HACETTEPE UNIVERSITY
DEPARTMENT OF COMPUTER ENGINEERING
BBM453 COMPUTER NETWORK LABORATORY

## REPORT OF EXPERIMENT
11 - DYNAMIC ROUTING

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1. **First, you should create lab topology described in the Lab09-Routing Experiment Figure2.**

   We created the topology like below. **10.101.1.0** network mentions Group1, **10.102.2.0** network Group2, and **10.110.3.0** network mentions Group 10.
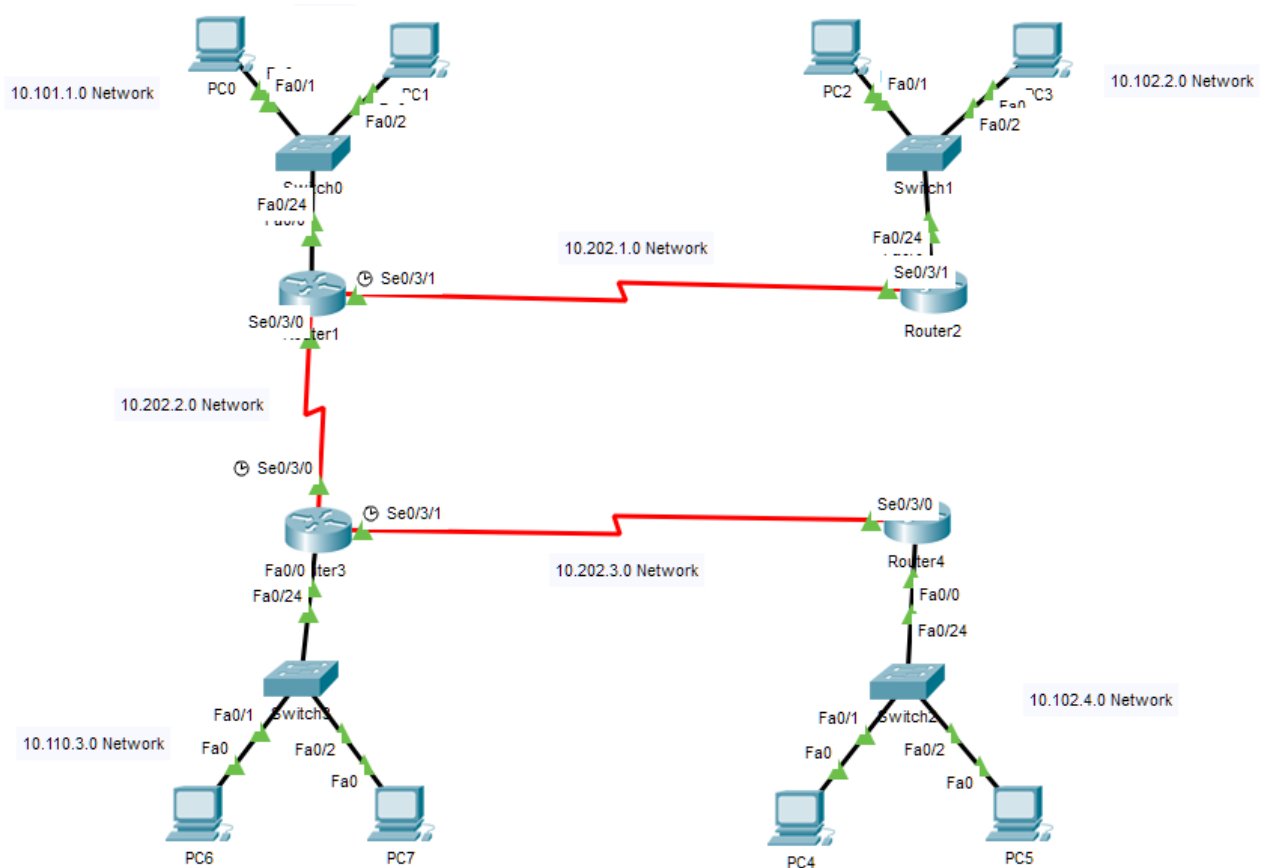
2. **Assign all interfaces (FastEthernet, Serial) described in the Lab Topology.**

   All interfaces are assigned like the below screenshots.

```
Router(config)#interface FastEthernet0/0
Router(config-if)#ip ad
Router(config-if)#ip address 10.110.3.254 255.255.255.0
Router(config-if)#no shut
Router(config-if)#no shutdown
Router(config-if)#exit

Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip ad
Router(config-if)#ip address 10.101.1.254 255.255.255.0
Router(config-if)#no shut
Router(config-if)#no shutdown
```

3. **All groups should use the same dynamic routing protocols simultaneously. You have to research routing protocol commands for Cisco Router.**

1. RIP stands for **Routing Information Protocol**. RIP is an intra-domain routing protocol used within an autonomous system. RIP is based on the distance vector-based strategy. In a routing table, the first column is the destination, or we can say that it is a network address. The cost metric is the number of hops to reach the destination. The hop count is the number of networks required to reach the destination.RIP supports a maximum 15 hops which means that the maximum 16 hops can be configured in a RIP. The Administrative distance value is 120 (Ad value). If the Ad value is less, then the protocol is more reliable than the protocol with more Ad value. The RIP protocol has the highest Ad value, so it is not as reliable as the other routing protocols.

"router rip" command: Enables router rip configuration. Tells the router to enable the RIP routing protocol.

- **"network IP_ADDR"**: Allows us to specify the networks which we want to advertise. We only need to specify the networks which are directly connected with the router.

2. OSPF stands for **Open Shortest Path First**. It is a widely used and supported routing protocol. It is an intradomain protocol, which means that it is used within an area or a network. It is an interior gateway protocol. It is based on a link-state routing algorithm in which each router contains the information of every domain, and based on this information, it determines the shortest path. The goal of routing is to learn routes. The OSPF achieves by learning about every router and subnet within the entire network. Every router contains the same information about the network. The way the router learns this information by sending LSA (Link State Advertisements). These LSAs contain information about every router, subnet, and other networking information.

"router ospf PROCESS_ID" command: It is used to create or modify an existing OSPF routing process and enters the user into OSPF router configuration mode.

- **"network IP_ADDR WILD_CARD area AREA_ID"**: Used to identify which device interface will be included within the OSPF process and to what area the interface will be assigned to. The correct usage of the network command is vital for the operation of the OSPF network.

3. Enhanced Interior Gateway Routing Protocol (EIGRP), referred to as an advanced Distance Vector protocol, offers radical improvements over RIP. Traditional DV protocols such as RIP exchange periodic routing updates with all their neighbors, saving the best distance (or metric) and the vector (or next hop) for each destination. EIGRP differs in that it saves not only the best (least-cost) route but all routes, allowing convergence to be much quicker. EIGRP is commonly used in large networks, and it updates only when a topology changes but not periodically unlike old Distance-Vector protocols such as RIP. Since EIGRP updates are triggered when there is a change, it is important to have a process that routers dynamically learn of other routers on a directly connected network.

"router eigrp AUTONOMOUS_SYSTEM_#" command: This command will enable EIGRP routing protocol in the router. We can use any ASN (Autonomous System Number) from 1 to 65,535. In order to become EIGRP neighbors, this number must be the same on all participates.

- **"network IP_ADDR IP_network_#":** This command allows us to specify the local interfaces which we want to include in EIGRP. Basically, we define a range of addresses and router search for these addresses in local interfaces. If a match is found EIGRP will be enabled on that interface. Once enabled, EIGRP will start advertising about the connected subnets with that interface.

4. **Configure RIP protocol. Display routing tables and ping from your computer to all other remote computers.**

RIP configuration for Router4

```
Router(config)#router rip
Router(config-router)#network 10.202.3.0
Router(config-router)#network 10.102.4.0
Router(config-router)#exit
```

RIP configuration for Router1

```
Router(config)#router rip
Router(config-router)#network 10.101.1.0
Router(config-router)#network 10.202.1.0
Router(config-router)#network 10.202.2.0
Router(config-router)#exit
Router(config)#exit
```

Show IP route for Router1

```
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

     10.0.0.0/24 is subnetted, 7 subnets
C       10.101.1.0 is directly connected, FastEthernet0/0
R       10.102.2.0 [120/1] via 10.202.1.1, 00:00:13, Serial0/3/1
R       10.102.4.0 [120/2] via 10.202.2.2, 00:00:13, Serial0/3/0
R       10.110.3.0 [120/1] via 10.202.2.2, 00:00:13, Serial0/3/0
C       10.202.1.0 is directly connected, Serial0/3/1
C       10.202.2.0 is directly connected, Serial0/3/0
R       10.202.3.0 [120/1] via 10.202.2.2, 00:00:13, Serial0/3/0
```

Show IP route for Router2

```
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

     10.0.0.0/24 is subnetted, 7 subnets
R       10.101.1.0 [120/1] via 10.202.1.2, 00:00:28, Serial0/3/1
C       10.102.2.0 is directly connected, FastEthernet0/0
R       10.102.4.0 [120/3] via 10.202.1.2, 00:00:28, Serial0/3/1
R       10.110.3.0 [120/2] via 10.202.1.2, 00:00:28, Serial0/3/1
C       10.202.1.0 is directly connected, Serial0/3/1
R       10.202.2.0 [120/1] via 10.202.1.2, 00:00:28, Serial0/3/1
R       10.202.3.0 [120/2] via 10.202.1.2, 00:00:28, Serial0/3/1
```

Show IP route for Router3

```
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

     10.0.0.0/24 is subnetted, 7 subnets
R       10.101.1.0 [120/1] via 10.202.2.1, 00:00:15, Serial0/3/0
R       10.102.2.0 [120/2] via 10.202.2.1, 00:00:15, Serial0/3/0
R       10.102.4.0 [120/1] via 10.202.3.2, 00:00:08, Serial0/3/1
C       10.110.3.0 is directly connected, FastEthernet0/0
R       10.202.1.0 [120/1] via 10.202.2.1, 00:00:15, Serial0/3/0
C       10.202.2.0 is directly connected, Serial0/3/0
C       10.202.3.0 is directly connected, Serial0/3/1
```

Show IP route for Router4

```
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

     10.0.0.0/24 is subnetted, 7 subnets
R       10.101.1.0 [120/2] via 10.202.3.1, 00:00:02, Serial0/3/0
R       10.102.2.0 [120/3] via 10.202.3.1, 00:00:02, Serial0/3/0
C       10.102.4.0 is directly connected, FastEthernet0/0
R       10.110.3.0 [120/1] via 10.202.3.1, 00:00:02, Serial0/3/0
R       10.202.1.0 [120/2] via 10.202.3.1, 00:00:02, Serial0/3/0
R       10.202.2.0 [120/1] via 10.202.3.1, 00:00:02, Serial0/3/0
C       10.202.3.0 is directly connected, Serial0/3/0
```

Here we pinged from PC3 to PC5 and PC0 consecutively. Also, we pinged from PC5 to PC3 and PC0 consecutively. Pinging is successful. So that means the topology is correct and working.

5. Remove RIP configuration and configure OSPF protocol. Display routing tables and ping from your computer to all other remote computers.

OSPF for Router1

```
Router(config)#router ospf 1
Router(config-router)#network 10.202.2.0 0.0.0.255 area 0
Router(config-router)#network 10.202.1.0 0.0.0.255 area 0
Router(config-router)#network 10.101.1.0 0.0.0.255 area 0
Router(config-router)#end
```

OSPF for Router2

```
Router(config)#router ospf 1
Router(config-router)#network 10.202.1.0 0.0.0.255 area 0
Router(config-router)#network 10.102.2.0 0.0.0.255 area 0
02:42:16: %OSPF-5-ADJCHG: Process 1, Nbr 10.202.2.1 on Serial0/3/1
Router(config-router)#
Router(config-router)#network 10.102.2.0 0.0.0.255 area 0
Router(config-router)#end
```

OSPF for Router3

```
Router(config)#router ospf 1
Router(config-router)#network 10.202.2.0 0.0.0.255 area 0
Router(config-router)#network 10.202.3.0
02:43:21: %OSPF-5-ADJCHG: Process 1, Nbr 10.202.2.1 on Serial0/3/0
from LOADING to Fnetwork 10.202.3.0
% Incomplete command.
Router(config-router)#network 10.202.3.0 0.0.0.255 area 0
Router(config-router)#network 10.110.3.0 0.0.0.255 area 0
Router(config-router)#end
```

OSPF for Router4

```
Router(config)#router ospf 1
Router(config-router)#network 10.202.3.0 0.0.0.255 area 0
Router(config-router)#
02:44:26: %OSPF-5-ADJCHG: Process 1, Nbr 10.202.3.1 on Serial0/3/0 from LOADING
to FULL, Loading Done

Router(config-router)#network 10.102.4.0 0.0.0.255 area 0
Router(config-router)#end
```

Show IP route for Router1

```
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

     10.0.0.0/24 is subnetted, 7 subnets
C       10.101.1.0 is directly connected, FastEthernet0/0
O       10.102.2.0 [110/65] via 10.202.1.1, 00:02:44, Serial0/3/1
O       10.102.4.0 [110/129] via 10.202.2.2, 00:00:34, Serial0/3/0
O       10.110.3.0 [110/65] via 10.202.2.2, 00:01:24, Serial0/3/0
C       10.202.1.0 is directly connected, Serial0/3/1
C       10.202.2.0 is directly connected, Serial0/3/0
O       10.202.3.0 [110/128] via 10.202.2.2, 00:01:34, Serial0/3/0
```

Show IP route for Router2

```
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

     10.0.0.0/24 is subnetted, 7 subnets
O       10.101.1.0 [110/65] via 10.202.1.2, 00:03:23, Serial0/3/1
C       10.102.2.0 is directly connected, FastEthernet0/0
O       10.102.4.0 [110/193] via 10.202.1.2, 00:01:07, Serial0/3/1
O       10.110.3.0 [110/129] via 10.202.1.2, 00:02:02, Serial0/3/1
C       10.202.1.0 is directly connected, Serial0/3/1
O       10.202.2.0 [110/128] via 10.202.1.2, 00:03:23, Serial0/3/1
O       10.202.3.0 [110/192] via 10.202.1.2, 00:02:12, Serial0/3/1
```

Show IP route for Router3

```
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

     10.0.0.0/24 is subnetted, 7 subnets
O       10.101.1.0 [110/65] via 10.202.2.1, 00:02:43, Serial0/3/0
O       10.102.2.0 [110/129] via 10.202.2.1, 00:02:43, Serial0/3/0
O       10.102.4.0 [110/65] via 10.202.3.2, 00:01:30, Serial0/3/1
C       10.110.3.0 is directly connected, FastEthernet0/0
O       10.202.1.0 [110/128] via 10.202.2.1, 00:02:43, Serial0/3/0
C       10.202.2.0 is directly connected, Serial0/3/0
C       10.202.3.0 is directly connected, Serial0/3/1
```

Show IP route for Router4

```
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

     10.0.0.0/24 is subnetted, 7 subnets
O       10.101.1.0 [110/129] via 10.202.3.1, 00:01:54, Serial0/3/0
O       10.102.2.0 [110/193] via 10.202.3.1, 00:01:54, Serial0/3/0
C       10.102.4.0 is directly connected, FastEthernet0/0
O       10.110.3.0 [110/65] via 10.202.3.1, 00:01:54, Serial0/3/0
O       10.202.1.0 [110/192] via 10.202.3.1, 00:01:54, Serial0/3/0
O       10.202.2.0 [110/128] via 10.202.3.1, 00:01:54, Serial0/3/0
C       10.202.3.0 is directly connected, Serial0/3/0
```

PC3

Physical | Config | Desktop | Programming | Attributes

Command Prompt

```
C:\>ping 10.101.1.1

Pinging 10.101.1.1 with 32 bytes of data:

Reply from 10.101.1.1: bytes=32 time=1ms TTL=126
Reply from 10.101.1.1: bytes=32 time=5ms TTL=126
Reply from 10.101.1.1: bytes=32 time=1ms TTL=126
Reply from 10.101.1.1: bytes=32 time=1ms TTL=126

Ping statistics for 10.101.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 5ms, Average = 2ms

C:\>ping 10.102.4.2

Pinging 10.102.4.2 with 32 bytes of data:

Reply from 10.102.4.2: bytes=32 time=3ms TTL=124
Reply from 10.102.4.2: bytes=32 time=3ms TTL=124
Reply from 10.102.4.2: bytes=32 time=3ms TTL=124
Reply from 10.102.4.2: bytes=32 time=3ms TTL=124

Ping statistics for 10.102.4.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 3ms, Average = 3ms
```

PC5

Physical | Config | Desktop | Programming | Attributes

Command Prompt

```
C:\>ping 10.102.2.2

Pinging 10.102.2.2 with 32 bytes of data:

Reply from 10.102.2.2: bytes=32 time=7ms TTL=124
Reply from 10.102.2.2: bytes=32 time=4ms TTL=124
Reply from 10.102.2.2: bytes=32 time=3ms TTL=124
Reply from 10.102.2.2: bytes=32 time=3ms TTL=124

Ping statistics for 10.102.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 7ms, Average = 4ms

C:\>ping 10.101.1.1

Pinging 10.101.1.1 with 32 bytes of data:

Reply from 10.101.1.1: bytes=32 time=2ms TTL=125
Reply from 10.101.1.1: bytes=32 time=4ms TTL=125
Reply from 10.101.1.1: bytes=32 time=2ms TTL=125
Reply from 10.101.1.1: bytes=32 time=2ms TTL=125

Ping statistics for 10.101.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 4ms, Average = 2ms
```

6. **Remove OSPF configuration and configure EIGRP protocol. Display routing tables and ping from your computer to all other remote computers.**

Configuration order Router: 3-4-2-1

EIGRP configuration for Router1

```
Router(config)#router eigrp 10
Router(config-router)#network 10.101.1.0 0.0.0.255
Router(config-router)#network 10.202.1.0 0.0.0.255
Router(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 10: Neighbor 10.202.1.1 (Serial0/3/1) is up: new adjacency

Router(config-router)#network 10.202.2.0 0.0.0.255
Router(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 10: Neighbor 10.202.2.2 (Serial0/3/0) is up: new adjacency
```

EIGRP configuration for Router2

```
Router(config)#router eigrp 10
Router(config-router)#network 10.202.1.0 0.0.0.255
Router(config-router)#network 10.102.2.0 0.0.0.255
Router(config-router)#end
```

EIGRP configuration for Router3

```
Router(config)#router eigrp 10
Router(config-router)#network 10.202.3.0 0.0.0.255
Router(config-router)#network 10.202.2.0 0.0.0.255
Router(config-router)#network 10.110.3.0 0.0.0.255
Router(config-router)#end
```

EIGRP configuration for Router4

```
Router(config)#router eigrp 10
Router(config-router)#network 10.202.3.0 0.0.0.255
Router(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 10: Neighbor 10.202.3.1 (Serial0/3/0) is up: new adjacency

Router(config-router)#network 10.102.4.0 0.0.0.255
Router(config-router)#end
```

Show IP route for Router1

```
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

     10.0.0.0/24 is subnetted, 7 subnets
C       10.101.1.0 is directly connected, FastEthernet0/0
D       10.102.2.0 [90/2172416] via 10.202.1.1, 00:00:41, Serial0/3/1
D       10.102.4.0 [90/2684416] via 10.202.2.2, 00:00:30, Serial0/3/0
D       10.110.3.0 [90/2172416] via 10.202.2.2, 00:00:30, Serial0/3/0
C       10.202.1.0 is directly connected, Serial0/3/1
C       10.202.2.0 is directly connected, Serial0/3/0
D       10.202.3.0 [90/2681856] via 10.202.2.2, 00:00:30, Serial0/3/0
```

Show IP route for Router2

```
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

     10.0.0.0/24 is subnetted, 7 subnets
D       10.101.1.0 [90/2172416] via 10.202.1.2, 00:01:14, Serial0/3/1
C       10.102.2.0 is directly connected, FastEthernet0/0
D       10.102.4.0 [90/3196416] via 10.202.1.2, 00:01:03, Serial0/3/1
D       10.110.3.0 [90/2684416] via 10.202.1.2, 00:01:03, Serial0/3/1
C       10.202.1.0 is directly connected, Serial0/3/1
D       10.202.2.0 [90/2681856] via 10.202.1.2, 00:01:03, Serial0/3/1
D       10.202.3.0 [90/3193856] via 10.202.1.2, 00:01:03, Serial0/3/1
```

Show IP route for Router3

```
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

     10.0.0.0/24 is subnetted, 7 subnets
D       10.101.1.0 [90/2172416] via 10.202.2.1, 00:01:28, Serial0/3/0
D       10.102.2.0 [90/2684416] via 10.202.2.1, 00:01:28, Serial0/3/0
D       10.102.4.0 [90/2172416] via 10.202.3.2, 00:03:45, Serial0/3/1
C       10.110.3.0 is directly connected, FastEthernet0/0
D       10.202.1.0 [90/2681856] via 10.202.2.1, 00:01:28, Serial0/3/0
C       10.202.2.0 is directly connected, Serial0/3/0
C       10.202.3.0 is directly connected, Serial0/3/1
```

Show IP route for Router4

```
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

     10.0.0.0/24 is subnetted, 7 subnets
D       10.101.1.0 [90/2684416] via 10.202.3.1, 00:01:53, Serial0/3/0
D       10.102.2.0 [90/3196416] via 10.202.3.1, 00:01:53, Serial0/3/0
C       10.102.4.0 is directly connected, FastEthernet0/0
D       10.110.3.0 [90/2172416] via 10.202.3.1, 00:04:20, Serial0/3/0
D       10.202.1.0 [90/3193856] via 10.202.3.1, 00:01:53, Serial0/3/0
D       10.202.2.0 [90/2681856] via 10.202.3.1, 00:04:20, Serial0/3/0
C       10.202.3.0 is directly connected, Serial0/3/0
```

Here we pinged from PC3 to PC5 and PC0 consecutively. Also, we pinged from PC5 to PC3 and PC0. Pinging is successful. So that means the topology is correct and working.

PC3

| Physical | Config | Desktop | Programming | Attributes |

Command Prompt

```
C:\>ping 10.101.1.1

Pinging 10.101.1.1 with 32 bytes of data:

Reply from 10.101.1.1: bytes=32 time=2ms TTL=126
Reply from 10.101.1.1: bytes=32 time=1ms TTL=126
Reply from 10.101.1.1: bytes=32 time=1ms TTL=126
Reply from 10.101.1.1: bytes=32 time=1ms TTL=126

Ping statistics for 10.101.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 2ms, Average = 1ms

C:\>ping 10.102.4.2

Pinging 10.102.4.2 with 32 bytes of data:

Reply from 10.102.4.2: bytes=32 time=3ms TTL=124
Reply from 10.102.4.2: bytes=32 time=3ms TTL=124
Reply from 10.102.4.2: bytes=32 time=3ms TTL=124
Reply from 10.102.4.2: bytes=32 time=3ms TTL=124

Ping statistics for 10.102.4.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 3ms, Average = 3ms
```

PC5

| Physical | Config | Desktop | Programming | Attributes |

Command Prompt

```
C:\>ping 10.102.2.2

Pinging 10.102.2.2 with 32 bytes of data:

Reply from 10.102.2.2: bytes=32 time=9ms TTL=124
Reply from 10.102.2.2: bytes=32 time=3ms TTL=124
Reply from 10.102.2.2: bytes=32 time=3ms TTL=124
Reply from 10.102.2.2: bytes=32 time=3ms TTL=124

Ping statistics for 10.102.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 9ms, Average = 4ms

C:\>ping 10.101.1.1

Pinging 10.101.1.1 with 32 bytes of data:

Reply from 10.101.1.1: bytes=32 time=2ms TTL=125
Reply from 10.101.1.1: bytes=32 time=2ms TTL=125
Reply from 10.101.1.1: bytes=32 time=4ms TTL=125
Reply from 10.101.1.1: bytes=32 time=5ms TTL=125

Ping statistics for 10.101.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 5ms, Average = 3ms
```