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CN LAB ASSIGNMENT WEEK 6-

1)a) What is OSPF routing protocol?

Open Shortest Path First (OSPF) is a link-state routing protocol that is used to find the best path between the source and the destination router using its own Shortest Path First). OSPF is developed by Internet Engineering Task Force (IETF) as one of the Interior Gateway Protocol (IGP), i.e, the protocol which aims at moving the packet within a large autonomous system or routing domain. It is a network layer protocol which works on protocol number 89 and uses AD value 110. OSPF uses multicast address 224.0.0.5 for normal communication and 224.0.0.6 for update to designated router(DR)/Backup Designated Router (BDR).

OSPF (Open Shortest Path First) is a link state routing protocol. Because it is an open standard, it is implemented by a variety of network vendors. OSPF will run on most routers that doesn't necessarily have to be Cisco routers (unlike EIGRP which can be run only on Cisco routers).

Here are the most important features of OSPF:

- a classless routing protocol
- supports VLSM, CIDR, manual route summarization, equal cost load balancing
- incremental updates are supported

- uses only one parameter as the metric – the interface cost.
- the administrative distance of OSPF routes is, by default, 110.
- uses multicast addresses 224.0.0.5 and 224.0.0.6 for routing updates.

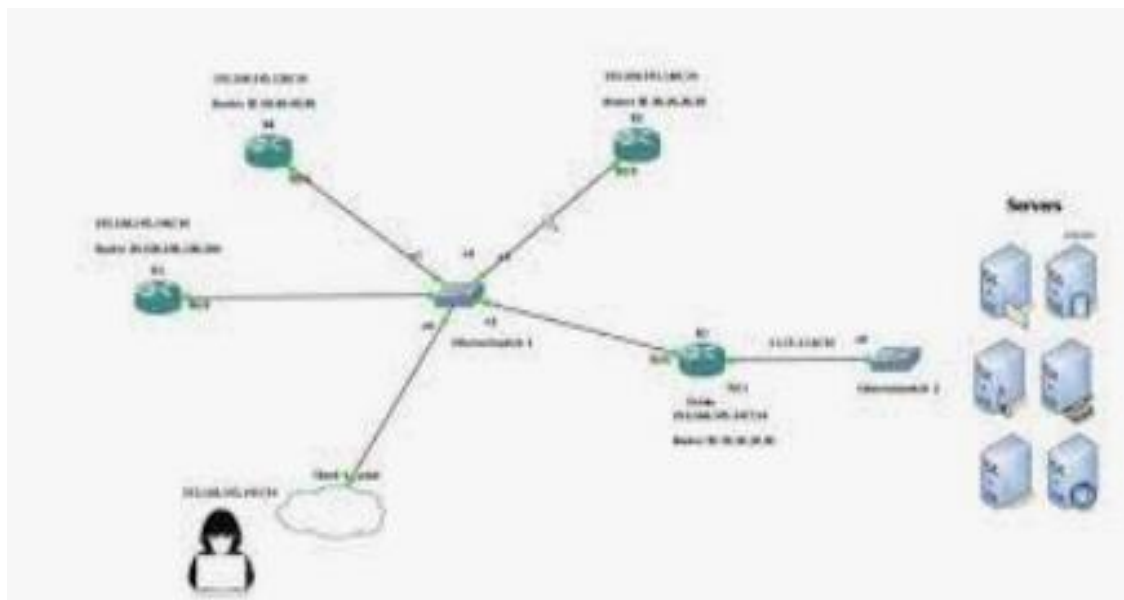
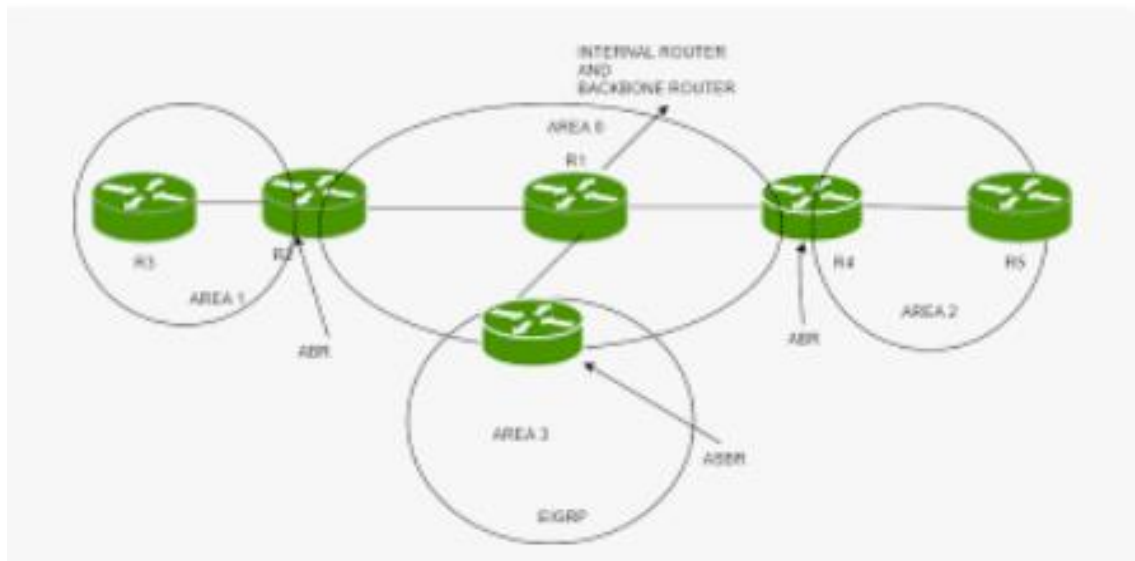
Routers running OSPF have to establish neighbour relationships before exchanging routes. Because OSPF is a link state routing protocol, neighbours don't exchange routing tables. Instead, they exchange information about network topology. Each OSPF router then runs SPF or Dijkstra algorithm to calculate the best routes and adds those to the routing table. Because each router knows the entire topology of a network, the chance for a routing loop to occur is minimal.

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

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

Step 2: The second step is to exchange database information. After becoming the neighbours, 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.



b) How to configure OSPF Configuration in CISCO PACKET TRACER?

STEPS-

1) Place two routers on the Cisco Packet Tracer Screen.



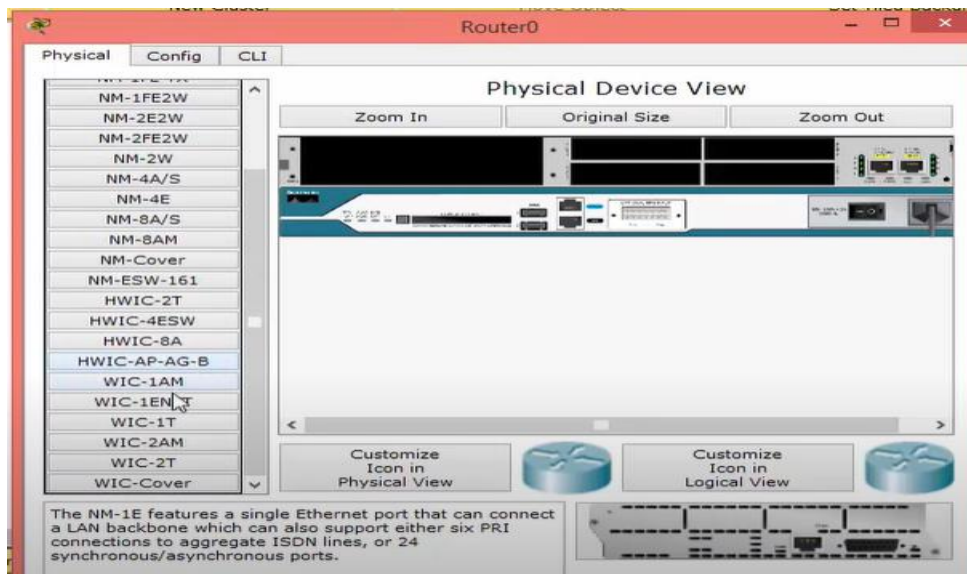
2)Place two switches below the routers.



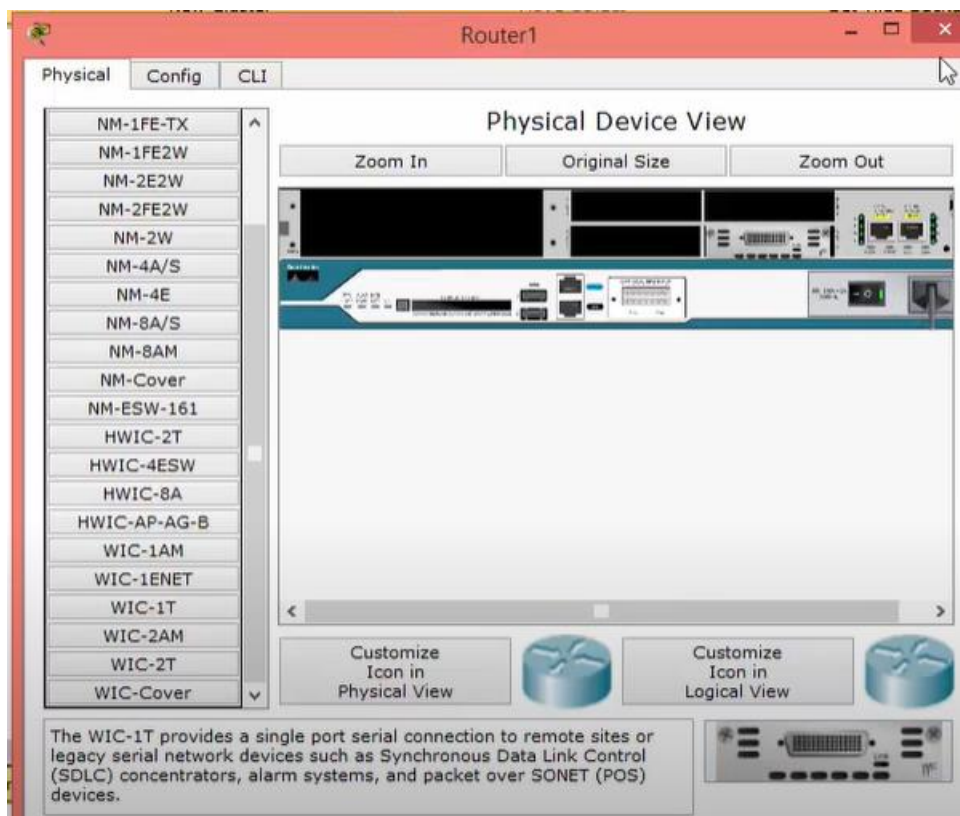
3)Place 2 PC's each below the switches.



4) Check the configuration of Router0 and choose the appropriate configuration.



5) Check the configuration of Router1 and choose the appropriate configuration.



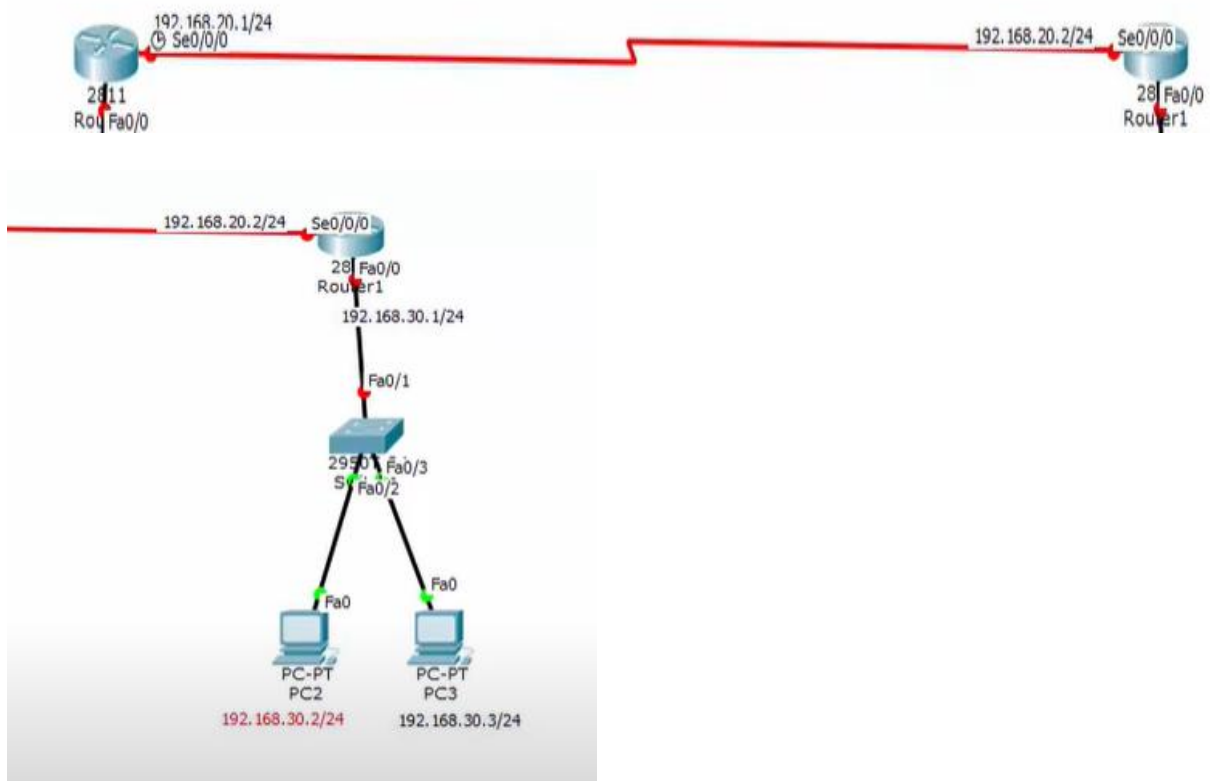
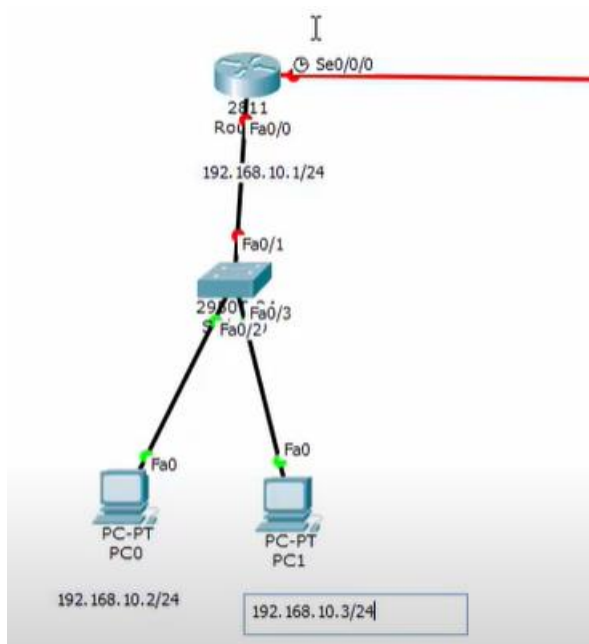
6) Connect both the routers using the proper cable.



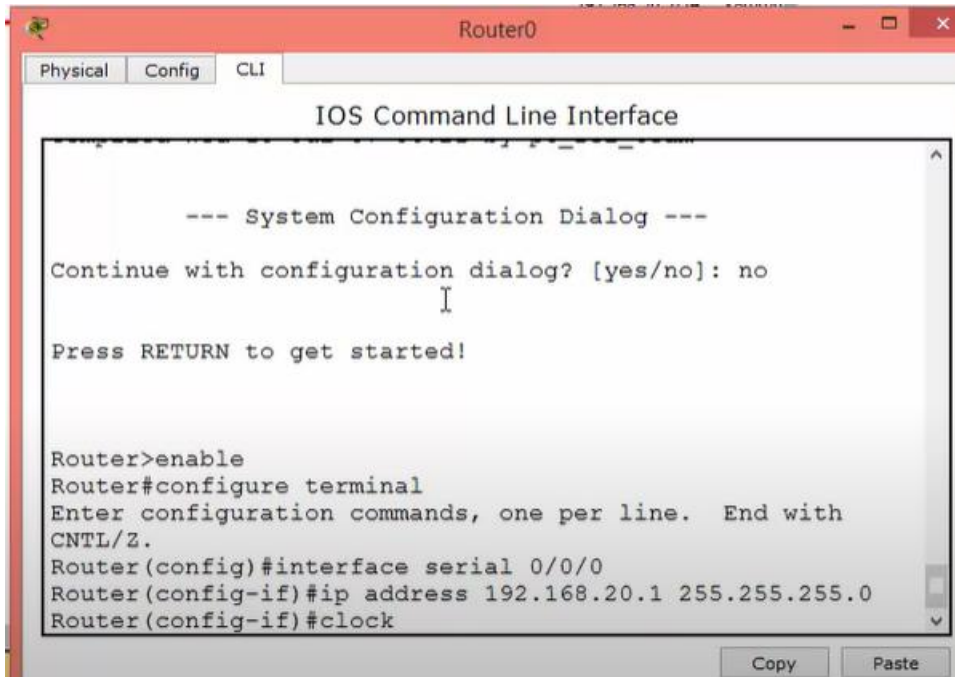
7) Connect the router to the switch and PC's using the appropriate Ethernet port.



8) Label the router, switch and PC's with their corresponding IP Addresses.



9) Open the Command Line Interface of Router0 and enter the following commands.

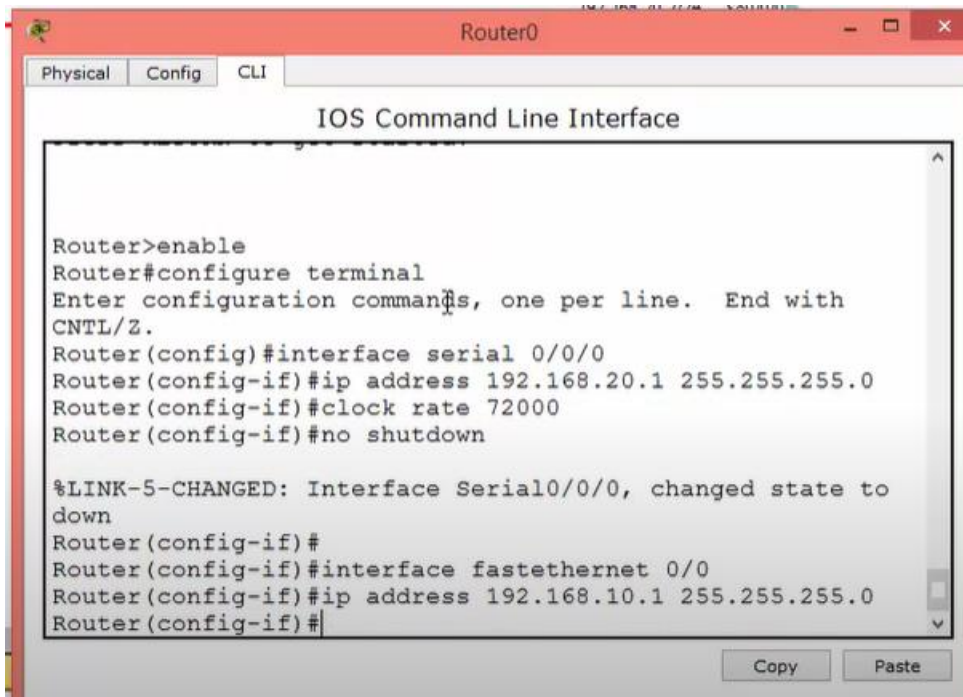


The screenshot shows the 'Router0' window with the 'CLI' tab selected. The title bar is red. The main area is titled 'IOS Command Line Interface'. It displays a 'System Configuration Dialog' with the prompt 'Continue with configuration dialog? [yes/no]: no' and a cursor. Below this, it says 'Press RETURN to get started!'. The user has entered 'enable', changing the prompt to 'Router#'. Then 'configure terminal' was entered, changing the prompt to 'Router(config)#'. The user then entered 'interface serial 0/0/0', 'ip address 192.168.20.1 255.255.255.0', and 'clock'.

```
Router0
Physical Config CLI
IOS Command Line Interface

--- System Configuration Dialog ---
Continue with configuration dialog? [yes/no]: no
Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with
CNTL/Z.
Router(config)#interface serial 0/0/0
Router(config-if)#ip address 192.168.20.1 255.255.255.0
Router(config-if)#clock
```



The screenshot shows the 'Router0' window with the 'CLI' tab selected. The title bar is red. The main area is titled 'IOS Command Line Interface'. The user continues the configuration from the previous state. They enter 'no shutdown', which triggers a system message: '%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down'. Then they enter 'interface fastethernet 0/0', 'ip address 192.168.10.1 255.255.255.0', and the prompt returns to 'Router(config-if)#'.

```
Router0
Physical Config CLI
IOS Command Line Interface

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with
CNTL/Z.
Router(config)#interface serial 0/0/0
Router(config-if)#ip address 192.168.20.1 255.255.255.0
Router(config-if)#clock rate 72000
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to
down
Router(config-if)#
Router(config-if)#interface fastethernet 0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#
```


Router0

Physical Config CLI

IOS Command Line Interface

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

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)#
```

Copy Paste

Router0

Physical Config CLI

IOS Command Line Interface

```
Router(config-if)#
Router(config-if)#interface fastethernet 0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shutdown

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)#router ospf 1
Router(config-router)#network 192.168.10.0 0.0.0.255 area
0
Router(config-router)#network 192.168.20.0 0.0.0.255 area
0
```

Copy Paste

Router0

Physical Config CLI

IOS Command Line Interface

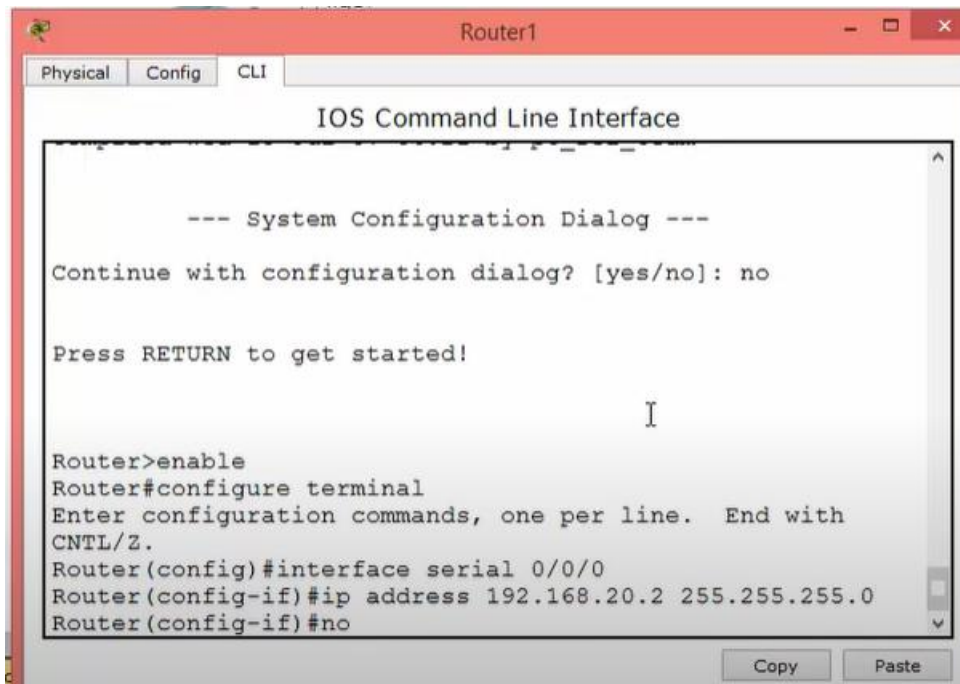
```
%LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#router ospf 1
Router(config-router)#network 192.168.10.0 0.0.0.255 area
0
Router(config-router)#network 192.168.20.0 0.0.0.255 area
0
Router(config-router)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console

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

Copy Paste

10) Similarly, open the Command Line Interface of Router1 and enter the commands.



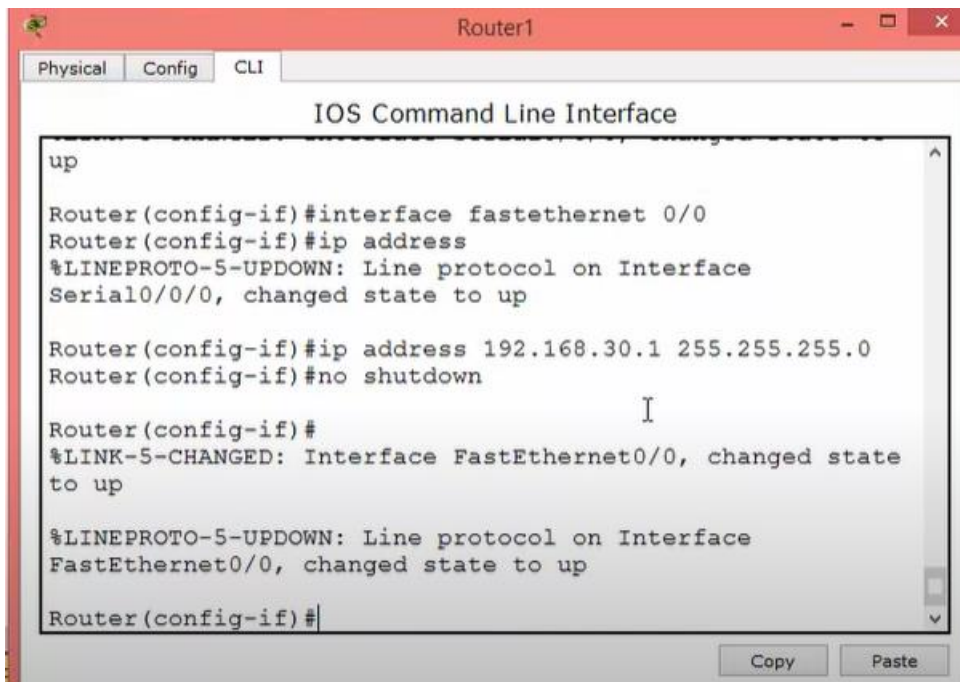
The screenshot shows the 'Router1' window with the 'CLI' tab selected. The title bar reads 'Router1'. Below the tabs, the text 'IOS Command Line Interface' is displayed. The main terminal area shows the following text: '--- System Configuration Dialog ---', 'Continue with configuration dialog? [yes/no]: no', 'Press RETURN to get started!', and a cursor 'I'. Below this, the commands entered are: 'Router>enable', 'Router#configure terminal', 'Enter configuration commands, one per line. End with CNTL/Z.', 'Router(config)#interface serial 0/0/0', 'Router(config-if)#ip address 192.168.20.2 255.255.255.0', and 'Router(config-if)#no'. At the bottom right, there are 'Copy' and 'Paste' buttons.

```
Router1
Physical Config CLI
IOS Command Line Interface

--- System Configuration Dialog ---
Continue with configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with
CNTL/Z.
Router(config)#interface serial 0/0/0
Router(config-if)#ip address 192.168.20.2 255.255.255.0
Router(config-if)#no
```



The screenshot shows the 'Router1' window with the 'CLI' tab selected. The title bar reads 'Router1'. Below the tabs, the text 'IOS Command Line Interface' is displayed. The main terminal area shows the following text: 'up', 'Router(config-if)#interface fastethernet 0/0', 'Router(config-if)#ip address', '%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up', 'Router(config-if)#ip address 192.168.30.1 255.255.255.0', 'Router(config-if)#no shutdown', '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', and 'Router(config-if)#'. At the bottom right, there are 'Copy' and 'Paste' buttons.

```
Router1
Physical Config CLI
IOS Command Line Interface

up
Router(config-if)#interface fastethernet 0/0
Router(config-if)#ip address
%LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial0/0/0, changed state to up

Router(config-if)#ip address 192.168.30.1 255.255.255.0
Router(config-if)#no shutdown

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)#
```



The screenshot shows the Router1 CLI window with the 'CLI' tab selected. The title bar is 'Router1'. The main window is titled 'IOS Command Line Interface'. The command history shows the following sequence of commands and system messages:

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#
Router(config)#router ospf 1
Router(config-router)#network 192.168.30.0 0.0.0.255 area
0
Router(config-router)#network 192.168.20.0 0.0.0.255 area
0
Router(config-router)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console

00:05:16: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.20.1 on
Serial0/0/0 from LOADING to FULL, Loading Done
```

At the bottom of the window, there are 'Copy' and 'Paste' buttons.



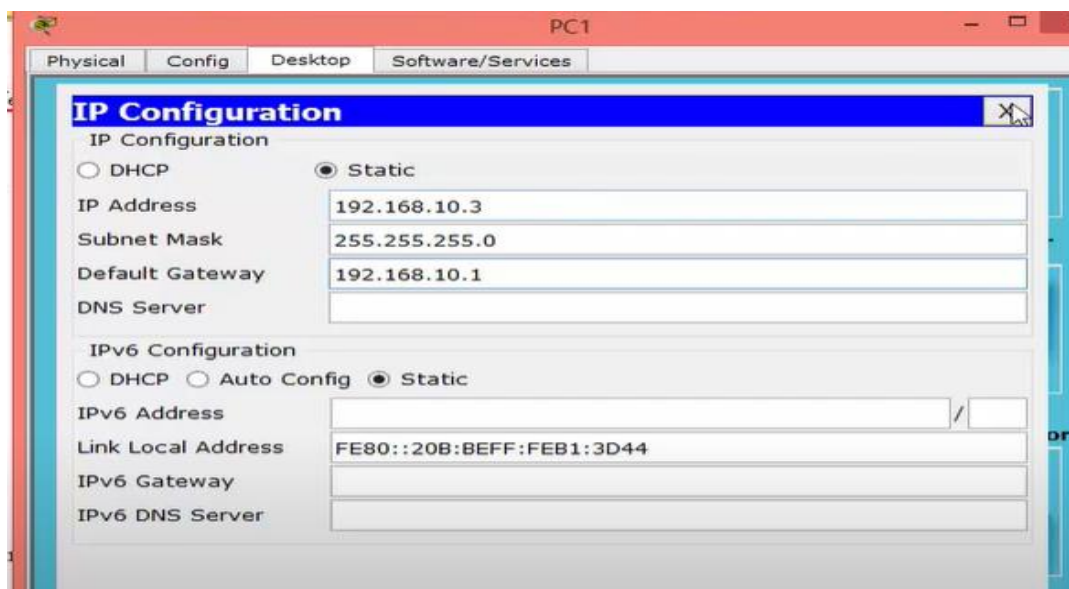
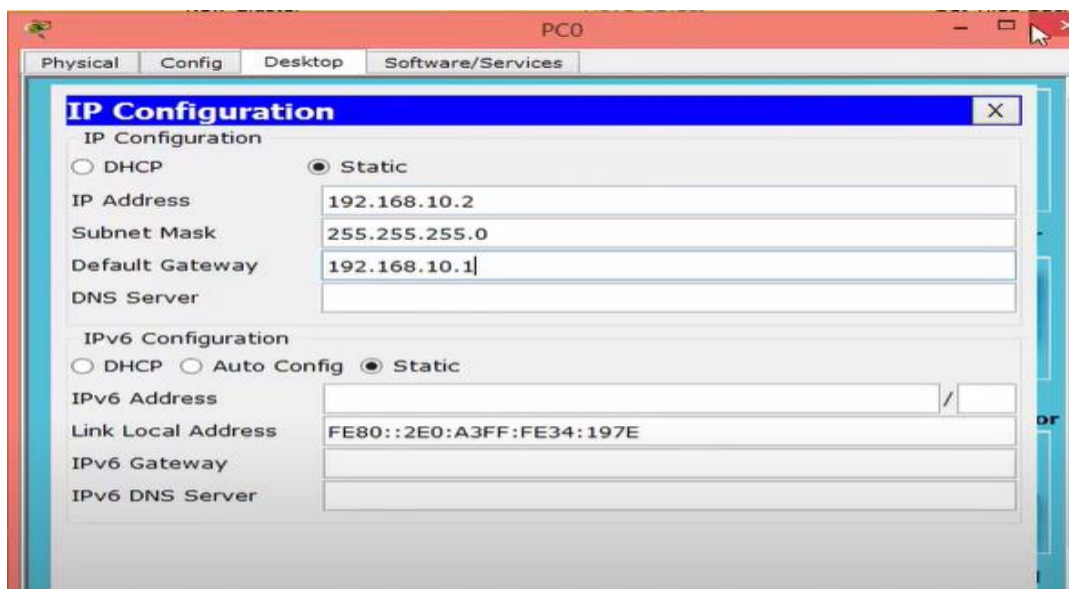
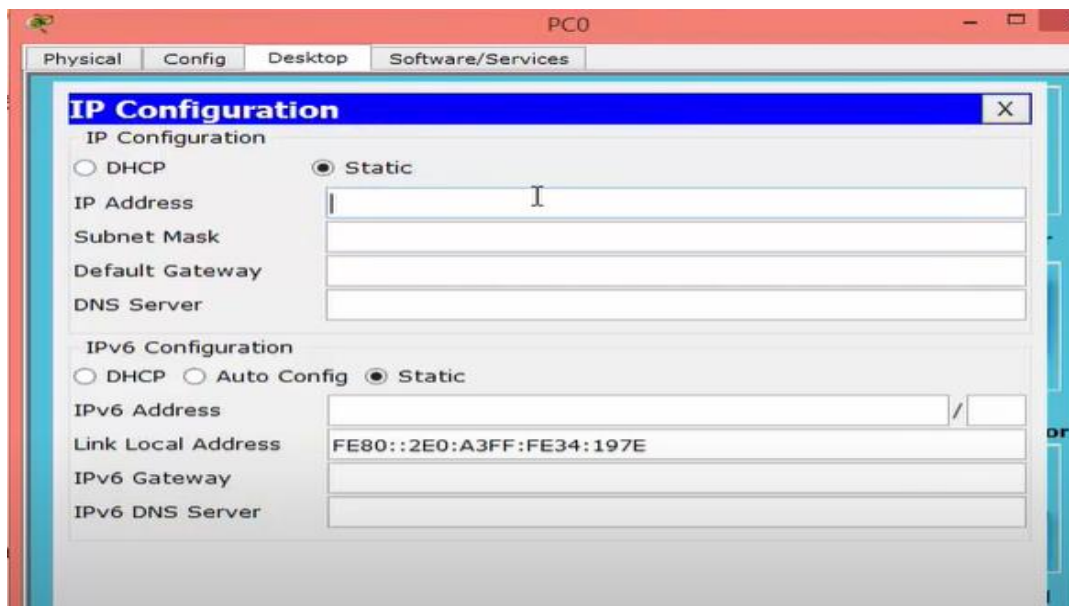
The screenshot shows the Router1 CLI window with the 'CLI' tab selected. The title bar is 'Router1'. The main window is titled 'IOS Command Line Interface'. The command history shows the following sequence of commands and system messages:

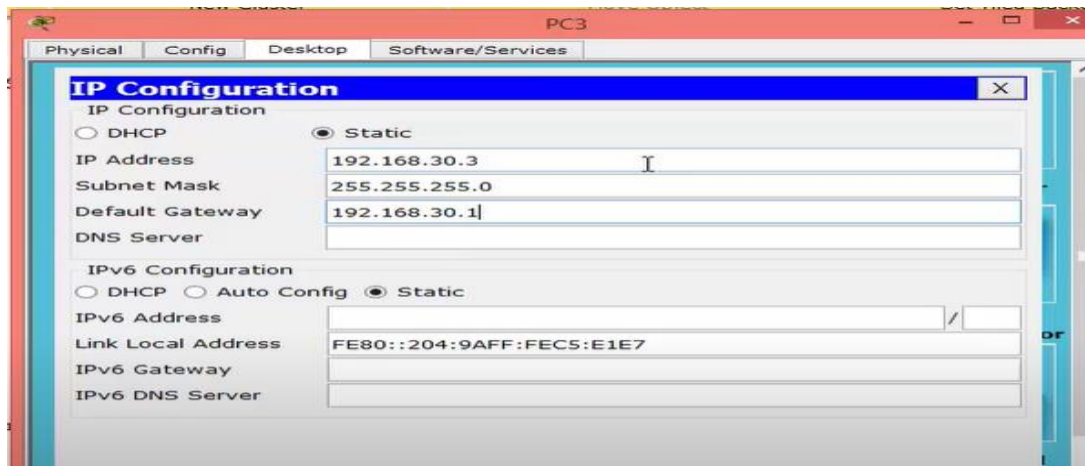
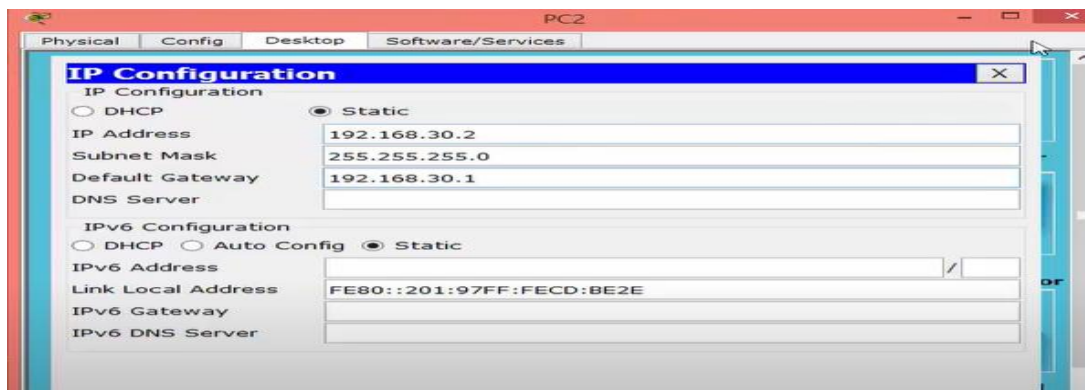
```
Router(config)#router ospf 1
Router(config-router)#network 192.168.30.0 0.0.0.255 area
0
Router(config-router)#network 192.168.20.0 0.0.0.255 area
0
Router(config-router)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console

00:05:16: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.20.1 on
Serial0/0/0 from LOADING to FULL, Loading Done
^Z
Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router#
Router#
```

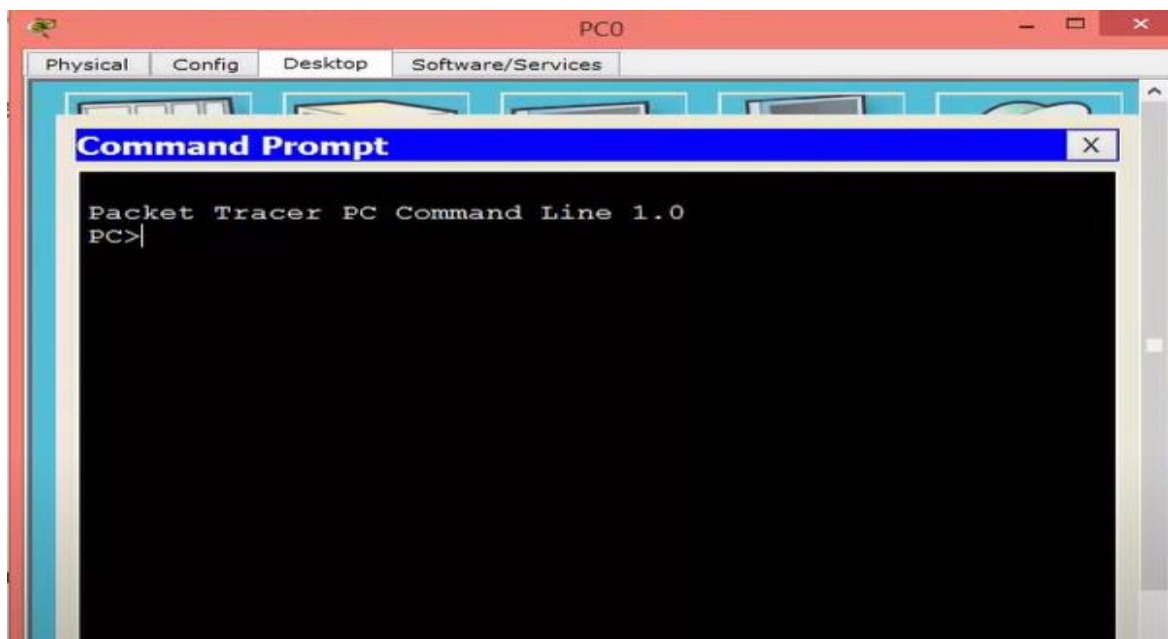
At the bottom of the window, there are 'Copy' and 'Paste' buttons.

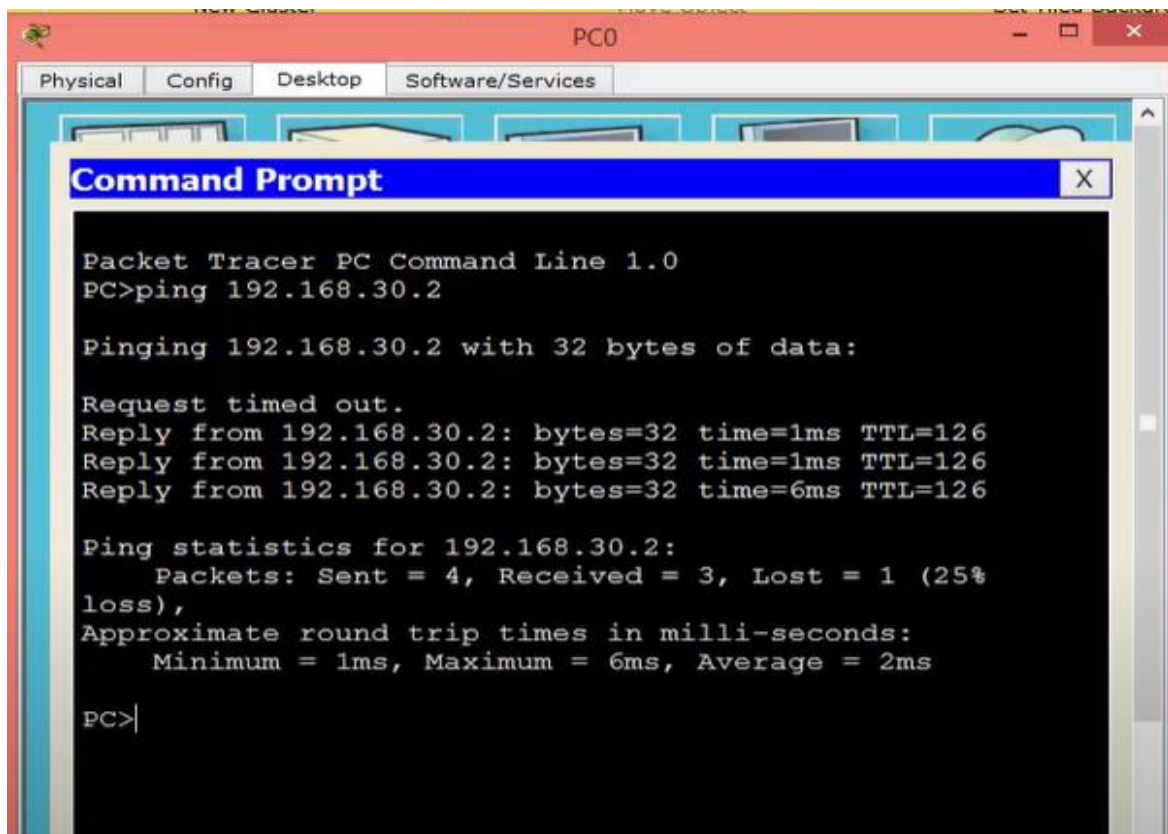
11) Open the IP Configuration of the PC's and assign them the appropriate IP Address as given.



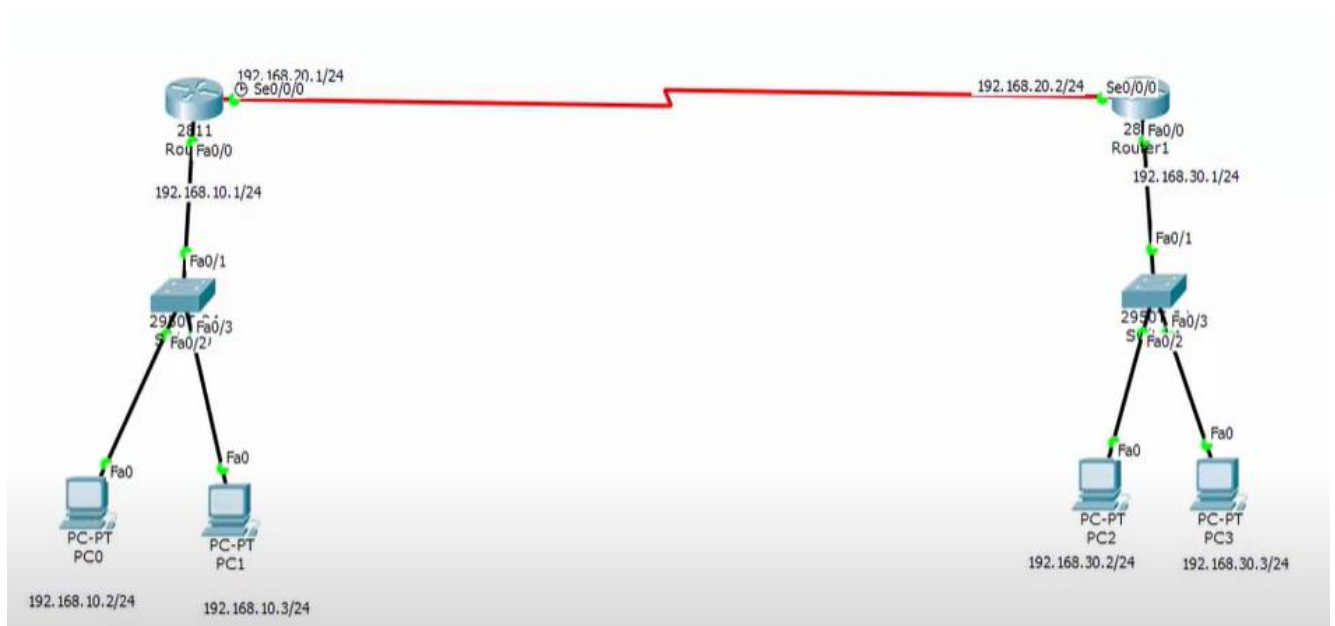


12) Open the Command Prompt of PC and use the Ping command to setup the OSPF connection.





13) Add a Simple PDU to each of the PC's to setup the connection and turn on the simulation.



The simulation is successful and the OSPF Protocol is configured using Cisco Packet Tracer.

-----X-----
Thank you!