EXPERIMENT 8 – Basic Routing

Objective:

To understand the basic functionality of a router and how does a router route the traffic between directly connected networks.

Router:

Router is a layer 3 (Network layer) device that connects two or more packet-switched networks or subnetworks. Routing is the process of selecting a path across one or more networks. In packet-switching networks, such as the Internet, routing selects the paths for IP packets to travel from their origin to their destination. These Internet routing decisions are made by specialized pieces of network hardware called routers.

Routing Table:

To direct packets effectively, a router uses an internal routing table — a list of paths to various network destinations. The router reads a packet's header to determine where it is going, then consults the routing table to figure out the most efficient path to that destination. It then forwards the packet to the next network in the path.

Routers work in the following way: when a router receives a packet, it reads the header of the packet to see its intended destination. It then determines where to route the packet based on information in its routing tables. Routers do this millions of times a second with millions of packets. As a packet travels to its destination, it may be routed several times by different routers.

Routing tables can either be static or dynamic. Static routing tables do not change. A network administrator manually sets up static routing tables.

Command Syntax:

Following is the command syntax for association of IP address on a router interface:

Router(config)# interface gig0/0
Router(config-if)# ip address 192.168.10.10 255.255.255.0
Router(config-if)# no shutdown

Topology:

Basic routing topology consists of two LAN segments (Network 1 and Network 2) that are connected to each other using a Cisco 2911 router. Each LAN segment contains a Cisco 2960 switch and one endpoint (PC) connected to that switch. Each LAN segment is connected to a separate router interface.

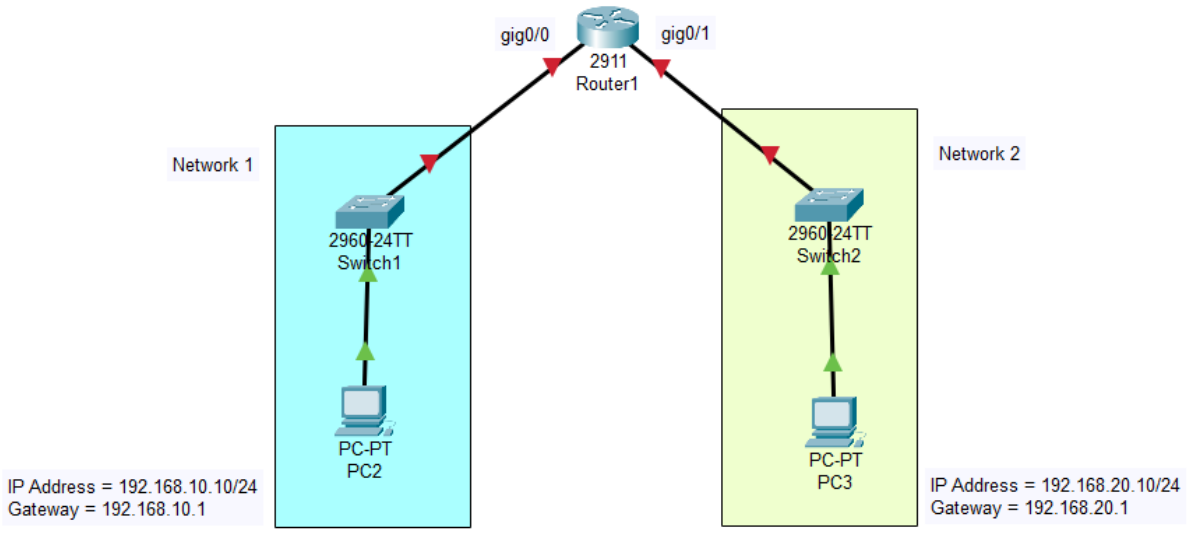
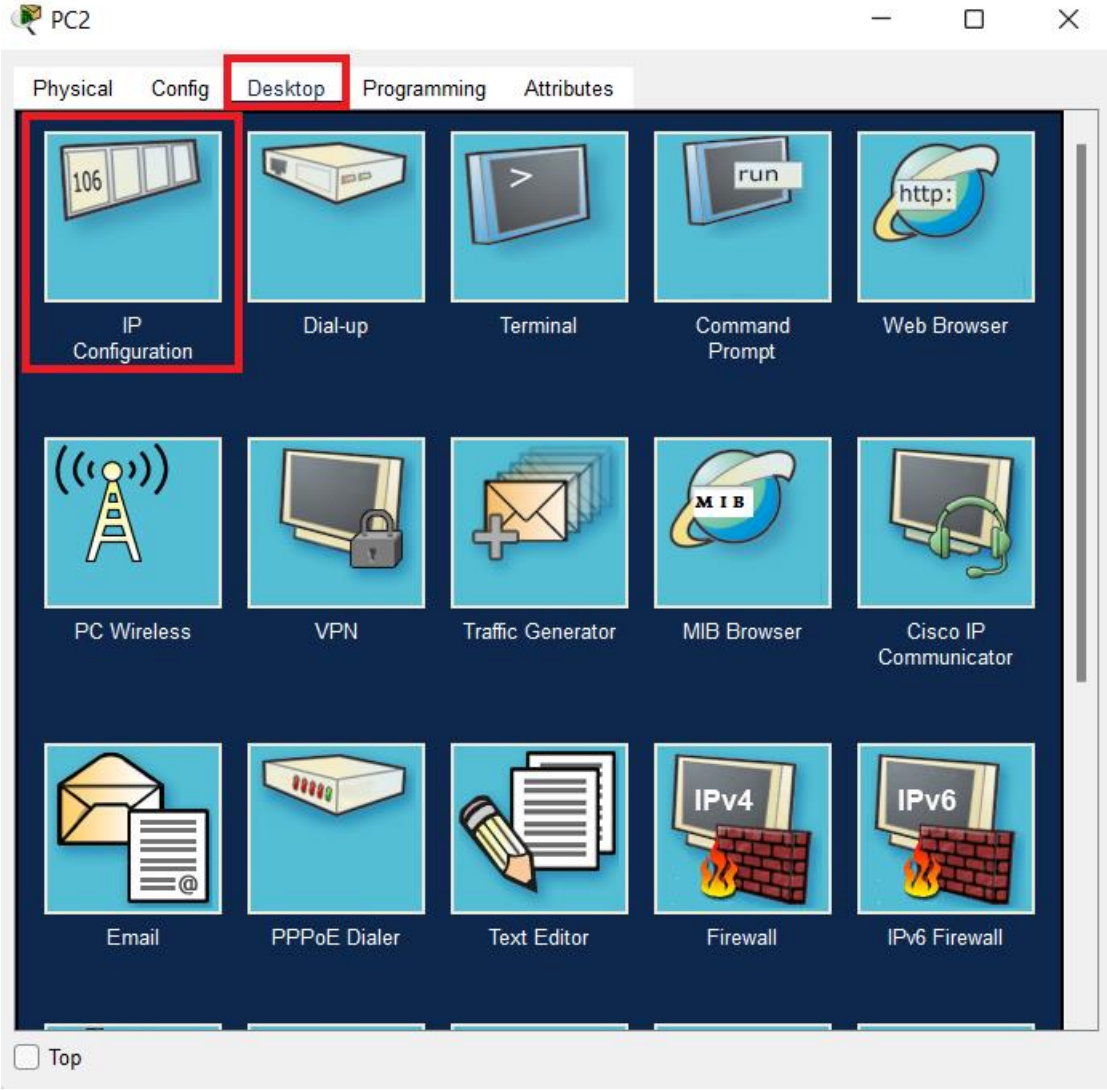


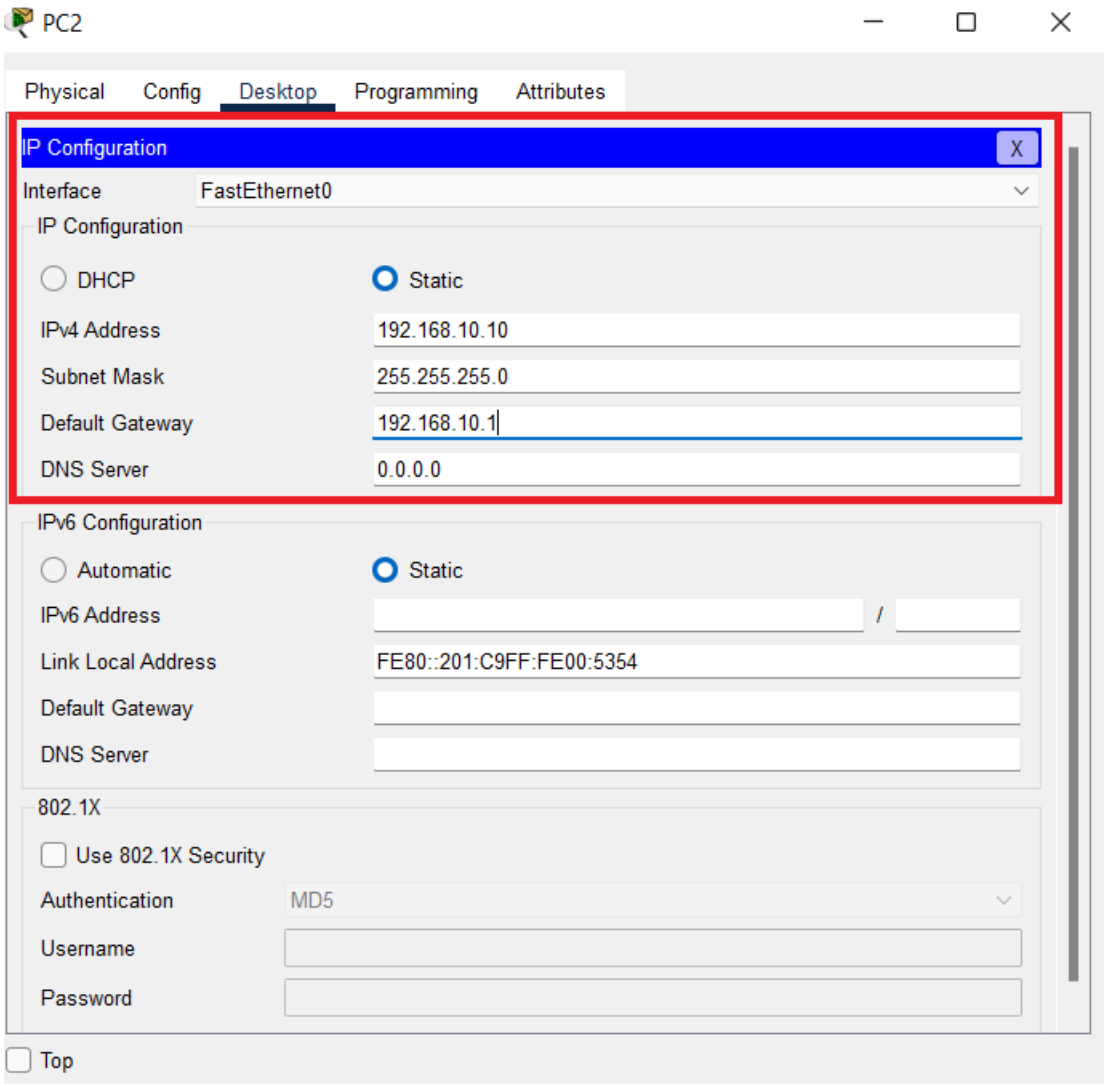
Figure 1 - Basic Routing Topology

Steps:

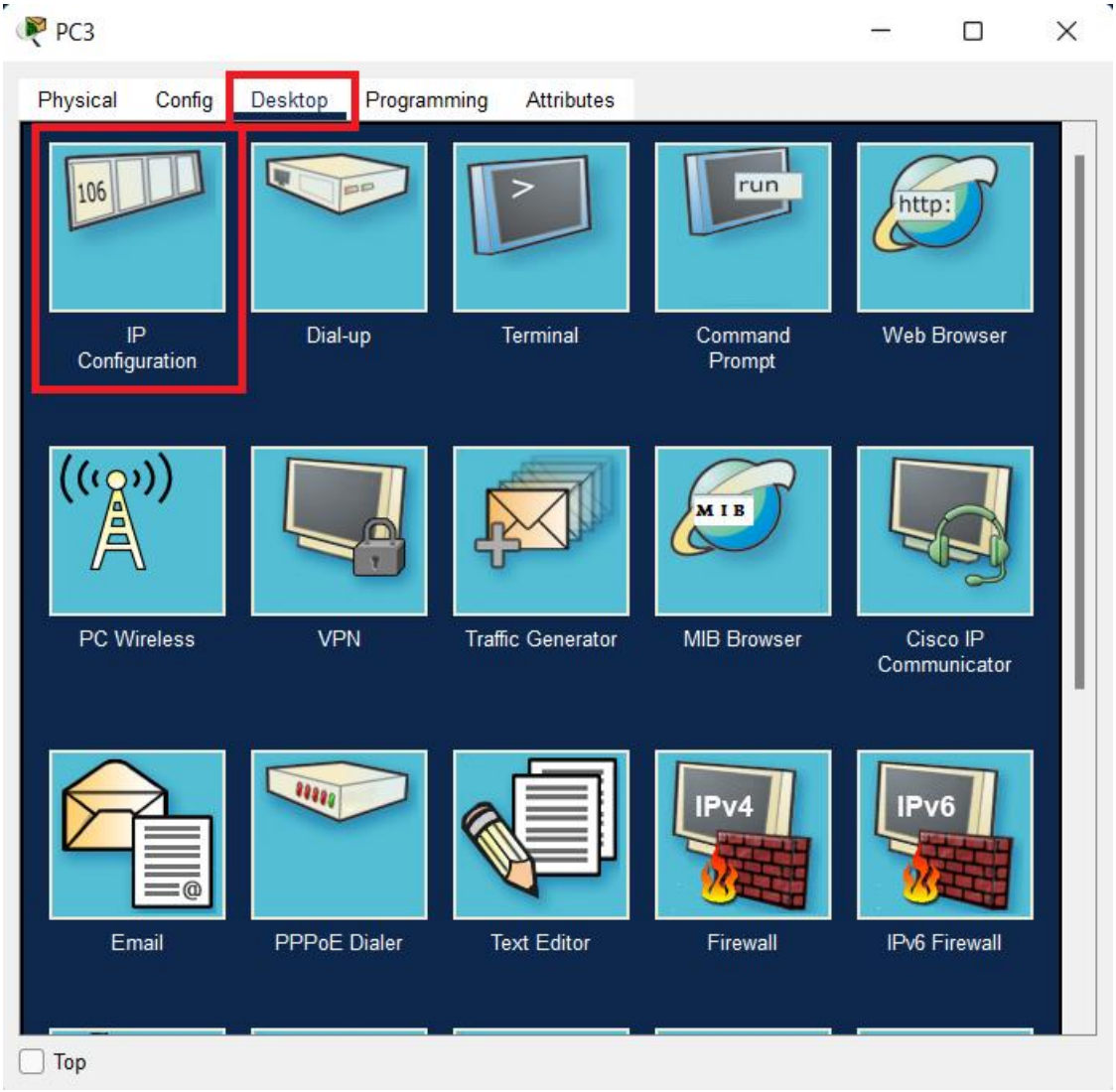
Select the first endpoint and click on “Desktop” tab and select “IP configuration” as shown below:



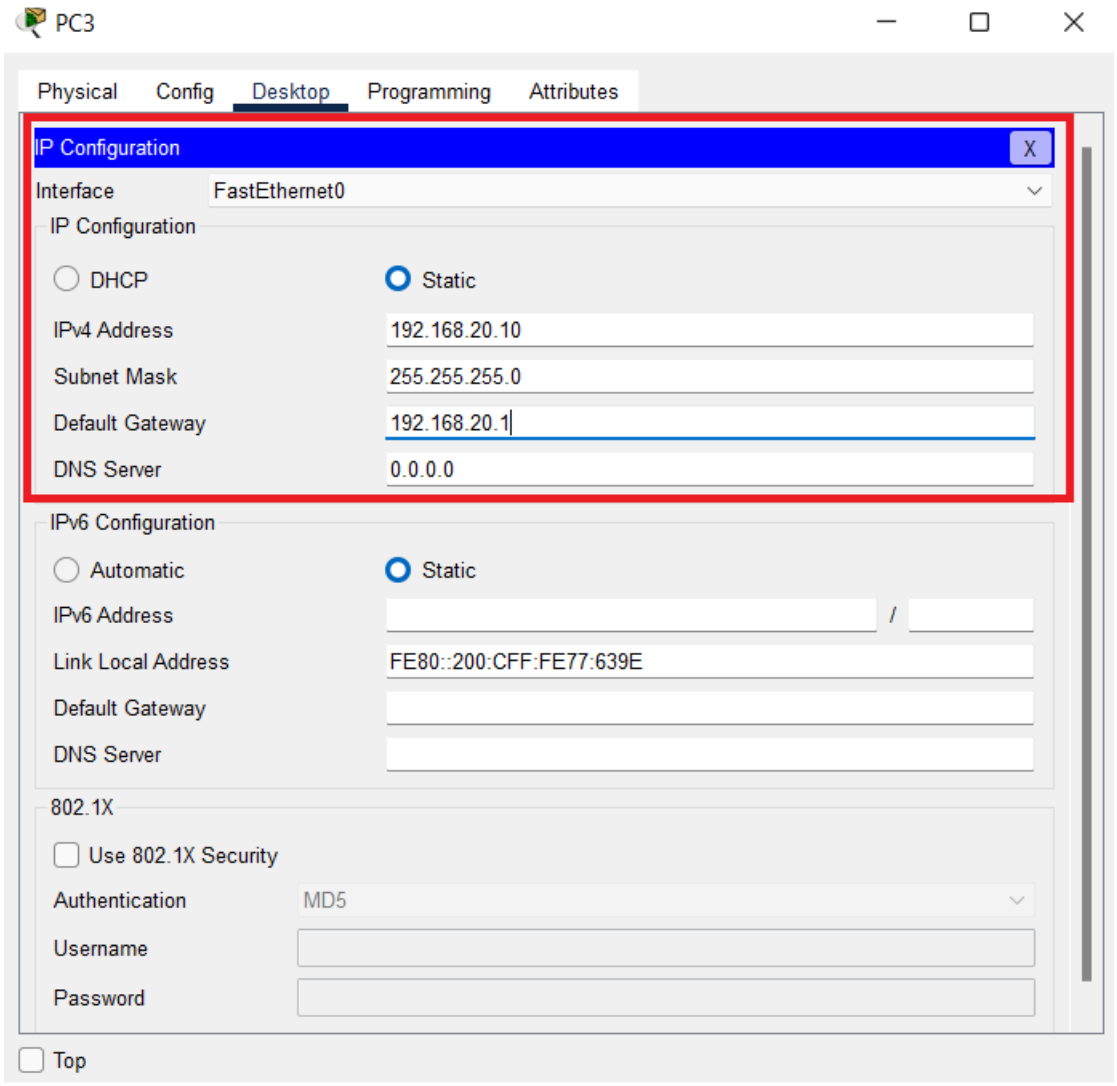
Assign the static IP address, subnet mask and default gateway as shown below:



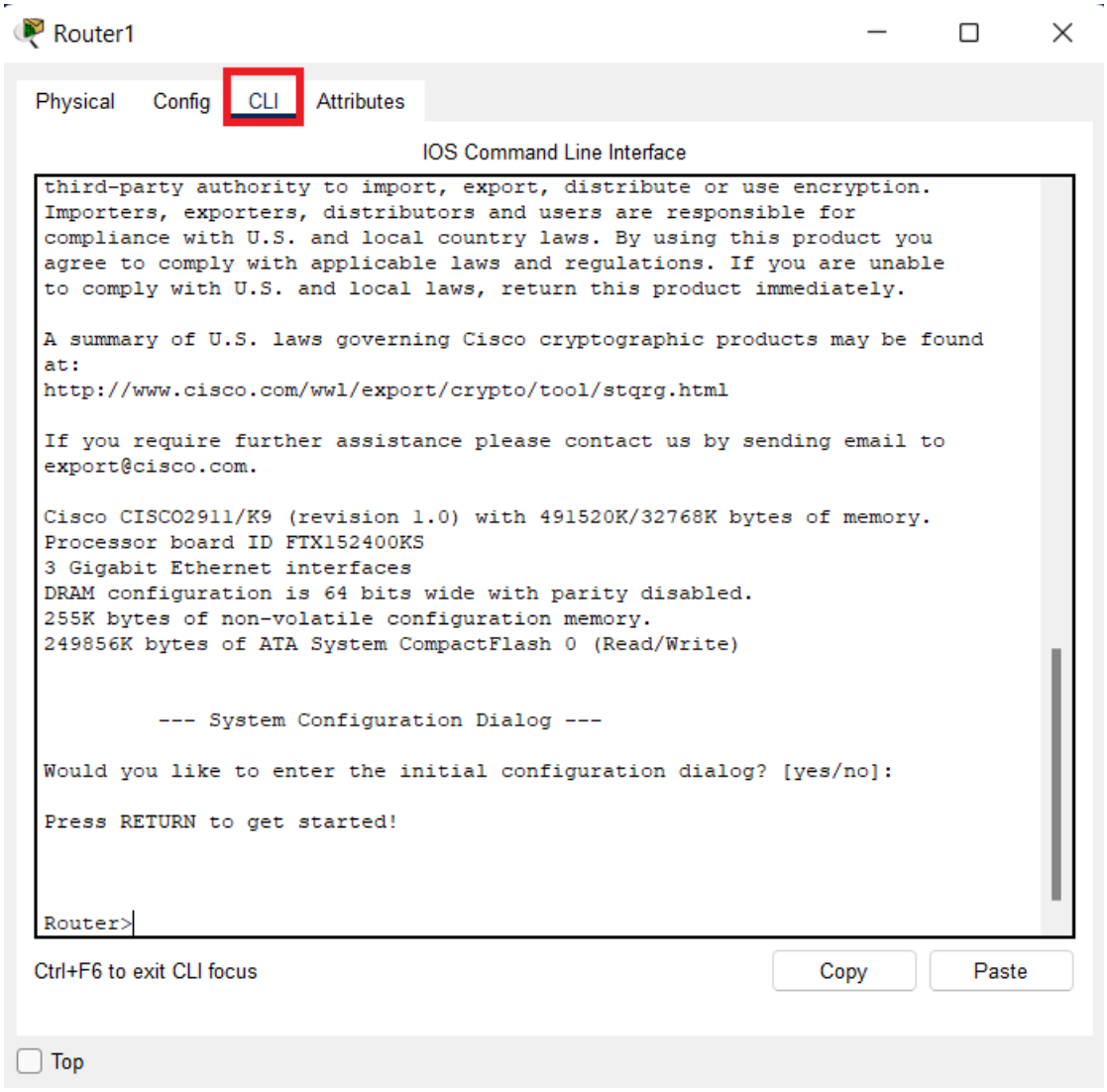
Select the second endpoint and click on “Desktop” tab and select “IP configuration” as shown below:



Assign the static IP address, subnet mask and default gateway as shown below:



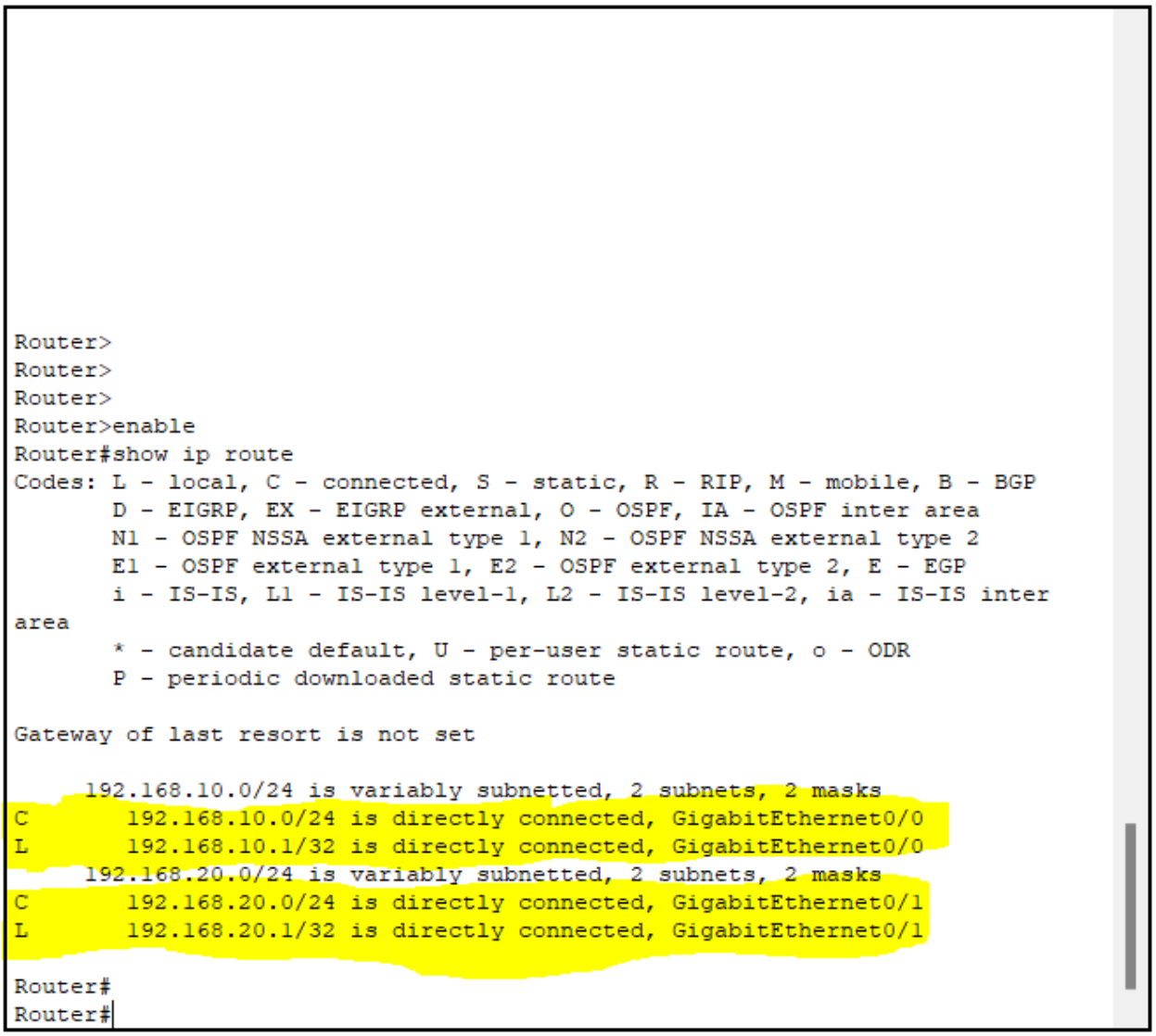
Select the Router and click on CLI tab. Do not enter the initial configuration dialog as shown below:



As shown in the topology diagram, we need to configure two router interfaces gig0/0 and gig0/1 with respective gateway IP addresses. We will configure the gateway IP addresses on both router interfaces followed by “no shutdown” command:

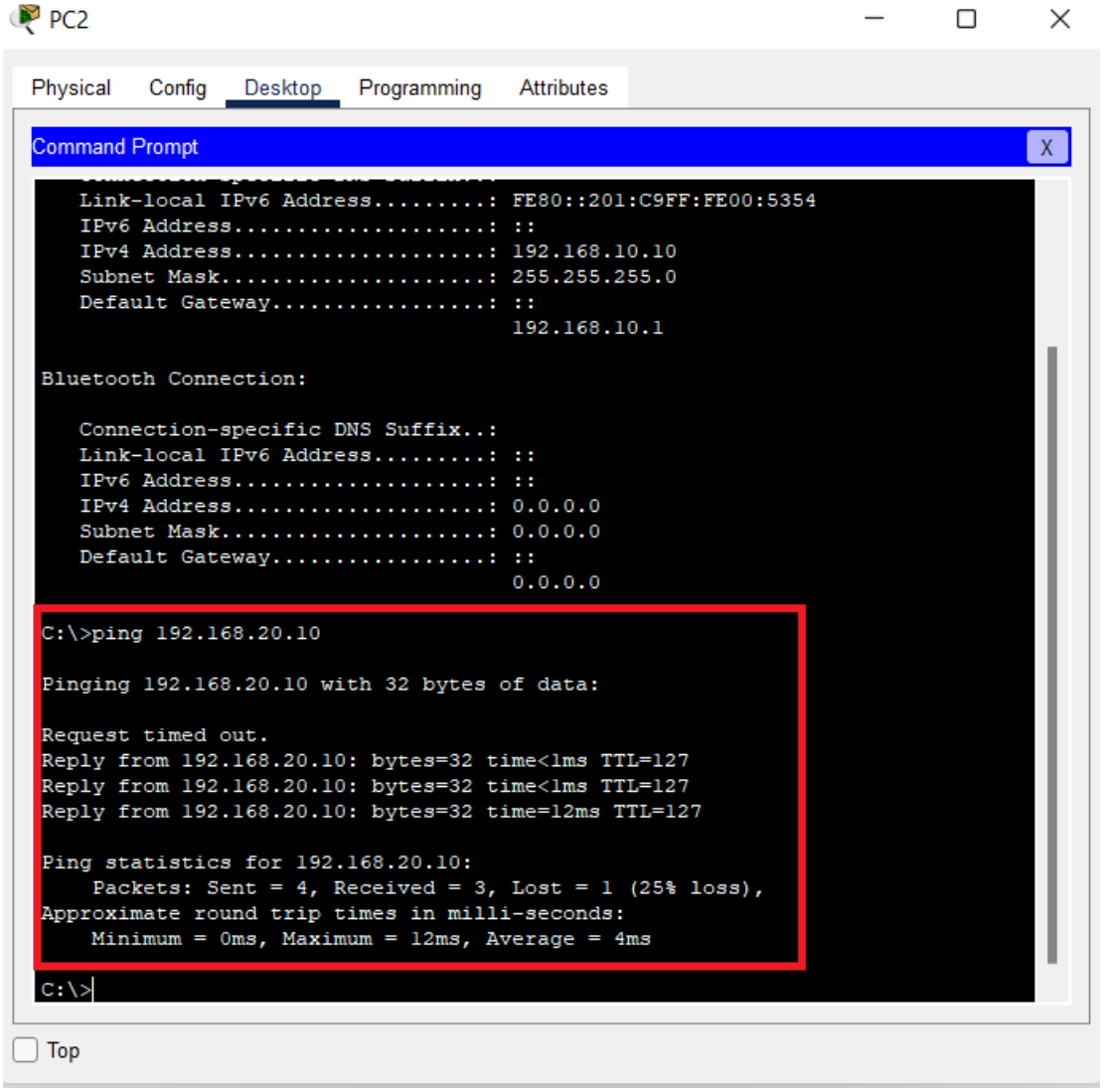
```
         --- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]:

Press RETURN to get started!



Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface gig0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shutdown

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

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

Router(config-if)#exit
Router(config)#
Router(config)#interface gig0/1
Router(config-if)#ip address 192.168.20.1 255.255.255.0
Router(config-if)#no shutdown

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

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

Router(config-if)#
```

We can check the routing table of router using "***show ip route***" command from the privileged exec mode. Entries in routing table that start with C represent directly connected networks, these are the network segments that are directly connected with the router, for example, in our topology network 1 (192.168.10.0/24) and network 2 (192.168.20.0/24) are directly connected networks for router.



Connectivity check:

Navigate to the command prompt on first PC (connected in network 1) to second PC (connected in network 2) and verify the network connectivity.



Key take aways:

Routers do the routing between directly connected networks by default, without any additional configuration.