

**PRUEBA DE HABILIDADES DIPLOMADO CISCO CCNA**

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## **CONTENIDO**

INTRODUCCION .....	3
DESARROLLO ESCENARIO 1 .....	4
Topología de red .....	4
Desarrollo .....	5
Tabla de enrutamiento .....	5
Parte 1: Configuración del enrutamiento .....	6
Parte 2: Tabla de Enrutamiento.....	9
Parte 3: Deshabilitar la propagación del protocolo RIP .....	13
Parte 4: Verificación del protocolo RIP .....	14
Parte 5: Configurar encapsulamiento y autenticación PPP .....	15
Parte 6: Configuración de PAT.....	15
Parte 7: Configuración del servicio DHCP .....	17
DESARROLLO ESCENARIO 2 .....	19
CONCLUSIONES .....	30
BIBLIOGRAFÍA.....	31

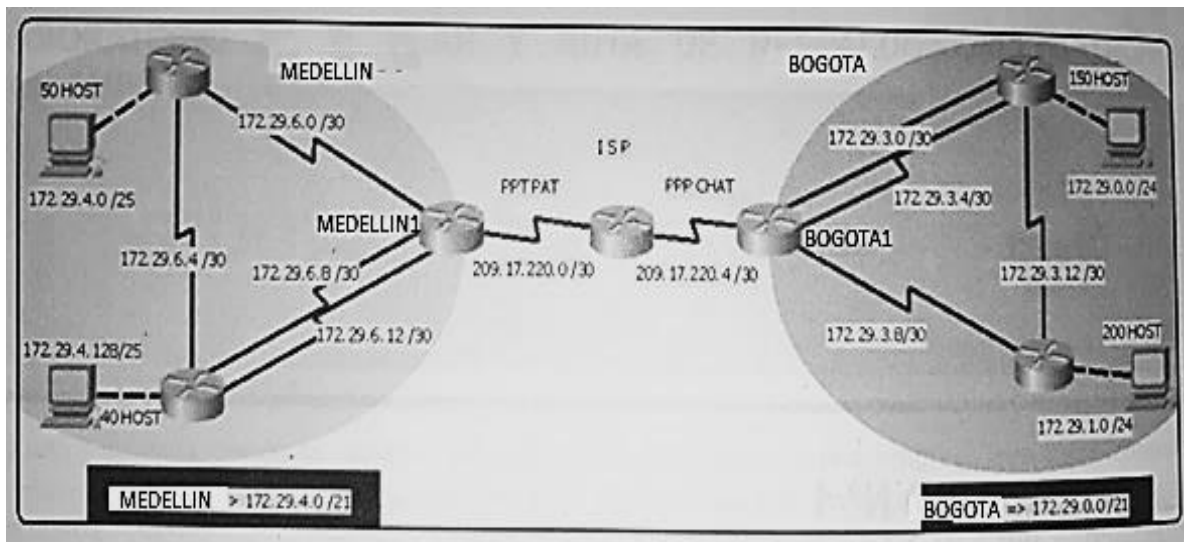
## **INTRODUCCION**

La presente actividad tiene la finalidad de poner a prueba el conocimiento adquirido por el estudiante y como este puede resolver problemas que se pueden presentar en el ámbito laboral. Para estudiantes que trabajan o piensan laborar en el área de telecomunicaciones, sistemas o afines este tipo de actividad es muy conveniente, ya que le permite afrontar este tipo de problemas como proyectos a ejecutar e implementar, además de generarle habilidades de análisis y resolución.

## DESARROLLO ESCENARIO 1

Una empresa posee sucursales distribuidas en las ciudades de Bogotá y Medellín, en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los lineamientos establecidos para el direccionamiento IP, protocolos de enrutamiento y demás aspectos que forman parte de la topología de red.

Topología de red



Este escenario plantea el uso de RIP como protocolo de enrutamiento, considerando que se tendrán rutas por defecto redistribuidas; asimismo, habilitar el encapsulamiento PPP y su autenticación.

Los routers Bogota2 y medellin2 proporcionan el servicio DHCP a su propia red LAN y a los routers 3 de cada ciudad.

Debe configurar PPP en los enlaces hacia el ISP, con autenticación.

Debe habilitar NAT de sobrecarga en los routers Bogota1 y medellin1.

## Desarrollo

Como trabajo inicial se debe realizar lo siguiente.

- Realizar las rutinas de diagnóstico y dejar los equipos listos para su configuración (asignar nombres de equipos, asignar claves de seguridad, etc).
- Realizar la conexión física de los equipos con base en la topología de red.

Configurar la topología de red, de acuerdo con las siguientes especificaciones.

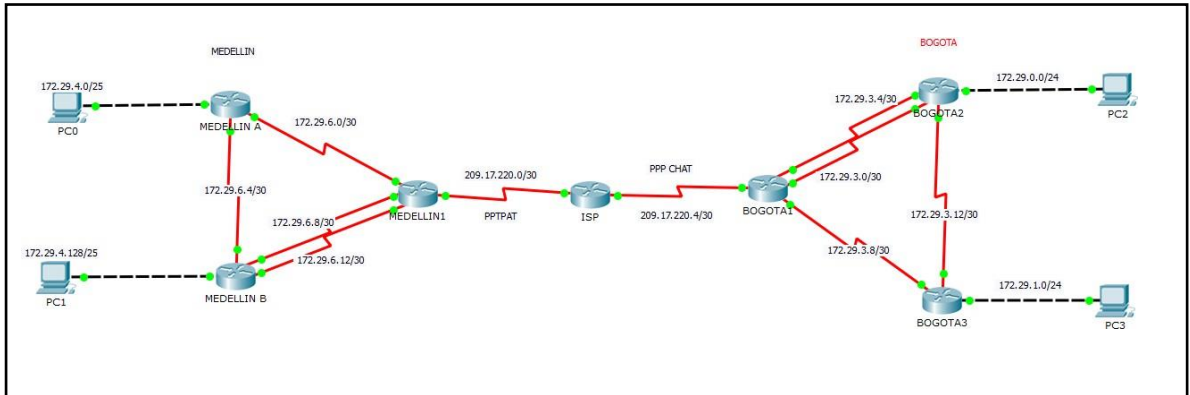


Tabla de enrutamiento:

Para lograr un mejor entendimiento de la red, se realiza el levantamiento de información correspondiente al direccionamiento IPv4 para las interfaces de los router a configurar.

Medellin1				
ip	172.29.6.13	172.29.6.1	172.29.6.9	209.17.220.1
Netmask	255.255.255.252	255.255.255.252	255.255.255.252	255.255.255.252
Interfaz	S 0/0/0	S 0/0/1	s 0/1/1	s 0/1/0
Medellin2				
ip	172.29.6.5	172.29.6.1	172.29.4.1	
Netmask	255.255.255.252	255.255.255.252	255.255.255.128	
Interfaz	S 0/0/0	S 0/0/1	Gi 0/0	
Medellin3				
ip	172.29.6.6	172.29.6.14	172.29.6.10	172.29.4.129
Netmask	255.255.255.252	255.255.255.252	255.255.255.252	255.255.255.128
Interfaz	S 0/0/0	S 0/0/1	s 0/1/0	Gi 0/0
ISP				
ip	209.17.220.2		209.17.220.5	

Netmask	255.255.255.252		255.255.255.252	
Interfaz	s 0/1/0		s 0/1/1	
<b>BOGOTA1</b>				
ip	209.17.220.6	172.29.3.9	172.29.3.5	172.29.3.1
Netmask	255.255.255.252	255.255.255.252	255.255.255.252	255.255.255.252
Interfaz	s 0/0/0	S 0/1/0	s 0/1/1	s 0/0/1
<b>BOGOTA2</b>				
ip	172.29.3.14	172.29.3.6	172.29.3.2	172.29.0.1
Netmask	255.255.255.252	255.255.255.252	255.255.255.252	255.255.255.0
Interfaz	S 0/1/0	s 0/1/1	s 0/0/0	g 0/0
<b>BOGOTA3</b>				
ip	172.29.3.10	172.29.3.13	172.29.1.1	
Netmask	255.255.255.252	255.255.255.252	255.255.255.0	
Interfaz	S 0/1/0	s 0/1/1	g 0/0	

## Parte 1: Configuración del enrutamiento

- a. Configurar el enrutamiento en la red usando el protocolo RIP versión 2, declare la red principal, desactive la sumarización automática.

*Para la configuración de RIP en el router, se debe ingresar con privilegios, seguido usar el comando "router rip", la versión que usaremos en este caso "2" y finalmente la red a la cual se le aplicara este enrutamiento.*

```
MEDELLIN2(config)#router rip
MEDELLIN2(config-router)#version 2
MEDELLIN2(config-router)#network 172.29.4.0
MEDELLIN3(config)#router rip
MEDELLIN3(config-router)#version 2
MEDELLIN3(config-router)#network 172.29.4.128
```

*Con el fin de desactivar la sumarización automática debemos ejecutar el comando "no auto-summary"*

- b. Los routers Bogota1 y Medellín1 deberán añadir a su configuración de enrutamiento una ruta por defecto hacia el ISP y, a su vez, redistribuirla dentro de las publicaciones de RIP.
  - Configuramos interfaces en Medellín1
 

```
MEDELLIN1>show ip interface
Serial0/0/0 is up, line protocol is up (connected)
Internet address is 172.29.6.13/30
Serial0/0/1 is up, line protocol is up (connected)
Internet address is 172.29.6.2/30
```

*Serial0/1/0 is up, line protocol is up (connected)*  
*Internet address is 209.17.220.1/30*  
*Serial0/1/1 is up, line protocol is up (connected)*  
*Internet address is 172.29.6.9/30*

- Configuramos interfaces en Bogota1  
*Serial0/0/0 is up, line protocol is up (connected)*  
*Internet address is 209.17.220.6/30*  
*Serial0/0/1 is up, line protocol is up (connected)*  
*Internet address is 172.29.3.1/30*  
*Serial0/1/0 is up, line protocol is up (connected)*  
*Internet address is 172.29.3.9/30*  
*Serial0/1/1 is up, line protocol is up (connected)*  
*Internet address is 172.29.3.5/30*

c. El router ISP deberá tener una ruta estática dirigida hacia cada red interna de Bogotá y Medellín para el caso se sumarian las subredes de cada uno a /22.

- Configuramos la ruta estática en Medellin1 y Bogota1, mediante el comando "*ip route 0.0.0.0 0.0.0.0 gateway*"- Se puede evidenciar que ha quedado aplicado con el comando "*Show ip route*"

```
MEDELLIN1#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 209.17.220.2 to network 0.0.0.0

    172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R       172.29.4.0/25 [120/1] via 172.29.6.1, 00:00:28, Serial0/0/1
R       172.29.4.128/25 [120/1] via 172.29.6.14, 00:00:04, Serial0/0/0
        [120/1] via 172.29.6.10, 00:00:04, Serial0/1/1
C       172.29.6.0/30 is directly connected, Serial0/0/1
L       172.29.6.2/32 is directly connected, Serial0/0/1
R       172.29.6.4/30 [120/1] via 172.29.6.1, 00:00:28, Serial0/0/1
        [120/1] via 172.29.6.14, 00:00:04, Serial0/0/0
        [120/1] via 172.29.6.10, 00:00:04, Serial0/1/1
C       172.29.6.8/30 is directly connected, Serial0/1/1
L       172.29.6.9/32 is directly connected, Serial0/1/1
C       172.29.6.12/30 is directly connected, Serial0/0/0
L       172.29.6.13/32 is directly connected, Serial0/0/0
O       209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks
C       209.17.220.0/30 is directly connected, Serial0/1/0
L       209.17.220.1/32 is directly connected, Serial0/1/0
S*    0.0.0.0/0 [1/0] via 209.17.220.2
```

```

BOGOTAL#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 209.17.220.5 to network 0.0.0.0

   172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R    172.29.0.0/24 [120/1] via 172.29.3.2, 00:00:21, Serial0/0/1
      [120/1] via 172.29.3.6, 00:00:21, Serial0/1/1
R    172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:09, Serial0/1/0
C    172.29.3.0/30 is directly connected, Serial0/0/1
L    172.29.3.1/32 is directly connected, Serial0/0/1
C    172.29.3.4/30 is directly connected, Serial0/1/1
L    172.29.3.5/32 is directly connected, Serial0/1/1
C    172.29.3.8/30 is directly connected, Serial0/1/0
L    172.29.3.9/32 is directly connected, Serial0/1/0
R    172.29.3.12/30 [120/1] via 172.29.3.2, 00:00:21, Serial0/0/1
      [120/1] via 172.29.3.10, 00:00:09, Serial0/1/0
      [120/1] via 172.29.3.6, 00:00:21, Serial0/1/1
   209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks
C    209.17.220.4/30 is directly connected, Serial0/0/0
I    209.17.220.5/32 is directly connected, Serial0/0/0
S*   0.0.0.0/0 [1/0] via 209.17.220.5

```

## Configuración en router ISP

```

ISP#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

   172.29.0.0/16 is variably subnetted, 4 subnets, 3 masks
S    172.29.0.0/22 is directly connected, Serial0/1/1
S    172.29.1.0/24 is directly connected, Serial0/1/1
S    172.29.4.0/25 [1/0] via 209.17.220.1
S    172.29.4.128/25 [1/0] via 209.17.220.1
   209.17.220.0/24 is variably subnetted, 4 subnets, 2 masks
C    209.17.220.0/30 is directly connected, Serial0/1/0
L    209.17.220.2/32 is directly connected, Serial0/1/0
C    209.17.220.4/30 is directly connected, Serial0/1/1
L    209.17.220.5/32 is directly connected, Serial0/1/1

```



## Parte 2: Tabla de Enrutamiento.

- a. Verificar la tabla de enrutamiento en cada uno de los routers para comprobar las redes y sus rutas.

Para esto debemos ejecutar el comando `>show ip route`

```
ISP#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
```

```
172.29.0.0/16 is variably subnetted, 4 subnets, 3 masks
S   172.29.0.0/22 is directly connected, Serial0/1/1
S   172.29.1.0/24 is directly connected, Serial0/1/1
S   172.29.4.0/25 [1/0] via 209.17.220.1
S   172.29.4.128/25 [1/0] via 209.17.220.1
209.17.220.0/24 is variably subnetted, 4 subnets, 2 masks
C   209.17.220.0/30 is directly connected, Serial0/1/0
L   209.17.220.2/32 is directly connected, Serial0/1/0
C   209.17.220.4/30 is directly connected, Serial0/1/1
L   209.17.220.5/32 is directly connected, Serial0/1/1
```

```
MEDELLIN1>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 209.17.220.2 to network 0.0.0.0
```

```
172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R   172.29.4.0/25 [120/1] via 172.29.6.1, 00:00:19, Serial0/0/1
R   172.29.4.128/25 [120/1] via 172.29.6.10, 00:00:04, Serial0/1/1
    [120/1] via 172.29.6.14, 00:00:04, Serial0/0/0
C   172.29.6.0/30 is directly connected, Serial0/0/1
L   172.29.6.2/32 is directly connected, Serial0/0/1
R   172.29.6.4/30 [120/1] via 172.29.6.10, 00:00:04, Serial0/1/1
    [120/1] via 172.29.6.1, 00:00:19, Serial0/0/1
    [120/1] via 172.29.6.14, 00:00:04, Serial0/0/0
C   172.29.6.8/30 is directly connected, Serial0/1/1
```

```

L    172.29.6.9/32 is directly connected, Serial0/1/1
C    172.29.6.12/30 is directly connected, Serial0/0/0
L    172.29.6.13/32 is directly connected, Serial0/0/0
    209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks
C    209.17.220.0/30 is directly connected, Serial0/1/0
L    209.17.220.1/32 is directly connected, Serial0/1/0
S* 0.0.0.0/0 [1/0] via 209.17.220.2

```

BOGOTA1>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 209.17.220.5 to network 0.0.0.0

```

    172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R    172.29.0.0/24 [120/1] via 172.29.3.2, 00:00:06, Serial0/0/1
    [120/1] via 172.29.3.6, 00:00:06, Serial0/1/1
R    172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:22, Serial0/1/0
C    172.29.3.0/30 is directly connected, Serial0/0/1
L    172.29.3.1/32 is directly connected, Serial0/0/1
C    172.29.3.4/30 is directly connected, Serial0/1/1
L    172.29.3.5/32 is directly connected, Serial0/1/1
C    172.29.3.8/30 is directly connected, Serial0/1/0
L    172.29.3.9/32 is directly connected, Serial0/1/0
R    172.29.3.12/30 [120/1] via 172.29.3.2, 00:00:06, Serial0/0/1
    [120/1] via 172.29.3.6, 00:00:06, Serial0/1/1
    [120/1] via 172.29.3.10, 00:00:22, Serial0/1/0
    209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks
C    209.17.220.4/30 is directly connected, Serial0/0/0
L    209.17.220.6/32 is directly connected, Serial0/0/0
S* 0.0.0.0/0 [1/0] via 209.17.220.5

```

b. Verificar el balanceo de carga que presentan los routers.

Lo cual es verificable con el comando "*Show ip route*"

c. Obsérvese en los routers Bogotá1 y Medellín1 cierta similitud por su ubicación, por tener dos enlaces de conexión hacia otro router y por la ruta por defecto que manejan.

MEDELLIN1>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 209.17.220.2 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks  
R 172.29.4.0/25 [120/1] via 172.29.6.1, 00:00:19, Serial0/0/1  
R 172.29.4.128/25 [120/1] via 172.29.6.10, 00:00:04, Serial0/1/1  
[120/1] via 172.29.6.14, 00:00:04, Serial0/0/0  
C 172.29.6.0/30 is directly connected, Serial0/0/1  
L 172.29.6.2/32 is directly connected, Serial0/0/1  
R 172.29.6.4/30 [120/1] via 172.29.6.10, 00:00:04, Serial0/1/1  
[120/1] via 172.29.6.1, 00:00:19, Serial0/0/1  
[120/1] via 172.29.6.14, 00:00:04, Serial0/0/0  
C 172.29.6.8/30 is directly connected, Serial0/1/1  
L 172.29.6.9/32 is directly connected, Serial0/1/1  
C 172.29.6.12/30 is directly connected, Serial0/0/0  
L 172.29.6.13/32 is directly connected, Serial0/0/0  
209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks  
C 209.17.220.0/30 is directly connected, Serial0/1/0  
L 209.17.220.1/32 is directly connected, Serial0/1/0  
S\* 0.0.0.0/0 [1/0] via 209.17.220.2

BOGOTA1>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 209.17.220.5 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks  
R 172.29.0.0/24 [120/1] via 172.29.3.2, 00:00:27, Serial0/0/1  
[120/1] via 172.29.3.6, 00:00:27, Serial0/1/1  
R 172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:13, Serial0/1/0  
C 172.29.3.0/30 is directly connected, Serial0/0/1  
L 172.29.3.1/32 is directly connected, Serial0/0/1  
C 172.29.3.4/30 is directly connected, Serial0/1/1  
L 172.29.3.5/32 is directly connected, Serial0/1/1  
C 172.29.3.8/30 is directly connected, Serial0/1/0  
L 172.29.3.9/32 is directly connected, Serial0/1/0  
R 172.29.3.12/30 [120/1] via 172.29.3.2, 00:00:27, Serial0/0/1  
[120/1] via 172.29.3.6, 00:00:27, Serial0/1/1  
[120/1] via 172.29.3.10, 00:00:13, Serial0/1/0  
209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks  
C 209.17.220.4/30 is directly connected, Serial0/0/0  
L 209.17.220.6/32 is directly connected, Serial0/0/0

S\* 0.0.0.0/0 [1/0] via 209.17.220.5

- d. Los routers Medellín2 y Bogotá2 también presentan redes conectadas directamente y recibidas mediante RIP.

```
MEDELLIN2>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

```

       172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
C       172.29.4.0/25 is directly connected, GigabitEthernet0/0
L       172.29.4.1/32 is directly connected, GigabitEthernet0/0
R       172.29.4.128/25 [120/1] via 172.29.6.6, 00:00:21, Serial0/0/0
C       172.29.6.0/30 is directly connected, Serial0/0/1
L       172.29.6.1/32 is directly connected, Serial0/0/1
C       172.29.6.4/30 is directly connected, Serial0/0/0
L       172.29.6.5/32 is directly connected, Serial0/0/0
R       172.29.6.8/30 [120/1] via 172.29.6.2, 00:00:17, Serial0/0/1
           [120/1] via 172.29.6.6, 00:00:21, Serial0/0/0
R       172.29.6.12/30 [120/1] via 172.29.6.2, 00:00:17, Serial0/0/1
           [120/1] via 172.29.6.6, 00:00:21, Serial0/0/0
R       209.17.220.0/24 [120/1] via 172.29.6.2, 00:00:17, Serial0/0/1
```

```
BOGOTA2>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

```

       172.29.0.0/16 is variably subnetted, 10 subnets, 3 masks
C       172.29.0.0/24 is directly connected, GigabitEthernet0/0
L       172.29.0.1/32 is directly connected, GigabitEthernet0/0
R       172.29.1.0/24 [120/1] via 172.29.3.13, 00:00:18, Serial0/1/0
C       172.29.3.0/30 is directly connected, Serial0/0/0
L       172.29.3.2/32 is directly connected, Serial0/0/0
C       172.29.3.4/30 is directly connected, Serial0/1/1
L       172.29.3.6/32 is directly connected, Serial0/1/1
R       172.29.3.8/30 [120/1] via 172.29.3.1, 00:00:00, Serial0/0/0
           [120/1] via 172.29.3.5, 00:00:00, Serial0/1/1
           [120/1] via 172.29.3.13, 00:00:18, Serial0/1/0
C       172.29.3.12/30 is directly connected, Serial0/1/0
L       172.29.3.14/32 is directly connected, Serial0/1/0
R       209.17.220.0/24 [120/1] via 172.29.3.5, 00:00:00, Serial0/1/1
           [120/1] via 172.29.3.1, 00:00:00, Serial0/0/0
```

- e. El router ISP solo debe indicar sus rutas estáticas adicionales a las directamente conectadas.

```

ISP#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

172.29.0.0/16 is variably subnetted, 4 subnets, 3 masks
S   172.29.0.0/22 is directly connected, Serial0/1/1
S   172.29.1.0/24 is directly connected, Serial0/1/1
S   172.29.4.0/25 [1/0] via 209.17.220.1
S   172.29.4.128/25 [1/0] via 209.17.220.1
209.17.220.0/24 is variably subnetted, 4 subnets, 2 masks
C   209.17.220.0/30 is directly connected, Serial0/1/0
L   209.17.220.2/32 is directly connected, Serial0/1/0
C   209.17.220.4/30 is directly connected, Serial0/1/1
L   209.17.220.5/32 is directly connected, Serial0/1/1

```

### Parte 3: Deshabilitar la propagación del protocolo RIP.

a. Para no propagar las publicaciones por interfaces que no lo requieran se debe deshabilitar la propagación del protocolo RIP, en la siguiente tabla se indican las interfaces de cada router que no necesitan desactivación.

ROUTER	INTERFAZ
Bogota1	SERIAL0/0/1; SERIAL0/1/0; SERIAL0/1/1
Bogota2	SERIAL0/0/0; SERIAL0/0/1
Bogota3	SERIAL0/0/0; SERIAL0/0/1; SERIAL0/1/0
Medellín1	SERIAL0/0/0; SERIAL0/0/1; SERIAL0/1/1
Medellín2	SERIAL0/0/0; SERIAL0/0/1
Medellín3	SERIAL0/0/0; SERIAL0/0/1; SERIAL0/1/0
ISP	No lo requiere

Para este fin debemos ejecutar el comando "Passive-interface nombre\_interfaz"

```

BOGOTA1(config)#router rip
BOGOTA1(config-router)#passi
BOGOTA1(config-router)#passive-interface s0/0/0

MEDELLIN1(config-router)#passive-interface s0/1/0

BOGOTA2(config-router)#passive-interface s0/1/0
BOGOTA2(config-router)#passive-interface s0/1/1

BOGOTA3(config-router)#passive-interface s0/1/1

MEDELLIN2(config-router)#passive-interface s0/1/1
MEDELLIN2(config-router)#passive-interface s0/1/0

MEDELLIN3(config-router)#passive-interface s0/1/1

```

#### Parte 4: Verificación del protocolo RIP.

- a. Verificar y documentar las opciones de enrutamiento configuradas en los routers, como el passive interface para la conexión hacia el ISP, la versión de RIP y las interfaces que participan de la publicación entre otros datos.
- b. Verificar y documentar la base de datos de RIP de cada router, donde se informa de manera detallada de todas las rutas hacia cada red.

```
MEDELLIN2#
MEDELLIN2#show ip route rip
    172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R       172.29.4.128/25 [120/1] via 172.29.6.6, 00:00:14, Serial0/0/0
R       172.29.6.8/30 [120/1] via 172.29.6.6, 00:00:14, Serial0/0/0
        [120/1] via 172.29.6.2, 00:00:22, Serial0/0/1
R       172.29.6.12/30 [120/1] via 172.29.6.6, 00:00:14, Serial0/0/0
        [120/1] via 172.29.6.2, 00:00:22, Serial0/0/1
R       209.17.220.0/24 [120/1] via 172.29.6.2, 00:00:22, Serial0/0/1

MEDELLIN3#show ip route rip
    172.29.0.0/16 is variably subnetted, 10 subnets, 3 masks
R       172.29.4.0/25 [120/1] via 172.29.6.5, 00:00:22, Serial0/0/0
R       172.29.6.0/30 [120/1] via 172.29.6.5, 00:00:22, Serial0/0/0
        [120/1] via 172.29.6.13, 00:00:28, Serial0/0/1
        [120/1] via 172.29.6.9, 00:00:28, Serial0/1/0

MEDELLIN1#show ip route rip
    172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R       172.29.4.0/25 [120/1] via 172.29.6.1, 00:00:08, Serial0/0/1
R       172.29.4.128/25 [120/1] via 172.29.6.14, 00:00:07, Serial0/0/0
        [120/1] via 172.29.6.10, 00:00:07, Serial0/1/1
R       172.29.6.4/30 [120/1] via 172.29.6.1, 00:00:08, Serial0/0/1
        [120/1] via 172.29.6.14, 00:00:07, Serial0/0/0
        [120/1] via 172.29.6.10, 00:00:07, Serial0/1/1
    209.17.220.0/24 is variably subnetted, 3 subnets, 3 masks
R       209.17.220.0/24 [120/2] via 172.29.6.14, 00:00:33, Serial0/0/0
        [120/2] via 172.29.6.10, 00:00:14, Serial0/1/1

BOGOTA1>show ip route rip
    172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R       172.29.0.0/24 [120/1] via 172.29.3.2, 00:00:05, Serial0/0/1
R       172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:24, Serial0/1/0
R       172.29.3.12/30 [120/1] via 172.29.3.2, 00:00:05, Serial0/0/1
        [120/1] via 172.29.3.10, 00:00:24, Serial0/1/0
    209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks
BOGOTA1#

BOGOTA2>show ip route rip
    172.29.0.0/16 is variably subnetted, 10 subnets, 3 masks
R       172.29.1.0/24 [120/2] via 172.29.3.1, 00:00:26, Serial0/0/0
        [120/2] via 172.29.3.5, 00:00:26, Serial0/1/1
R       172.29.3.8/30 [120/1] via 172.29.3.1, 00:00:26, Serial0/0/0
        [120/1] via 172.29.3.5, 00:00:26, Serial0/1/1
R       209.17.220.0/24 [120/1] via 172.29.3.5, 00:00:26, Serial0/1/1
        [120/1] via 172.29.3.1, 00:00:26, Serial0/0/0
BOGOTA2#
```

```
BOGOTA3>show ip route rip
      172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R       172.29.0.0/24 [120/2] via 172.29.3.9, 00:00:14, Serial0/1/0
R       172.29.3.0/30 [120/1] via 172.29.3.9, 00:00:14, Serial0/1/0
R       172.29.3.4/30 [120/1] via 172.29.3.9, 00:00:14, Serial0/1/0
R       209.17.220.0/24 [120/1] via 172.29.3.9, 00:00:14, Serial0/1/0
```

## Parte 5: Configurar encapsulamiento y autenticación PPP.

- Según la topología se requiere que el enlace Medellín1 con ISP sea configurado con autenticación PAT.

```
MEDELLIN1(config)#int s0/1/0
MEDELLIN1(config-if)#encapsulation ppp
MEDELLIN1(config)#
MEDELLIN1(config)#username ISP secret ISP
MEDELLIN1(config)#int s0/1/0
MEDELLIN1(config-if)#ppp authentication PAP
MEDELLIN1(config-if)#ppp PAP sent-username MEDELLIN1 password MEDELLIN1
ISP(config)#int s0/1/0
ISP(config-if)#encapsulation ppp
ISP(config-if)#no shu
ISP(config-if)#exit
```

- El enlace Bogotá1 con ISP se debe configurar con autenticación CHAT.

```
ISP(config)#int s0/1/1
ISP(config-if)#encapsulation ppp
ISP(config-if)#no shu
ISP(config-if)#exit
BOGOTA1(config)#username BOGOTA1 secret BOGOTA1
BOGOTA1(config)#int s0/0/0
BOGOTA1(config-if)#ppp authentication chat
```

## Parte 6: Configuración de PAT.

- En la topología, si se activa NAT en cada equipo de salida (Bogotá1 y Medellín1), los routers internos de una ciudad no podrán llegar hasta los routers internos en el otro extremo, sólo existirá comunicación hasta los routers Bogotá1, ISP y Medellín1.
- Después de verificar lo indicado en el paso anterior proceda a configurar el NAT en el router Medellín1. Compruebe que la traducción de direcciones indique las interfaces de entrada y de salida. Al realizar una prueba de ping, la dirección debe ser traducida automáticamente a la dirección de la interfaz serial 0/1/0 del router Medellín1, cómo diferente puerto.

Definimos los host a los cuales les permitiremos y serán empleados en la autenticación PAT

```
MEDELLIN1(config)#ip access-list standard HOST
MEDELLIN1(config-std-nacl)#permit 172.29.4.0 0.0.0.255
MEDELLIN1(config-std-nacl)#exit
```

Seguido a esto, usamos overload sobre al interfaz de salida, para permitir multiples host la salida y comunicación al exterior.

```
MEDELLIN1(config)#ip nat inside source list HOST interface s0/1/0
MEDELLIN1(config)#int s0/1/0
MEDELLIN1(config-if)#ip nat outside
MEDELLIN1(config-if)#exit
MEDELLIN1(config)#int s0/0/0
MEDELLIN1(config-if)#ip nat inside
MEDELLIN1(config-if)#exit
MEDELLIN1(config)#int s0/1/1
MEDELLIN1(config-if)#ip nat inside
MEDELLIN1(config-if)#exit
MEDELLIN1(config)#int s0/0/1
MEDELLIN1(config-if)#ip nat inside
MEDELLIN1(config-if)#exit
```

- c. Proceda a configurar el NAT en el router Bogotá1. Compruebe que la traducción de direcciones indique las interfaces de entrada y de salida. Al realizar una prueba de ping, la dirección debe ser traducida automáticamente a la dirección de la interfaz serial 0/1/0 del router Bogotá1, cómo diferente puerto.

Realizamos el proceso similar como se hizo con el router MEDELLIN1

```
BOGOTAL(config)#ip access-list standard HOST
BOGOTAL(config-std-nacl)#permit 172.29.0.0 0.0.0.255
BOGOTAL(config-std-nacl)#exit
-----
BOGOTAL(config)#ip nat inside source list HOST interface s0/0/0 overload
BOGOTAL(config)#int s0/1/1
BOGOTAL(config-if)#nat inside
      ^
% Invalid input detected at '^' marker.

BOGOTAL(config-if)#ip nat inside
BOGOTAL(config-if)#exit
BOGOTAL(config)#int s0/0/1
BOGOTAL(config-if)#ip nat inside
BOGOTAL(config-if)#exit
BOGOTAL(config)#int s0/1/0
BOGOTAL(config-if)#ip nat inside
BOGOTAL(config-if)#exit
```

Realizamos ping para confirmar

```
MEDELLIN1>ping 172.29.6.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.29.6.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/8/18 ms
```



## Parte 7: Configuración del servicio DHCP.

- Configurar la red Medellín2 y Medellín3 donde el router Medellín 2 debe ser el servidor DHCP para ambas redes Lan.
- El router Medellín3 deberá habilitar el paso de los mensajes broadcast hacia la IP del router Medellín2.
- Configurar la red Bogotá2 y Bogotá3 donde el router Medellín2 debe ser el servidor DHCP para ambas redes Lan.
- Configure el router Bogotá1 para que habilite el paso de los mensajes Broadcast hacia la IP del router Bogotá2

### Configuramos los pools DHCP en el router MEDELLIN2

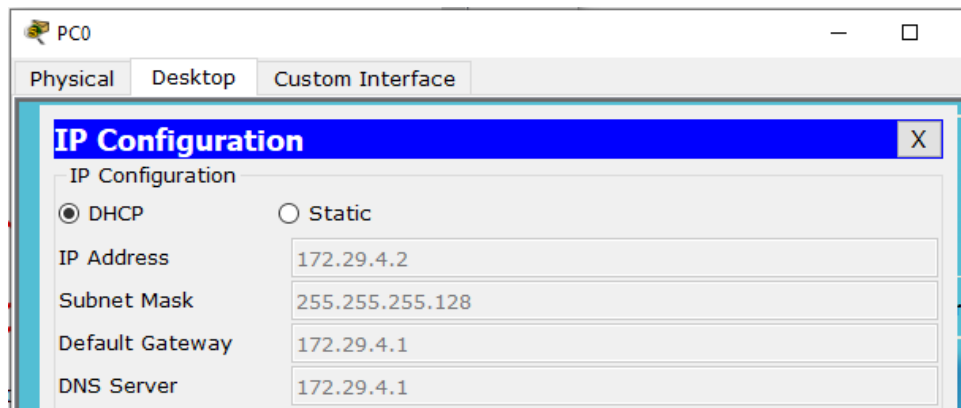
```
MEDELLIN2(config)#ip dhcp pool red1
MEDELLIN2(dhcp-config)#network 172.29.4.128 255.255.255.128
MEDELLIN2(dhcp-config)#default-router 172.29.4.129
MEDELLIN2(dhcp-config)#dns-server 172.29.4.129
MEDELLIN2(dhcp-config)#end

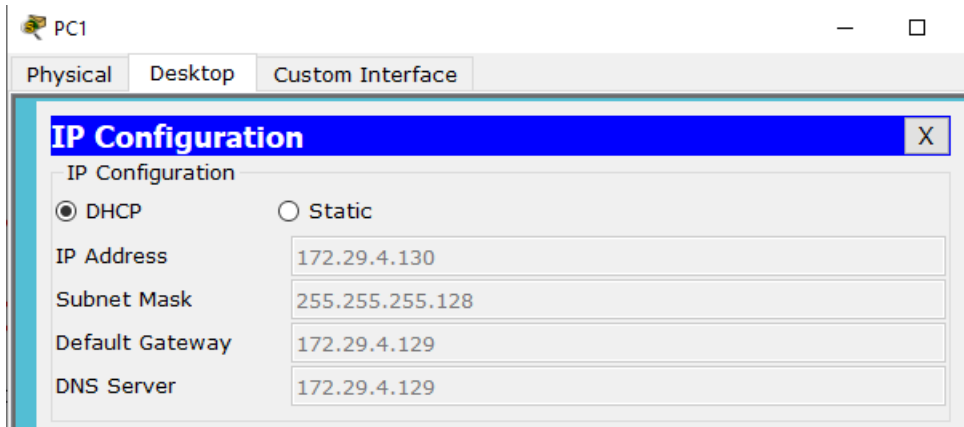
MEDELLIN2(config)#ip dhcp pool red2
MEDELLIN2(dhcp-config)#network 172.29.4.0 255.255.255.128
MEDELLIN2(dhcp-config)#default-router 172.29.4.1
MEDELLIN2(dhcp-config)#dns-server 172.29.4.1
MEDELLIN2(dhcp-config)#end
```

### En MEDELLIN3 habilitamos el tráfico broadcast DHCP proveniente del router MEDELLIN2

```
MEDELLIN3(config)#interface g0/0
MEDELLIN3(config-if)#ip helper
MEDELLIN3(config-if)#ip helper-address 172.29.6.5
MEDELLIN3(config-if)#exit
```

### Confirmamos en equipos PC





Confirmamos ping desde PC1 conectado a MEDELLIN3 hacia PC0 conectado a MEDELLIN2

```
PC>ping 172.29.4.2

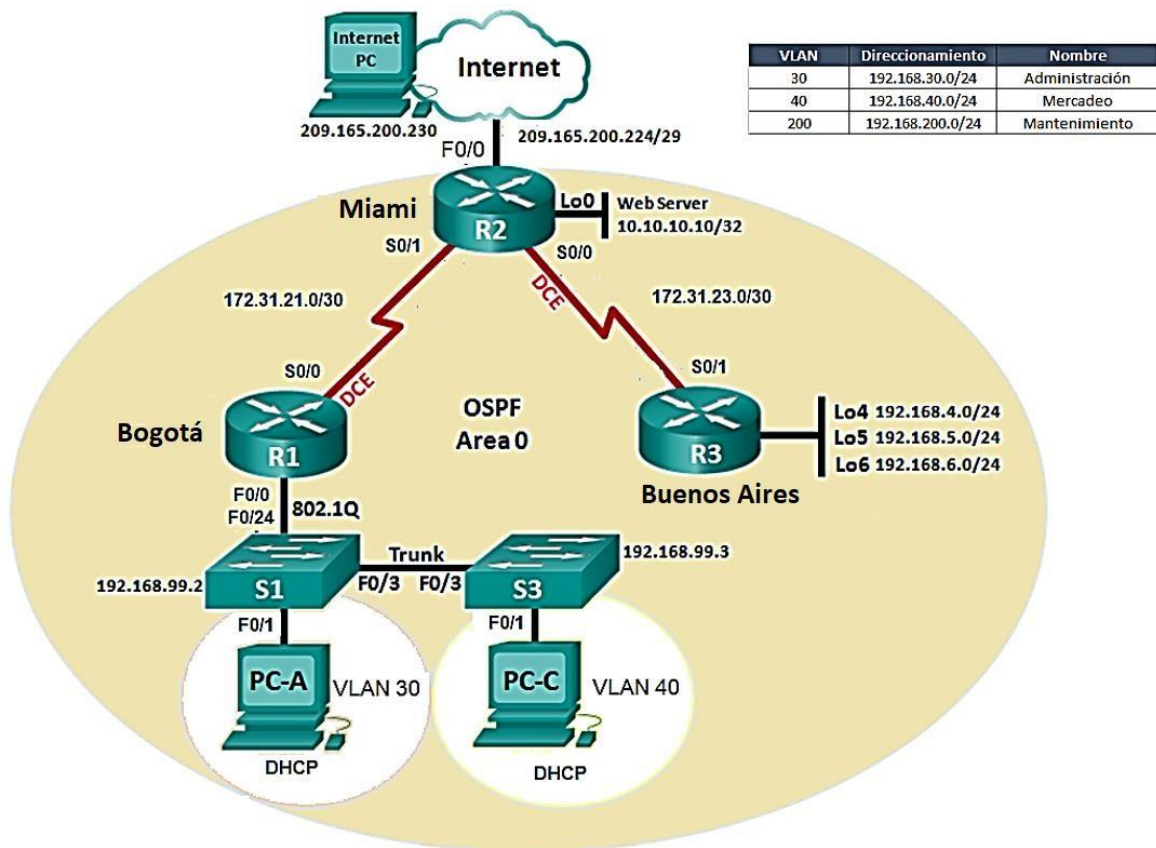
Pinging 172.29.4.2 with 32 bytes of data:

Reply from 172.29.4.2: bytes=32 time=5ms TTL=126
Reply from 172.29.4.2: bytes=32 time=3ms TTL=126
Reply from 172.29.4.2: bytes=32 time=1ms TTL=126

Ping statistics for 172.29.4.2:
    Packets: Sent = 3, Received = 3, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 5ms, Average = 3ms
```

## DESARROLLO ESCENARIO 2

Una empresa de Tecnología posee tres sucursales distribuidas en las ciudades de Miami, Bogotá y Buenos Aires, en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los lineamientos establecidos para el direccionamiento IP, protocolos de enrutamiento y demás aspectos que forman parte de la topología de red.



1. Configurar el direccionamiento IP acorde con la topología de red para cada uno de los dispositivos que forman parte del escenario

Se realiza la configuración de interfaces en R1,R2 y R3

```

R1(config)#int s
R1(config)#int serial 0/0/0
R1(config-if)#ip add
R1(config-if)#ip ad
R1(config-if)#ip address 172.31.21.1 255.255.255.252
R1(config-if)#no shu

```

```

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)#end
---
```

```

R1>show ip interface brief

```

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0	unassigned	YES	unset	up	up
GigabitEthernet0/0.3	192.168.30.1	YES	manual	up	up
GigabitEthernet0/0.4	192.168.40.1	YES	manual	up	up
GigabitEthernet0/1	unassigned	YES	unset	administratively down	down
Serial0/0/0	172.31.21.1	YES	manual	up	up
Serial0/0/1	unassigned	YES	unset	administratively down	down
Vlan1	unassigned	YES	unset	administratively down	down

```

R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#int
% Incomplete command.
R2(config)#int s
R2(config)#int serial 0/0/0
R2(config-if)#ip add
R2(config-if)#ip address 172.31.21.2 255.255.255.252
R2(config-if)#no shu

```

```

R2(config)#int gi
R2(config)#int gigabitEthernet 0/0
R2(config-if)#ip add
R2(config-if)#ip address 209.165.200.224 255.255.255.248
Bad mask /29 for address 209.165.200.224
R2(config-if)#ip address 209.165.200.225 255.255.255.248
R2(config-if)#no shu

```

```

R2>show ip interface brief

```

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0	209.165.200.225	YES	manual	up	up
GigabitEthernet0/1	unassigned	YES	unset	administratively down	down
Serial0/0/0	172.31.21.2	YES	manual	up	up
Serial0/0/1	172.31.23.2	YES	manual	up	up
Loopback0	10.10.10.10	YES	manual	up	up
Vlan1	unassigned	YES	unset	administratively down	down

```

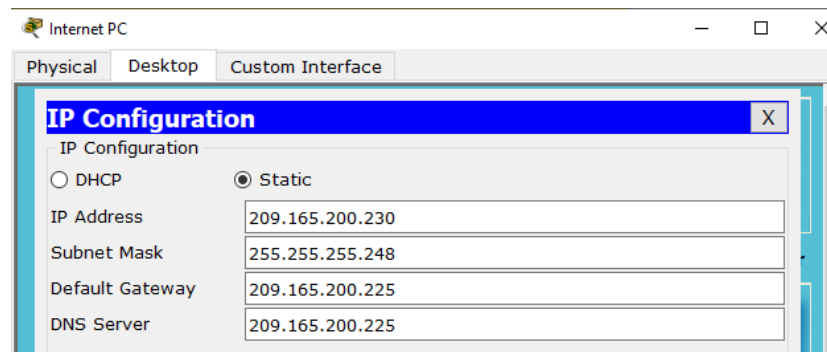
R2>

```

```

R3>show ip interface brief
Interface          IP-Address      OK? Method Status          Protocol
GigabitEthernet0/0 unassigned      YES unset   administratively down down
GigabitEthernet0/1 unassigned      YES unset   administratively down down
Serial0/0/0        unassigned      YES unset   administratively down down
Serial0/0/1        172.31.23.1    YES manual  up                up
Loopback4          192.168.4.1    YES manual  up                up
Loopback5          192.168.5.1    YES manual  up                up
Loopback6          192.168.6.1    YES manual  up                up

```



```
S3>show ip interface brief
```

```

Interface          IP-Address      OK? Method Status          Protocol
Vlan1              192.168.99.3   YES manual  up                up

```

```
S1>show ip interface brief
```

```

Interface          IP-Address      OK? Method Status          Protocol
FastEthernet0/24   unassigned      YES manual  up                up
Vlan1              192.168.99.2   YES manual  up                up

```

2. Configurar el protocolo de enrutamiento OSPFv2 bajo los siguientes criterios:

### OSPFv2 área 0

Configuration Item or Task	Specification
Router ID R1	1.1.1.1
Router ID R2	5.5.5.5
Router ID R3	8.8.8.8
Configurar todas las interfaces LAN como pasivas	

Establecer el ancho de banda para enlaces seriales en	256 Kb/s
Ajustar el costo en la métrica de So/o a	9500

### Configuramos en R1 OSPF, según los parámetros anteriores

```
R1>enable
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#router-id 1.1.1.1
R1(config-router)#network 192.168.99.0 0.0.0.255 area 0
R1(config-router)#network 172.31.21.0 0.0.0.3 area 0
R1(config-router)#passive-interface gi0/0
R1(config-router)#int s0/0/0
R1(config-if)#bandwidth 128
R1(config-if)#ip ospf cost 9500
R1(config-if)#end
```

### Configuramos en R2 OSPF, según los parámetros anteriores

```
R2>
R2>enable
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router ospf 1
R2(config-router)#router-id 5.5.5.5
R2(config-router)#network 172.31.21.0 0.0.0.3 area 0
R2(config-router)#
01:19:53: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial0/0/0 from LOADING to
FULL, Loading Done
R2(config-router)#network 209.165.200.224 0.0.0.7 area 0
R2(config-router)#passive-interface gi0/0
R2(config-router)#int s0/0/0
R2(config-if)#bandwidth 256
R2(config-if)#ip ospf cost 9500
R2(config-if)#end
R2#
```

### Configuramos en R3 OSPF, según los parámetros anteriores

```
R3>ena
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#router ospf 1
R3(config-router)#router-id 8.8.8.8
R3(config-router)#network 172.31.23.0 0.0.0.3 area 0
R3(config-router)#int s0/0/1
R3(config-if)#bandwidth 256
R3(config-if)#ip ospf cost 9500
R3(config-if)#end
R3#
```

### Verificar información de OSPF

- Visualizar tablas de enrutamiento y routers conectados por OSPFv2

Para la visualización se puede realizar mediante el comando

*R1>show ip route*

```
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 not set
```

```

172.31.0.0/16 is variably subnetted, 3 subnets, 2 masks
C    172.31.21.0/30 is directly connected, Serial0/0/0
L    172.31.21.1/32 is directly connected, Serial0/0/0
O    172.31.23.0/30 [110/9564] via 172.31.21.2, 00:00:55, Serial0/0/0
    209.165.200.0/29 is subnetted, 1 subnets
O    209.165.200.224/29 [110/9501] via 172.31.21.2, 00:24:19, Serial0/0/0
```

```
R2#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
```

```

10.0.0.0/32 is subnetted, 1 subnets
C    10.10.10.10/32 is directly connected, Loopback0
172.31.0.0/16 is variably subnetted, 4 subnets, 2 masks
C    172.31.21.0/30 is directly connected, Serial0/0/0
L    172.31.21.2/32 is directly connected, Serial0/0/0
C    172.31.23.0/30 is directly connected, Serial0/0/1
L    172.31.23.2/32 is directly connected, Serial0/0/1
    209.165.200.0/24 is variably subnetted, 2 subnets, 2 masks
C    209.165.200.224/29 is directly connected, GigabitEthernet0/0
L    209.165.200.225/32 is directly connected, GigabitEthernet0/0
```

```
R3#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
```

```

172.31.0.0/16 is variably subnetted, 3 subnets, 2 masks
O    172.31.21.0/30 [110/19000] via 172.31.23.2, 00:02:19, Serial0/0/1
C    172.31.23.0/30 is directly connected, Serial0/0/1
L    172.31.23.1/32 is directly connected, Serial0/0/1
192.168.4.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.4.0/24 is directly connected, Loopback4
L    192.168.4.1/32 is directly connected, Loopback4
192.168.5.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.5.0/24 is directly connected, Loopback5
L    192.168.5.1/32 is directly connected, Loopback5
192.168.6.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.6.0/24 is directly connected, Loopback6
L    192.168.6.1/32 is directly connected, Loopback6
209.165.200.0/29 is subnetted, 1 subnets
O    209.165.200.224/29 [110/9501] via 172.31.23.2, 00:02:19, Serial0/0/1
n3*
```

- Visualizar lista resumida de interfaces por OSPF en donde se ilustre el costo de cada interface  
Para la visualización se puede realizar mediante el comando  
*R1>show ip ospf interface*

```
R1#show ip ospf interface
```

```
Serial0/0/0 is up, line protocol is up
Internet address is 172.31.21.1/30, Area 0
Process ID 1, Router ID 1.1.1.1, Network Type POINT-TO-POINT, Cost: 9500
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:00
Index 1/1, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1, Adjacent neighbor count is 1
Adjacent with neighbor 5.5.5.5
Suppress hello for 0 neighbor(s)
```

- Visualizar el OSPF Process ID, Router ID, Address summarizations, Routing Networks, and passive interfaces configuradas en cada router.  
Para esto ejecutamos el commando *“Show ip protocols”*



R1>show ip protocols

```
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 1.1.1.1
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.99.0 0.0.0.255 area 0
    172.31.21.0 0.0.0.3 area 0
  Passive Interface(s):
    GigabitEthernet0/0
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1          110          00:07:25
    5.5.5.5          110          00:07:26
    8.8.8.8          110          00:07:25
  Distance: (default is 110)
```

R2>show ip protocols

```
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 5.5.5.5
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    172.31.21.0 0.0.0.3 area 0
    209.165.200.224 0.0.0.7 area 0
    172.31.23.0 0.0.0.3 area 0
  Passive Interface(s):
    GigabitEthernet0/0
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1          110          00:08:17
    5.5.5.5          110          00:08:17
    8.8.8.8          110          00:08:16
  Distance: (default is 110)
```

R3>show ip protocols

```
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 8.8.8.8
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    172.31.23.0 0.0.0.3 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1          110          00:08:34
    5.5.5.5          110          00:08:35
    8.8.8.8          110          00:08:33
  Distance: (default is 110)
```

3. Configurar VLANs, Puertos troncales, puertos de acceso, encapsulamiento, Inter-VLAN Routing y Seguridad en los Switches acorde a la topología de red establecida.

Por lo tanto es necesario crear las VLAN en ambos switches(S1,S3)

```
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#int fa 0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 40
% Access VLAN does not exist. Creating vlan 40
Switch(config-if)#exit
Switch(config)#exit
Switch#
```

```
Switch(config)#inter
Switch(config)#interface f
Switch(config)#interface fastEthernet 0/1
Switch(config-if)#switchport mode access
Switch(config-if)#sw
Switch(config-if)#switchport access vlan 30
% Access VLAN does not exist. Creating vlan 30
Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console
cop
Switch#copy ru
Switch#copy running-config st
Switch#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

Procedemos a crear la interfaz VLAN y el encapsulamiento en R1(Bogotá)

```
R1>enable
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#int g0/0
R1(config-if)#no shut

R1(config)#int g0/0.30
R1(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.30, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.30, changed
state to up

R1(config-subif)#encapsulation dot1Q 30
R1(config-subif)#ip add
R1(config-subif)#ip address 192.168.30.1 255.255.255.0
```

```

R1(config-subif)#int g0/0.40
R1(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.40, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.40, changed
state to up
encapsulation dot1Q40
^
% Invalid input detected at '^' marker.

R1(config-subif)#encapsulation dot1Q 40
R1(config-subif)#ip add
R1(config-subif)#ip address 192.168.40.1 255.255.255.0

```

4. En el Switch 3 deshabilitar DNS lookup  
Para esto ejecutar el comando "*no ip domain-lookup*", a continuación el ejemplo:

```

Switch>enable
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#no ip domain-lookup

```

5. Asignar direcciones IP a los Switches acorde a los lineamientos.  
Asignamos direccionamiento de acuerdo a la información suministrada

```

S3(config)#int V1
S3(config)#int Vlan 1
S3(config-if)#ip add
S3(config-if)#ip address 192.168.99.3 255.255.255.0
S3(config-if)#end

```

6. Desactivar todas las interfaces que no sean utilizadas en el esquema de red.  
Para esto ejecutamos el comando "*shutdown*", en cada una de las interfaces que no usaremos. como se muestra a continuación:

```

S1>ena
S1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
S1(config)#int fa0/2
S1(config-if)#shutdown

%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to administratively down
S1(config-if)#

```

7. Implementar DHCP and NAT for IPv4
8. Configurar R1 como servidor DHCP para las VLANs 30 y 40.  
Configuramos el pool DHCP en R1, para las VLAN 30 y 40, especificando Gateway por defecto, direccionamiento y mascara. Como se muestra a continuación:

```

R1(config)#ip dhcp pool vlan30
R1(dhcp-config)#network 192.168.30.0 255.255.255.0
R1(dhcp-config)#default-router 192.168.30.1
R1(dhcp-config)#ip dhcp pool vlan40
R1(dhcp-config)#network 192.168.40.0 255.255.255.0
R1(dhcp-config)#default-router 192.168.40.1

```

- Reservar las primeras 30 direcciones IP de las VLAN 30 y 40 para configuraciones estáticas.

Para este fin usamos el comando “*ip dhcp excluded-address*”, donde seguido al comando colocaremos el rango a excluir

```

R1(config)#ip dhcp excluded-address 192.168.30.1 192.168.30.30
R1(config)#ip dhcp excluded-address 192.168.40.1 192.168.40.30
R1(dhcp-config)#dns-server 10.10.10.11
R1(config)#ip domain-name ccna-unad.com

```

Configurar DHCP pool para VLAN 30	Name: ADMINISTRACION DNS-Server: 10.10.10.11 Domain-Name: ccna-unad.com Establecer default gateway.
Configurar DHCP pool para VLAN 40	Name: MERCADEO DNS-Server: 10.10.10.11 Domain-Name: ccna-unad.com Establecer default gateway.

- Configurar NAT en R2 para permitir que los hosts puedan salir a internet

Configuramos las interfaces con el nat correspondiente

```

R2(config)#int g0/0
R2(config-if)#ip nat inside
R2(config-if)#int s0/0/0
R2(config-if)#ip nat outside
R2(config-if)#int s0/0/1
R2(config-if)#ip nat outside
R2(config-if)#end

```

- Configurar al menos dos listas de acceso de tipo estándar a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.
- Configurar al menos dos listas de acceso de tipo extendido o nombradas a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.

Por lo que en R2, configuramos las ACL correspondientes, permitiendo las VLAN30 y 40, así como el segmento 192.168.4.0

```

R2(config)#user usuarioweb privilege 15 secret cisco
R2(config)#ip http server
R2(config)#ip http secure-server
R2(config)#access-list 1 permit 192.168.30.0.0.0.255
R2(config)#access-list 1 permit 192.168.40.0.0.0.255

```

*R2(config)#access-list 1 permit 192.168.4.0 0.0.3.255*

*R2(config)#ip nat pool Internet 209.165.200.225 209.165.200.228 netmask 255.255.255.248*

*R2(config)#ip nat inside source list 1 pool Internet*

*R2(config)#ip nat inside source static 10.10.10.10 209.165.200.229*

## CONCLUSIONES

De la anterior actividad se ha logrado concluir que para la correcta solución de problemas de conectividad es necesario tener un buen concepto y conocimiento de las capas del modelo OSI, es decir, saber en donde se puede generar un bloqueo en el acceso a un recurso de red (carpetas compartidas, web services, entre otros).

De forma puntual también se concluye lo siguiente:

- El enrutamiento RIP permite la propagación de rutas entre routers.
- El enrutamiento OSPF permite seleccionar una ruta dependiendo cual sea más corta evitando cargas y mejorando los tiempos de respuesta.
- El uso de entrega de direccionamiento por DHCP evita la carga administrativa.
- Las VLAN permite la separación de tráfico de forma lógica, permitiendo el uso del mismo medio físico para la transferencia de información.

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