

Lab 3 - Routing Protocol

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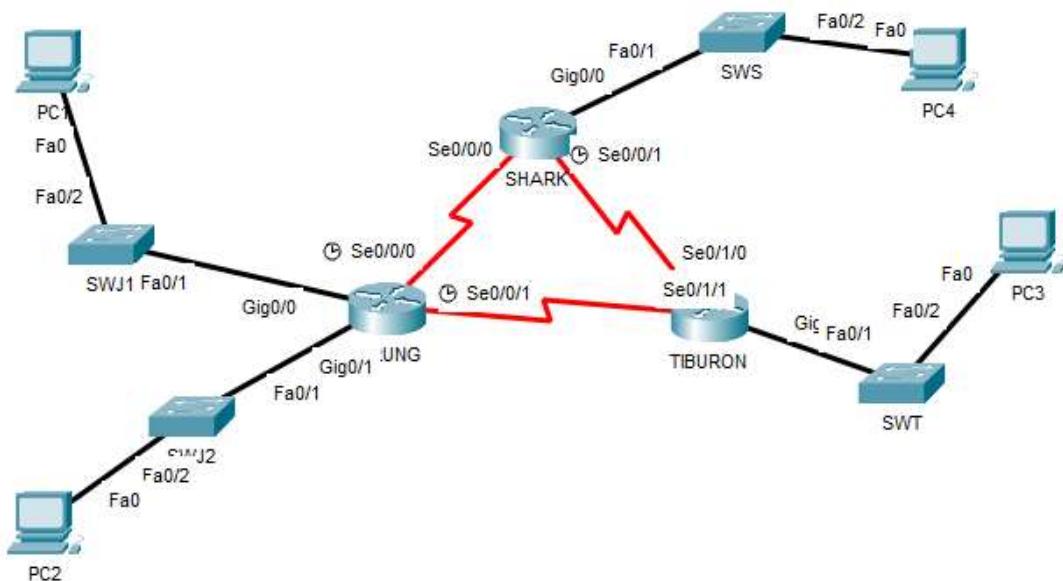
MATRIC NUM.: A23CS0069

SECTION: 12

INTRODUCTION

This lab looks into the network layer, focusing on subnetting and routing.

TOPOLOGY



LAB INFORMATION

Here is some basic information for the lab. The network address given is 172.18.110.0/23.

Table 1

Device	Subnetwork	Usable Hosts
JERUNG	LAN1	20
	LAN2	30
SHARK	LAN	60
TIBURON	LAN	50
Connections	JERUNG-SHARK	2
	JERUNG-TIBURON	2
	SHARK-TIBURON	2

Table 2

#	Device Name	Interface	IP Address	Subnet Mask	Gateway
1	JERUNG	Se0/0/0	172.18.110.193	255.255.255.252	-
2		Se0/0/1	172.18.110.197	255.255.255.252	-
3		G0/0	172.18.110.1	255.255.255.224	-
4		G0/1	172.18.110.33	255.255.255.224	-
5	TIBURON	Se0/1/1	172.18.110.198	255.255.255.252	-
6		Se0/1/0	172.18.110.202	255.255.255.252	-
7		G0/0	172.18.110.129	255.255.255.192	-
8	SHARK	Se0/0/0	172.18.110.194	255.255.255.252	-
9		Se0/0/1	172.18.110.201	255.255.255.252	-
10		G0/0	172.18.110.65	255.255.255.192	-
11	PC1	-	172.18.110.30	255.255.255.224	172.18.110.1
12	PC2	-	172.18.110.62	255.255.255.224	172.18.110.33
13	PC3	-	172.18.110.190	255.255.255.192	172.18.110.129
14	PC4	-	172.18.110.126	255.255.255.192	172.18.110.65

LAB TASKS

Task 1 – IP Addressing

- Given the network address of the organisation and the basic information provided in both Tables 1 and 2. Show your workings here and complete Table 2 with the correct information. PCs will be given the last usable address of the subnetwork.

Calculations:

Device	Subnetwork	Usable Hosts	Subnet Mask	Network Address	Usable IP Range	Broadcast Address
JERUNG	LAN1	$20 = 2^5 = 32 = /27$	255.255.255.24	172.18.110.0	172.18.110.1 - 172.18.110.30	172.18.110.31
	LAN2	$30 = 2^5 = 32 = /27$	255.255.255.24	172.18.110.32	172.18.110.33 - 172.18.110.62	172.18.110.63
SHARK	LAN	$60 = 2^6 = 64 = /26$	255.255.255.192	172.18.110.64	172.18.110.65 - 172.18.110.126	172.18.110.127
TIBURO N	LAN	$50 = 2^6 = 64 = /26$	255.255.255.192	172.18.110.128	172.18.110.129 - 172.18.110.190	172.18.110.191
Connections	JERUNG-SHARK	$2 = 2^2 = 4 = /30$	255.255.255.252	172.18.110.192	172.18.110.193 - 172.18.110.194	172.18.110.195
	JERUNG-TIBURO N	$2 = 2^2 = 4 = /30$	255.255.255.252	172.18.110.196	172.18.110.197 - 172.18.110.200	172.18.110.199
	SHARK-TIBURO N	$2 = 2^2 = 4 = /30$	255.255.255.252	172.18.110.200	172.18.110.201 - 172.18.110.202	172.18.110.203

2. Using the IP addresses calculated, configure the devices with the appropriate information.

JERUNG:

The screenshot shows the JERUNG configuration interface. The left sidebar lists global settings, routing, switching, and interface configurations for various ports. The 'Serial0/0/0' port is currently selected. The main pane displays the configuration for 'Serial0/0/0' with the following details:

Serial0/0/0	
Port Status	<input type="checkbox"/> On
Duplex	<input checked="" type="radio"/> Full Duplex
Clock Rate	2000000
IP Configuration	
IPv4 Address	172.18.110.193
Subnet Mask	255.255.255.252
Tx Ring Limit	10

Below the configuration pane, there is a section titled "Equivalent IOS Commands" containing the following configuration commands:

```
JERUNG>
JERUNG#enable
JERUNG#
JERUNG#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
JERUNG(config)#interface GigabitEthernet0/0
JERUNG(config-if)#
JERUNG(config-if)#exit
JERUNG(config)#interface Serial0/0/0
JERUNG(config-if)#ip address 172.18.110.193 255.255.0.0
JERUNG(config-if)#ip address 172.18.110.193 255.255.255.252
JERUNG(config-if)#

```

Top

JERUNG

Physical Config CLI Attributes

GLOBAL

- Settings
- Algorithm Settings
- ROUTING**
- Static
- RIP
- SWITCHING**
- VLAN Database
- INTERFACE**
- GigabitEthernet0/0
- GigabitEthernet0/1
- Serial0/0/0
- Serial0/0/1**

Serial0/0/1

Port Status

Duplex Full Duplex On

Clock Rate 2000000

IP Configuration

IPv4 Address 72.18.110.197

Subnet Mask 255.255.255.252

Tx Ring Limit 10

Equivalent IOS Commands

```
JERUNG(config-if)#
JERUNG(config-if)#exit
JERUNG(config)#interface Serial0/0/1
JERUNG(config-if)#
JERUNG(config-if)#exit
JERUNG(config)#interface Serial0/0/0
JERUNG(config-if)#
JERUNG(config-if)#exit
JERUNG(config)#interface Serial0/0/1
JERUNG(config-if)#ip address 72.18.110.197 255.0.0.0
JERUNG(config-if)#ip address 72.18.110.197 255.255.255.252
JERUNG(config-if)#

```

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JERUNG

Physical Config CLI Attributes

GLOBAL

- Settings
- Algorithm Settings

ROUTING

- Static
- RIP

SWITCHING

- VLAN Database

INTERFACE

- GigabitEthernet0/0
- GigabitEthernet0/1
- Serial0/0/0
- Serial0/0/1

GigabitEthernet0/0

Port Status On

Bandwidth 1000 Mbps 100 Mbps 10 Mbps Auto

Duplex Half Duplex Full Duplex Auto

MAC Address 0002.1636.2A01

IP Configuration

IPv4 Address	172.18.110.1
Subnet Mask	255.255.255.224

Tx Ring Limit 10

Equivalent IOS Commands

```

JERUNG(config)#interface Serial0/0/0
JERUNG(config-if)#
JERUNG(config-if)#exit
JERUNG(config)#interface Serial0/0/1
JERUNG(config-if)#ip address 72.18.110.197 255.0.0.0
JERUNG(config-if)#ip address 72.18.110.197 255.255.255.252
JERUNG(config-if)#
JERUNG(config-if)#exit
JERUNG(config)#interface GigabitEthernet0/0
JERUNG(config-if)#ip address 172.18.110.1 255.255.255.252
JERUNG(config-if)#ip address 172.18.110.1 255.255.255.224
JERUNG(config-if)#

```

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JERUNG

Physical Config CLI Attributes

GLOBAL

- Settings
- Algorithm Settings
- ROUTING**

 - Static
 - RIP

- SWITCHING**

 - VLAN Database

- INTERFACE**

 - GigabitEthernet0/0
 - GigabitEthernet0/1**
 - Serial0/0/0
 - Serial0/0/1

GigabitEthernet0/1

Port Status	<input type="checkbox"/> On
Bandwidth	<input type="radio"/> 1000 Mbps <input checked="" type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto
Duplex	<input type="radio"/> Half Duplex <input checked="" type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto
MAC Address	0002.1636.2A02
IP Configuration	
IPv4 Address	172.18.110.33
Subnet Mask	255.255.255.224
Tx Ring Limit	10

Equivalent IOS Commands

```

JERUNG(config)#ip address 72.18.110.197 255.0.0.0
JERUNG(config-if)#ip address 72.18.110.197 255.255.255.252
JERUNG(config-if)#
JERUNG(config-if)#exit
JERUNG(config)#interface GigabitEthernet0/0
JERUNG(config-if)#ip address 172.18.110.1 255.255.255.252
JERUNG(config-if)#ip address 172.18.110.1 255.255.255.224
JERUNG(config-if)#
JERUNG(config-if)#exit
JERUNG(config)#interface GigabitEthernet0/1
JERUNG(config-if)#ip address 172.18.110.33 255.255.255.224
JERUNG(config-if)#

```

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TIBURON:

TIBURON

Physical Config CLI Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0

GigabitEthernet0/1

Serial0/1/0

Serial0/1/1

Port Status

Duplex Full Duplex On

Clock Rate 1200

IP Configuration

IPv4 Address 172.18.110.198

Subnet Mask 255.255.255.252

Tx Ring Limit 10

Equivalent IOS Commands

```
TIBURON(config-if)#exit
TIBURON(config)#interface Serial0/1/1
TIBURON(config-if)#ip address 172.18.110.198 255.255.255.252
TIBURON(config-if)#no shutdown
TIBURON(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

TIBURON(config-if)#exit
TIBURON(config)#interface Serial0/1/1
TIBURON(config-if)#

```

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TIBURON

Physical Config CLI Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0

GigabitEthernet0/1

Serial0/1/0

Serial0/1/1

Serial0/1/0

Port Status

Duplex Full Duplex On

Clock Rate 1200

IP Configuration

IPv4 Address 172.18.110.202

Subnet Mask 255.255.255.252

Tx Ring Limit 10

Equivalent IOS Commands

```
TIBURON(config-if)#no shutdown
TIBURON(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

TIBURON(config-if)#exit
TIBURON(config)#interface Serial0/1/1
TIBURON(config-if)#
TIBURON(config-if)#exit
TIBURON(config)#interface Serial0/1/0
TIBURON(config-if)#

```

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Serial0/1/0

TIBURON

Physical Config CLI Attributes

GLOBAL

- Settings
- Algorithm Settings
- ROUTING**

 - Static
 - RIP

- SWITCHING**
- VLAN Database
- INTERFACE**

 - GigabitEthernet0/0
 - GigabitEthernet0/1
 - Serial0/1/0
 - Serial0/1/1

GigabitEthernet0/0

Port Status	GigabitEthernet0/0			
Bandwidth	<input type="radio"/> 1000 Mbps	<input checked="" type="radio"/> 100 Mbps	<input type="radio"/> 10 Mbps	<input checked="" type="checkbox"/> Auto
Duplex	<input type="radio"/> Half Duplex	<input checked="" type="radio"/> Full Duplex	<input checked="" type="checkbox"/> Auto	
MAC Address	00D0.BC84.3401			
IP Configuration				
IPv4 Address	172.18.110.129			
Subnet Mask	255.255.255.192			
Tx Ring Limit	10			

Equivalent IOS Commands

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
TIBURON(config-if)#exit
TIBURON(config)#interface Serial0/1/1
TIBURON(config-if)#
TIBURON(config-if)#exit
TIBURON(config)#interface Serial0/1/0
TIBURON(config-if)#
TIBURON(config-if)#exit
TIBURON(config)#interface GigabitEthernet0/0
TIBURON(config-if)#

```

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SHARK:

The screenshot shows the SHARK software interface for network configuration. The main window has tabs at the top: Physical, Config (which is selected), CLI, and Attributes. On the left, there's a navigation tree with sections like GLOBAL, ROUTING, SWITCHING, and INTERFACE. Under INTERFACE, 'Serial0/0/0' is selected, highlighted with a blue border. The right panel displays the configuration for 'Serial0/0/0'. It includes fields for Port Status (Duplex: Full Duplex, On checked), Clock Rate (2000000), IP Configuration (IPv4 Address: 172.18.110.194, Subnet Mask: 255.255.255.252), and Tx Ring Limit (10). Below this is a section titled 'Equivalent IOS Commands' containing the following configuration script:

```
SHARK>enable
SHARK#
SHARK#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
SHARK(config)#interface GigabitEthernet0/0
SHARK(config-if)#
SHARK(config-if)#exit
SHARK(config)#interface Serial0/0/0
SHARK(config-if)#ip address 172.18.110.194 255.255.0.0
SHARK(config-if)#ip address 172.18.110.194 255.255.255.252
SHARK(config-if)#

```

SHARK

Physical Config CLI Attributes

GLOBAL

- Settings
- Algorithm Settings
- ROUTING**
- Static
- RIP
- SWITCHING**
- VLAN Database
- INTERFACE**
- GigabitEthernet0/0
- GigabitEthernet0/1
- Serial0/0/0
- Serial0/0/1**

Serial0/0/1

Port Status

Duplex Full Duplex On

Clock Rate 2000000

IP Configuration

IPv4 Address 172.18.110.201

Subnet Mask 255.255.255.252

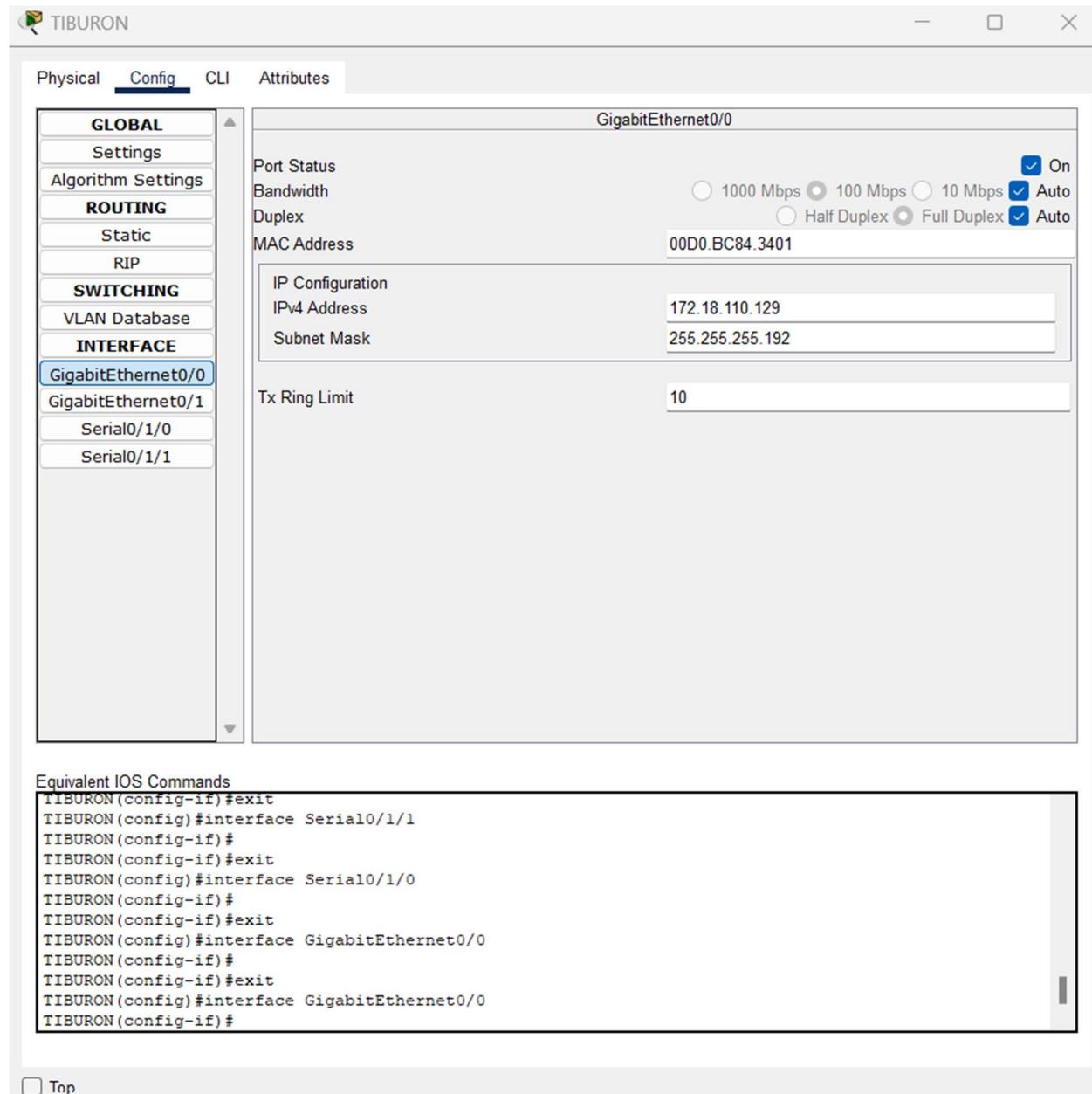
Tx Ring Limit 10

Equivalent IOS Commands

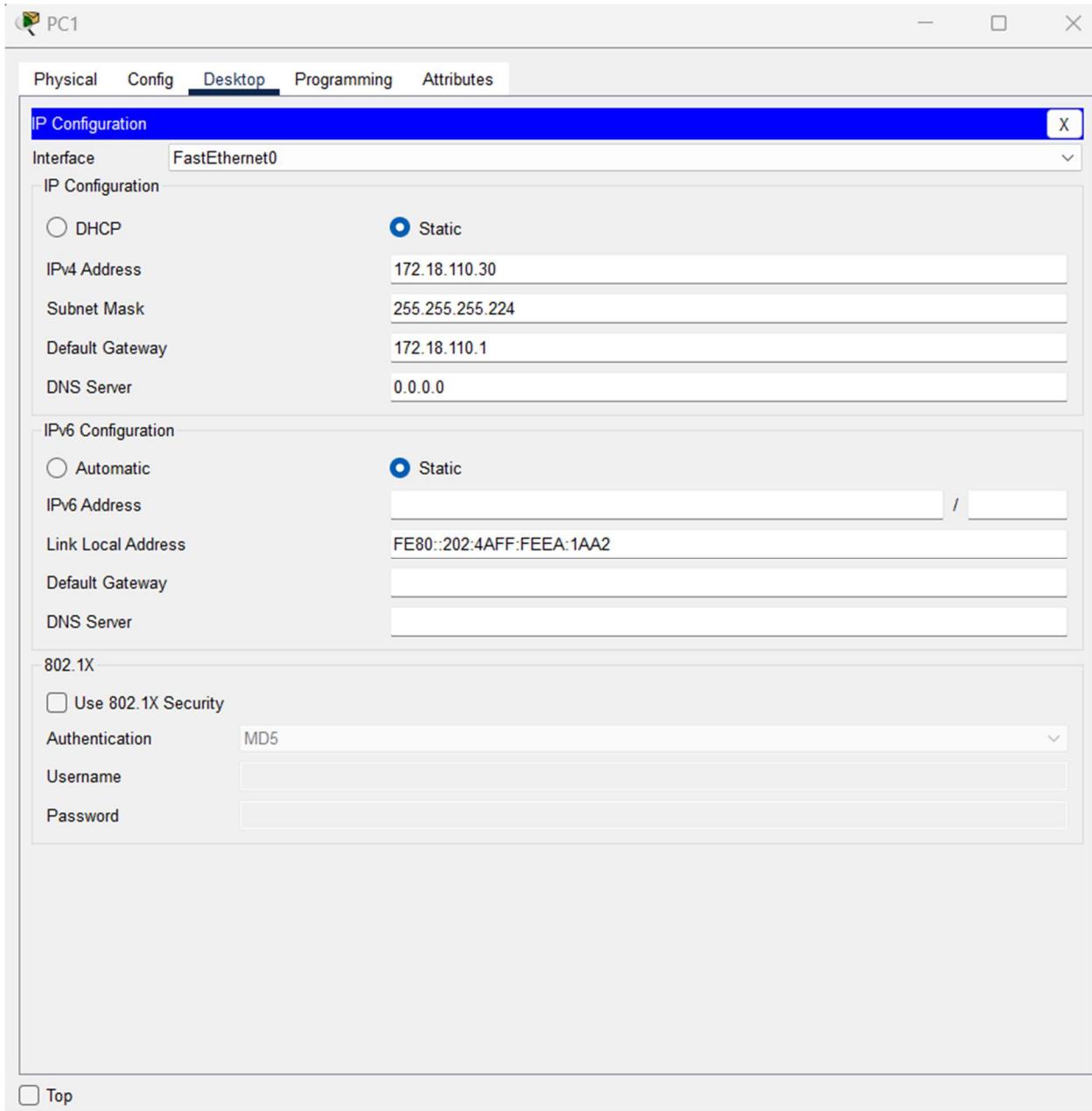
```
SHARK(config)#interface GigabitEthernet0/0
SHARK(config-if)#
SHARK(config-if)#exit
SHARK(config)#interface Serial0/0/0
SHARK(config-if)#ip address 172.18.110.194 255.255.0.0
SHARK(config-if)#ip address 172.18.110.194 255.255.255.252
SHARK(config-if)#
SHARK(config-if)#exit
SHARK(config)#interface Serial0/0/1
SHARK(config-if)#ip address 172.18.110.201 255.255.255.252
SHARK(config-if)#ip address 172.18.110.201 255.255.255.252
SHARK(config-if)#

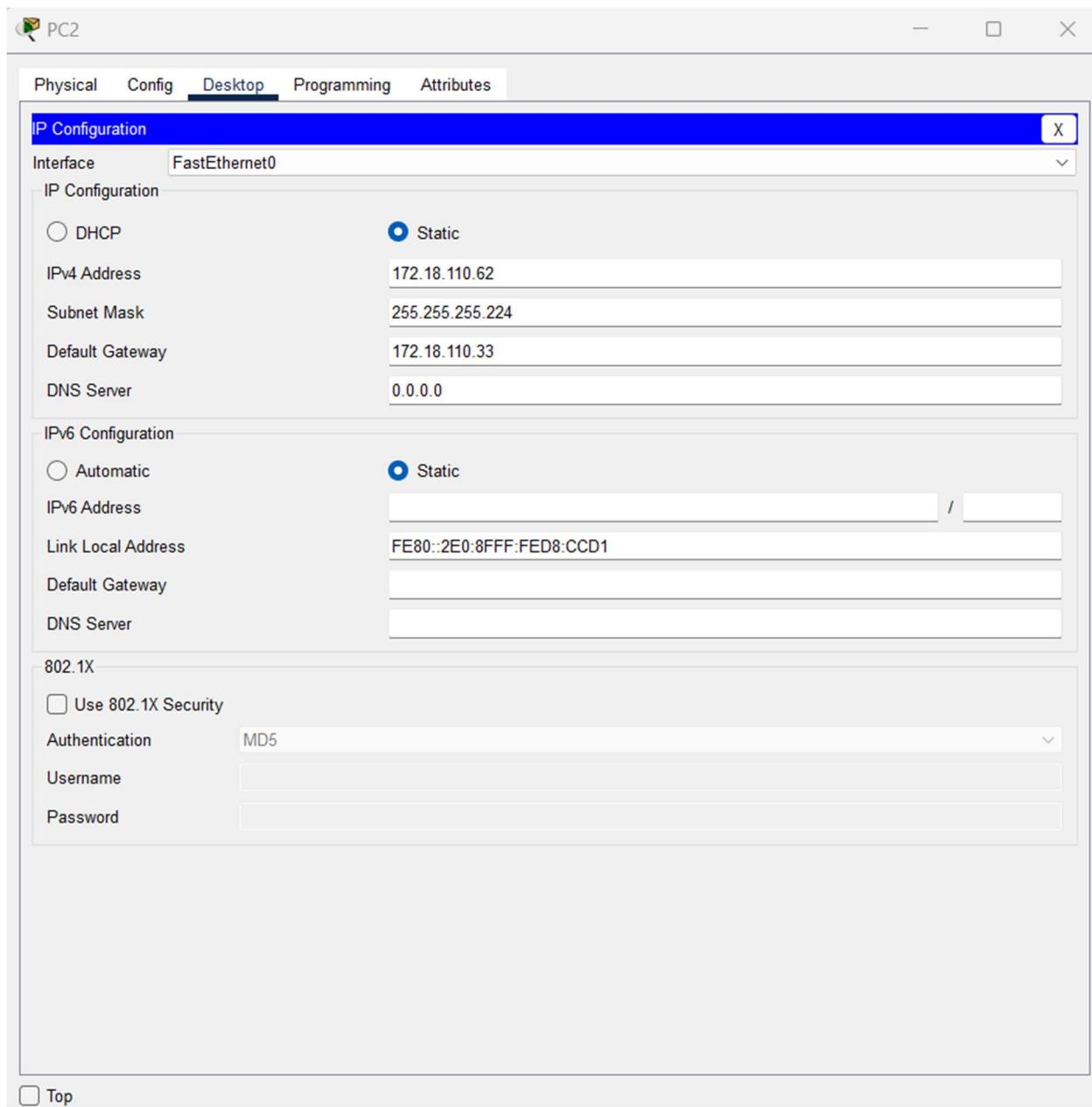
```

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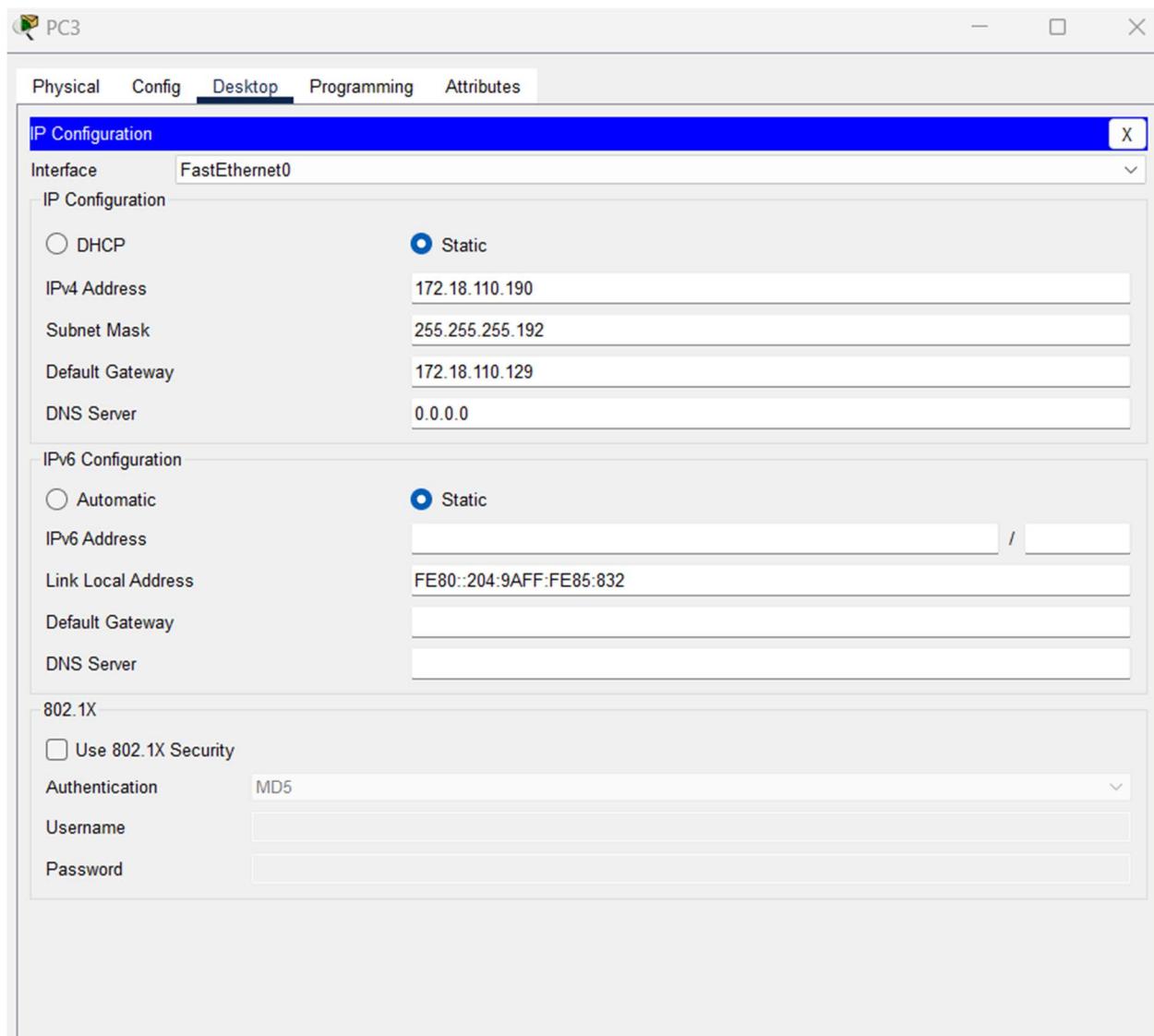


PC1:

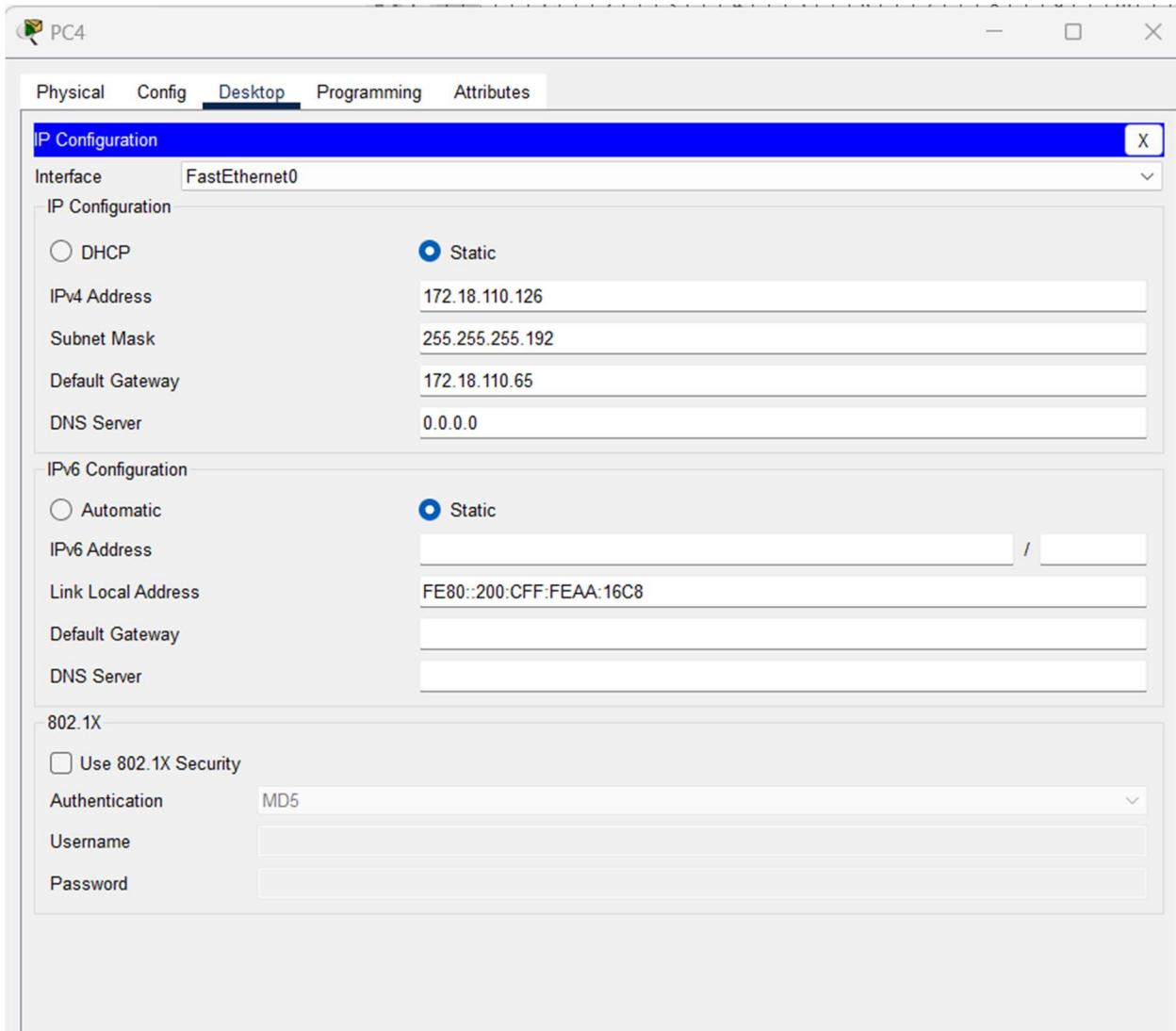
**PC2:**



PC3:



PC4:



Task 2 – Routing Table

1. Paste the current routing table of each router here. There are 2 ways to this – via CLI and via Packet Tracer (PT) tool. Use both ways to show the routing table of all the routers.
 - a. CLI
 - i. Click on a router. In the prompt, type show ip route. The routing table of the router will be shown, as shown in Figure A.

```

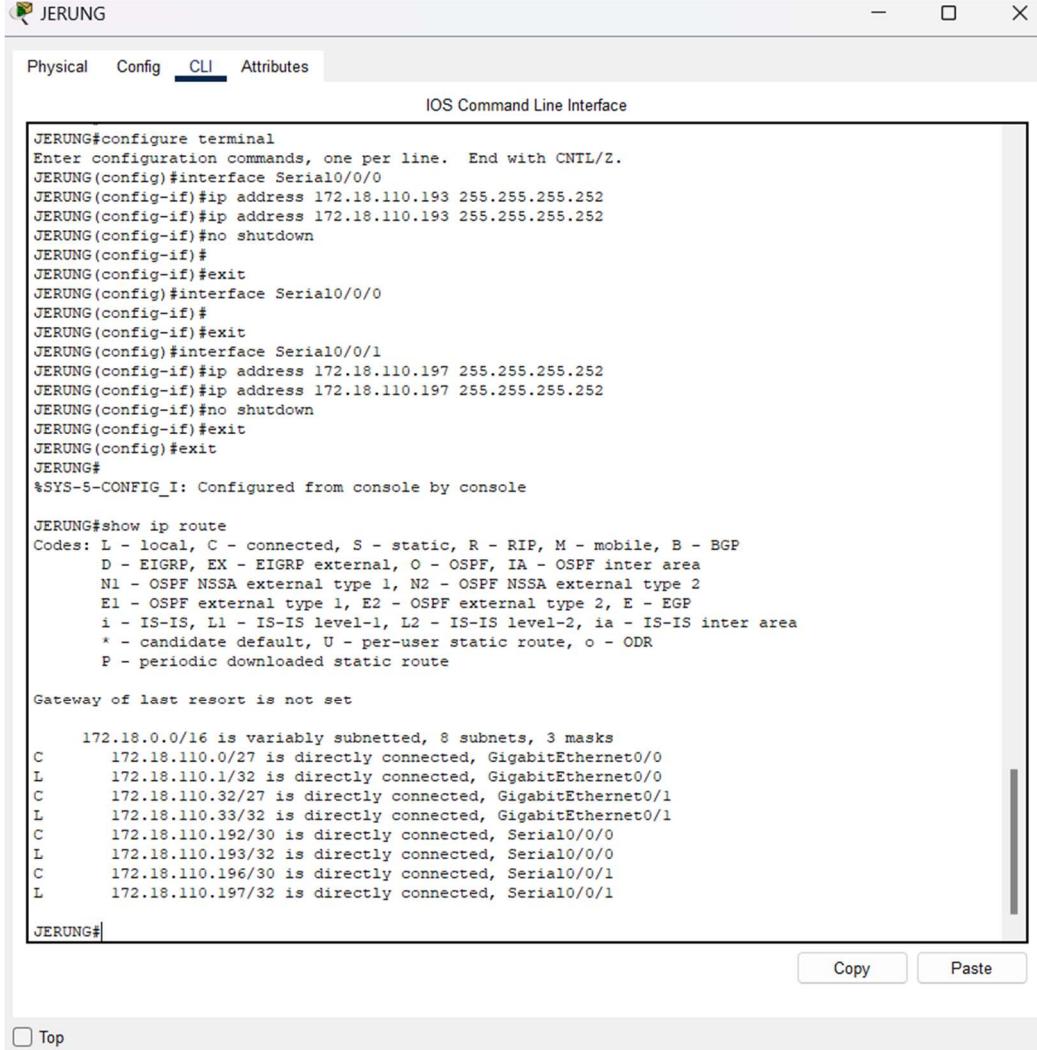
SHARK#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

      172.18.0.0/16 is variably subnetted, 2 subnets, 2 masks
C        172.18.110.0/26 is directly connected, GigabitEthernet0/0
L        172.18.110.1/32 is directly connected, GigabitEthernet0/0

```

Figure A

JERUNG:


```

JERUNG#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
JERUNG(config)#interface Serial0/0/0
JERUNG(config-if)#ip address 172.18.110.193 255.255.255.252
JERUNG(config-if)#ip address 172.18.110.193 255.255.255.252
JERUNG(config-if)#no shutdown
JERUNG(config-if)#
JERUNG(config-if)#exit
JERUNG(config)#interface Serial0/0/0
JERUNG(config-if)#
JERUNG(config-if)#exit
JERUNG(config)#interface Serial0/0/1
JERUNG(config-if)#ip address 172.18.110.197 255.255.255.252
JERUNG(config-if)#ip address 172.18.110.197 255.255.255.252
JERUNG(config-if)#no shutdown
JERUNG(config-if)#
JERUNG(config)#exit
JERUNG#
%SYS-5-CONFIG_I: Configured from console by console

JERUNG#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

      172.18.0.0/16 is variably subnetted, 8 subnets, 3 masks
C        172.18.110.0/27 is directly connected, GigabitEthernet0/0
L        172.18.110.1/32 is directly connected, GigabitEthernet0/0
C        172.18.110.32/27 is directly connected, GigabitEthernet0/1
L        172.18.110.33/32 is directly connected, GigabitEthernet0/1
C        172.18.110.192/30 is directly connected, Serial0/0/0
L        172.18.110.193/32 is directly connected, Serial0/0/0
C        172.18.110.196/30 is directly connected, Serial0/0/1
L        172.18.110.197/32 is directly connected, Serial0/0/1

JERUNG#

```

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TIBURON:

TIBURON

Physical Config **CLI** Attributes

IOS Command Line Interface

```

TIBURON(config-if)#ip address 172.18.110.129 255.255.255.192
TIBURON(config-if)#no shutdown

TIBURON(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

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

TIBURON(config-if)#exit
TIBURON(config)#interface Serial0/1/0
TIBURON(config-if)#ip address 172.18.110.202 255.255.255.252
TIBURON(config-if)#no shutdown
TIBURON(config-if)#exit
TIBURON(config)#exit
TIBURON#
%SYS-5-CONFIG_I: Configured from console by console

TIBURON#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

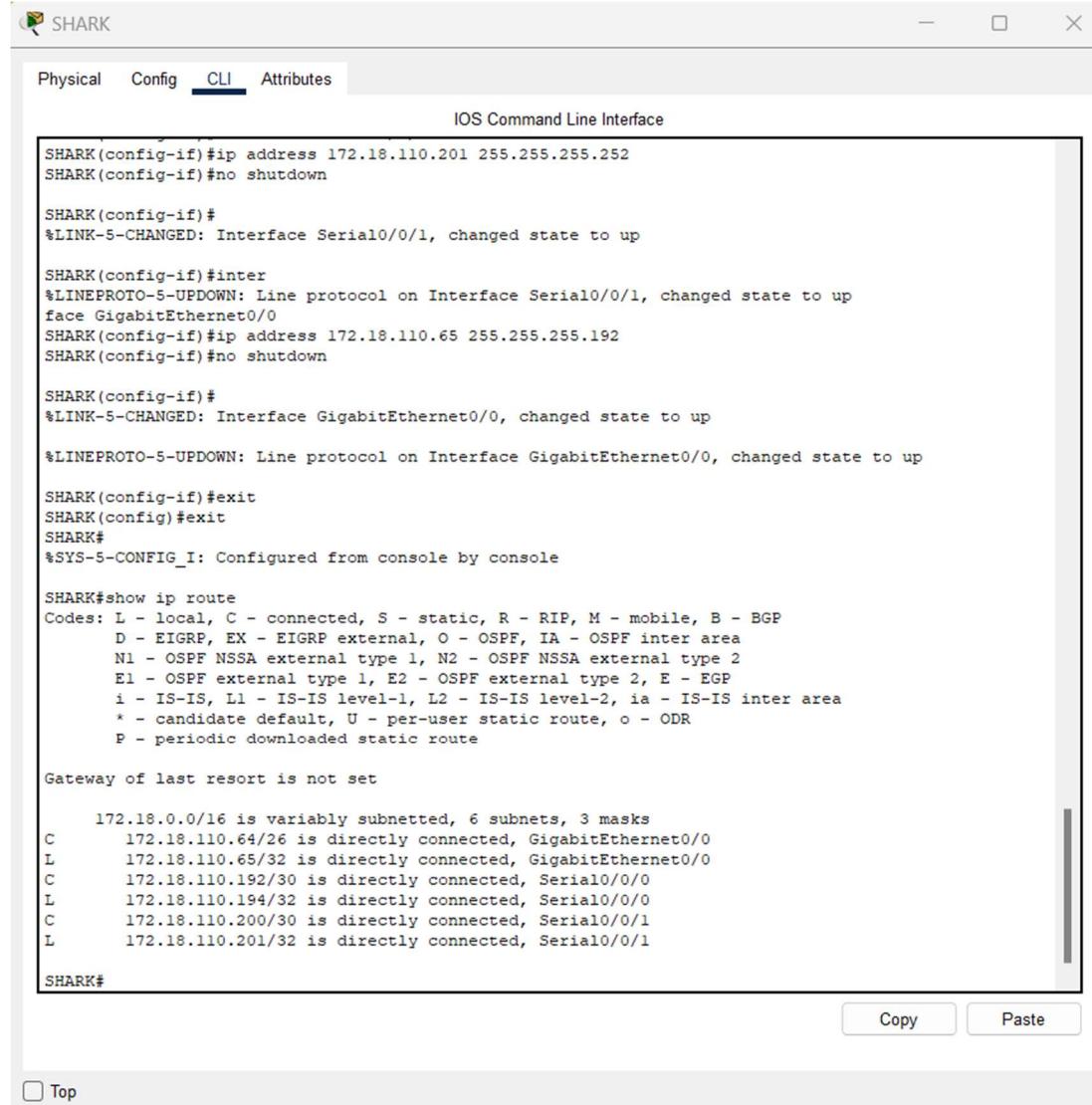
      172.18.0.0/16 is variably subnetted, 6 subnets, 3 masks
C        172.18.110.128/26 is directly connected, GigabitEthernet0/0
L        172.18.110.129/32 is directly connected, GigabitEthernet0/0
C        172.18.110.196/30 is directly connected, Serial0/1/1
L        172.18.110.198/32 is directly connected, Serial0/1/1
C        172.18.110.200/30 is directly connected, Serial0/1/0
L        172.18.110.202/32 is directly connected, Serial0/1/0

TIBURON#

```

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SHARK:



```

SHARK#ip address 172.18.110.201 255.255.255.252
SHARK#no shutdown

SHARK#%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

SHARK#inter
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up
face GigabitEthernet0/0
SHARK#ip address 172.18.110.65 255.255.255.192
SHARK#no shutdown

SHARK#%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

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

SHARK#exit
SHARK#exit
SHARK#
%SYS-5-CONFIG_I: Configured from console by console

SHARK#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

  172.18.0.0/16 is variably subnetted, 6 subnets, 3 masks
C    172.18.110.64/26 is directly connected, GigabitEthernet0/0
L    172.18.110.65/32 is directly connected, GigabitEthernet0/0
C    172.18.110.192/30 is directly connected, Serial0/0/0
L    172.18.110.194/32 is directly connected, Serial0/0/0
C    172.18.110.200/30 is directly connected, Serial0/0/1
L    172.18.110.201/32 is directly connected, Serial0/0/1

SHARK#

```

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[Copy](#) [Paste](#)

b. PT tool

- Click on the magnifying glass (shown in Figure B), then click on a router, then choose Routing Table. A sample of the result is shown in Figure C.



Figure B

Routing Table for SHARK					
Type	Network	Port	Next Hop IP	Metric	
C	172.18.110.0/26	GigabitEthernet0/0	---	0/0	
L	172.18.110.1/32	GigabitEthernet0/0	---	0/0	

Figure C

JERUNG:

Routing Table for JERUNG					
Type	Network	Port	Next Hop IP	Metric	
C	172.18.110.0/27	GigabitEthernet0/0	---	0/0	
L	172.18.110.1/32	GigabitEthernet0/0	---	0/0	
C	172.18.110.32/27	GigabitEthernet0/1	---	0/0	
L	172.18.110.33/32	GigabitEthernet0/1	---	0/0	
C	172.18.110.192/30	Serial0/0/0	---	0/0	
L	172.18.110.193/32	Serial0/0/0	---	0/0	
C	172.18.110.196/30	Serial0/0/1	---	0/0	
L	172.18.110.197/32	Serial0/0/1	---	0/0	

TIBURON:

Routing Table for TIBURON					
Type	Network	Port	Next Hop IP	Metric	
C	172.18.110.128/26	GigabitEthernet0/0	---	0/0	
L	172.18.110.129/32	GigabitEthernet0/0	---	0/0	
C	172.18.110.196/30	Serial0/1/1	---	0/0	
L	172.18.110.198/32	Serial0/1/1	---	0/0	
C	172.18.110.200/30	Serial0/1/0	---	0/0	
L	172.18.110.202/32	Serial0/1/0	---	0/0	

SHARK:

Routing Table for SHARK				
Type	Network	Port	Next Hop IP	Metric
C	172.18.110.64/26	GigabitEthernet0/0	---	0/0
L	172.18.110.65/32	GigabitEthernet0/0	---	0/0
C	172.18.110.192/30	Serial0/0/0	---	0/0
L	172.18.110.194/32	Serial0/0/0	---	0/0
C	172.18.110.200/30	Serial0/0/1	---	0/0
L	172.18.110.201/32	Serial0/0/1	---	0/0

2. Try to ping PC2 from PC1, paste the results here.

```

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 172.18.110.62

Pinging 172.18.110.62 with 32 bytes of data:

Request timed out.
Reply from 172.18.110.62: bytes=32 time<1ms TTL=127
Reply from 172.18.110.62: bytes=32 time<1ms TTL=127
Reply from 172.18.110.62: bytes=32 time<1ms TTL=127

Ping statistics for 172.18.110.62:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>

```

3. Try to ping PC4 from PC1, paste the results here.

```
C:\>ping 172.18.110.126

Pinging 172.18.110.126 with 32 bytes of data:

Reply from 172.18.110.1: Destination host unreachable.

Ping statistics for 172.18.110.126:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

4. Explain the reason(s) behind the results.

PC1 ping PC2 successfully because they are in the same subnet.

PC1 failed to ping PC4 because they are in different subnets and connected to different router. Therefore, devices in different subnets and different router cannot communicate with each other and the pinging result shows “Destination host unreachable”.

5. What needs to be done to ensure all PCs can ping each other successfully?

Check all interfaces have proper IP address, subnet mask, and default gateway configurations. Besides, static route must be configured on all routers to enable communication between devices in different subnet and router.

Task 2 – Routing Configuration

1. Let’s start by opening the routing table (using the PT tool) for TIBURON and JERUNG. This is done to show changes to the routing table as configurations are made.

Routing Table for TIBURON				
Type	Network	Port	Next Hop IP	Metric
C	172.18.110.64/26	GigabitEthernet0/0	---	0/0
L	172.18.110.65/32	GigabitEthernet0/0	---	0/0
C	172.18.110.196/30	Serial0/1/1	---	0/0
I	172.18.110.198/32	Serial0/1/1	---	0/0

Routing Table for JERUNG				
Type	Network	Port	Next Hop IP	Metric
C	172.18.110.128/27	GigabitEthernet0/1	---	0/0
L	172.18.110.129/32	GigabitEthernet0/1	---	0/0
C	172.18.110.160/27	GigabitEthernet0/0	---	0/0
I	172.18.110.161/32	GigabitEthernet0/0	---	0/0

Figure D

Routing Table for TIBURON

Type	Network	Port	Next Hop IP	Metric
C	172.18.110.128/26	GigabitEthernet0/0	---	0/0
L	172.18.110.129/32	GigabitEthernet0/0	---	0/0
C	172.18.110.196/30	Serial0/1/1	---	0/0
L	172.18.110.198/32	Serial0/1/1	---	0/0
C	172.18.110.200/30	Serial0/1/0	---	0/0
L	172.18.110.202/32	Serial0/1/0	---	0/0

Routing Table for JERUNG

Type	Network	Port	Next Hop IP	Metric
C	172.18.110.0/27	GigabitEthernet0/0	---	0/0
L	172.18.110.1/32	GigabitEthernet0/0	---	0/0
C	172.18.110.32/27	GigabitEthernet0/1	---	0/0
L	172.18.110.33/32	GigabitEthernet0/1	---	0/0
C	172.18.110.192/30	Serial0/0/0	---	0/0
L	172.18.110.193/32	Serial0/0/0	---	0/0
C	172.18.110.196/30	Serial0/0/1	---	0/0
L	172.18.110.197/32	Serial0/0/1	---	0/0

2. In router JERUNG, configure the RIP routing protocol as shown in Figure E.

```
JERUNG#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
JERUNG(config)#router rip
JERUNG(config-router)#version 2
JERUNG(config-router)#network 172.18.110.128
JERUNG(config-router)#network 172.18.110.160
JERUNG(config-router)#network 172.18.110.192
JERUNG(config-router)#network 172.18.110.196
JERUNG(config-router)#no auto-summary
JERUNG(config-router)#

```

Figure E

JERUNG:

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

JERUNG con0 is now available

Press RETURN to get started.

Enter configuration commands, one per line. End with CNTL/Z.
JERUNG(config)#router rip
JERUNG(config-router)#version 2
JERUNG(config-router)#network 172.18.110.128
JERUNG(config-router)#network 172.18.110.160
JERUNG(config-router)#network 172.18.110.192
JERUNG(config-router)#network 172.18.110.196
JERUNG(config-router)#no auto-summary
JERUNG(config-router)#
JERUNG(config-router)#

```

Top

[Copy](#) [Paste](#)

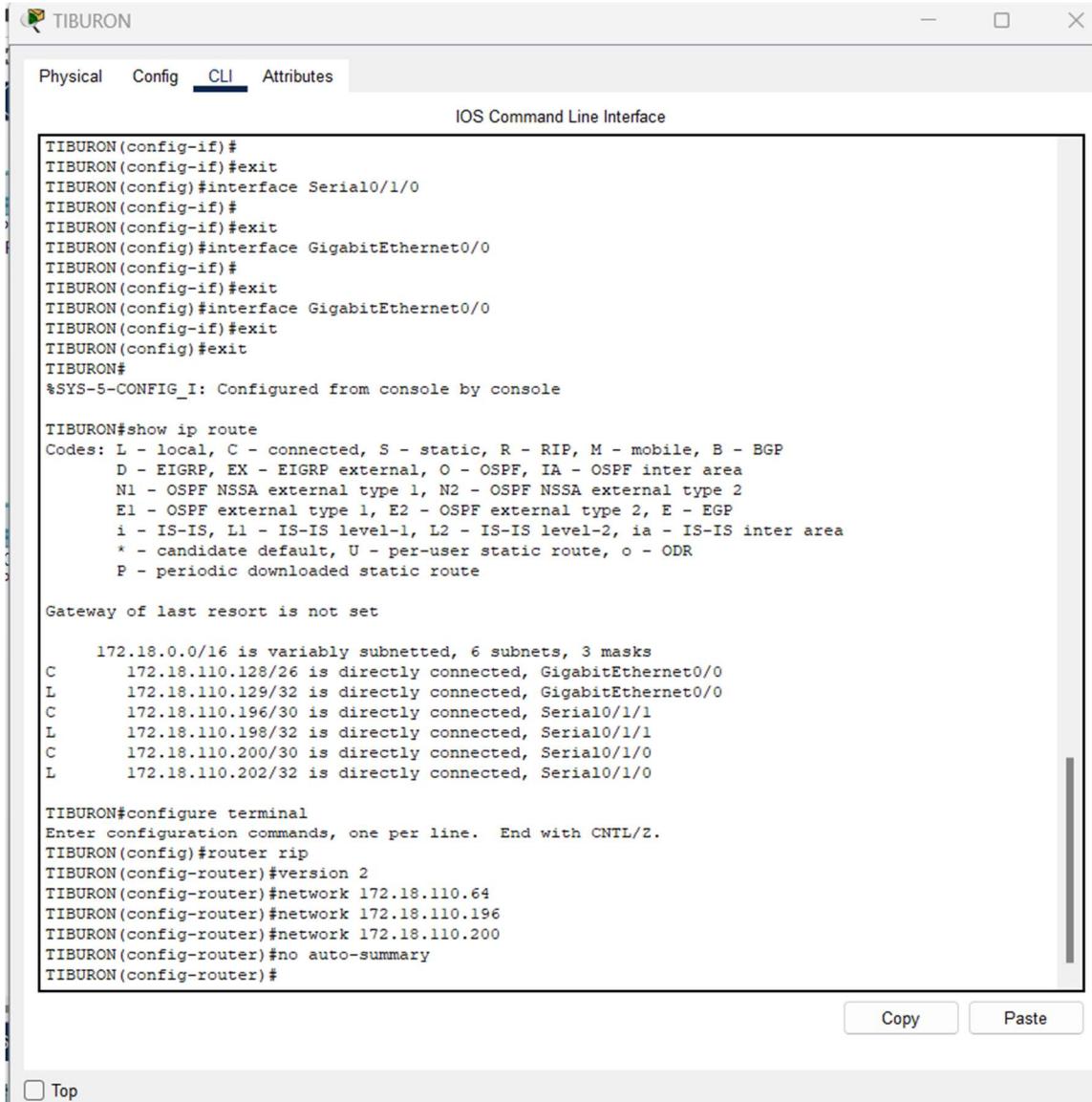
- a. What can you say about the addresses used in the ‘network’ instructions in Figure E?
- These addresses are the network addresses for different subnets. This instruction makes RIP to include interfaces within the subnet to enable devices in different subnet and router to communicate between each other.**
3. Then configure RIP in TIBURON. All are similar except use the network address. Use the instructions as shown below.

```

TIBURON (config-router) #network 172.18.110.64
TIBURON (config-router) #network 172.18.110.196
TIBURON (config-router) #network 172.18.110.200

```

TIBURON:



Physical Config **CLI** Attributes

IOS Command Line Interface

```

TIBURON(config-if)#
TIBURON(config-if)#exit
TIBURON(config)#interface Serial0/1/0
TIBURON(config-if)#
TIBURON(config-if)#exit
TIBURON(config)#interface GigabitEthernet0/0
TIBURON(config-if)#
TIBURON(config-if)#exit
TIBURON(config)#interface GigabitEthernet0/0
TIBURON(config-if)#exit
TIBURON(config)#exit
TIBURON#
*SYS-5-CONFIG_I: Configured from console by console

TIBURON#show ip route
Codes: L - local, C - static, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

      172.18.0.0/16 is variably subnetted, 6 subnets, 3 masks
C        172.18.110.128/26 is directly connected, GigabitEthernet0/0
L        172.18.110.129/32 is directly connected, GigabitEthernet0/0
C        172.18.110.196/30 is directly connected, Serial0/1/1
L        172.18.110.198/32 is directly connected, Serial0/1/1
C        172.18.110.200/30 is directly connected, Serial0/1/0
L        172.18.110.202/32 is directly connected, Serial0/1/0

TIBURON#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
TIBURON(config)#router rip
TIBURON(config-router)#version 2
TIBURON(config-router)#network 172.18.110.64
TIBURON(config-router)#network 172.18.110.196
TIBURON(config-router)#network 172.18.110.200
TIBURON(config-router)#no auto-summary
TIBURON(config-router)#

```

Top

- As you may have seen, there are changes in the routing tables of both TIBURON and JERUNG. Paste a copy of these routing tables here.

Routing Table for TIBURON						Routing Table for JERUNG					
Type	Network	Port	Next Hop IP	Metric		Type	Network	Port	Next Hop IP	Metric	
R	172.18.110.0/27	Serial0/1/1	172.1...	120/1		C	172.18.110.0/27	GigabitEthernet0/0	---	0/0	
R	172.18.110.32/27	Serial0/1/1	172.1...	120/1		L	172.18.110.1/32	GigabitEthernet0/0	---	0/0	
C	172.18.110.128/26	GigabitEthernet0/0	---	0/0		C	172.18.110.32/27	GigabitEthernet0/1	---	0/0	
L	172.18.110.129/32	GigabitEthernet0/0	---	0/0		L	172.18.110.33/32	GigabitEthernet0/1	---	0/0	
R	172.18.110.192/30	Serial0/1/1	172.1...	120/1		R	172.18.110.128/26	Serial0/0/1	172.1...	120/1	
C	172.18.110.196/30	Serial0/1/1	---	0/0		C	172.18.110.192/30	Serial0/0/0	---	0/0	
L	172.18.110.198/32	Serial0/1/1	---	0/0		L	172.18.110.193/32	Serial0/0/0	---	0/0	
C	172.18.110.200/30	Serial0/1/0	---	0/0		C	172.18.110.196/30	Serial0/0/1	---	0/0	
L	172.18.110.202/32	Serial0/1/0	---	0/0		L	172.18.110.197/32	Serial0/0/1	---	0/0	
					P	R	172.18.110.200/30	Serial0/0/1	172.1...	120/1	

- a. What are the changes seen in TIBURON?

Networks with type R (RIP-learned routes) occurs in the routing table.

- b. What are the Networks with type R in TIBURON and JERUNG?

TIBURON: 172.18.110.0/27, 172.18.110.32/27, and 172.18.110.192/30

JERUNG: 172.18.110.128/26, and 172.18.110.200/30

- c. Ping PC3 from PC1. Was it successful?

PC1 ping PC3 successfully.

```
C:\>ping 172.18.110.190

Pinging 172.18.110.190 with 32 bytes of data:

Reply from 172.18.110.190: bytes=32 time=16ms TTL=126
Reply from 172.18.110.190: bytes=32 time=1ms TTL=126
Reply from 172.18.110.190: bytes=32 time=4ms TTL=126
Reply from 172.18.110.190: bytes=32 time=6ms TTL=126

Ping statistics for 172.18.110.190:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 16ms, Average = 6ms

C:\>
```

- d. Ping PC4 from PC1. Was it successful?

PC1 failed to ping PC4.

```
C:\>ping 172.18.110.126
Pinging 172.18.110.126 with 32 bytes of data:
Reply from 172.18.110.1: Destination host unreachable.

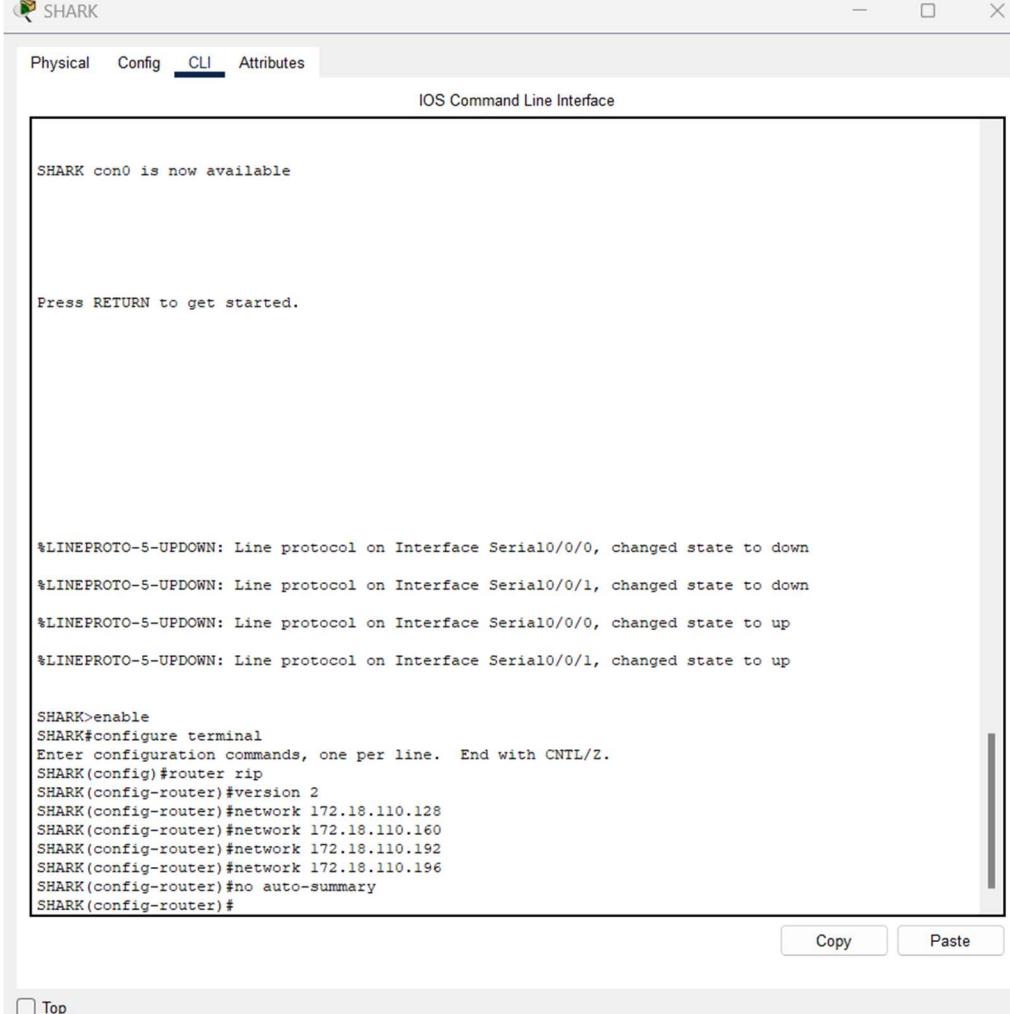
Ping statistics for 172.18.110.126:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

- e. Explain the reasons for your answer.

PC1 ping PC3 successfully because both PCs are in subnets that directly connected to JERUNG. JERUNG can route between its interface.

PC1 failed to ping PC4 because both PCs are in different subnets that does not connect to same router. PC1 connected to JERUNG whereas PC4 connected to SHARK. Besides, SHARK router does not have configuration of RIP.

- f. Continue with configuration of RIP in SHARK. Paste your configurations here.



The screenshot shows the SHARK CLI interface. The title bar says "SHARK". The tab bar has "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is the text "IOS Command Line Interface". The main window contains the following text:

```
SHARK con0 is now available

Press RETURN to get started.

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

SHARK>enable
SHARK#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
SHARK(config)#router rip
SHARK(config-router)#version 2
SHARK(config-router)#network 172.18.110.128
SHARK(config-router)#network 172.18.110.160
SHARK(config-router)#network 172.18.110.192
SHARK(config-router)#network 172.18.110.196
SHARK(config-router)#no auto-summary
SHARK(config-router)#

```

At the bottom right of the main window are "Copy" and "Paste" buttons. At the bottom left is a "Top" button.

- g. Open router SHARK's routing table and paste here.

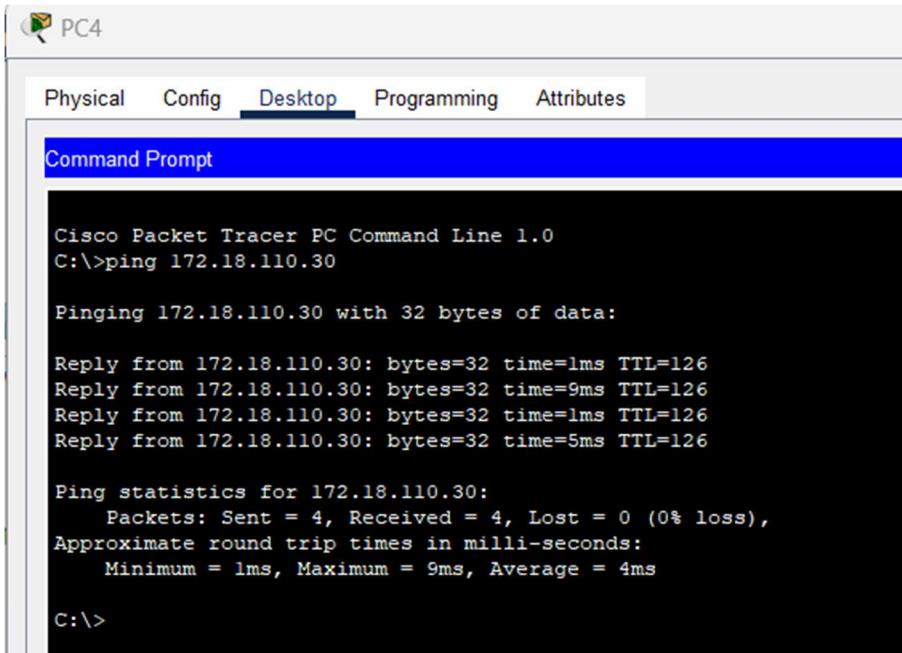
SHARK:

Routing Table for SHARK					
Type	Network	Port	Next Hop IP	Metric	
R	172.18.110.0/27	Serial0/0/0	172.18.110.193	120/1	
R	172.18.110.32/27	Serial0/0/0	172.18.110.193	120/1	
C	172.18.110.64/26	GigabitEthernet0/0	---	0/0	
L	172.18.110.65/32	GigabitEthernet0/0	---	0/0	
R	172.18.110.128/26	Serial0/0/1	172.18.110.202	120/1	
C	172.18.110.192/30	Serial0/0/0	---	0/0	
L	172.18.110.194/32	Serial0/0/0	---	0/0	
R	172.18.110.196/30	Serial0/0/0	172.18.110.193	120/1	
R	172.18.110.196/30	Serial0/0/1	172.18.110.202	120/1	
C	172.18.110.200/30	Serial0/0/1	---	0/0	
L	172.18.110.201/32	Serial0/0/1	---	0/0	

- h. Try to ping from PC4 to all other PCs in the topology. *Note: Try to ping at least twice to get best results.

PC	Ping result
1	Success
2	Success
3	Success

PC1:



PC4

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 172.18.110.30

Pinging 172.18.110.30 with 32 bytes of data:

Reply from 172.18.110.30: bytes=32 time=1ms TTL=126
Reply from 172.18.110.30: bytes=32 time=9ms TTL=126
Reply from 172.18.110.30: bytes=32 time=1ms TTL=126
Reply from 172.18.110.30: bytes=32 time=5ms TTL=126

Ping statistics for 172.18.110.30:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 9ms, Average = 4ms

C:\>
```

PC2:

```
C:\>ping 172.18.110.62

Pinging 172.18.110.62 with 32 bytes of data:

Reply from 172.18.110.62: bytes=32 time=10ms TTL=126
Reply from 172.18.110.62: bytes=32 time=11ms TTL=126
Reply from 172.18.110.62: bytes=32 time=9ms TTL=126
Reply from 172.18.110.62: bytes=32 time=1ms TTL=126

Ping statistics for 172.18.110.62:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 11ms, Average = 7ms

C:\>
```

PC3:

```
C:\>ping 172.18.110.190

Pinging 172.18.110.190 with 32 bytes of data:

Reply from 172.18.110.190: bytes=32 time=18ms TTL=126
Reply from 172.18.110.190: bytes=32 time=7ms TTL=126
Reply from 172.18.110.190: bytes=32 time=8ms TTL=126
Reply from 172.18.110.190: bytes=32 time=5ms TTL=126

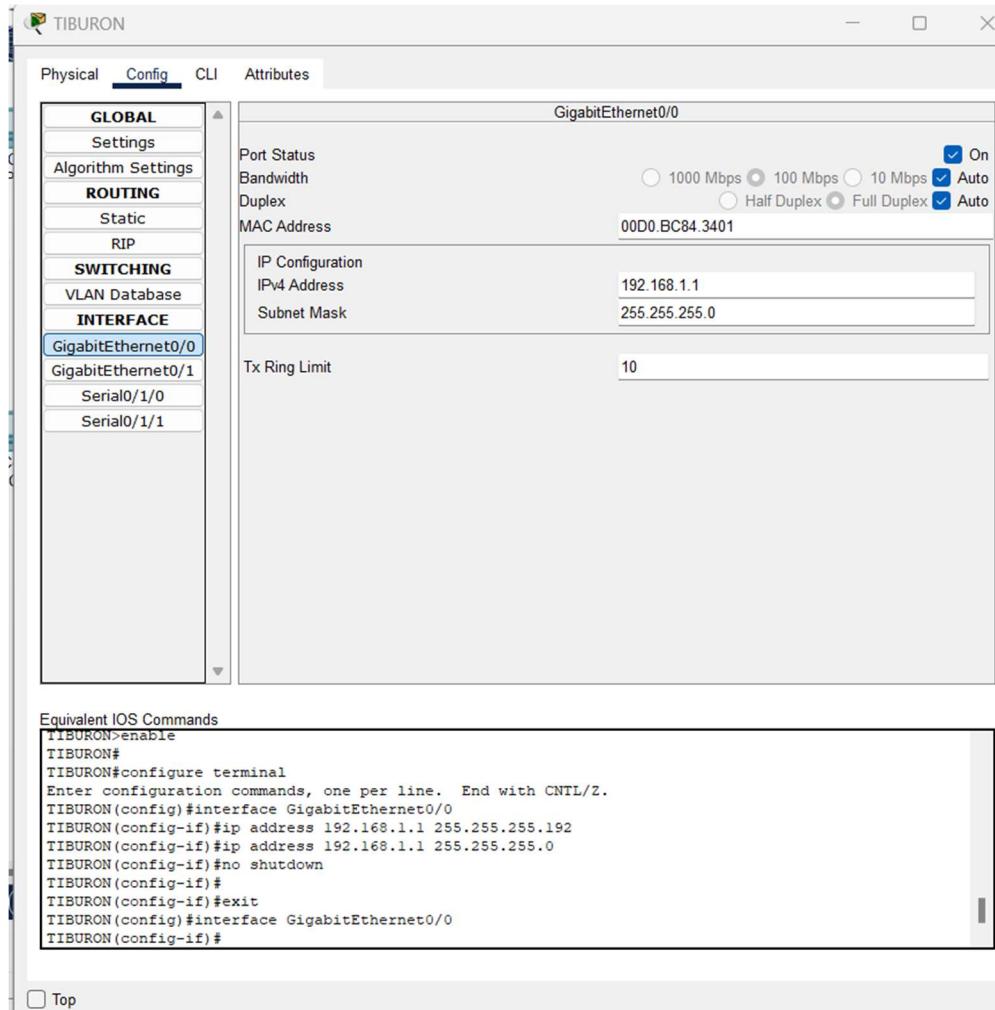
Ping statistics for 172.18.110.190:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 5ms, Maximum = 18ms, Average = 9ms

C:\>
```

Task 3 – Routing Update

1. Let's try a little experiment. Change the IP addresses of router TIBURON interface G0/0 to 192.168.1.1/24.

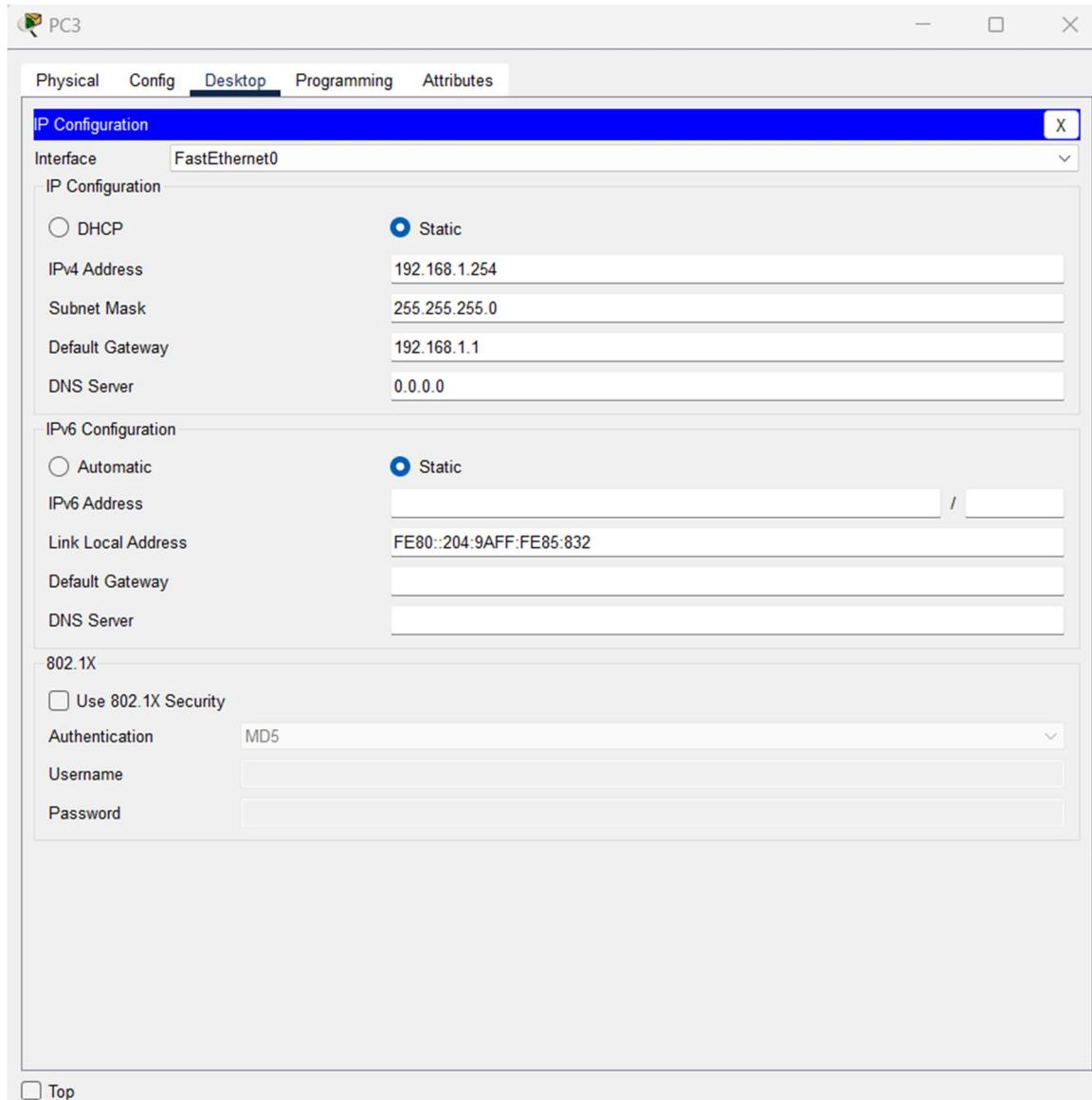
TIBURON:



- This means that the subnet has changed. Find the new Network address of this subnet. Network Address is: 192.168.1.0/24
- As this change happens, PC3 must also have different IP address, subnet mask and gateway address. What will it be?

PC3	Info
IP address	192.168.1.254
Subnet Mask	255.255.255.0
Gateway Address	192.168.1.1

PC3:



c. After this change, can PC4 and PC1 ping PC3?

PC4 and PC1 cannot ping PC3.

PC4:

```
C:\>ping 192.168.1.254

Pinging 192.168.1.254 with 32 bytes of data:

Reply from 172.18.110.65: Destination host unreachable.
Reply from 172.18.110.65: Destination host unreachable.
Request timed out.
Reply from 172.18.110.65: Destination host unreachable.

Ping statistics for 192.168.1.254:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

PC1:

```
C:\>ping 192.168.1.254

Pinging 192.168.1.254 with 32 bytes of data:

Reply from 172.18.110.1: Destination host unreachable.

Ping statistics for 192.168.1.254:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

- d. Copy and paste the routing tables for both SHARK and TIBURON here.

SHARK:

Routing Table for SHARK				
Type	Network	Port	Next Hop IP	Metric
R	172.18.110.0/27	Serial0/0/0	172.18.110.193	120/1
R	172.18.110.32/27	Serial0/0/0	172.18.110.193	120/1
C	172.18.110.64/26	GigabitEthernet0/0	---	0/0
L	172.18.110.65/32	GigabitEthernet0/0	---	0/0
R	172.18.110.128/26	Serial0/0/1	172.18.110.202	120/16
C	172.18.110.192/30	Serial0/0/0	---	0/0
L	172.18.110.194/32	Serial0/0/0	---	0/0
R	172.18.110.196/30	Serial0/0/1	172.18.110.202	120/1
R	172.18.110.196/30	Serial0/0/0	172.18.110.193	120/1
C	172.18.110.200/30	Serial0/0/1	---	0/0
L	172.18.110.201/32	Serial0/0/1	---	0/0

TIBURON:

Routing Table for TIBURON					
Type	Network	Port	Next Hop IP	Metric	
R	172.18.110.0/27	Serial0/1/1	172.18.110.197	120/1	
R	172.18.110.32/27	Serial0/1/1	172.18.110.197	120/1	
R	172.18.110.64/26	Serial0/1/0	172.18.110.201	120/1	
R	172.18.110.192/30	Serial0/1/1	172.18.110.197	120/1	
R	172.18.110.192/30	Serial0/1/0	172.18.110.201	120/1	
C	172.18.110.196/30	Serial0/1/1	---	0/0	
L	172.18.110.198/32	Serial0/1/1	---	0/0	
C	172.18.110.200/30	Serial0/1/0	---	0/0	
L	172.18.110.202/32	Serial0/1/0	---	0/0	
C	192.168.1.0/24	GigabitEthernet0/0	---	0/0	
L	192.168.1.1/32	GigabitEthernet0/0	---	0/0	

- e. Referring to the routing table, explain your findings.

SHARK's routing table does not include 192.168.1.0/24 subnet, whereas TIBURON's routing table includes the 192.168.1.0/24 subnet. This causes PC4 and PC1 cannot ping PC3 successfully. JERUNG and SHARK need to add the 192.168.1.0/24 subnet in their routing table so that all devices can communicate successfully across different subnets.

- f. What is your next move to ensure end-to-end connectivity (i.e. all PCs can ping each other successfully)?

Add static routes for new TIBURON subnet (192.168.1.0/24) on JERUNG and SHARK.

JERUNG:

```
JERUNG>enable
JERUNG#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
JERUNG(config)#ip route 192.168.1.0 255.255.255.0 172.18.110.198
```

TIBURON:

```
TIBURON(config)#ip route 172.18.110.0 255.255.255.224 172.18.110.197
TIBURON(config)#ip route 172.18.110.64 255.255.255.192 172.18.110.201
```

SHARK:

```
SHARK(config)#ip route 192.168.1.0 255.255.255.0 172.18.110.193
```

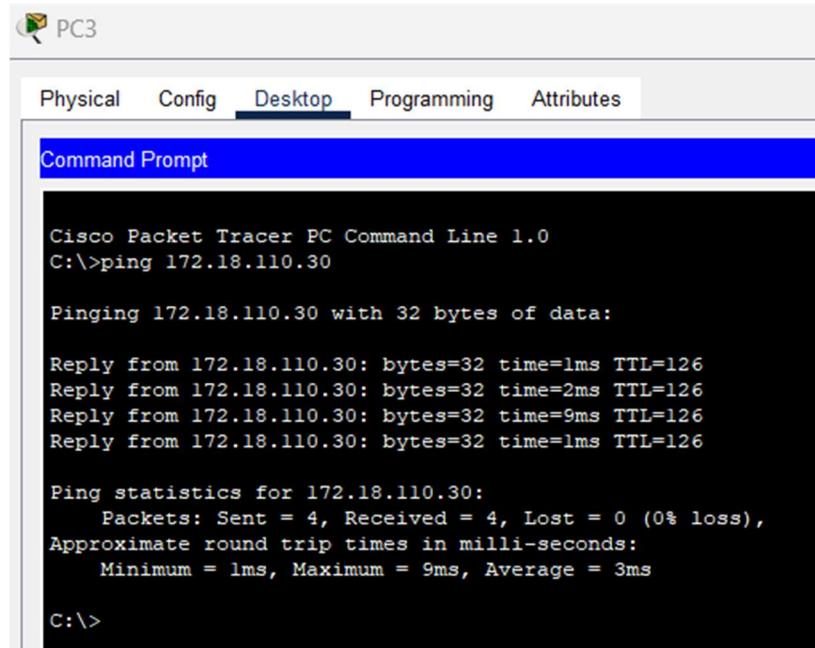
- g. Show your configurations in TIBURON to ensure end-to-end connectivity.

```
TIBURON(config)#ip route 192.168.1.0 255.255.255.0 172.18.110.198
%Invalid next hop address (it's this router)
TIBURON(config)#ip route 192.168.1.0 255.255.255.0 172.18.110.201
TIBURON(config)#ip route 172.18.110.0 255.255.255.224 172.18.110.197
TIBURON(config)#ip route 172.18.110.64 255.255.255.192 172.18.110.201
TIBURON(config)#

```

- h. To ensure end-to-end connectivity, ping to all the PCs from PC3.

PC	Ping result
1	Success
2	Success
4	Success

PC1:**PC2:**

```
C:\>ping 172.18.110.62

Pinging 172.18.110.62 with 32 bytes of data:

Reply from 172.18.110.62: bytes=32 time=10ms TTL=126
Reply from 172.18.110.62: bytes=32 time=7ms TTL=126
Reply from 172.18.110.62: bytes=32 time=1ms TTL=126
Reply from 172.18.110.62: bytes=32 time=8ms TTL=126

Ping statistics for 172.18.110.62:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 10ms, Average = 6ms

C:\>
```

PC4:

```
C:\>ping 172.18.110.126

Pinging 172.18.110.126 with 32 bytes of data:

Reply from 172.18.110.126: bytes=32 time=11ms TTL=125
Reply from 172.18.110.126: bytes=32 time=10ms TTL=125
Reply from 172.18.110.126: bytes=32 time=17ms TTL=125
Reply from 172.18.110.126: bytes=32 time=9ms TTL=125

Ping statistics for 172.18.110.126:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 9ms, Maximum = 17ms, Average = 11ms

C:\>
```

REFLECTION

What have you learned in this task?

From this task, I learned how to allocate IP address based on the subnet requirements such as smaller mask (/30) for serial links and larger mask (/27) for GigabitEthernet links. Besides, I also learned how to configure static routes so that communication can occur between devices in different subnets. Other than that, I learned ways to test configurations using “ping” command and “show ip route” command.