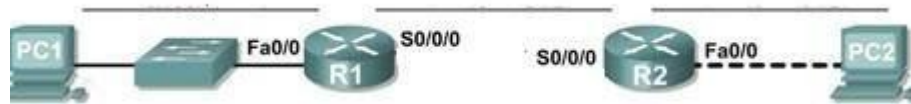


Lab 6: Subnet and Router Configuration

Topology Diagram



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	192.168.1.1	255.255.255.224	N/A
	S0/0/0	192.168.1.33	255.255.255.224	N/A
R2	Fa0/0	192.168.1.65	255.255.255.224	N/A
	S0/0/0	192.168.1.62	255.255.255.224	N/A
PC1	NIC	192.168.1.30	255.255.255.224	192.168.1.1
PC2	NIC	192.168.1.94	255.255.255.224	192.168.1.65

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? 255.255.255.224

What is the subnet mask for the network in slash format? /27

How many usable hosts are there per subnet? $2^5 - 2 = 30$

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.
192.168.1.30
3. Assign the first valid host address in subnet 2 to the WAN interface on R1.
192.168.1.33
4. Assign the last valid host address in subnet 2 to the WAN interface on R2.
192.168.1.62
5. Assign the first valid host address in subnet 3 to the LAN interface of R2.
192.168.1.65
6. Assign the last valid host address in subnet 3 to PC2.
192.168.1.94

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.

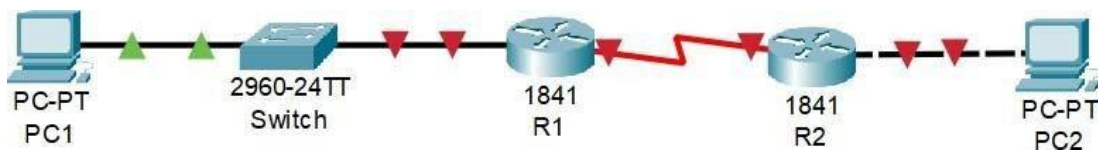


Fig 1: The devices have been connected

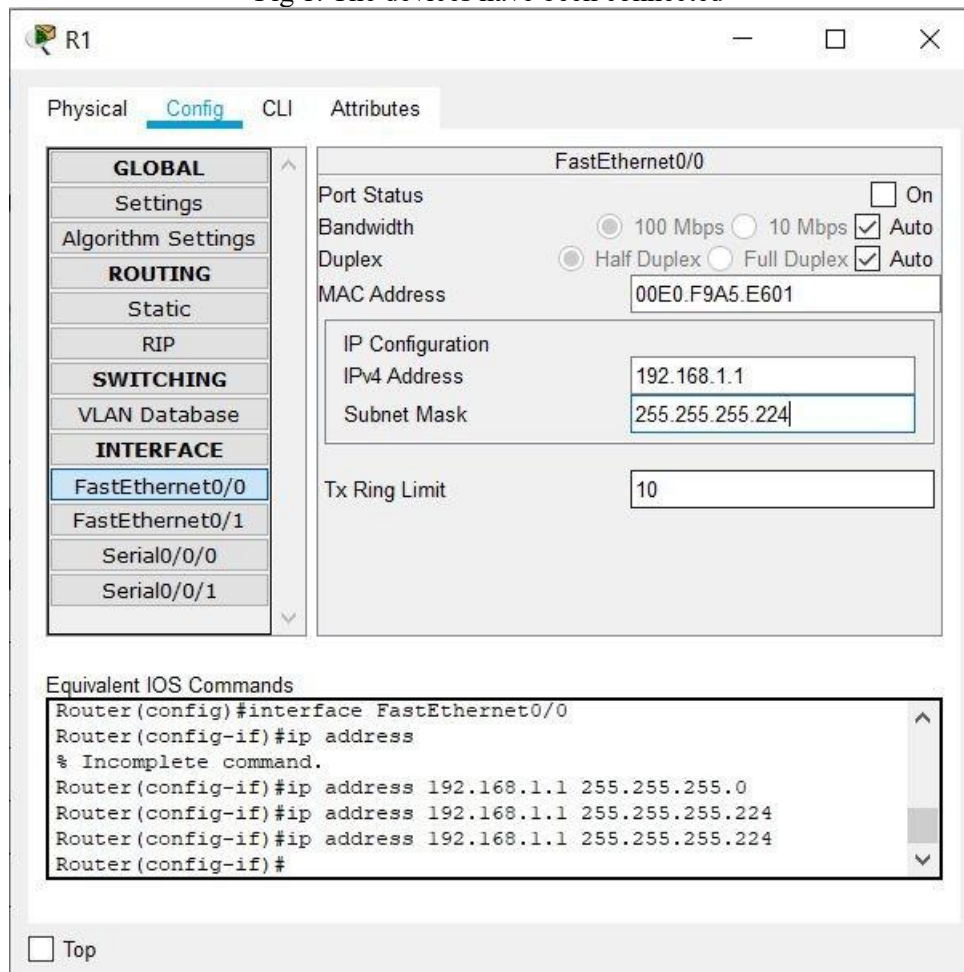


Fig 2: Fa0/0 config of R1

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 192.168.1.33

Subnet Mask 255.255.255.224

Tx Ring Limit 10

Equivalent IOS Commands

```
Router(config-if)#ip address 192.168.1.1 255.255.255.224
Router(config-if)#ip address 192.168.1.1 255.255.255.224
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 192.168.1.33 255.255.255.224
Router(config-if)#
```

☐ Top

Fig 3: S0/0 config of R1

R2

PhysicalConfigCLIAttributes

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

192.168.1.65

Subnet Mask

255.255.255.224

Tx Ring Limit

10

Equivalent IOS Commands

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.1.65 255.255.255.0
Router(config-if)#

☐ Top

Fig 4: Fa0/0 config of R2


```

interface FastEthernet0/0
ip address 192.168.1.1 255.255.255.224
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
no ip address
duplex auto
speed auto
shutdown
!
interface Serial0/0/0
ip address 192.168.1.33 255.255.255.224
clock rate 2000000
shutdown
!
interface Serial0/0/1
no ip address
clock rate 2000000
shutdown
!
interface Vlan1
no ip address
--More--

```

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

```

!
!
!
interface FastEthernet0/0
ip address 192.168.1.65 255.255.255.224
duplex auto
speed auto
shutdown
!
interface FastEthernet0/1
no ip address
duplex auto
speed auto
shutdown
!
interface Serial0/0/0
ip address 192.168.1.62 255.255.255.224
clock rate 2000000
shutdown
!
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.

PC1

Physical **Config** Desktop Programming Attributes

GLOBAL

Settings

Algorithm Settings

INTERFACE

FastEthernet0

Bluetooth

FastEthernet0

Port Status ☒ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 0003.E4D2.8642

IP Configuration

☐ DHCP

☒ Static

IPv4 Address 192.168.1.30

Subnet Mask 255.255.255.224

IPv6 Configuration

☐ Automatic

☒ Static

IPv6 Address

Link Local Address: FE80::203:E4FF:FED2:8642

☐ Top

Fig 6: Fa0 interface for PC1

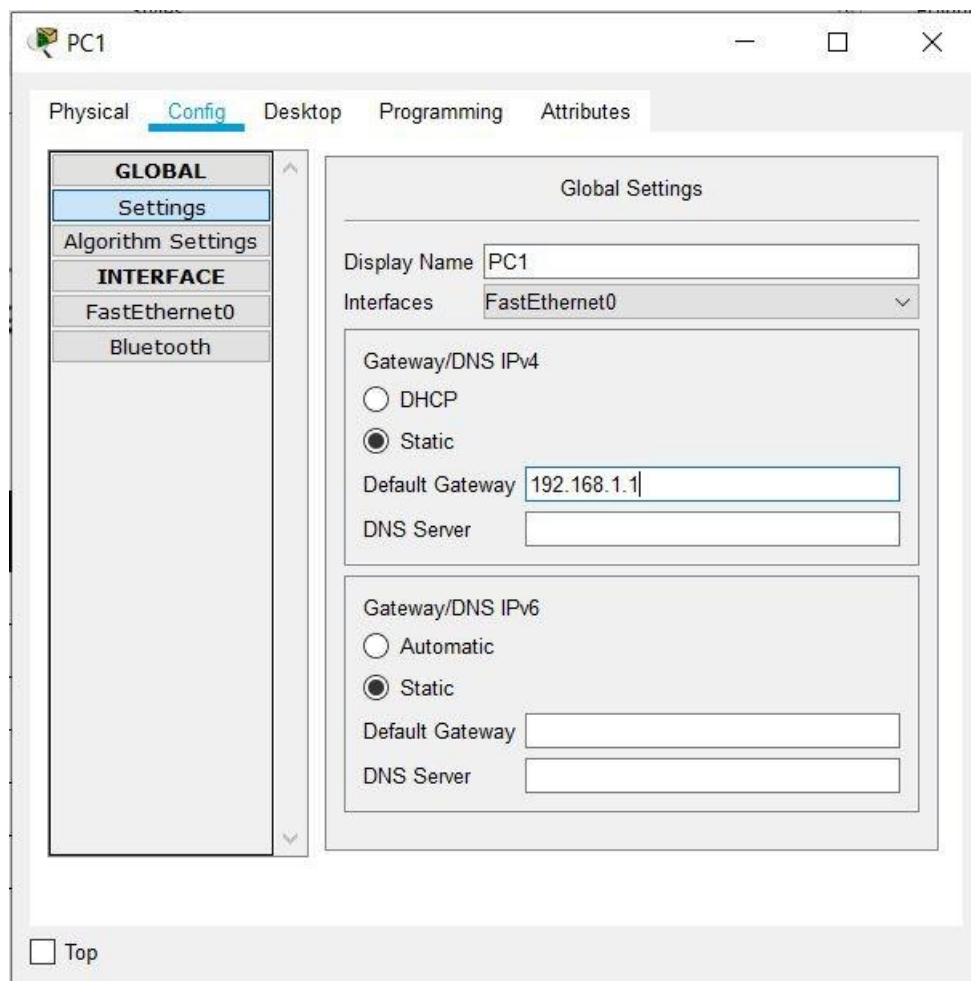


Fig 7: PC1 default gateway

PC2

Physical Config Desktop Programming Attributes

GLOBAL

Settings

Algorithm Settings

INTERFACE

FastEthernet0

Bluetooth

FastEthernet0

Port Status ☒ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☒ Half Duplex ☐ Full Duplex ☒ Auto

MAC Address 0002.16D1.390C

IP Configuration

☐ DHCP

☒ Static

IPv4 Address 192.168.1.94

Subnet Mask 255.255.255.224

IPv6 Configuration

☐ Automatic

☒ Static

IPv6 Address

Link Local Address: FE80::202:16FF:FED1:390C

☐ Top

Fig 8: Fa0 interface for PC2

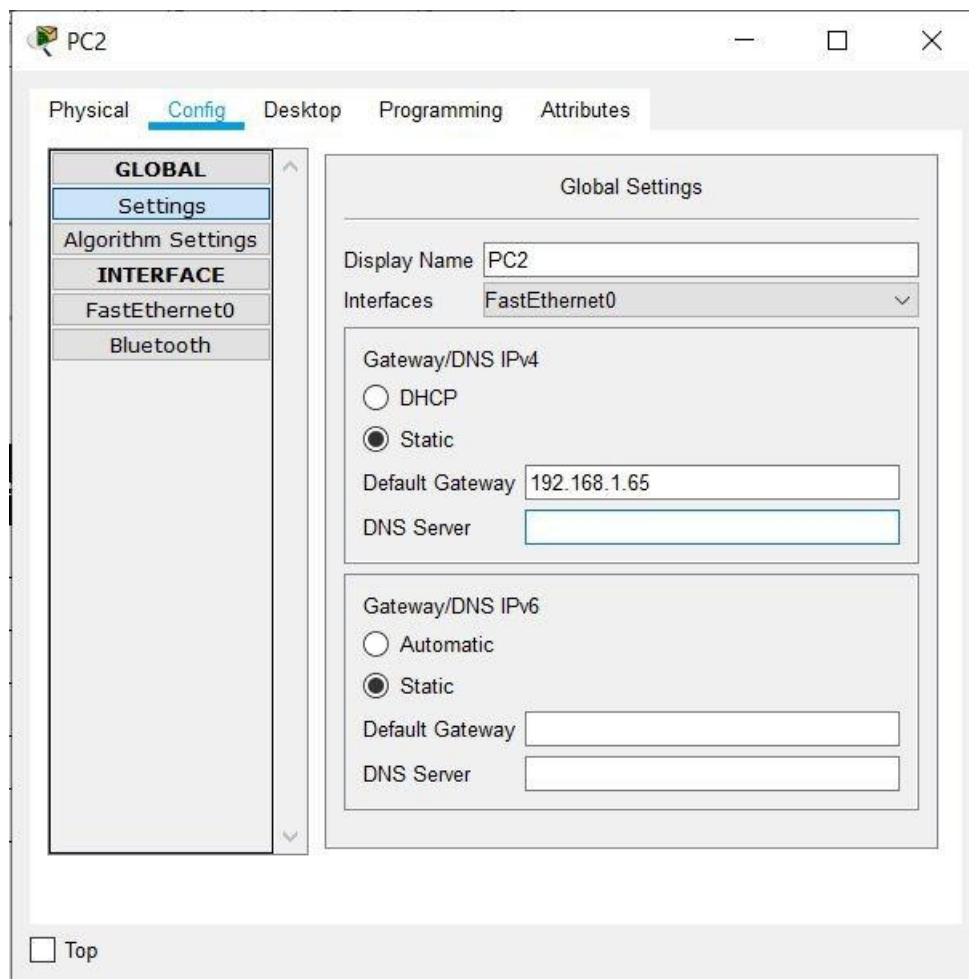


Fig 9: Default gateway of PC2

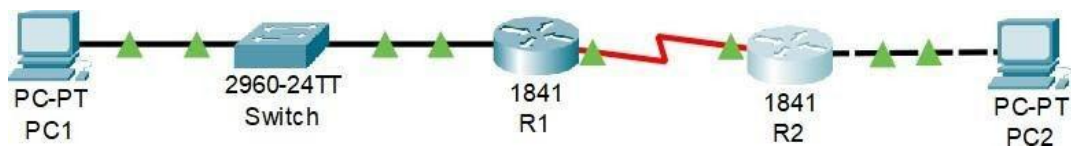
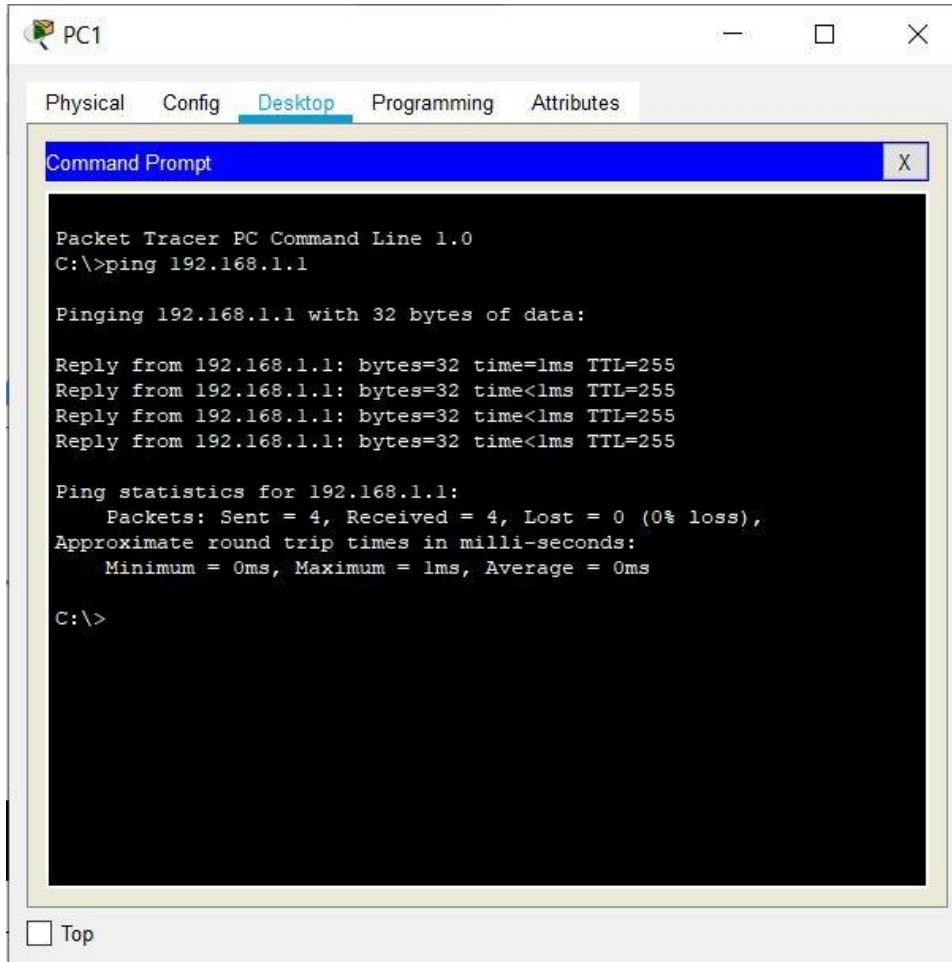


Fig 10: Final network after setup

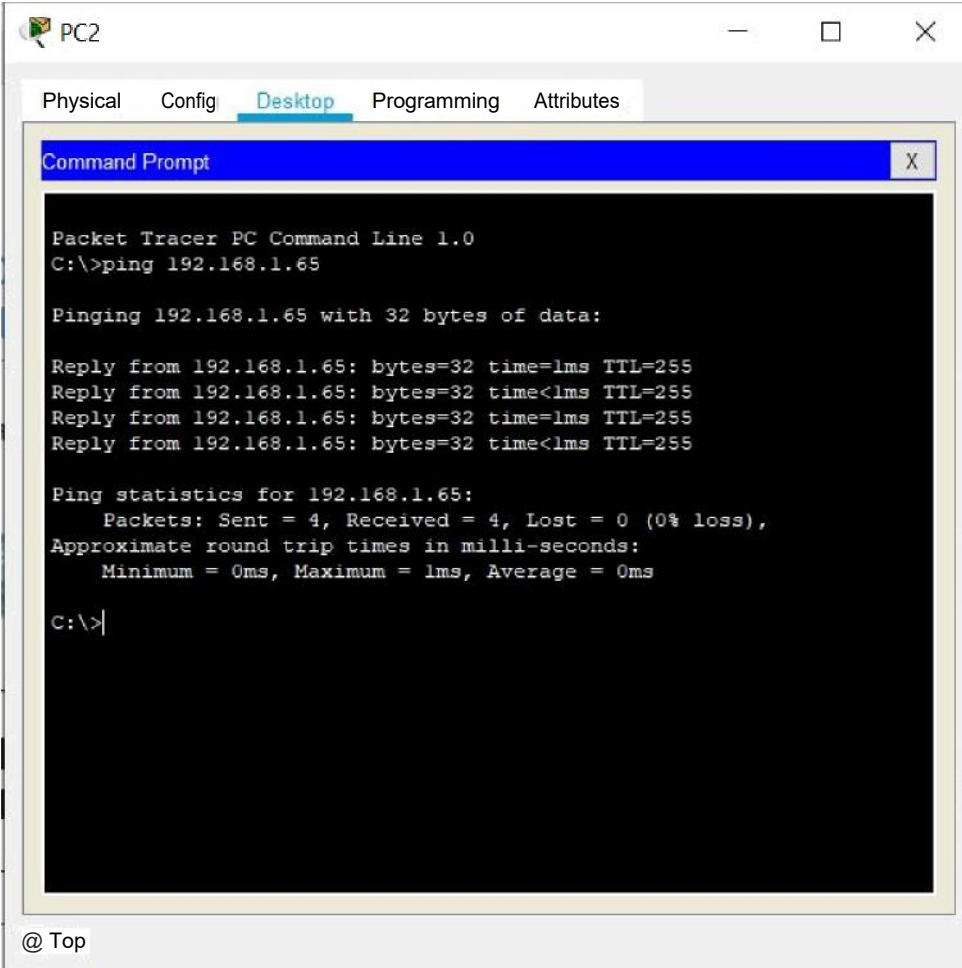
Task 4: Verify the Configurations.

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 PC Command Line window for PC2. The 'Desktop' tab is selected. The command prompt displays the output of a ping command to 192.168.1.65. The output shows four successful replies with 32 bytes of data, a time of 1ms, and a TTL of 255. The ping statistics show 4 packets sent, 4 received, and 0% loss.

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.65

Pinging 192.168.1.65 with 32 bytes of data:

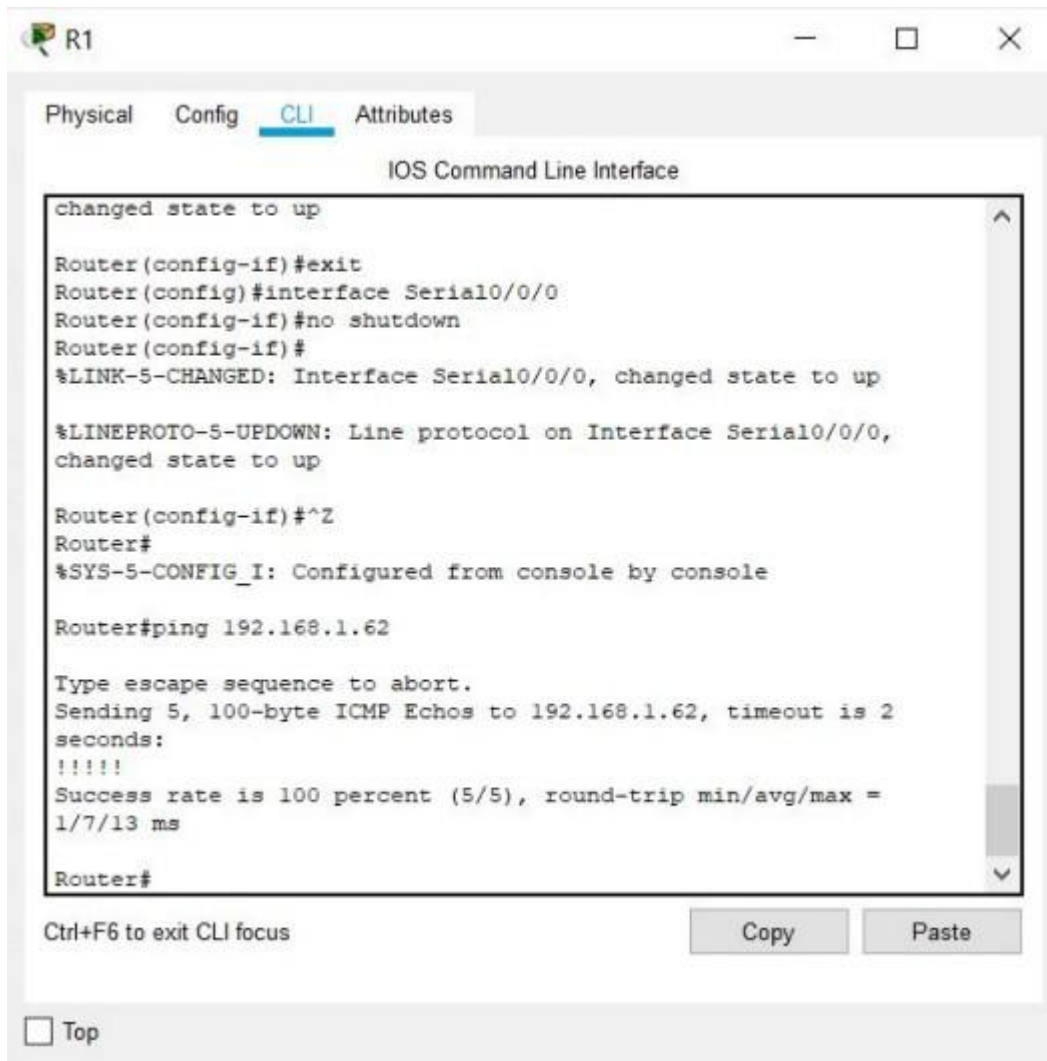
Reply from 192.168.1.65: bytes=32 time=1ms TTL=255
Reply from 192.168.1.65: bytes=32 time<1ms TTL=255
Reply from 192.168.1.65: bytes=32 time=1ms TTL=255
Reply from 192.168.1.65: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.1.65:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

@ Top

From the R1 to R2, is it possible to ping Serial interface? [Yes](#)



The screenshot shows a window titled 'R1' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The terminal output shows the following sequence of commands and responses:

```
changed state to up
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up

Router(config-if)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console

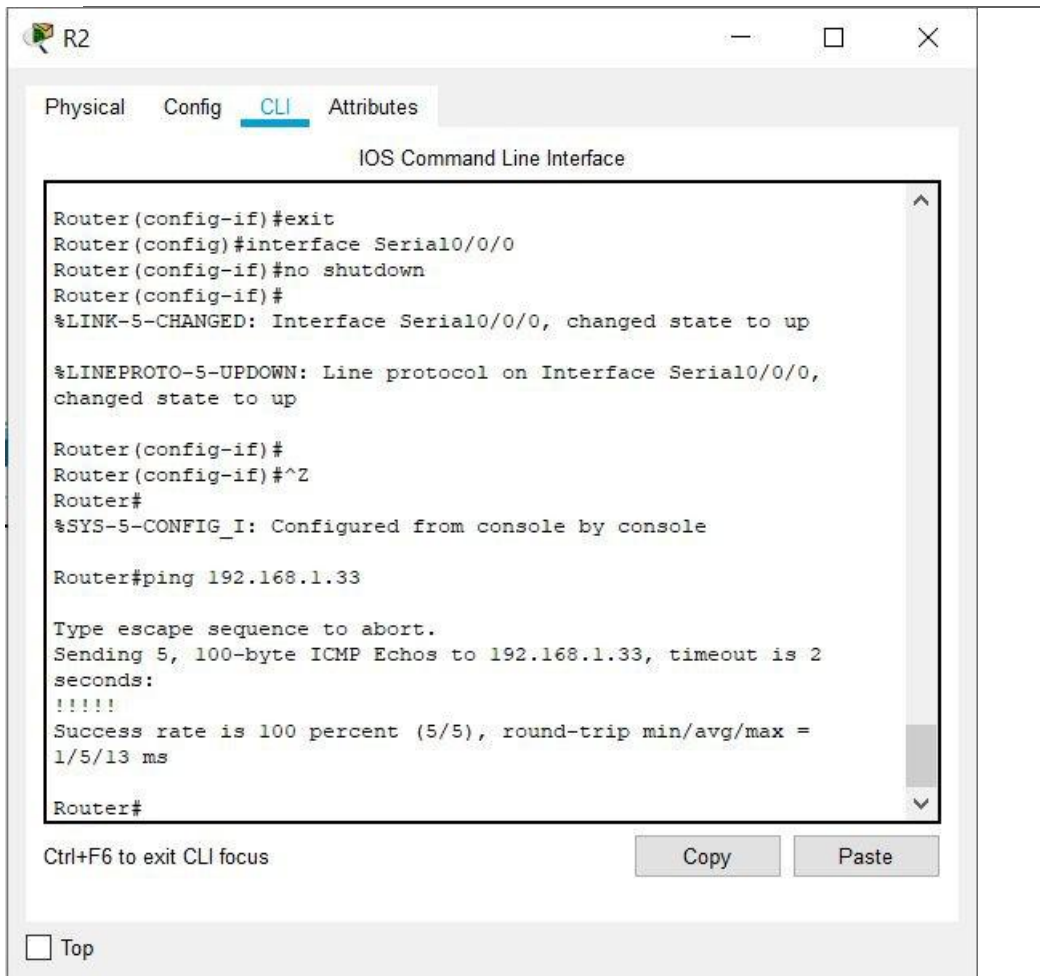
Router#ping 192.168.1.62

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.62, timeout is 2
seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
1/7/13 ms

Router#
```

At the bottom of the CLI window, there is a status bar with the text 'Ctrl+F6 to exit CLI focus' and two buttons: 'Copy' and 'Paste'. Below the CLI window, there is a checkbox labeled 'Top'.

From the R2 to R1, is it possible to ping Serial interface? [Yes](#)



The screenshot shows a window titled 'R2' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The terminal output shows the following sequence of commands and responses:

```
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up

Router(config-if)#
Router(config-if)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#ping 192.168.1.33

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.33, timeout is 2
seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
1/5/13 ms
Router#
```

Below the terminal output, there is a text prompt 'Ctrl+F6 to exit CLI focus' and two buttons labeled 'Copy' and 'Paste'. At the bottom left, there is a checkbox labeled 'Top'.

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

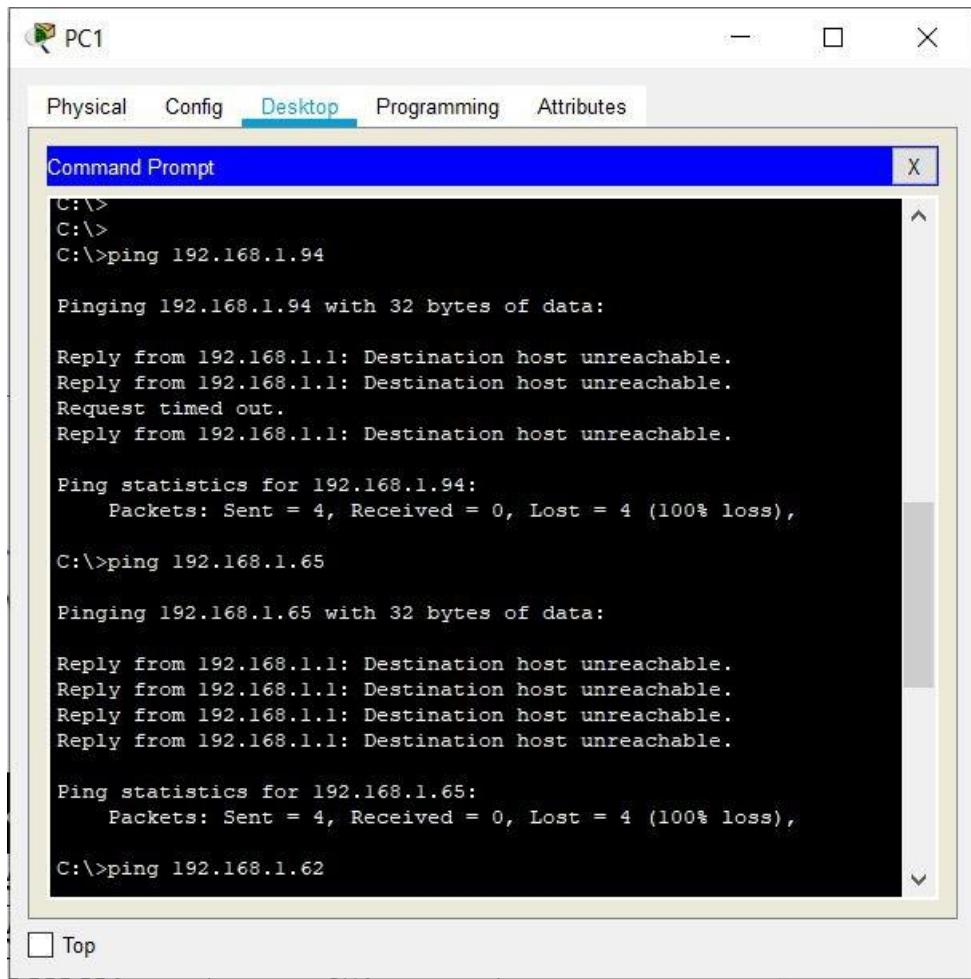
Task 5: Reflection

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

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

R2 and R1 cannot ping the serial port of each other.

PC1 and PC2 cannot ping Serial port of R1 and R2.



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

We have not configured routing static or dynamic for these devices. This network is missing either static routing or dynamic routing or both. if we want the devices on the different LANs to be able to ping each other we need to configure the IP addresses of the devices on the Router ARP table, using some protocol.

Conclusion :

We learnt how to choose and set up subnets, how masking works in serverless routing, and also how to debug such networks briefly.