

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

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

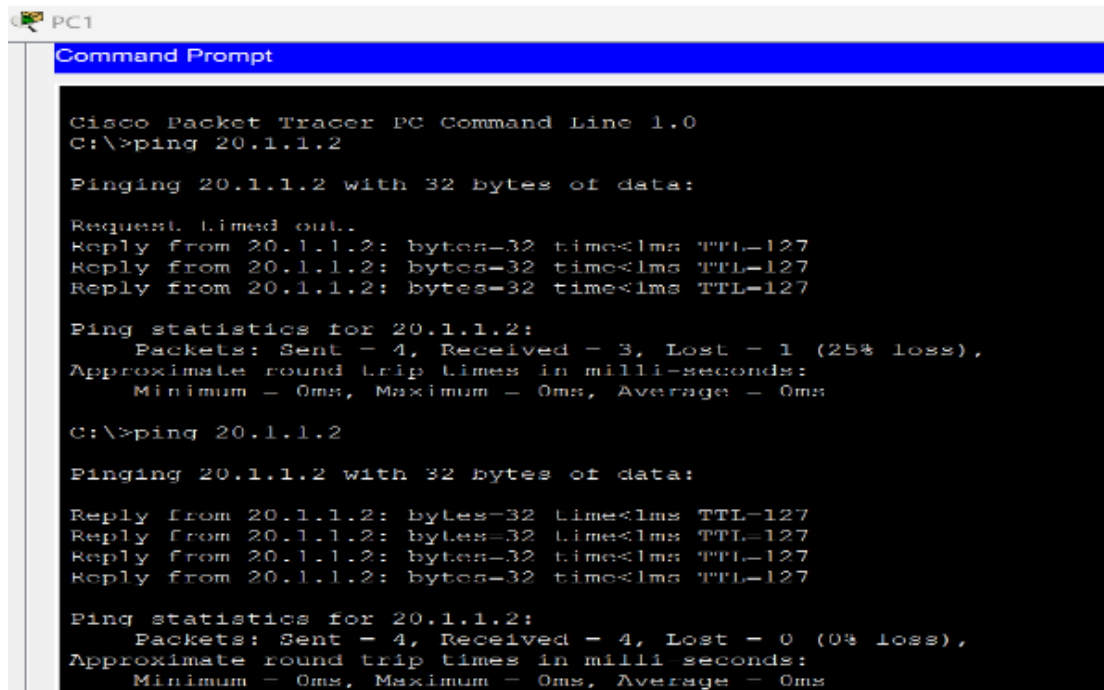
Authentication: MD5

Username:

Password:

Step 4: Testing Connectivity

1. Ping from PC1 to PC3:



```
PC1
Command Prompt

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 20.1.1.2

Pinging 20.1.1.2 with 32 bytes of data:

Request timed out.
Reply from 20.1.1.2: bytes=32 time<1ms TTL=127
Reply from 20.1.1.2: bytes=32 time<1ms TTL=127
Reply from 20.1.1.2: bytes=32 time<1ms TTL=127

Ping statistics for 20.1.1.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

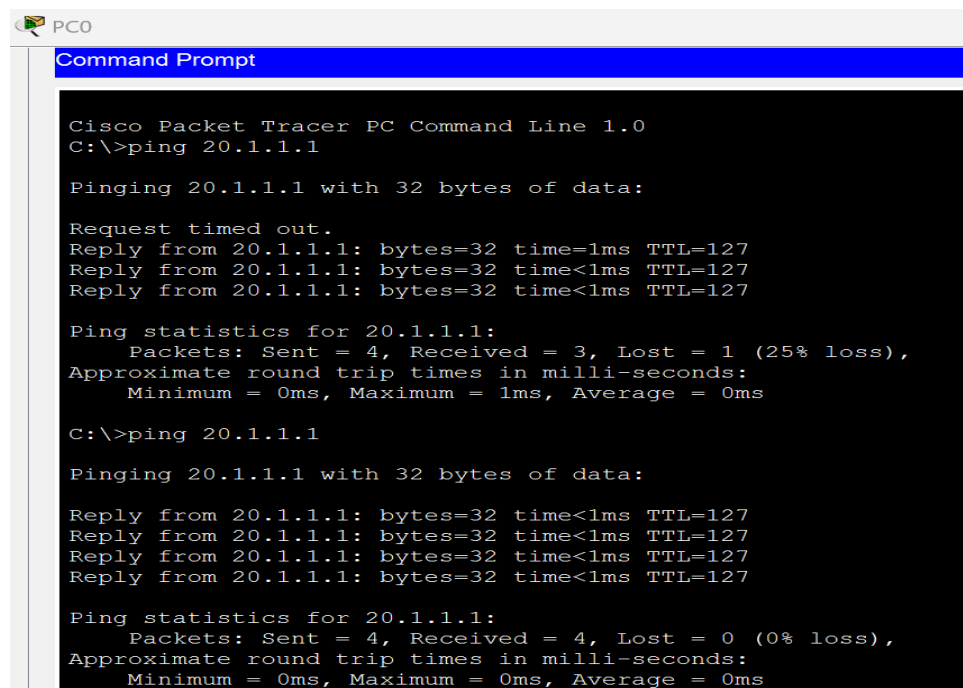
C:\>ping 20.1.1.2

Pinging 20.1.1.2 with 32 bytes of data:

Reply from 20.1.1.2: bytes=32 time<1ms TTL=127
Reply from 20.1.1.2: bytes=32 time<1ms TTL=127
Reply from 20.1.1.2: bytes=32 time<1ms TTL=127
Reply from 20.1.1.2: bytes=32 time<1ms TTL=127

Ping statistics for 20.1.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

2. Ping from PC0 to PC5:



```
PC0
Command Prompt

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 20.1.1.1

Pinging 20.1.1.1 with 32 bytes of data:

Request timed out.
Reply from 20.1.1.1: bytes=32 time=1ms TTL=127
Reply from 20.1.1.1: bytes=32 time<1ms TTL=127
Reply from 20.1.1.1: bytes=32 time<1ms TTL=127

Ping statistics for 20.1.1.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 20.1.1.1

Pinging 20.1.1.1 with 32 bytes of data:

Reply from 20.1.1.1: bytes=32 time<1ms TTL=127
Reply from 20.1.1.1: bytes=32 time<1ms TTL=127
Reply from 20.1.1.1: bytes=32 time<1ms TTL=127
Reply from 20.1.1.1: bytes=32 time<1ms TTL=127

Ping statistics for 20.1.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

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

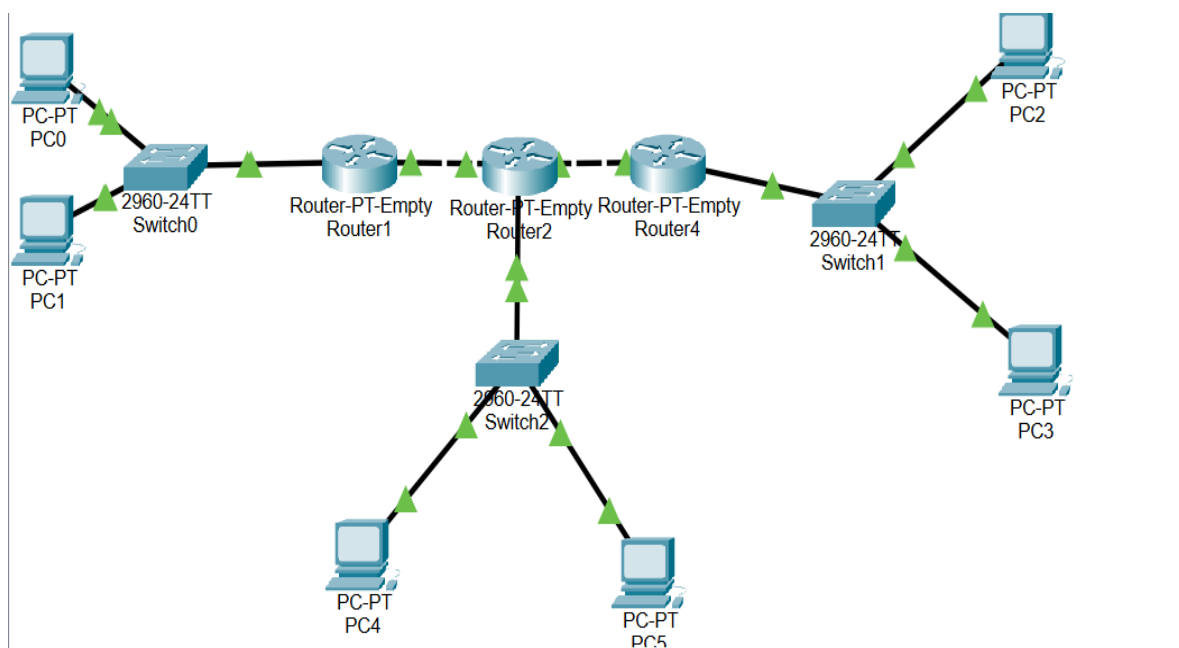
```
Switch>show mac address-table
Mac Address Table
```

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

PC4

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 30.1.1.1

Subnet Mask: 255.255.255.0

Default Gateway: 30.1.1.100

DNS Server: 0.0.0.0

PC3

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 50.1.1.2

Subnet Mask: 255.255.255.0

Default Gateway: 50.1.1.100

DNS Server: 0.0.0.0

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

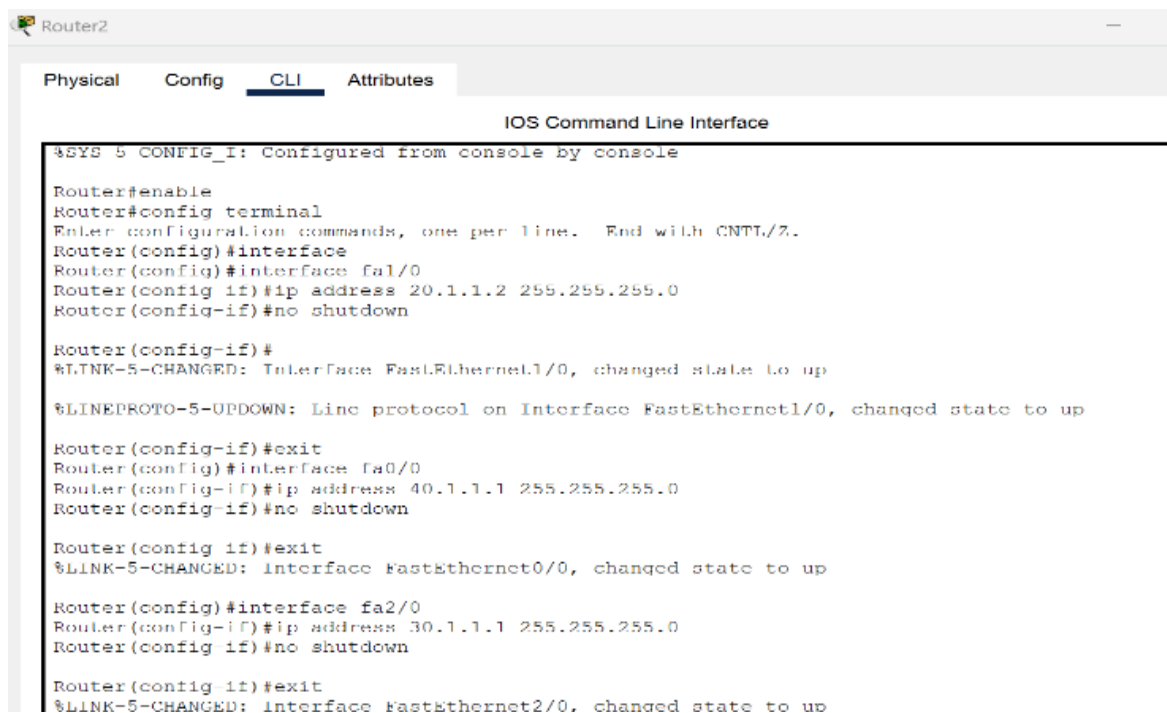
IPv4 Address: 30.1.1.2

Subnet Mask: 255.255.255.0

Default Gateway: 30.1.1.100

DNS Server: 0.0.0.0

STEP 3 : Configuring Static Routes



The screenshot shows the CLI window for Router2. The 'CLI' tab is selected. The command history shows the following sequence of commands and system messages:

```
%SYS 5 CONFIG_1: Configured from console by console

Router#enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface
Router(config)#interface fa1/0
Router(config-if)#ip address 20.1.1.2 255.255.255.0
Router(config-if)#no shutdown

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

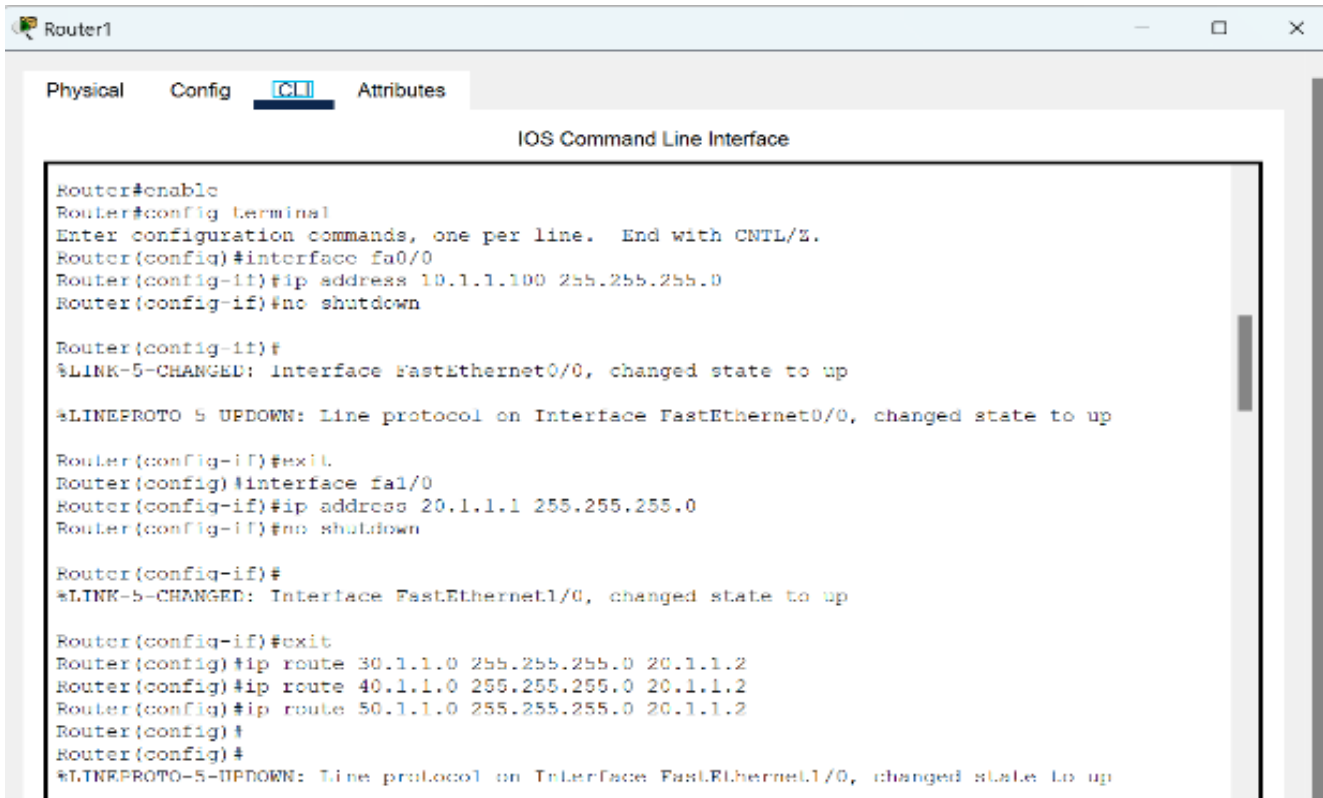
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up

Router(config-if)#exit
Router(config)#interface fa0/0
Router(config-if)#ip address 40.1.1.1 255.255.255.0
Router(config-if)#no shutdown

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

Router(config)#interface fa2/0
Router(config-if)#ip address 30.1.1.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#exit
%LINK-5-CHANGED: Interface FastEthernet2/0, changed state to up
```



The screenshot shows the CLI window for Router1. The 'CLI' tab is selected. The command history shows the following sequence of commands and system messages:

```
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 10.1.1.100 255.255.255.0
Router(config-if)#no shutdown

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 fa1/0
Router(config-if)#ip address 20.1.1.1 255.255.255.0
Router(config-if)#no shutdown

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

Router(config-if)#exit
Router(config)#ip route 30.1.1.0 255.255.255.0 20.1.1.2
Router(config)#ip route 40.1.1.0 255.255.255.0 20.1.1.2
Router(config)#ip route 50.1.1.0 255.255.255.0 20.1.1.2
Router(config)#
Router(config)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up
```

```
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 fal/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



Command Prompt

```
Ping statistics for 50.1.1.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 10.1.1.100

Pinging 10.1.1.100 with 32 bytes of data:

Reply from 10.1.1.100: bytes=32 time<1ms TTL=255
Reply from 10.1.1.100: bytes=32 time<1ms TTL=255
Reply from 10.1.1.100: bytes=32 time<1ms TTL=255
Reply from 10.1.1.100: bytes=32 time<1ms TTL=255

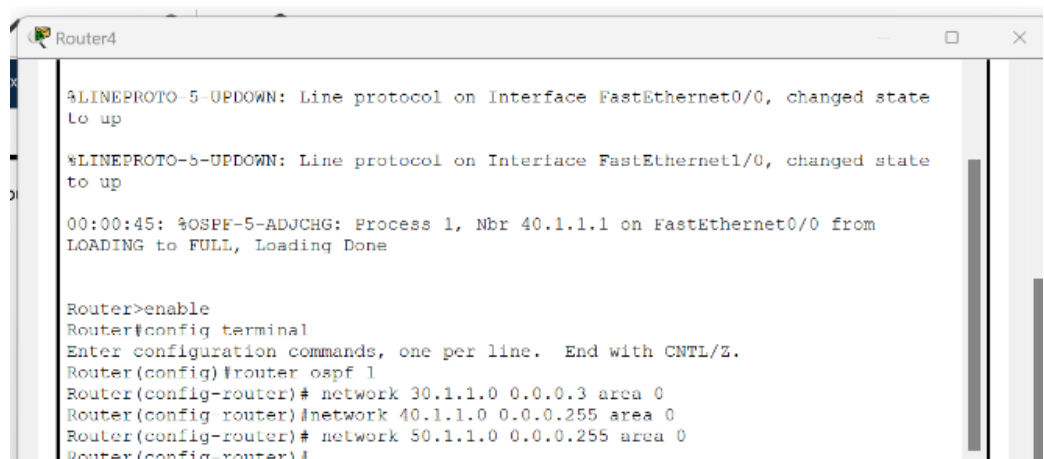
Ping statistics for 10.1.1.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

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
```



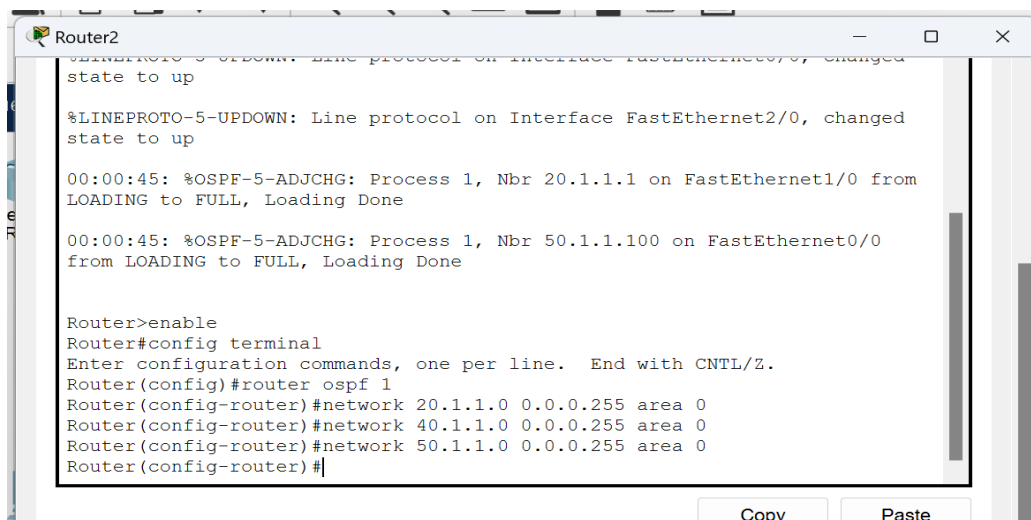
```
Router4

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

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

00:00:45: %OSPF-5-ADJCHG: Process 1, Nbr 40.1.1.1 on FastEthernet0/0 from
LOADING to FULL, Loading Done

Router>enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)# network 30.1.1.0 0.0.0.3 area 0
Router(config-router)#network 40.1.1.0 0.0.0.255 area 0
Router(config-router)# network 50.1.1.0 0.0.0.255 area 0
Router(config-router)#
```



```
Router2

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

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet2/0, changed
state to up

00:00:45: %OSPF-5-ADJCHG: Process 1, Nbr 20.1.1.1 on FastEthernet1/0 from
LOADING to FULL, Loading Done

00:00:45: %OSPF-5-ADJCHG: Process 1, Nbr 50.1.1.100 on FastEthernet0/0
from LOADING to FULL, Loading Done

Router>enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 20.1.1.0 0.0.0.255 area 0
Router(config-router)#network 40.1.1.0 0.0.0.255 area 0
Router(config-router)#network 50.1.1.0 0.0.0.255 area 0
Router(config-router)#
```

Copy

Paste

Step 2: Verify OSPF Configuration

1. Check OSPF Neighbors

```
Router4
Router#show ip ospf neighbor

Neighbor ID    Pri   State           Dead Time   Address      Interface
40.1.1.1       1     FULL/BDR        00:00:37   40.1.1.1     FastEthernet0/0
Router#
```

```
Router1
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ip ospf neighbor

Neighbor ID    Pri   State           Dead Time   Address      Interface
40.1.1.1       1     FULL/DR         00:00:33   20.1.1.2     FastEthernet1/0
Router#
```

```
Router2
Router>enable
Router#show ip ospf neighbor

Neighbor ID    Pri   State           Dead Time   Address      Interface
50.1.1.100     1     FULL/DR         00:00:34   40.1.1.2     FastEthernet0/0
40.1.1.2       1     FULL/BDR        00:00:34   20.1.1.1     FastEthernet1/0
20.1.1.1       1     FULL/BDR        00:00:34   20.1.1.1     FastEthernet1/0
Router#
```

2. Check OSPF Interface States

```
Router4
FastEthernet0/0
Router#show ip ospf interface

FastEthernet0/0 is up, line protocol is up
  Internet address is 40.1.1.2/24, Area 0
  Process ID 1, Router ID 50.1.1.100, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 50.1.1.100, Interface address 40.1.1.2
  Backup Designated Router (ID) 40.1.1.1, Interface address 40.1.1.1
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:01
  Index 1/1, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 40.1.1.1 (Backup Designated Router)
  Suppress hello for 0 neighbor(s)
FastEthernet1/0 is up, line protocol is up
  Internet address is 50.1.1.100/24, Area 0
  Process ID 1, Router ID 50.1.1.100, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 50.1.1.100, Interface address 50.1.1.100
  No backup designated router on this network
```

```
Router2
Router#show ip ospf interface

FastEthernet1/0 is up, line protocol is up
  Internet address is 20.1.1.2/24, Area 0
  Process ID 1, Router ID 40.1.1.1, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 40.1.1.1, Interface address 20.1.1.2
  Backup Designated Router (ID) 20.1.1.1, Interface address 20.1.1.1
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit !
    Hello due in 00:00:09
  Index 1/1, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 20.1.1.1 (Backup Designated Router)
  Suppress hello for 0 neighbor(s)
FastEthernet0/0 is up, line protocol is up
  Internet address is 40.1.1.1/24, Area 0
  Process ID 1, Router ID 40.1.1.1, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State BDR, Priority 1
  Designated Router (ID) 50.1.1.100, Interface address 40.1.1.2
```

```
Router1
40.1.1.1      1    FULL/DR      00:00:33      20.1.1.2      FastEthernet1
Router#show ip ospf interface

FastEthernet0/0 is up, line protocol is up
 Internet address is 10.1.1.100/24, Area 0
 Process ID 1, Router ID 20.1.1.1, Network Type BROADCAST, Cost: 1
 Transmit Delay is 1 sec, State DR, Priority 1
 Designated Router (ID) 20.1.1.1, Interface address 10.1.1.100
 No backup designated router on this network
 Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
   Hello due in 00:00:00
 Index 1/1, flood queue length 0
 Next 0x0(0)/0x0(0)
 Last flood scan length is 1, maximum is 1
 Last flood scan time is 0 msec, maximum is 0 msec
 Neighbor Count is 0, Adjacent neighbor count is 0
 Suppress hello for 0 neighbor(s)
FastEthernet1/0 is up, line protocol is up
 Internet address is 20.1.1.1/24, Area 0
 Process ID 1, Router ID 20.1.1.1, Network Type BROADCAST, Cost: 1
```

3. Check the Routing Table

```
Router2
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 [110/2] via 20.1.1.1, 00:44:04, FastEthernet1/0
  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
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
```



```
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:

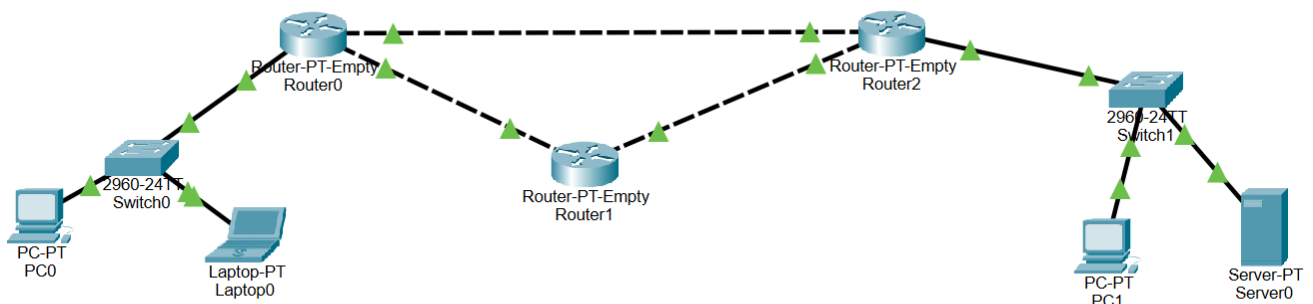
Request timed out.
Reply from 50.1.1.1: bytes=32 time<1ms TTL=125
Reply from 50.1.1.1: bytes=32 time<1ms TTL=125
Reply from 50.1.1.1: bytes=32 time<1ms TTL=125

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
```