Lab 3 – Routing Protocol

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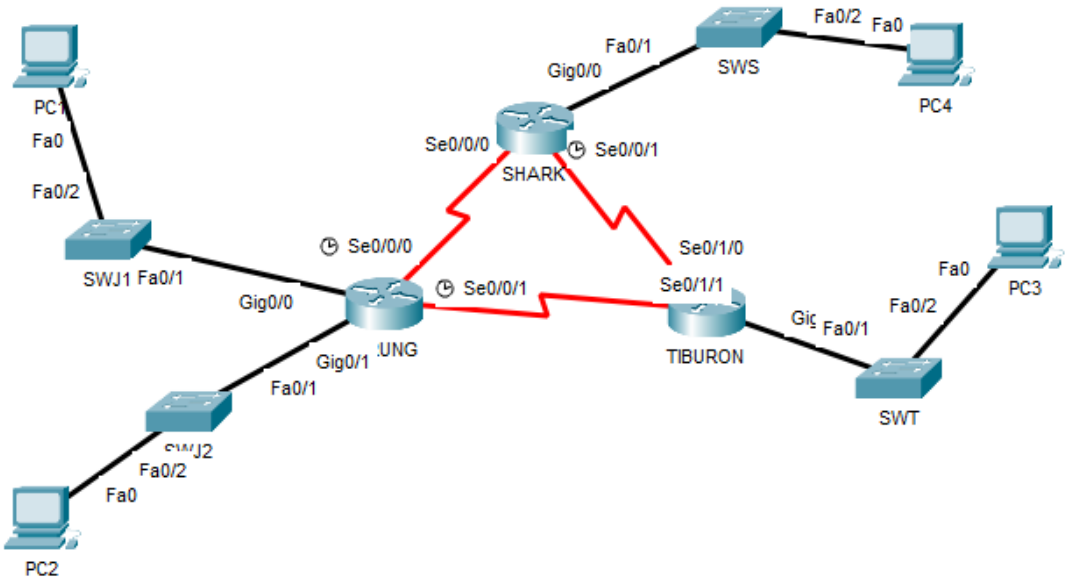
INTRODUCTION

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

1. 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.

Answer:

JERUNG LAN1	
Required IPs	20 IPs
Subnet Size (2^n)	$2^5 = 32 > 20 + 2$
Subnet Mask	/32 – 5 = /27
Network Address	172.18.110.0/27
Broadcast Address	172.18.110.31
Usable IP Range	172.18.110.1 – 172.18.110.30

JERUNG LAN2	
Required IPs	30 IPs
Subnet Size (2^n)	$2^5 = 32 > 30 + 2$
Subnet Mask	/32 – 5 = /27
Network Address	172.18.110.32/27
Broadcast Address	172.18.110.63
Usable IP Range	172.18.110.33 – 172.18.110.62

SHARK LAN	
Required IPs	60 IPs
Subnet Size (2^n)	$2^6 = 64 > 60 + 2$
Subnet Mask	/32 – 6 = /26
Network Address	172.18.110.64/26
Broadcast Address	172.18.110.127

Usable IP Range	172.18.110.65 – 172.18.110.126

TIBURON LAN	
Required IPs	50 IPs
Subnet Size (2^n)	$2^6 = 64 > 50 + 2$
Subnet Mask	/32 – 6 = /26
Network Address	172.18.110.128/26
Broadcast Address	172.18.110.191
Usable IP Range	172.18.110.129 – 172.18.110.190

JERUNG-SHARK Connection	
Required IPs	2 IPs
Subnet Size (2^n)	$2^2 = 4 > 2 + 2$
Subnet Mask	/32 – 2 = /30
Network Address	172.18.110.192/30
Broadcast Address	172.18.110.195
Usable IP Range	172.18.110.193 – 172.18.110.194

JERUNG-TIBURON Connection	
Required IPs	2 IPs
Subnet Size (2^n)	$2^2 = 4 > 2 + 2$
Subnet Mask	/32 – 2 = /30
Network Address	172.18.110.196/30
Broadcast Address	172.18.110.199
Usable IP Range	172.18.110.197 – 172.18.110.198

SHARK-TIBURON Connection	
Required IPs	2 IPs
Subnet Size (2^n)	$2^2 = 4 > 2 + 2$
Subnet Mask	/32 – 2 = /30
Network Address	172.18.110.200/30
Broadcast Address	172.18.110.203
Usable IP Range	172.18.110.201 – 172.18.110.202

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

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

Answer:

JERUNG

```
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
```

Figure JERUNG

SHARK

```
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
```

Figure SHARK

TIBURON

```
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
```

Figure TIBURON

b. PT tool

i. 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.

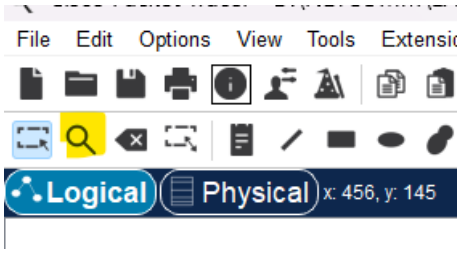


Figure B

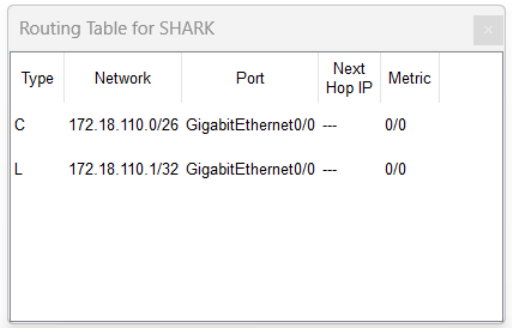


Figure C

Answer:
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

Figure JERUNG

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

Figure SHARK

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

Figure TIBURON

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

```
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
```

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

```
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.
Reply from 172.18.110.1: Destination host unreachable.
Reply from 172.18.110.1: Destination host unreachable.
Request timed out.

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

4. Explain the reason(s) behind the results.
   Answer:
   The packets from PC1 are successfully sent to PC2 because they share the same router, and their subnets are connected properly. However, PC1 cannot ping PC4 because of missing routing information where SHARK does not have a static route with JERUNG, routers are unable to forward packets to PCs.

5. What needs to be done to ensure all PCs can ping each other successfully?
   Answer:
   Make sure all PCs are in the correct subnet by configuring their IP addresses correctly.

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.

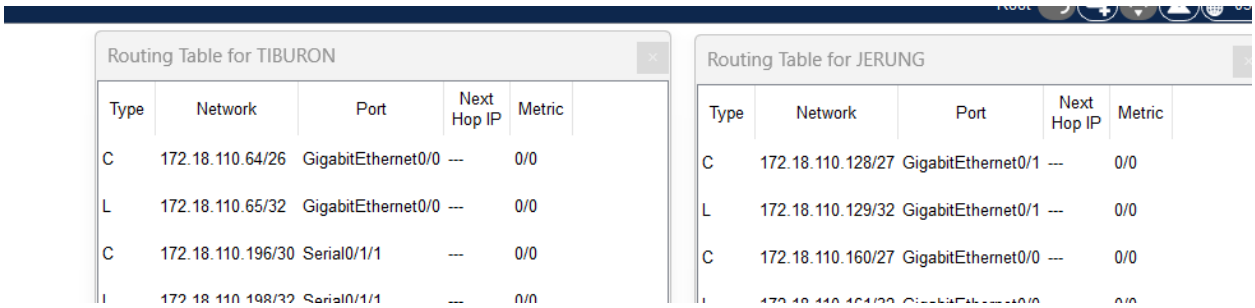


Figure D

Answer:

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

Figure TIBURON and JERUNG

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

a. What can you say about the addresses used in the 'network' instructions in Figure E?

Answer:
The addresses in the 'network' instructions are the networks connected to the router. They tell the router to share and learn routes for those networks, so devices in different networks can communicate. 172.18.110.128 represents LAN2, while 172.18.110.160 corresponds to LAN1. 172.18.110.192 is for the point-to-point link between JERUNG and SHARK, and 172.18.110.196 is for the point-to-point link between JERUNG and TIBURON.

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
```

4. 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.
   Answer:

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
C	172.18.110.128/26	GigabitEthernet0/0	---	0/0
L	172.18.110.129/32	GigabitEthernet0/0	---	0/0
R	172.18.110.192/30	Serial0/1/1	172.18.110.197	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

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
R	172.18.110.128/26	Serial0/0/1	172.18.110.198	120/1
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
R	172.18.110.200/30	Serial0/0/1	172.18.110.198	120/1

Figure TIBURON and JERUNG

   a. What are the changes seen in TIBURON?
      Answer:
      Type R has appeared in the routing table, meaning that the router learned through RIP.

   b. What are the Networks with type R in TIBURON and JERUNG?
      Answer:
      The networks with type R in TIBURON are 172.18.110.0/27, 172.18.110.32/27, 172.18.110.192/30.
      The networks with type R in JERUNG are 172.18.110.128/26, 172.18.110.200/30.

   c. Ping PC3 from PC1. Was it successful?

      Answer:
      Yes.

```
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=10ms TTL=126
Reply from 172.18.110.190: bytes=32 time=11ms TTL=126
Reply from 172.18.110.190: bytes=32 time=1ms 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 = 11ms, Average = 7ms
```

d. Ping PC4 from PC1. Was it successful?

Answer:

No.

```
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.
Request timed out.
Reply from 172.18.110.1: Destination host unreachable.
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.

Answer:

PC1 can send packets to PC3 because RIP configured successfully in JERUNG and TIBURON.

While PC1 can't send packets to PC4 because SHARK is not configured to forward packets to PC4's network.

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

Answer:

```
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 172.18.110.0
SHARK(config-router)#network 172.18.110.192
SHARK(config-router)#network 172.18.110.200
SHARK(config-router)#no auto-summary
SHARK(config-router)#
```

Figure SHARK

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

Answer:

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	Serial0/0/1	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

Figure SHARK

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

Answer:

PC	Ping result
1	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=11ms TTL=126 Reply from 172.18.110.30: bytes=32 time=4ms 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 = 11ms, Average = 5ms 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=2ms TTL=126 Reply from 172.18.110.30: bytes=32 time=1ms TTL=126 Reply from 172.18.110.30: bytes=32 time=7ms TTL=126 Reply from 172.18.110.30: bytes=32 time=1ms 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 = 7ms, Average = 2ms

2	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=5ms TTL=126 Reply from 172.18.110.62: bytes=32 time=1ms 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 = 10ms, Average = 4ms 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=8ms TTL=126 Reply from 172.18.110.62: bytes=32 time=6ms TTL=126 Reply from 172.18.110.62: bytes=32 time=7ms TTL=126 Reply from 172.18.110.62: bytes=32 time=7ms 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 = 6ms, Maximum = 8ms, Average = 7ms
3	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=15ms TTL=126 Reply from 172.18.110.190: bytes=32 time=1ms TTL=126 Reply from 172.18.110.190: bytes=32 time=8ms TTL=126 Reply from 172.18.110.190: bytes=32 time=1ms 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 = 15ms, Average = 6ms 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=12ms TTL=126 Reply from 172.18.110.190: bytes=32 time=1ms TTL=126 Reply from 172.18.110.190: bytes=32 time=1ms TTL=126 Reply from 172.18.110.190: bytes=32 time=7ms 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 = 12ms, Average = 5ms

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.
    a. This means that the subnet has changed. Find the new Network address of this subnet. Network Address is: __192.168.1.0/24_____
    b. As this change happens, PC3 must also have different IP address, subnet mask and gateway address. What will it be?
    Answer:

PC3	Info
IP address	192.168.1.254
Subnet Mask	255.255.255.0
Gateway Address	192.168.1.1

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

Answer:

No. PC4 can't ping to PC3.

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

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

No. PC1 can't ping to PC3.

```
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.
Reply from 172.18.110.1: Destination host unreachable.
Reply from 172.18.110.1: Destination host unreachable.
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),
```

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

Answer:

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	Serial0/0/1	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

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	192.168.1.0/26	GigabitEthernet0/0	---	0/0
L	192.168.1.1/32	GigabitEthernet0/0	---	0/0

Figure SHARK and TIBURON

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

Answer:

Direct connectivity exists between TIBURON and 192.168.1.0/24 subnet, but SHARK has no route to it, breaking end-to-end connectivity.

f. What is your next move to ensure end-to-end connectivity (i.e. all PCs can ping each other successfully)?
Answer:
Advertise 192.168.1.0/24 network via RIP from TIBURON.

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

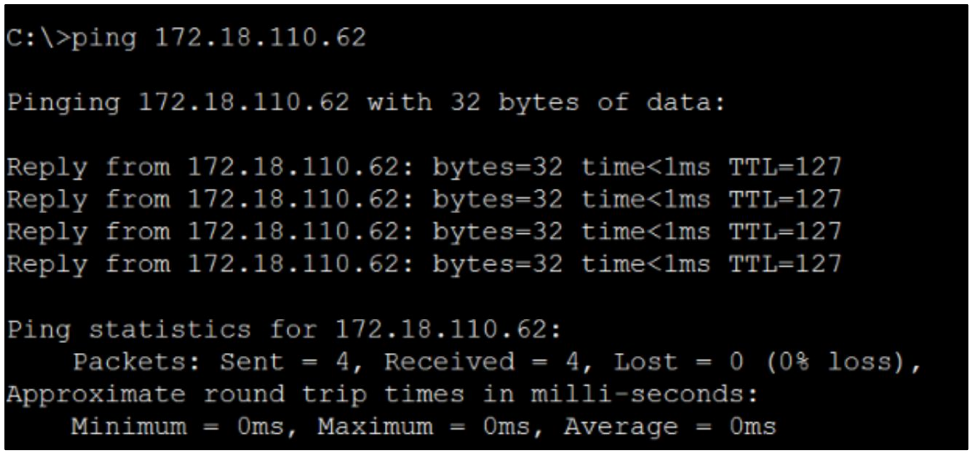
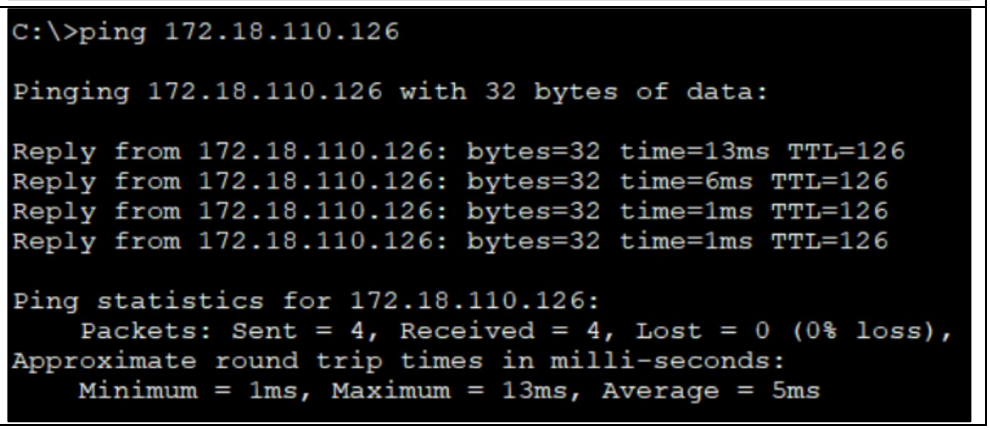
Answer:

```
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 192.168.1.0
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)#
```

Figure TIBURON

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

PC	Ping result
1	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=127 Reply from 172.18.110.30: bytes=32 time<1ms TTL=127 Reply from 172.18.110.30: bytes=32 time<1ms TTL=127 Reply from 172.18.110.30: bytes=32 time<1ms TTL=127 Ping statistics for 172.18.110.30: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 0ms, Maximum = 0ms, Average = 0ms

2	
4	

REFLECTION

This assignment showed me how subnets, IP addresses and routing protocols like RIP communicate to ensure that devices can speak to one another. Device connectivity may be impacted by changes to IP addresses and subnet masks. Routers also can exchange information about networks they can reach by using RIP. I also learned how to update routing tables, configure RIP and diagnose connectivity problems using tools like ping. The main lesson to be learned was that proper network setup and route shared are essential to run smoothly.