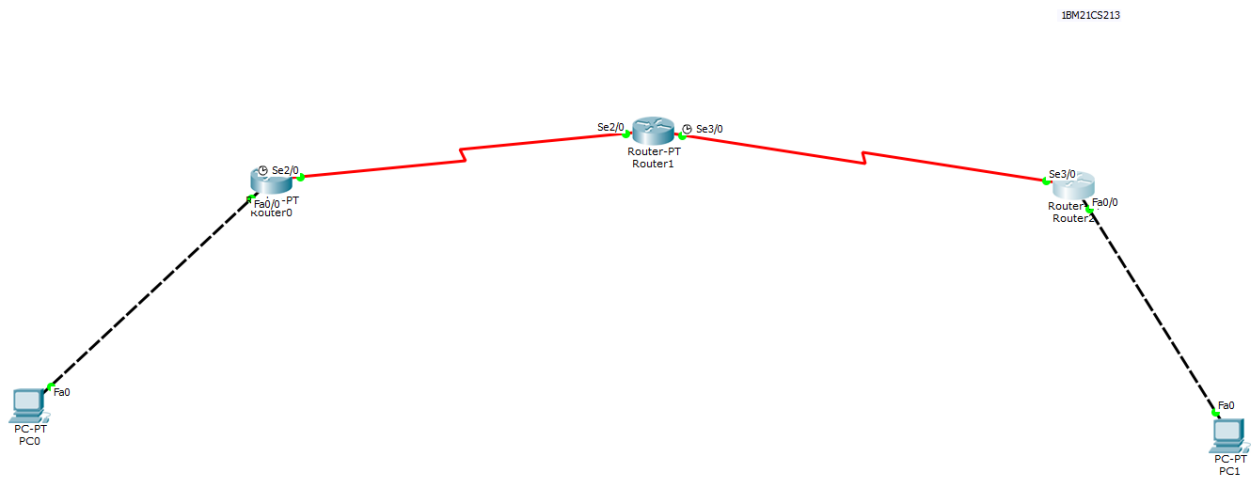


WEEK 6

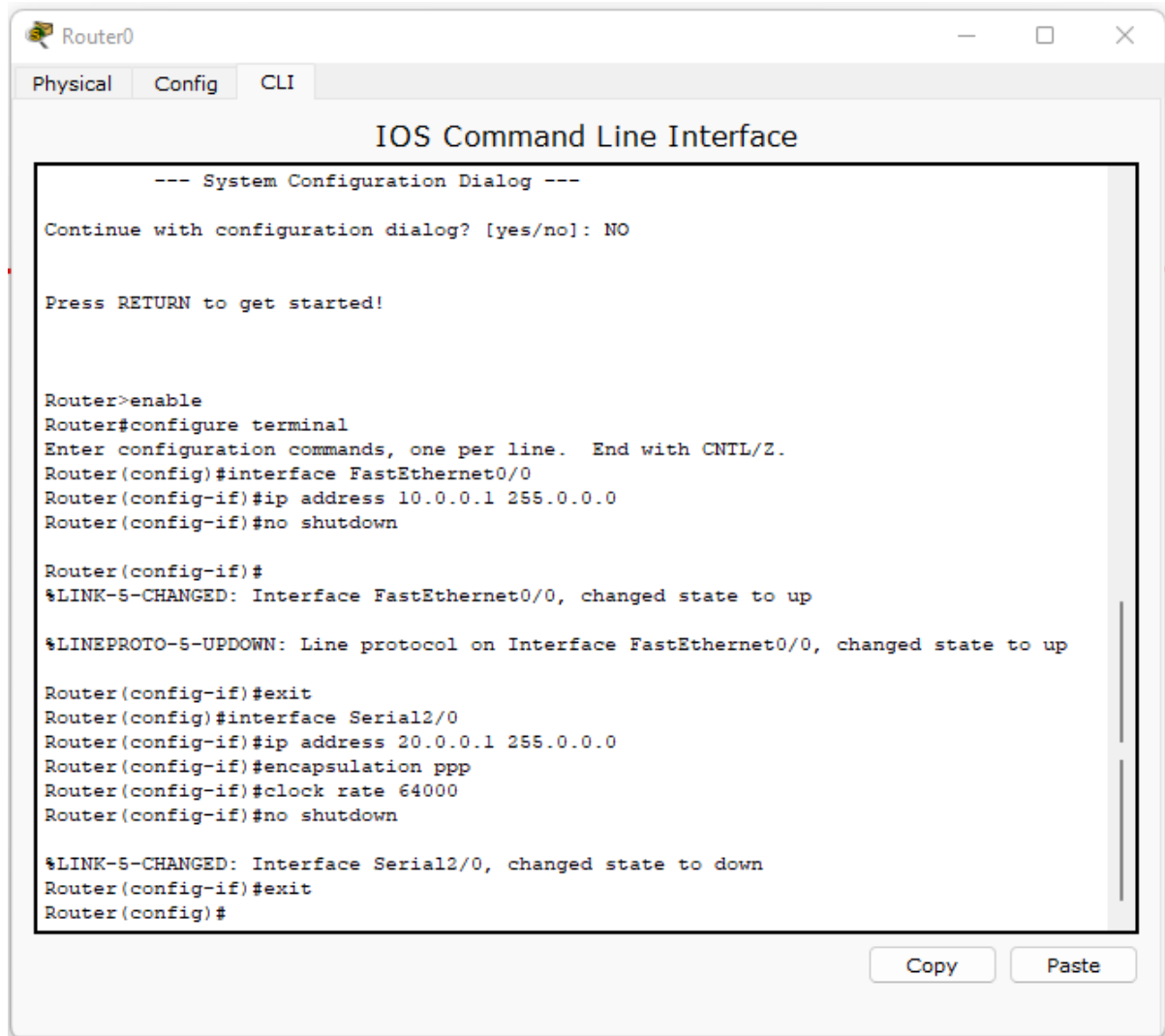
Configure OSPF Routing Protocol:-

Network:-



Procedure:

1. Create a topology as shown above.
2. Configure IP addresses to all the interfaces.



The screenshot shows a window titled "Router0" with three tabs: "Physical", "Config", and "CLI". The "CLI" tab is active, displaying the "IOS Command Line Interface". The interface shows a "System Configuration Dialog" with the prompt "Continue with configuration dialog? [yes/no]: NO". Below this, it says "Press RETURN to get started!". The user has entered the command "enable", and the prompt changes to "Router#". The user then enters "configure terminal", and the prompt changes to "Router(config)#". The user enters "interface FastEthernet0/0", and the prompt changes to "Router(config-if)#". The user enters "ip address 10.0.0.1 255.0.0.0", and the prompt remains "Router(config-if)#". The user enters "no shutdown", and the prompt remains "Router(config-if)#". The interface shows the status changes: "%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up" and "%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up". The user enters "exit", and the prompt changes to "Router(config)#". The user enters "interface Serial2/0", and the prompt changes to "Router(config-if)#". The user enters "ip address 20.0.0.1 255.0.0.0", and the prompt remains "Router(config-if)#". The user enters "encapsulation ppp", and the prompt remains "Router(config-if)#". The user enters "clock rate 64000", and the prompt remains "Router(config-if)#". The user enters "no shutdown", and the prompt remains "Router(config-if)#". The interface shows the status changes: "%LINK-5-CHANGED: Interface Serial2/0, changed state to down". The user enters "exit", and the prompt changes to "Router(config)#". The user enters "exit", and the prompt changes to "Router#".

```
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 FastEthernet0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#no shutdown

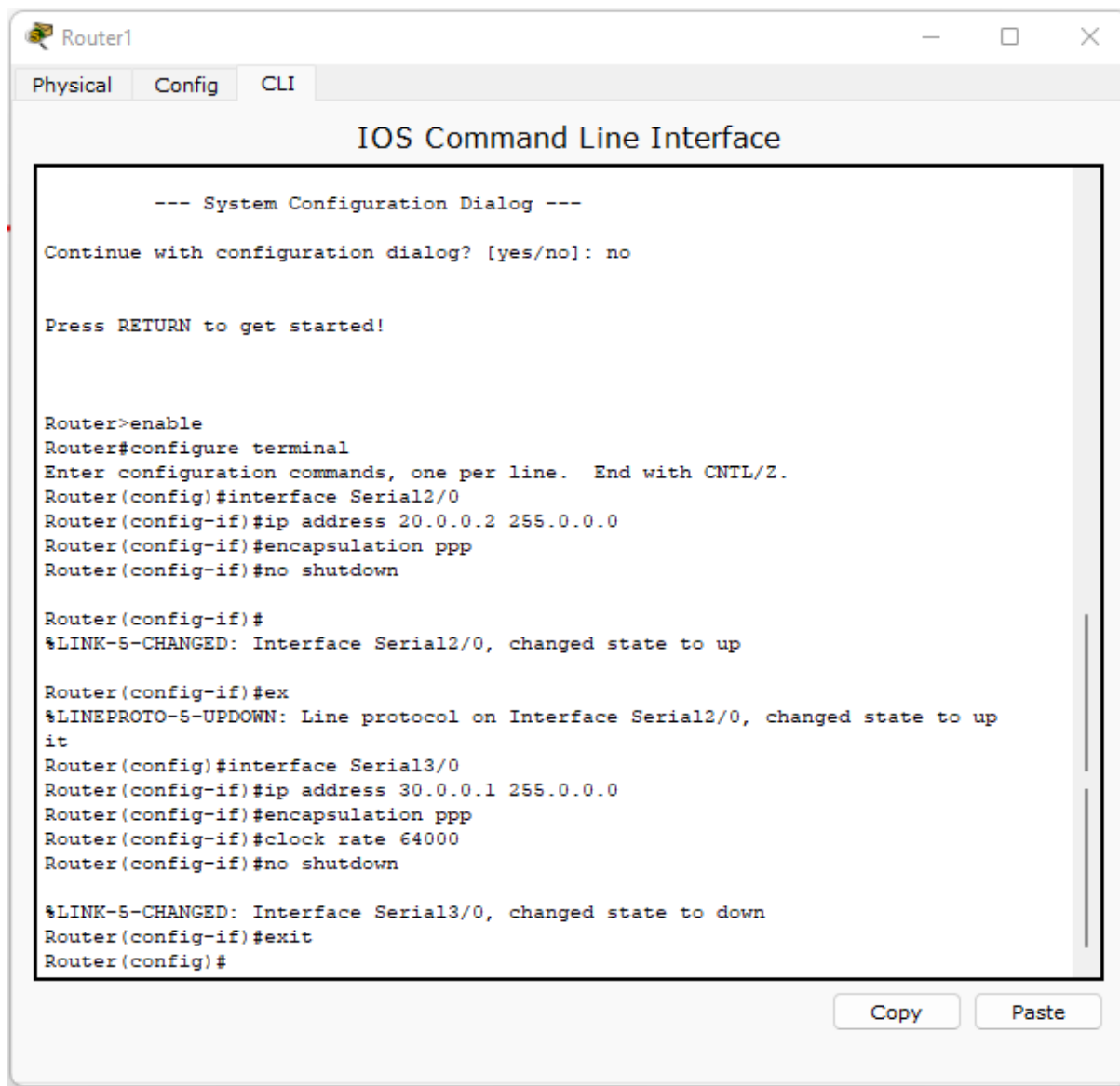
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

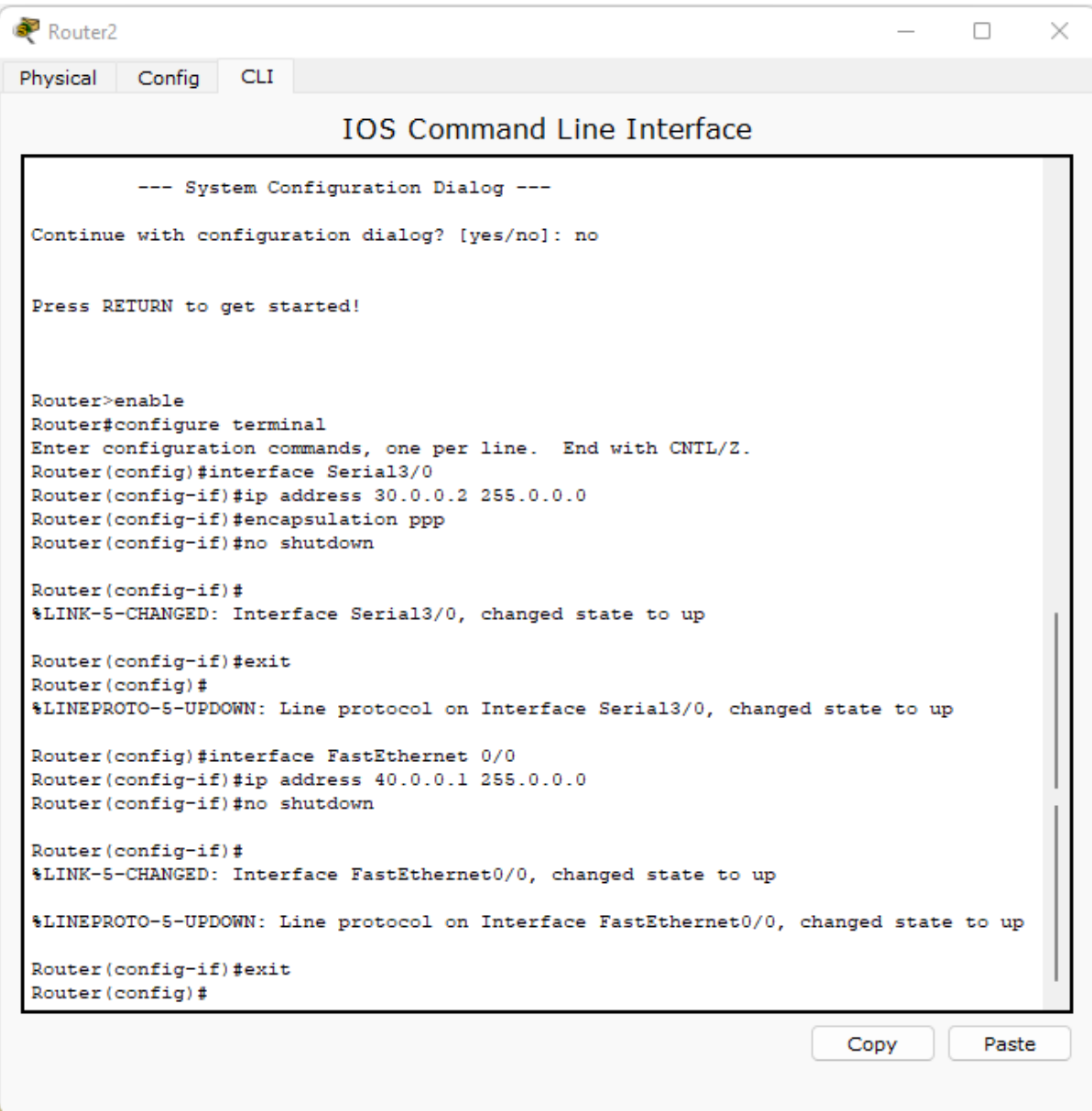
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#encapsulation ppp
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown

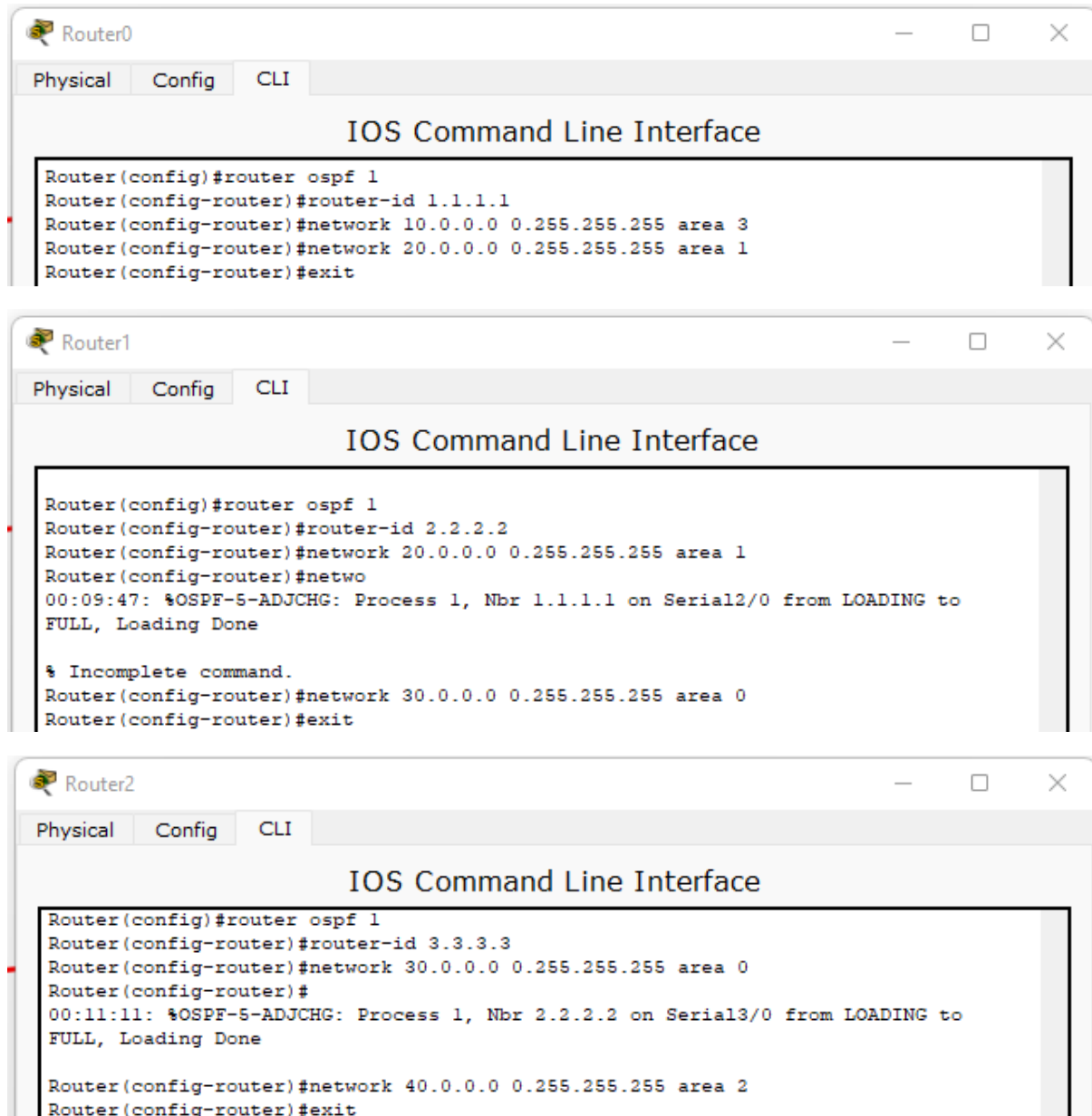
%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#exit
Router(config)#
```

Copy Paste





- Now, enable IP routing by configuring ospf routing protocol in all routers.



The image displays three separate windows for Cisco routers, each showing the IOS Command Line Interface (CLI) with the following configurations:

Router0

```
Router(config)#router ospf 1
Router(config-router)#router-id 1.1.1.1
Router(config-router)#network 10.0.0.0 0.255.255.255 area 3
Router(config-router)#network 20.0.0.0 0.255.255.255 area 1
Router(config-router)#exit
```

Router1

```
Router(config)#router ospf 1
Router(config-router)#router-id 2.2.2.2
Router(config-router)#network 20.0.0.0 0.255.255.255 area 1
Router(config-router)#netwo
00:09:47: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial2/0 from LOADING to FULL, Loading Done

% Incomplete command.
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#exit
```

Router2

```
Router(config)#router ospf 1
Router(config-router)#router-id 3.3.3.3
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#
00:11:11: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial3/0 from LOADING to FULL, Loading Done

Router(config-router)#network 40.0.0.0 0.255.255.255 area 2
Router(config-router)#exit
```

4. Now, check the routing table of Router0.



```
Router0
Physical Config CLI
IOS Command Line Interface

Router#show ip route
Codes: C - connected, S - static, I - IGRP, 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

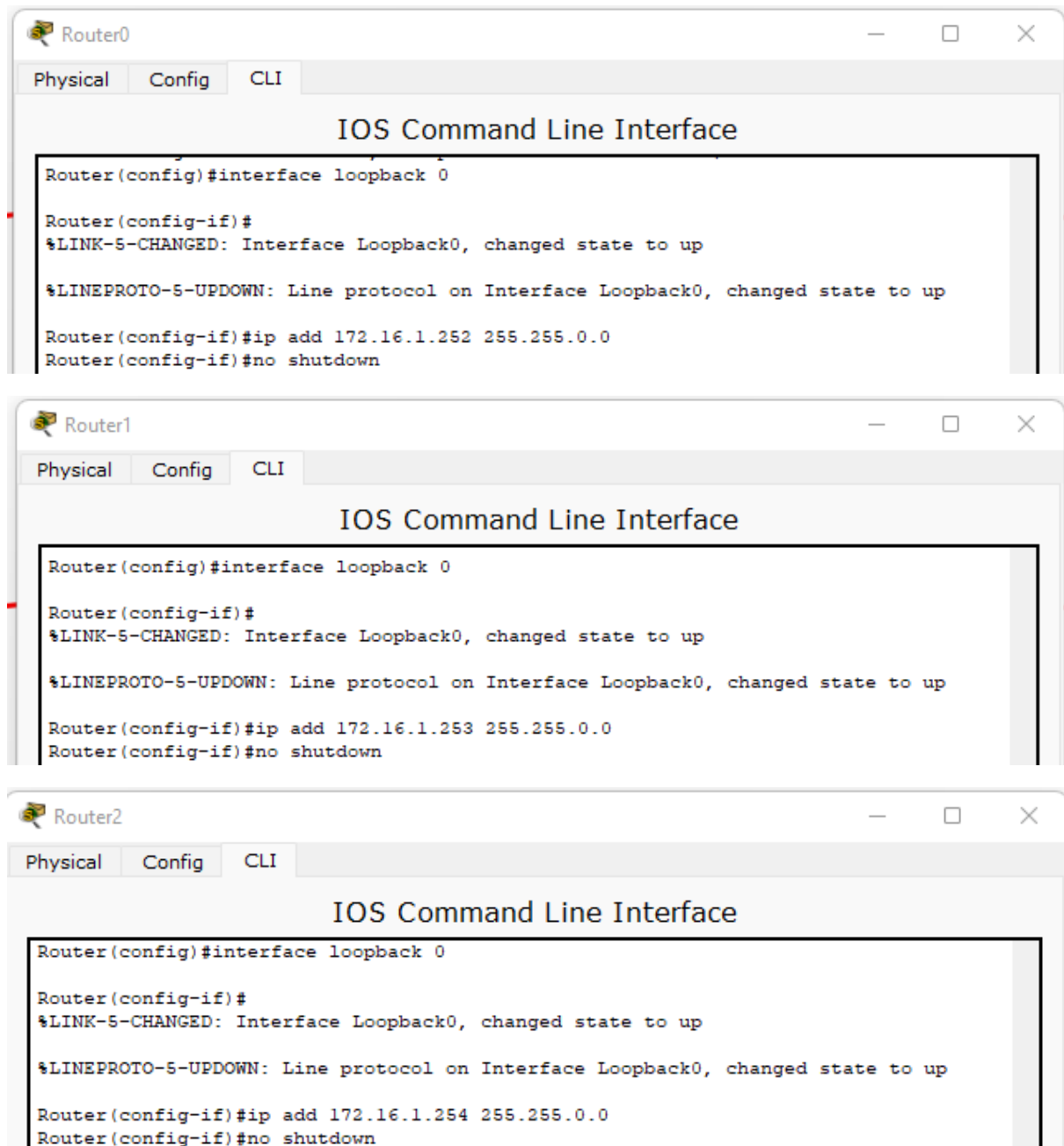
C    10.0.0.0/8 is directly connected, FastEthernet0/0
    20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    20.0.0.0/8 is directly connected, Serial2/0
C    20.0.0.2/32 is directly connected, Serial2/0
O IA 30.0.0.0/8 [110/128] via 20.0.0.2, 00:01:34, Serial2/0
O IA 40.0.0.0/8 [110/129] via 20.0.0.2, 00:00:18, Serial2/0
```

Here Router1 knows Area 0, network 20.0.0.0 connects Router1 from Router0, so Router0 learns network through this network.

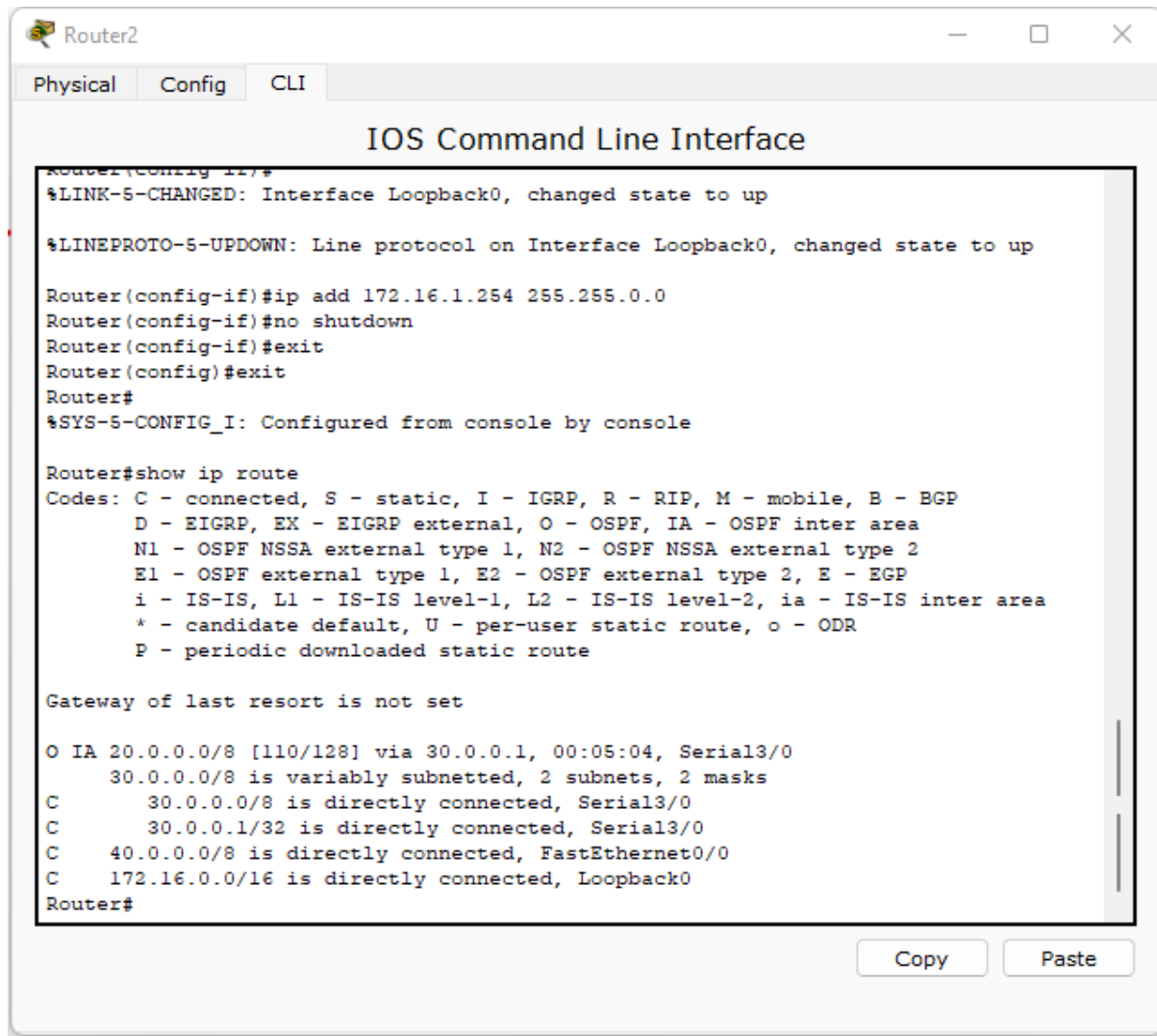
Router(config)#router ospf 1

Here, 1 is the Process ID. It can be from 1-65535. It initializes ospf process.

5. There must be one interface up to keep ospf process up. So it is better to configure loopback address to routers. It is a virtual interface that never goes down once we configure.



6. Now, check the routing table of Router2.



The screenshot shows the Router2 CLI interface with the 'CLI' tab selected. The title bar reads 'Router2'. Below the tabs, the title 'IOS Command Line Interface' is displayed. The main text area contains the following commands and output:

```
Router(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

Router(config-if)#ip add 172.16.1.254 255.255.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ip route
Codes: C - connected, S - static, I - IGRP, 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

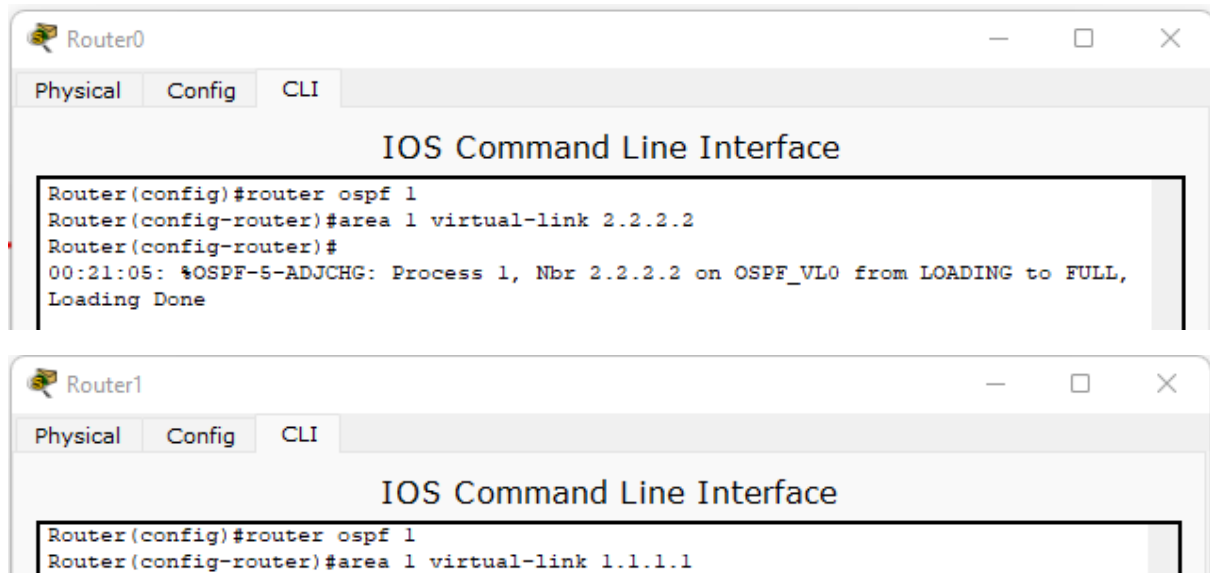
Gateway of last resort is not set

O IA 20.0.0.0/8 [110/128] via 30.0.0.1, 00:05:04, Serial3/0
    30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C      30.0.0.0/8 is directly connected, Serial3/0
C      30.0.0.1/32 is directly connected, Serial3/0
C      40.0.0.0/8 is directly connected, FastEthernet0/0
C      172.16.0.0/16 is directly connected, Loopback0
Router#
```

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

Here, Router2 does not know about Area 3. So, we have to create virtual link to connect Area 3 to Area 0.

7. Create a virtual link between Router0 and Router1. By this, we create a virtual link to connect Area 3 to Area 0.



The image displays two separate Cisco IOS Command Line Interface (CLI) windows, one for Router0 and one for Router1. Both windows have tabs for 'Physical', 'Config', and 'CLI', with 'CLI' being the active tab. The title bar of each window indicates the router name (Router0 or Router1). The main content area of each window is titled 'IOS Command Line Interface'.

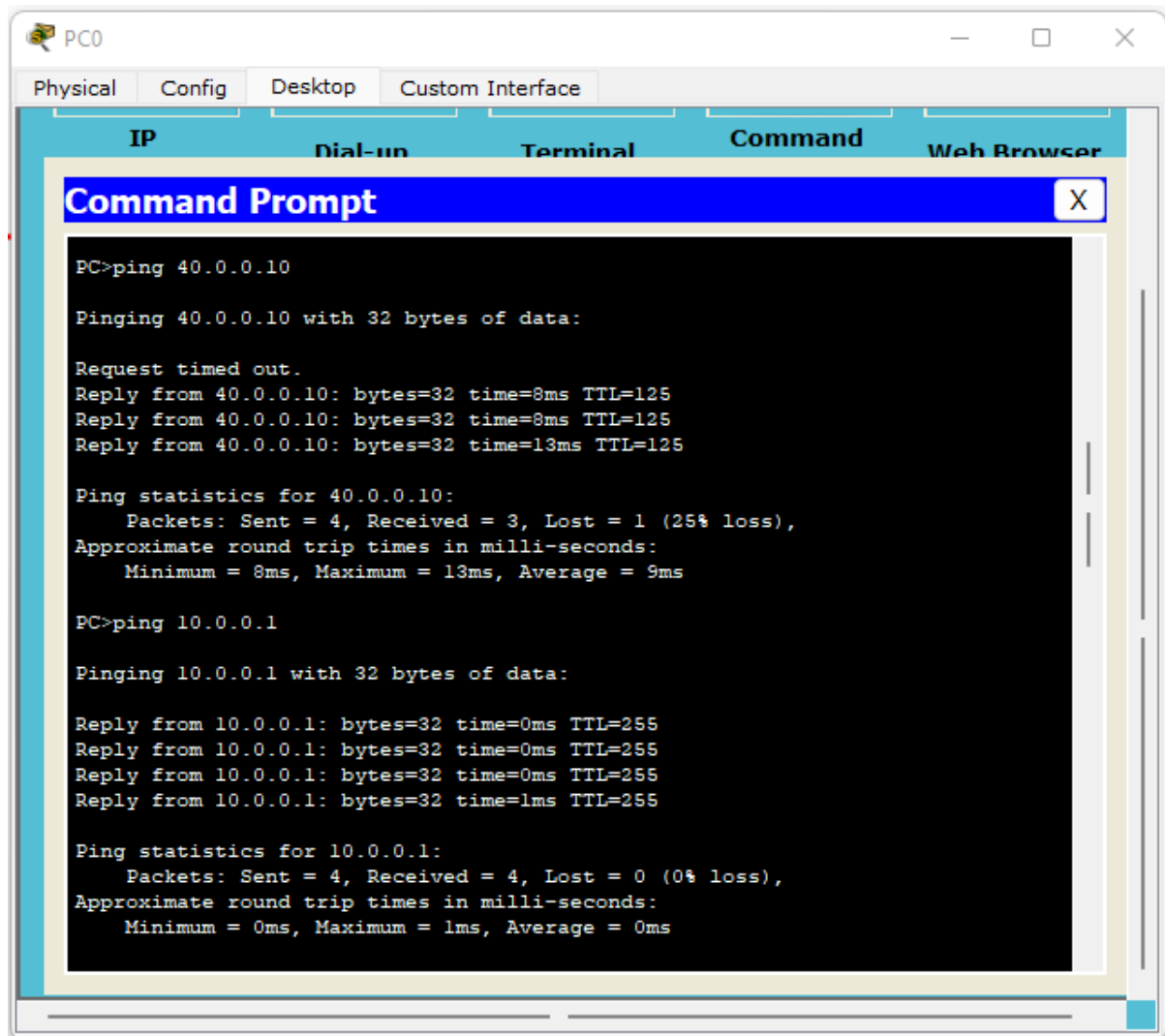
Router0 CLI:

```
Router(config)#router ospf 1
Router(config-router)#area 1 virtual-link 2.2.2.2
Router(config-router)#
00:21:05: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on OSPF_VL0 from LOADING to FULL,
Loading Done
```

Router1 CLI:

```
Router(config)#router ospf 1
Router(config-router)#area 1 virtual-link 1.1.1.1
```

8. Check the connectivity between 10.0.0.10 to 40.0.0.10



The screenshot shows a Packet Tracer PC0 interface. The 'Command' tab is selected, displaying a 'Command Prompt' window. The window contains the following text:

```
PC>ping 40.0.0.10

Pinging 40.0.0.10 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.10: bytes=32 time=8ms TTL=125
Reply from 40.0.0.10: bytes=32 time=8ms TTL=125
Reply from 40.0.0.10: bytes=32 time=13ms TTL=125

Ping statistics for 40.0.0.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 13ms, Average = 9ms

PC>ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

Reply from 10.0.0.1: bytes=32 time=0ms TTL=255
Reply from 10.0.0.1: bytes=32 time=0ms TTL=255
Reply from 10.0.0.1: bytes=32 time=0ms TTL=255
Reply from 10.0.0.1: bytes=32 time=1ms TTL=255

Ping statistics for 10.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

