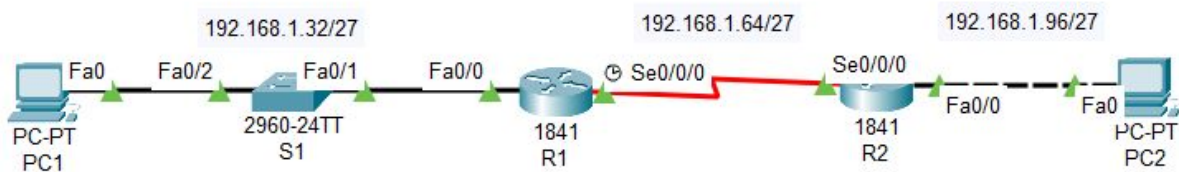


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Lab 6: Subnet and Router Configuration

Topology Diagram



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	192.168.1.65	255.255.255.192	N/A
	S0/0/0	192.168.1.129	255.255.255.192	N/A
R2	Fa0/0	192.168.1.193	255.255.255.192	N/A
	S0/0/0	192.168.1.190	255.255.255.192	N/A
PC1	NIC	192.168.1.126	255.255.255.192	192.168.1.65
PC2	NIC	192.168.1.254	255.255.255.192	192.168.1.193

Learning Objectives

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

- Subnet an address space given requirements.
- Assign appropriate addresses to interfaces and documents.
- 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 subnets are needed for this network
 - (1) For network connected to router R1
 - (2) For network connected to router R2
 - (3) For link between router R1 and router R2

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

- 11111111.11111111.11111111.11000000

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

- The subnet mask for the network in slash format is the number of 1s in the dotted decimal format, /26 in this case.

How many usable hosts are there per subnet?

- In IPv4, there are two IPs that cannot be assigned to any devices. These are the **Network ID** and the **Broadcast IP address**. Therefore, you need to subtract two addresses from the total IP formula. The number of usable hosts is given as $2^H - 2$ where H is host bits. Therefore, $2^6 - 2 = 62$ usable hosts per subnet.

Step 3: Assign subnetwork addresses to the Topology Diagram.

1. Assign subnet 1 to the network attached to R1. (Network R1 → 192.168.1.64/26)
2. Assign subnet 2 to the link between R1 and R2. (Link between R1 and R2 → 192.168.1.128/26)
3. Assign subnet 3 to the network attached to R2. (Network R2 → 192.168.1.192/26)

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.
(Fa0/0 → 192.168.1.65)

2. Assign the last valid host address in subnet 1 to PC1. (192.168.1.126)
3. Assign the first valid host address in subnet 2 to the WAN interface on R1.
(S0/0/0 → 192.168.1.129)
4. Assign the last valid host address in subnet 2 to the WAN interface on R2.
(S0/0/0 → 192.168.1.190)
5. Assign the first valid host address in subnet 3 to the LAN interface of R2.
(Fa0/0 → 192.168.1.193)
6. Assign the last valid host address in subnet 3 to PC2. (192.168.1.254)

Step 2: Document the addresses to be used in the table provided 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.

The screenshot shows the configuration window for Router1 in Packet Tracer. The 'Config' tab is selected. On the left, the 'INTERFACE' section is expanded, and 'FastEthernet0/0' is selected. The main configuration area for 'FastEthernet0/0' shows the following settings:

- Port Status: ☒ On
- Bandwidth: ☒ 100 Mbps, ☐ 10 Mbps
- Duplex: ☒ Half Duplex, ☐ Full Duplex
- MAC Address: 00D0.FF7C.0801
- IP Configuration:
 - IPv4 Address: 192.168.1.65
 - Subnet Mask: 255.255.255.192
- Tx Ring Limit: 10

At the bottom, the 'Equivalent IOS Commands' section shows the following commands:

```
Router1(config-if)#no shutdown
Router1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up
```

A 'Top' button is located at the bottom left of the window.

Router1

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 192.168.1.129

Subnet Mask 255.255.255.192

Tx Ring Limit 10

Equivalent IOS Commands

```
Router1(config-if)#ip address 192.168.1.129 255.255.255.192
Router1(config-if)#ip address 192.168.1.129 255.255.255.192
Router1(config-if)#
Router1(config-if)#exit
Router1(config)#interface Serial0/0/0
Router1(config-if)#no shutdown
Router1(config-if)#
```

☐ Top

Router2

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 0001.42AC.AD01

IP Configuration

IPv4 Address 192.168.1.193

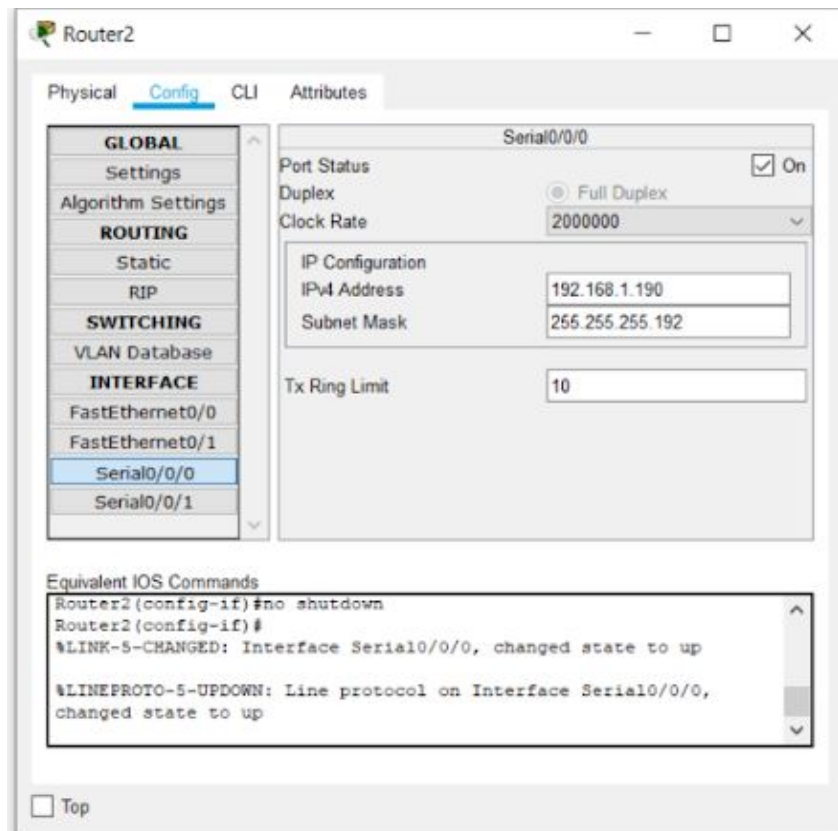
Subnet Mask 255.255.255.192

Tx Ring Limit 10

Equivalent IOS Commands

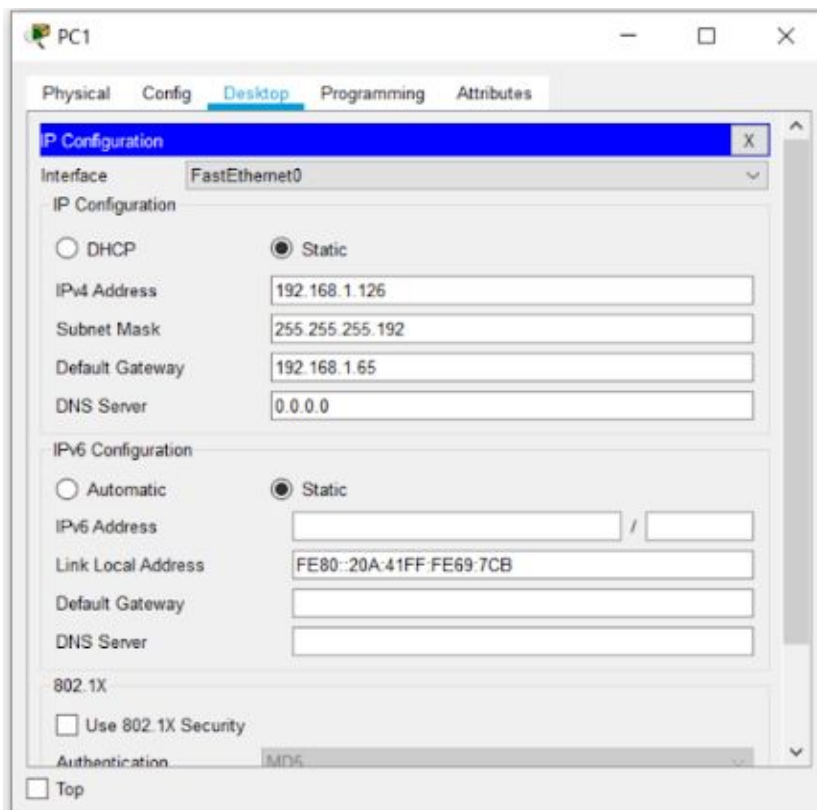
```
Router2(config-if)#no shutdown
Router2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up
```

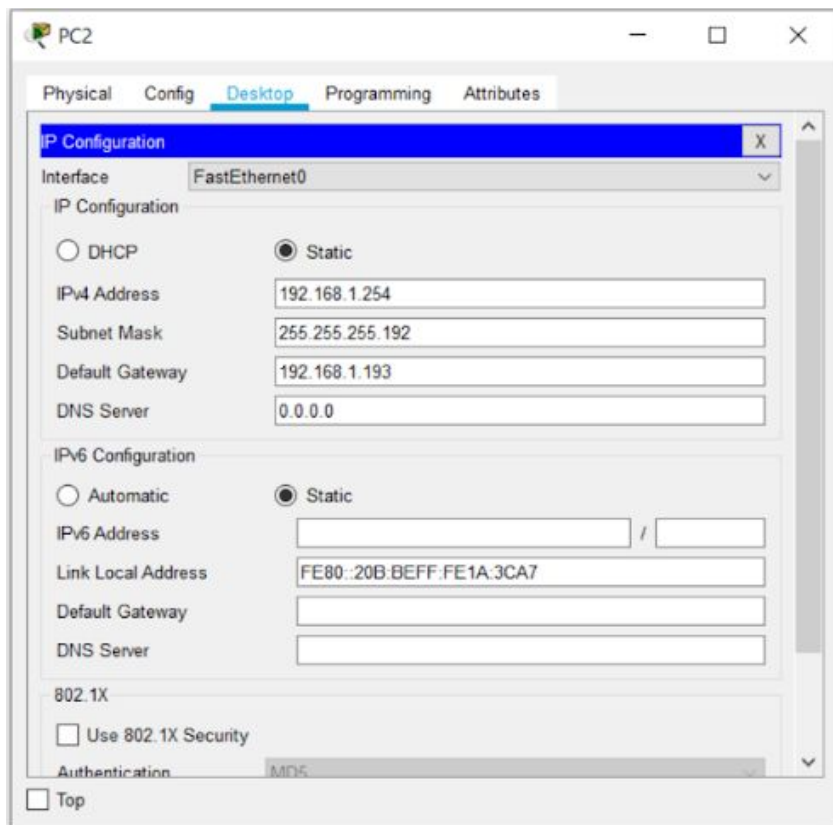
☐ Top



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.

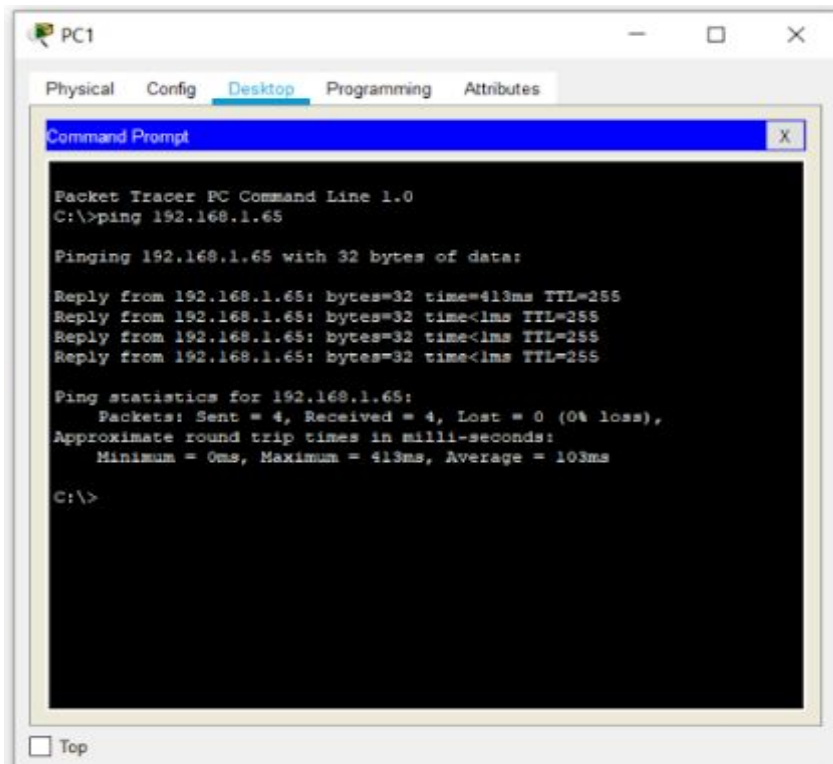




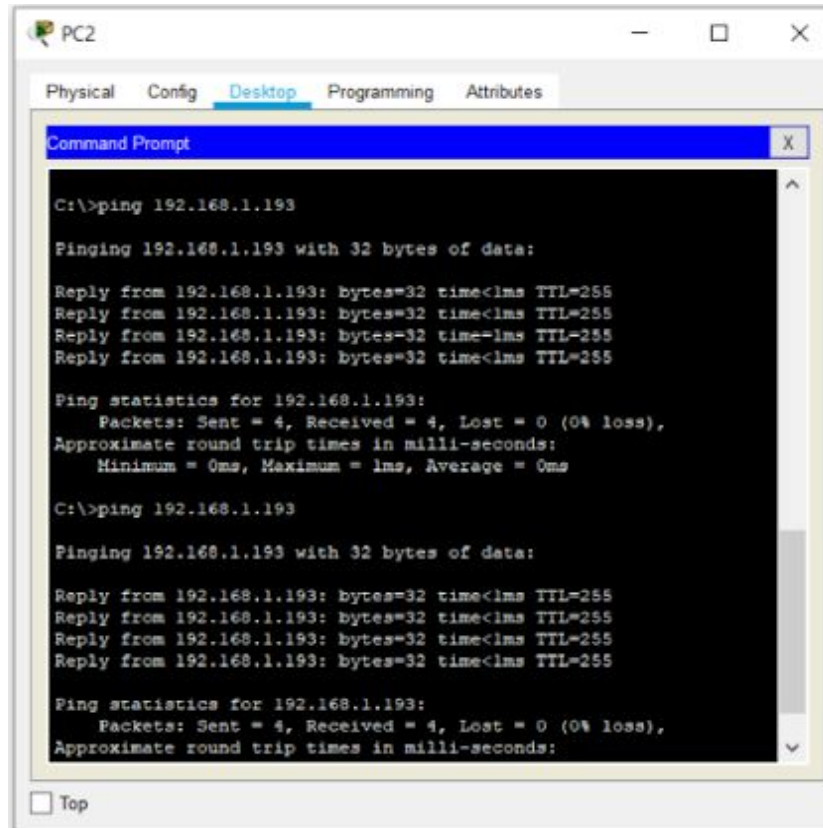
Task 4: Verify the Configurations.

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 window titled 'PC2' with tabs for Physical, Config, Desktop, Programming, and Attributes. The 'Desktop' tab is active, displaying a 'Command Prompt' window. The command prompt shows two successful ping operations to the IP address 192.168.1.193. Each operation consists of four replies and a summary statistics block.

```
C:\>ping 192.168.1.193

Pinging 192.168.1.193 with 32 bytes of data:

Reply from 192.168.1.193: bytes=32 time<1ms TTL=255
Reply from 192.168.1.193: bytes=32 time<1ms TTL=255
Reply from 192.168.1.193: bytes=32 time<1ms TTL=255
Reply from 192.168.1.193: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.1.193:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

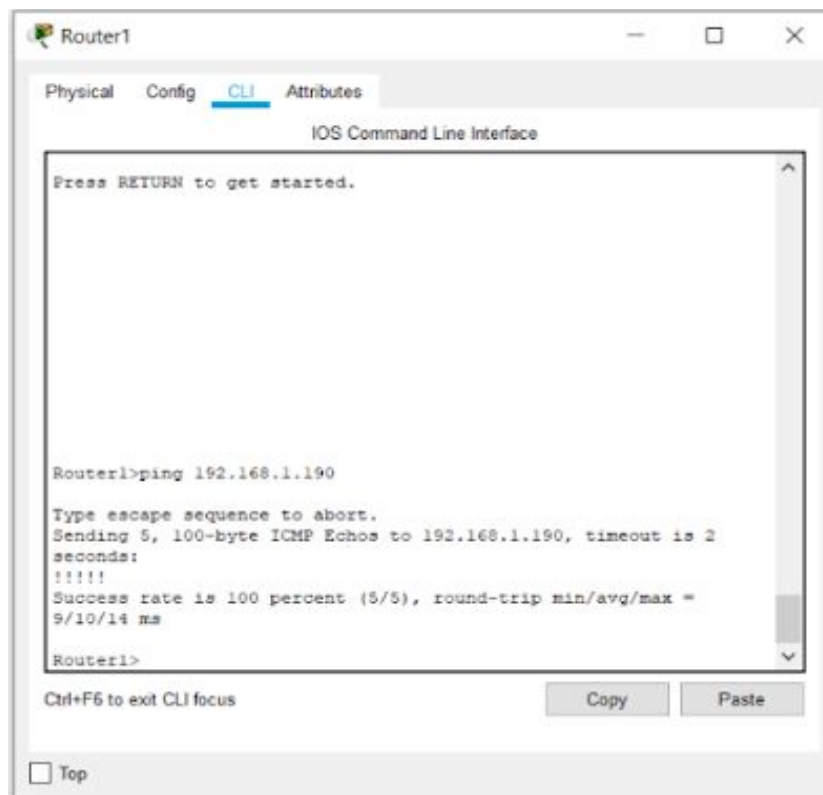
C:\>ping 192.168.1.193

Pinging 192.168.1.193 with 32 bytes of data:

Reply from 192.168.1.193: bytes=32 time<1ms TTL=255
Reply from 192.168.1.193: bytes=32 time<1ms TTL=255
Reply from 192.168.1.193: bytes=32 time<1ms TTL=255
Reply from 192.168.1.193: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.1.193:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
```

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



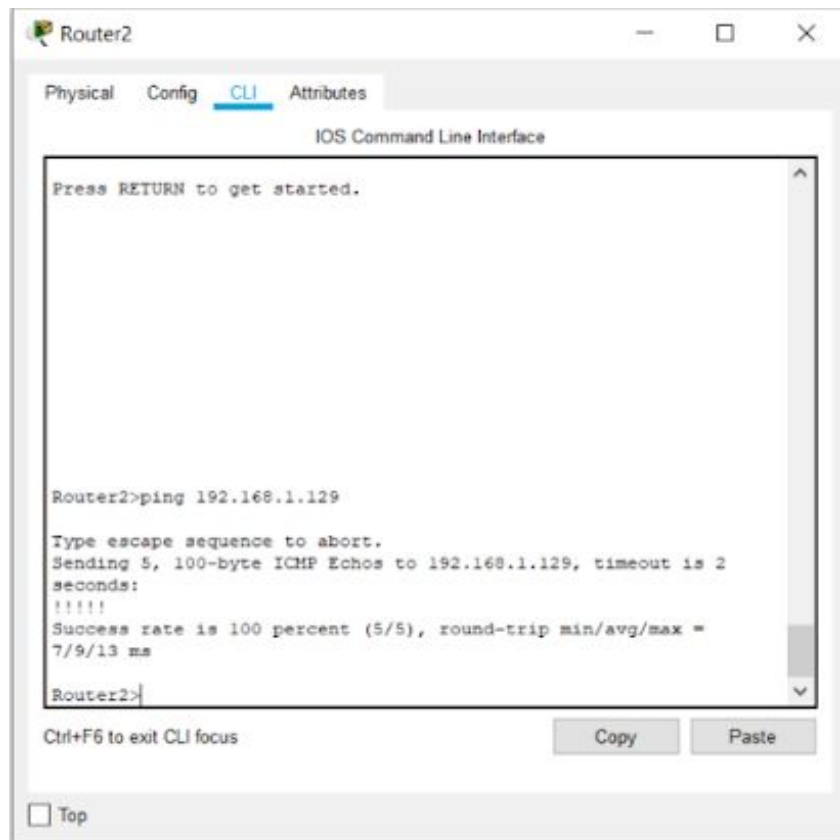
The screenshot shows a window titled 'Router1' with tabs for Physical, Config, CLI, and Attributes. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The prompt shows a successful ping operation to the IP address 192.168.1.190.

```
Router1>ping 192.168.1.190

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.190, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
9/10/14 ms

Router1>
```

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.

Task 5: Reflection

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

- Yes, from different networks, we can't do ping, we have to configure routing, either static or dynamic, for example from PC1 to PC2.

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.