

Lab 02: Routers with multiple networks and static routing

1. Introduction:

1.1. Routing:

Routing is the process of selecting a path for traffic in a [network](#), or between or across multiple networks. Broadly, routing is performed in many types of networks, including [circuit-switched networks](#), such as the [public switched telephone network](#) (PSTN), and [computer networks](#), such as the [Internet](#).

1.2. IP routing:

IP Routing is an umbrella term for the set of protocols that determine the path that data follows in order to travel across multiple networks from its source to its destination. Data is routed from its source to its destination through a series of routers, and across multiple networks. The IP Routing protocols enable routers to build up a forwarding table that correlates final destinations with next hop addresses.

1.3. Static routing:

Static routing is a form of [routing](#) that occurs when a router uses a manually-configured routing entry, rather than information from a dynamic routing traffic. In many cases, static routes are manually configured by a [network administrator](#) by adding in entries into a [routing table](#), though this may not always be the case. Unlike [dynamic routing](#), static routes are fixed and do not change if the network is changed or reconfigured.

1.4. Advantages of static routing:

Static routing, if used without dynamic routing, has the following advantages:

- Static routing causes very little load on the CPU of the router and produces no traffic to other routers.
- Static routing leaves the network administrator with full control over the routing behaviour of the network.

1.5. IP route command:

IP route command is used to configure the static route. Static routes are the most secure way of routing. They will also increase overall network performance. These features are extremely helpful in small network.

2. Tools required:

- CISCO Packet tracer

3. Objective of the Experiment:

After completing this Lab student should be able to:

- Configure router in cisco packet tracer.
- Do IP static routing using CLI.
- Do static routing using GUI.
- Configure multiple routers having multiple networks.

4. Walk-through Tasks:

4.1. Create a topology that have 2 routers, connecting together with copper cross cable, having three networks and do IP static routing in it.

For creating this topology, you have to follow these steps:

1. Open cisco packet tracer.
2. Go in network devices tab and add two routers.
3. Then add two switches by entering in the switches tabs.
4. Add two PC's from the end devices tab in the cisco packet tracer.
5. Connect two routers using copper cross cable.
6. Connect router with switches using copper straight-through cable from connections tab.
7. Connect PC's with switches using copper straight-through cable from connection tab.

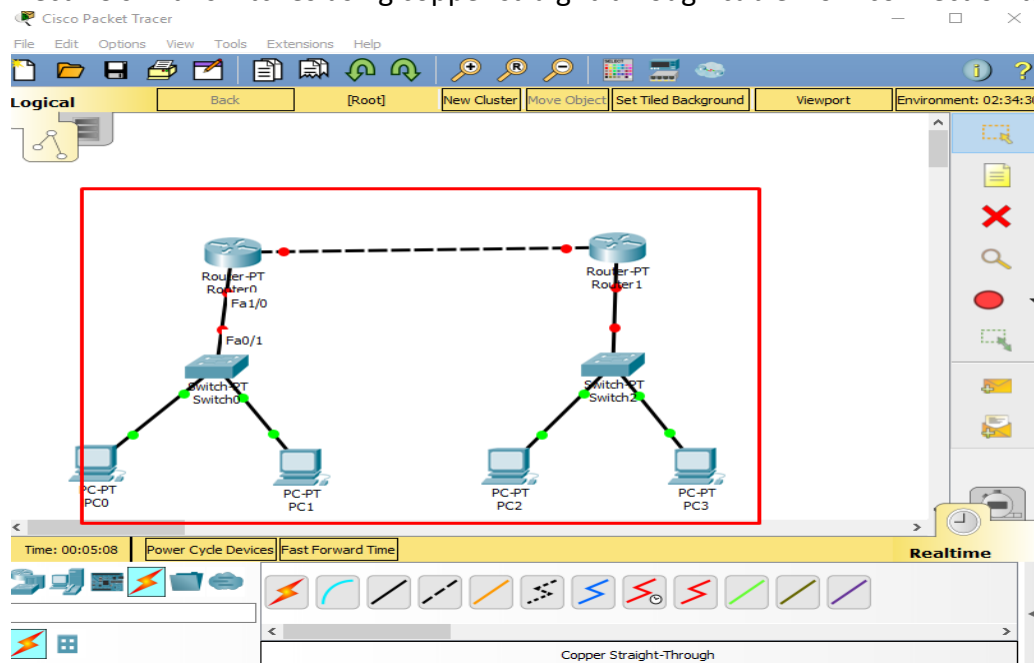


Figure 1: complete topology

8. Click on the router and go in the CLI tab.
9. Press N from the question asked by the router CLI and press enter.
10. Connection lights are red because until now router is not configured.
11. Write **En** or **enable** command to get privileged for router configuration and press enter.
12. Write **config t** or **configure terminal** command for get into configuration mode.
13. Now before of routers, add note on your workspace on both sides of the router indicating IP address, Subnet mask and default gateway, which will look like:

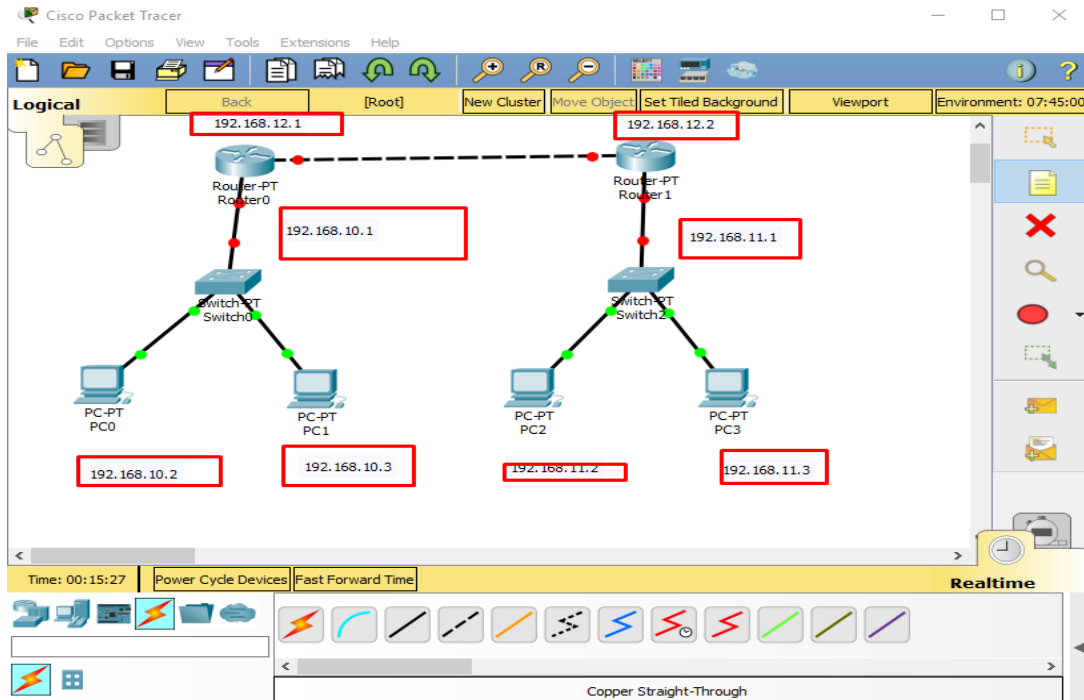


Figure 2: showing IP addresses in the picture.

14. Open CLI and write command **interface fastEthernet 0/0** for telling interface of router you want to configure.
15. Then write command **ip add 192.168.12.1 255.255.255.0** to provide IP address along with subnet mask of the interface.
16. Write command **no shut**, **press enter** and **exit** for doing the state of the interface in upstate, after this red light of this interface should turn to green one.
17. Open CLI and write command **interface fastEthernet 1/0** for telling interface of router you want to configure.
18. Then write command **ip add 192.168.10.1 255.255.255.0** to provide IP address along with subnet mask of the interface.
19. Write command **no shut**, **press enter** and **exit** for doing the state of the interface in upstate, after this red light of this interface should turn to green one.

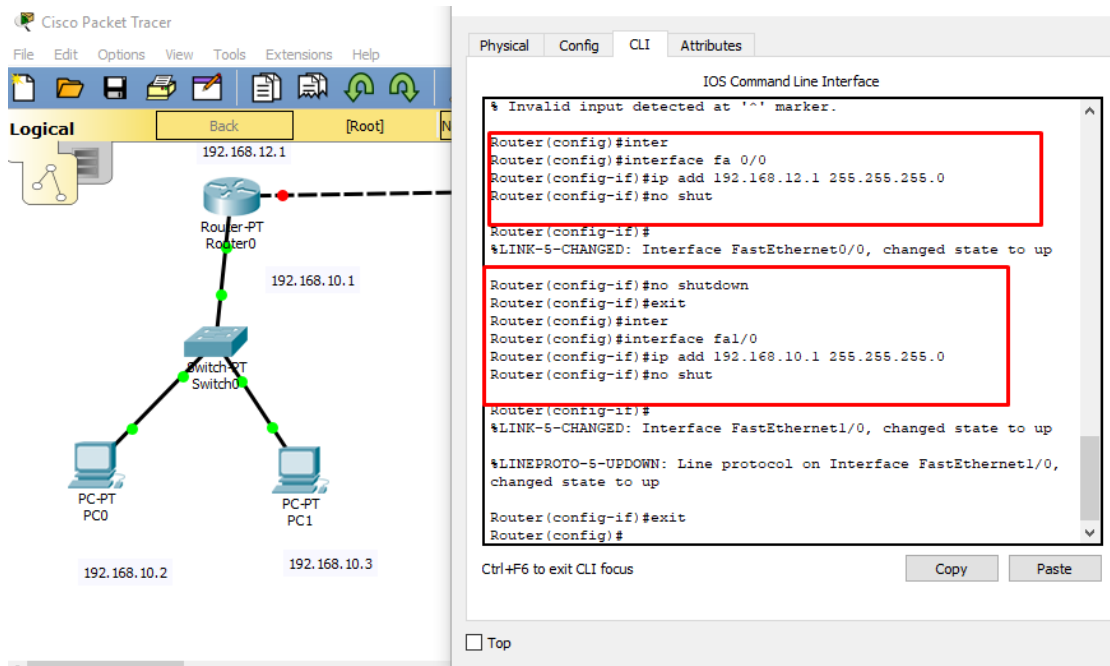


Figure 3: CLI of the router0.

20. In the same way click on router second router and configure it's both interfaces, which are fa 0/0 and fa 1/0.
21. In the same way configure PC's attached to them.
22. The IP address for fa 0/0 192.168.12.2 and for fa 1/0 is 192.168.11.1.

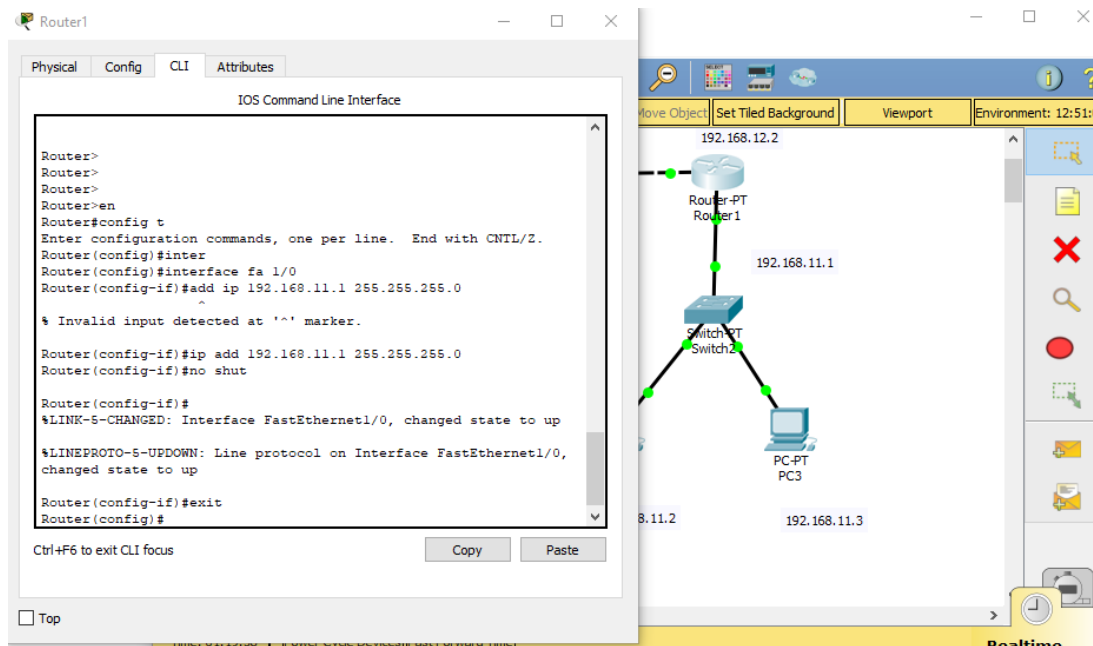


Figure 4: configuration of second router.

23. Add IP addresses, subnet masks and default gateways for both PC's connected with router one.

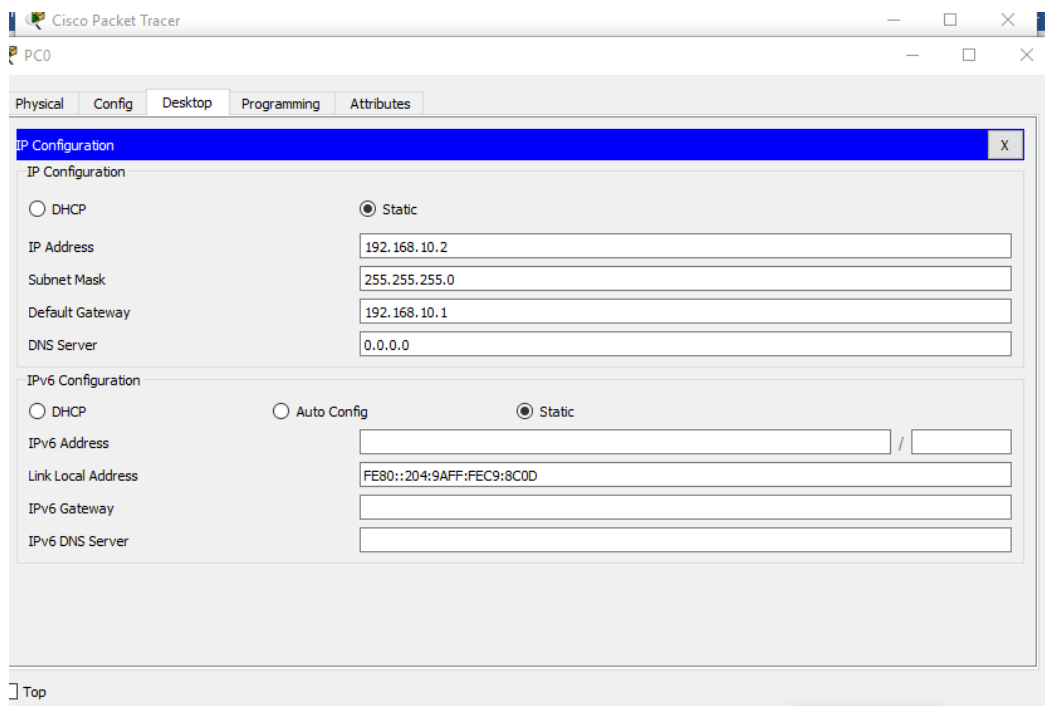


Figure 5: IP address, subnet masks and default gateways of pc connected with router one.

24. Give IP addresses, subnet masks and default gateways for both PC's connected with second router.

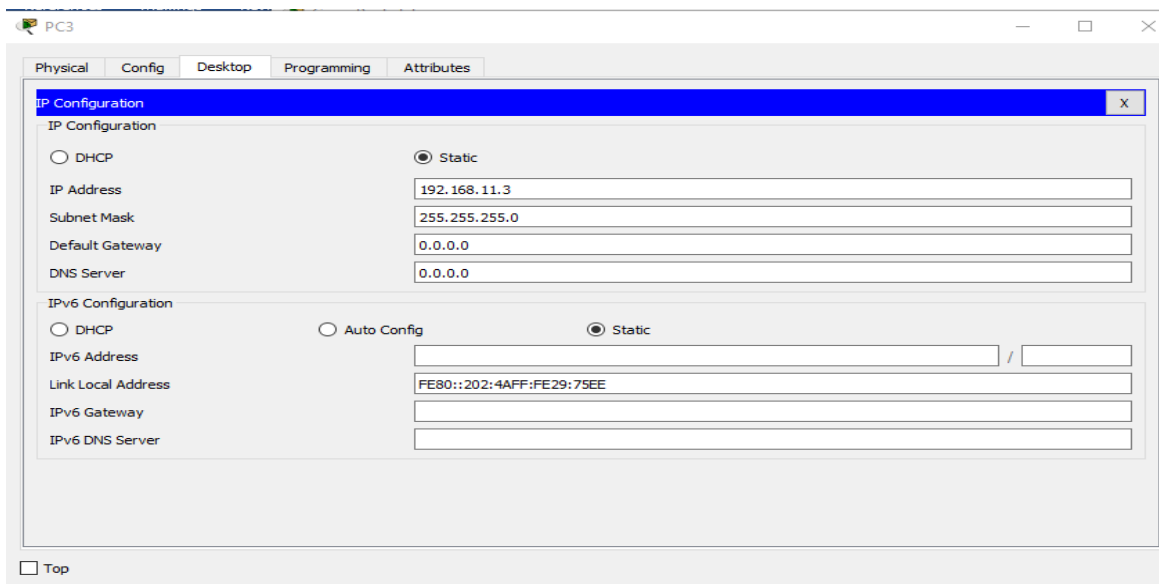


Figure 6: IP address, subnet masks and default gateways of pc connected with second router

25. Now send PDU PC0 to PC1, by clicking on PDU and adding on both PC's, you will see that, this process or transaction will have failed because, these are two different networks.

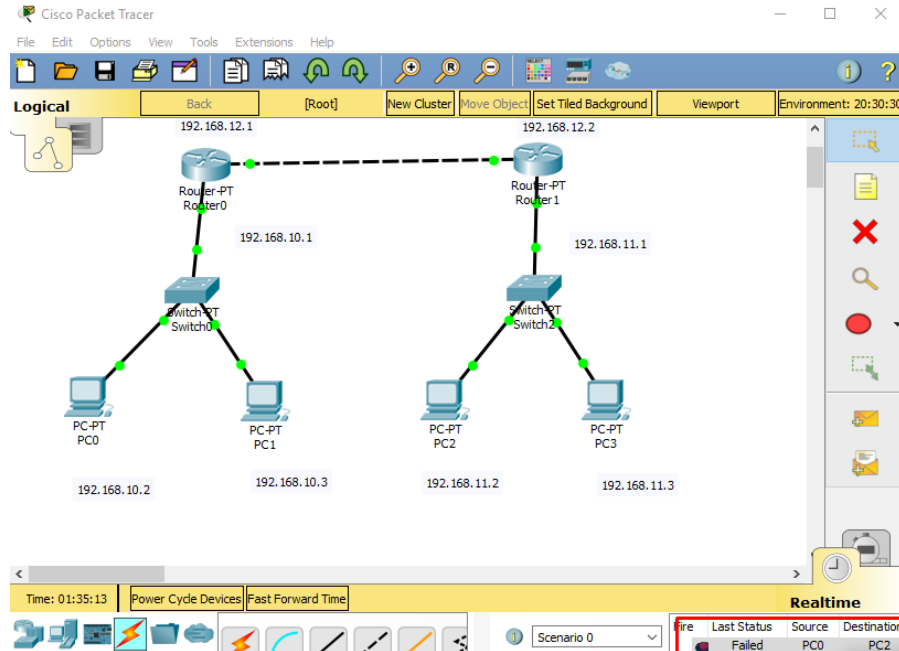


Figure 7: message sending failed.

26. This is failed because on router we do not have any other route or any other way so that it can communicate with other network this thing you can see by clicking on zoom glass and click on router then a window will appear that show the routing table of the router. Which will be looks like that:

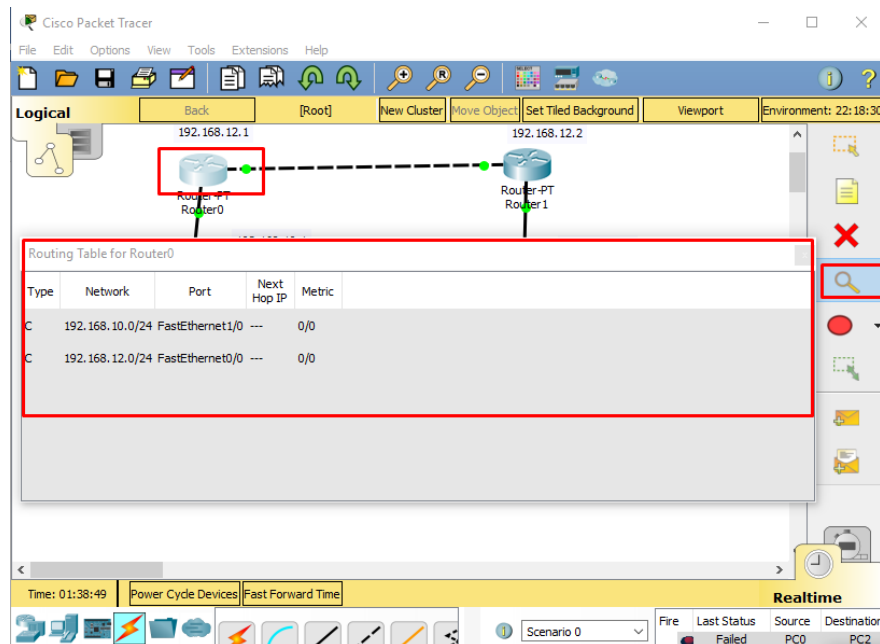


Figure 8: the routing table of the router.

27. For giving it another route and doing static routing we will do by using command: **ip route** "giving route to which you want to connected " " subnet mask " " ip of next hop" . which can be seen in the figure below:

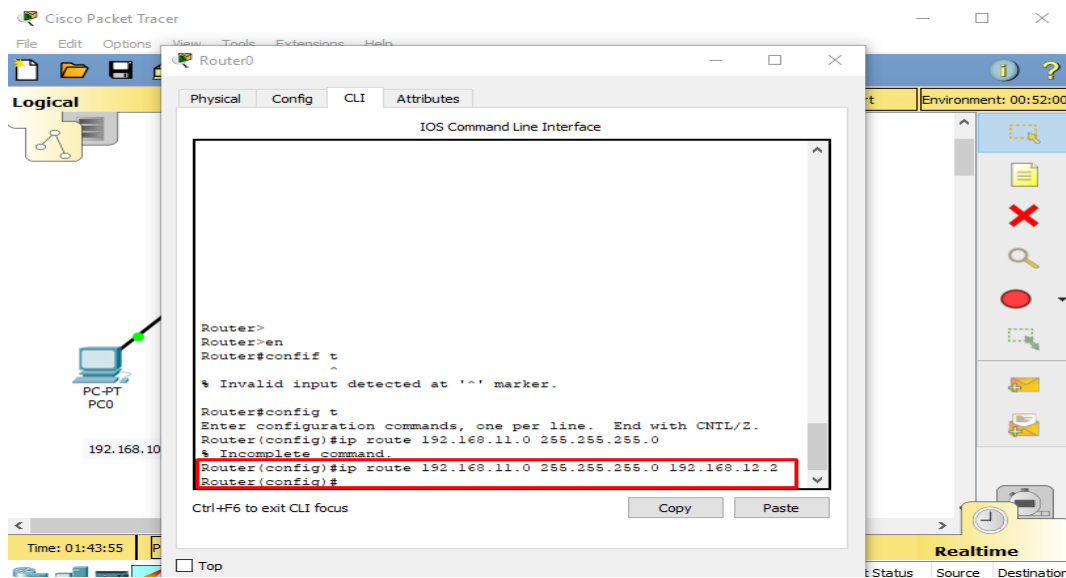


Figure 9: the command on CLI

28. In the same way, give other router the address of next hop and the network to which it wants to connect, tis can be shown in the figure below.

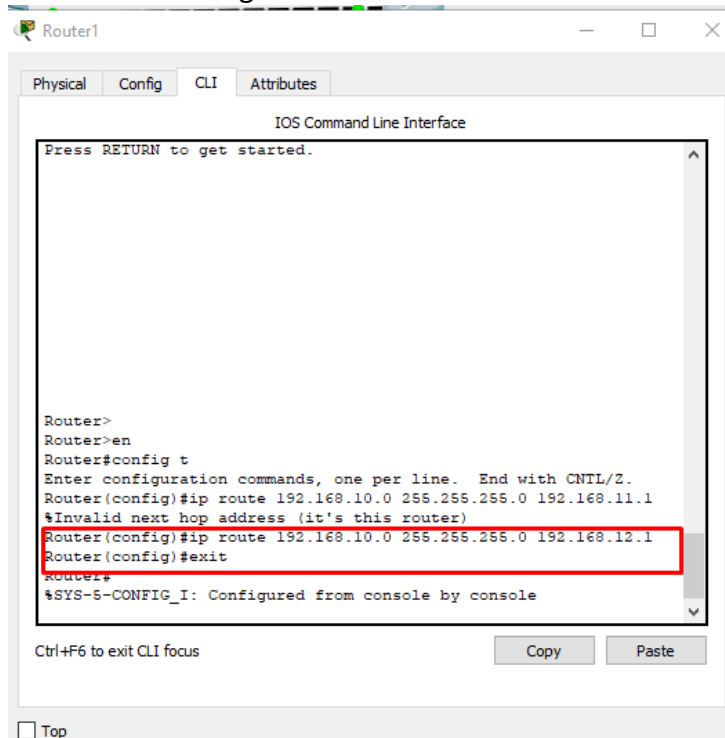


Figure 10: command on second router

29. After doing all these settings, now try to send PDU from PC0 to PC3 and router 0 to router 1 you will see that. All the PDU's will go successfully, which can be seen like that:

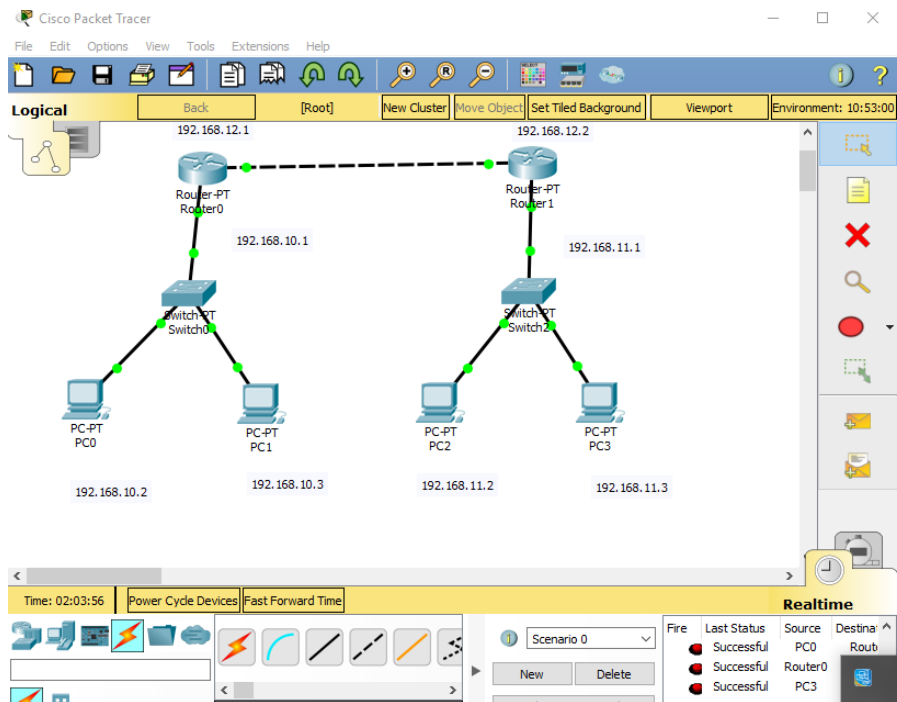


Figure 11: successful message delivery.

5. Practice tasks:

5.1 Task 1:

Construct a network topology which have three routers, three switches, six PC's, each network having two systems and five networks, assign proper hostnames to every router and to every switch, mention IP addresses and network address by using notes option in cisco packet tracer, initialize a network by assigning all IP addresses, subnet masks and default gateways to every PC, configure all routers for its own network as well as do static routing for other respective networks.

5.2 Task 2:

Construct a network that have two routers and six switches, each router is connected with three switches making a tree like structure and each network having four PC's connected to it. , assign proper hostnames to every router and to every switch, mention IP addresses and network address by using notes option in cisco packet tracer, initialize a network by assigning all IP addresses, subnet masks and default gateways to every PC, configure all routers for its own network as well as do static routing for other respective networks. Send PDU's from various path using PC's from all networks, moreover also show the routing table for each router, in which you had static route.