

## Computer Networks Lab

### Spring 2024

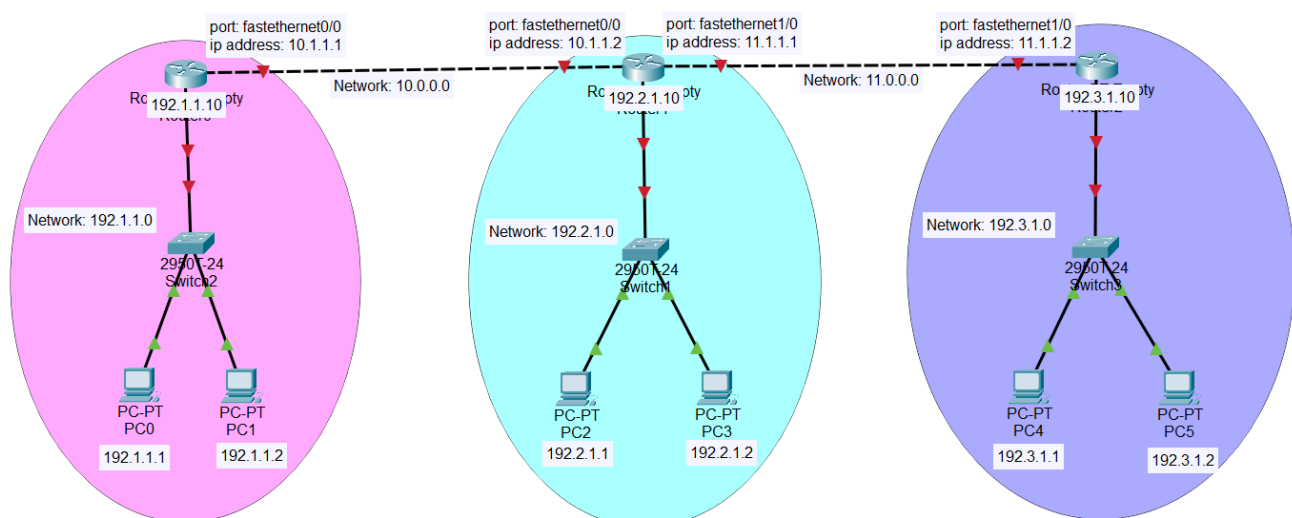
### Week 10

## Static Routing

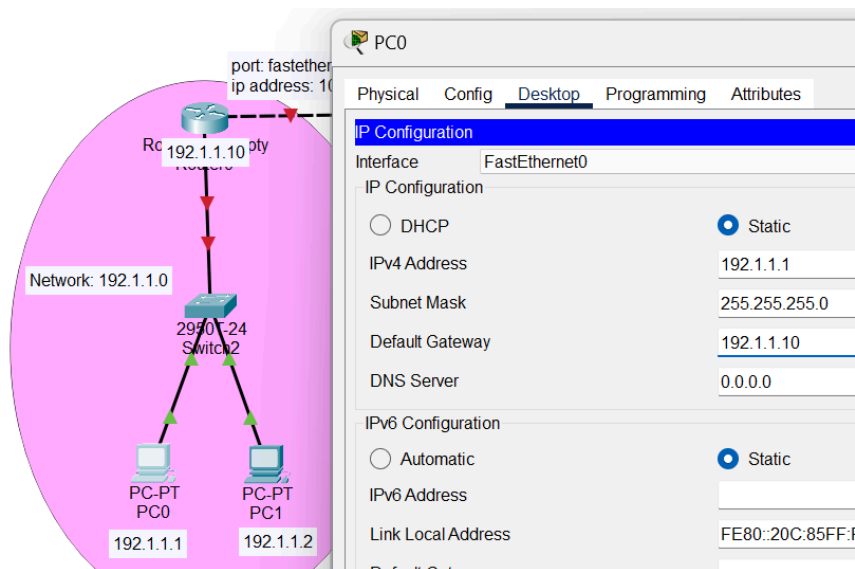
Static routes are used for a variety of reasons and are often used when there is no dynamic route to the destination IP address, or to override the dynamically learned route. By default, static routes have an administrative distance of one, which gives them precedence over routes from any dynamic routing protocol. When the administrative distance is increased to a value greater than the dynamic routing protocol, the static route can be a safety net when dynamic routing fails. For example, Enhanced Interior Gateway Routing Protocol (EIGRP) derived routes have a default administrative distance of 90 for internal routes, and 170 for external routes. To configure a static route that is overridden by an EIGRP route, specify an administrative distance that is greater than 170 for the static route. A static route with a high administrative distance is called a floating static route. It is installed in the routing table only when the dynamically learned route disappears. An example of a floating static route is: ip route 172.31.10.0 255.255.255.0 10.10.10.2 101.

### Walk Through Task:

**Step 1:** Create a topology as such:



**Step 2:** Assign ip addresses to the PC accordingly as mentioned in the image above with the accurate default gateway.



**Step 3:** Once all the systems are assigned with an ip address, set the default gateway.

**For router in network: 192.1.1.0 (pink area):**

**Step 3.1:** go to the router's CLI

**Step 3.2:** type '**en**'

**Step 3.3:** type '**config t**' to access configuration terminal

**Step 3.4:** access the interface connected to the switch in the network (in this case its port 3/0)

**Step 3.5:** add ip address by using the command '**ip address 192.1.1.10 255.255.255.0**'. Here 192.1.1.10 is the ip address, while 255.255.255.0 is the subnet mask.

**Step 3.6:** '**no shutdown**' the interface.

```
Router>
Router>
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastethernet 3/0
Router(config-if)#ip address 192.1.1.10 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet3/0, changed state to up
Router(config-if)#
```

**For router in network: 192.2.1.0 (blue area):**

**Step 3.1:** go to the router's CLI

**Step 3.2:** type '**en**'

**Step 3.3:** type '**config t**' to access configuration terminal

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**Step 3.4:** access the interface connected to the switch in the network (in this case its port 3/0)

**Step 3.5:** add ip address by using the command '**ip address 192.2.1.10 255.255.255.0**'. Here 192.2.1.10 is the ip address, while 255.255.255.0 is the subnet mask.

**Step 3.6:** '**no shutdown**' the interface.

```
Router>
Router>
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastEthernet3/0
Router(config-if)#ip address 192.2.1.10 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet3/0, changed state to up

Router(config-if)#
```

**For router in network: 192.3.1.0 (purple area):**

**Step 3.1:** go to the router's CLI

**Step 3.2:** type '**en**'

**Step 3.3:** type '**config t**' to access configuration terminal

**Step 3.4:** access the interface connected to the switch in the network (in this case its port 3/0)

**Step 3.5:** add ip address by using the command '**ip address 192.3.1.10 255.255.255.0**'. Here 192.3.1.10 is the ip address, while 255.255.255.0 is the subnet mask.

**Step 3.6:** '**no shutdown**' the interface.







```
Router>
Router>
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastEthernet3/0
Router(config-if)#ip address 192.3.1.10 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet3/0, changed state to up

Router(config-if)#
```

**Step 4:** Once all the networks with the PCs connected are all set, send PDUs to the respective router to check the correctness of the topology.

Realtime Simulation										
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	Router0	ICMP		0.000	N	0	(edit)	(delete)
	Successful	PC2	Router1	ICMP		0.000	N	1	(edit)	(delete)
	Successful	PC4	Router2	ICMP		0.000	N	2	(edit)	(delete)

**Step 5:** Set up the routes between the routers of the area in pink and blue

**For the router in the area in pink:**

**Step 5.1:** go to the router's CLI

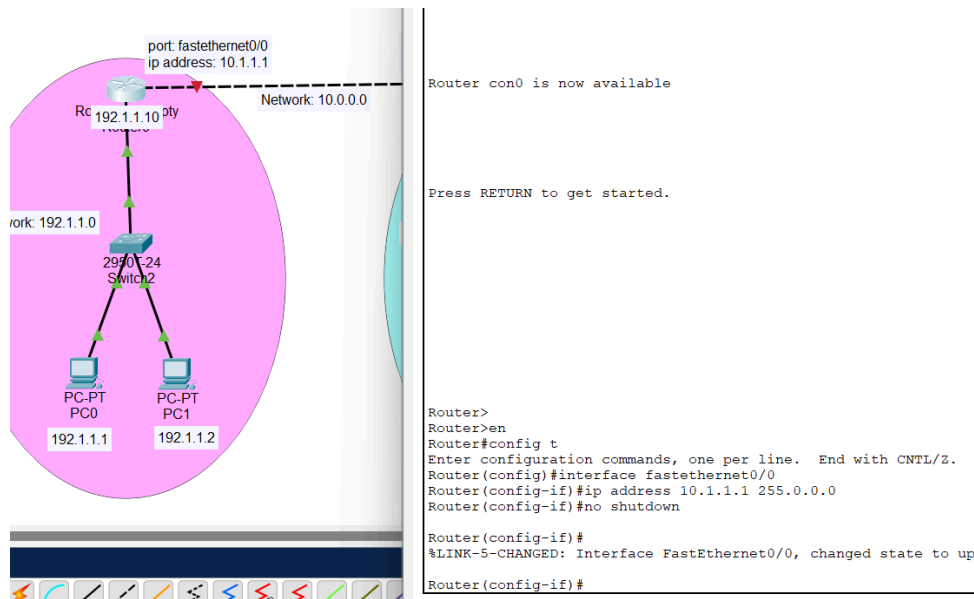
**Step 5.2:** type '**en**'

**Step 5.3:** type '**config t**' to access configuration terminal

**Step 5.4:** access the interface connected to the switch in the network (in this case its port 3/0)

**Step 5.5:** add ip address by using the command '**ip address 10.1.1.1 255.0.0.0**'. Here 10.1.1.1 is the ip address, while 255.0.0.0 is the subnet mask.

**Step 5.6:** '**no shutdown**' the interface.



**For the router in the area in blue:**

**Step 5.1:** go to the router's CLI

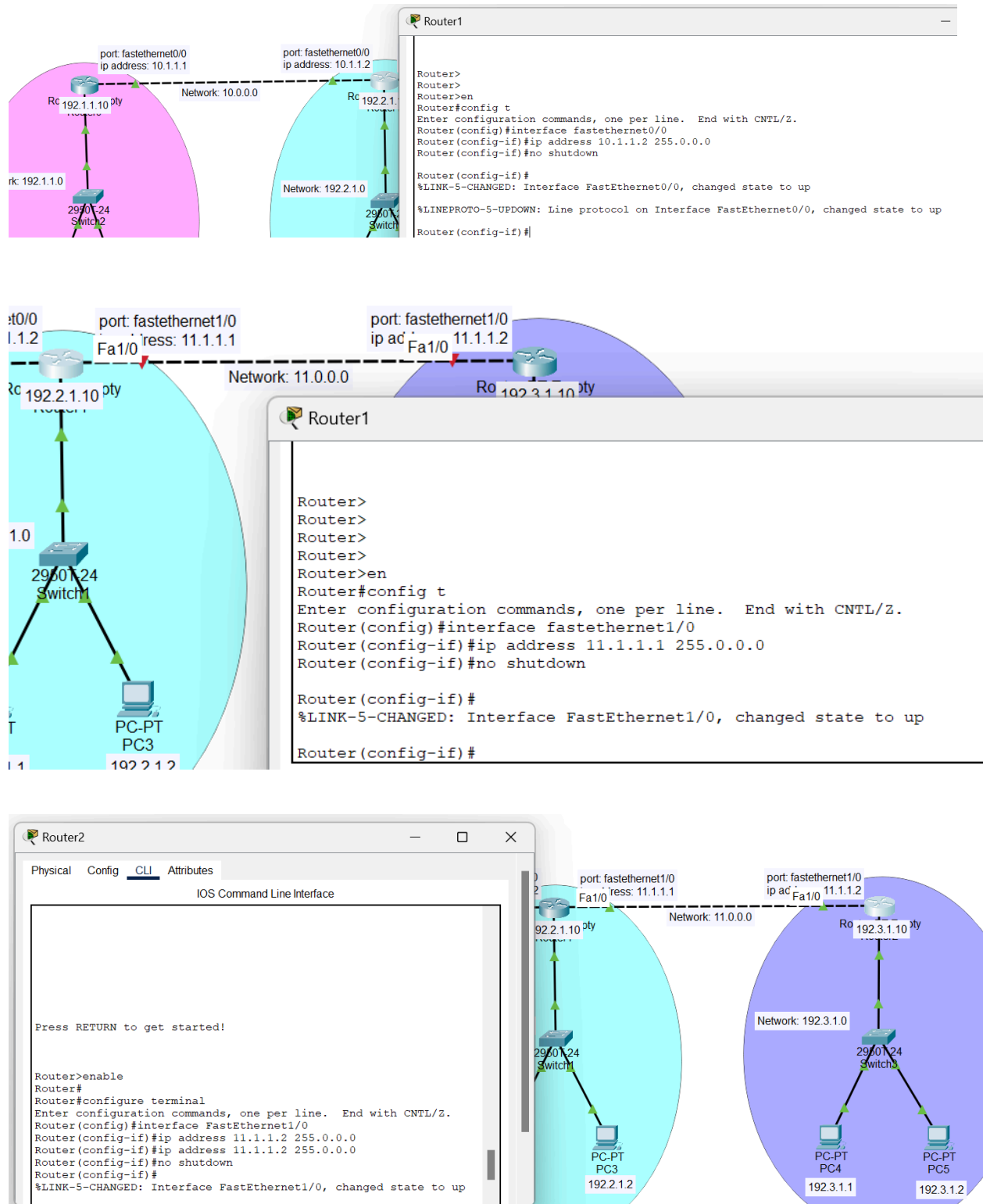
**Step 5.2:** type '**en**'

**Step 5.3:** type '**config t**' to access configuration terminal

**Step 5.4:** access the interface connected to the switch in the network (in this case its port 3/0)

**Step 5.5:** add ip address by using the command '**ip address 10.1.1.2 255.0.0.0**'. Here 10.1.1.1 is the ip address, while 255.0.0.0 is the subnet mask.

**Step 5.6:** '**no shutdown**' the interface.



Step 6: Set up the static routing

**Connecting network 192.1.1.0 (area in pink) with others networks**

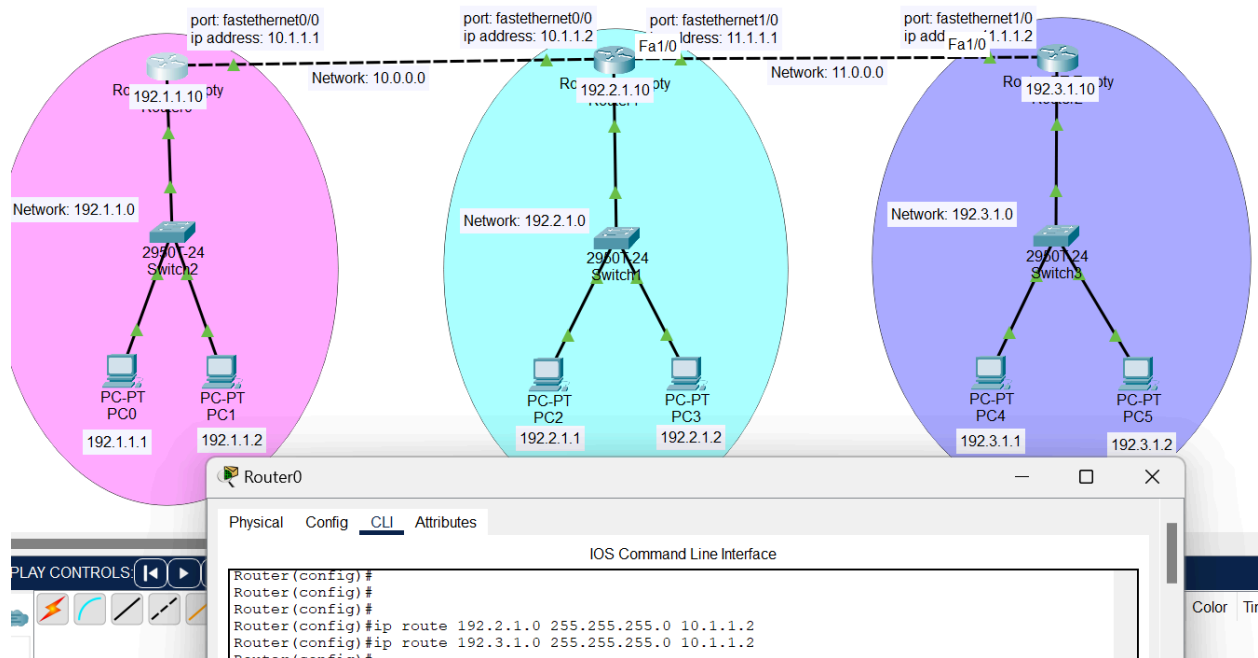
**Step 6.1:** use the command to add the destination network from that router to the next one

**‘Ip route destination\_network destination\_subnetmask next\_hop’**

In this case, we are required to send packets from the area in pink to the other two areas, we will add these command on router0 (in area pink)

**‘Ip route 192.2.1.0 255.255.255.0 10.1.1.2’** and **‘Ip route 192.3.1.0 255.255.255.0 10.1.1.2’**

*Note that next hop will be the interface on the next router the packets will go to.*



### Connecting network 192.2.1.0 (area in blue) with others networks

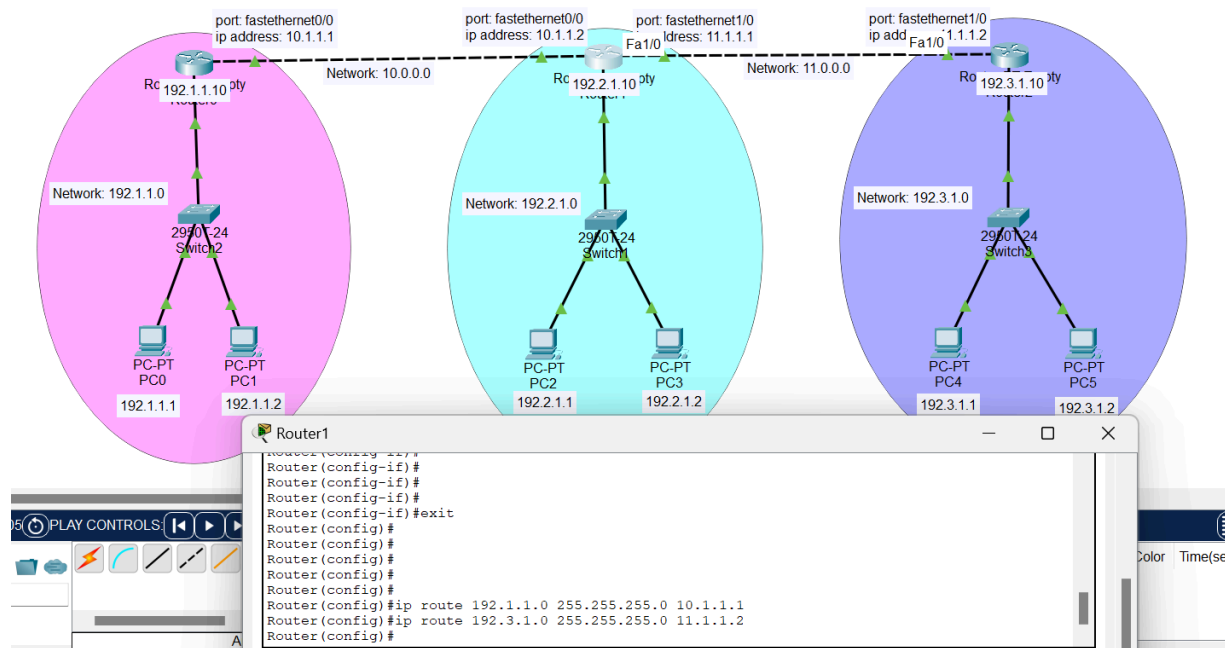
**Step 6.1:** use the command to add the destination network from that router to the next one

**‘Ip route destination\_network destination\_subnetmask next\_hop’**

In this case, we are required to send packets from the area in pink to the other two areas, we will add these command on router0 (in area blue)

**‘Ip route 192.1.1.0 255.255.255.0 10.1.1.1’** and **‘Ip route 192.3.1.0 255.255.255.0 11.1.1.2’**

*Note that next hop will be the interface on the next router the packets will go to.*



### Connecting network 192.2.1.0 (area in blue) with others networks

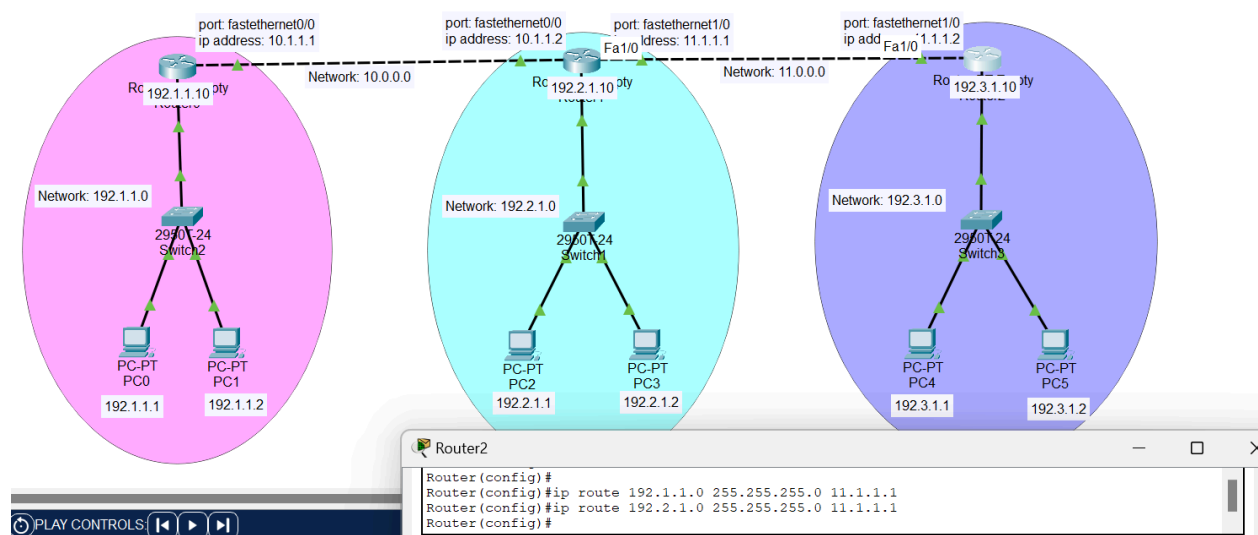
**Step 6.1:** use the command to add the destination network from that router to the next one

**‘Ip route destination\_network destination\_subnetmask next\_hop’**

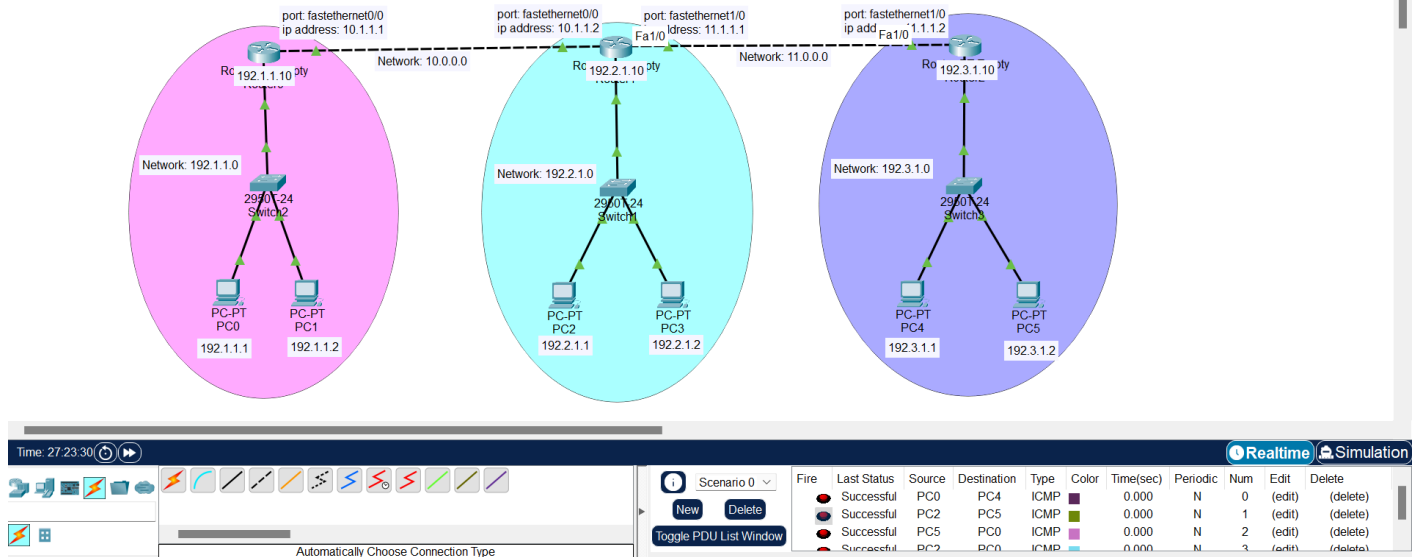
In this case, we are required to send packets from the area in pink to the other two areas, we will add these command on router0 (in area purple)

**‘Ip route 192.1.1.0 255.255.255.0 10.1.1.1’ and ‘Ip route 192.3.1.0 255.255.255.0 11.1.1.2’**

*Note that next hop will be the interface on the next router the packets will go to.*



**Step 7:** Once all set, send PDUs to the respective router to check the correctness of the topology.



## Practice tasks

### 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

### **Submission Guidelines:**

- Submit the .pkt file , renamed to your roll number
- Submit a document with screenshots of all the steps