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Assignment Submission III

OSPF and RIP Configuration on Different Areas Using Cisco Packet Tracer

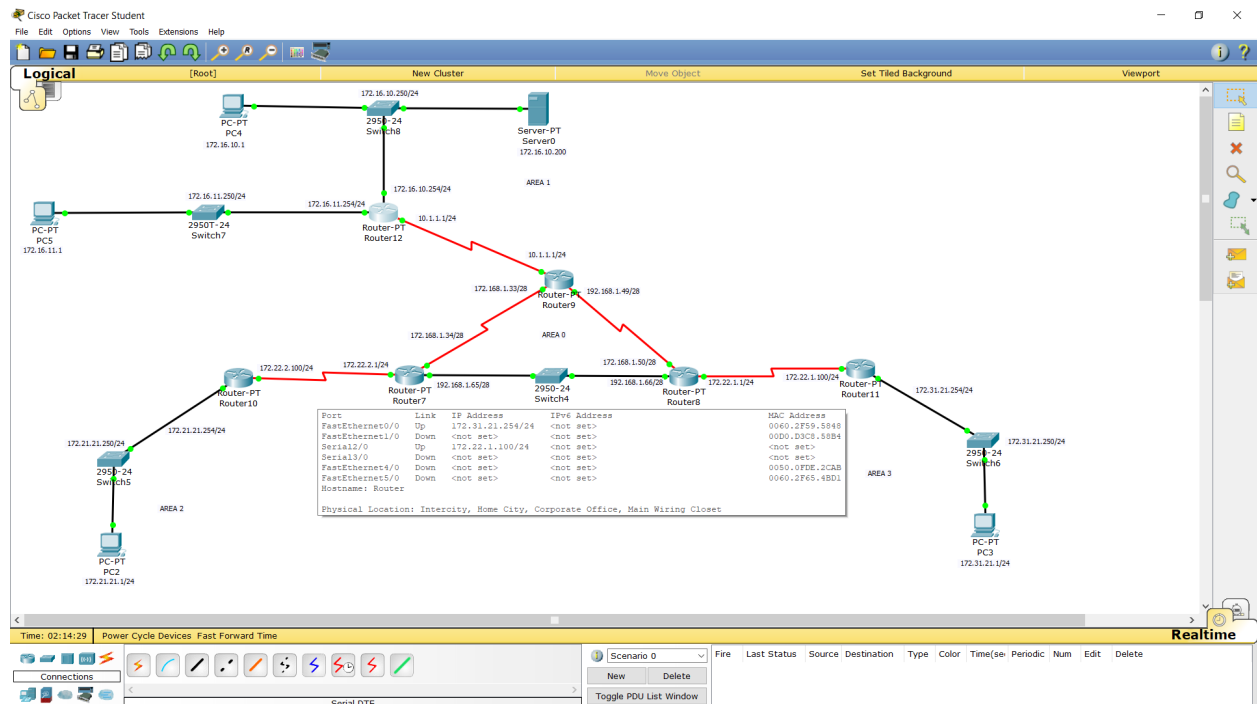
Key Ideas

- OSPF stands for Open Short Path First which is a routing protocol for internet protocols. It uses an algorithm called link state which is a group of interior gateway protocols which operate on a single system.
- RIP is a distance vector protocol, routers which use RIP protocol send all or part of their routing table to the neighboring routers to update the routing tables.

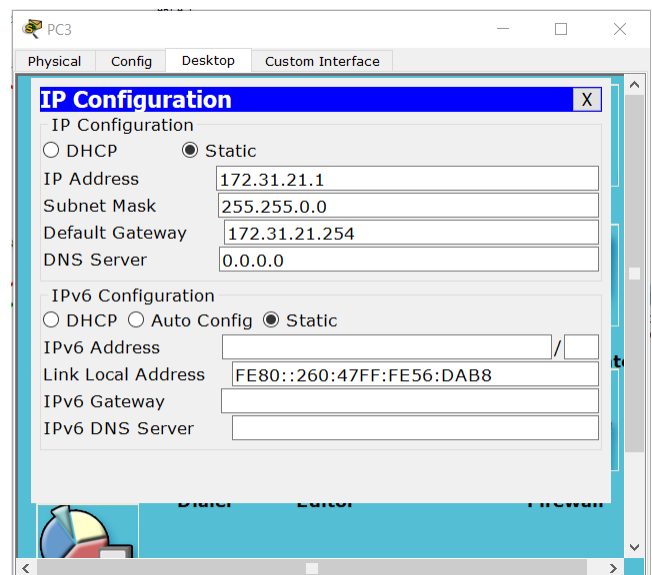
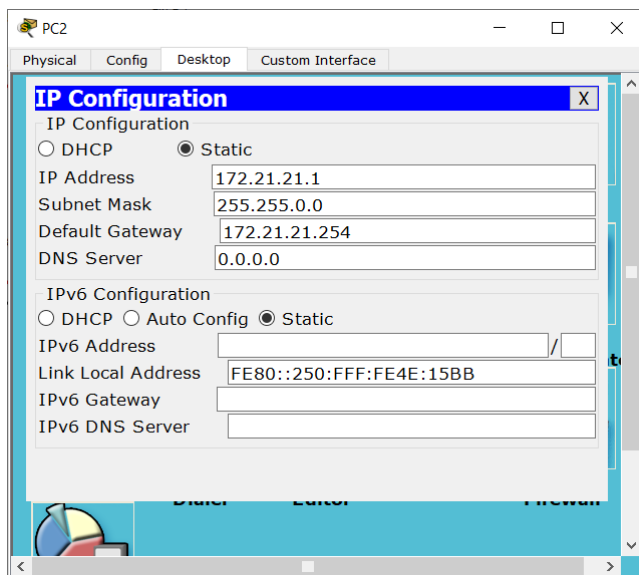
RIP	OSPF
Uses Bellman Ford algorithm	Uses Dijkstra Algorithm
Distance vector protocol	Link state protocol analyzes speed
Used in smaller size organization	Used for large size organization
Allows maximum of 15 hops	No restriction
Administrative distance is 120	Administrative distance is 110

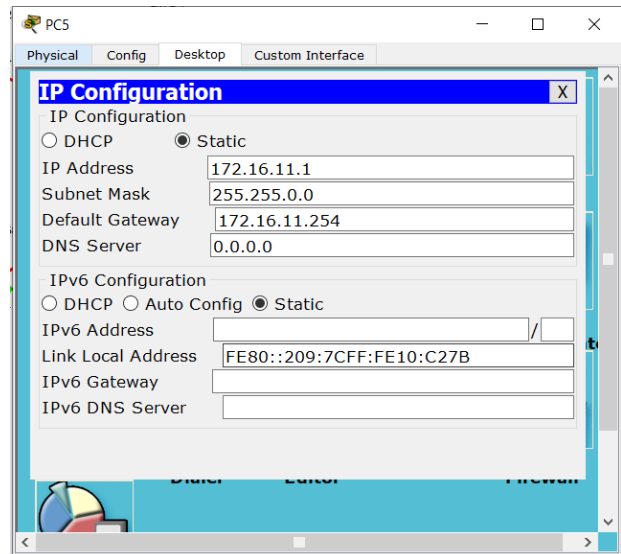
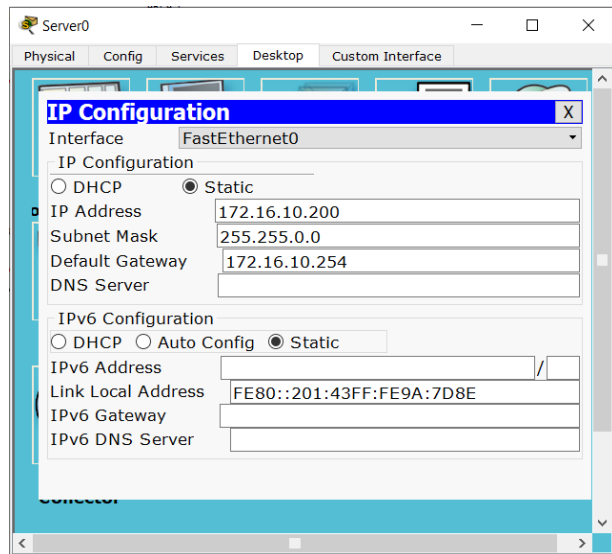
Simulation of OSPF on Cisco Packet Tracer

- 1) Place the components on the workspace and connect them using the proper cables.



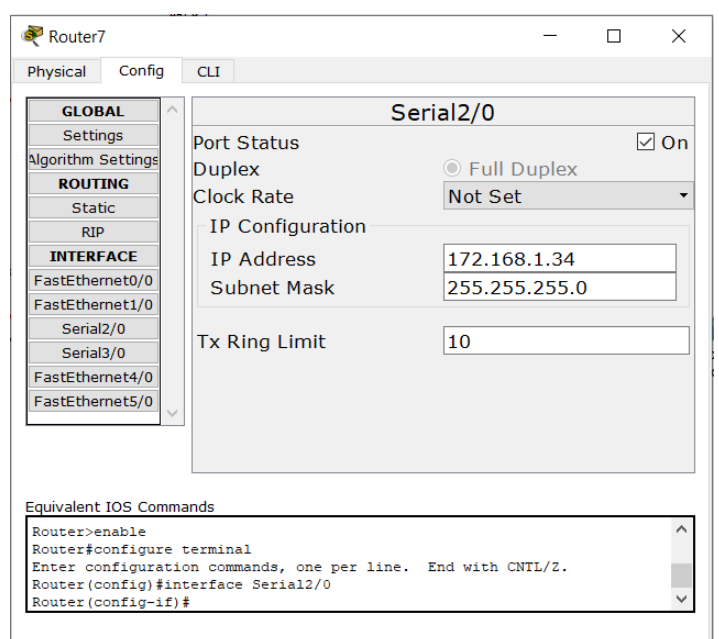
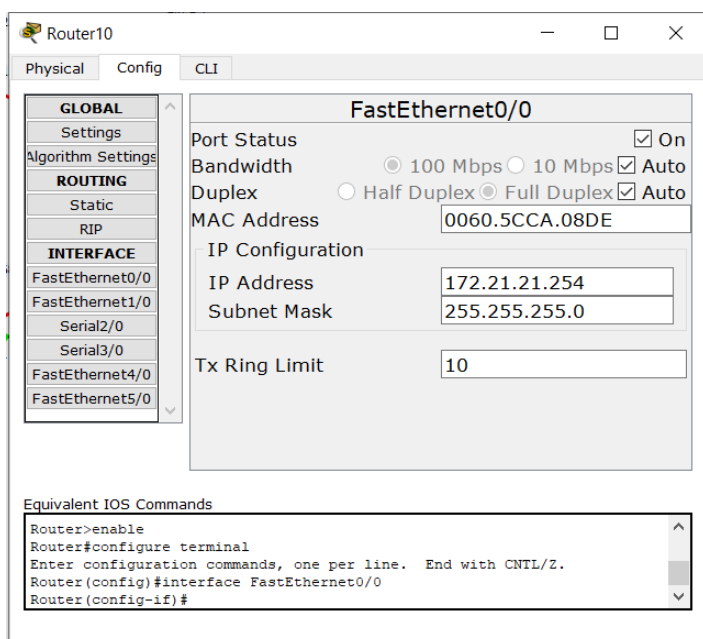
2) Then configure the IP address and subnet mask for all computers respectively including their default gateway of their routers.





- 3) Configure routers using their fast internet port for local connection and serial port for outside connection. Open the CLI for a specific router and use the below commands to configure IP address and subnet mask.

```
enable
configure terminal
interface <router interface>          (example f0/0 or ser0/3)
ip address <ip address> <subnet mask>
no shut
exit
```



Router11

Physical Config CLI

FastEthernet0/0

Port Status ☒ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 0060.2F59.5848

IP Configuration

IP Address 172.31.21.254

Subnet Mask 255.255.255.0

Tx Ring Limit 10

Equivalent IOS Commands

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
```

Router11

Physical Config CLI

Serial2/0

Port Status ☒ On

Duplex ☒ Full Duplex

Clock Rate Not Set

IP Configuration

IP Address 172.22.1.100

Subnet Mask 255.255.255.0

Tx Ring Limit 10

Equivalent IOS Commands

```
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
```

- 4) Once we configure the IP address for all components then we can start configuring the OSPF for each router. We use the CLI and input the commands below to configure the OSPF for a specific router.

router ospf 1 (give the router process id)

network <network id> <wildcard subnet> area <area number> (172.21.21.254 0.255.255.255 area 1)

exit

do show ip route (will show us the IP route lis)

Router10

Physical Config CLI

IOS Command Line Interface

```
Router(config)#
Router(config)#
Router(config)#do 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

    172.21.0.0/24 is subnetted, 1 subnets
C       172.21.21.0 is directly connected, FastEthernet0/0
    172.22.0.0/24 is subnetted, 2 subnets
O IA    172.22.1.0 [110/129] via 172.22.2.1, 00:58:02, Serial2/0
C       172.22.2.0 is directly connected, Serial2/0
    172.31.0.0/24 is subnetted, 1 subnets
O IA    172.31.21.0 [110/130] via 172.22.2.1, 00:57:22, Serial2/0
    172.168.0.0/24 is subnetted, 1 subnets
O       172.168.1.0 [110/128] via 172.22.2.1, 00:22:56, Serial2/0
O IA    192.168.1.0/24 [110/65] via 172.22.2.1, 00:59:09, Serial2/0
Router(config)#
```

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Router9

Physical Config CLI

IOS Command Line Interface

```
Router>
Router>
Router>enable
Router#
Router#config ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#do 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, Serial7/0
    172.168.0.0/24 is subnetted, 1 subnets
C       172.168.1.0 is directly connected, Serial2/0
C       192.168.1.0/24 is directly connected, Serial3/0
Router(config)#
```

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Router11

Physical Config CLI

IOS Command Line Interface

```
Router#config ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#do 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

    172.21.0.0/24 is subnetted, 1 subnets
O IA    172.21.21.0 [110/130] via 172.22.1.1, 00:58:39, Serial2/0
    172.22.0.0/24 is subnetted, 2 subnets
C       172.22.1.0 is directly connected, Serial2/0
O IA    172.22.2.0 [110/129] via 172.22.1.1, 00:58:39, Serial2/0
    172.31.0.0/24 is subnetted, 1 subnets
C       172.31.21.0 is directly connected, FastEthernet0/0
    172.168.0.0/24 is subnetted, 1 subnets
O       172.168.1.0 [110/128] via 172.22.1.1, 00:22:14, Serial2/0
O IA    192.168.1.0/24 [110/65] via 172.22.1.1, 00:58:39, Serial2/0
Router(config)#
```

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Router8

Physical Config CLI

IOS Command Line Interface

```
Router#config ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#do 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

    172.21.0.0/24 is subnetted, 1 subnets
O IA    172.21.21.0 [110/66] via 192.168.1.65, 01:00:11, FastEthernet0/0
    172.22.0.0/24 is subnetted, 2 subnets
C       172.22.1.0 is directly connected, Serial3/0
O IA    172.22.2.0 [110/65] via 192.168.1.65, 01:00:11, FastEthernet0/0
    172.31.0.0/24 is subnetted, 1 subnets
O       172.31.21.0 [110/65] via 172.22.1.100, 00:59:09, Serial3/0
    172.168.0.0/24 is subnetted, 1 subnets
C       172.168.1.0 is directly connected, Serial2/0
C       192.168.1.0/24 is directly connected, FastEthernet0/0
Router(config)#
```

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5) We can now test the connection from the nearest hope to the farthest hope to make sure all connections we created work fine.

```
PC2
Physical Config Desktop Custom Interface

Command Prompt X
Reply from 172.31.21.1: bytes=32 time=2ms TTL=124
Reply from 172.31.21.1: bytes=32 time=2ms TTL=124
Reply from 172.31.21.1: bytes=32 time=2ms TTL=124
Reply from 172.31.21.1: bytes=32 time=2ms TTL=124

Ping statistics for 172.31.21.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 2ms, Average = 2ms

PC>ping 172.21.21.254

Pinging 172.21.21.254 with 32 bytes of data:

Reply from 172.21.21.254: bytes=32 time=1ms TTL=255
Reply from 172.21.21.254: bytes=32 time=0ms TTL=255
Reply from 172.21.21.254: bytes=32 time=1ms TTL=255
Reply from 172.21.21.254: bytes=32 time=0ms TTL=255

Ping statistics for 172.21.21.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 172.21.21.254
```

```
PC2
Physical Config Desktop Custom Interface

Command Prompt X
Reply from 172.21.21.254: bytes=32 time=1ms TTL=255
Reply from 172.21.21.254: bytes=32 time=0ms TTL=255
Reply from 172.21.21.254: bytes=32 time=1ms TTL=255
Reply from 172.21.21.254: bytes=32 time=0ms TTL=255

Ping statistics for 172.21.21.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 172.22.2.100

Pinging 172.22.2.100 with 32 bytes of data:

Reply from 172.22.2.100: bytes=32 time=0ms TTL=255
Reply from 172.22.2.100: bytes=32 time=0ms TTL=255
Reply from 172.22.2.100: bytes=32 time=1ms TTL=255
Reply from 172.22.2.100: bytes=32 time=0ms TTL=255

Ping statistics for 172.22.2.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>
```

```
PC2
Physical Config Desktop Custom Interface

Command Prompt X
Reply from 172.22.2.100: bytes=32 time=0ms TTL=255
Reply from 172.22.2.100: bytes=32 time=0ms TTL=255
Reply from 172.22.2.100: bytes=32 time=1ms TTL=255
Reply from 172.22.2.100: bytes=32 time=0ms TTL=255

Ping statistics for 172.22.2.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 172.22.2.1

Pinging 172.22.2.1 with 32 bytes of data:

Reply from 172.22.2.1: bytes=32 time=4ms TTL=254
Reply from 172.22.2.1: bytes=32 time=1ms TTL=254
Reply from 172.22.2.1: bytes=32 time=1ms TTL=254
Reply from 172.22.2.1: bytes=32 time=1ms TTL=254

Ping statistics for 172.22.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 4ms, Average = 1ms

PC>
```

```
PC2
Physical Config Desktop Custom Interface

Command Prompt X
Reply from 172.22.2.1: bytes=32 time=4ms TTL=254
Reply from 172.22.2.1: bytes=32 time=1ms TTL=254
Reply from 172.22.2.1: bytes=32 time=1ms TTL=254
Reply from 172.22.2.1: bytes=32 time=1ms TTL=254

Ping statistics for 172.22.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 4ms, Average = 1ms

PC>ping 192.168.1.65

Pinging 192.168.1.65 with 32 bytes of data:

Reply from 192.168.1.65: bytes=32 time=1ms TTL=254
Reply from 192.168.1.65: bytes=32 time=1ms TTL=254
Reply from 192.168.1.65: bytes=32 time=1ms TTL=254
Reply from 192.168.1.65: bytes=32 time=1ms TTL=254

Ping statistics for 192.168.1.65:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms

PC>
```

```
PC2
Physical Config Desktop Custom Interface

Command Prompt

Reply from 172.31.21.254: bytes=32 time=3ms TTL=252
Reply from 172.31.21.254: bytes=32 time=2ms TTL=252
Reply from 172.31.21.254: bytes=32 time=2ms TTL=252
Reply from 172.31.21.254: bytes=32 time=7ms TTL=252

Ping statistics for 172.31.21.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 7ms, Average = 3ms

PC>ping 172.31.21.1

Pinging 172.31.21.1 with 32 bytes of data:

Reply from 172.31.21.1: bytes=32 time=3ms TTL=124
Reply from 172.31.21.1: bytes=32 time=11ms TTL=124
Reply from 172.31.21.1: bytes=32 time=8ms TTL=124
Reply from 172.31.21.1: bytes=32 time=3ms TTL=124

Ping statistics for 172.31.21.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 11ms, Average = 6ms

PC>
```

```
PC2
Physical Config Desktop Custom Interface

Command Prompt

Reply from 172.31.21.254: bytes=32 time=3ms TTL=252
Reply from 172.31.21.254: bytes=32 time=2ms TTL=252
Reply from 172.31.21.254: bytes=32 time=2ms TTL=252
Reply from 172.31.21.254: bytes=32 time=7ms TTL=252

Ping statistics for 172.31.21.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 7ms, Average = 3ms

PC>ping 172.31.21.1

Pinging 172.31.21.1 with 32 bytes of data:

Reply from 172.31.21.1: bytes=32 time=3ms TTL=124
Reply from 172.31.21.1: bytes=32 time=11ms TTL=124
Reply from 172.31.21.1: bytes=32 time=8ms TTL=124
Reply from 172.31.21.1: bytes=32 time=3ms TTL=124

Ping statistics for 172.31.21.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 11ms, Average = 6ms

PC>
```

```
PC2
Physical Config Desktop Custom Interface

Command Prompt

Reply from 172.22.1.100: bytes=32 time=2ms TTL=252
Reply from 172.22.1.100: bytes=32 time=2ms TTL=252
Reply from 172.22.1.100: bytes=32 time=2ms TTL=252
Reply from 172.22.1.100: bytes=32 time=2ms TTL=252

Ping statistics for 172.22.1.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 2ms, Average = 2ms

PC>ping 172.31.21.254

Pinging 172.31.21.254 with 32 bytes of data:

Reply from 172.31.21.254: bytes=32 time=3ms TTL=252
Reply from 172.31.21.254: bytes=32 time=2ms TTL=252
Reply from 172.31.21.254: bytes=32 time=2ms TTL=252
Reply from 172.31.21.254: bytes=32 time=7ms TTL=252

Ping statistics for 172.31.21.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 7ms, Average = 3ms

PC>
```

```
PC2
Physical Config Desktop Custom Interface

Command Prompt

Reply from 172.22.1.1: bytes=32 time=2ms TTL=253
Reply from 172.22.1.1: bytes=32 time=1ms TTL=253
Reply from 172.22.1.1: bytes=32 time=17ms TTL=253
Reply from 172.22.1.1: bytes=32 time=1ms TTL=253

Ping statistics for 172.22.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 17ms, Average = 5ms

PC>ping 172.22.1.100

Pinging 172.22.1.100 with 32 bytes of data:

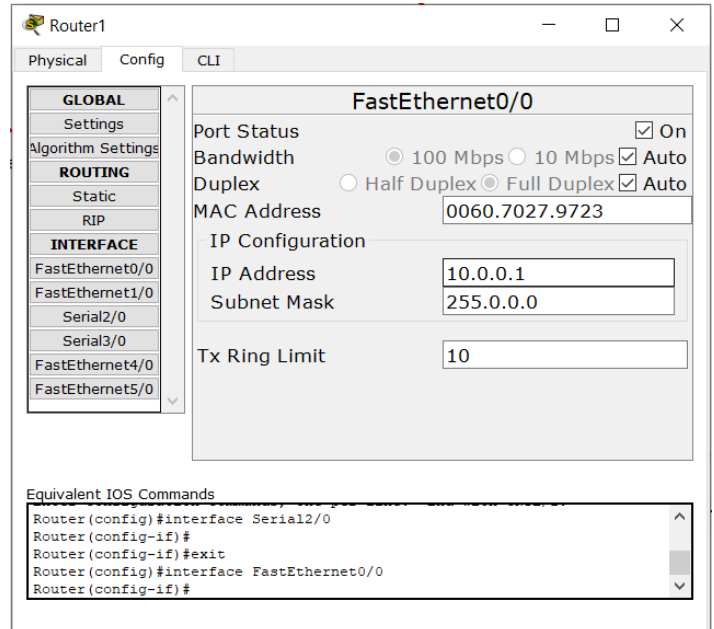
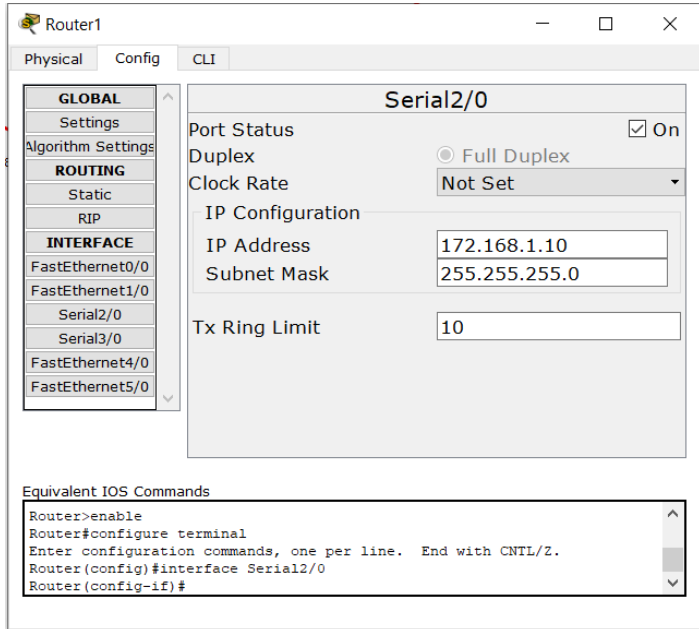
Reply from 172.22.1.100: bytes=32 time=2ms TTL=252
Reply from 172.22.1.100: bytes=32 time=2ms TTL=252
Reply from 172.22.1.100: bytes=32 time=2ms TTL=252
Reply from 172.22.1.100: bytes=32 time=2ms TTL=252

Ping statistics for 172.22.1.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 2ms, Average = 2ms

PC>
```

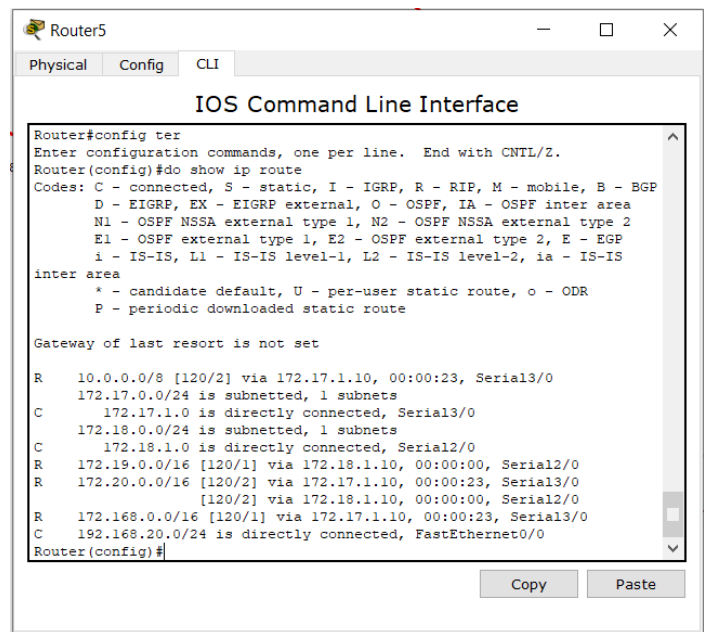
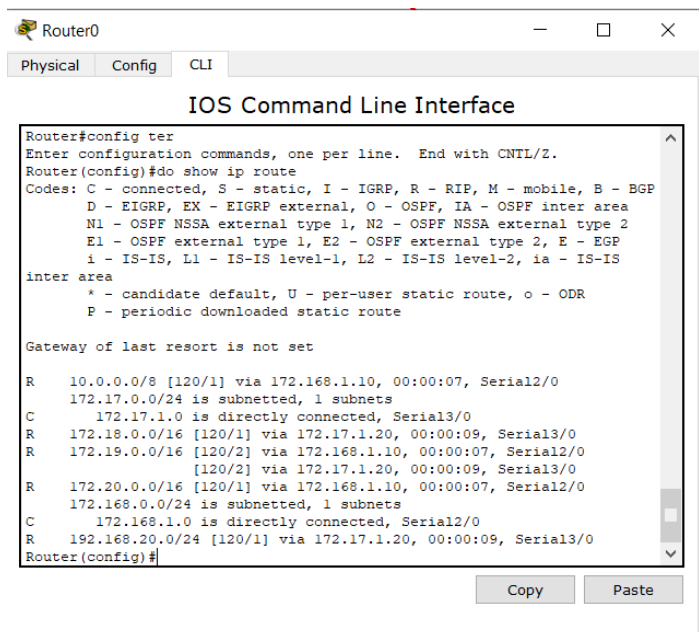
Simulation of RIP Protocol on Cisco Packet Tracer

- 1) Place the components on the workspace then connect all the components with the appropriate cables.

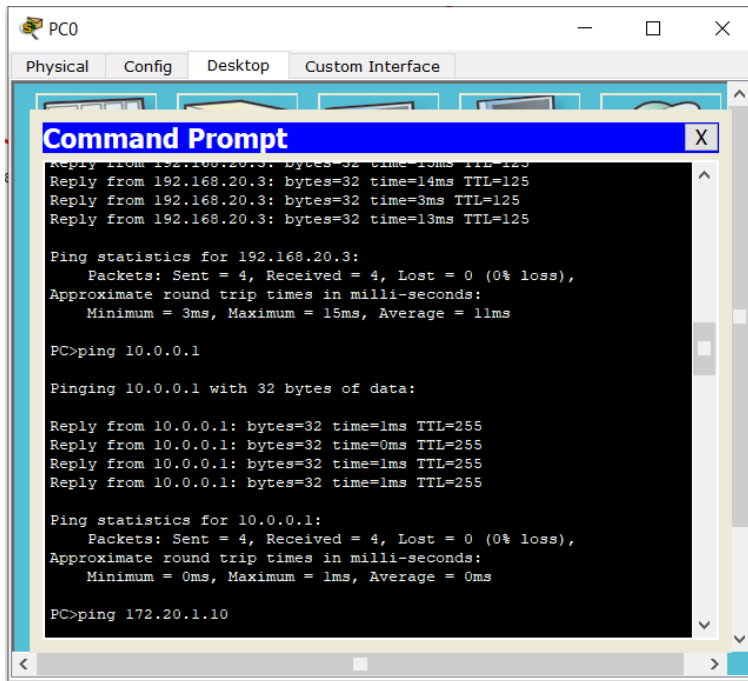


- 3) Once all the IP is configured and we get a green signal on each end point we can proceed to configure our RIP protocol. Open the router and go to CLI mode

enable
configure terminal
router rip
network <network id> (10.0.0.0)
do show ip route



5) Then after configuring our RIP protocol we can test the connection from the nearest hop to the farthest.



```
PC0
Physical Config Desktop Custom Interface
Command Prompt
Reply from 192.168.20.3: bytes=32 time=13ms TTL=125
Reply from 192.168.20.3: bytes=32 time=14ms TTL=125
Reply from 192.168.20.3: bytes=32 time=3ms TTL=125
Reply from 192.168.20.3: bytes=32 time=13ms TTL=125

Ping statistics for 192.168.20.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 15ms, Average = 11ms

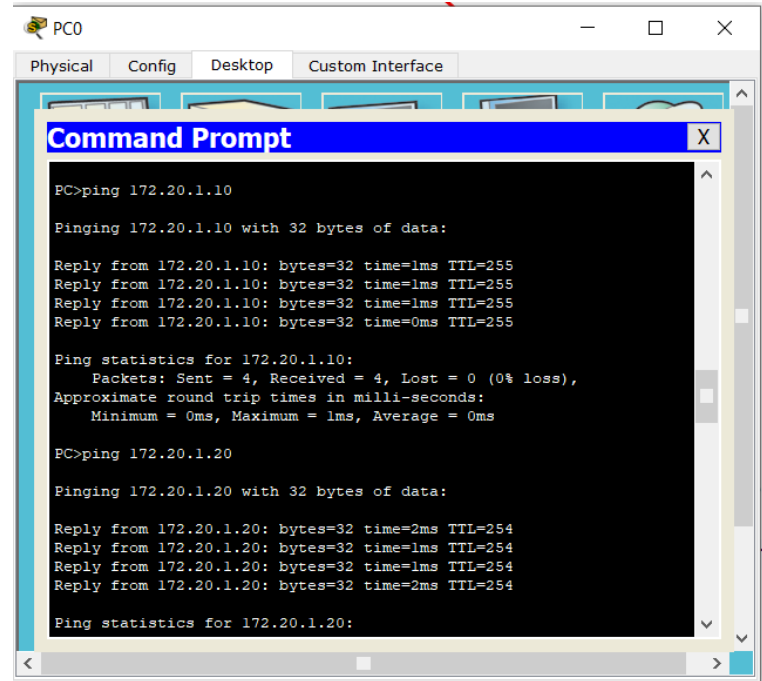
PC>ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

Reply from 10.0.0.1: bytes=32 time=1ms 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
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

PC>ping 172.20.1.10
```



```
PC0
Physical Config Desktop Custom Interface
Command Prompt
PC>ping 172.20.1.10

Pinging 172.20.1.10 with 32 bytes of data:

Reply from 172.20.1.10: bytes=32 time=1ms TTL=255
Reply from 172.20.1.10: bytes=32 time=1ms TTL=255
Reply from 172.20.1.10: bytes=32 time=1ms TTL=255
Reply from 172.20.1.10: bytes=32 time=0ms TTL=255

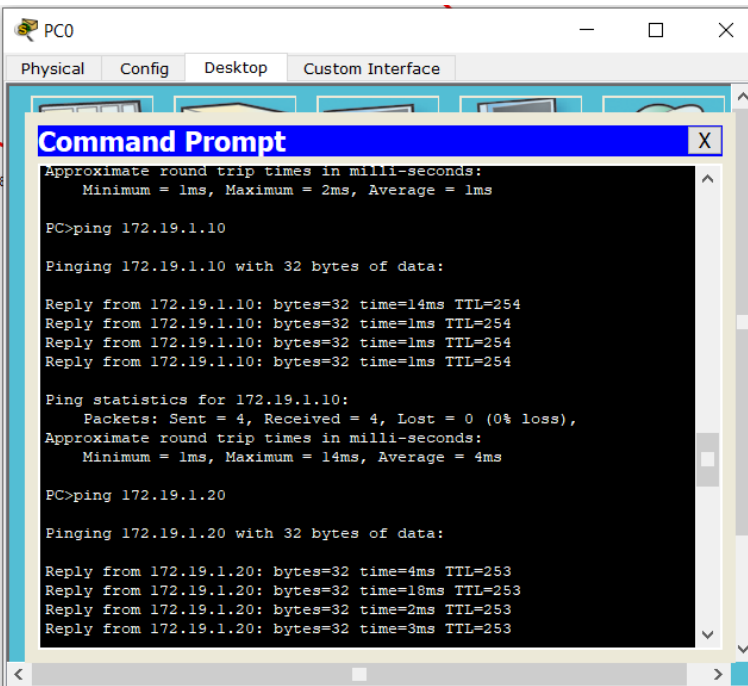
Ping statistics for 172.20.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 172.20.1.20

Pinging 172.20.1.20 with 32 bytes of data:

Reply from 172.20.1.20: bytes=32 time=2ms TTL=254
Reply from 172.20.1.20: bytes=32 time=1ms TTL=254
Reply from 172.20.1.20: bytes=32 time=1ms TTL=254
Reply from 172.20.1.20: bytes=32 time=2ms TTL=254

Ping statistics for 172.20.1.20:
```



```
PC0
Physical Config Desktop Custom Interface
Command Prompt
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 2ms, Average = 1ms

PC>ping 172.19.1.10

Pinging 172.19.1.10 with 32 bytes of data:

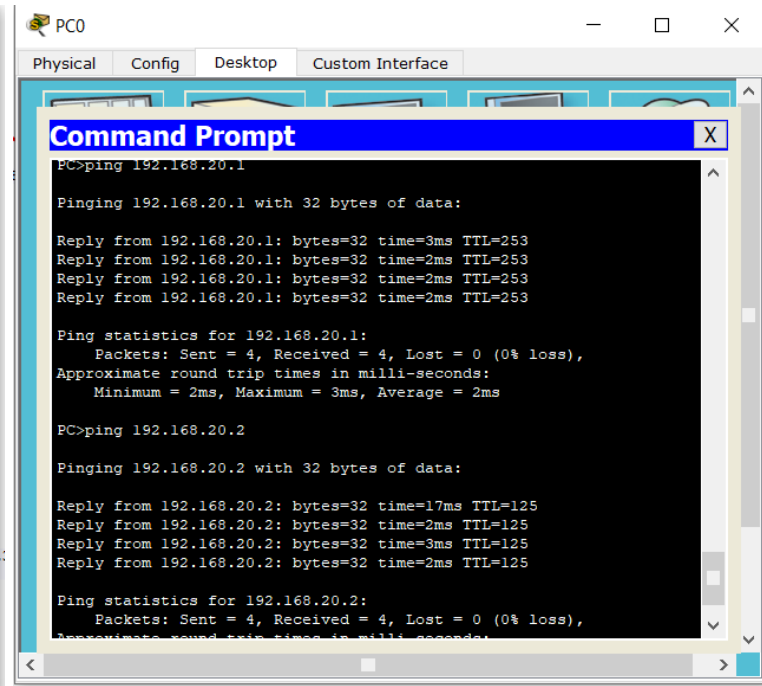
Reply from 172.19.1.10: bytes=32 time=14ms TTL=254
Reply from 172.19.1.10: bytes=32 time=1ms TTL=254
Reply from 172.19.1.10: bytes=32 time=1ms TTL=254
Reply from 172.19.1.10: bytes=32 time=1ms TTL=254

Ping statistics for 172.19.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 14ms, Average = 4ms

PC>ping 172.19.1.20

Pinging 172.19.1.20 with 32 bytes of data:

Reply from 172.19.1.20: bytes=32 time=4ms TTL=253
Reply from 172.19.1.20: bytes=32 time=18ms TTL=253
Reply from 172.19.1.20: bytes=32 time=2ms TTL=253
Reply from 172.19.1.20: bytes=32 time=3ms TTL=253
```



```
PC0
Physical Config Desktop Custom Interface
Command Prompt
PC>ping 192.168.20.1

Pinging 192.168.20.1 with 32 bytes of data:

Reply from 192.168.20.1: bytes=32 time=3ms TTL=253
Reply from 192.168.20.1: bytes=32 time=2ms TTL=253
Reply from 192.168.20.1: bytes=32 time=2ms TTL=253
Reply from 192.168.20.1: bytes=32 time=2ms TTL=253

Ping statistics for 192.168.20.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 3ms, Average = 2ms

PC>ping 192.168.20.2

Pinging 192.168.20.2 with 32 bytes of data:

Reply from 192.168.20.2: bytes=32 time=17ms TTL=125
Reply from 192.168.20.2: bytes=32 time=2ms TTL=125
Reply from 192.168.20.2: bytes=32 time=3ms TTL=125
Reply from 192.168.20.2: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.20.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
```

- The packet file for this assignment is attached here <https://github.com/mikias21/NADC/tree/main/assignment3>