DEPARTMENT OF TELECOMMUNICATION ENGINEERING
MEHRAN UNIVERSITY OF ENGINEERING & TECHNOLOGY, JAMSHORO
COMPUTER COMMUNICATION & NETWORKING
(6th Semester, 3th Year)
PBL

Name:_____Roll No: _____

Score: _____Signature of the Lab Tutor: _____ Date: _____

OBJECTIVES

#	Topic	#. Of Lectures	CLO	Taxonomy level
13	PBL: **Design** the complex network and **configure** the different routing protocol (RIP, OSP and EIGRP). **Evaluate** which routing protocol is better or any other approved problem.	3	1,2	C3, P3

OUTCOME(S)

a. An ability to apply knowledge of math, science, and engineering	PLO1: Engineering Knowledge:
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	**PLO5:** Modern Tool Usage

RUBRICS:

Performance Metric	Exceeds expectation (4-5)	Meets expectations (2-3)	Does not meet expectations (0-1)	Score
Knowledge and application [PLO1]	Applies the appropriate knowledge and concepts to the problem with accuracy and proficiency; shows precise understanding of these knowledge and concepts.	Applies the relevant knowledge and concept to the problem, possibly in a roundabout way; understands the major points of the knowledge, with possible misunderstanding or failure to recall minor points;	Fails to apply relevant knowledge and concepts to the problem; misunderstands or fails to recall critical points.	
Modern Tool Usage [PLO5]	Computer and software are extensively used in the course	Computer and software are somewhat utilized, effort was put into learning new software	Computer and software are not utilized, no attempt was made at learning new software	
			Total Score	

DISCUSSION:

You have implemented RIP, OSPF and EIGRP in separate network scenarios, now you have sufficient knowledge of Dynamic Routing Protocols and about their performance matric. You have to compare these Dynamic routing protocol and measure their performance and came up with your findings on the performance of these routing protocols.

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EIGRP:

EIGRP is an enhanced version of IGRP. The same distance vector technology found in IGRP is also used in EIGRP, and the underlying distance information remains unchanged. The convergence properties and the operating efficiency of this protocol have improved significantly.

EIGRP has four basic components:

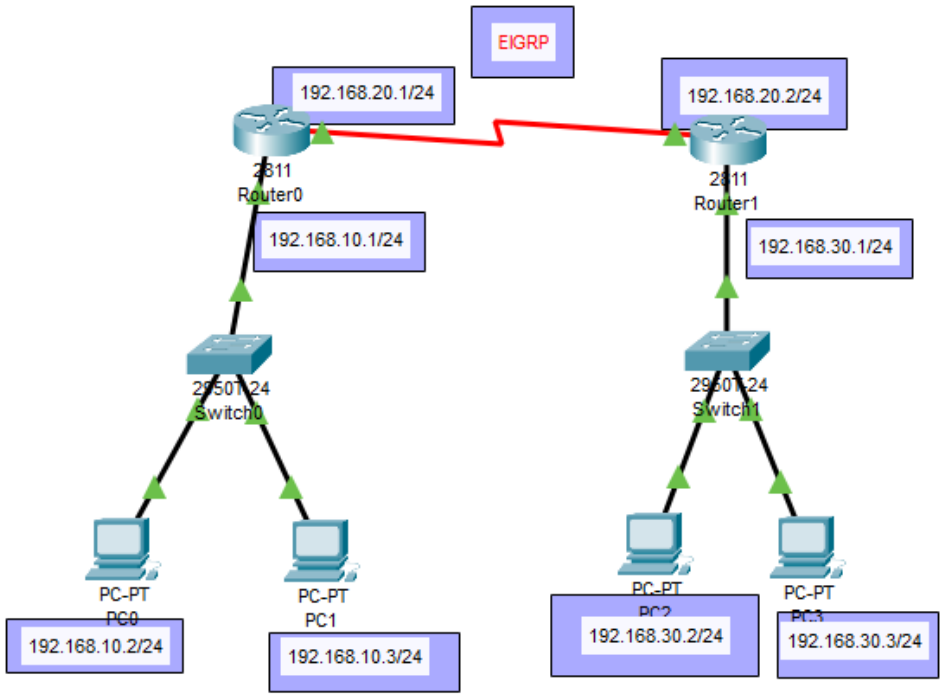
- Neighbor Discovery/Recovery
- Reliable Transport Protocol
- DUAL Finite State Machine
- Protocol Dependent Modules

Packet Formats

EIGRP uses five packet types:

- Hello/Acks
- Updates
- Queries
- Replies
- Requests

TOPOLOGY:



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EIGRP-CONFIGURATION:

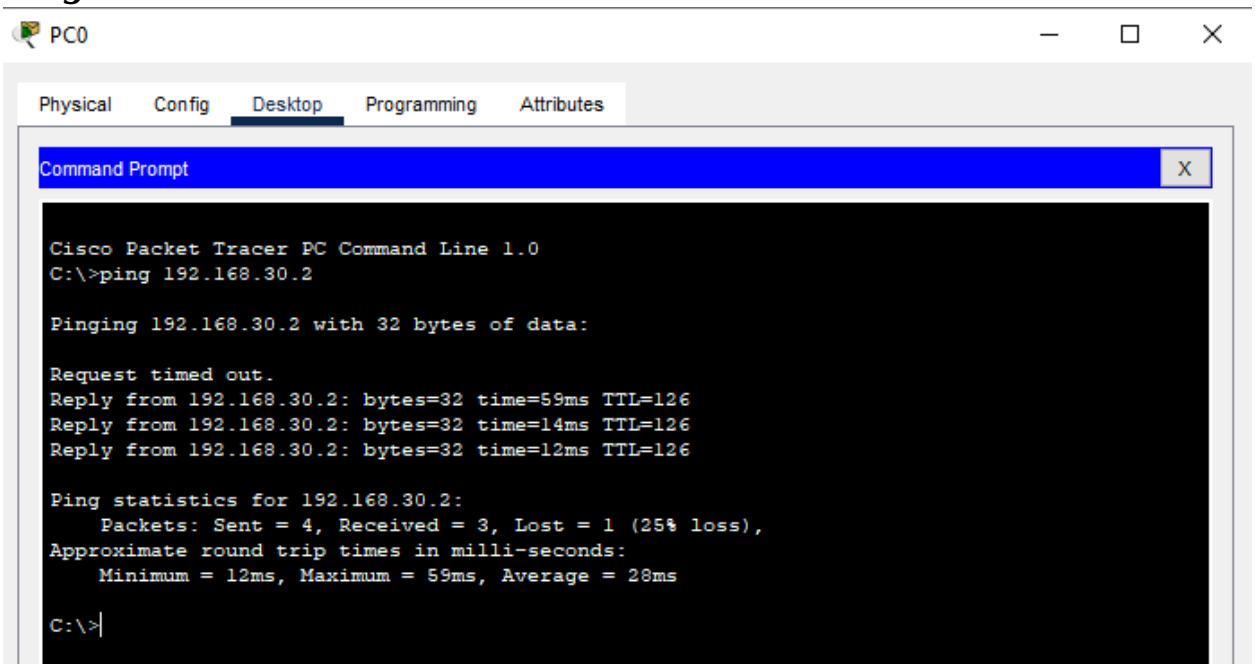
```
19TL28#
19TL28#configure t
Enter configuration commands, one per line.  End with CNTL/Z.
19TL28(config)#router eigrp 10
19TL28(config-router)#network 192.168.10.0 255.255.255.0
19TL28(config-router)#
19TL28(config-router)#network 192.168.20.0 255.255.255.0
```

```
19TL04(config)#router eigrp 10
19TL04(config-router)#network 192.168.20.0 255.255.255.0
19TL04(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 10: Neighbor 192.168.20.1 (Serial0/0/0) is up: new adjacency

19TL04(config-router)#network 192.168.30.0 255.255.255.0
19TL04(config-router)#exit
19TL04(config)#exit
19TL04#
%SYS-5-CONFIG_I: Configured from console by console

19TL04#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
19TL04#
```

Ping:



OSPF:

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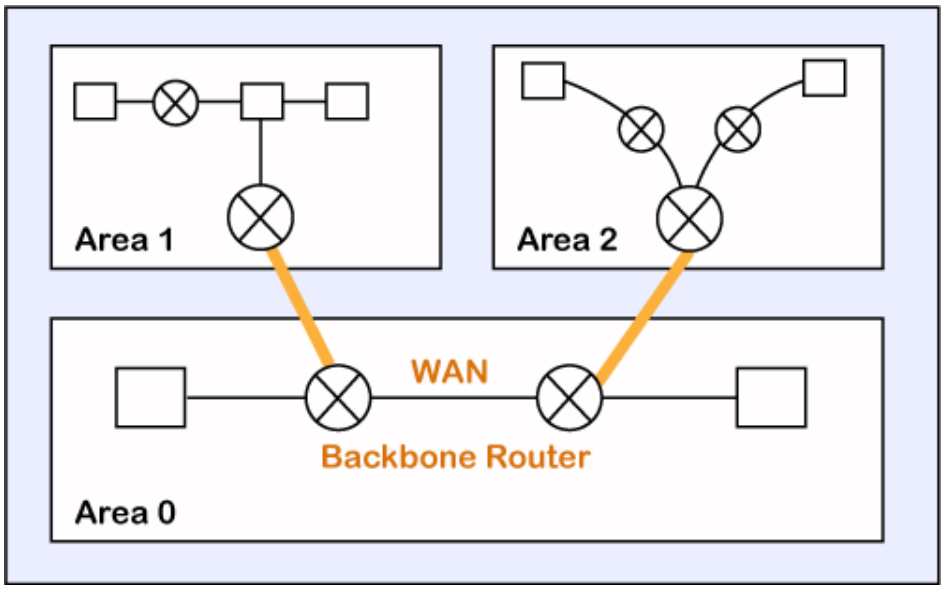
The OSPF stands for Open Shortest Path First. It is a widely used and supported routing protocol. It is an intradomain protocol, which means that it is used within an area or a network. It is an interior gateway protocol that has been designed within a single autonomous system.

OSPF Areas



OSPF divides the autonomous systems into areas where the area is a collection of networks, hosts, and routers. Like internet service providers divide the internet into a different autonomous system for easy management and OSPF further divides the autonomous systems into Areas.

How does OSPF work?

There are three steps that can explain the working of OSPF:

Step 1: The first step is to become OSPF neighbors. The two connecting routers running OSPF on the same link creates a neighbor relationship.

Step 2: The second step is to exchange database information. After becoming the neighbors, the two routers exchange the LSDB information with each other.

Step 3: The third step is to choose the best route. Once the LSDB information has been exchanged with each other, the router chooses the best route to be added to a routing table based on the calculation of SPF.

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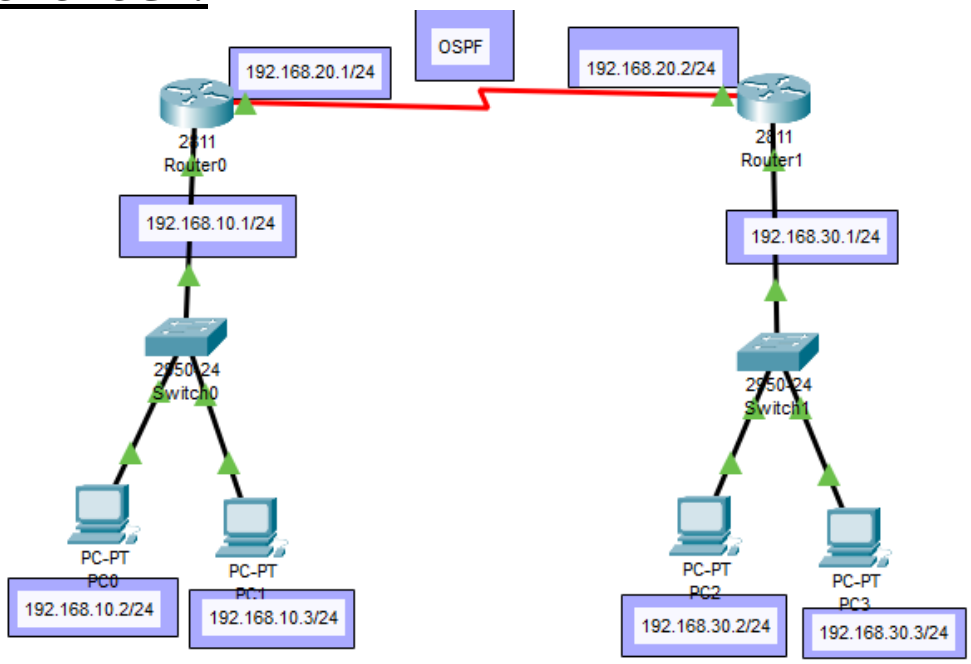
TOPOLOGY:



OSPF- CONFIGURATION:

```
Router>
Router>enable
Router#configure t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname 19TL28
19TL28(config)#int se0/0/0
19TL28(config-if)#ip address 192.168.20.1 255.255.255.0
19TL28(config-if)#clock rate 72000
19TL28(config-if)#no sh

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
19TL28(config-if)#interface fastethernet 0/0
19TL28(config-if)#ip address 192.168.10.1 255.255.255.0
19TL28(config-if)#no sh

19TL28(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

19TL28(config-if)#
```

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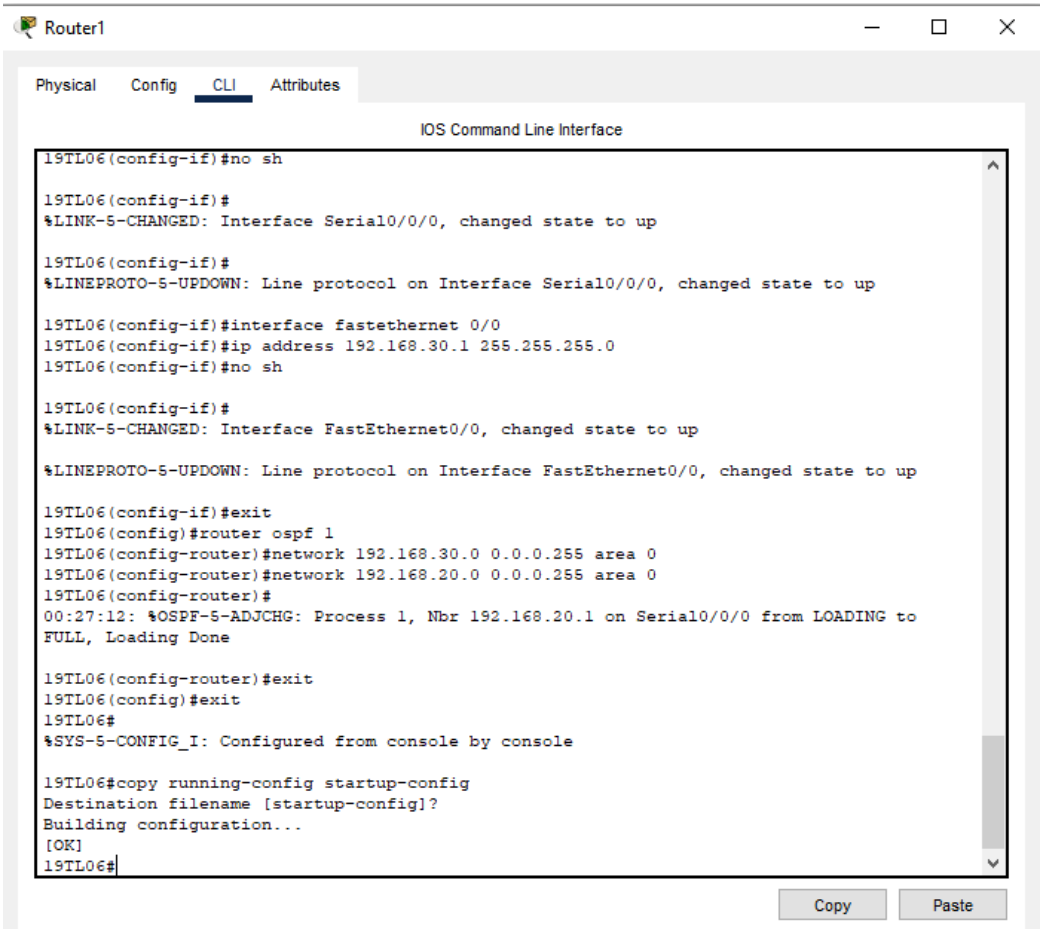
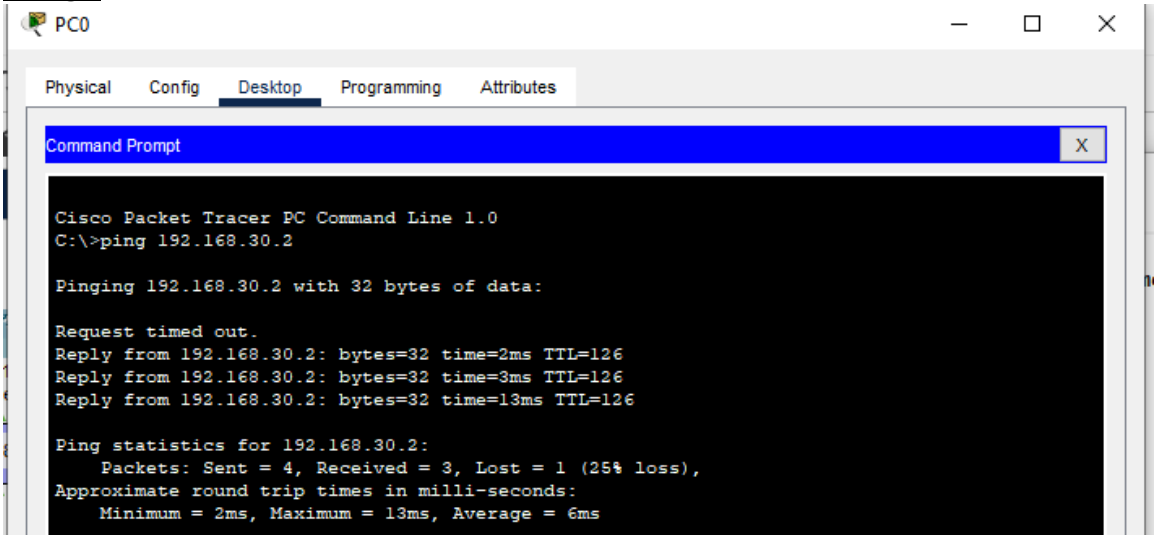


Ping:



RIP:

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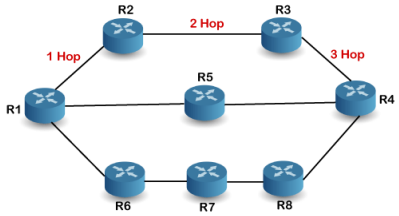
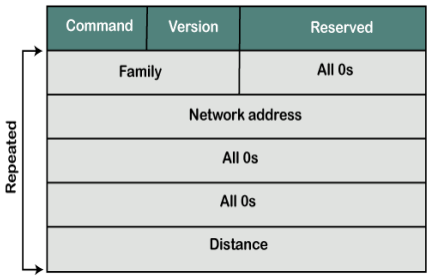
RIP stands for Routing Information Protocol. RIP is an intra-domain routing protocol used within an autonomous system. Here, intra-domain means routing the packets in a defined domain.

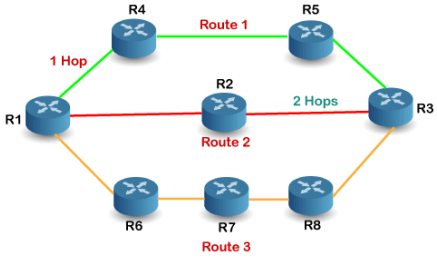
When the router sends the packet to the network segment, then it is counted as a single hop.



RIP Message Format



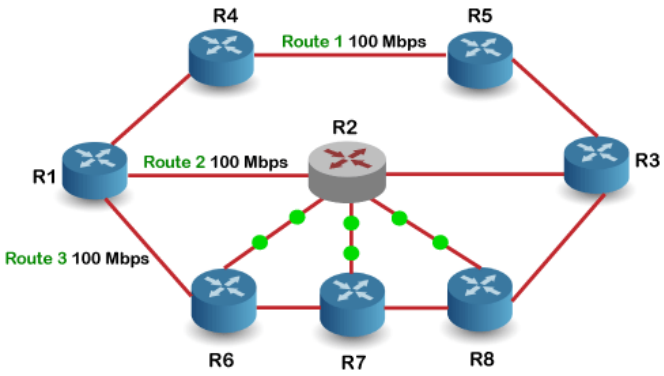
How does the RIP work?



If there are 8 routers in a network where Router 1 wants to send the data to Router 3. If the network is configured with RIP, it will choose the route which has the least number of hops. There are three routes in the above network, i.e., Route 1, Route 2, and Route 3. The Route 2 contains the least number of hops, i.e., 2 where Route 1 contains 3 hops, and Route 3 contains 4 hops, so RIP will choose Route 2.

Disadvantages of RIP:

- In RIP, the route is chosen based on the hop count metric. If another route of better bandwidth is available, then that route would not be chosen. Let's understand this scenario through an example.



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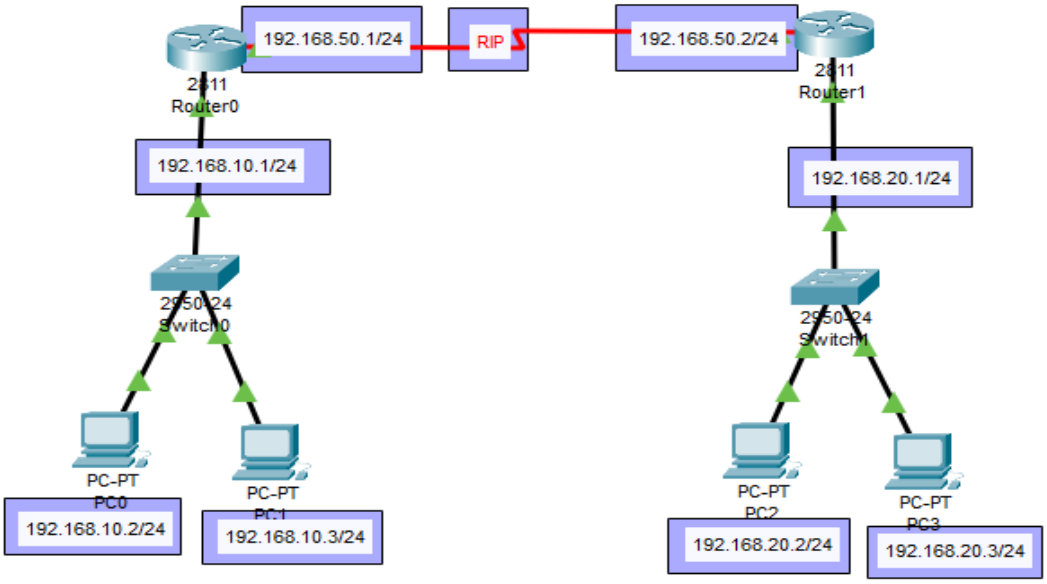
TOPOLOGY:



RIP-CONFIGURATION:

Router0

Physical Config CLI Attributes

IOS Command Line Interface

```
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int se0/0/0
Router(config-if)#ip address 192.168.50.1 255.255.255.0
Router(config-if)#clock rate 72000
Router(config-if)#no sh

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
Router(config-if)#interface fastethernet 0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no sh

Router(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

Router(config-if)#exit
Router(config)#
%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)#router rip
Router(config-router)#network 192.168.10.0
Router(config-router)#network 192.168.50.0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router#
```

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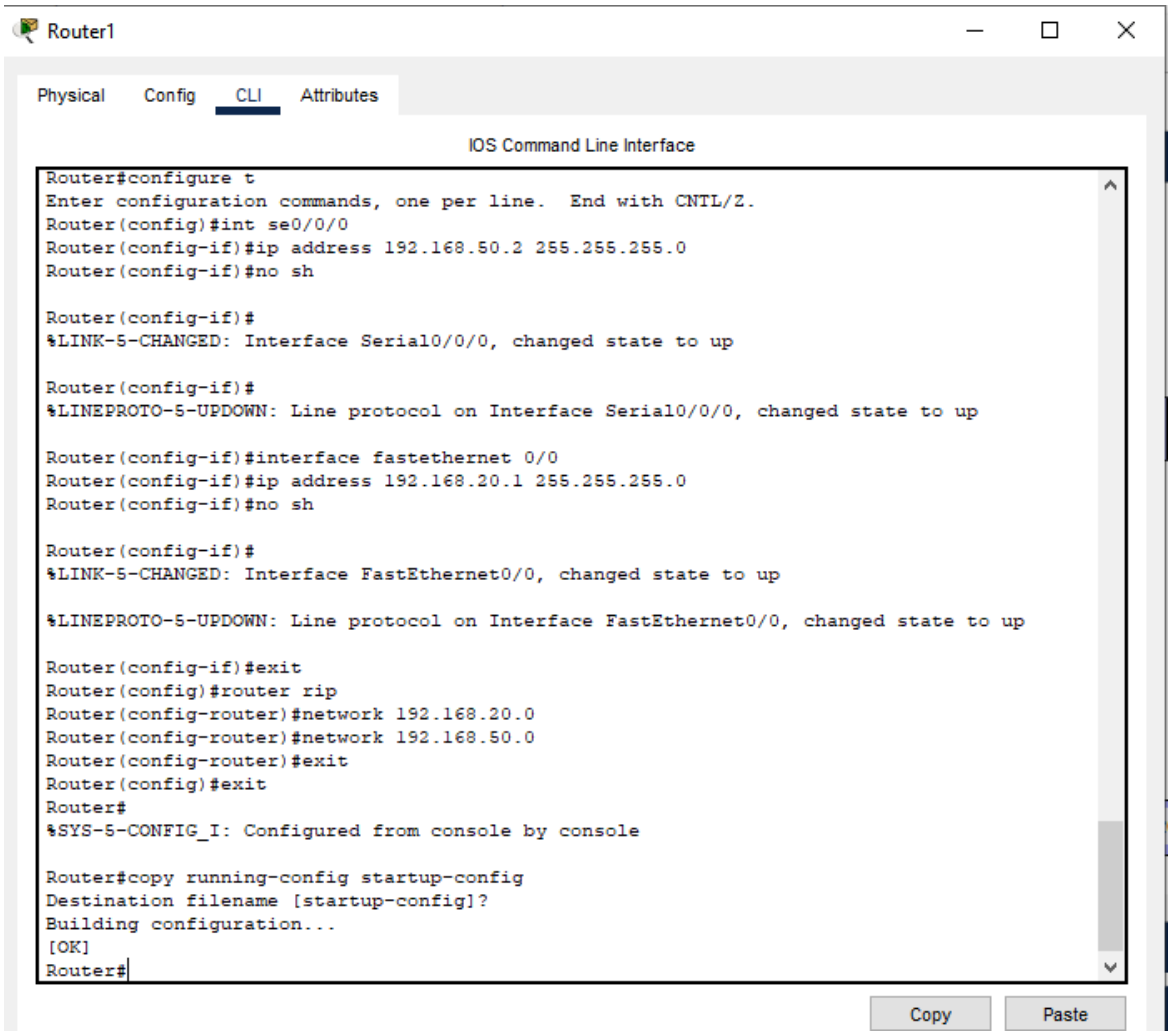

Ping: