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**Institute of Computer Technology
B. Tech Computer Science and Engineering**

**Sub:CN
Practical 8**

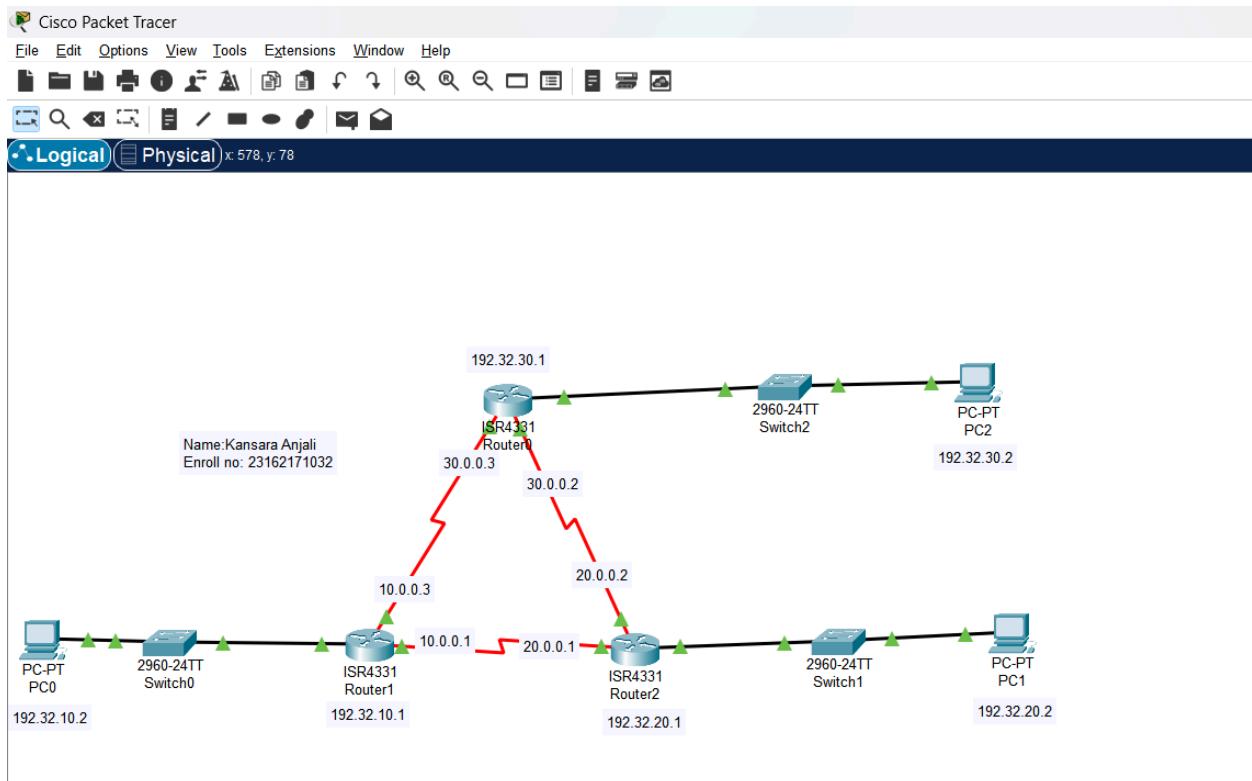
Aim: To design a network using Open Shortest Path First (OSPF) Protocol.

Scenario:

Consider that the organization has three departments and a routing protocol Open Shortest Path First (OSPF) protocol is implemented. Configure network as shown in figure below and implement Open Shortest Path First (OSPF) routing protocol.

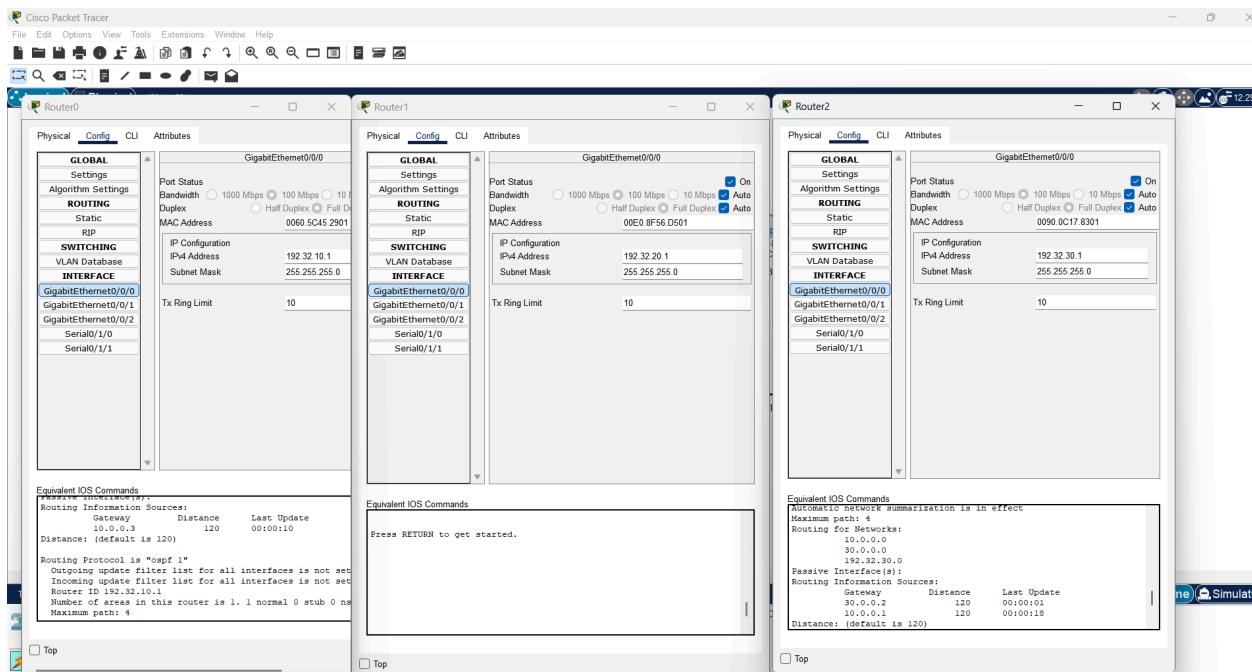
Procedure:

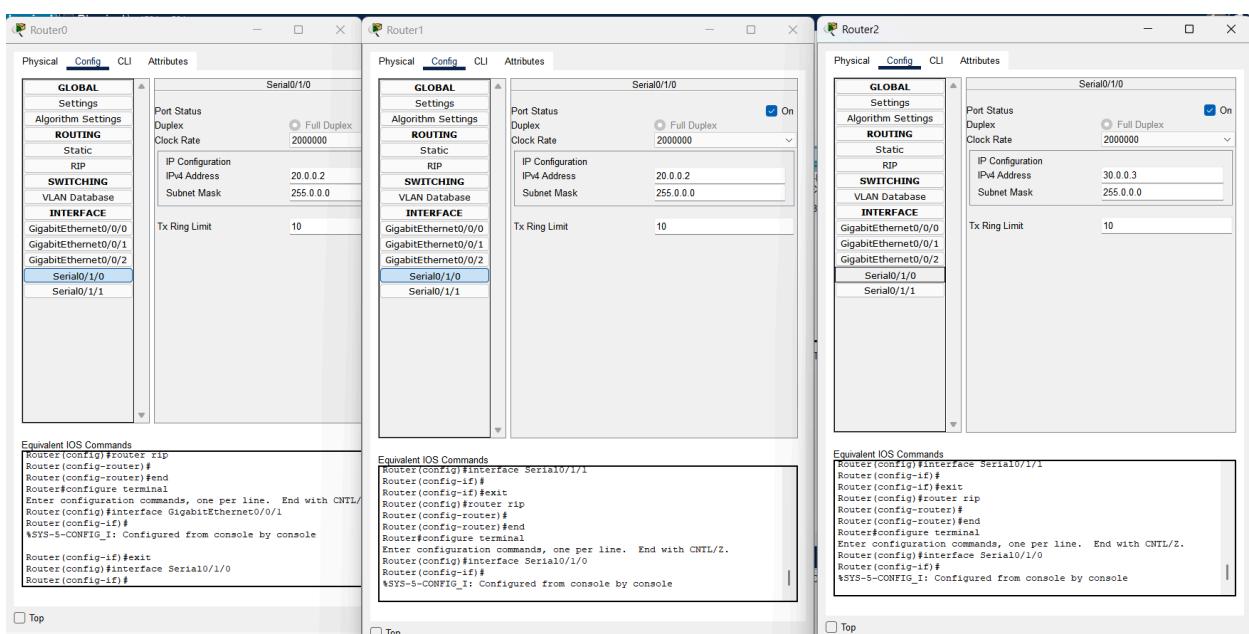
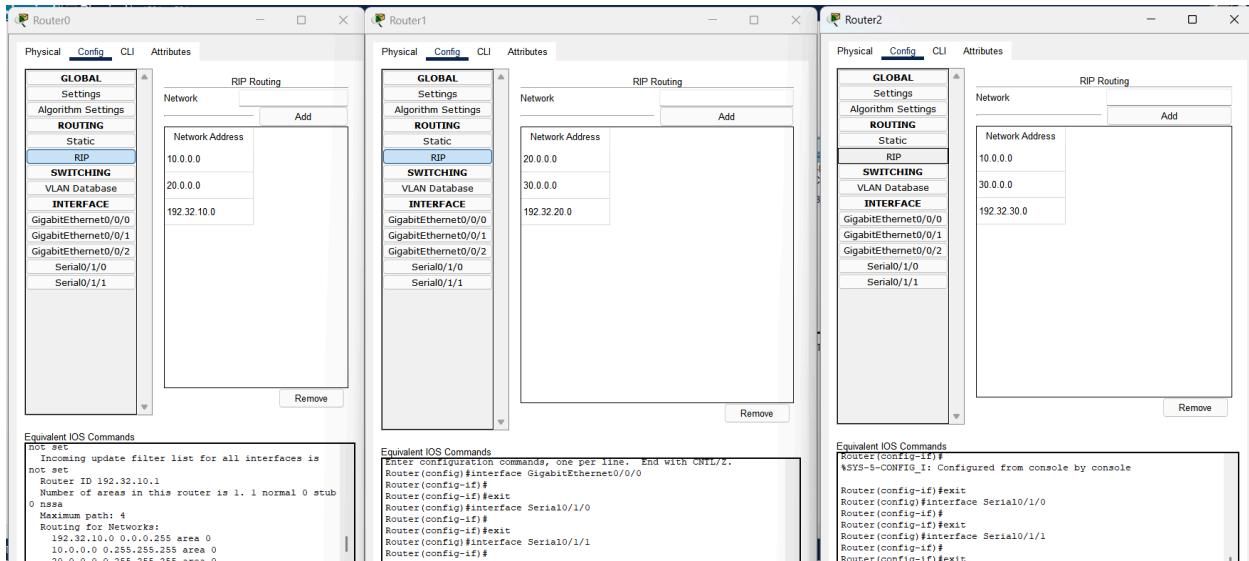
- 1) Create network as given below

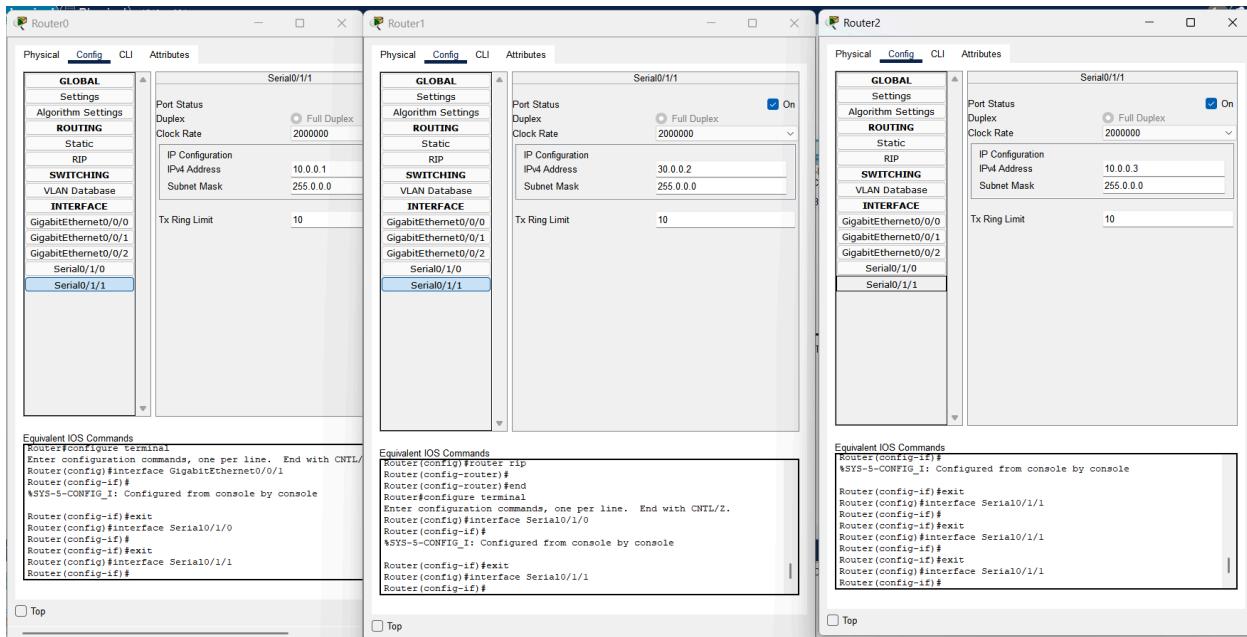


2) Configure IP address (All Devices, Routers)

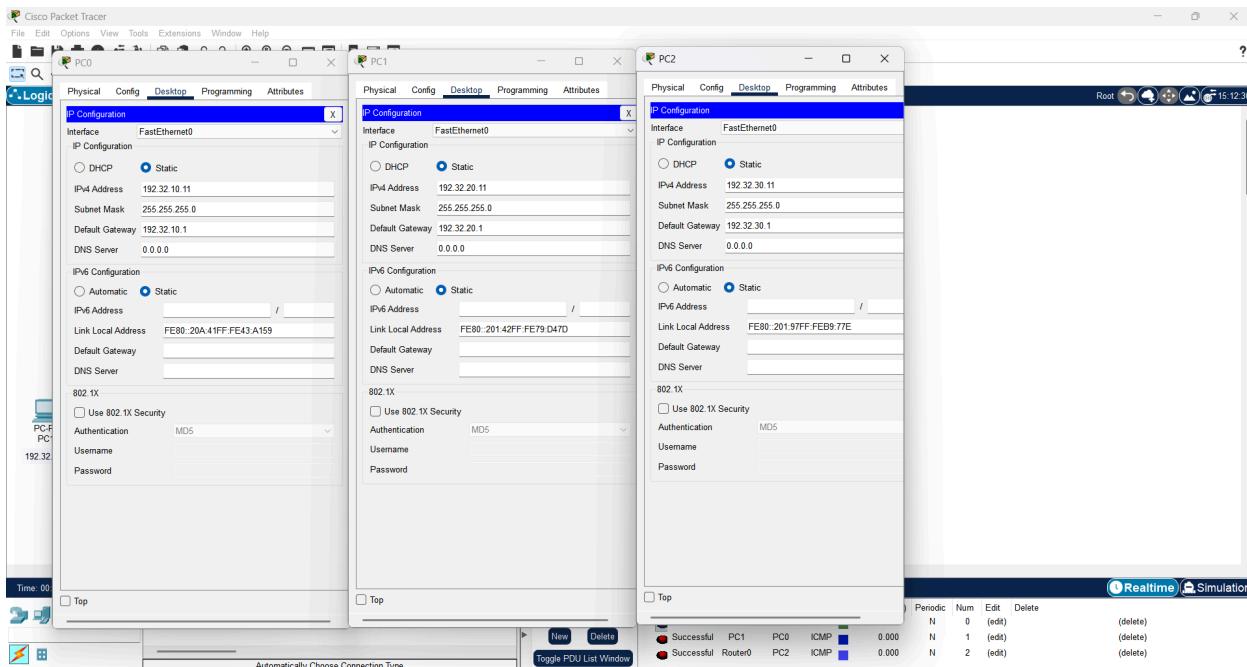
Routers:







PCs:



3) Configure open short path first routing table (OSPF in routers)

Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router(config)#do show ip int brief
Interface          IP-Address      OK? Method Status           Protocol
GigabitEthernet0/0/0 192.32.30.1   YES manual up            up
GigabitEthernet0/0/1 unassigned     YES unset administratively down down
GigabitEthernet0/0/2 unassigned     YES unset administratively down down
Serial0/1/0         30.0.0.3       YES manual up            up
Serial0/1/1         10.0.0.3       YES manual up            up
Vlan1              unassigned     YES unset administratively down down
Router(config)#router
% Unknown command or computer name, or unable to find computer address

Router(config)# router ospf 1
Router(config-router)#network 192.32.30.0 0.0.0.255 area 0
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0
Router(config-router)#do show ip route
Codes: L - local, C - connected, S - static, 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

  10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    10.0.0.0/8 is directly connected, Serial0/1/1
L    10.0.0.3/32 is directly connected, Serial0/1/1
  30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    30.0.0.0/8 is directly connected, Serial0/1/0
L    30.0.0.3/32 is directly connected, Serial0/1/0
  192.32.30.0/24 is variably subnetted, 2 subnets, 2 masks
C   192.32.30.0/24 is directly connected, GigabitEthernet0/0/0
L   192.32.30.1/32 is directly connected, GigabitEthernet0/0/0

Router(config-router)#do show ip protocol
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 3 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
```

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Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
C      192.32.30.0/24 is directly connected, GigabitEthernet0/0/0
L      192.32.30.1/32 is directly connected, GigabitEthernet0/0/0

Router(config-router)#do show ip protocol
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 3 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 1, receive any version
    Interface          Send   Recv   Triggered RIP  Key-chain
    GigabitEthernet0/0/0 12 1
    Serial0/1/0         12 1
    Serial0/1/1         12 1
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
    30.0.0.0
    192.32.30.0
  Passive Interface(s):
  Routing Information Sources:
    Gateway          Distance      Last Update
  Distance: (default is 120)

  Routing Protocol is "ospf 1"
    Outgoing update filter list for all interfaces is not set
    Incoming update filter list for all interfaces is not set
    Router ID 192.32.30.1
    Number of areas in this router is 1. 1 normal 0 stub 0 nssa
    Maximum path: 4
    Routing for Networks:
      192.32.30.0 0.0.0.255 area 0
      30.0.0.0 0.255.255.255 area 0
      10.0.0.0 0.255.255.255 area 0
    Routing Information Sources:
      Gateway          Distance      Last Update
      192.32.30.1      110        00:00:33
  Distance: (default is 110)

Router(config-router)#

```

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Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```

Router(config)#router rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#network 192.32.10.0
Router(config-router)#
Router(config-router)#exit
Router(config)#do show ip int brief
Interface          IP-Address      OK? Method Status        Protocol
GigabitEthernet0/0/0 192.32.10.1   YES manual up           up
GigabitEthernet0/0/1 unassigned     YES unset administratively down down
GigabitEthernet0/0/2 unassigned     YES unset administratively down down
Serial0/1/0         10.0.0.1       YES manual up           up
Serial0/1/1         20.0.0.1       YES manual up           up
Vlan1              unassigned     YES unset administratively down down
Router(config)#router ospf 1
^
% Invalid input detected at '^' marker.

Router(config)#router ospf 1
Router(config-router)#network 192.32.10.0 0.0.0.255 area 0
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0
Router(config-router)#network 20.0.0.0 0.255.255.255 area 0
Router(config-router)#do show ip route
Codes: L - local, C - connected, S - static, 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

      10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        10.0.0.0/8 is directly connected, Serial0/1/0
L        10.0.0.1/32 is directly connected, Serial0/1/0
      20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        20.0.0.0/8 is directly connected, Serial0/1/1
L        20.0.0.1/32 is directly connected, Serial0/1/1
      192.32.10.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.32.10.0/24 is directly connected, GigabitEthernet0/0/0
L        192.32.10.1/32 is directly connected, GigabitEthernet0/0/0

```

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Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
C      192.32.10.0/24 is directly connected, GigabitEthernet0/0/0
L      192.32.10.1/32 is directly connected, GigabitEthernet0/0/0

Router(config-router)#do show ip protocol
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 19 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 1, receive any version
    Interface      Send   Recv   Triggered RIP  Key-chain
    GigabitEthernet0/0/0  12 1
    Serial0/1/0       12 1
    Serial0/1/1       12 1
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
    20.0.0.0
    192.32.10.0
  Passive Interface(s):
  Routing Information Sources:
    Gateway          Distance      Last Update
  Distance: (default is 120)

  Routing Protocol is "ospf 1"
    Outgoing update filter list for all interfaces is not set
    Incoming update filter list for all interfaces is not set
    Router ID 192.32.10.1
    Number of areas in this router is 1. 1 normal 0 stub 0 nssa
    Maximum path: 4
    Routing for Networks:
      192.32.10.0 0.0.0.255 area 0
      10.0.0.0 0.255.255.255 area 0
      20.0.0.0 0.255.255.255 area 0
    Routing Information Sources:
      Gateway          Distance      Last Update
      192.32.10.1       110        00:00:58
  Distance: (default is 110)

Router(config-router)#

```

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Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router(config)#router rip
Router(config-router)#network 20.0.0.0
Router(config-router)#network 30.0.0.0
Router(config-router)#network 192.32.20.0
Router(config-router)#
Router(config-router)#exit
Router(config)#do show ip int brief
Interface          IP-Address      OK? Method Status       Protocol
GigabitEthernet0/0/0 192.32.20.1   YES manual up        up
GigabitEthernet0/0/1 unassigned     YES unset administratively down down
GigabitEthernet0/0/2 unassigned     YES unset administratively down down
Serial0/1/0          20.0.0.2      YES manual up        up
Serial0/1/1          30.0.0.2      YES manual up        up
Vlan1               unassigned     YES unset administratively down down
Router(config)#do show ip route
Codes: L - local, C - connected, S - static, 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

  20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    20.0.0.0/8 is directly connected, Serial0/1/0
L    20.0.0.2/32 is directly connected, Serial0/1/0
      30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    30.0.0.0/8 is directly connected, Serial0/1/1
L    30.0.0.2/32 is directly connected, Serial0/1/1
      192.32.20.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.32.20.0/24 is directly connected, GigabitEthernet0/0/0
L    192.32.20.1/32 is directly connected, GigabitEthernet0/0/0

Router(config)#router ospf 1
Router(config-router)#network 192.32.20.0 0.0.0.255 area 0
Router(config-router)#network 20.0.0.0 0.255.255.255 area 0
Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#do show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
```

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Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
C      192.32.20.0/24 is directly connected, GigabitEthernet0/0/0
L      192.32.20.1/32 is directly connected, GigabitEthernet0/0/0

Router(config-router)#do show ip protocol
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 25 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 1, receive any version
    Interface          Send   Recv   Triggered RIP  Key-chain
    GigabitEthernet0/0/0 12 1
    Serial0/1/0          12 1
    Serial0/1/1          12 1
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    20.0.0.0
    30.0.0.0
    192.32.20.0
  Passive Interface(s):
  Routing Information Sources:
    Gateway          Distance      Last Update
  Distance: (default is 120)

  Routing Protocol is "ospf 1"
    Outgoing update filter list for all interfaces is not set
    Incoming update filter list for all interfaces is not set
    Router ID 192.32.20.1
    Number of areas in this router is 1. 1 normal 0 stub 0 nssa
    Maximum path: 4
    Routing for Networks:
      192.32.20.0 0.0.0.255 area 0
      20.0.0.0 0.255.255.255 area 0
      30.0.0.0 0.255.255.255 area 0
    Routing Information Sources:
      Gateway          Distance      Last Update
      192.32.20.1      110          00:00:46
  Distance: (default is 110)

Router(config-router)#[/pre>

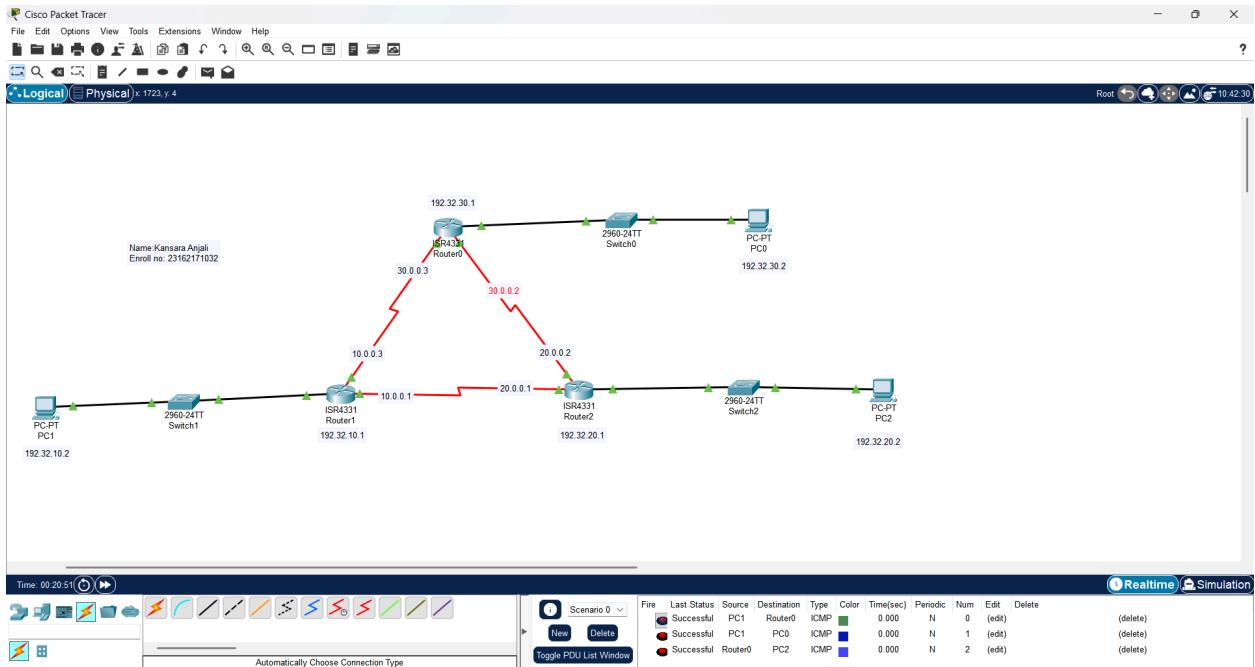
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```

Output:



Conclusion:

IP addresses were configured on all routers and end devices, and OSPF was enabled on each router using Area 0. After configuration, the routers formed OSPF neighbor relationships and exchanged routing information dynamically. The routing table verified that all networks were reachable, and OSPF ensured efficient path selection based on cost.