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# Rip routing protocol

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# 1 Abstract

The purpose of this experiment is to know how the RIP routing protocol works and to know how to configure RIP routing protocol. Also, to enable every device in the network to communicate with each other.

# 2 Introduction

The modern network must be fast, it must dynamically recognize events and act accordingly. If the path is down, the traffic must immediately flow into a secondary lane so that information is not lost. With this in mind, a manual update of our routers' routing table is no longer sufficient. If we automate this, every time we connect a new LAN chip to a router, all the other routers will know about it. Moreover, if the link is broken, the network should automatically direct all traffic to other links. We're not talking about magic, we're talking about dynamic steering. The simplest routing protocol we can use is RIP, which is ideal for introducing you to dynamic routing. Another advantage of routing information protocol is that it avoids redundancy during routing. This is obtained by using the number of hops, that is, we only use the path that has the minimum

The number of hops. The maximum value that the hop count can reach is 15. If the number of hops is greater than this value, then that designated network is considered as inaccessible.

Also, in this experiment we add loopback to R1, to imitate a connection to an ISP, then we establish a static route redistribution to the ISP connection (loopback in our case).

So the gateway's last resource will be the ISP for all routers.

# 3 Topology of this experiment

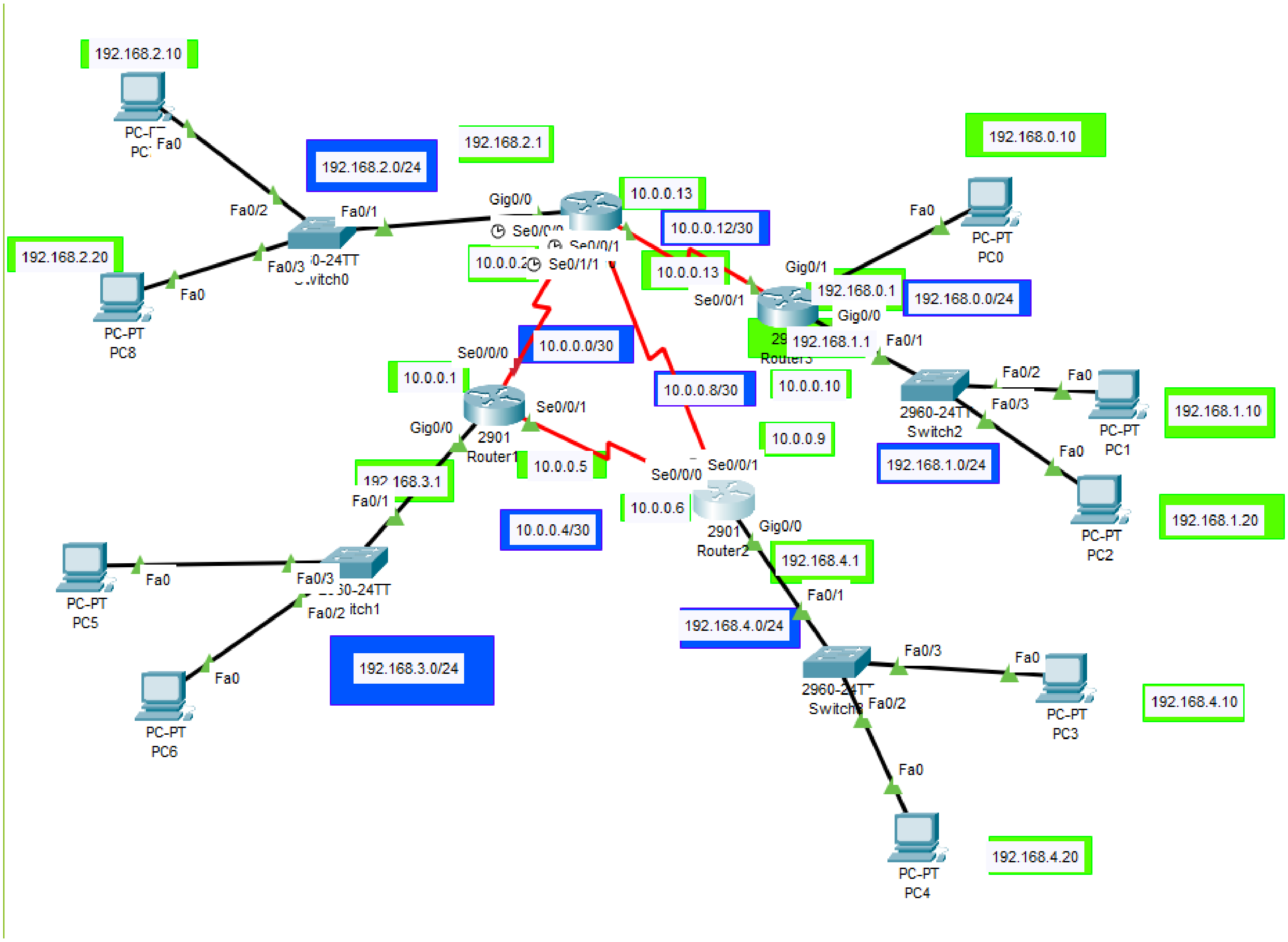



Figure 1: Topology Experiment

# 4 Procedure

1. Firstly I build the network as shown in the topology above. Also configured the Addressing as shown, the blue color refers to networks, and the green refers to the hosts.

2. Then we started & configured the routing RIP protocol for all router, as shown in figures 2,3,4 and 5

```
R0#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R0(config)#router rip
R0(config)#router rip
R0(config-router)#network 10.0.0.0
R0(config-router)# network 192.168.2.0
R0(config-router)#
```

Figure 2: RIP in router 0

```
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#router rip
R1(config-router)#network 10.0.0.0
R1(config-router)# network 192.168.3.0
```

Figure 3: RIP in router 1

```
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#router
R3(config)#router r
R3(config)#router rip
R3(config-router)# network 10.0.0.0
R3(config-router)# network 192.168.0.0
R3(config-router)# network 192.168.1.0
R3(config-router)#
```

Figure 4: RIP in router 2

```
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#router rip
R2(config-router)# network 10.0.0.0
R2(config-router)# network 192.168.4.0
R2(config-router)#
```

Figure 5: RIP in router 3

3. After that we made sure that the networks are listed precisely in the routing table as they are in the figure above,as shows in figure 6,7,8 and 12.

```
R0#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, 5 subnets, 2 masks
R       10.0.0.4/30 [120/1] via 10.0.0.9, 00:00:02, Serial0/1/1
C       10.0.0.8/30 is directly connected, Serial0/1/1
L       10.0.0.10/32 is directly connected, Serial0/1/1
C       10.0.0.12/30 is directly connected, Serial0/0/1
L       10.0.0.13/32 is directly connected, Serial0/0/1
R    192.168.0.0/24 [120/1] via 10.0.0.14, 00:00:25, Serial0/0/1
R    192.168.1.0/24 [120/1] via 10.0.0.14, 00:00:25, Serial0/0/1
     192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.2.0/24 is directly connected, GigabitEthernet0/0
L       192.168.2.1/32 is directly connected, GigabitEthernet0/0
R    192.168.3.0/24 [120/2] via 10.0.0.9, 00:00:02, Serial0/1/1
R    192.168.4.0/24 [120/1] via 10.0.0.9, 00:00:02, Serial0/1/1
```

Figure 6: Routing table R0

```
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, 4 subnets, 2 masks
C       10.0.0.4/30 is directly connected, Serial0/0/1
L       10.0.0.5/32 is directly connected, Serial0/0/1
R       10.0.0.8/30 [120/1] via 10.0.0.6, 00:00:01, Serial0/0/1
R       10.0.0.12/30 [120/2] via 10.0.0.6, 00:00:01, Serial0/0/1
R    192.168.0.0/24 [120/3] via 10.0.0.6, 00:00:01, Serial0/0/1
R    192.168.1.0/24 [120/3] via 10.0.0.6, 00:00:01, Serial0/0/1
R    192.168.2.0/24 [120/2] via 10.0.0.6, 00:00:01, Serial0/0/1
     192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.3.0/24 is directly connected, GigabitEthernet0/0
L       192.168.3.1/32 is directly connected, GigabitEthernet0/0
R    192.168.4.0/24 [120/1] via 10.0.0.6, 00:00:01, Serial0/0/1
```

Figure 7: Routing table R1

```
Gateway of last resort is not set

     10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
C       10.0.0.4/30 is directly connected, Serial0/0/1
L       10.0.0.6/32 is directly connected, Serial0/0/1
C       10.0.0.8/30 is directly connected, Serial0/0/0
L       10.0.0.9/32 is directly connected, Serial0/0/0
R       10.0.0.12/30 [120/1] via 10.0.0.10, 00:00:17, Serial0/0/0
R    192.168.0.0/24 [120/2] via 10.0.0.10, 00:00:17, Serial0/0/0
R    192.168.1.0/24 [120/2] via 10.0.0.10, 00:00:17, Serial0/0/0
R    192.168.2.0/24 [120/1] via 10.0.0.10, 00:00:17, Serial0/0/0
R    192.168.3.0/24 [120/1] via 10.0.0.5, 00:00:23, Serial0/0/1
     192.168.4.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.4.0/24 is directly connected, GigabitEthernet0/0
L       192.168.4.1/32 is directly connected, GigabitEthernet0/0
```

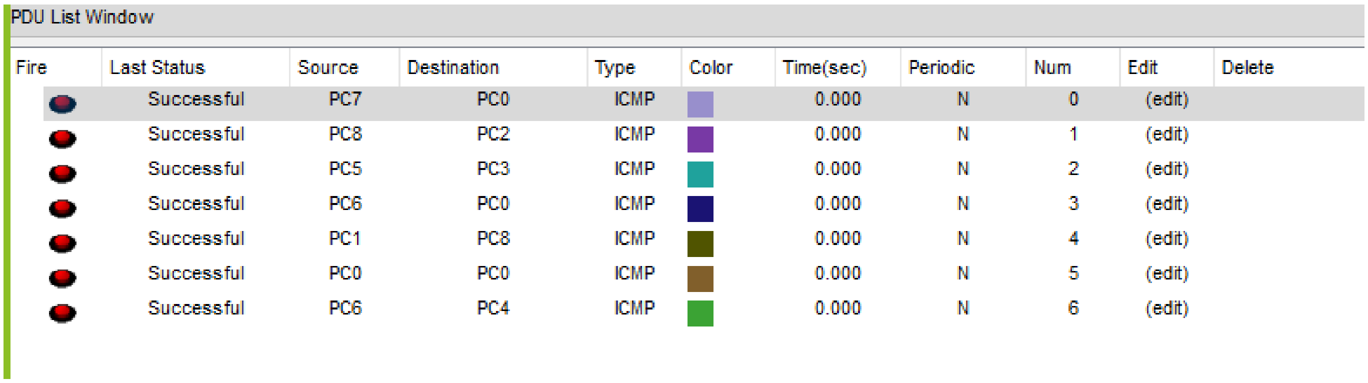
Figure 8: Routing table R2

```
Gateway of last resort is not set

     10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
R       10.0.0.4/30 [120/2] via 10.0.0.13, 00:00:05, Serial0/0/1
R       10.0.0.8/30 [120/1] via 10.0.0.13, 00:00:05, Serial0/0/1
C       10.0.0.12/30 is directly connected, Serial0/0/1
L       10.0.0.14/32 is directly connected, Serial0/0/1
     192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.0.0/24 is directly connected, GigabitEthernet0/1
L       192.168.0.1/32 is directly connected, GigabitEthernet0/1
     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
R    192.168.2.0/24 [120/1] via 10.0.0.13, 00:00:05, Serial0/0/1
R    192.168.3.0/24 [120/3] via 10.0.0.13, 00:00:05, Serial0/0/1
R    192.168.4.0/24 [120/2] via 10.0.0.13, 00:00:05, Serial0/0/1
```

Figure 9: Routing table R3

4. then we verify the connectivity between each host to make sure that all hosts in the different networks can communicate with each other. Figure 10 show the result.



PDU List Window

| Fire | Last Status | Source | Destination | Type | Color | Time(sec) | Periodic | Num | Edit | Delete |
|---|---|---|---|---|---|---|---|---|---|---|
| | Successful | PC7 | PC0 | ICMP | | 0.000 | N | 0 | (edit) | |
| | Successful | PC8 | PC2 | ICMP | | 0.000 | N | 1 | (edit) | |
| | Successful | PC5 | PC3 | ICMP | | 0.000 | N | 2 | (edit) | |
| | Successful | PC6 | PC0 | ICMP | | 0.000 | N | 3 | (edit) | |
| | Successful | PC1 | PC8 | ICMP | | 0.000 | N | 4 | (edit) | |
| | Successful | PC0 | PC0 | ICMP | | 0.000 | N | 5 | (edit) | |
| | Successful | PC6 | PC4 | ICMP | | 0.000 | N | 6 | (edit) | |

Figure 10: Verify Connectivity

5. Later on, we record the full path between two hosts in the topology by using **tracert** command. Figure 11 show the result.

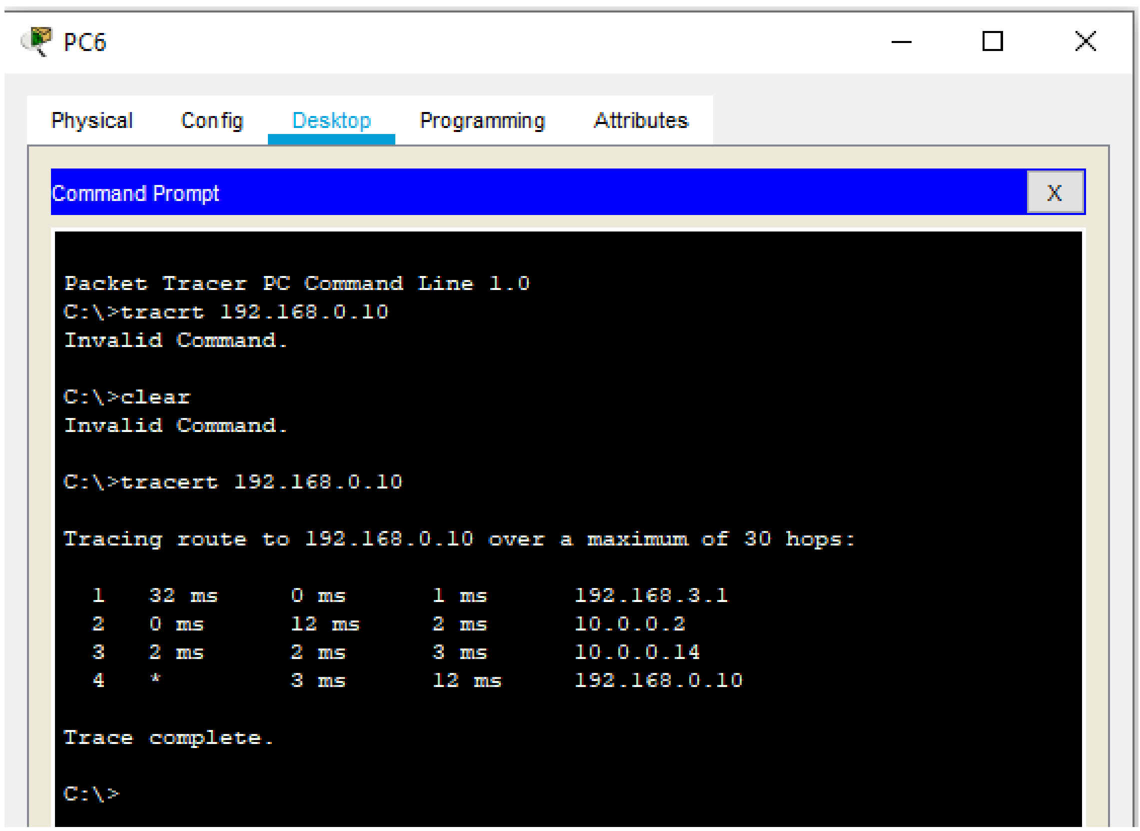



Figure 11: Tracert from PC6 to PC0

6. Also, after a rip configuration, I add loopback to R3 to imitate a connection to an ISP, as figures 12 and 13 show, so every packet with a known IP will go to isp, which is a gateway last resort. In Figured 12, we establish a static route redistribution to the ISP connection (loopback in our case).

   - A Gateway of Last Resort or Default gateway is a route used by the router when no other known route exists to transmit the IP packet. Known routes are present in the routing table.

```
R3(config)#int lo0

R3(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

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

R3(config-if)#ip add 209.165.201.1 255.255.255.255
R3(config-if)#exi
R3(config)#router rip
R3(config-router)#de
R3(config-router)#default-information o
R3(config-router)#default-information originate
```

Figure 12: Lob0 ip

```
R3(config)#ip route 0.0.0.0 0.0.0.0 loopback 0
%Default route without gateway, if not a point-to-point interface, may impact performance
R3(config)#
```

Figure 13: Default route

7. In the last, we made sure that all routing tables in the router will have a Gateway of Last Resort which is IsP. Figures 14,15,16 and 17 show the result for each router.

```
R0#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 10.0.0.14 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
R       10.0.0.4/30 [120/1] via 10.0.0.9, 00:00:15, Serial0/1/1
C       10.0.0.8/30 is directly connected, Serial0/1/1
L       10.0.0.10/32 is directly connected, Serial0/1/1
C       10.0.0.12/30 is directly connected, Serial0/0/1
L       10.0.0.13/32 is directly connected, Serial0/0/1
R    192.168.0.0/24 [120/1] via 10.0.0.14, 00:00:05, Serial0/0/1
R    192.168.1.0/24 [120/1] via 10.0.0.14, 00:00:05, Serial0/0/1
     192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.2.0/24 is directly connected, GigabitEthernet0/0
L       192.168.2.1/32 is directly connected, GigabitEthernet0/0
R    192.168.3.0/24 [120/2] via 10.0.0.9, 00:00:15, Serial0/1/1
R    192.168.4.0/24 [120/1] via 10.0.0.9, 00:00:15, Serial0/1/1
R*   0.0.0.0/0 [120/1] via 10.0.0.14, 00:00:05, Serial0/0/1
```

Figure 14: Routing table R0

```
R1#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 10.0.0.6 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
C       10.0.0.4/30 is directly connected, Serial0/0/1
L       10.0.0.5/32 is directly connected, Serial0/0/1
R       10.0.0.8/30 [120/1] via 10.0.0.6, 00:00:26, Serial0/0/1
R       10.0.0.12/30 [120/2] via 10.0.0.6, 00:00:26, Serial0/0/1
R    192.168.0.0/24 [120/3] via 10.0.0.6, 00:00:26, Serial0/0/1
R    192.168.1.0/24 [120/3] via 10.0.0.6, 00:00:26, Serial0/0/1
R    192.168.2.0/24 [120/2] via 10.0.0.6, 00:00:26, Serial0/0/1
     192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.3.0/24 is directly connected, GigabitEthernet0/0
L       192.168.3.1/32 is directly connected, GigabitEthernet0/0
R    192.168.4.0/24 [120/1] via 10.0.0.6, 00:00:26, Serial0/0/1
R*   0.0.0.0/0 [120/3] via 10.0.0.6, 00:00:26, Serial0/0/1
```

Figure 15: Routing table R1

```
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 10.0.0.10 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
C       10.0.0.4/30 is directly connected, Serial0/0/1
L       10.0.0.6/32 is directly connected, Serial0/0/1
C       10.0.0.8/30 is directly connected, Serial0/0/0
L       10.0.0.9/32 is directly connected, Serial0/0/0
R       10.0.0.12/30 [120/1] via 10.0.0.10, 00:00:00, Serial0/0/0
R    192.168.0.0/24 [120/2] via 10.0.0.10, 00:00:00, Serial0/0/0
R    192.168.1.0/24 [120/2] via 10.0.0.10, 00:00:00, Serial0/0/0
R    192.168.2.0/24 [120/1] via 10.0.0.10, 00:00:00, Serial0/0/0
R    192.168.3.0/24 [120/1] via 10.0.0.5, 00:00:02, Serial0/0/1
     192.168.4.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.4.0/24 is directly connected, GigabitEthernet0/0
L       192.168.4.1/32 is directly connected, GigabitEthernet0/0
R*   0.0.0.0/0 [120/2] via 10.0.0.10, 00:00:00, Serial0/0/0
```

Figure 16: Routing table R2

```
       P - periodic downloaded static route

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
R       10.0.0.4/30 [120/2] via 10.0.0.13, 00:00:17, Serial0/0/1
R       10.0.0.8/30 [120/1] via 10.0.0.13, 00:00:17, Serial0/0/1
C       10.0.0.12/30 is directly connected, Serial0/0/1
L       10.0.0.14/32 is directly connected, Serial0/0/1
     192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.0.0/24 is directly connected, GigabitEthernet0/1
L       192.168.0.1/32 is directly connected, GigabitEthernet0/1
     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
R    192.168.2.0/24 [120/1] via 10.0.0.13, 00:00:17, Serial0/0/1
R    192.168.3.0/24 [120/3] via 10.0.0.13, 00:00:17, Serial0/0/1
R    192.168.4.0/24 [120/2] via 10.0.0.13, 00:00:17, Serial0/0/1
     209.165.201.0/32 is subnetted, 1 subnets
C       209.165.201.1/32 is directly connected, Loopback0
S*   0.0.0.0/0 is directly connected, Loopback0
```

Figure 17: Routing table R3

# 5 Conclusion

In most networking environments, RIP is not the preferred choice for routing as its time to converge and scalability are poor compared to EIGRP, OSPF, or IS-IS. However, it is easy to configure, because RIP does not require any parameters, unlike other protocols.

# 6 References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https://www.careerride.com/Networking-gateway-of-last-resort.aspx: :text=A