Lab Number: 09 **Date: 2025/08/17**

Title: Basic router configuration and static routing in Packet Tracer

Theory:

a) Router

A router is a network device that forwards data packets between computer networks. Routers perform traffic directing functions on the Internet. A packet is typically forwarded from one router to another through the networks that constitute the internetwork until it reaches its destination node.

b) **Network Diagram**

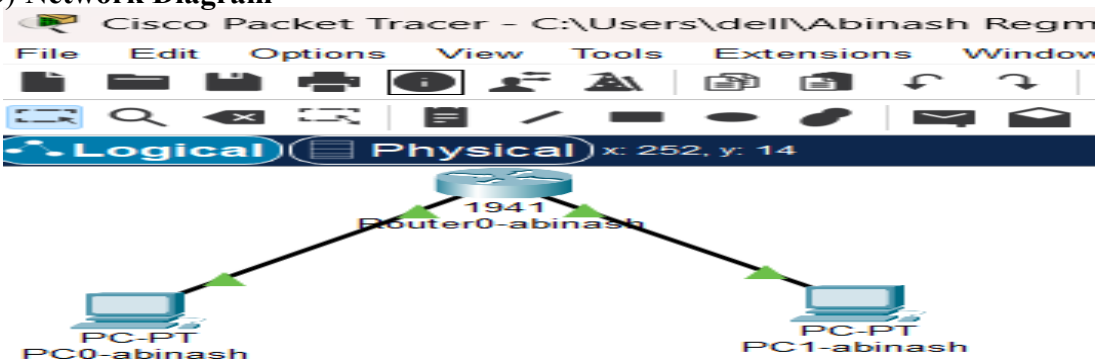


Fig: Network diagram including router and switch

Implementation Sequence

Here is the implementation sequence for Basic router configuration and static routing in Packet Tracer.

a. Basic router Configuration

i. Configuring Global Parameters

Here are the steps to configure global parameters on a router:

Step 1: Open Packet Tracer and set up the devices (routers, PCs).

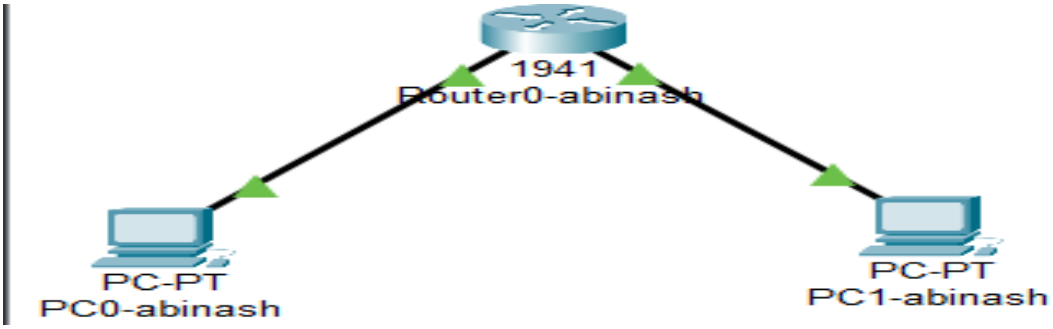


Fig: Simple Network setup

Step 2: Access the Router CLI

Use the console cable to access the router's command-line interface (CLI)

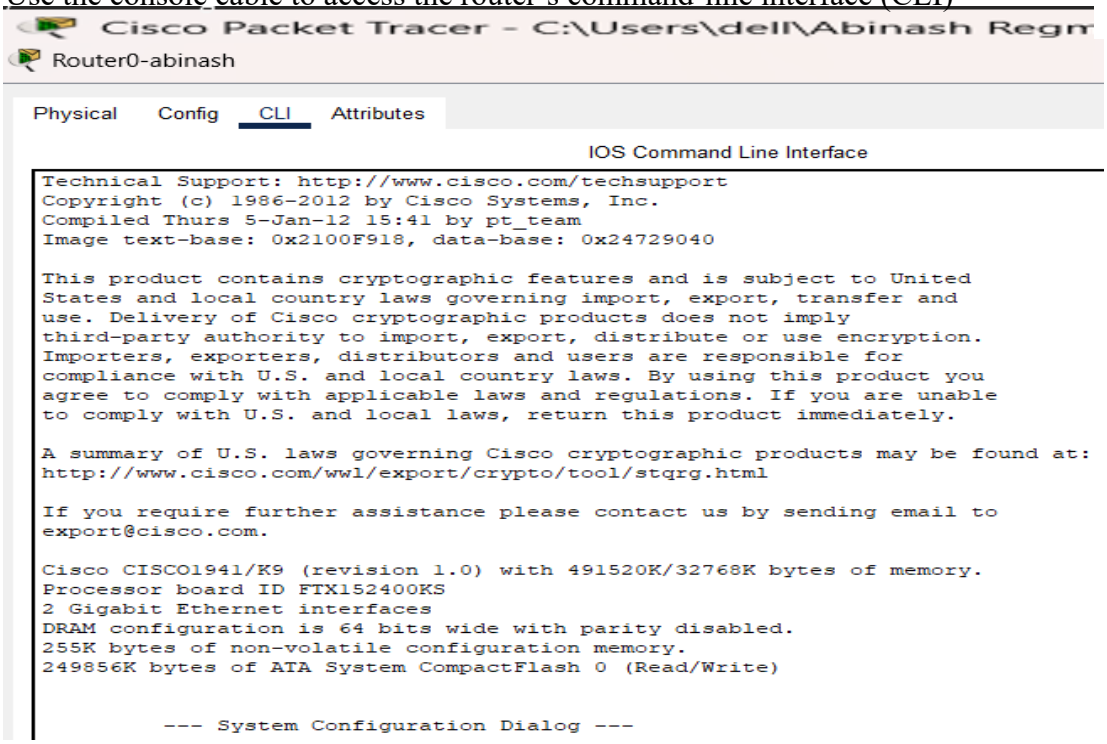


Fig: Accessing Router Command-Line Interface via Console Cable

Step 3: Configure Terminal

Type enable to enter privileged EXEC mode and use configure terminal to access global configuration mode.

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
```

Fig: Entering Privileged EXEC and Global Configuration Mode on the Router

Step 4: Set a hostname for the router

Use the command hostname [RouterName] to assign a name to the router.

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname router1
```

Fig: Setting the Hostname on the Router

Step 5: Configure a Password for Privileged Mode

Set an enable password using Router(config)#enable secret [password]

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname router1
router1(config)#enable secret 9803068643
router1(config)#
```

Fig: Configuring a Password

ii. Configuring Gigabit Ethernet

Here are the steps to configure gigabit Ethernet interfaces on a router:

Step 1: Configure Terminal

Type enable to enter privileged EXEC mode and use configure terminal to access global configuration mode.

```
router1#enable
router1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
router1(config)#
```

Fig: Entering Privileged EXEC and Global Configuration Mode on Router

Step 2: Access the interface configuration mode

Use the command interface <interface_name> to enter the configuration mode for a specific router interface.

```
router1(config)#interface GigabitEthernet0/1
```

Fig: Accessing the interface configuration mode

Step 3: Assign an IP address

Once in the interface configuration mode, assign a unique IP address and subnet mask to the interface using the Ip address command.

```
router1(config)#interface GigabitEthernet0/1
router1(config-if)#ip address 111.111.11.1 255.255.0.0
router1(config-if)#
```

Fig: Enabling the Gigabit Ethernet Interface on Router

Step 4: Enable the interface

After assigning an IP address, use the no shutdown command to activate the interface. By default, router interfaces are in a “shutdown” state.

```
router1(config)#interface GigabitEthernet0/1
router1(config-if)#ip address 111.111.11.1 255.255.0.0
router1(config-if)#no shutdown

router1(config-if)#
```

Fig: Enabling the Gigabit Ethernet Interface on a Router

b. Static Routing Configuration

i. Configuring Network (PCs and Routers)

Network Diagram

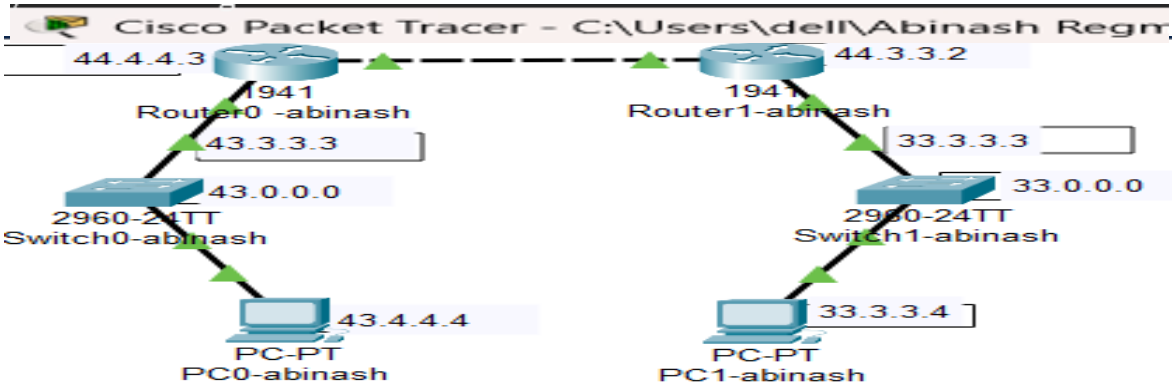


fig: Network Diagram for static routing

Configuring PCs

Step 1: Assign IP addresses to the PC's

Configure the IP addresses on the PCs within the same network as their respective router's interface.

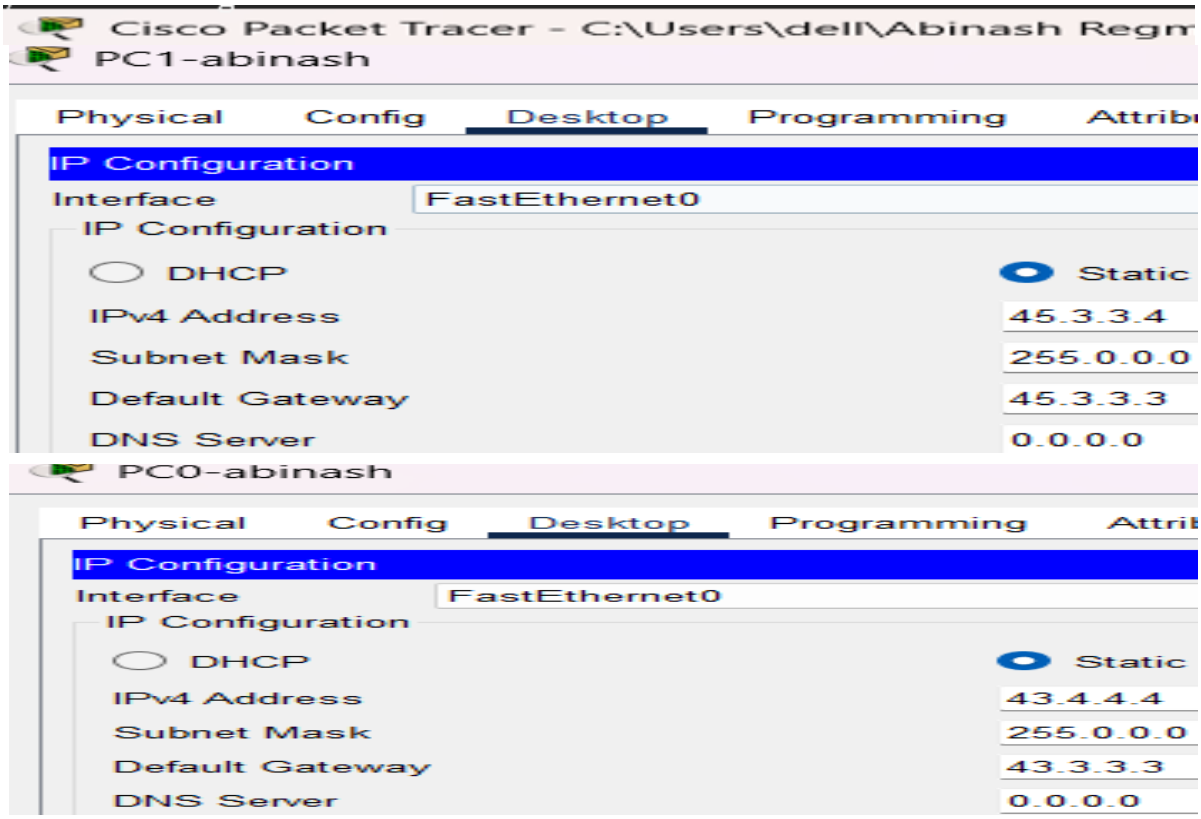


Fig: Assigning IP address to PC's

Configuring Routers

Step 1: Set the IP address on the Gigabit Ethernet interface

For router0

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ip address 44.4.4.3 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#ip address 43.3.3.3 255.0.0.0
Router(config-if)#exit
```

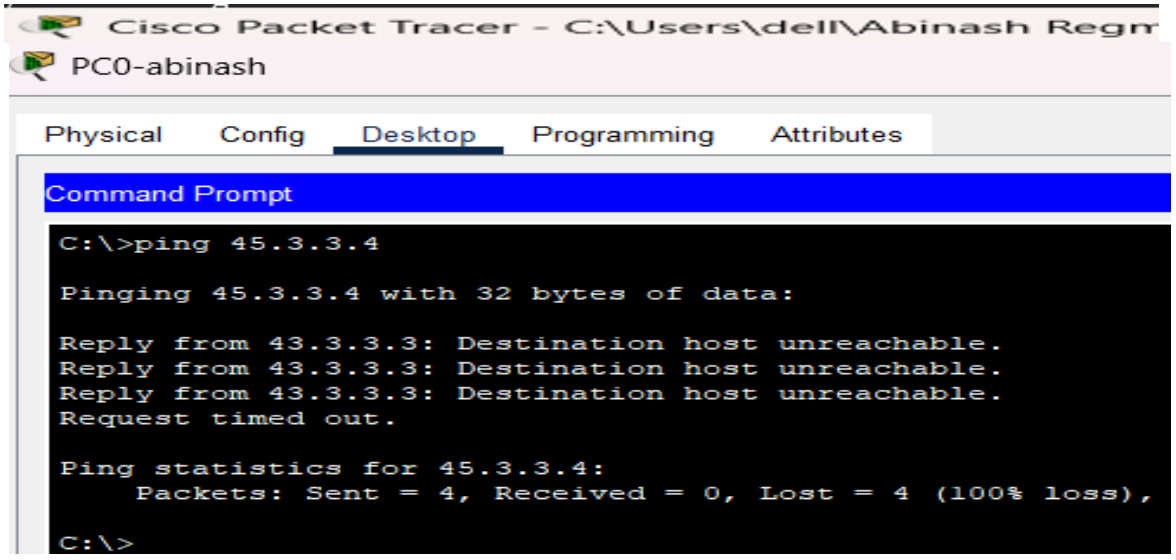
fig: Configuring IP Address on Gigabit Ethernet Interface

For router1

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ip address 45.3.3.3 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#ip address 44.3.3.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
```

Fig: Configuring IP Address on Gigabit Ethernet Interface

Step 2: Checking Router is working or not



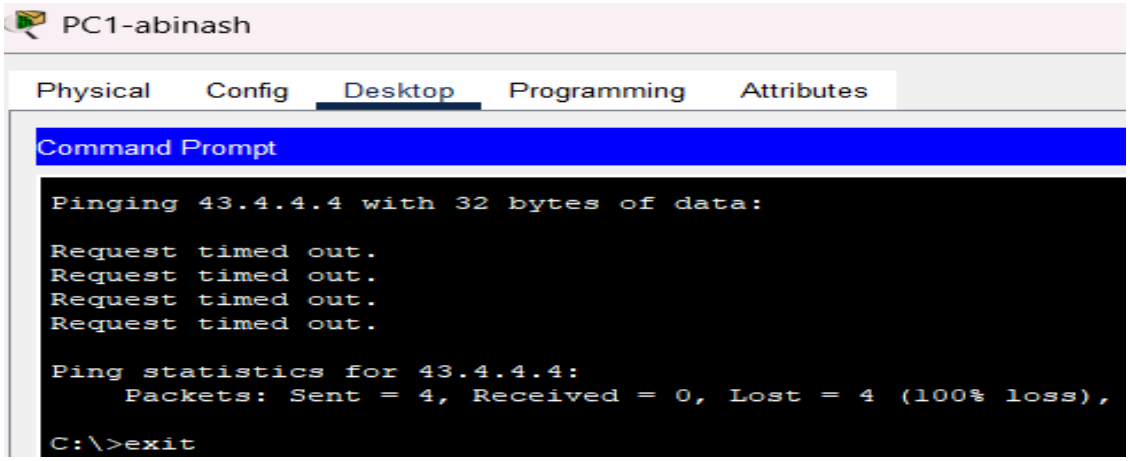


Fig: Router Connectivity Test Failure

Above figure shows two failed ping attempts from different PCs to check connectivity. Both PCs are trying to reach different IPs (44.3.3.4 and 55.4.4.5), but the destination hosts are unreachable. The error message 100% packet loss indicate a problem with the router's configuration or connection between networks. This suggests that the router is not routing packets correctly between these networks.

Step 3: Adding a static route

Adding a static route to Router R1's network

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip route 44.0.0.0 255.0.0.0 44.4.4.3
%Invalid next hop address (it's this router)
Router(config)#ip route 44.0.0.0 255.0.0.0 44.3.3.2
Router(config)#ip route 45.0.0.0 255.0.0.0 44.3.3.2
Router(config)#
```

Fig: Adding Static Route to Router 1 Network

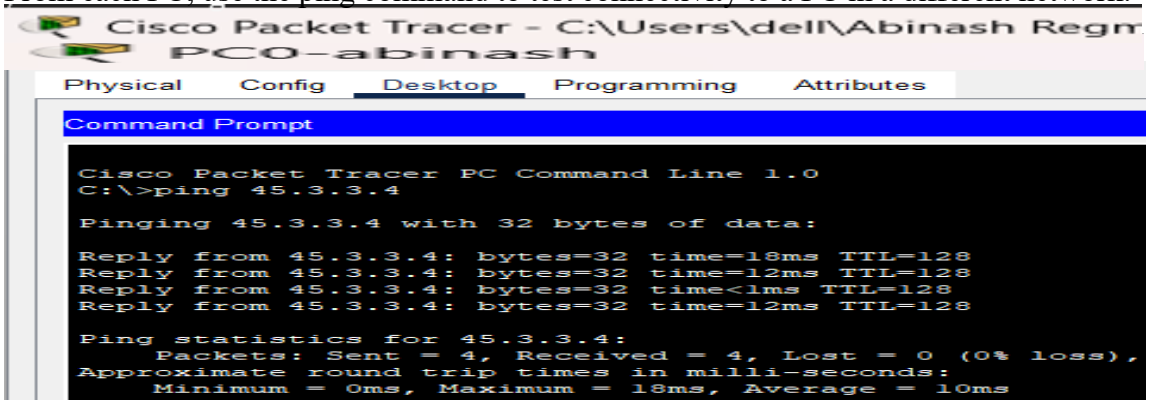
Add a static route to Router R0's network

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z
Router(config)#ip route 44.0.0.0 255.0.0.0 44.4.4.3
Router(config)#ip route 43.0.0.0 255.0.0.0 44.4.4.3
Router(config)#
```

Fig: Adding Static Route to Router R0 Network

ii. Testing and Validation

From each PC, use the ping command to test connectivity to a PC in a different network.



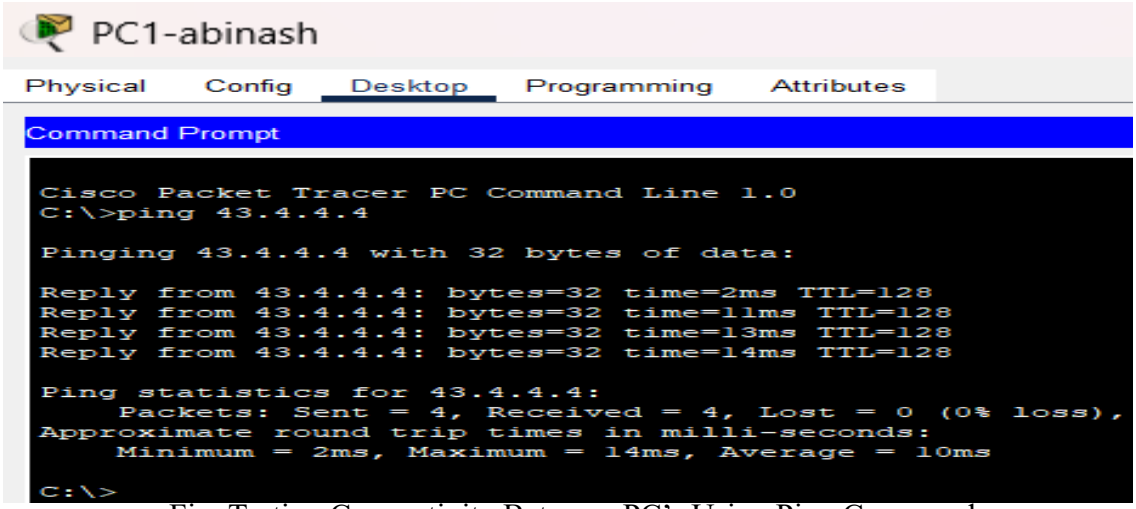


Fig: Testing Connectivity Between PC's Using Ping Commands

The above shows successful ping tests between two PCs in different networks. PC0 pings 45.3.3.4 with no packet loss and low latency, while PC1 pings 43.4.4.4 with similar successful results. This confirms network connectivity between the PCs.

Conclusion

This lab introduced basic router configuration and static routing using Cisco Packet Tracer. We successfully set up routers and configured static routes, enabling communication between PCs on different networks. This exercise demonstrated essential network configuration skills and the importance of routing in ensuring connectivity.

-Abinash Regmi