

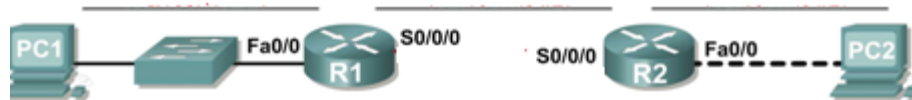
Name: Ashutosh Naik  
UID: 2018130030  
RollNo: 35  
Batch: C

## CEL 51, DCCN, Monsoon 2020

### Lab 6: Subnet and Router Configuration

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#### Topology Diagram



#### Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	192.168.1.1	255.255.255.192	N/A
	S0/0/0	192.168.1.65	255.255.255.192	N/A
R2	Fa0/0	192.168.1.129	255.255.255.192	N/A
	S0/0/0	192.168.1.126	255.255.255.192	N/A
PC1	NIC	192.168.1.62	255.255.255.192	192.168.1.1
PC2	NIC	192.168.1.190	255.255.255.192	192.168.1.129

#### Learning Objectives

Upon completion of this lab, you will be able to:

- Subnet an address space given requirements.
- Assign appropriate addresses to interfaces and document.
- Configure and activate Serial and FastEthernet interfaces.
- Test and verify configurations.
- Reflect upon and document the network implementation.

#### Scenario

In this lab activity, you will design and apply an IP addressing scheme for the topology shown in the Topology Diagram. You will be given one address block that you must subnet to provide a logical addressing scheme for the network. The routers will then be ready for interface address configuration according to your IP addressing scheme. When the configuration is complete, verify that the network is working properly.

## Task 1: Subnet the Address Space.

### Step 1: Examine the network requirements.

You have been given the 192.168.1.0/24 address space to use in your network design. The network consists of the following segments:

- The network connected to router R1 will require enough IP addresses to support 15 hosts.
- The network connected to router R2 will require enough IP addresses to support 30 hosts.
- The link between router R1 and router R2 will require IP addresses at each end of the link.

### Step 2: Consider the following questions when creating your network design.

How many subnets are needed for this network? 3

What is the subnet mask for this network in dotted decimal format? 255.255.255.192

What is the subnet mask for the network in slash format? /26

How many usable hosts are there per subnet?  $2^6 - 2 = 62$

### Step 3: Assign sub-network addresses to the Topology Diagram.

1. Assign subnet 1 to the network attached to R1.
2. Assign subnet 2 to the link between R1 and R2.
3. Assign subnet 3 to the network attached to R2.

## Task 2: Determine Interface Addresses.

### Step 1: Assign appropriate addresses to the device interfaces.

1. Assign the first valid host address in subnet 1 to the LAN interface on R1.  
**192.168.1.1**
2. Assign the last valid host address in subnet 1 to PC1.  
**192.168.1.62**
3. Assign the first valid host address in subnet 2 to the WAN interface on R1.  
**192.168.1.65**
4. Assign the last valid host address in subnet 2 to the WAN interface on R2.  
**192.168.1.126**
5. Assign the first valid host address in subnet 3 to the LAN interface of R2.  
**192.168.1.129**
6. Assign the last valid host address in subnet 3 to PC2.  
**192.168.1.190**

**Step 2: Document the addresses to be used in the table provide under the Topology Diagram.**

**Task 3: Configure the Serial and FastEthernet Addresses.**

**Step 1: Configure the router interfaces.**

Configure the interfaces on the R1 and R2 routers with the IP addresses from your network design. Please note, to complete the activity in Packet Tracer you will be using the Config Tab. When you have finished, be sure to save the running configuration to the NVRAM of the router.

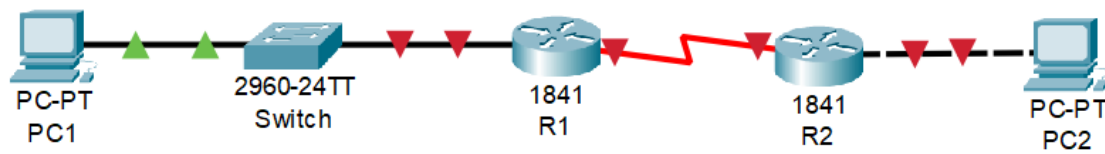


Fig 1: The devices have been connected

R1

Physical **Config** CLI Attributes

**GLOBAL**

Settings

Algorithm Settings

**ROUTING**

Static

RIP

**SWITCHING**

VLAN Database

**INTERFACE**

FastEthernet0/0

FastEthernet0/1

Serial0/0/0

Serial0/0/1

**FastEthernet0/0**

Port Status ☒ On

Bandwidth ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 00E0.F9A5.E601

IP Configuration

IPv4 Address 192.168.1.1

Subnet Mask 255.255.255.192

Tx Ring Limit 10

Equivalent IOS Commands

```
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.224
Router(config-if)#
```

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Fig 2: Fa0/0 config of R1

R1

Physical **Config** CLI Attributes

**GLOBAL**

Settings

Algorithm Settings

**ROUTING**

Static

RIP

**SWITCHING**

VLAN Database

**INTERFACE**

FastEthernet0/0

FastEthernet0/1

**Serial0/0/0**

Serial0/0/1

Serial0/0/0

Port Status ☒ On

Duplex ☐ Full Duplex

Clock Rate 2000000

IP Configuration

IPv4 Address 192.168.1.65

Subnet Mask 255.255.255.192

Tx Ring Limit 10

Equivalent IOS Commands

```
Router(config-if)#ip address 192.168.1.1 255.255.255.192
% 192.168.1.0 overlaps with Serial0/0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 192.168.1.65 255.255.255.224
Router(config-if)#
```

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Fig 3: S0/0 config of R1

R2

Physical **Config** CLI Attributes

**GLOBAL**

Settings

Algorithm Settings

**ROUTING**

Static

RIP

**SWITCHING**

VLAN Database

**INTERFACE**

FastEthernet0/0

FastEthernet0/1

Serial0/0/0

Serial0/0/1

**FastEthernet0/0**

Port Status ☒ On

Bandwidth ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 00E0.F7BB.9301

IP Configuration

IPv4 Address 192.168.1.129

Subnet Mask 255.255.255.192

Tx Ring Limit 10

Equivalent IOS Commands

```
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.1.65 255.255.255.224
Router(config-if)#ip address 192.168.1.129 255.255.255.224
Router(config-if)#
```

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Fig 4: Fa0/0 config of R2



```

!
!
interface FastEthernet0/0
 ip address 192.168.1.1 255.255.255.192
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0/0
 ip address 192.168.1.65 255.255.255.192
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
--More--

```

The startup-config shows the running-config details for R1

```

!
!
!
!
interface FastEthernet0/0
 ip address 192.168.1.129 255.255.255.192
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0/0
 ip address 192.168.1.126 255.255.255.192
 clock rate 64000
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
--More--

```

The startup-config shows the running-config details for R2

## Step 2: Configure the PC interfaces.

Configure the Ethernet interfaces of PC1 and PC2 with the IP addresses and default gateways from your network design.



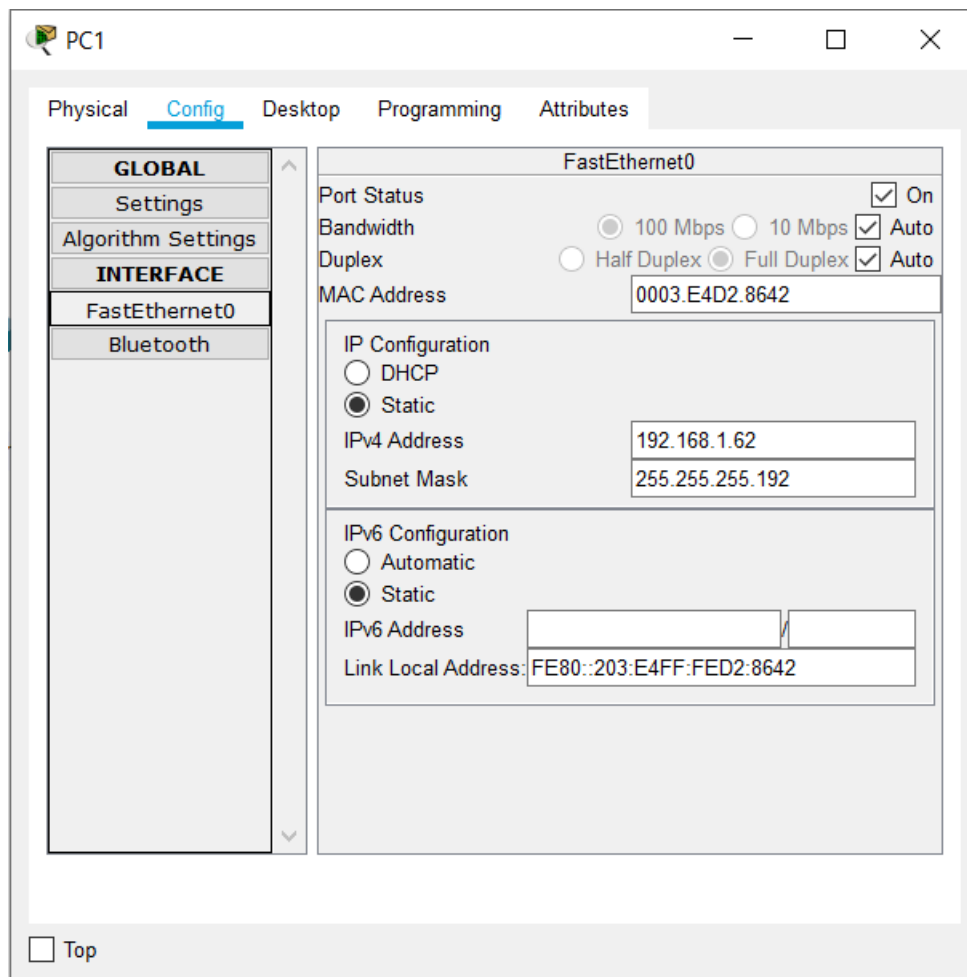


Fig 6: Fa0 interface for PC1

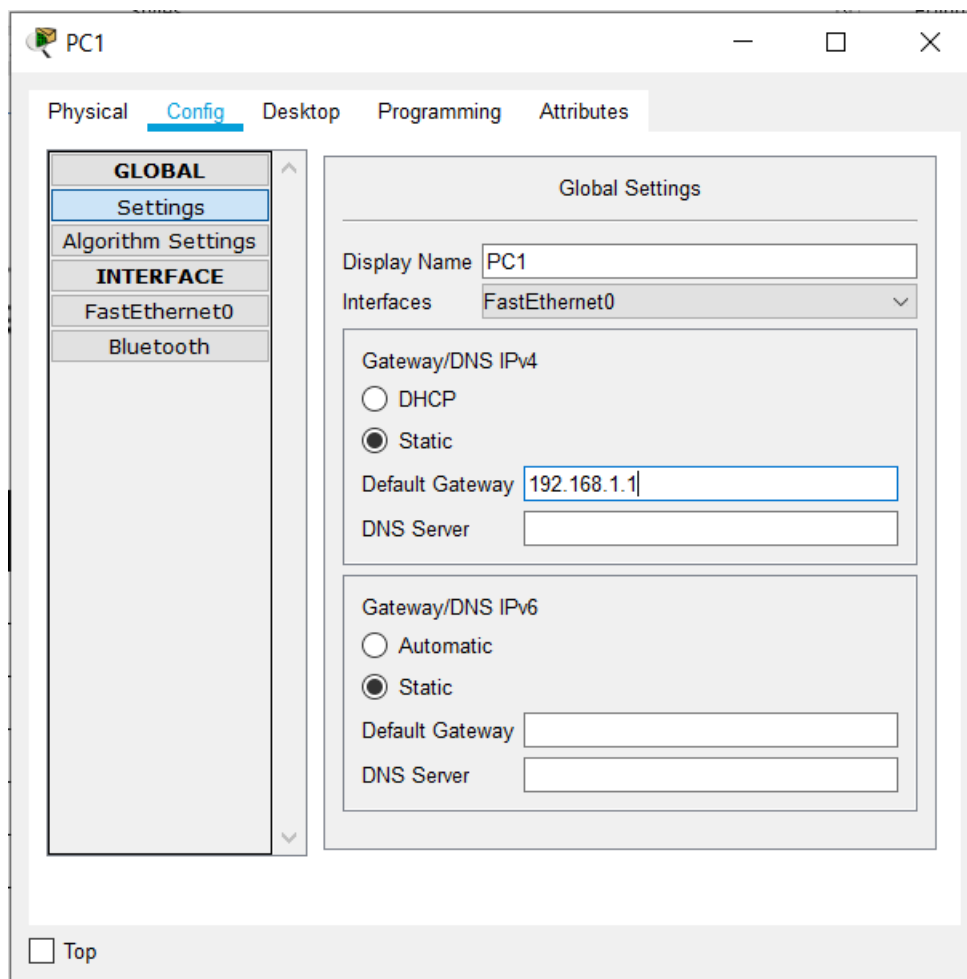


Fig 7: PC1 default gateway

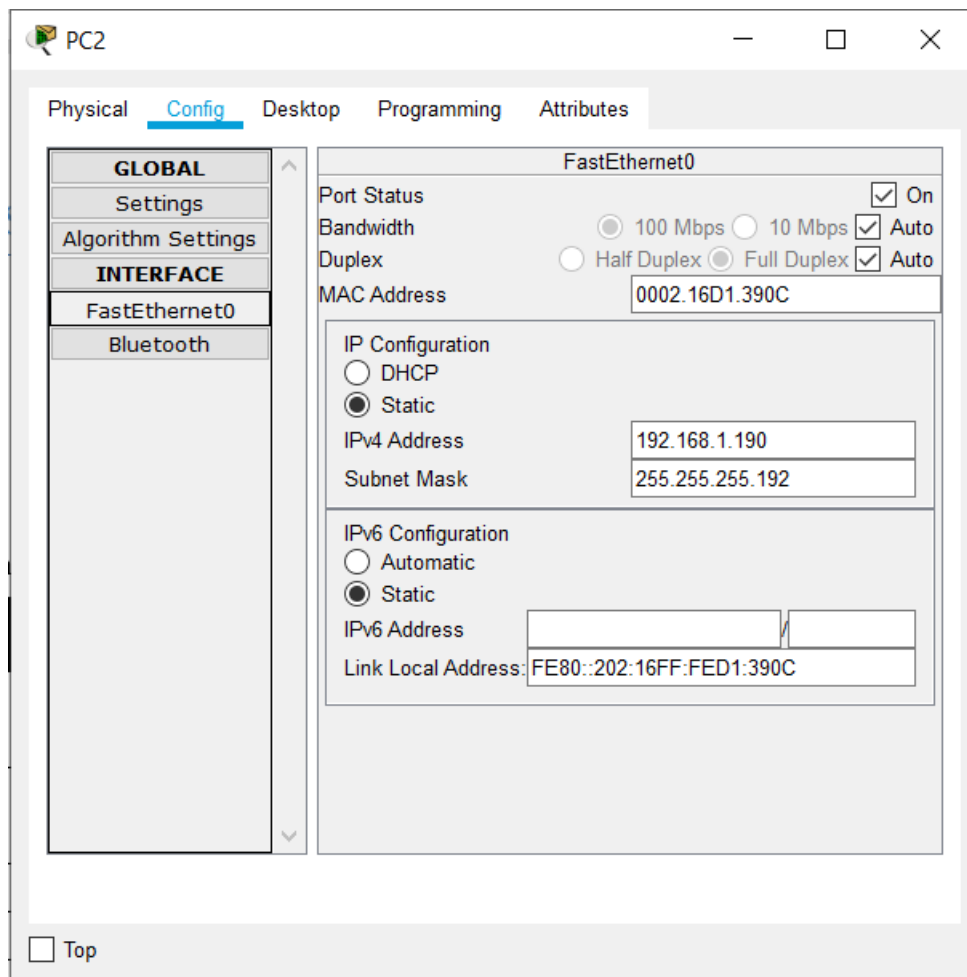


Fig 8: Fa0 interface for PC2

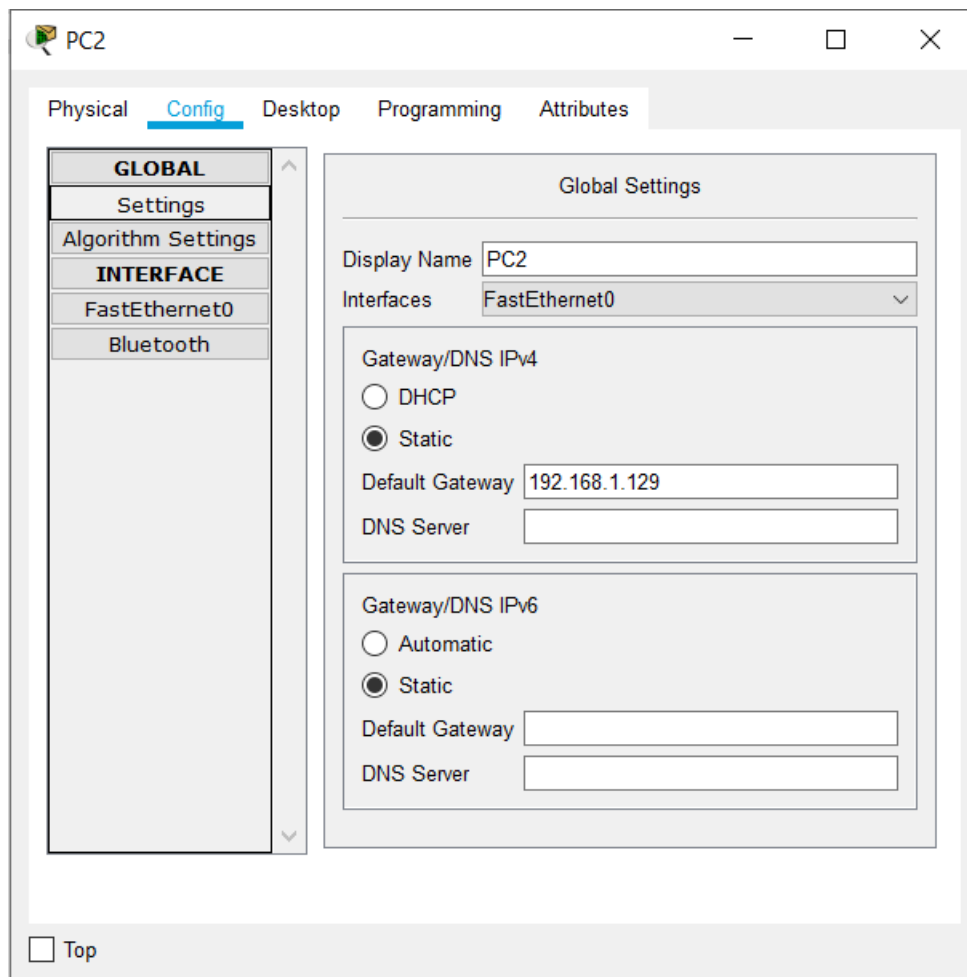


Fig 9: Default gateway of PC2

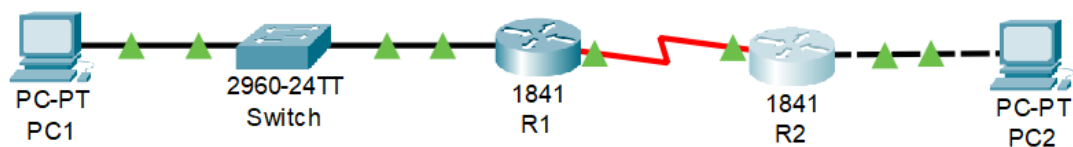
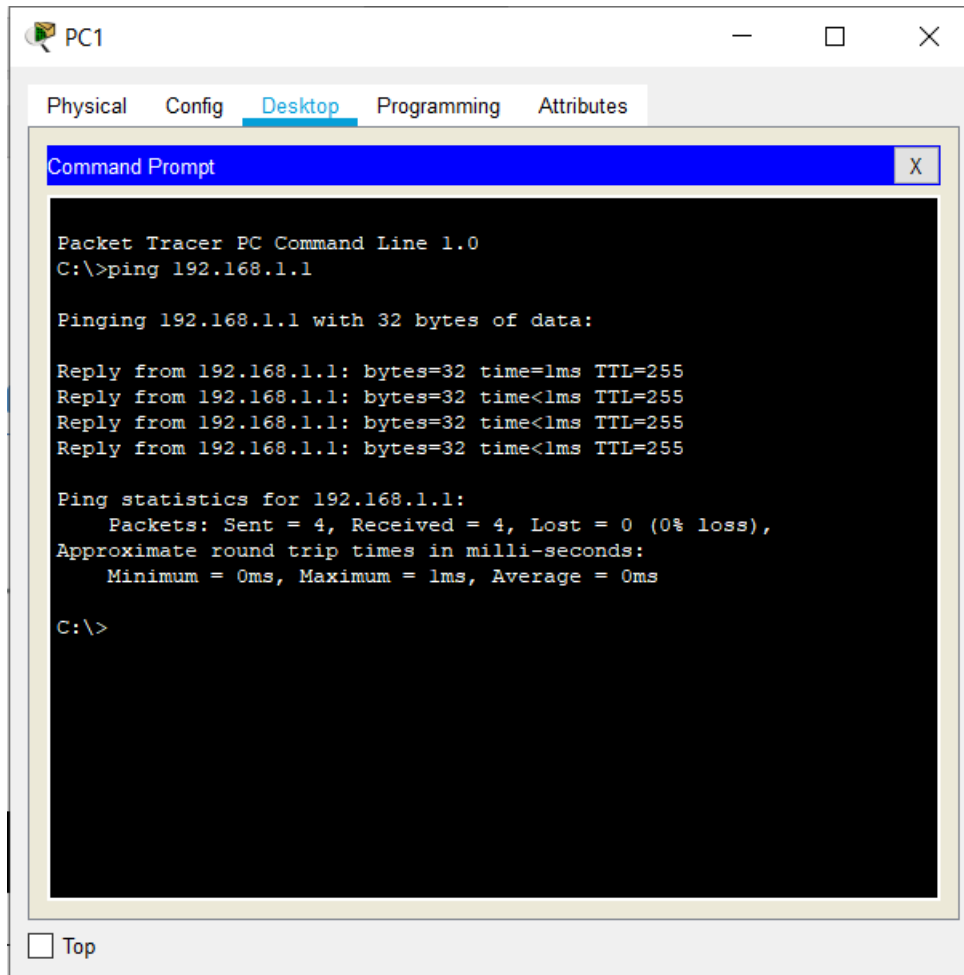


Fig 10: Final network after setup

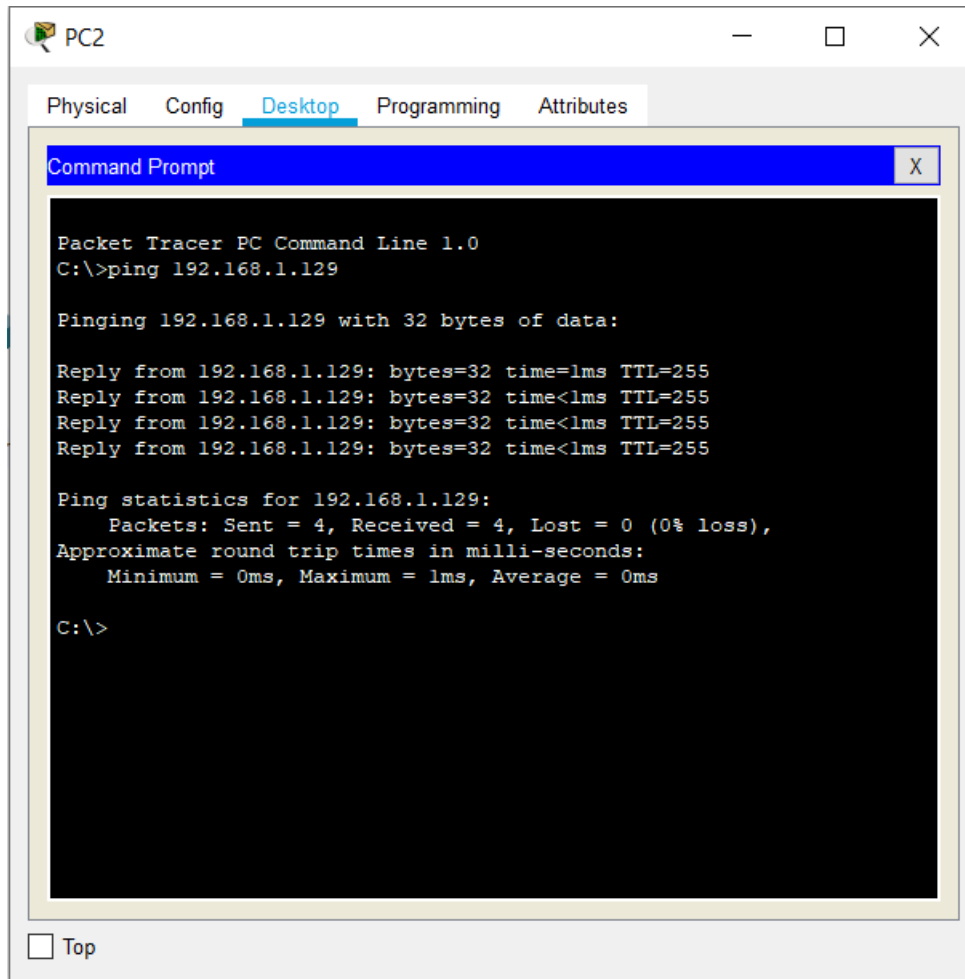
#### Task 4: Verify the Configurations.

Answer the following questions to verify that the network is operating as expected.

From the host attached to R1, is it possible to ping the default gateway? Yes



From the host attached to R2, is it possible to ping the default gateway? Yes



The screenshot shows a Packet Tracer interface for PC2. The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The command prompt shows the execution of a ping command to 192.168.1.129, which is successful. The output includes details about the data size (32 bytes), time (1ms), and TTL (255) for each of the four packets sent. The ping statistics show 0% loss and 0ms average round trip time.

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.129

Pinging 192.168.1.129 with 32 bytes of data:

Reply from 192.168.1.129: bytes=32 time=1ms TTL=255
Reply from 192.168.1.129: bytes=32 time<1ms TTL=255
Reply from 192.168.1.129: bytes=32 time<1ms TTL=255
Reply from 192.168.1.129: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.1.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

From the router R1, is it possible to ping the Serial 0/0/0 interface of R2? Yes

```
Router#  
Router#ping 192.168.1.126  
  
Type escape sequence to abort.  
Sending 5, 100-byte ICMP Echos to 192.168.1.126, timeout is 2  
seconds:  
!!!!  
Success rate is 100 percent (5/5), round-trip min/avg/max =  
1/4/14 ms  
  
Router#
```

From the router R2, is it possible to ping the Serial 0/0/0 interface of R1? Yes

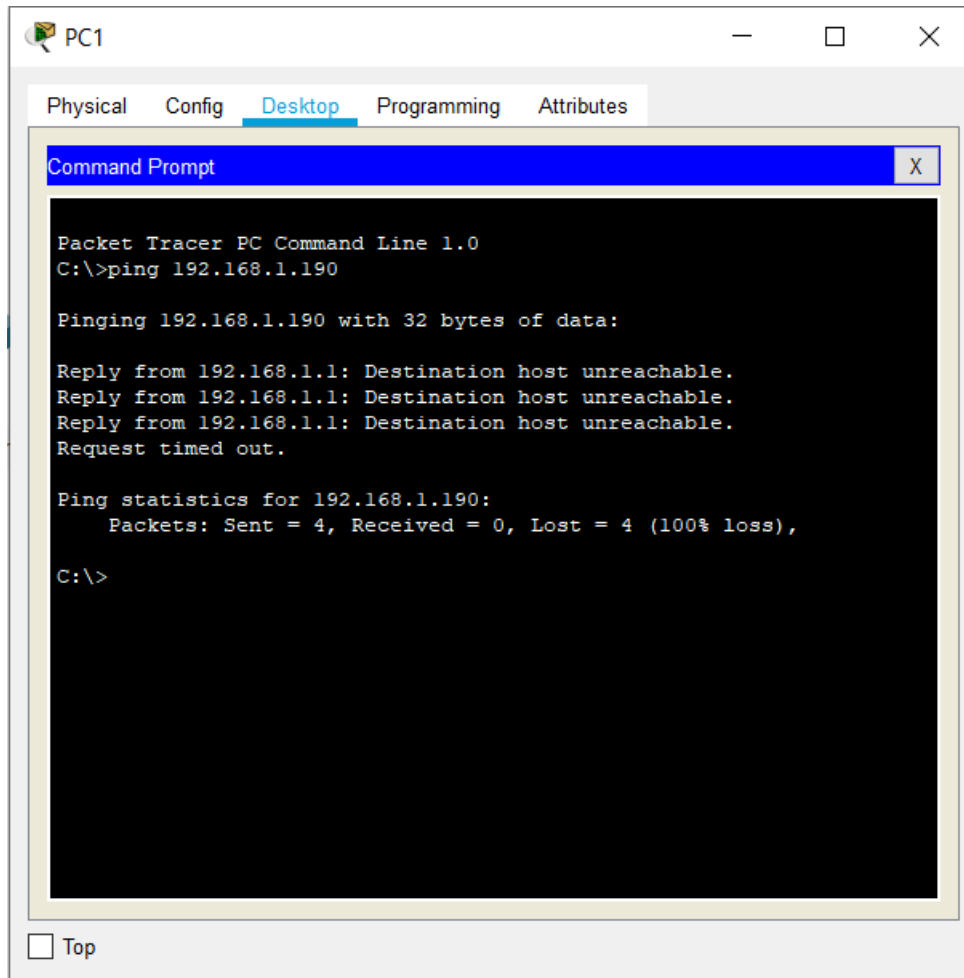
The answer to the above questions should be **yes**. If any of the above pings failed, check your physical connections and configurations.

```
Router#  
Router#ping 192.168.1.65  
  
Type escape sequence to abort.  
Sending 5, 100-byte ICMP Echos to 192.168.1.65, timeout is 2  
seconds:  
!!!!  
Success rate is 100 percent (5/5), round-trip min/avg/max =  
3/9/15 ms  
  
Router#
```

## Task 5: Reflection

Are there any devices on the network that cannot ping each other?

Devices not part of the same network cannot ping each other.



What is missing from the network that is preventing communication between these devices?

There is no routing protocol