DIPLOMADO DE PROFUNDIZACIÓN CISCO (DISEÑO E IMPLEMENTACIÓN DE SOLUCIONES INTEGRADAS LAN / WAN)

EVALUACIÓN – PRUEBA DE HABILIDADES PRÁCTICAS CCNA

POR:
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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA
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PROGRAMA DE INGENIERÍA DE SISTEMAS
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Contenido

INTRODUCCION

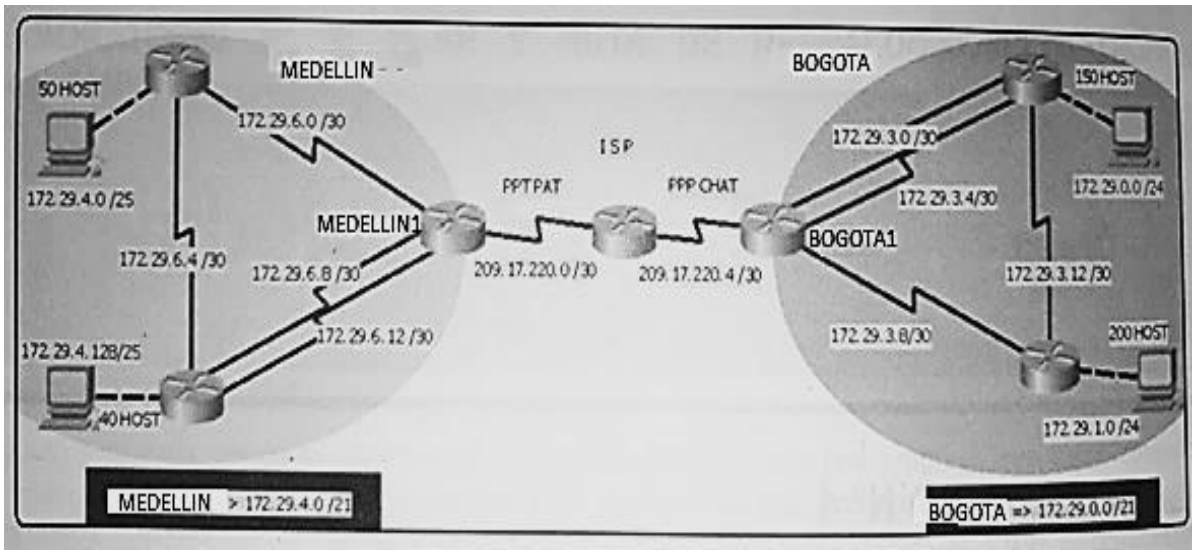
La “Prueba de habilidades prácticas”, es el paso final en las actividades del Diplomado de Profundización CCNA, lo que identifica el alcance de competencia y habilidades obtenidas por el estudiante en el desarrollo del diplomado de profundización. Aprovechando los beneficios que han surgido tras las nuevas tecnologías en el campo de las telecomunicaciones se propone una solución de acuerdo con los requerimientos descritos para el desarrollo de la misma.

El presente tiene como finalidad a aplicar todos los conocimientos adquiridos en el diplomado de profundización CCNA, desarrollando temas como la configuración de VLANs, OSPFv2, DHCPv4 y ACL en switches y routers, diseñar e implementar NAT dinámicas y estáticas, listas de acceso bajo los protocolos IPv4 y entre otros temas de gran importancia para afianzar nuestros conocimientos en networking. Para ello se utilizará la herramienta de simulación Packet Tracert.

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 tendran rutas por defecto redistribuidas; asimismo, habilitar el encapsulamiento PPP y su autenticación.

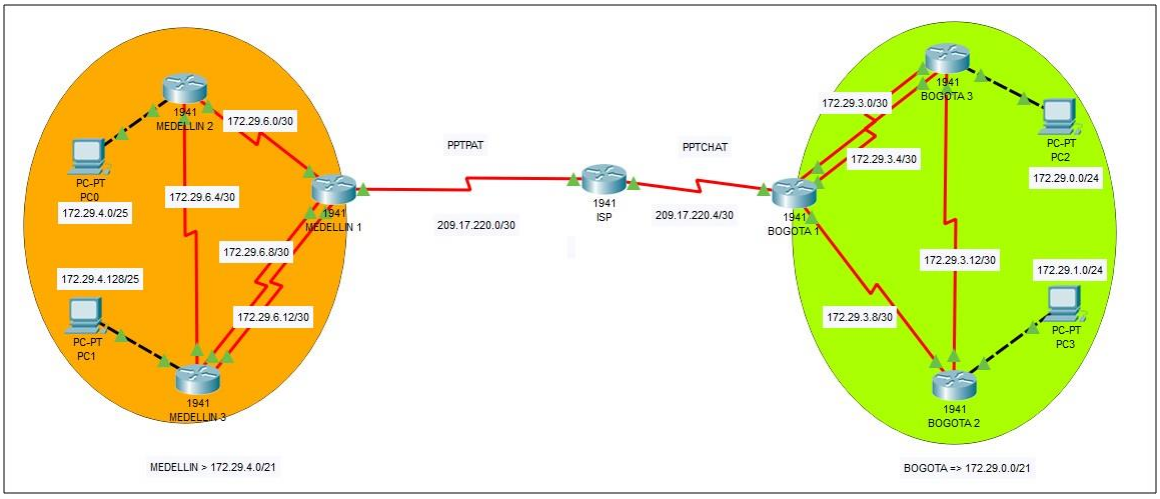
Los routers Bogota2 y medellin2 proporcionan el servicio DHCP a su propia red LAN y a los routers 3 de cada ciudad.
Debe configurar PPP en los enlaces hacia el ISP, con autenticación.
Debe habilitar NAT de sobrecarga en los routers Bogota1 y medellin1.

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 fisica de los equipos con base en la topología de red

TOPOLOGÍA



Conexiones Fisicas.

```
ISP(config)#int s0/0/0
ISP(config-if)#ip addess 209.17.220.1 255.255.255.252
ISP(config-if)#ip address 209.17.220.1 255.255.255.252
ISP(config-if)#clock rate 4000000
ISP(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
ISP(config-if)#
ISP(config-if)#int s0/0/1
ISP(config-if)#ip address 209.17.220.5 255.255.255.252
ISP(config-if)#clock rate 4000000
ISP(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
ISP(config-if)#
ISP(config-if)#
ISP#
```

```
%SYS-5-CONFIG_I: Configured from console by console
ISP#


Medellin1(config)#int s0/0/0
Medellin1(config-if)#ip address 209.17.220.2 255.255.255.252
Medellin1(config-if)#no shut
Medellin1(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Medellin1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
Medellin1(config-if)#int s0/0/1
Medellin1(config-if)#ip address 172.29.6.1 255.255.255.252
Medellin1(config-if)#clock rate 4000000
Medellin1(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Medellin1(config-if)#
Medellin1(config-if)#int s0/1/0
Medellin1(config-if)#ip address 172.29.6.9 255.255.255.252
Medellin1(config-if)#clock rate 4000000
Medellin1(config-if)#no shut
Medellin1(config)#int s0/1/1
Medellin1(config-if)#ip address 172.29.6.13 255.255.255.252
Medellin1(config-if)#clock rate 4000000
Medellin1(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
Medellin1(config-if)#


Medellin2(config)#int s0/0/0
Medellin2(config-if)#ip address 172.29.6.2 255.255.255.252
Medellin2(config-if)#no shut
Medellin2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Medellin2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
Medellin2(config-if)#int s0/0/1
Medellin2(config-if)#ip address 172.29.6.5 255.255.255.252
Medellin2(config-if)#clock rate 4000000
Medellin2(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Medellin2(config-if)#
Medellin2(config-if)#int g0/0
Medellin2(config-if)#ip address 172.29.4.1 255.255.255.128
Medellin2(config-if)#no shut
```

```
Medellin3(config)#int s0/0/0
Medellin3(config-if)#ip address 172.29.10 255.255.255.252
Medellin3(config-if)#ip address 172.29.6.10 255.255.255.252
Medellin3(config-if)#no shut
Medellin3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
Medellin3(config-if)#int s0/0/1
Medellin3(config-if)#ip address 172.29.6.14 255.255.255.252
Medellin3(config-if)#no shut
Medellin3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
Medellin3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1,
changed state to up
Medellin3(config-if)#int s0/1/0
Medellin3(config-if)#ip address 172.29.6.6 255.255.255.252
Medellin3(config-if)#no shut
Medellin3(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
Medellin3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0,
changed state to up
Medellin3(config-if)#int g0/0
Medellin3(config-if)#ip address 172.29.4.129 255.255.255.128
Medellin3(config-if)#no shut
Medellin3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0, changed state to up
Medellin3(config-if)#
```

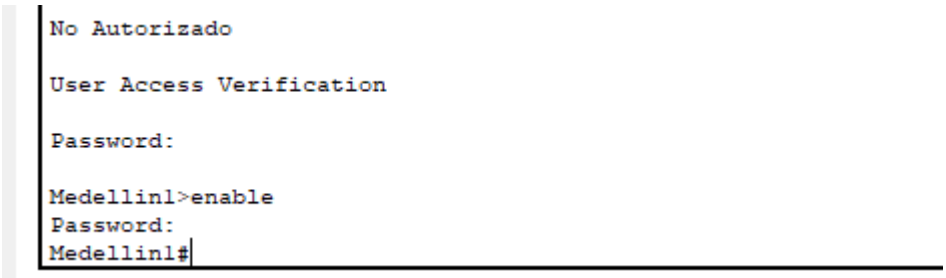
```
Bogota1(config)#int s0/0/0
Bogota1(config-if)#ip address 209.17.220.6 255.255.255.252
Bogota1(config-if)#no shut
Bogota1(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
Bogota1(config-if)#int s0/0/1
Bogota1(config-if)#ip address 172.29.3.9 255.255.255.252
Bogota1(config-if)#clock rate 4000000
Bogota1(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Bogota1(config-if)#
Bogota1(config-if)#int s0/1/0
```

```
Bogota1(config-if)#ip address 172.29.3.1 255.255.255.252
Bogota1(config-if)#clock rate 4000000
Bogota1(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
Bogota1(config-if)#
Bogota1(config-if)#int s0/1/1
Bogota1(config-if)#ip address 172.29.3.5 255.255.255.252
Bogota1(config-if)#clock rate 4000000
Bogota1(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down


Bogota2(config)#int s0/0/0
Bogota2(config-if)#ip address 172.29.3.10 255.255.255.252
Bogota2(config-if)#no shut
Bogota2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Bogota2(config-if)#int s0/0/0
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
Bogota2(config-if)#int s0/0/1
Bogota2(config-if)#ip address 172.29.3.13 255.255.255.252
Bogota2(config-if)#clock rate 4000000
Bogota2(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Bogota2(config-if)#
Bogota2(config-if)#int g0/0
Bogota2(config-if)#ip address 172.29.1.1 255.255.255.0
Bogota2(config-if)#no shut
Bogota2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0, changed state to up
Bogota2(config-if)#


Bogota3(config)#int s0/0/0
Bogota3(config-if)#ip address 172.29.3.2 255.255.255.252
Bogota3(config-if)#no shut
Bogota3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Bogota3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
Bogota3(config-if)#int s0/0/1
Bogota3(config-if)#ip address 172.29.3.6 255.255.255.252
Bogota3(config-if)#no shut
Bogota3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
```

```
Bogota3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1,
changed state to up
Bogota3(config-if)#int s0/1/0
Bogota3(config-if)#ip address 172.29.3.14 255.255.255.252
Bogota3(config-if)#no shut
Bogota3(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0,
changed state to up
Bogota3(config-if)#int g0/0
Bogota3(config-if)#ip address 172.29.0.1 255.255.255.0
Bogota3(config-if)#no shut
```

Configuracion de Equipos.

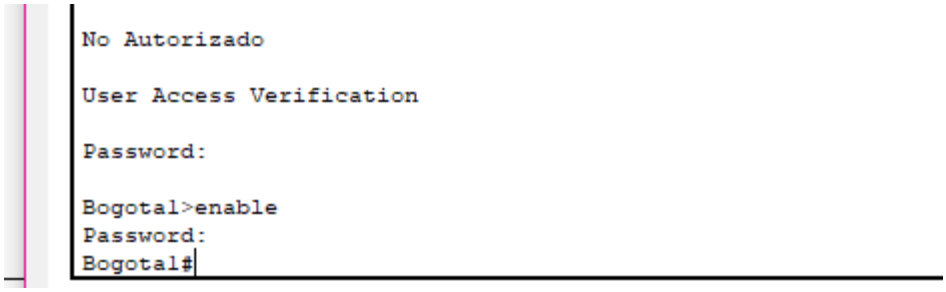
```
Medellin1>en
Medellin1#config t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin1(config)#no ip domain-lookup
Medellin1(config)#service password-encryption
Medellin1(config)#enable secret class
Medellin1(config)#line console 0
Medellin1(config-line)#password cisco
Medellin1(config-line)#login
Medellin1(config-line)#line vty 0 15
Medellin1(config-line)#password cisco
Medellin1(config-line)#login
Medellin1(config-line)#banner motd "No Autorizado"
Medellin1(config)#
```




```
Medellin2>en
Medellin2#config t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin2(config)#no ip domain-lookup
```

```
Medellin2(config)#service password-encryption
Medellin2(config)#enable secret class
Medellin2(config)#line console 0
Medellin2(config-line)#password cisco
Medellin2(config-line)#login
Medellin2(config-line)#line vty 0 15
Medellin2(config-line)#password cisco
Medellin2(config-line)#login
Medellin2(config-line)#banner motd "No Autorizado"
Medellin2(config)#

Medellin3>en
Medellin3#config t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin3(config)#no ip domain-lookup
Medellin3(config)#service password-encryption
Medellin3(config)#enable secret class
Medellin3(config)#line console 0
Medellin3(config-line)#password cisco
Medellin3(config-line)#login
Medellin3(config-line)#line vty 0 15
Medellin3(config-line)#password cisco
Medellin3(config-line)#login
Medellin3(config-line)#banner motd "No Autorizado"
Medellin3(config)#



ISP>en
ISP#config t
Enter configuration commands, one per line. End with CNTL/Z.
ISP(config)#no ip domain-lookup
ISP(config)#service password-encryption
ISP(config)#enable secret class
ISP(config)#line console 0
ISP(config-line)#password cisco
ISP(config-line)#login
ISP(config-line)#line vty 0 15
ISP(config-line)#password cisco
ISP(config-line)#login
ISP(config-line)#banner motd "No Autorizado"
ISP(config)#


Bogota1>en
Bogota1#config t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota1(config)#no ip domain-lookup
Bogota1(config)#service password-encryption
Bogota1(config)#enable secret class
Bogota1(config)#line console 0
```

```
Bogota1(config-line)#password cisco
Bogota1(config-line)#login
Bogota1(config-line)#line vty 0 15
Bogota1(config-line)#password cisco
Bogota1(config-line)#login
Bogota1(config-line)#banner motd "No Autorizado"
Bogota1(config)#
```




```
Bogota2>en
Bogota2#config t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota2(config)#no ip domain-lookup
Bogota2(config)#service password-encryption
Bogota2(config)#enable secret class
Bogota2(config)#line console 0
Bogota2(config-line)#password cisco
Bogota2(config-line)#login
Bogota2(config-line)#line vty 0 15
Bogota2(config-line)#password cisco
Bogota2(config-line)#login
Bogota2(config-line)#banner motd "No Autorizado"
Bogota2(config)#
Bogota2(config)#
```

```
Bogota3>en
Bogota3#config t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota3(config)#no ip domain-lookup
Bogota3(config)#service password-encryption
Bogota3(config)#enable secret class
Bogota3(config)#line console 0
Bogota3(config-line)#password cisco
Bogota3(config-line)#login
Bogota3(config-line)#line vty 0 15
Bogota3(config-line)#password cisco
Bogota3(config-line)#login
Bogota3(config-line)#banner motd "No Autorizado"
Bogota3(config)#
```

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

Parte 1: Configuración del enrutamiento

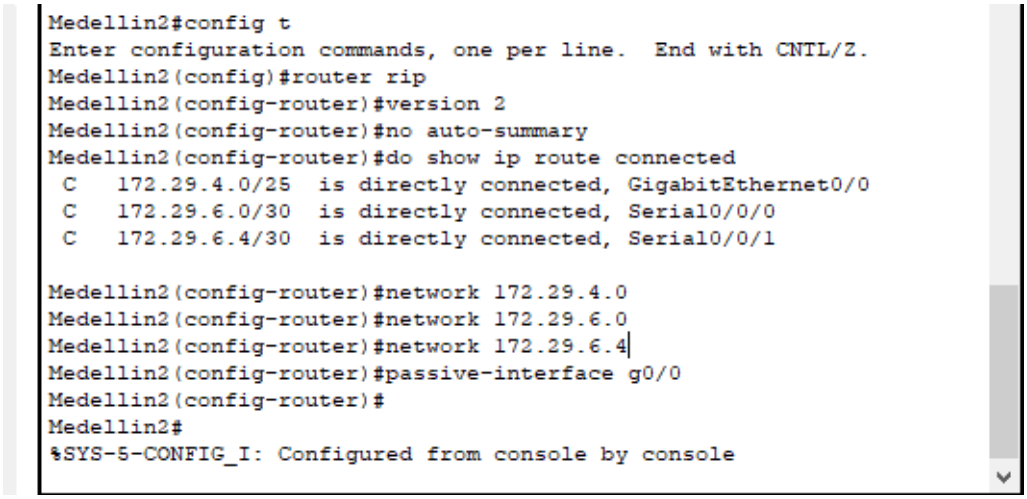
a. Configurar el enrutamiento en la red usando el protocolo RIP versión 2, declare la red principal, desactive la sumarización automática.

```
Medellin1>enable
Medellin1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin1(config)#router rip
Medellin1(config-router)#version 2
Medellin1(config-router)#no auto-summary
Medellin1(config-router)#do show ip route connected
      C 172.29.6.0/30 is directly connected, Serial0/0/1
      C 172.29.6.8/30 is directly connected, Serial0/1/0
      C 172.29.6.12/30 is directly connected, Serial0/1/1
      C 209.17.220.0/30 is directly connected, Serial0/0/0
Medellin1(config-router)#network 172.29.6.0
Medellin1(config-router)#network 172.29.6.8
Medellin1(config-router)#network 172.29.6.12
Medellin1(config-router)#passive-interface s0/0/0
Medellin1(config-router)#
```

```
Medellin1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Medellin1(config)#router rip
Medellin1(config-router)#version 2
Medellin1(config-router)#no auto-summary
Medellin1(config-router)#do show ip route connected
 C   172.29.6.0/30  is directly connected, Serial0/0/1
 C   172.29.6.8/30  is directly connected, Serial0/1/0
 C   172.29.6.12/30  is directly connected, Serial0/1/1
 C   209.17.220.0/30  is directly connected, Serial0/0/0

Medellin1(config-router)#network 172.29.6.0
Medellin1(config-router)#network 172.29.6.8
Medellin1(config-router)#network 172.29.6.12
Medellin1(config-router)#passive-interface s0/0/0
Medellin1(config-router)#
```

```
Medellin2#config t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin2(config)#router rip
Medellin2(config-router)#version 2
Medellin2(config-router)#no auto-summary
Medellin2(config-router)#do show ip route connected
      C 172.29.4.0/25 is directly connected, GigabitEthernet0/0
```

```
     C 172.29.6.0/30 is directly connected, Serial0/0/0
     C 172.29.6.4/30 is directly connected, Serial0/0/1
Medellin2(config-router)#network 172.29.4.0
Medellin2(config-router)#network 172.29.6.0
Medellin2(config-router)#network 172.29.6.4
Medellin2(config-router)#passive-interface g0/0
Medellin2(config-router)#
Medellin2#
%SYS-5-CONFIG_I: Configured from console by console
```



```
Medellin2#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Medellin2(config)#router rip
Medellin2(config-router)#version 2
Medellin2(config-router)#no auto-summary
Medellin2(config-router)#do show ip route connected
 C   172.29.4.0/25  is directly connected, GigabitEthernet0/0
 C   172.29.6.0/30  is directly connected, Serial0/0/0
 C   172.29.6.4/30  is directly connected, Serial0/0/1

Medellin2(config-router)#network 172.29.4.0
Medellin2(config-router)#network 172.29.6.0
Medellin2(config-router)#network 172.29.6.4
Medellin2(config-router)#passive-interface g0/0
Medellin2(config-router)#
Medellin2#
%SYS-5-CONFIG_I: Configured from console by console
```

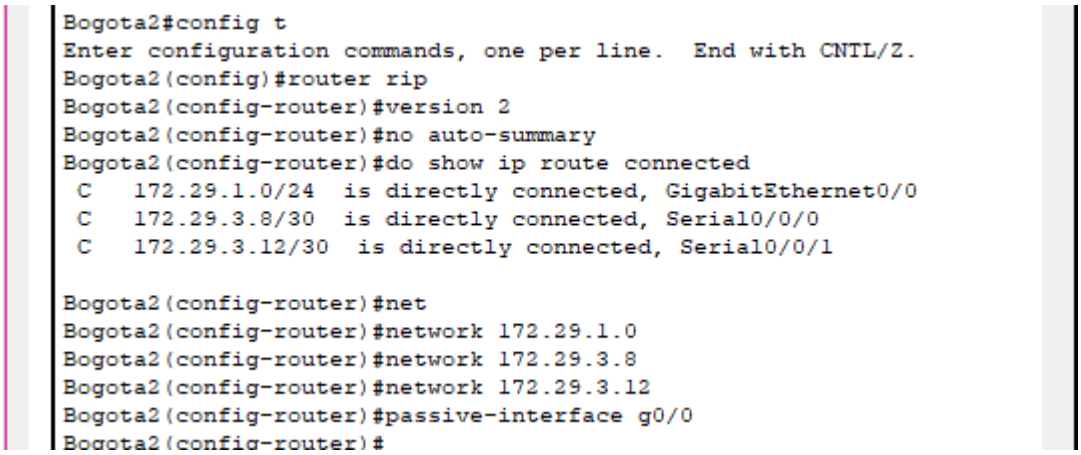
```
Medellin3#config t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin3(config)#router rip
Medellin3(config-router)#version 2
Medellin3(config-router)#no auto-summary
Medellin3(config-router)#do show ip route connected
     C 172.29.4.128/25 is directly connected, GigabitEthernet0/0
     C 172.29.6.4/30 is directly connected, Serial0/1/0
     C 172.29.6.8/30 is directly connected, Serial0/0/0
     C 172.29.6.12/30 is directly connected, Serial0/0/1
Medellin3(config-router)#network 172.29.4.128
Medellin3(config-router)#network 172.29.6.4
Medellin3(config-router)#network 172.29.6.8
Medellin3(config-router)#network 172.29.6.12
Medellin3(config-router)#passive-interface g0/0
Medellin3(config-router)#
```

```
Medellin3#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Medellin3(config)#router rip
Medellin3(config-router)#version 2
Medellin3(config-router)#no auto-summary
Medellin3(config-router)#do show ip route connected
 C    172.29.4.128/25  is directly connected, GigabitEthernet0/0
 C    172.29.6.4/30  is directly connected, Serial0/1/0
 C    172.29.6.8/30  is directly connected, Serial0/0/0
 C    172.29.6.12/30  is directly connected, Serial0/0/1

Medellin3(config-router)#network 172.29.4.128
Medellin3(config-router)#network 172.29.6.4
Medellin3(config-router)#network 172.29.6.8
Medellin3(config-router)#network 172.29.6.12
Medellin3(config-router)#passive-interface g0/0
Medellin3(config-router)#
```

```
Bogota1#config t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota1(config)#router rip
Bogota1(config-router)#version 2
Bogota1(config-router)#no auto-summary
Bogota1(config-router)#do show ip route connected
      C 172.29.3.0/30 is directly connected, Serial0/1/0
      C 172.29.3.4/30 is directly connected, Serial0/1/1
      C 172.29.3.8/30 is directly connected, Serial0/0/1
      C 209.17.220.4/30 is directly connected, Serial0/0/0
Bogota1(config-router)#network 172.29.3.0
Bogota1(config-router)#network 172.29.3.4
Bogota1(config-router)#network 172.29.3.8
Bogota1(config-router)#passive-interface s0/0/0
Bogota1(config-router)#
```

```
Bogota1#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Bogota1(config)#router rip
Bogota1(config-router)#version 2
Bogota1(config-router)#no auto-summary
Bogota1(config-router)#do show ip route connected
 C    172.29.3.0/30  is directly connected, Serial0/1/0
 C    172.29.3.4/30  is directly connected, Serial0/1/1
 C    172.29.3.8/30  is directly connected, Serial0/0/1
 C    209.17.220.4/30  is directly connected, Serial0/0/0

Bogota1(config-router)#network 172.29.3.0
Bogota1(config-router)#network 172.29.3.4
Bogota1(config-router)#network 172.29.3.8
Bogota1(config-router)#passive-interface s0/0/0
Bogota1(config-router)#
```

```
Bogota2#config t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota2(config)#router rip
Bogota2(config-router)#version 2
Bogota2(config-router)#no auto-summary
Bogota2(config-router)#do show ip route connected
     C 172.29.1.0/24 is directly connected, GigabitEthernet0/0
     C 172.29.3.8/30 is directly connected, Serial0/0/0
     C 172.29.3.12/30 is directly connected, Serial0/0/1
Bogota2(config-router)#net
Bogota2(config-router)#network 172.29.1.0
Bogota2(config-router)#network 172.29.3.8
Bogota2(config-router)#network 172.29.3.12
Bogota2(config-router)#passive-interface g0/0
Bogota2(config-router)#
```



```
Bogota2#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Bogota2(config)#router rip
Bogota2(config-router)#version 2
Bogota2(config-router)#no auto-summary
Bogota2(config-router)#do show ip route connected
 C   172.29.1.0/24  is directly connected, GigabitEthernet0/0
 C   172.29.3.8/30  is directly connected, Serial0/0/0
 C   172.29.3.12/30  is directly connected, Serial0/0/1

Bogota2(config-router)#net
Bogota2(config-router)#network 172.29.1.0
Bogota2(config-router)#network 172.29.3.8
Bogota2(config-router)#network 172.29.3.12
Bogota2(config-router)#passive-interface g0/0
Bogota2(config-router)#
```

```
Bogota3#config t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota3(config)#router rip
Bogota3(config-router)#version 2
Bogota3(config-router)#no auto-summary
Bogota3(config-router)#do show ip route connected
     C 172.29.0.0/24 is directly connected, GigabitEthernet0/0
     C 172.29.3.0/30 is directly connected, Serial0/0/0
     C 172.29.3.4/30 is directly connected, Serial0/0/1
     C 172.29.3.12/30 is directly connected, Serial0/1/0
Bogota3(config-router)#net
Bogota3(config-router)#network 172.29.0.0
Bogota3(config-router)#network 172.29.3.0
Bogota3(config-router)#network 172.29.3.4
Bogota3(config-router)#network 172.29.3.12
Bogota3(config-router)#passive-interface g0/0
Bogota3(config-router)#
```

```
Bogota3#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Bogota3(config)#router rip
Bogota3(config-router)#version 2
Bogota3(config-router)#no auto-summary
Bogota3(config-router)#do show ip route connected
 C    172.29.0.0/24  is directly connected, GigabitEthernet0/0
 C    172.29.3.0/30  is directly connected, Serial0/0/0
 C    172.29.3.4/30  is directly connected, Serial0/0/1
 C    172.29.3.12/30  is directly connected, Serial0/1/0

Bogota3(config-router)#net
Bogota3(config-router)#network 172.29.0.0
Bogota3(config-router)#network 172.29.3.0
Bogota3(config-router)#network 172.29.3.4
Bogota3(config-router)#network 172.29.3.12
Bogota3(config-router)#passive-interface g0/0
Bogota3(config-router)#
```

VERIFICACION

```
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 not set

     172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R       172.29.4.0/25 [120/1] via 172.29.6.2, 00:00:03, Serial0/0/1
R       172.29.4.128/25 [120/1] via 172.29.6.10, 00:00:05, Serial0/1/0
                        [120/1] via 172.29.6.14, 00:00:05, Serial0/1/1
C       172.29.6.0/30 is directly connected, Serial0/0/1
L       172.29.6.1/32 is directly connected, Serial0/0/1
R       172.29.6.4/30 [120/1] via 172.29.6.2, 00:00:03, Serial0/0/1
                      [120/1] via 172.29.6.10, 00:00:05, Serial0/1/0
                      [120/1] via 172.29.6.14, 00:00:05, Serial0/1/1
C       172.29.6.8/30 is directly connected, Serial0/1/0
L       172.29.6.9/32 is directly connected, Serial0/1/0
C       172.29.6.12/30 is directly connected, Serial0/1/1
L       172.29.6.13/32 is directly connected, Serial0/1/1
     209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks
C       209.17.220.0/30 is directly connected, Serial0/0/0
L       209.17.220.2/32 is directly connected, Serial0/0/0

Medellin1#
```

```
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 not set

     172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R       172.29.0.0/24 [120/1] via 172.29.3.6, 00:00:08, Serial0/1/1
                      [120/1] via 172.29.3.2, 00:00:08, Serial0/1/0
R       172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:09, Serial0/0/1
C       172.29.3.0/30 is directly connected, Serial0/1/0
L       172.29.3.1/32 is directly connected, Serial0/1/0
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, Serial0/0/1
L       172.29.3.9/32 is directly connected, Serial0/0/1
R       172.29.3.12/30 [120/1] via 172.29.3.10, 00:00:09, Serial0/0/1
                       [120/1] via 172.29.3.6, 00:00:08, Serial0/1/1
                       [120/1] via 172.29.3.2, 00:00:08, 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

Bogota1#
```

b. Los routers Bogota1 y Medellín 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.

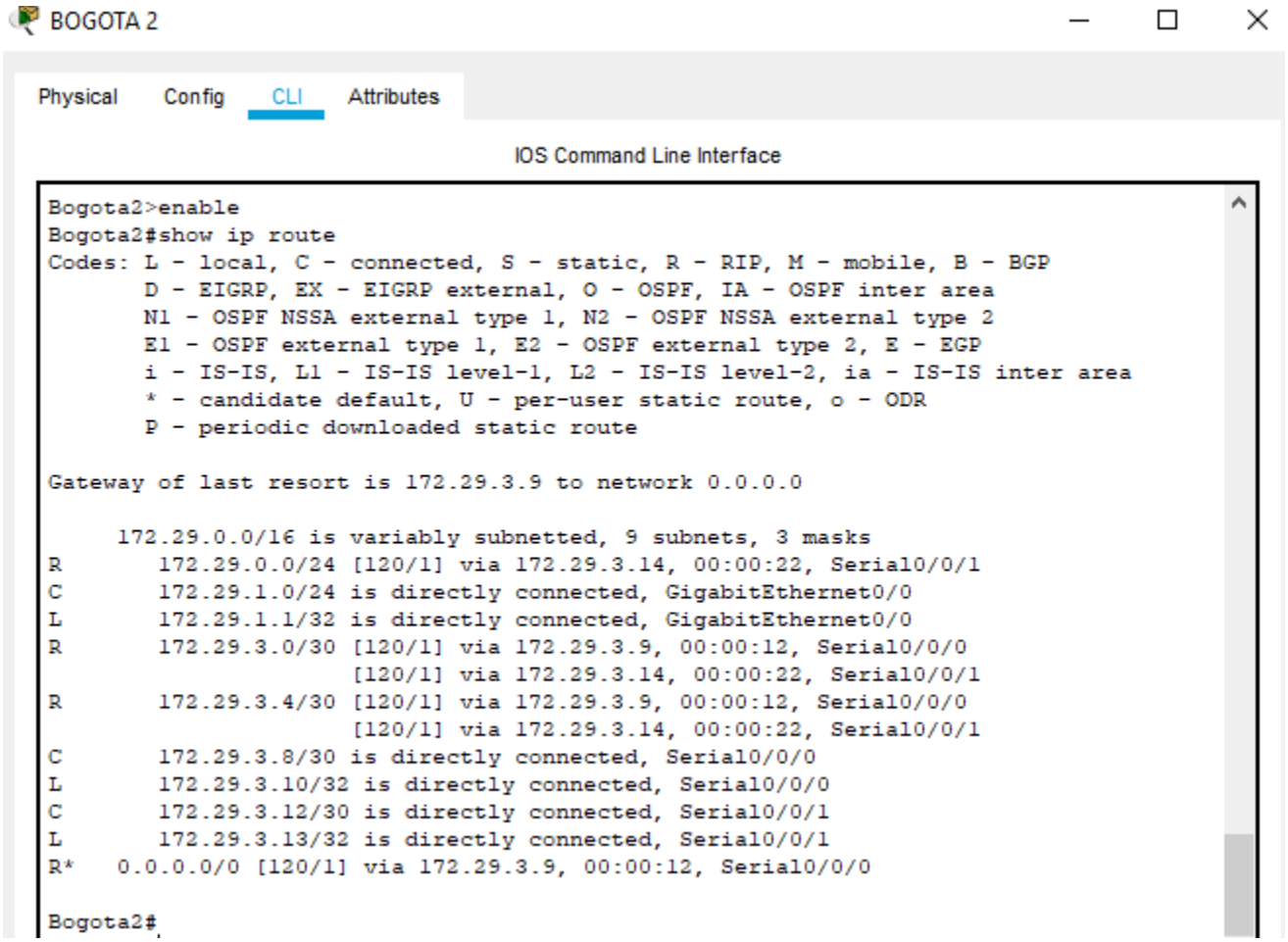
```
Medellin1#
Medellin1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin1(config)#ip route 0.0.0.0 0.0.0.0 209.17.220.1
Medellin1(config)#router rip
Medellin1(config-router)#default-information originate
Medellin1(config-router)#
```

VERIFICACION EN MEDELLIN3

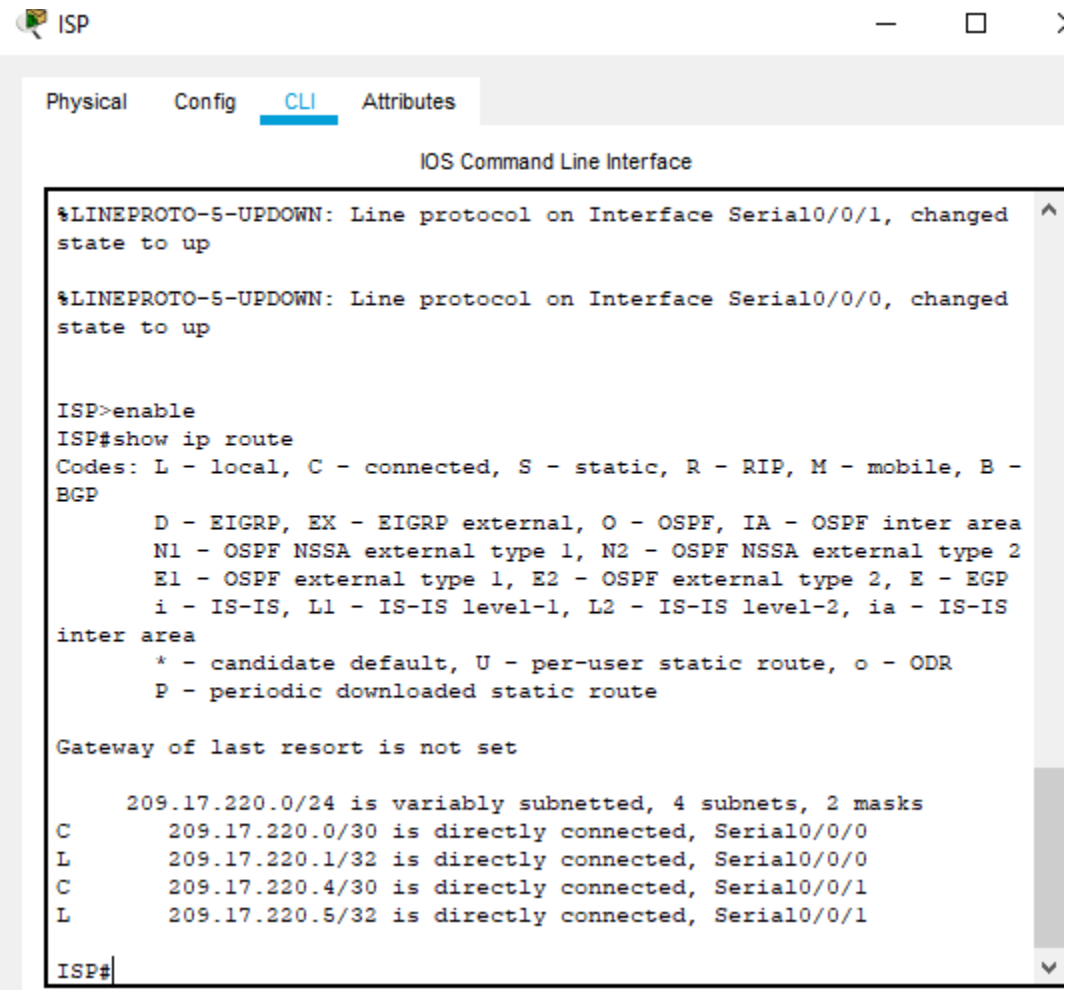
```
Medellin3#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, 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 172.29.6.9 to network 0.0.0.0

     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, 00:00:08, Serial0/1/0
C       172.29.4.128/25 is directly connected, GigabitEthernet0/0
L       172.29.4.129/32 is directly connected, GigabitEthernet0/0
R       172.29.6.0/30 [120/1] via 172.29.6.9, 00:00:22, Serial0/0/0
                      [120/1] via 172.29.6.5, 00:00:08, Serial0/1/0
                      [120/1] via 172.29.6.13, 00:00:22, Serial0/0/1
C       172.29.6.4/30 is directly connected, Serial0/1/0
L       172.29.6.6/32 is directly connected, Serial0/1/0
C       172.29.6.8/30 is directly connected, Serial0/0/0
L       172.29.6.10/32 is directly connected, Serial0/0/0
C       172.29.6.12/30 is directly connected, Serial0/0/1
L       172.29.6.14/32 is directly connected, Serial0/0/1
R*   0.0.0.0/0 [120/1] via 172.29.6.9, 00:00:22, Serial0/0/0
               [120/1] via 172.29.6.13, 00:00:22, Serial0/0/1

Medellin3#
```

```
Bogota1>enable
Bogota1#config t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota1(config)#ip route 0.0.0.0 0.0.0.0 209.17.220.5
Bogota1(config)#router rip
Bogota1(config-router)#default-information originate
Bogota1(config-router)#
```

VERIFICACION EN BOGOTA 2

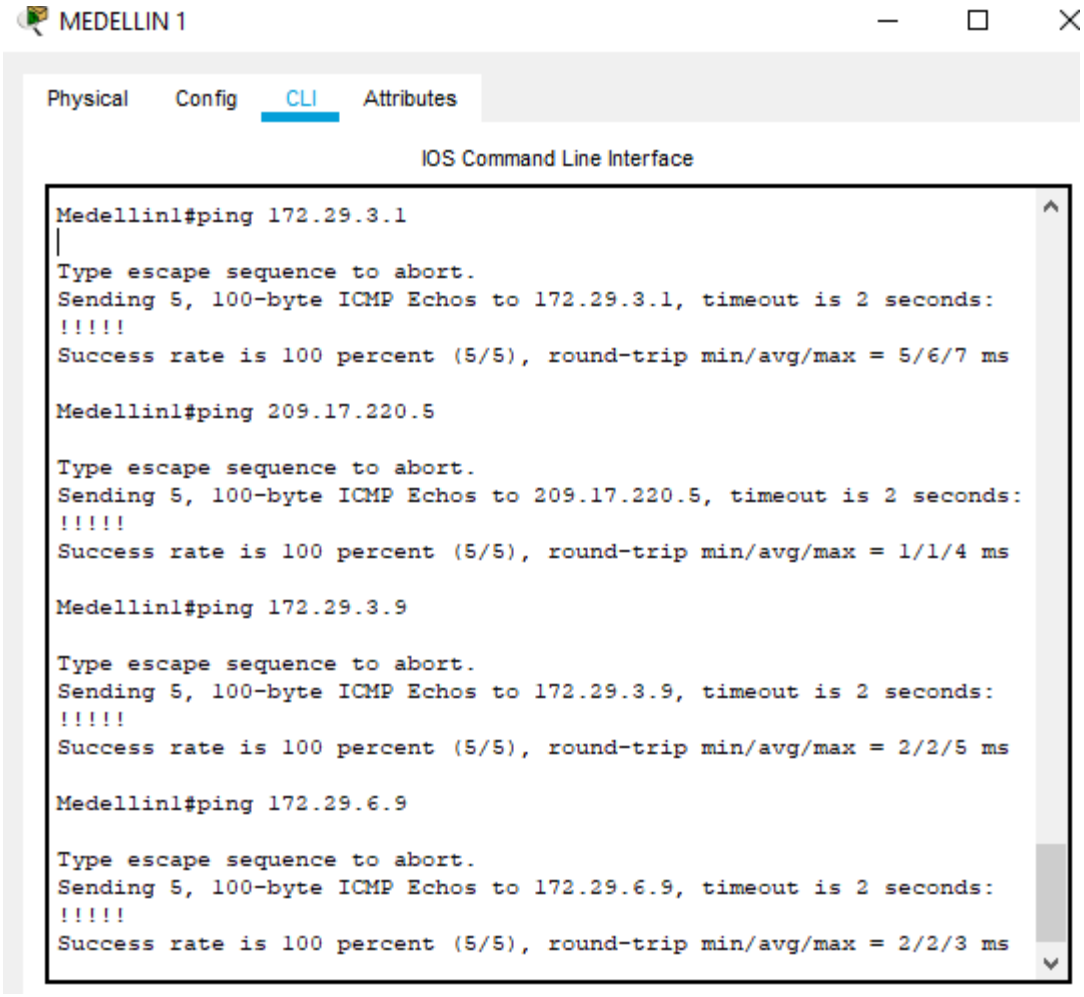


c. El router ISP deberá tener una ruta estática dirigida hacia cada red interna de Bogotá y Medellín para el caso se sumarizan las subredes de cada uno a /22.




```
ISP#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ISP(config)#ip route 172.29.4.0 255.255.252.0 209.17.220.2
ISP(config)#ip route 172.29.0.0 255.255.252.0 209.17.220.6
ISP(config)#
```

VERIFICANDO EN MEDELLIN1 – PING



Parte 2: Tabla de Enrutamiento.

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

R/ta: Realizado en puntos anteriores.

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

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.

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

e. Las tablas de los routers restantes deben permitir visualizar rutas redundantes para el caso de la ruta por defecto.

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

MEDELLIN 3

Physical Config CLI Attributes

IOS Command Line Interface

```
Medellin3>enable
Medellin3#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 172.29.6.9 to network 0.0.0.0

     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, 00:00:14, Serial0/1/0
C       172.29.4.128/25 is directly connected, GigabitEthernet0/0
L       172.29.4.129/32 is directly connected, GigabitEthernet0/0
R       172.29.6.0/30 [120/1] via 172.29.6.9, 00:00:09, Serial0/0/0
                      [120/1] via 172.29.6.5, 00:00:14, Serial0/1/0
                      [120/1] via 172.29.6.13, 00:00:09, Serial0/0/1
C       172.29.6.4/30 is directly connected, Serial0/1/0
L       172.29.6.6/32 is directly connected, Serial0/1/0
C       172.29.6.8/30 is directly connected, Serial0/0/0
L       172.29.6.10/32 is directly connected, Serial0/0/0
C       172.29.6.12/30 is directly connected, Serial0/0/1
L       172.29.6.14/32 is directly connected, Serial0/0/1
R*   0.0.0.0/0 [120/1] via 172.29.6.9, 00:00:09, Serial0/0/0
               [120/1] via 172.29.6.13, 00:00:09, Serial0/0/1
```

BOGOTA 1

Physical Config CLI Attributes

IOS Command Line Interface

```
Bogota1>enable
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 172.29.3.6, 00:00:14, Serial0/1/1
                      [120/1] via 172.29.3.2, 00:00:14, Serial0/1/0
R       172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:09, Serial0/0/1
C       172.29.3.0/30 is directly connected, Serial0/1/0
L       172.29.3.1/32 is directly connected, Serial0/1/0
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, Serial0/0/1
L       172.29.3.9/32 is directly connected, Serial0/0/1
R       172.29.3.12/30 [120/1] via 172.29.3.10, 00:00:09, Serial0/0/1
                       [120/1] via 172.29.3.6, 00:00:14, Serial0/1/1
                       [120/1] via 172.29.3.2, 00:00:14, 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
```

BOGOTA 3

Physical Config CLI Attributes

IOS Command Line Interface

```
Bogota3>enable
Bogota3#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 172.29.3.1 to network 0.0.0.0

     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, 00:00:22, 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, Serial0/0/1
L       172.29.3.6/32 is directly connected, Serial0/0/1
R       172.29.3.8/30 [120/1] via 172.29.3.5, 00:00:06, Serial0/0/1
                      [120/1] via 172.29.3.1, 00:00:06, Serial0/0/0
                      [120/1] via 172.29.3.13, 00:00:22, 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*   0.0.0.0/0 [120/1] via 172.29.3.1, 00:00:06, Serial0/0/0
               [120/1] via 172.29.3.5, 00:00:06, Serial0/0/1

Bogota3#
```

ISP

Physical Config CLI Attributes

IOS Command Line Interface

```
ISP>enable
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

     172.29.0.0/22 is subnetted, 2 subnets
S       172.29.0.0/22 [1/0] via 209.17.220.6
S       172.29.4.0/22 [1/0] via 209.17.220.2
     209.17.220.0/24 is variably subnetted, 4 subnets, 2 masks
C       209.17.220.0/30 is directly connected, Serial0/0/0
L       209.17.220.1/32 is directly connected, Serial0/0/0
C       209.17.220.4/30 is directly connected, Serial0/0/1
L       209.17.220.5/32 is directly connected, Serial0/0/1

ISP#
```

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

Rta: Desarrollado en la Conexión.

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.

Rta: Desarrollado en puntos anteriores.

Parte 5: Configurar encapsulamiento y autenticación PPP.

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

```
Medellin1#config t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin1(config)#username ISP password cisco
Medellin1(config)#
Medellin1(config)#int s0/0/0
Medellin1(config-if)#encapsulation ppp
Medellin1(config-if)#ppp authentication pap
Medellin1(config-if)#ppp pap sent-username Medellin1 password
cisco
Medellin1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
Medellin1(config-if)#end
Medellin1#
%SYS-5-CONFIG_I: Configured from console by console
Medellin1#ping 209.17.220.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.17.220.1, timeout is 2
seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1
ms
Medellin1#
```

```
ISP#config t
Enter configuration commands, one per line. End with CNTL/Z.
ISP(config)#username Medellin1 password cisco
ISP(config)#int s0/0/0
ISP(config-if)#encapsulation ppp
ISP(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to down
ISP(config-if)#ppp authentication pap
ISP(config-if)#ppp pap ?
sent-username Set outbound PAP username
ISP(config-if)#ppp pap sent-username ISP password cisco
ISP(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
```

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

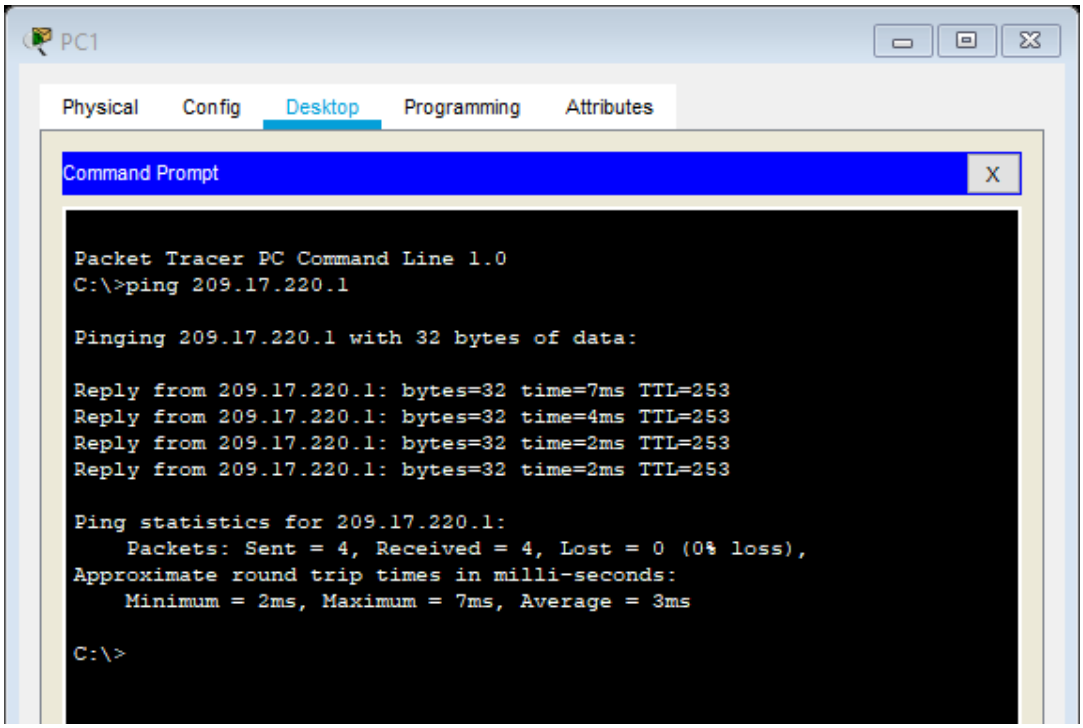
```
Bogota1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota1(config)#username ISP password cisco
Bogota1(config)#int s0/0/0
Bogota1(config-if)#encapsulation ppp
Bogota1(config-if)#ppp authentication chap
Bogota1(config-if)#
Bogota1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
Bogota1(config-if)#end
Bogota1#
%SYS-5-CONFIG_I: Configured from console by console
Bogota1#ping 209.17.220.5
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.17.220.5, timeout is 2
seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/6
ms
```

```
ISP(config)#username Bogota1 password cisco
ISP(config)#int s0/0/1
ISP(config-if)#encapsulation ppp
ISP(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1,
changed state to down
ISP(config-if)#ppp authentication chap
ISP(config-if)#
ISP(config-if)#end
ISP#
%SYS-5-CONFIG_I: Configured from console by console
ISP#ping 209.17.220.6
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.17.220.6, timeout is 2
seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms
```

Parte 6: Configuración de PAT.

a. 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.
b. 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.

```
Medellin1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin1(config)#ip nat inside source list 1 interface s0/0/0
overload
Medellin1(config)#access-list 1 permit 172.29.4.0 0.0.3.255
Medellin1(config)#int s0/0/0
Medellin1(config-if)#ip nat outside
Medellin1(config-if)#int s0/0/1
Medellin1(config-if)#ip nat inside
Medellin1(config-if)#int s0/1/0
Medellin1(config-if)#ip nat inside
Medellin1(config-if)#int s0/1/1
Medellin1(config-if)#ip nat inside
Medellin1(config-if)#
```

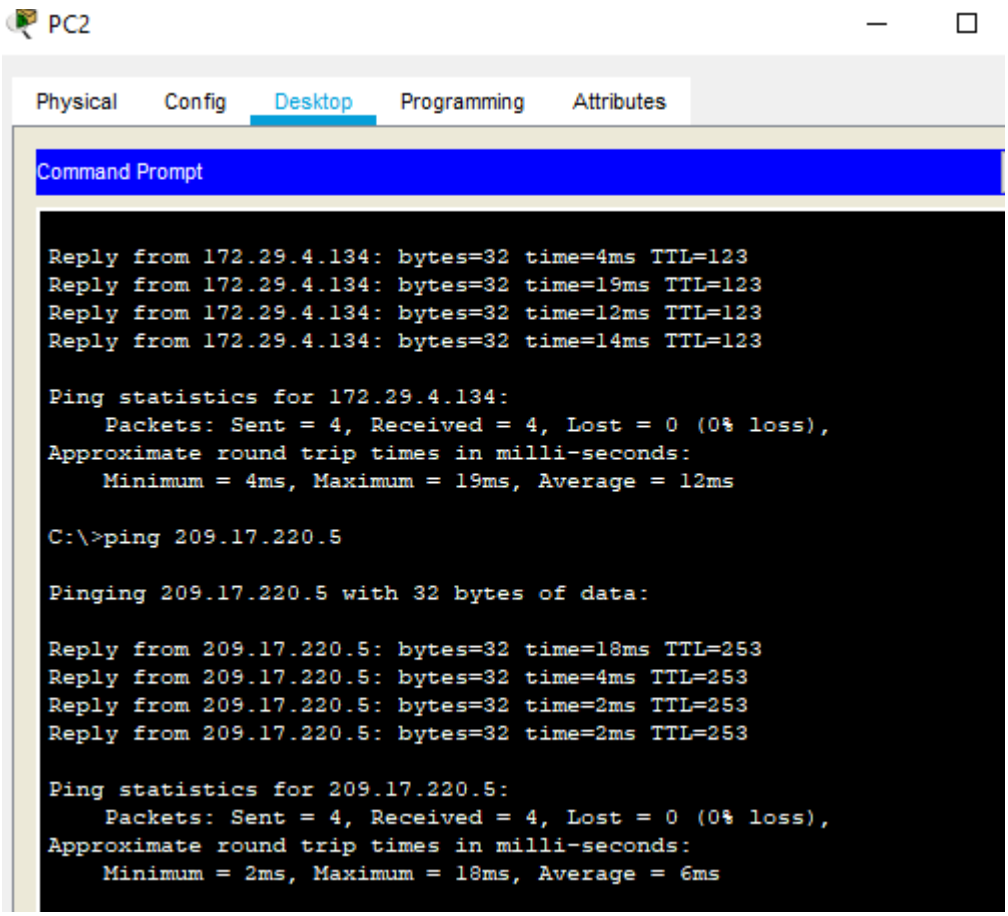


```
Medellin1#show ip nat t
Medellin1#show ip nat t
Pro  Inside global     Inside local       Outside local      Outside global
icmp 209.17.220.2:1    172.29.4.6:1       172.29.1.6:1       172.29.1.6:1
icmp 209.17.220.2:2    172.29.4.6:2       172.29.1.6:2       172.29.1.6:2
icmp 209.17.220.2:3    172.29.4.6:3       172.29.1.6:3       172.29.1.6:3
icmp 209.17.220.2:4    172.29.4.6:4       172.29.1.6:4       172.29.1.6:4

Medellin1#
```

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.

```
Bogota1>en
Bogota1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota1(config)#ip nat inside source list 1 interface s0/0/0
overload
Bogota1(config)#access-list 1 permit 172.29.0.0 0.0.3.255
Bogota1(config)#int s0/0/0
Bogota1(config-if)#ip nat outside
Bogota1(config-if)#int s0/0/1
Bogota1(config-if)#ip nat inside
Bogota1(config-if)#int s0/1/0
Bogota1(config-if)#ip nat inside
Bogota1(config-if)#int s0/1/1
Bogota1(config-if)#ip nat inside
Bogota1(config-if)#
```

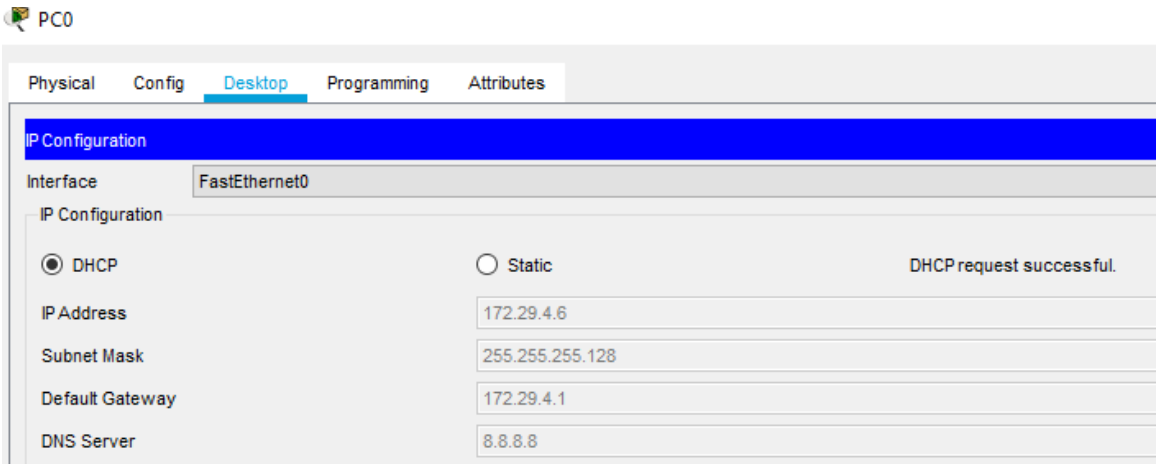
```
Bogota1#
Bogota1#show ip nat t
Pro  Inside global     Inside local       Outside local      Outside global
icmp 209.17.220.6:19   172.29.0.6:19      172.29.4.6:19      172.29.4.6:19
icmp 209.17.220.6:20   172.29.0.6:20      172.29.4.6:20      172.29.4.6:20
```



Parte 7: Configuración del servicio DHCP.

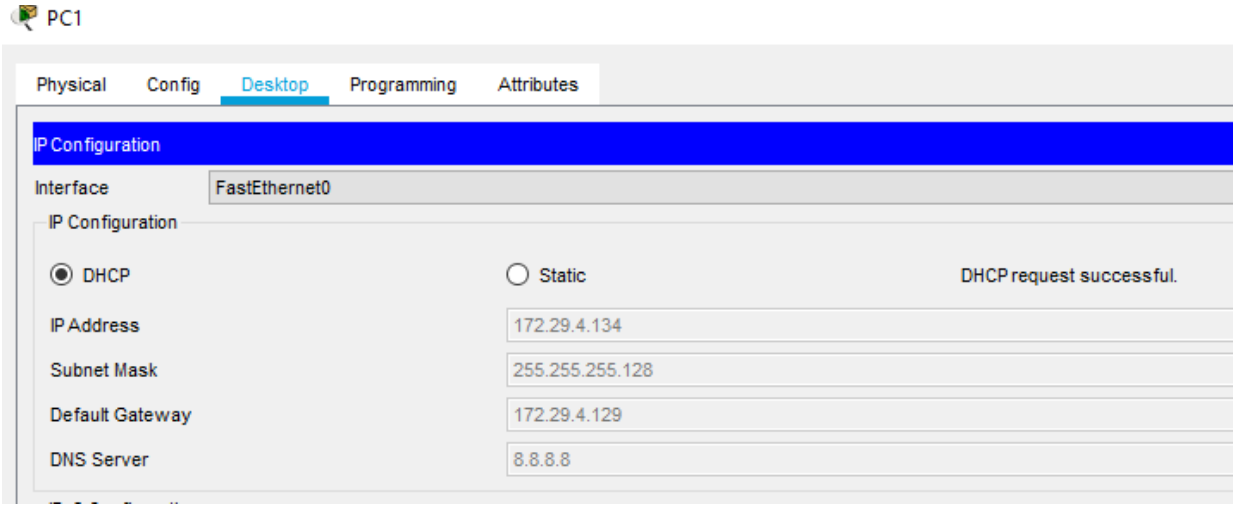
a. Configurar la red Medellín2 y Medellín3 donde el router Medellín 2 debe ser el servidor DHCP para ambas redes Lan.

```
Medellin2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin2(config)#ip dhcp excluded-address 172.29.4.1 172.29.4.5
Medellin2(config)#ip dhcp excluded-address 172.29.4.129
172.29.4.133
Medellin2(config)#ip dhcp pool MEDE2
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 8.8.8.8
Medellin2(dhcp-config)#exit
Medellin2(config)#
Medellin2(config)#ip dhcp pool MEDE3
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 8.8.8.8
Medellin2(dhcp-config)#exit
Medellin2(config)#
```



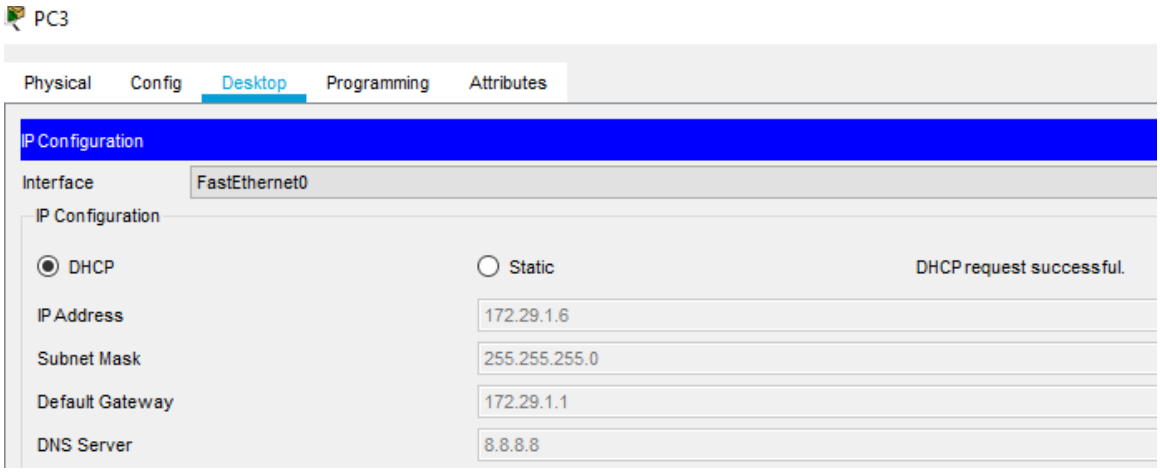
b. El router Medellín3 deberá habilitar el paso de los mensajes broadcast hacia la IP del router Medellín2.

```
Medellin3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin3(config)#int g0/0
Medellin3(config-if)#ip helper-address 172.29.6.5
Medellin3(config-if)#
```



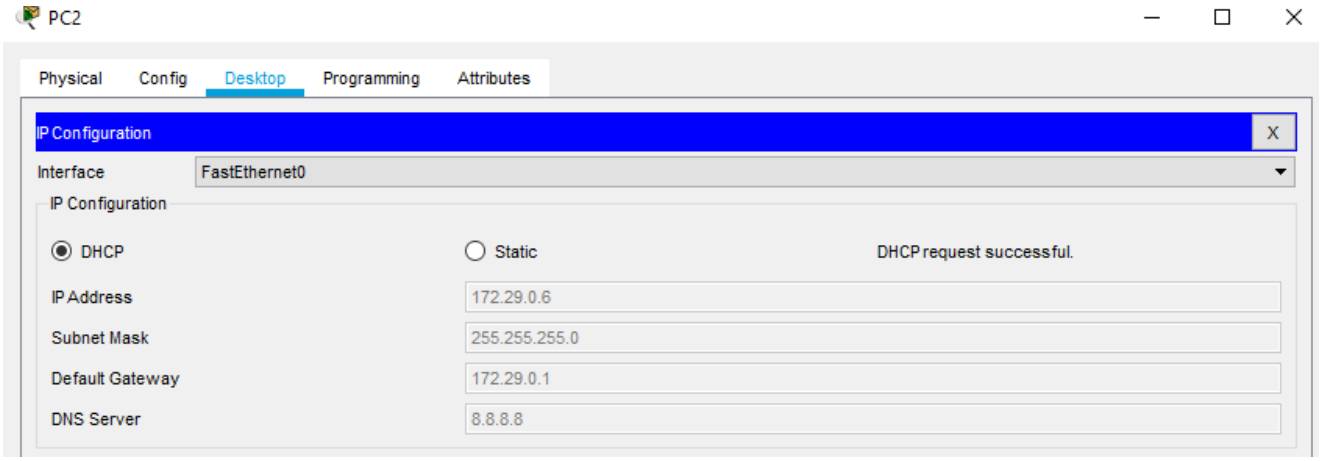
c. Configurar la red Bogotá2 y Bogotá3 donde el router Bogotá2 debe ser el servidor DHCP para ambas redes Lan.

```
Bogota2>en
Bogota2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota2(config)#ip dhcp excluded-address 172.29.1.1 172.29.1.5
Bogota2(config)#ip dhcp excluded-address 172.29.0.1 172.29.0.5
Bogota2(config)#ip dhcp pool BTA2
Bogota2(dhcp-config)#network 172.29.1.0 255.255.255.0
Bogota2(dhcp-config)#default-router 172.29.1.1
Bogota2(dhcp-config)#dns-server 8.8.8.8
Bogota2(dhcp-config)#ip dhcp pool BTA3
Bogota2(dhcp-config)#network 172.29.0.0 255.255.255.0
Bogota2(dhcp-config)#default-router 172.29.0.1
Bogota2(dhcp-config)#dns-server 8.8.8.8
Bogota2(dhcp-config)#
```

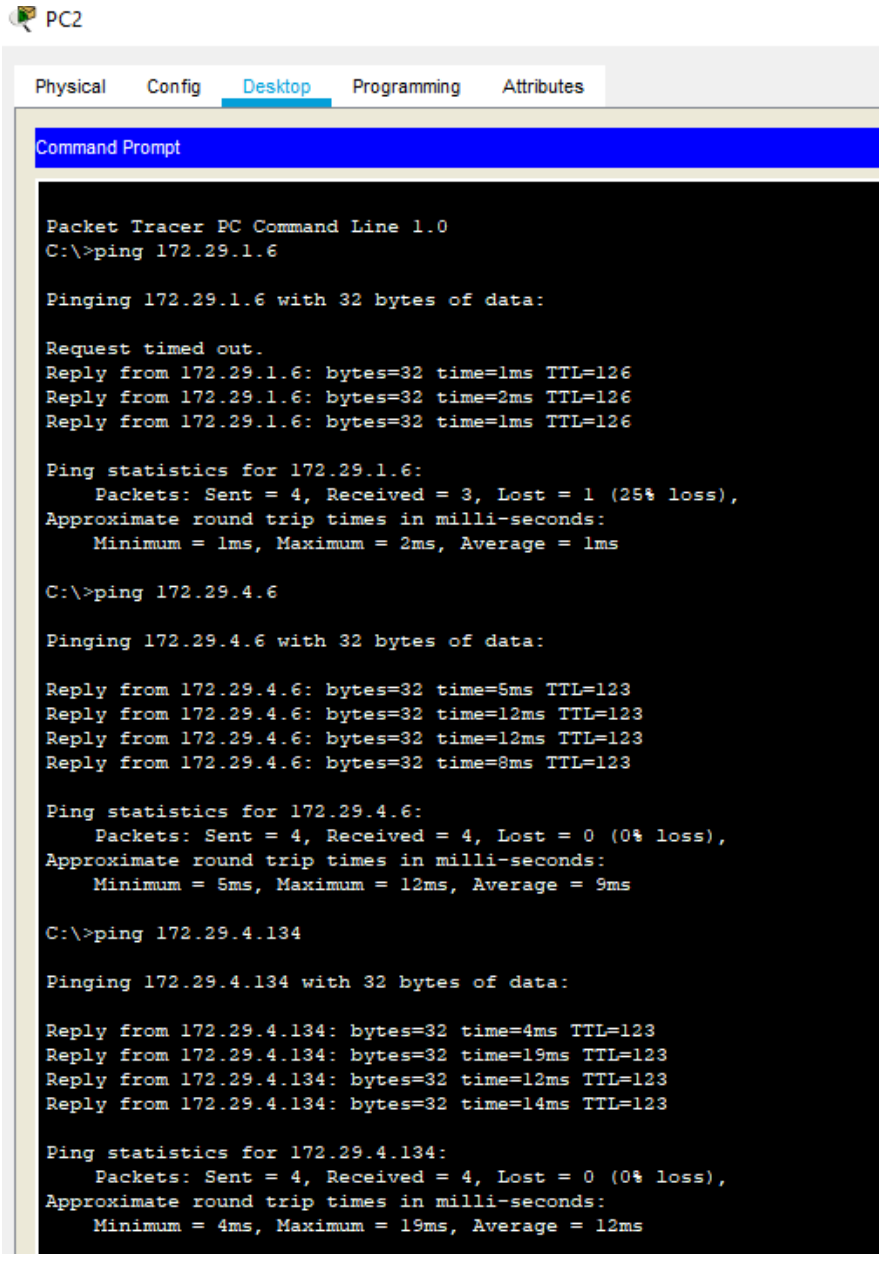


d. Configure el router Bogotá3 para que habilite el paso de los mensajes Broadcast hacia la IP del router Bogotá2.

```
Bogota3>en
Bogota3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota3(config)#int g0/0
Bogota3(config-if)#ip helper-address 172.29.3.13
Bogota3(config-if)#
Bogota3#
```

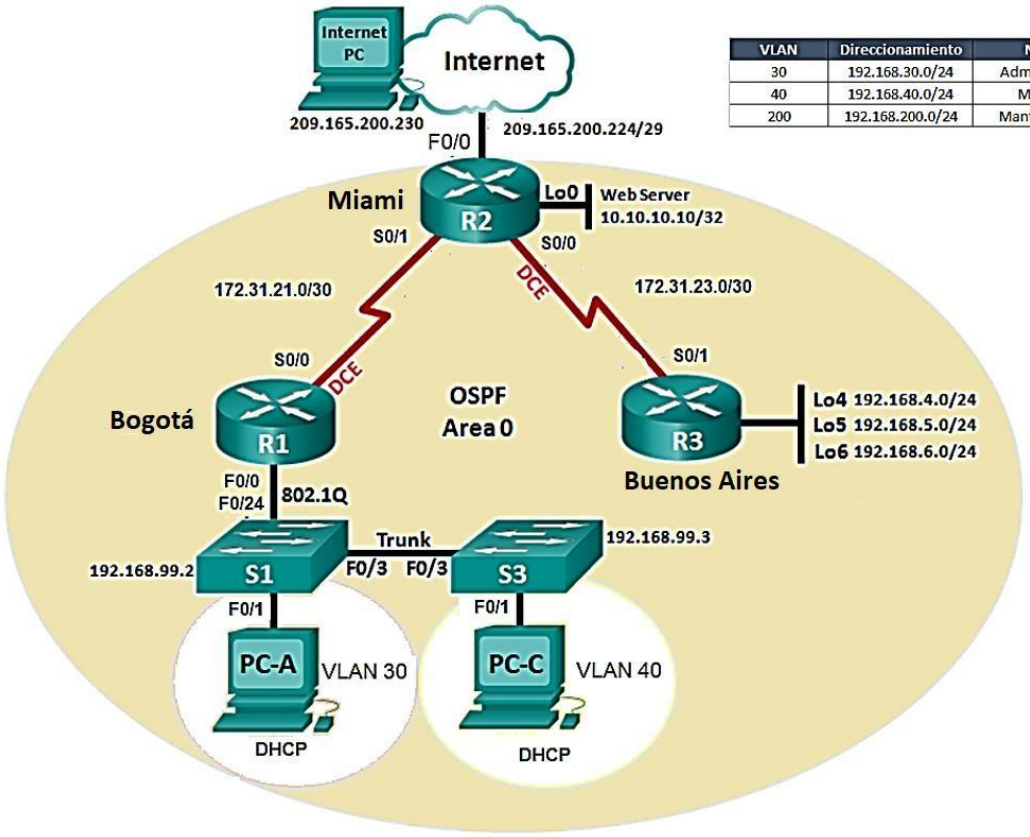


VERIFICANDO CONEXIÓN DESDE PC2 HACIA LOS DEMAS EQUIPOS



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.



VLAN	Direccionamiento	Nombre
30	192.168.30.0/24	Administración
40	192.168.40.0/24	Mercadeo
200	192.168.200.0/24	Mantenimiento

DESARROLLO

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

```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname BOGOTA
BOGOTA(config)#int s0/0/0
BOGOTA(config-if)#ip address 172.31.21.1 255.255.255.252
BOGOTA(config-if)#clock rate 128000
BOGOTA(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
BOGOTA(config-if)#
BOGOTA(config-if)#
```

```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname MIAMI
MIAMI(config)#int loop0
MIAMI(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state
to up
MIAMI(config-if)#ip address 10.10.10.10 255.255.255.255
MIAMI(config-if)#no shut
MIAMI(config-if)#int s0/0/0
MIAMI(config-if)#ip address 172.31.23.1 255.255.255.252
MIAMI(config-if)#clock rate 128000
MIAMI(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
MIAMI(config-if)#
MIAMI(config-if)#int s0/0/1
MIAMI(config-if)#ip add 172.31.21.2 255.255.255.252
MIAMI(config-if)#no shut
MIAMI(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
MIAMI(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state
to up
MIAMI(config-if)#int g0/0
MIAMI(config-if)#ip address 209.165.200.225 255.255.255.248
MIAMI(config-if)#
```

```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
```

```
Router(config)#hostname BUENOSAIRES
BUENOSAIRES(config)#int loop4
BUENOSAIRES(config-if)#
%LINK-5-CHANGED: Interface Loopback4, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback4, changed state
to up
BUENOSAIRES(config-if)#ip address 192.168.4.1 255.255.255.0
BUENOSAIRES(config-if)#no shut
BUENOSAIRES(config-if)#int loop5
BUENOSAIRES(config-if)#
%LINK-5-CHANGED: Interface Loopback5, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback5, changed state
to up
BUENOSAIRES(config-if)#ip address 192.168.5.1 255.255.255.0
BUENOSAIRES(config-if)#no shut
BUENOSAIRES(config-if)#int loop6
BUENOSAIRES(config-if)#
%LINK-5-CHANGED: Interface Loopback6, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback6, changed state
to up
BUENOSAIRES(config-if)#ip address 192.168.6.1 255.255.255.0
BUENOSAIRES(config-if)#no shut
BUENOSAIRES(config-if)#int s0/0/1
BUENOSAIRES(config-if)#ip address 172.31.23.2 255.255.255.252
BUENOSAIRES(config-if)#no shut
BUENOSAIRES(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
BUENOSAIRES(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state
to up
BUENOSAIRES(config-if)#
```

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

OSPFv2 area 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 S0/0 a	9500

```
BOGOTA>enable
BOGOTA#config t
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA(config)#router ospf 1
BOGOTA(config-router)#router-id 1.1.1.1
BOGOTA(config-router)#network 192.168.99.0 0.0.0.255 area 0
BOGOTA(config-router)#network 172.31.21.0 0.0.0.3 area 0
```

```
BOGOTA(config-router)#passive-interface gi0/0
BOGOTA(config-router)#int s0/0/0
BOGOTA(config-if)#bandwidth 256
BOGOTA(config-if)#ip ospf cost 9500
BOGOTA(config-if)#int s0/0/1
BOGOTA(config-if)#bandwidth 256
BOGOTA(config-if)#

MIAMI>enable
MIAMI#config t
Enter configuration commands, one per line. End with CNTL/Z.
MIAMI(config)#router ospf 1
MIAMI(config-router)#router-id 5.5.5.5
MIAMI(config-router)#network 209.165.200.224 0.0.0.7 area 0
MIAMI(config-router)#network 172.31.21.0 0.0.0.3 area 0
MIAMI(config-router)#
01:02:57: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial0/0/1 from
LOADING to FULL, Loading Done
MIAMI(config-router)#network 10.10.10.10 0.0.0.3 area 0
MIAMI(config-router)#passive-interface gi0/0
MIAMI(config-router)#int s0/0/0
MIAMI(config-if)#int s0/0/0
MIAMI(config-if)#bandwidth 256
MIAMI(config-if)#ip ospf cost 9500
MIAMI(config-if)#int s0/0/1
MIAMI(config-if)#bandwidth 256
MIAMI(config-if)#


BUENOSAIRES>enable
BUENOSAIRES#config t
Enter configuration commands, one per line. End with CNTL/Z.
BUENOSAIRES(config)#router ospf 1
BUENOSAIRES(config-router)#router-id 8.8.8.8
BUENOSAIRES(config-router)#network 172.31.23.0 0.0.0.3 area 0
BUENOSAIRES(config-router)#network 192.168.4.0 0.0.0.255 area 0
BUENOSAIRES(config-router)#network 192.168.5.0 0.0.0.255 area 0
BUENOSAIRES(config-router)#network 192.168.6.0 0.0.0.255 area 0
BUENOSAIRES(config-router)#int s0/0/0
BUENOSAIRES(config-if)#bandwidth 256
BUENOSAIRES(config-if)#ip ospf cost 9500
BUENOSAIRES(config-if)#int s0/0/1
BUENOSAIRES(config-if)#bandwidth 256
BUENOSAIRES(config-if)#
```

Verificar información de OSPF

- Visualizar tablas de enrutamiento y routers conectados por OSPFv2

```
MIAMI>enable
MIAMI#show ip ospf neig

Neighbor ID     Pri   State           Dead Time   Address         Interface
1.1.1.1           0   FULL/  -        00:00:33    172.31.21.1     Serial0/0/1
MIAMI#
MIAMI#
```

```
BOGOTA>enable
BOGOTA#show ip ospf neig

Neighbor ID     Pri   State           Dead Time   Address         Interface
5.5.5.5           0   FULL/  -        00:00:38    172.31.21.2     Serial0/0/0
BOGOTA#
```

- Visualizar lista resumida de interfaces por OSPF en donde se ilustre el costo de cada interface

R2

Physical Config CLI Attributes

IOS Command Line Interface

```
MIAMI#
MIAMI#show ip ospf interface

Loopback0 is up, line protocol is up
  Internet address is 10.10.10.10/32, Area 0
  Process ID 1, Router ID 5.5.5.5, Network Type LOOPBACK, Cost: 1
  Loopback interface is treated as a stub Host
Serial0/0/1 is up, line protocol is up
  Internet address is 172.31.21.2/30, Area 0
  Process ID 1, Router ID 5.5.5.5, Network Type POINT-TO-POINT, Cost: 390
  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 00:00:04
  Index 2/2, 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 1.1.1.1
  Suppress hello for 0 neighbor(s)
```

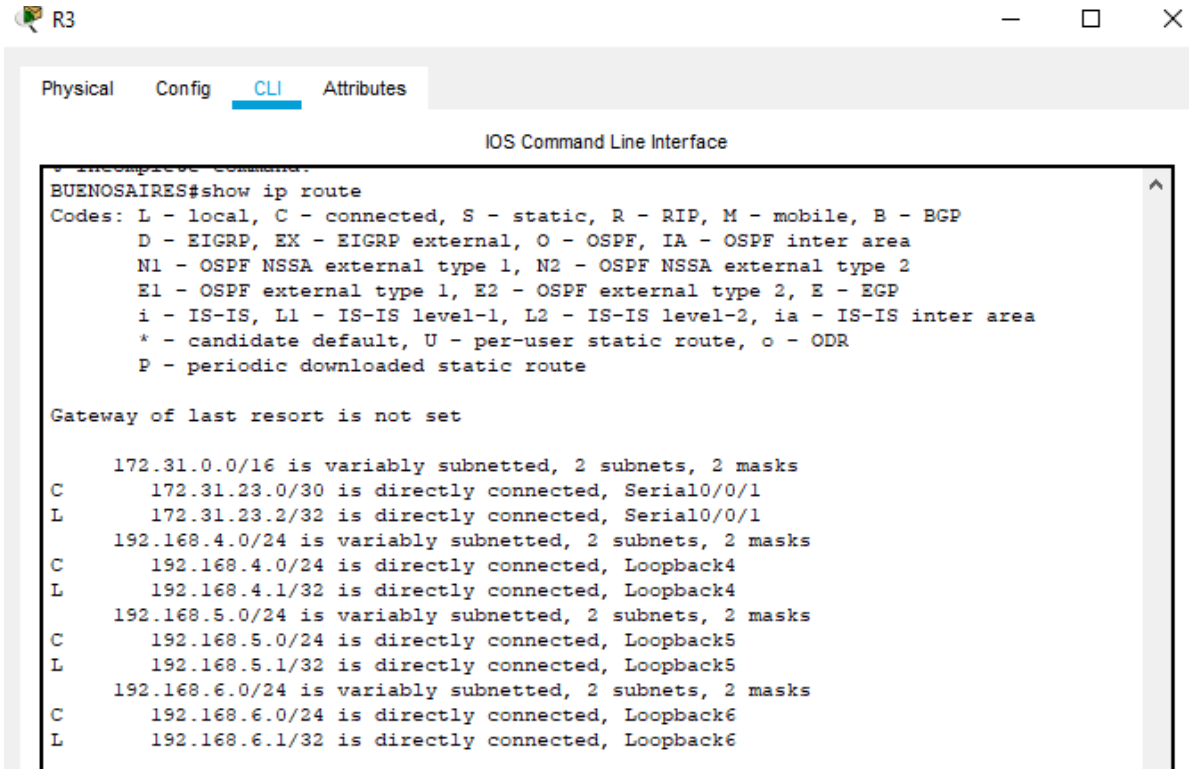
- Visualizar el OSPF Process ID, Router ID, Address summarizations, Routing Networks, and passive interfaces configuradas en cada router.

R3

Physical Config CLI Attributes

IOS Command Line Interface

```
BUENOSAIRES#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
    192.168.4.0 0.0.0.255 area 0
    192.168.5.0 0.0.0.255 area 0
    192.168.6.0 0.0.0.255 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    8.8.8.8              110      00:24:44
```



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

```
Switch>
Switch>enable
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 30
Switch(config-vlan)#name Administracion
Switch(config-vlan)#exit
Switch(config)#vlan 40
Switch(config-vlan)#name Mercadeo
Switch(config-vlan)#exit
Switch(config)#vlan 200
Switch(config-vlan)#name Mantenimiento
Switch(config-vlan)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console
Switch#show vlan brief


VLAN Name Status Ports
---- -------------------------------- --------- -------------------------
------
                                1 default active Fa0/1, Fa0/2, Fa0/3, Fa0/4
```

```
                                Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                Gig0/1, Gig0/2
30 Administracion active
40 Mercadeo active
200 Mantenimiento active
1002 fddi-default active
1003 token-ring-default active
1004 fddinet-default active
1005 trnet-default active
Switch#


Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#enable secret class
Switch(config)#line console 0
Switch(config-line)#password cisco
Switch(config-line)#login
Switch(config-line)#line vty 0 4
Switch(config-line)#password cisco
Switch(config-line)#login
Switch(config-line)#service pass
Switch(config-line)#service pass
Switch(config)#service pass
Switch(config)#service password-encryption
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console
Switch#

Switch(config)#interface range fa0/1
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 30
Switch(config-if-range)#exit
```

4. En el Switch 3 deshabilitar DNS lookup

```
Switch(config)#no ip domain-lookup
```

5. Asignar direcciones IP a los Switches acorde a los lineamientos***.***

```
Switch(config)#int vlan 1
Switch(config-if)#ip address 192.168.99.3 255.255.255.0
Switch(config-if)#exit
Switch(config)#
```

6. Desactivar todas las interfaces que no sean utilizadas en el esquema de red.

7. Implement DHCP and NAT for IPv4

8. Configurar R1 como servidor DHCP para las VLANs 30 y 40.

```
BOGOTA>enable
BOGOTA#config t
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA(config)#ip dhcp pool vlan30
BOGOTA(dhcp-config)#network 192.168.30.0 255.255.255.0
BOGOTA(dhcp-config)#default-router 192.168.30.1
BOGOTA(dhcp-config)#ip dhcp pool vlan40
BOGOTA(dhcp-config)#network 192.168.40.0 255.255.255.0
BOGOTA(dhcp-config)#default-router 192.168.40.1
BOGOTA(dhcp-config)#ip dhcp pool vlan200
BOGOTA(dhcp-config)#network 192.168.200.0 255.255.255.0
BOGOTA(dhcp-config)#default-router 192.168.200.1
BOGOTA(dhcp-config)#
```

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

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.

10. Configurar NAT en R2 para permitir que los host puedan salir a internet

```
MIAMI>enable
MIAMI#config t
Enter configuration commands, one per line. End with CNTL/Z.
MIAMI(config)#interface GigabitEthernet0/0
MIAMI(config-if)#f)#ip nat inside
^
% Invalid input detected at '^' marker.
MIAMI(config-if)#ip nat inside
MIAMI(config-if)#int s0/0/0
```

```
MIAMI(config-if)#ip nat outside
MIAMI(config-if)#int s0/0/0
MIAMI(config-if)#int s0/0/1
MIAMI(config-if)#ip nat outsideip nat outside
MIAMI(config-if)#int s0/0/1
MIAMI(config-if)#ip nat outside
MIAMI(config-if)#exit
MIAMI(config)#
```

11. 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.

```
MIAMI#config t
Enter configuration commands, one per line.  End with CNTL/Z.
MIAMI(config)#access-list 1 permit 192.168.30.0 0.0.0.255
MIAMI(config)#access-list 1 permit 192.168.40.0 0.0.0.255
MIAMI(config)#ip nat pool INTERNET 209.165.200.225 209.165.200.228
netmask 255.255.255.248
MIAMI(config)#ip nat inside source list 1 pool INTERNET
MIAMI(config)#
```

```
MIAMI(config)#ip access-list standard ADMIN_S
MIAMI(config-std-nacl)#permit host 172.31.21.1
MIAMI(config-std-nacl)#exit
MIAMI(config)#line vty 0 4
MIAMI(config-line)#access-class ADMIN_S in
MIAMI(config-line)#exit
```

12. 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**.**

```
MIAMI#config t
Enter configuration commands, one per line.  End with CNTL/Z.
MIAMI(config)#access-list 101 permit tcp any host 209.165.200.229
eq www
MIAMI(config)#access-list 101 permit icmp any any echo-reply
MIAMI(config)#int g0/0
MIAMI(config-if)#ip access-group 101 in
MIAMI(config-if)#int s/0/0/0
                  ^
MIAMI(config-if)#int s0/0/0
MIAMI(config-if)#ip access-group 101 out
MIAMI(config-if)#int s0/0/1
MIAMI(config-if)#ip access-group 101 out
MIAMI(config-if)#int g0/1
MIAMI(config-if)#ip access-group 101 out
```

```
MIAMI(config-if)#exit
MIAMI(config)#
```

13. Verificar procesos de comunicación y redireccionamiento de tráfico en los routers mediante el uso de Ping y Traceroute.

```
MIAMI#show access-lists
Standard IP access list 1
    10 permit 192.168.30.0 0.0.0.255
    20 permit 192.168.40.0 0.0.0.255
Standard IP access list ADMIN_S
    10 permit host 172.31.21.1
Extended IP access list 101
    10 permit tcp any host 209.165.200.229 eq www
    20 permit icmp any any echo-reply
```

CONCLUSIONES

- El desarrollo de la prueba de habilidades permitió conceptualizar con claridad el termino de red, que no es más que un conjunto de equipos (computadoras y/o dispositivos) conectados por medio de cables, señales, ondas o cualquier otro método de transporte de datos, que comparten información (archivos), servicios (acceso a internet, e-mail, chat), etc.

- El protocolo DHCP está diseñado fundamentalmente para ahorrar tiempo gestionando direcciones IP en una red grande. El servicio DHCP se encuentra activo en un servidor donde se centraliza la administración de las direcciones IP de la red.

- Las NAT consiste en transportar los paquetes de información a través del router sin importar la clase, se consideran el único mecanismo utilizado para intercomunicar redes.

REFERENCIAS BIBLIOGRÁFICAS

- MACFARLANE, J. (2014). Network Routing Basics: Understanding IP Routing in Cisco Systems. Recuperado http://bibliotecavirtual.unad.edu.co:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=e000xww&AN=158227&lang=es&site=ehost-live

- CISCO. (2014). OSPF de una sola área. Principios de Enrutamiento y Conmutación. Recuperado: https://static-courseassets.s3.amazonaws.com/RSE50ES/module8/index.html#8.0.1.1

- CISCO. (2014). Enrutamiento Dinámico. Principios de Enrutamiento y Conmutación. Recuperado: https://static-courseassets.s3.amazonaws.com/RSE50ES/module7/index.html#7.0.1

- CISCO. (2014). Listas de control de acceso. Principios de Enrutamiento y Conmutación. Recuperado: https://static-courseassets.s3.amazonaws.com/RSE50ES/module9/index.html#9.0.1.1