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School of Technology
Department of ICT
Academic Year: 2022-23
Computer Communication and Networking Lab
20IC306P

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Experiment 2:

Aim: To Perform a Static Routing

Software required: - Cisco packet tracer

Theory: -

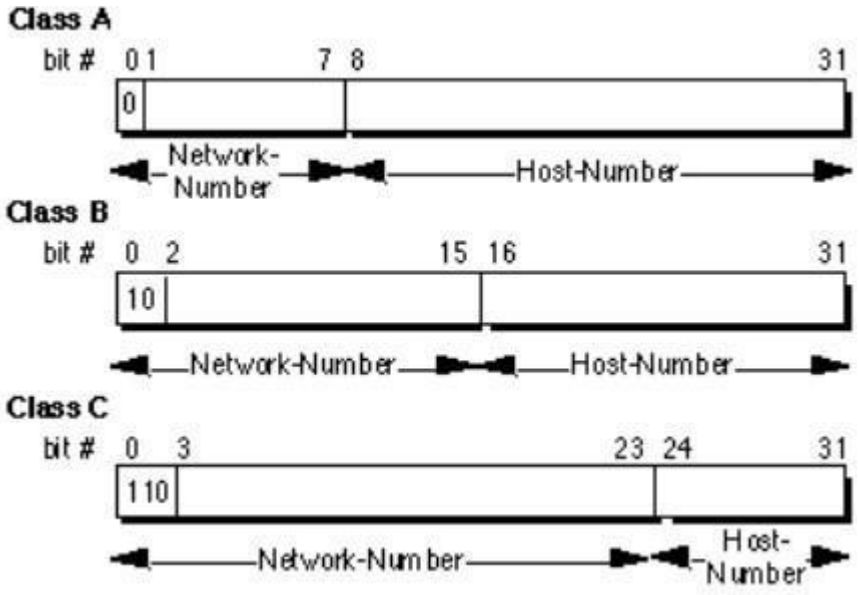
IP Address and Hostname:

In the Internet, machines are identified by what are known as IP addresses. It is a 4-byte address, and obviously unique for each machine. Since the Internet is a collection of networks, the IP address is composed of two parts.

1. A network part – that identifies which network within the Internet

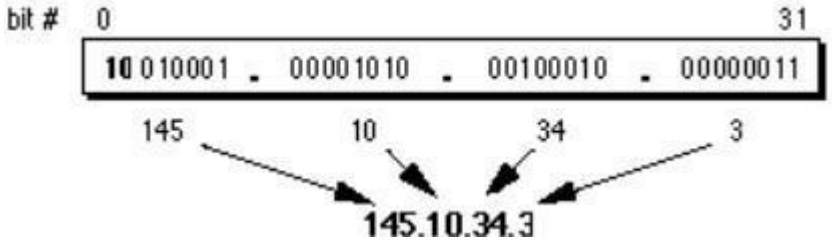
2. A host part – that identifies which host within the network

It was foreseen that all networks would not be of the same size, some would consist of a maximum of hundred machines, while others may require capability to accommodate tens of thousands. To cater to this demand, different classes of addresses were constructed. The important ones are classes A, B, and C. An address is identified as belonging to a particular class based on the following:



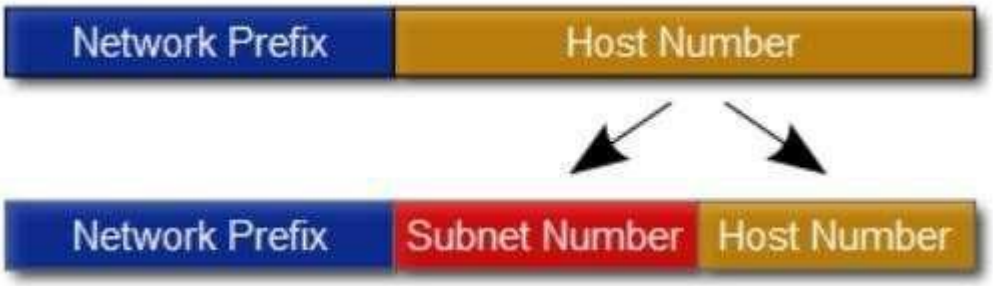
The IP address read as a 4-byte number would appear too big and cumbersome to remember, so the “dotted-decimal” notation is used for reading and writing. In this notation, the 32-bit IP

address is divided into 4 8-bit fields and the values are read in the decimal form, each value separated by a dot from the other.



Even though this is in a fairly human-readable form, remembering the IP addresses of hundreds of machines is not entirely easy, that is why hostnames were introduced. A machine is given a name (human-readable) and people can refer to it with this name. The name to address translation has to happen at some point, since the communication at the lower level is always in terms of addresses and not names.

Sub-netting: A subnetwork, or subnet, is a logically visible, distinctly addressed part of a single Internet Protocol network. The process of subnetting is the division of a computer network into groups of computers that have a common, designated IP address routing prefix.

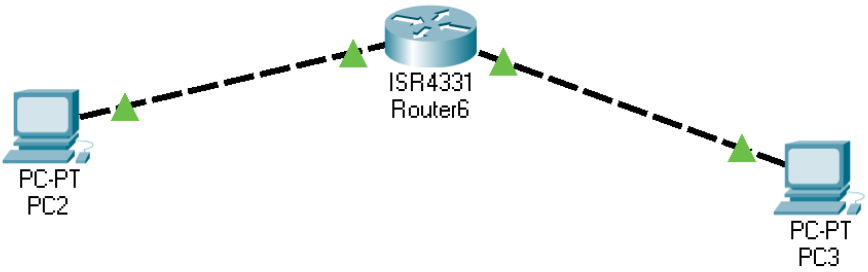


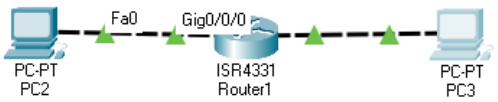
Subnetting breaks a network into smaller realms that may use existing address space more efficiently, and, when physically separated, may prevent excessive rates of Ethernet packet collision in a larger network. The subnets may be arranged logically in a hierarchical architecture, partitioning the organization's network address space (see also Autonomous System) into a tree-like routing structure. Routers are used to interchange traffic between subnetworks and constitute logical or physical borders between the subnets. They manage traffic between subnets based on the high-order bit sequence (routing prefix) of the addresses. A routing prefix is the sequence of leading (most significant) bits of an IP address that precede both the portion of the address used as host identifier and, if applicable, the set of bits that designate the subnet number In IPv4 networks, the routing prefix is traditionally expressed as a subnet mask, which is the prefix bit mask expressed in quad-dotted decimal representation. For example, 255.255.255.0 is the subnet mask for the 192.168.1.0/24 prefix. All hosts within a subnet can be reached in one routing hop, implying that all hosts in a subnet are connected to the same link.

Static Routing:

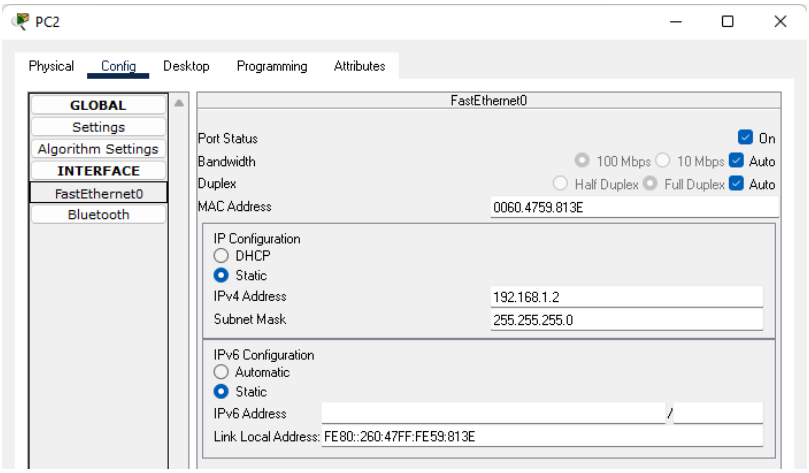
When data needs to be sent from one LAN to another say, or if there are different sub- networks in the same LAN, then data transfer is not possible directly. There arises the need for a gateway, which sits between the two networks and acts as the communication link for connections, which span more than one network. This experiment is aimed at creating a gateway between two networks, and configuring it to act as the middleman for communication across the networks.

Task 1. Two computers are connected through router. Establish connection between two computers which are connected as shown in the diagram.

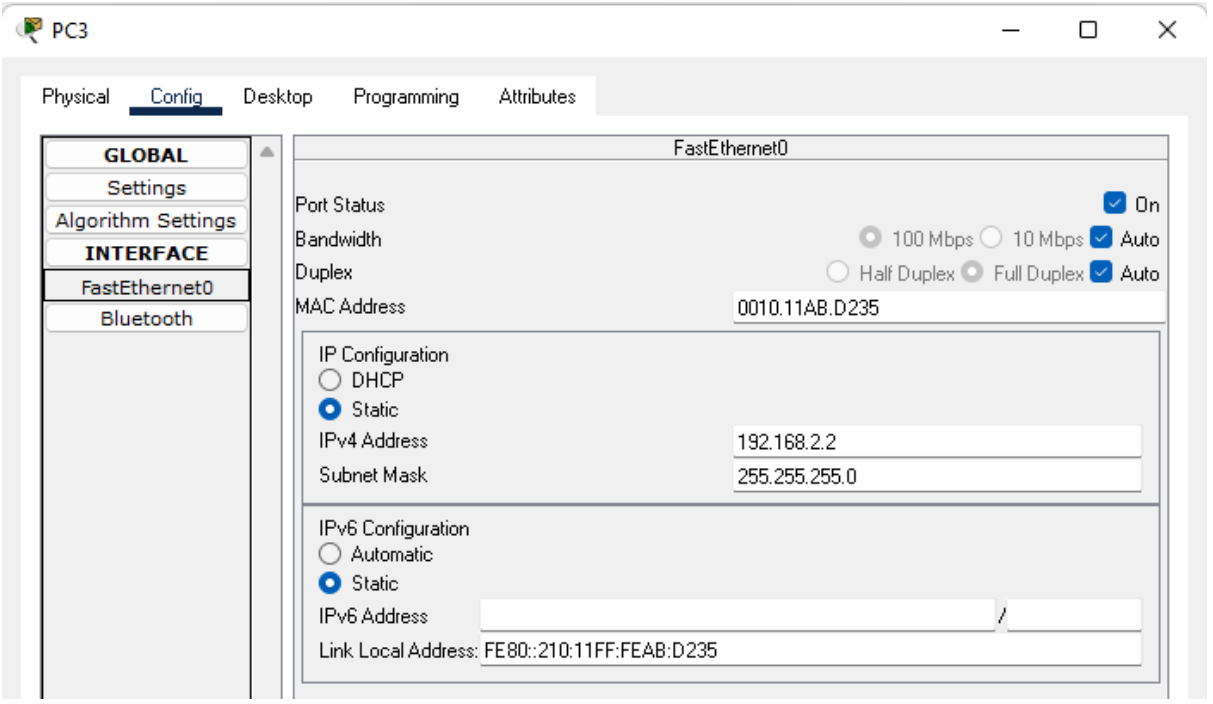




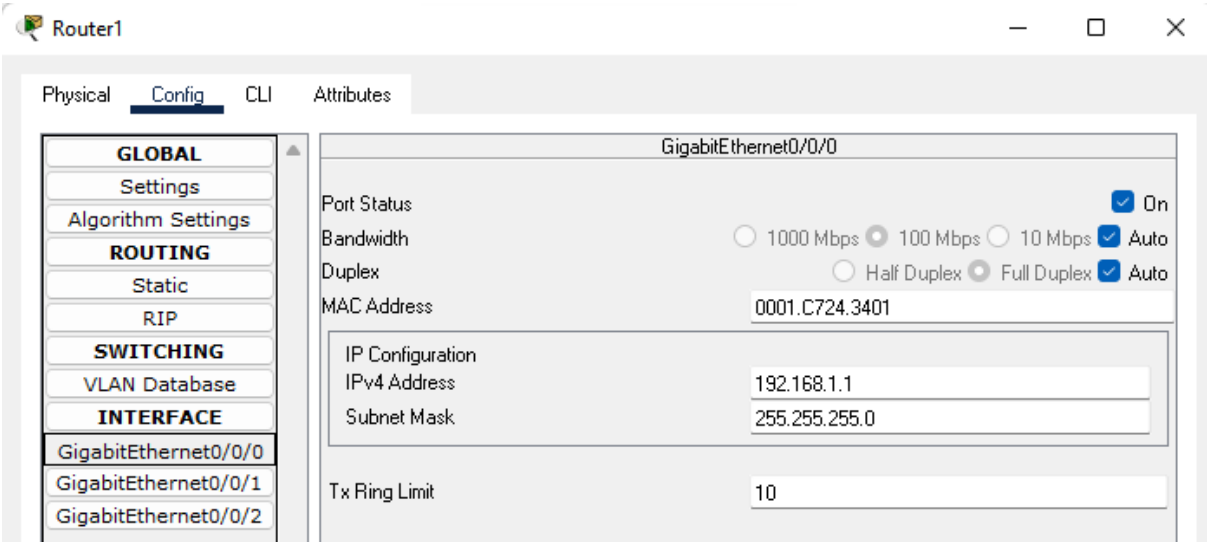
- IP address of one computer (PC2) is 192.168.1.2/24

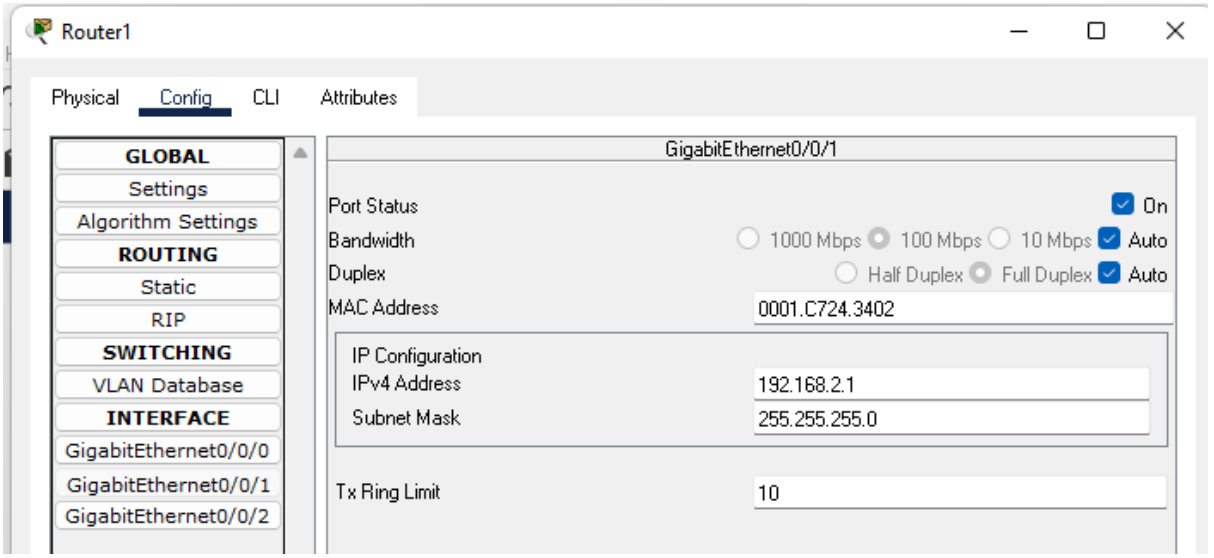


- IP address of another computer (PC3) is 192.168.2.2/24

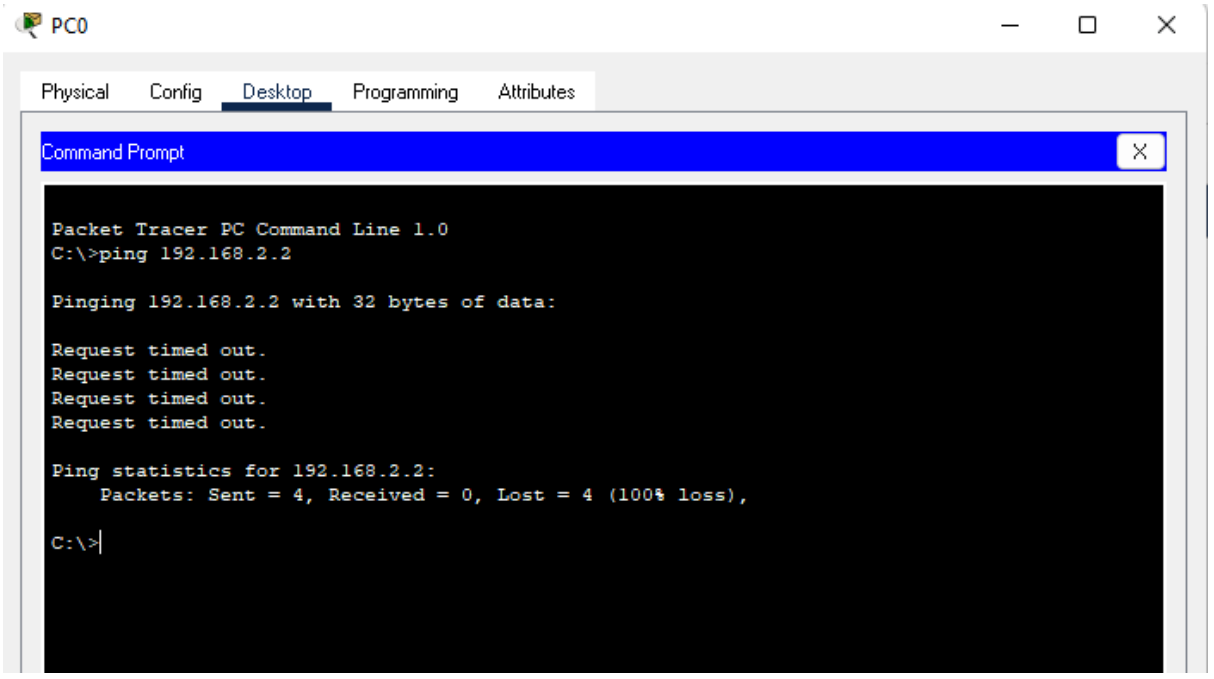


- Router has 192.168.1.1 as an IP address for PC2 interface and 192.168.2.1 as an IP address for PC3 interface.

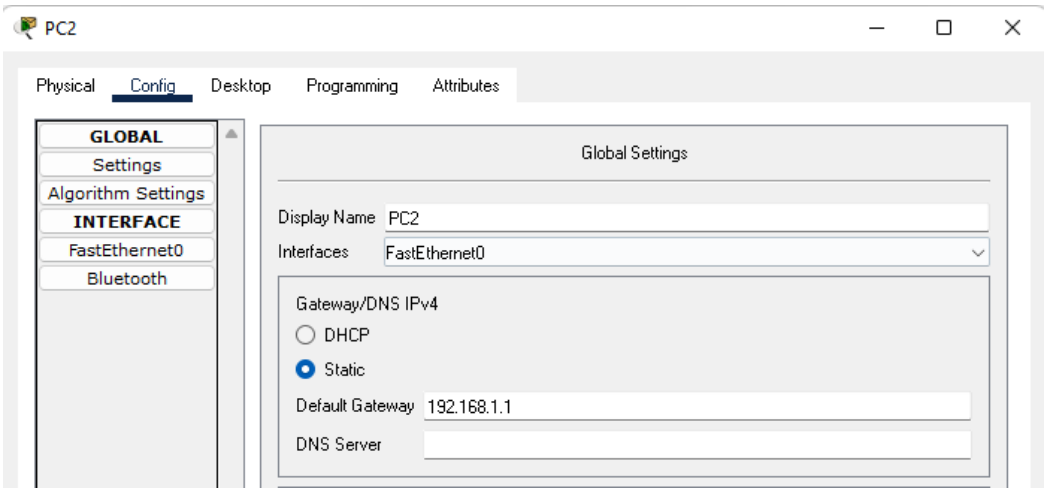


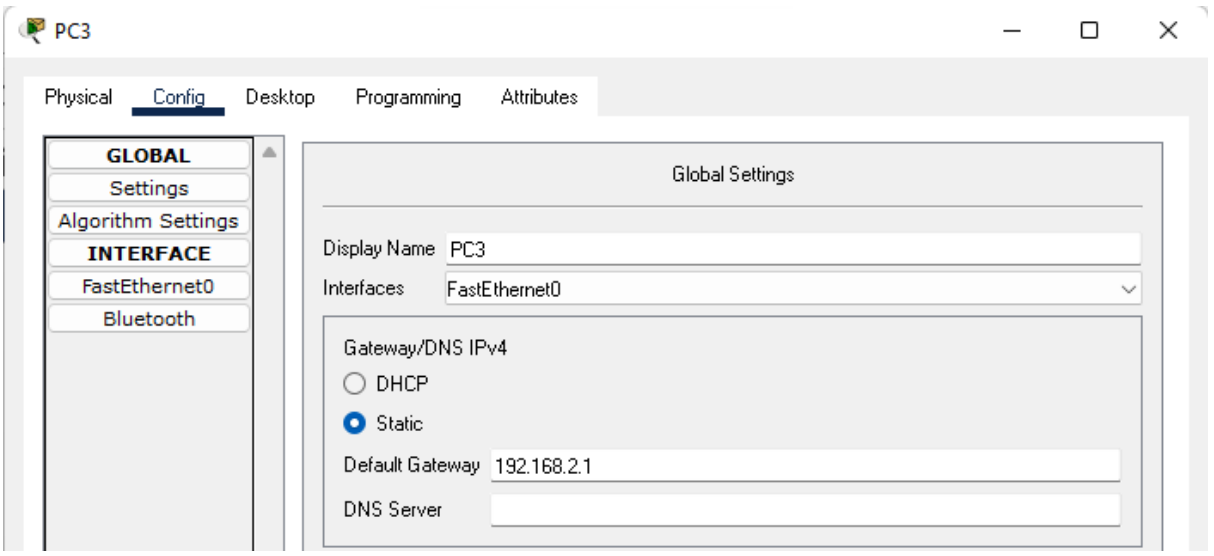


- Ping PC2 from PC3 and vice versa.
- Note the output of ping command



- How do you connect PC2 to PC3, so that they can ping each other?

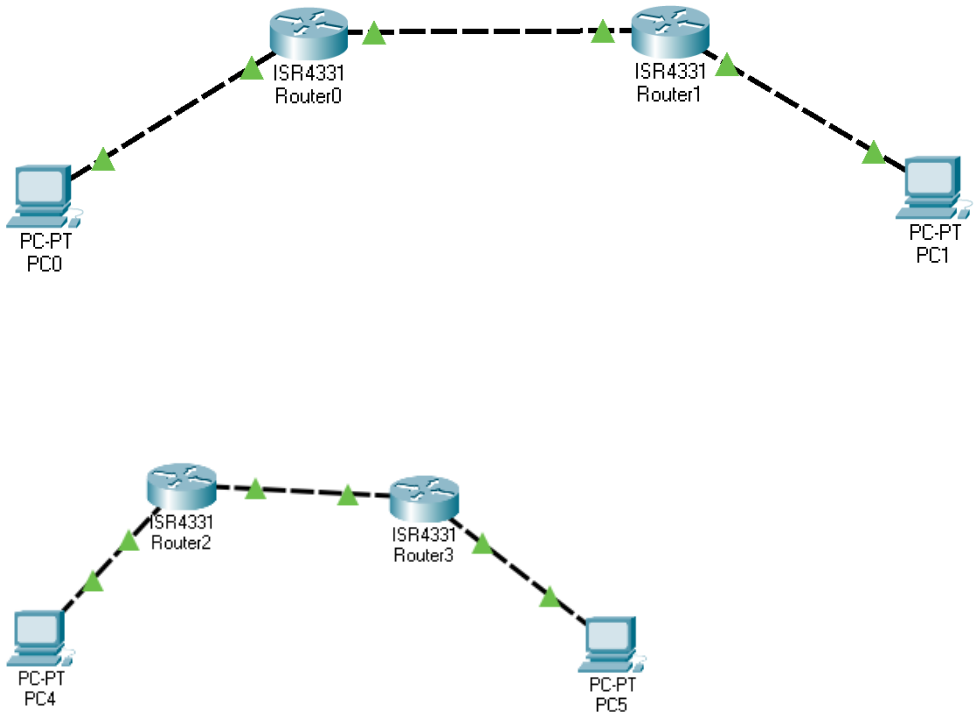




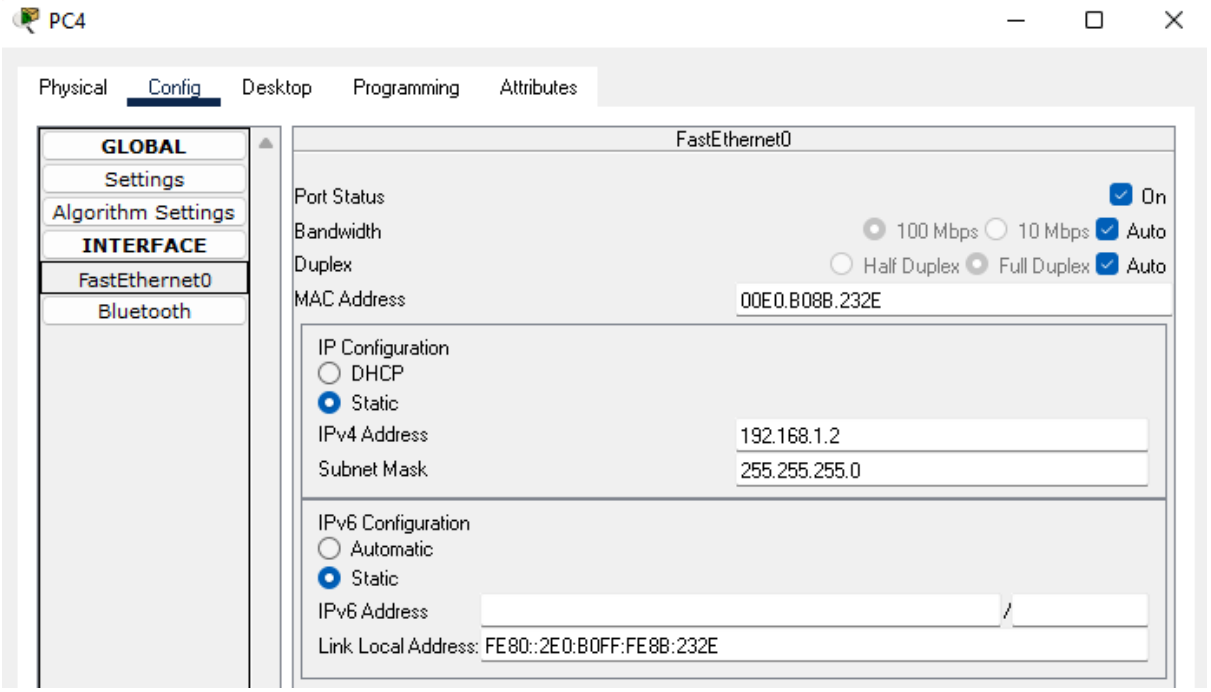

```
C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.2.2: bytes=32 time<1ms TTL=127
Reply from 192.168.2.2: bytes=32 time<1ms TTL=127
Reply from 192.168.2.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=127
Reply from 192.168.1.2: bytes=32 time<1ms TTL=127
Reply from 192.168.1.2: bytes=32 time=2ms TTL=127
Reply from 192.168.1.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\>
```

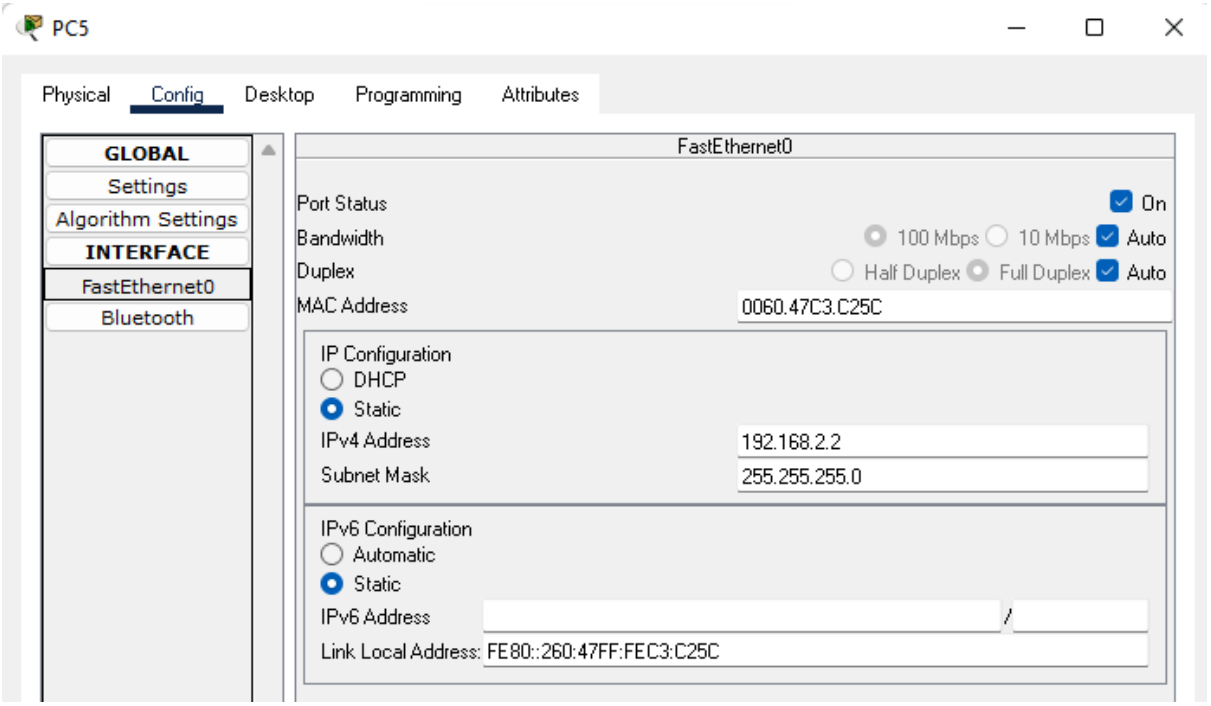
Task 2. Establish connection between two computers which are connected as shown in the diagram.



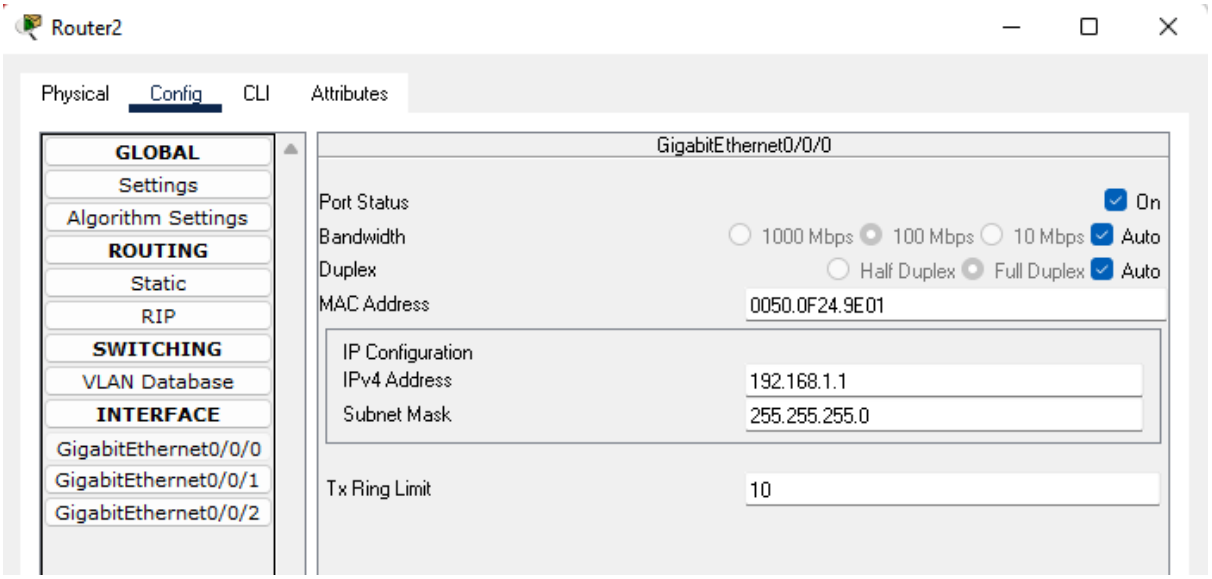
- IP address of one computer (PC0) is 192.168.1.2/24

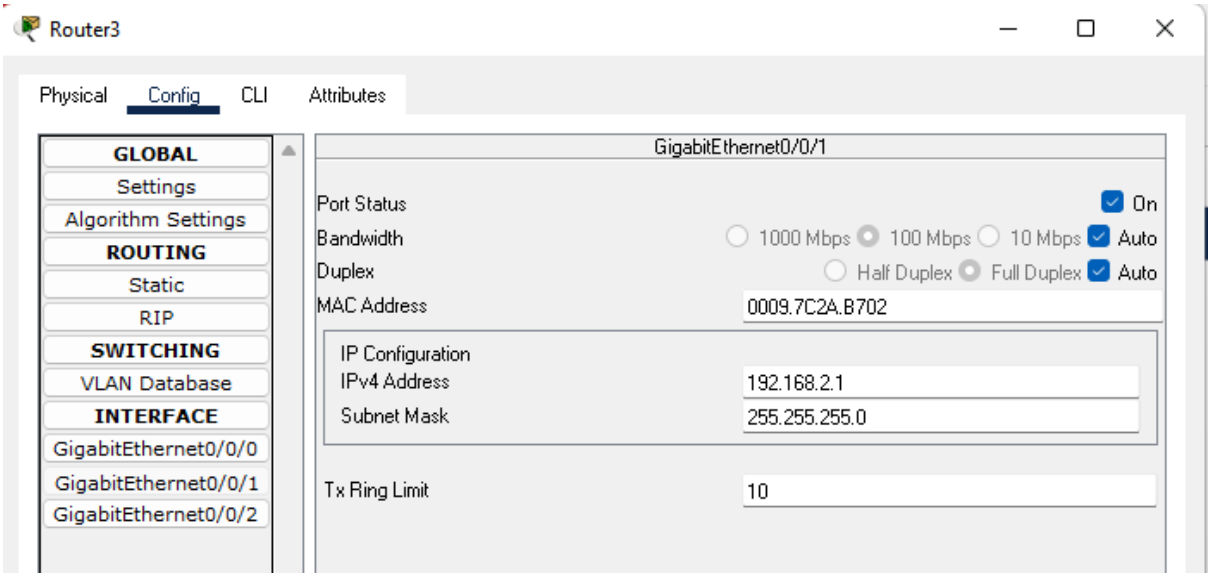


- IP address of another computer (PC1) is 192.168.2.2/24

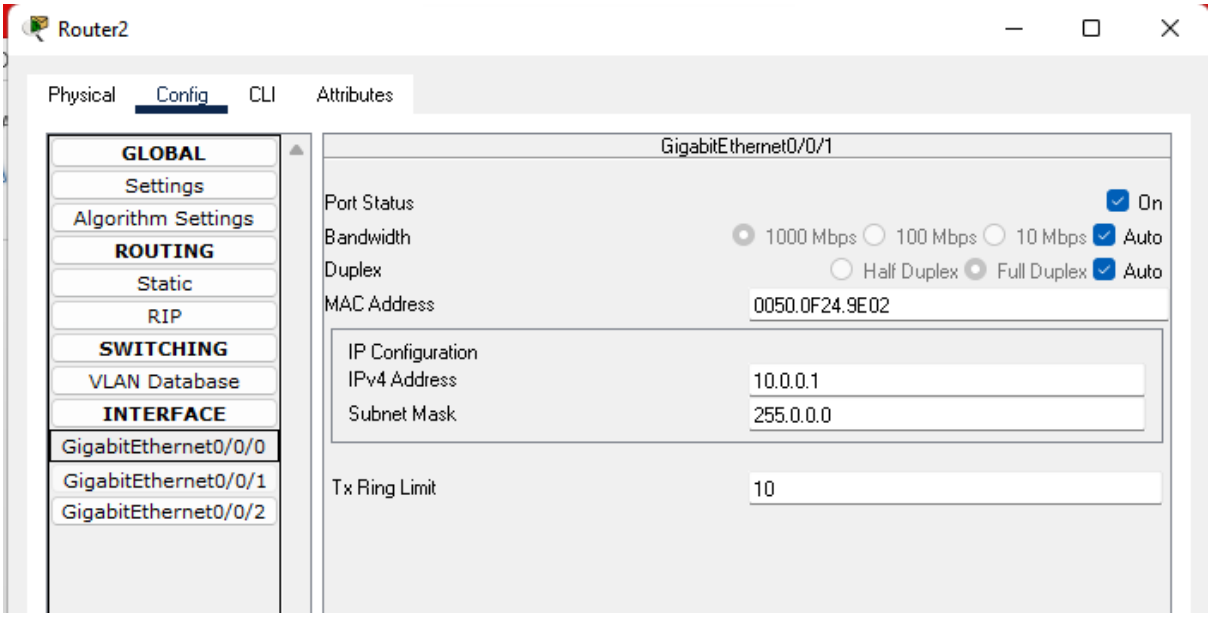


- Router0 has an IP address 192.168.1.1 for PC0 interface and Router1 has an IP address 192.168.2.1 for PC1 interface.

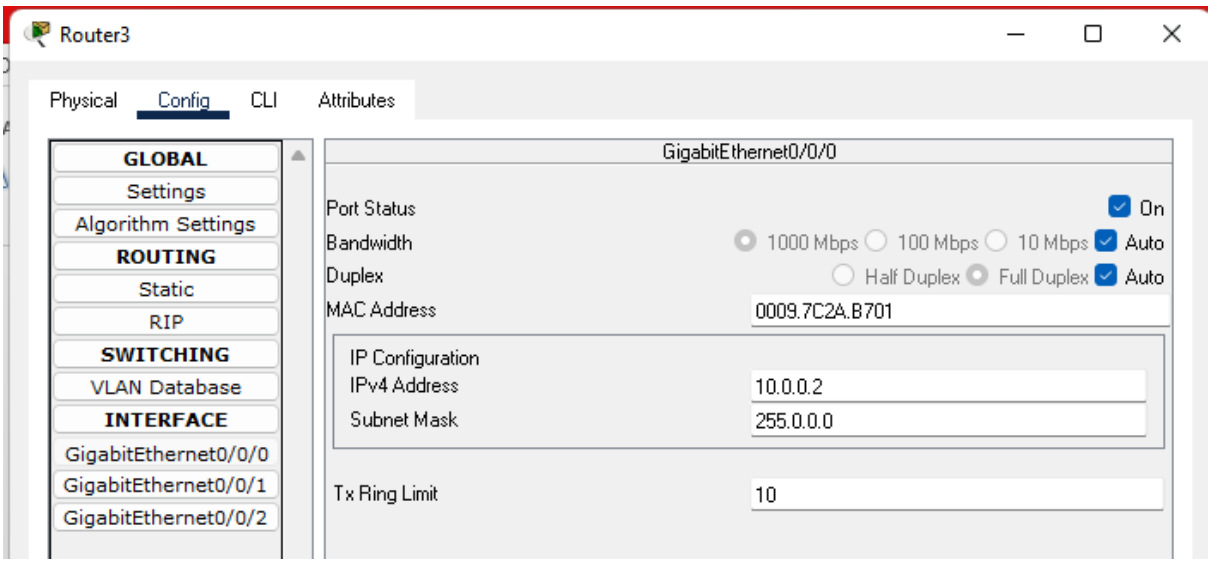




- Router 0 has an IP address 10.0.0.1 for interface of router 1.



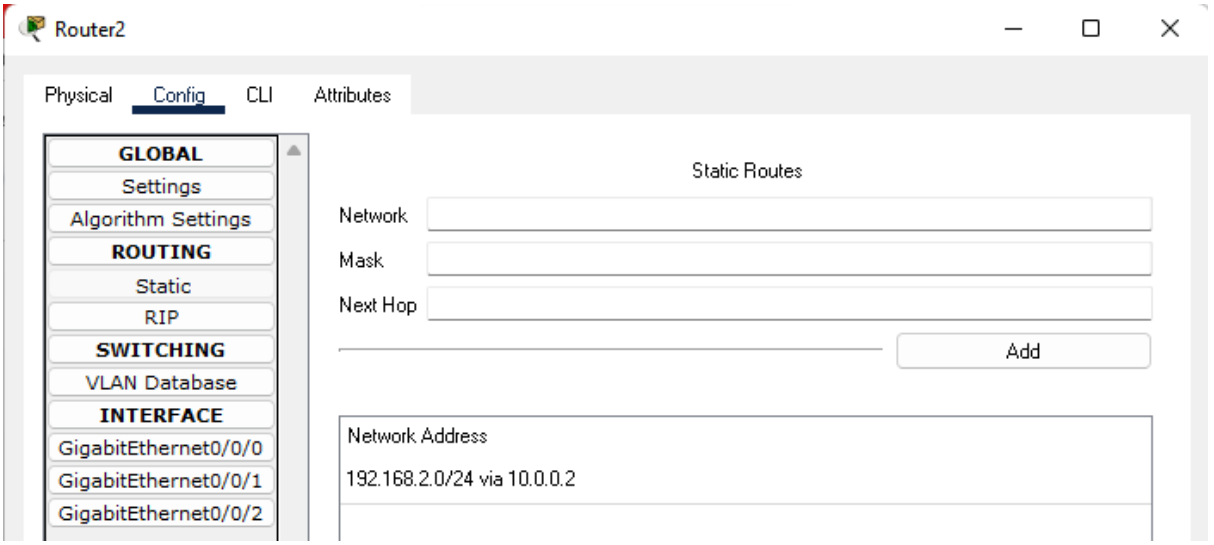
- Router 1 has an IP address 10.0.0.2 for interface of router 0.

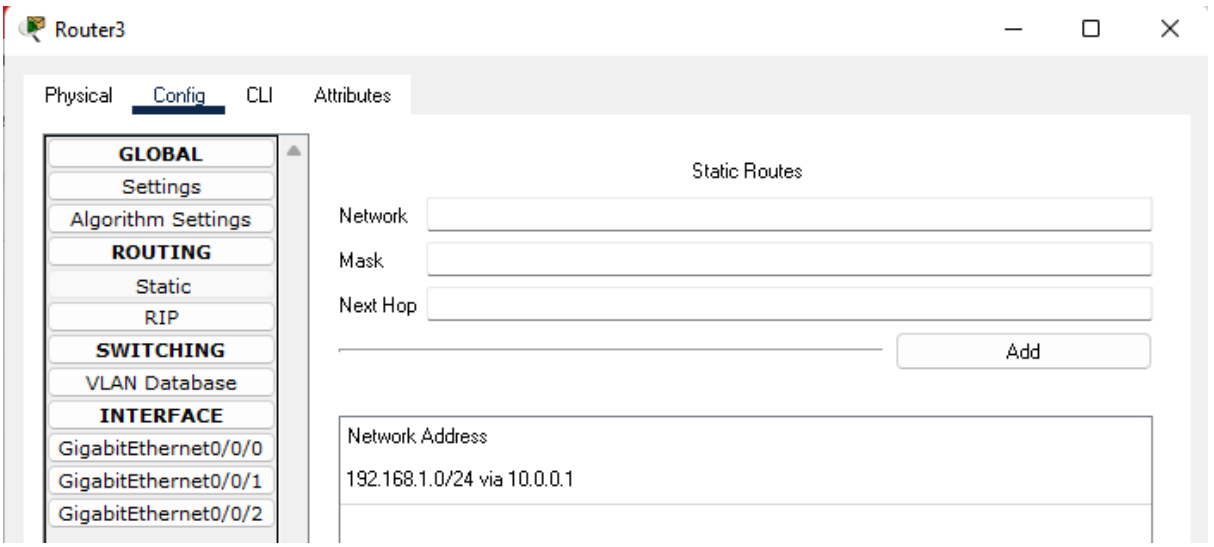


- Ping PC1 from PC0 and vice versa.
- Note the output of ping command

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

- How do you connect PC0 to PC1, so that they can ping each other?





PC4

```
C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 192.168.2.2: bytes=32 time<1ms TTL=126
Reply from 192.168.2.2: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

PC5

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=126
Reply from 192.168.1.2: bytes=32 time<1ms TTL=126
Reply from 192.168.1.2: bytes=32 time<1ms TTL=126
Reply from 192.168.1.2: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```