

Assignment **OSFP**

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Class: Se-5B

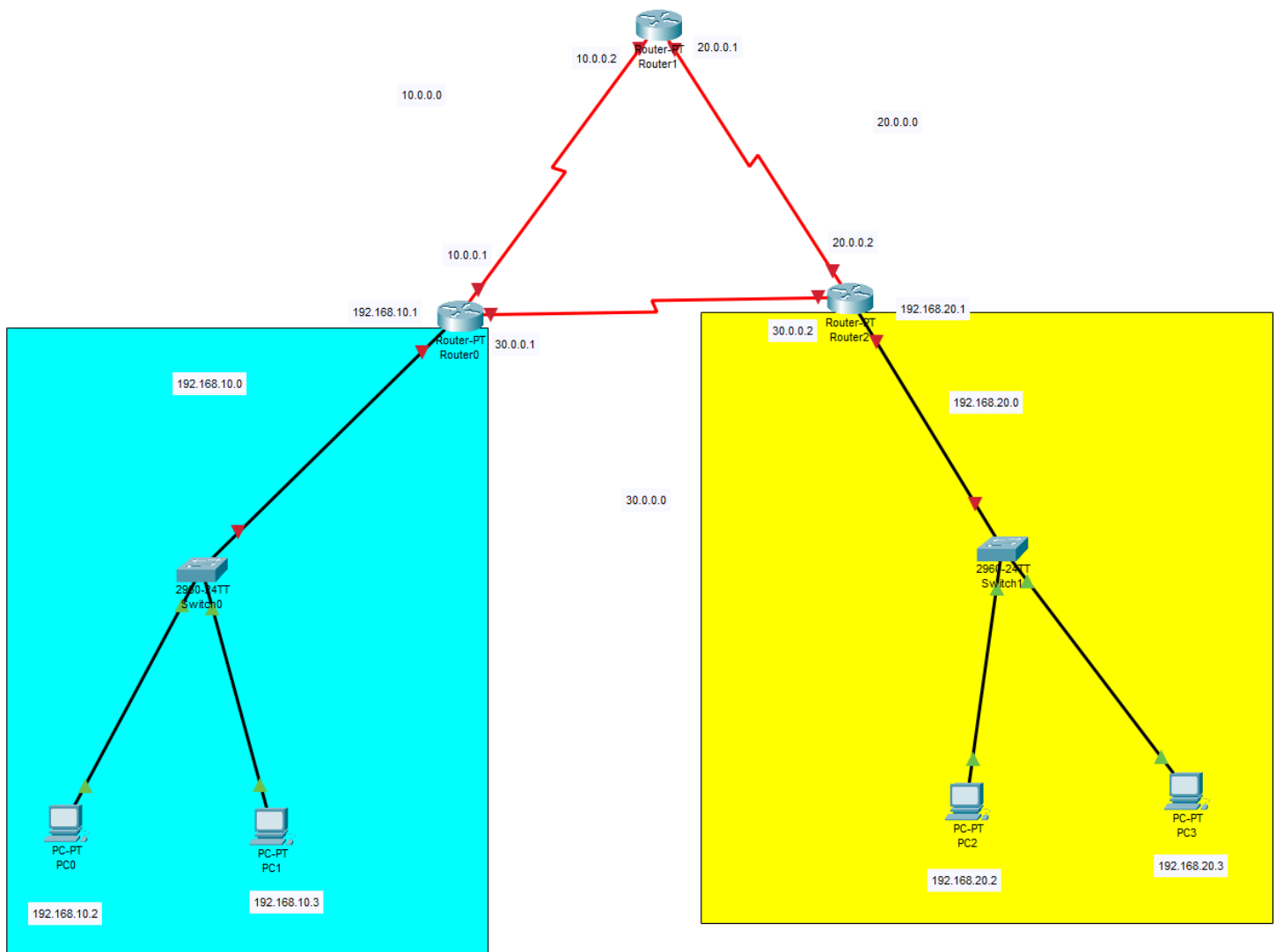
Roll: Se-221027

Course: Computer Networks
By Sir Wilayat

1. Overview of the Topology

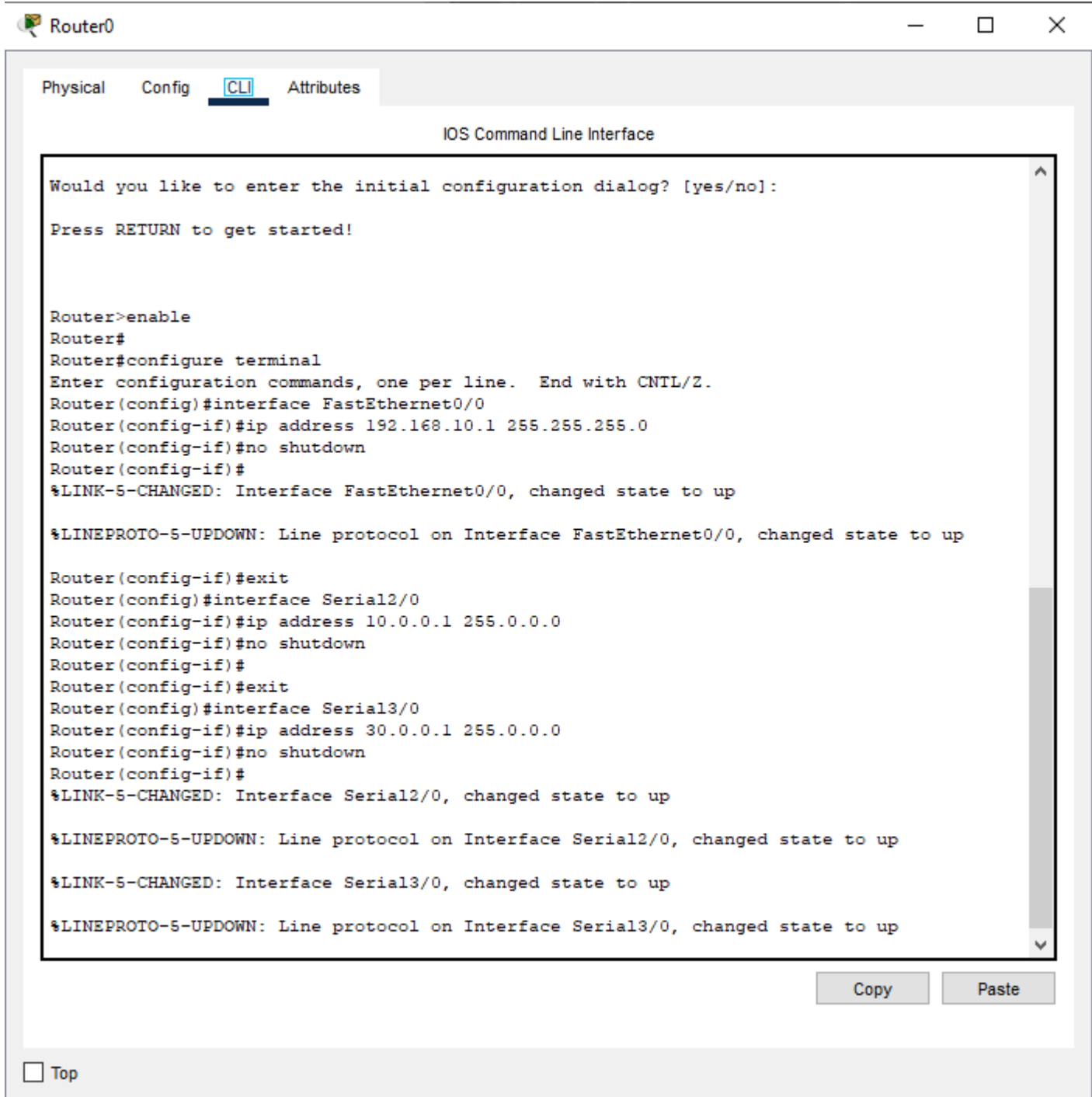
The provided network topology consists of:

- **Three Routers (Router0, Router1, Router2)**
- **Two Switches (Switch0, Switch1)**
- **Four PCs (PC0, PC1, PC2, PC3)**



OSPF (Open Shortest Path First) is a **dynamic routing protocol** that helps routers share and update network information efficiently. It is a **link-state protocol**.

Router Configuration:



The screenshot shows a window titled "Router0" with a tabbed interface. The "CLI" tab is selected, displaying the "IOS Command Line Interface". The interface shows a series of commands and their outputs for configuring a router. The commands include enabling the terminal, configuring interfaces FastEthernet0/0, Serial2/0, and Serial3/0 with IP addresses and no shutdown. The outputs show the state changes for each interface.

```
Would you like to enter the initial configuration dialog? [yes/no]:  
Press RETURN to get started!  
  
Router>enable  
Router#  
Router#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#interface FastEthernet0/0  
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)#interface Serial2/0  
Router(config-if)#ip address 10.0.0.1 255.0.0.0  
Router(config-if)#no shutdown  
Router(config-if)#  
Router(config-if)#exit  
Router(config)#interface Serial3/0  
Router(config-if)#ip address 30.0.0.1 255.0.0.0  
Router(config-if)#no shutdown  
Router(config-if)#  
%LINK-5-CHANGED: Interface Serial2/0, changed state to up  
  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up  
  
%LINK-5-CHANGED: Interface Serial3/0, changed state to up  
  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
```

At the bottom right of the CLI window, there are "Copy" and "Paste" buttons. At the bottom left of the Router0 window, there is a "Top" button.

Physical Config CLI Attributes

IOS Command Line Interface

```
Bridging software.
X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]:

Press RETURN to get started!

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
```

Copy

Paste

Physical Config CLI Attributes

IOS Command Line Interface

```
Bridging software.
X.25 software, Version 3.0.0.
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--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]:

Press RETURN to get started!

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial3/0
Router(config-if)#ip address 20.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

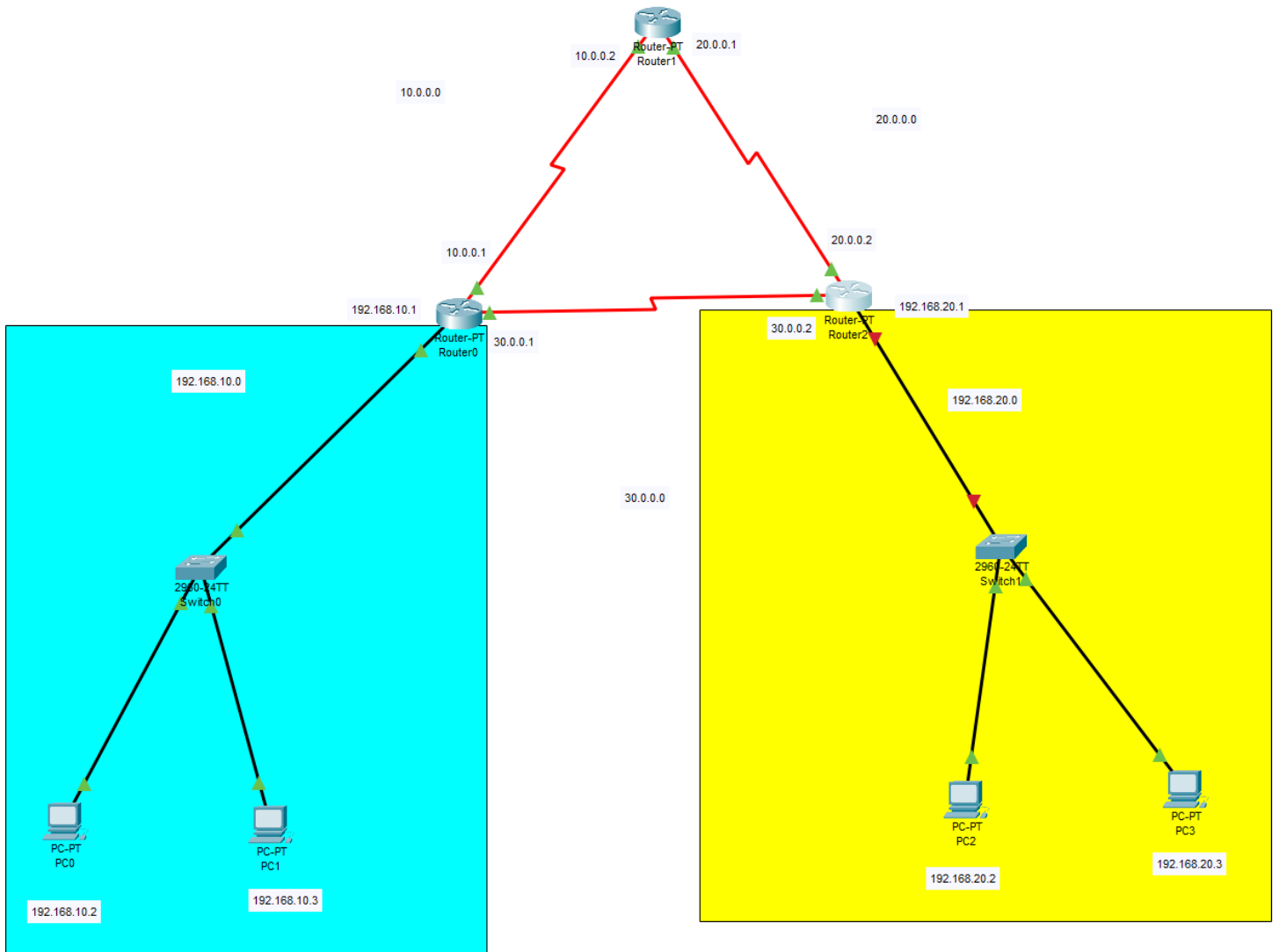
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 30.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up


%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
```

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OSFP Configuration:

 Router0

Physical

Config

CLI

Attributes

IOS Command Line Interface

```
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#rou
Router(config)#router os
Router(config)#router ospf 1
Router(config-router)#rou
Router(config-router)#router-id 1.1.1.1
Router(config-router)#net
Router(config-router)#network 192.168.10.0 0.0.0.255 are
Router(config-router)#network 192.168.10.0 0.0.0.255 area 0
Router(config-router)#network 10.0.0.0 0.0.0.3 area 0
Router(config-router)#network 30.0.0.0 0.0.0.3 area 0
Router(config-router)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#wr
Router#write m
Router#write memory
Building configuration...
[OK]
Router#
00:22:03: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial2/0 from LOADING to FULL,
Loading Done

00:23:37: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Serial3/0 from LOADING to FULL,
Loading Done
```

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☐ Top

Physical Config CLI Attributes

IOS Command Line Interface

```
Router(config-if)#
Router(config-if)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#conf
Router#configure
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#rou
Router(config)#router os
Router(config)#router ospf 1
Router(config-router)#rou
Router(config-router)#router-id 2.2.2.2
Router(config-router)#net
Router(config-router)#network 10.0.0.0 0.0.0.3 area 0
Router(config-router)#network 20.0.0.0 0.0.0.3 area 0
Router(config-router)#en
% Ambiguous command: "en"
Router(config)#
Router(config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
00:22:01: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial2/0 from LOADING to FULL,
Loading Done

Router#wri
Router#write me
Router#write memory
Building configuration...
[OK]
Router#
00:23:27: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Serial3/0 from LOADING to FULL,
Loading Done
```

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☐ Top

Physical Config CLI Attributes

IOS Command Line Interface

```
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#conf
Router#configure
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ru
Router(config)#rou
Router(config)#router os
Router(config)#router ospf 1
Router(config-router)#ro
Router(config-router)#router-id 3.3.3.3
Router(config-router)#netwo
Router(config-router)#network 20.0.0.0 0.0.0.0 area 0
Router(config-router)#network 20.0.0.0 0.0.0.3 area 0
Router(config-router)#network 30.0.0.0 0.0.0.3 area 0
Router(config-router)#network 30.0.0.0 0.0.0.3 area 0
00:23:25: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial3/0 from LOADING to FULL,
Loading Done

00:23:33: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial2/0 from LOADING to FULL,
Loading Done


Router(config-router)#network 192.168.20.0 0.0.0.255 area 0
Router(config-router)#
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#wr
Router#write m
Router#write memory
Building configuration...
[OK]
Router#
```

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Verify OSPF Configuration:

 Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
00:23:37: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Serial3/0 from LOADING to FULL, Loading Done

Router#
Router#sh
Router#show i
Router#show ip
Router#show ip os
Router#show ip ospf n
Router#show ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
2.2.2.2	0	FULL/ -	00:00:37	10.0.0.2	Serial2/0
3.3.3.3	0	FULL/ -	00:00:30	30.0.0.2	Serial3/0

```
Router#sh
Router#show ip
Router#show ip ro
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, Serial2/0
O    20.0.0.0/8 [110/128] via 10.0.0.2, 00:03:08, Serial2/0
      [110/128] via 30.0.0.2, 00:03:08, Serial3/0
C    30.0.0.0/8 is directly connected, Serial3/0
C    192.168.10.0/24 is directly connected, FastEthernet0/0
O    192.168.20.0/24 [110/65] via 30.0.0.2, 00:01:29, Serial3/0

Router#
```

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Physical Config CLI Attributes

IOS Command Line Interface

```
Router#sh
Router#show i
Router#show ios
Router#show ip
Router#show ip o
Router#show ip ospf n
Router#show ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
1.1.1.1	0	FULL/ -	00:00:39	10.0.0.1	Serial2/0
3.3.3.3	0	FULL/ -	00:00:38	20.0.0.2	Serial3/0

```
Router#
Router#
Router#sh
Router#show i
Router#show ip
Router#show ip ro
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, Serial2/0
C    20.0.0.0/8 is directly connected, Serial3/0
O    30.0.0.0/8 [110/128] via 10.0.0.1, 00:03:56, Serial2/0
      [110/128] via 20.0.0.2, 00:03:56, Serial3/0
O    192.168.10.0/24 [110/65] via 10.0.0.1, 00:05:22, Serial2/0
O    192.168.20.0/24 [110/65] via 20.0.0.2, 00:02:09, Serial3/0

Router#
```

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Physical Config CLI Attributes

IOS Command Line Interface

```
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#sh
Router#show i
Router#show ip
Router#show ip os
Router#show ip ospf n
Router#show ip ospf neighbor

Neighbor ID      Pri   State           Dead Time   Address        Interface
2.2.2.2          0     FULL/ -         00:00:30    20.0.0.1       Serial3/0
1.1.1.1          0     FULL/ -         00:00:38    30.0.0.1       Serial2/0
Router#sh
Router#show i
Router#show ip
Router#show ip rou
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    10.0.0.0/8 [110/128] via 20.0.0.1, 00:04:21, Serial3/0
     [110/128] via 30.0.0.1, 00:04:21, Serial2/0
C    20.0.0.0/8 is directly connected, Serial3/0
C    30.0.0.0/8 is directly connected, Serial2/0
O    192.168.10.0/24 [110/65] via 30.0.0.1, 00:04:21, Serial2/0
C    192.168.20.0/24 is directly connected, FastEthernet0/0

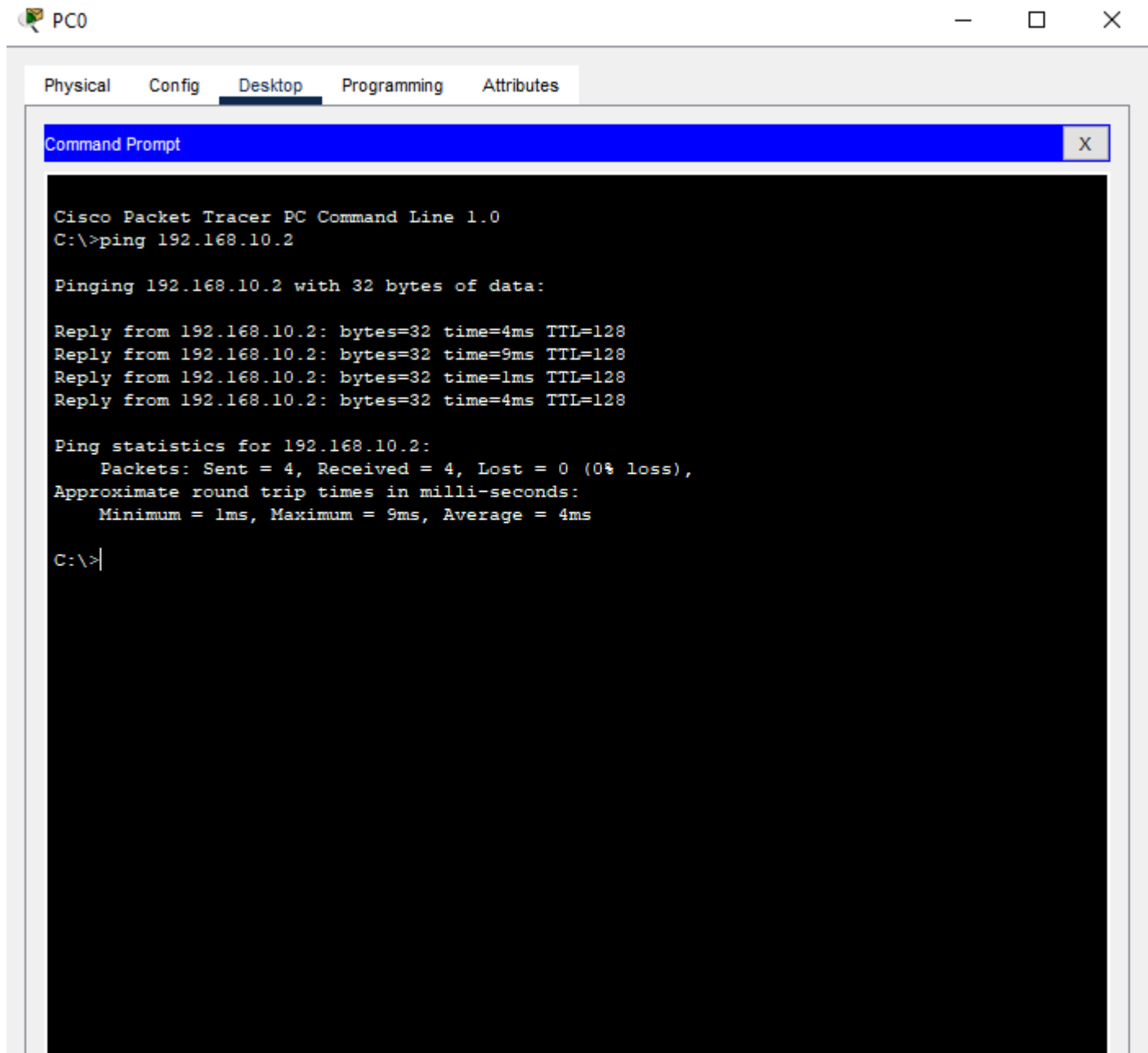
Router#s
```

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Testing Connectivity

From PC0 (192.168.10.2) to PC2 (192.168.20.2)



The screenshot shows a Cisco Packet Tracer PC Command Line window for PC0. The window has tabs for Physical, Config, Desktop, Programming, and Attributes, with Desktop selected. The Command Prompt displays the output of a ping command to 192.168.10.2. The output shows four successful replies with varying round-trip times (4ms, 9ms, 1ms, 4ms) and a TTL of 128. The ping statistics indicate that all four packets were sent and received, with 0% loss. The approximate round-trip times are: Minimum = 1ms, Maximum = 9ms, and Average = 4ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2: bytes=32 time=4ms TTL=128
Reply from 192.168.10.2: bytes=32 time=9ms TTL=128
Reply from 192.168.10.2: bytes=32 time=1ms TTL=128
Reply from 192.168.10.2: bytes=32 time=4ms TTL=128

Ping statistics for 192.168.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 9ms, Average = 4ms

C:\>
```

the successful pings and routing table validation demonstrate that OSPF was correctly implemented and is functioning as expected. The routers are dynamically

sharing routing information, allowing seamless communication between all devices in the network. This setup ensures efficient routing, redundancy, and scalability, making OSPF an effective choice for this network topology