

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

EVALUACIÓN – PRUEBA DE HABILIDADES PRÁCTICAS CCNA

POR:
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INTRODUCCION

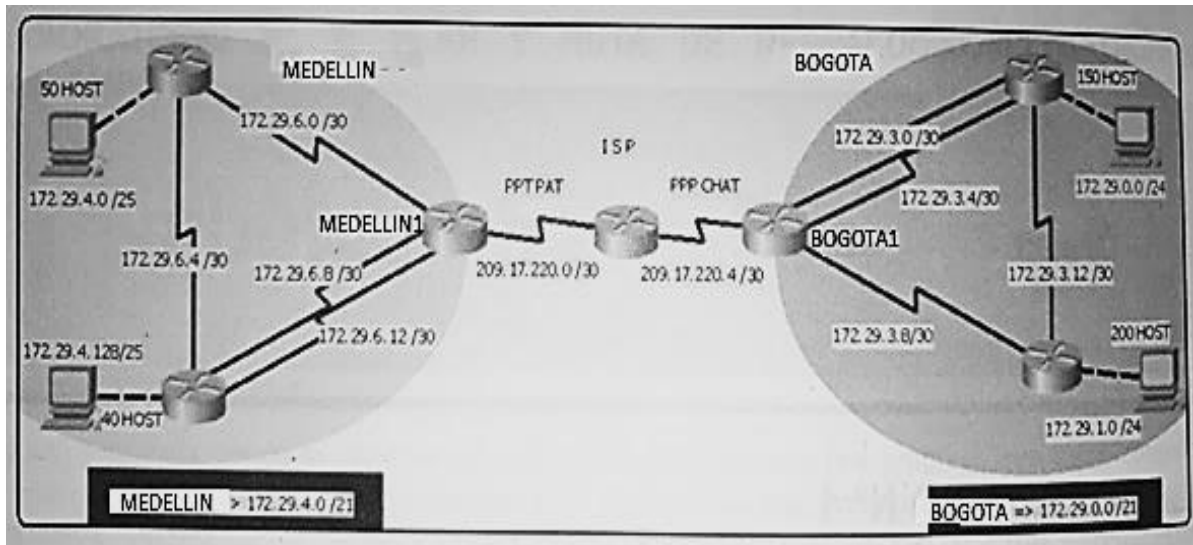
A continuación, se presenta el desarrollo de la prueba de habilidades propuesta como actividad final del diplomado profundización cisco (diseño e implementación de soluciones integradas lan / wan).

Esta actividad recoge los conceptos y temáticas aprendidas en el curso CCNA1, tales como RIPv2, DHCP, todo esto aplicado a 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.

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

Conexiones Físicas.

```
ISP(config)#int s0/0/0
ISP(config-if)#ip address 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)#
```

```
Bogotal(config)#int s0/0/0
Bogotal(config-if)#ip address 209.17.220.6 255.255.255.252
Bogotal(config-if)#no shut
Bogotal(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
Bogotal(config-if)#int s0/0/1
Bogotal(config-if)#ip address 172.29.3.9 255.255.255.252
Bogotal(config-if)#clock rate 4000000
Bogotal(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Bogotal(config-if)#
Bogotal(config-if)#int s0/1/0
Bogotal(config-if)#ip address 172.29.3.1 255.255.255.252
Bogotal(config-if)#clock rate 4000000
Bogotal(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
Bogotal(config-if)#
Bogotal(config-if)#int s0/1/1
Bogotal(config-if)#ip address 172.29.3.5 255.255.255.252
Bogotal(config-if)#clock rate 4000000
Bogotal(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 "Acceso Restringido"
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 "Acceso Restringido"
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 "Acceso Restringido"
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 "Acceso Restringido"
ISP(config)#
```

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

```
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)#
```

```
Bogotal#config t
Enter configuration commands, one per line. End with CNTL/Z.
Bogotal(config)#router rip
Bogotal(config-router)#version 2
Bogotal(config-router)#no auto-summary
Bogotal(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
Bogotal(config-router)#network 172.29.3.0
Bogotal(config-router)#network 172.29.3.4
Bogotal(config-router)#network 172.29.3.8
Bogotal(config-router)#passive-interface s0/0/0
Bogotal(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)#
```

```
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#
```

```

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 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

Bogotal#

```

b. Los routers Bogotal 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)#

```

Pasamos a verificar

```
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#
```

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

Pasamos a Verificar

```
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 172.29.3.9 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 172.29.3.14, 00:00:22, Serial0/0/1
C       172.29.1.0/24 is directly connected, GigabitEthernet0/0
L       172.29.1.1/32 is directly connected, GigabitEthernet0/0
R       172.29.3.0/30 [120/1] via 172.29.3.9, 00:00:12, Serial0/0/0
        [120/1] via 172.29.3.14, 00:00:22, Serial0/0/1
R       172.29.3.4/30 [120/1] via 172.29.3.9, 00:00:12, Serial0/0/0
        [120/1] via 172.29.3.14, 00:00:22, Serial0/0/1
C       172.29.3.8/30 is directly connected, Serial0/0/0
L       172.29.3.10/32 is directly connected, Serial0/0/0
C       172.29.3.12/30 is directly connected, Serial0/0/1
L       172.29.3.13/32 is directly connected, Serial0/0/1
R*    0.0.0.0/0 [120/1] via 172.29.3.9, 00:00:12, Serial0/0/0

Bogota2#
```

- 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.

```
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

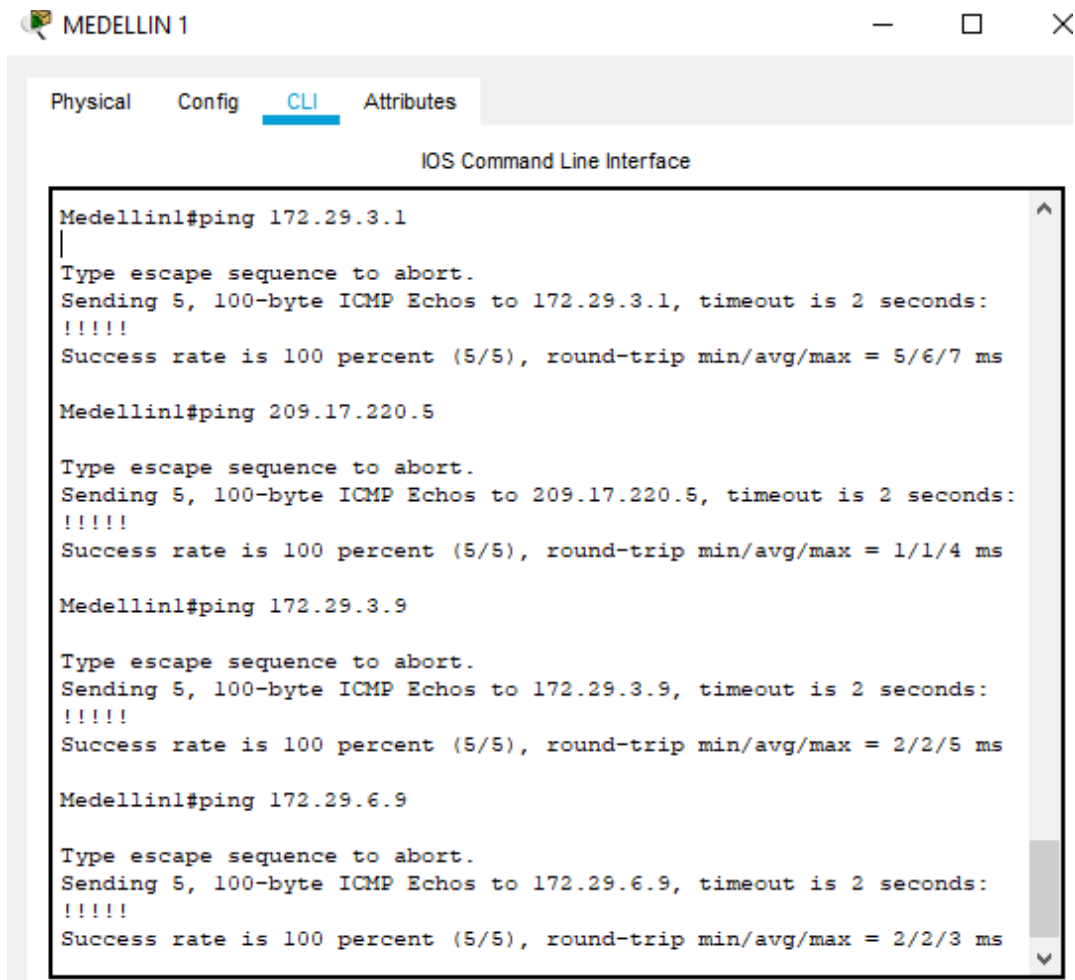
    209.17.220.0/24 is variably subnetted, 4 subnets, 2 masks
C       209.17.220.0/30 is directly connected, Serial0/0/0
L       209.17.220.1/32 is directly connected, Serial0/0/0
C       209.17.220.4/30 is directly connected, Serial0/0/1
L       209.17.220.5/32 is directly connected, Serial0/0/1

ISP#
```



```
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)#
```

Se vefrifica en Medellin 1



The screenshot shows a network device CLI window titled "MEDELLIN 1" with tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is active, displaying the "IOS Command Line Interface". The output shows four successful ping tests:

```
Medellin1#ping 172.29.3.1
|
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.29.3.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 5/6/7 ms

Medellin1#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 = 1/1/4 ms

Medellin1#ping 172.29.3.9

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.29.3.9, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/2/5 ms

Medellin1#ping 172.29.6.9

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.29.6.9, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/2/3 ms
```

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 1
Physical Config CLI Attributes
IOS Command Line Interface
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 209.17.220.1 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 172.29.6.2, 00:00:19, Serial0/0/1
R    172.29.4.128/25 [120/1] via 172.29.6.10, 00:00:12, Serial0/1/0
    [120/1] via 172.29.6.14, 00:00:12, 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, 00:00:19, Serial0/0/1
    [120/1] via 172.29.6.10, 00:00:12, Serial0/1/0
    [120/1] via 172.29.6.14, 00:00:12, 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
S*   0.0.0.0/0 [1/0] via 209.17.220.1

Medellin1#
```

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

```

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

```

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#

```

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: Ya fue desarrollado.

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: Ya fue desarrollado.

Parte 5: Configurar encapsulamiento y autenticación PPP.

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

```
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)#
Medellin1(config-if)#end
Medellin1#
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.

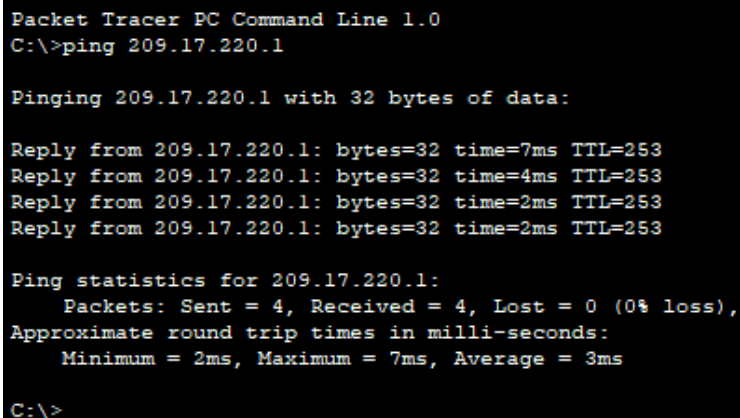
```
Bogotal#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Bogotal(config)#username ISP password cisco
Bogotal(config)#int s0/0/0
Bogotal(config-if)#encapsulation ppp
Bogotal(config-if)#ppp authentication chap
Bogotal(config-if)#
Bogotal(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
Bogotal(config-if)#end
Bogotal#
%SYS-5-CONFIG_I: Configured from console by console
Bogotal#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 Bogotal 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)#
```



```
Packet Tracer PC Command Line 1.0
C:\>ping 209.17.220.1

Pinging 209.17.220.1 with 32 bytes of data:

Reply from 209.17.220.1: bytes=32 time=7ms TTL=253
Reply from 209.17.220.1: bytes=32 time=4ms TTL=253
Reply from 209.17.220.1: bytes=32 time=2ms TTL=253
Reply from 209.17.220.1: bytes=32 time=2ms TTL=253

Ping statistics for 209.17.220.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 7ms, Average = 3ms

C:\>
```



```

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

```

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.

```

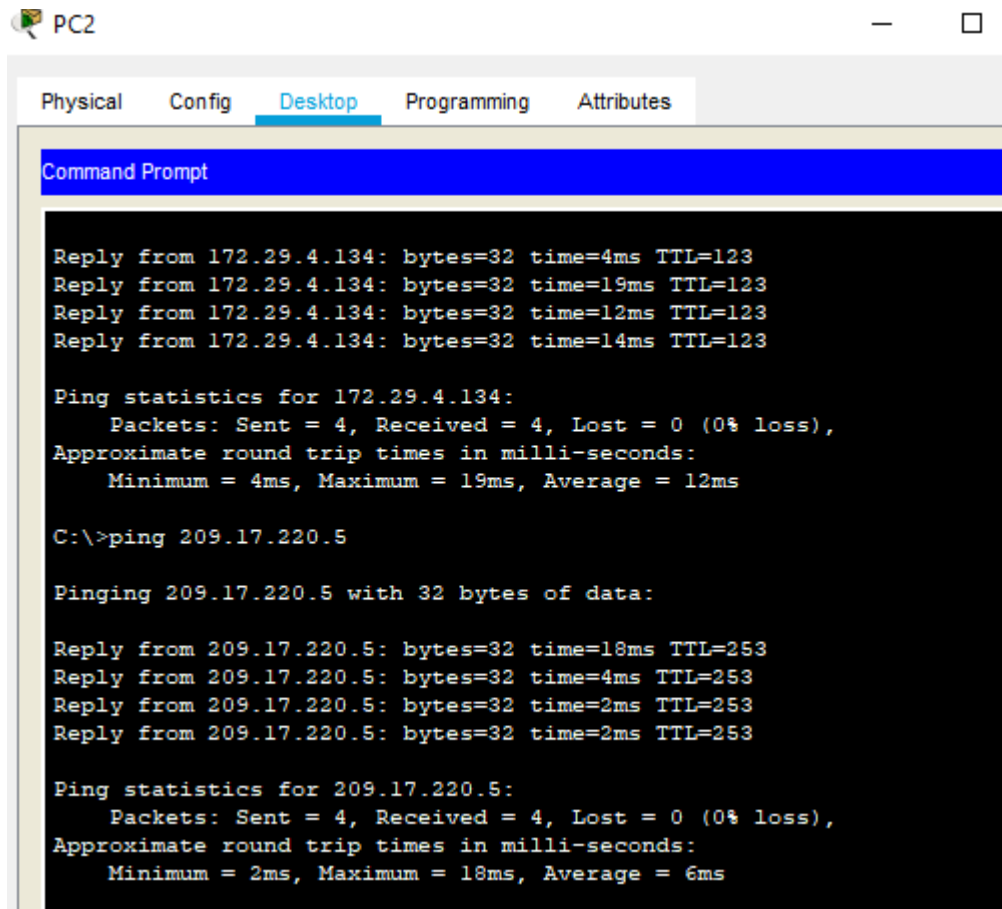
Bogota1>en
Bogota1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota1(config)#ip nat inside source list 1 interface s0/0/0
overload
Bogota1(config)#access-list 1 permit 172.29.0.0 0.0.3.255
Bogota1(config)#int s0/0/0
Bogota1(config-if)#ip nat outside
Bogota1(config-if)#int s0/0/1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

```



The screenshot shows a PC2 window with a 'Desktop' tab selected. A Command Prompt window is open, displaying the results of a ping command. The first ping is to 172.29.4.134, showing four successful replies with varying round-trip times (4ms, 19ms, 12ms, 14ms) and a 123ms TTL. The statistics show 4 packets sent, 4 received, and 0% loss, with an average round-trip time of 12ms. The second ping is to 209.17.220.5, also showing four successful replies with round-trip times of 18ms, 4ms, 2ms, and 2ms, and a 253ms TTL. The statistics show 4 packets sent, 4 received, and 0% loss, with an average round-trip time of 6ms.

```
Physical  Config  Desktop  Programming  Attributes
Command Prompt
Reply from 172.29.4.134: bytes=32 time=4ms TTL=123
Reply from 172.29.4.134: bytes=32 time=19ms TTL=123
Reply from 172.29.4.134: bytes=32 time=12ms TTL=123
Reply from 172.29.4.134: bytes=32 time=14ms TTL=123

Ping statistics for 172.29.4.134:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 19ms, Average = 12ms

C:\>ping 209.17.220.5

Pinging 209.17.220.5 with 32 bytes of data:

Reply from 209.17.220.5: bytes=32 time=18ms TTL=253
Reply from 209.17.220.5: bytes=32 time=4ms TTL=253
Reply from 209.17.220.5: bytes=32 time=2ms TTL=253
Reply from 209.17.220.5: bytes=32 time=2ms TTL=253

Ping statistics for 209.17.220.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 18ms, Average = 6ms
```

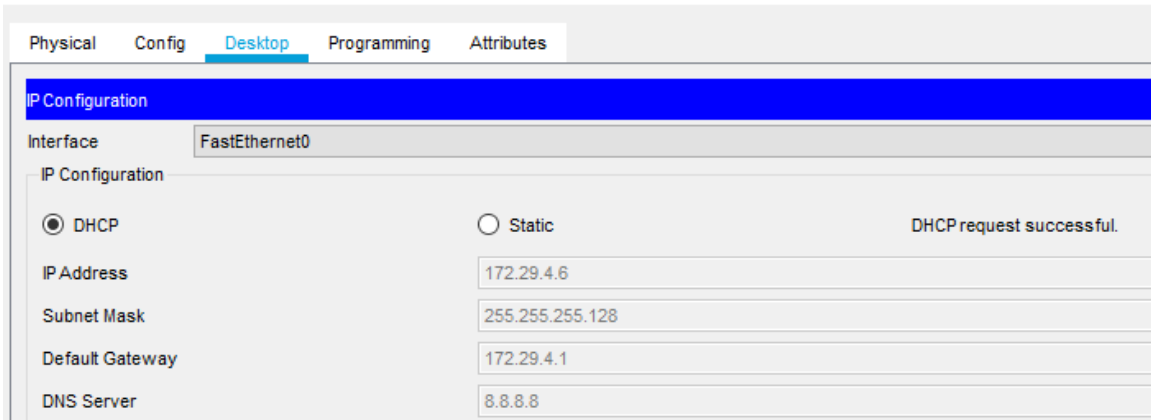
Parte 7: Configuración del servicio DHCP.

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) #
```

PC0



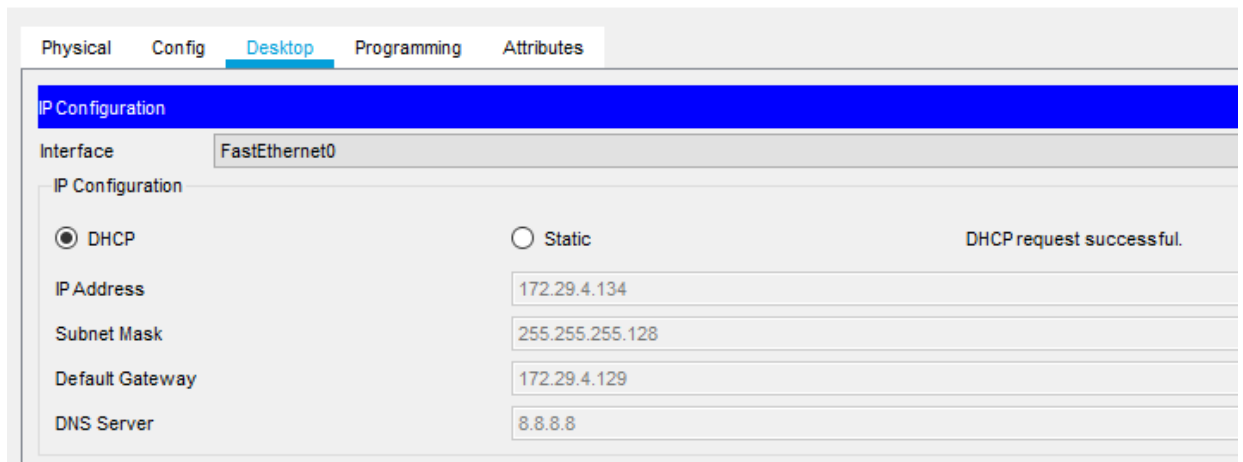
The screenshot shows the configuration interface for PC0, specifically the 'Desktop' tab. The 'IP Configuration' section is highlighted in blue. The interface is for the 'FastEthernet0' interface. The configuration is set to DHCP, and a message indicates 'DHCP request successful'. The IP Address is 172.29.4.6, Subnet Mask is 255.255.255.128, Default Gateway is 172.29.4.1, and DNS Server is 8.8.8.8.

Interface	FastEthernet0
IP Configuration	
<input checked="" type="radio"/> DHCP	<input type="radio"/> Static
IP Address	172.29.4.6
Subnet Mask	255.255.255.128
Default Gateway	172.29.4.1
DNS Server	8.8.8.8

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)#
```

PC1

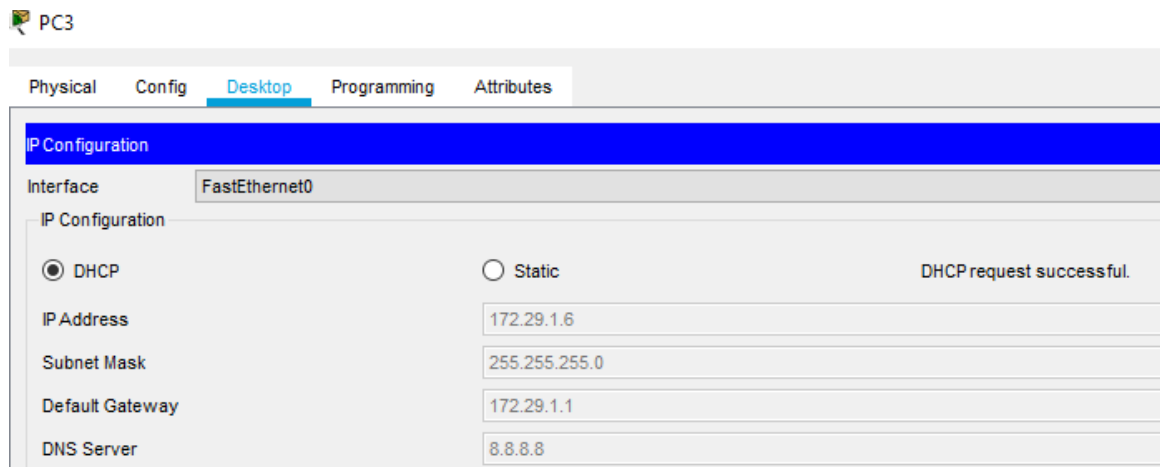


The screenshot shows the configuration interface for PC1, specifically the 'Desktop' tab. The 'IP Configuration' section is highlighted in blue. The interface is for the 'FastEthernet0' interface. The configuration is set to DHCP, and a message indicates 'DHCP request successful'. The IP Address is 172.29.4.134, Subnet Mask is 255.255.255.128, Default Gateway is 172.29.4.129, and DNS Server is 8.8.8.8.

Interface	FastEthernet0
IP Configuration	
<input checked="" type="radio"/> DHCP	<input type="radio"/> Static
IP Address	172.29.4.134
Subnet Mask	255.255.255.128
Default Gateway	172.29.4.129
DNS Server	8.8.8.8

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

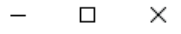
```
Bogota2>en
Bogota2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota2(config)#ip dhcp excluded-address 172.29.1.1 172.29.1.5
Bogota2(config)#ip dhcp excluded-address 172.29.0.1 172.29.0.5
Bogota2(config)#ip dhcp pool BTA2
Bogota2(dhcp-config)#network 172.29.1.0 255.255.255.0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

PC2



Physical Config **Desktop** Programming Attributes

IP Configuration X

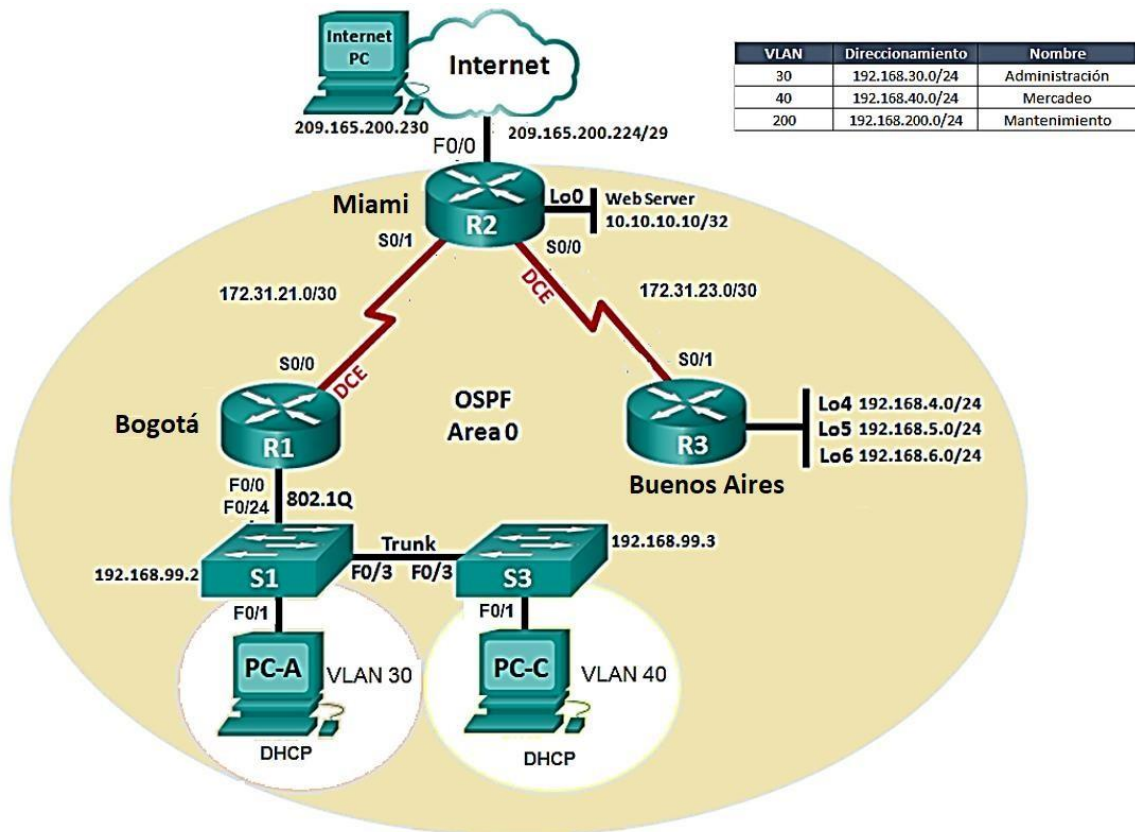
Interface FastEthernet0

IP Configuration

<input checked="" type="radio"/> DHCP	<input type="radio"/> Static	DHCP request successful.
IP Address	<input type="text" value="172.29.0.6"/>	
Subnet Mask	<input type="text" value="255.255.255.0"/>	
Default Gateway	<input type="text" value="172.29.0.1"/>	
DNS Server	<input type="text" value="8.8.8.8"/>	

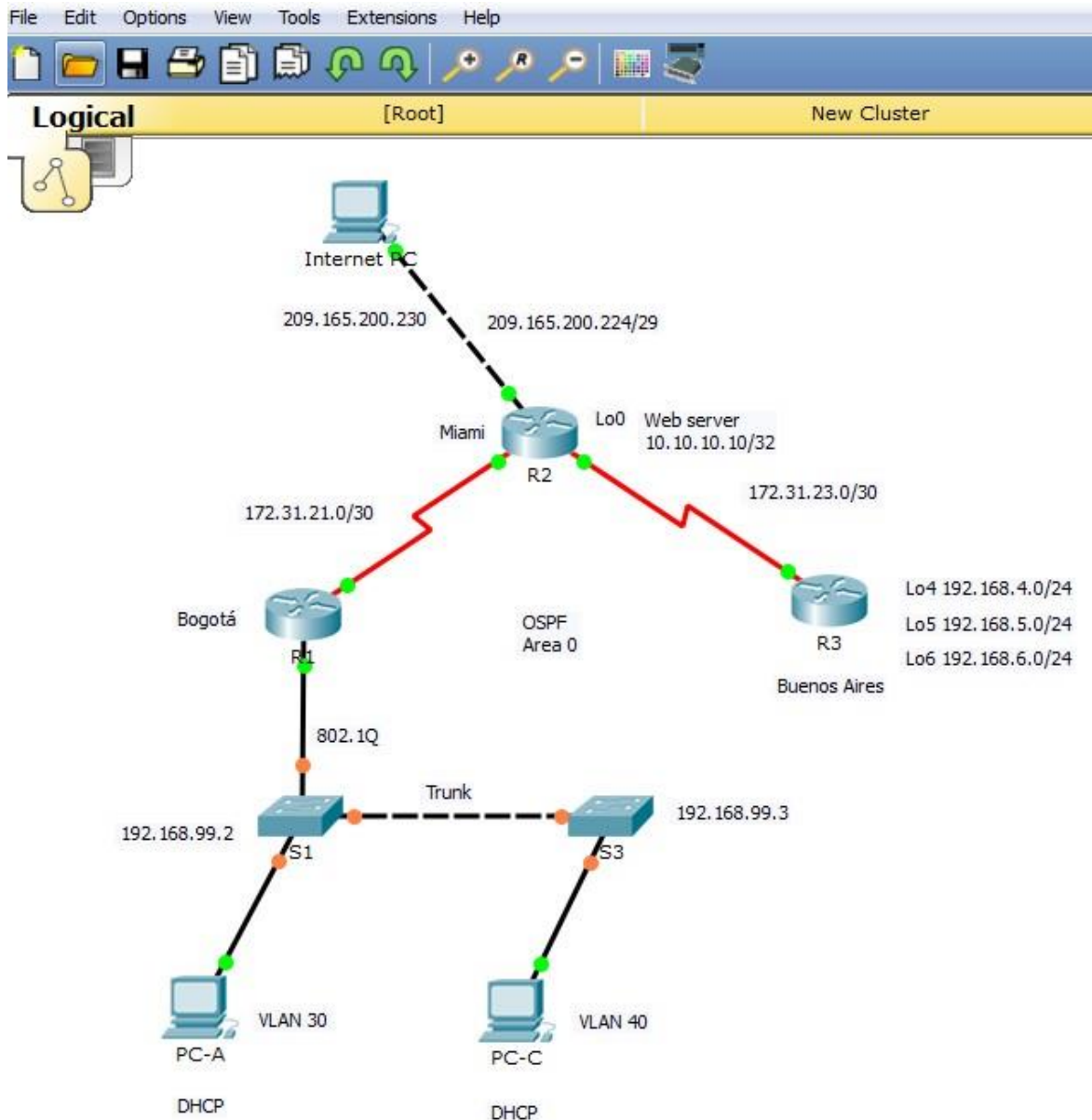
ESCENARIO 2

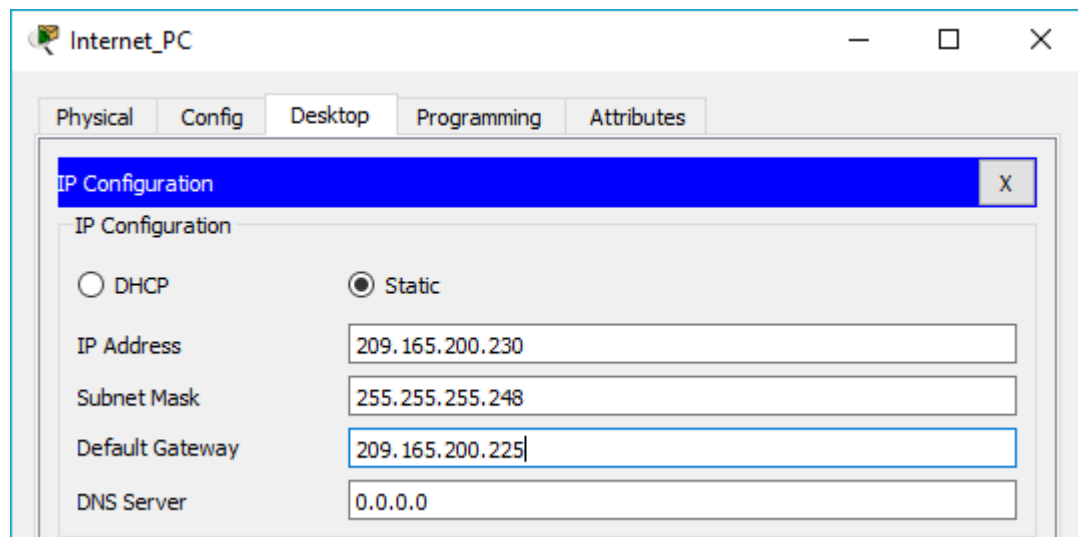
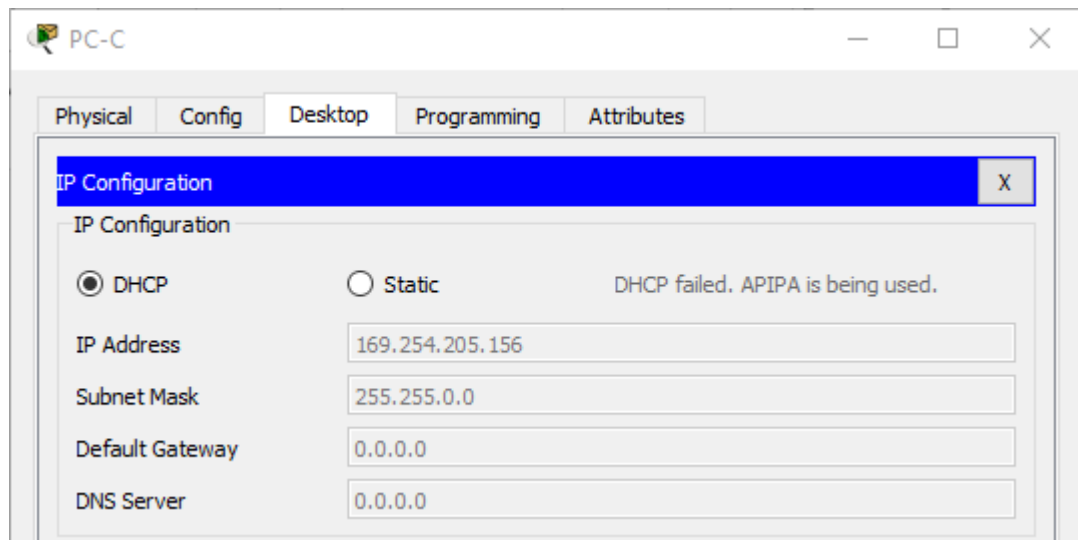
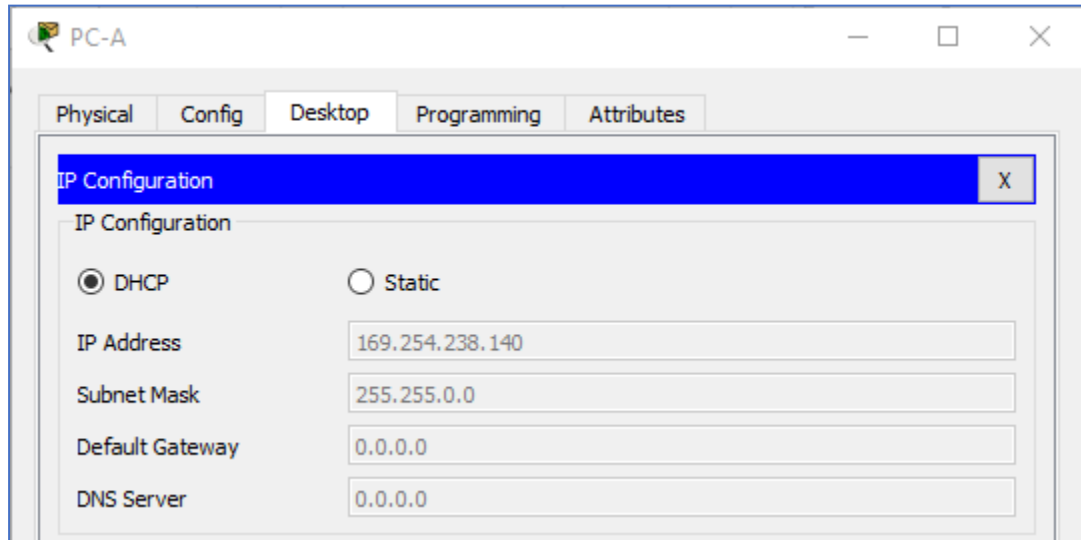
Una empresa de Tecnología posee tres sucursales distribuidas en las ciudades de Miami, Bogotá y Buenos Aires, en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los lineamientos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

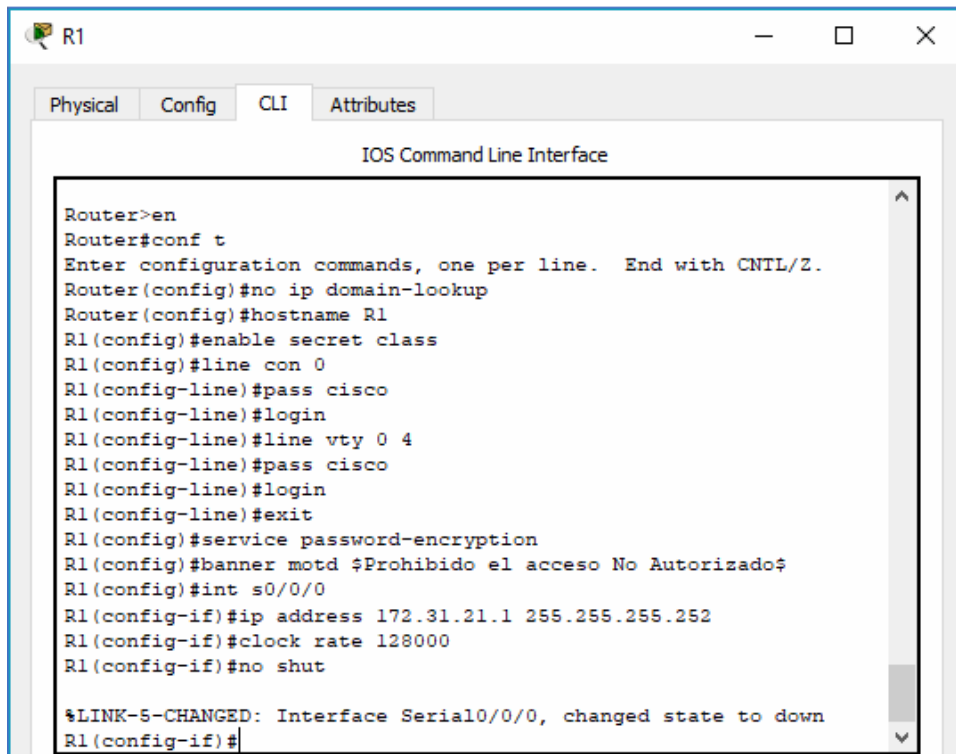


DESARROLLO

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



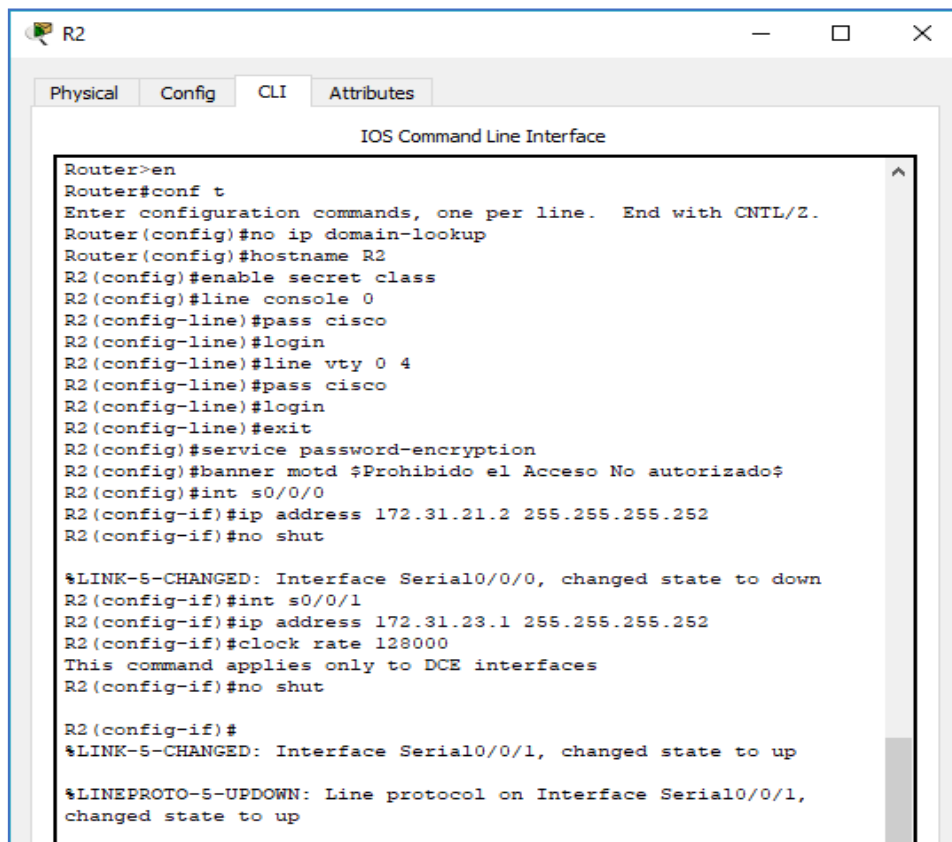




The screenshot shows a window titled 'R1' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The terminal output shows the following configuration commands for Router R1:

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#hostname R1
R1(config)#enable secret class
R1(config)#line con 0
R1(config-line)#pass cisco
R1(config-line)#login
R1(config-line)#line vty 0 4
R1(config-line)#pass cisco
R1(config-line)#login
R1(config-line)#exit
R1(config)#service password-encryption
R1(config)#banner motd $Prohibido el acceso No Autorizado$
R1(config)#int s0/0/0
R1(config-if)#ip address 172.31.21.1 255.255.255.252
R1(config-if)#clock rate 128000
R1(config-if)#no shut

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



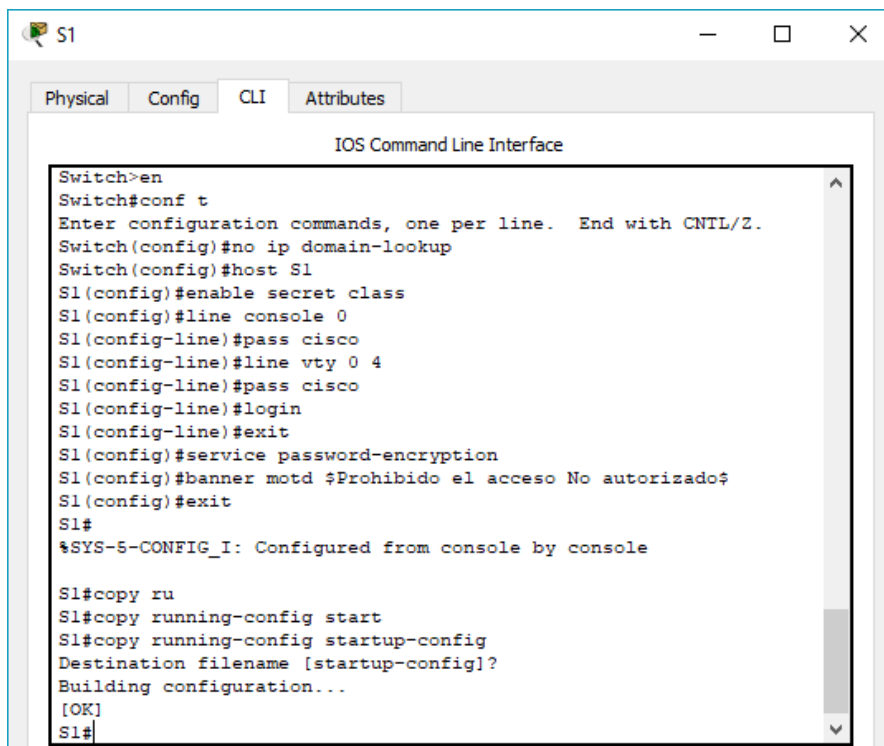
The screenshot shows a window titled 'R2' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The terminal output shows the following configuration commands for Router R2:

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#hostname R2
R2(config)#enable secret class
R2(config)#line console 0
R2(config-line)#pass cisco
R2(config-line)#login
R2(config-line)#line vty 0 4
R2(config-line)#pass cisco
R2(config-line)#login
R2(config-line)#exit
R2(config)#service password-encryption
R2(config)#banner motd $Prohibido el Acceso No autorizado$
R2(config)#int s0/0/0
R2(config-if)#ip address 172.31.21.2 255.255.255.252
R2(config-if)#no shut

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R2(config-if)#int s0/0/1
R2(config-if)#ip address 172.31.23.1 255.255.255.252
R2(config-if)#clock rate 128000
This command applies only to DCE interfaces
R2(config-if)#no shut

R2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1,
changed state to up
```

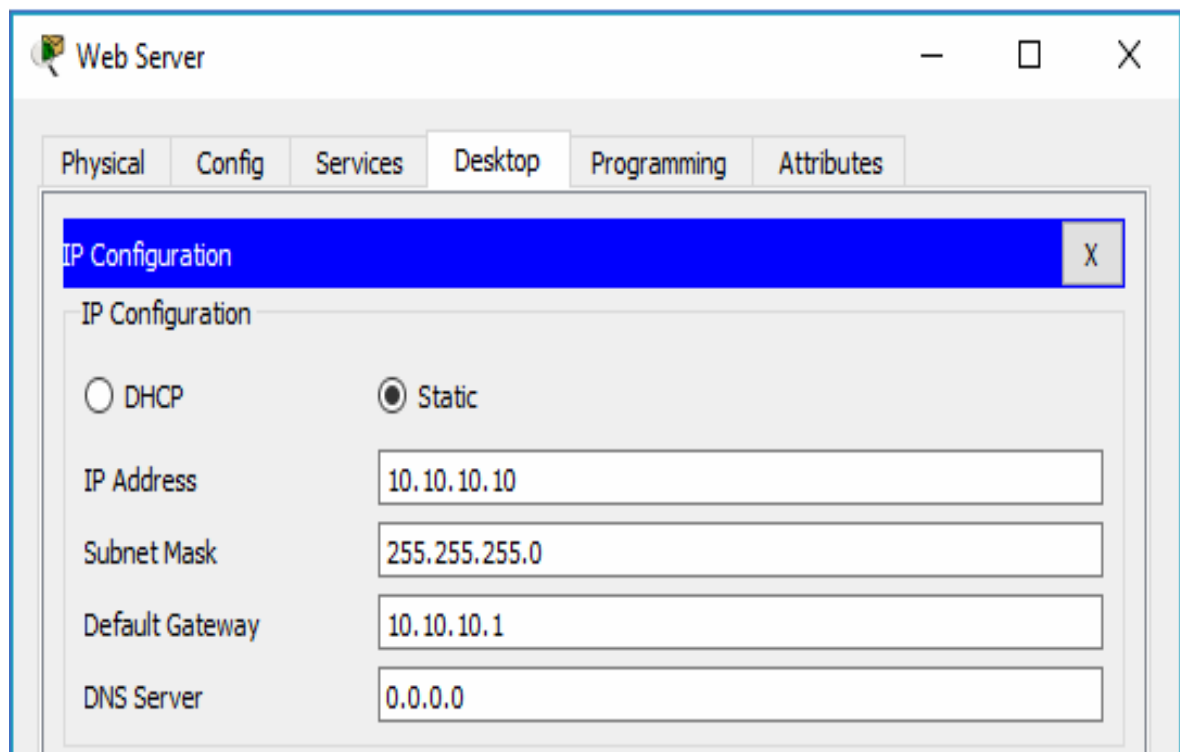


The screenshot shows a window titled 'S1' with tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, displaying the 'IOS Command Line Interface'. The terminal output shows the following commands and responses:

```
Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#no ip domain-lookup
Switch(config)#host S1
S1(config)#enable secret class
S1(config)#line console 0
S1(config-line)#pass cisco
S1(config-line)#line vty 0 4
S1(config-line)#pass cisco
S1(config-line)#login
S1(config-line)#exit
S1(config)#service password-encryption
S1(config)#banner motd #Prohibido el acceso No autorizado#
S1(config)#exit
S1#
%SYS-5-CONFIG_I: Configured from console by console

S1#copy ru
S1#copy running-config start
S1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
S1#
```

La anterior configuración aplica también a S3



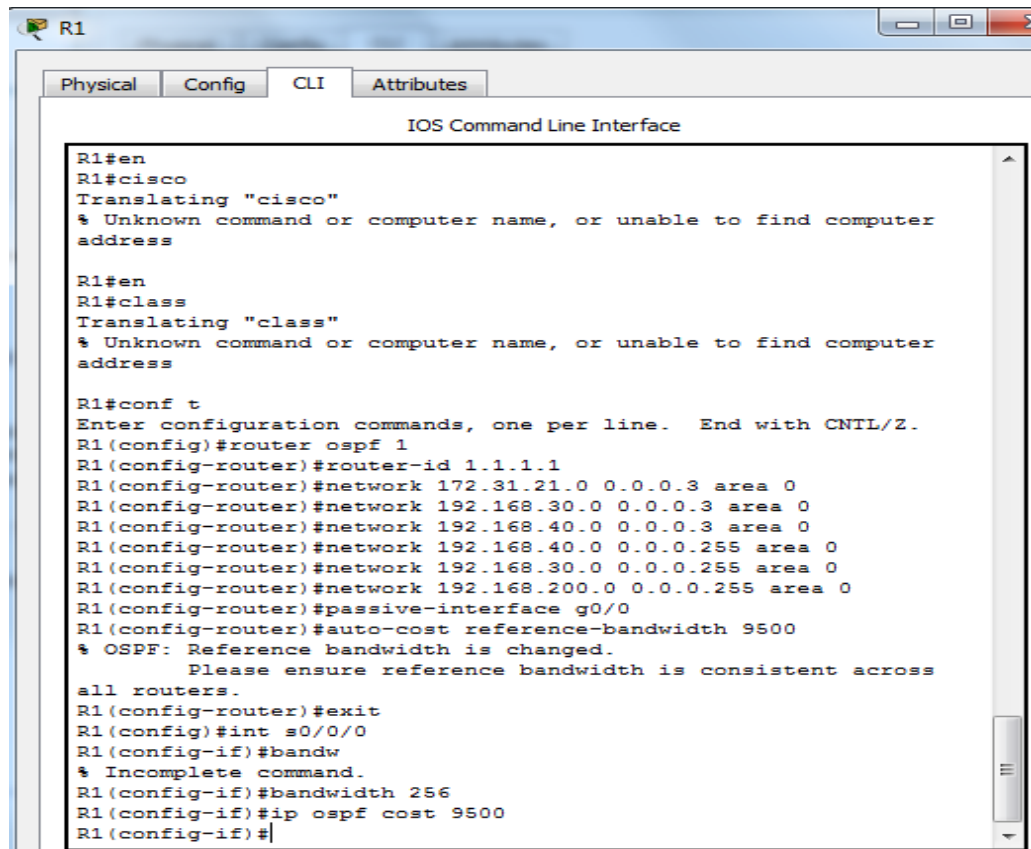
The screenshot shows a window titled 'Web Server' with tabs for Physical, Config, Services, Desktop, Programming, and Attributes. The Desktop tab is active, displaying the 'IP Configuration' settings. The configuration is as follows:

Field	Value
IP Configuration	<input checked="" type="radio"/> Static
IP Address	10.10.10.10
Subnet Mask	255.255.255.0
Default Gateway	10.10.10.1
DNS Server	0.0.0.0

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



```
R1
Physical Config CLI Attributes
IOS Command Line Interface
R1#en
R1#cisco
Translating "cisco"
% Unknown command or computer name, or unable to find computer address

R1#en
R1#class
Translating "class"
% Unknown command or computer name, or unable to find computer address

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 172.31.21.0 0.0.0.3 area 0
R1(config-router)#network 192.168.30.0 0.0.0.3 area 0
R1(config-router)#network 192.168.40.0 0.0.0.3 area 0
R1(config-router)#network 192.168.40.0 0.0.0.255 area 0
R1(config-router)#network 192.168.30.0 0.0.0.255 area 0
R1(config-router)#network 192.168.200.0 0.0.0.255 area 0
R1(config-router)#passive-interface g0/0
R1(config-router)#auto-cost reference-bandwidth 9500
% OSPF: Reference bandwidth is changed.
Please ensure reference bandwidth is consistent across
all routers.
R1(config-router)#exit
R1(config)#int s0/0/0
R1(config-if)#bandw
% Incomplete command.
R1(config-if)#bandwidth 256
R1(config-if)#ip ospf cost 9500
R1(config-if)#
```

```
R2
Physical Config CLI Attributes
IOS Command Line Interface
Password:
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)#network 172.31.23.0 0.0.0.3 area 0
R2(config-router)#network 10.10.10.0 0.0.0.255 area 0
R2(config-router)#passive-interfase g0/1
^
% Invalid input detected at '^' marker.
R2(config-router)#passive-interfase g0/0
^
% Invalid input detected at '^' marker.
R2(config-router)#passive-interface g0/1
R2(config-router)#auto-cost reference-bandwidth 9500
% OSPF: Reference bandwidth is changed.
Please ensure reference bandwidth is consistent across
all routers.
R2(config-router)#int s0/0/0
R2(config-if)#bandwidth 256
R2(config-if)#int s0/0/1
R2(config-if)#bandwidth 256
R2(config-if)#ip ospf cost 9500
R2(config-if)#exit|
R2(config)#
```

```
R3
Physical Config CLI Attributes
IOS Command Line Interface
prohibido el acceso no autorizado
User Access Verification
Password:
R3>en|
Password:
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#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)#network 192.168.4.0 0.0.0.255 area 0
R3(config-router)#passive-interface lo4
R3(config-router)#passive-interface lo5
R3(config-router)#passive-interface lo6
R3(config-router)#auto-cost reference-bandwidth 9500
% OSPF: Reference bandwidth is changed.
Please ensure reference bandwidth is consistent across
all routers.
R3(config-router)#exit
R3(config)#int s0/0/1
R3(config-if)#bandwidth 256
R3(config-if)#exit
R3(config)#
```

Verificar información de OSPF

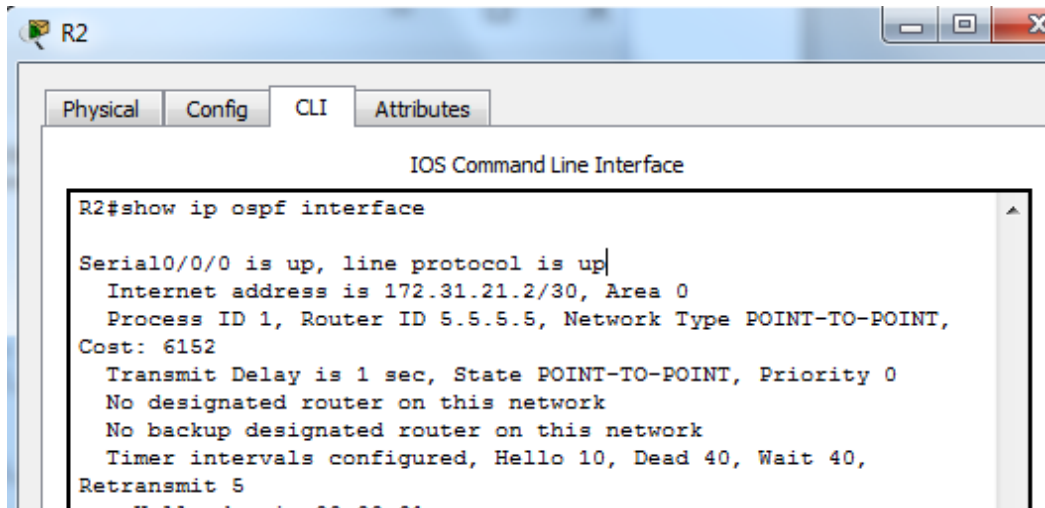
- Visualizar tablas de enrutamiento y routers conectados por OSPFv2



The screenshot shows the CLI of router R2 with the command `show ip ospf neig` executed. The output is a table of OSPF neighbors.

Neighbor ID	Pri	State	Dead Time	Address	Interface
8.8.8.8	0	FULL/ -	00:00:30	172.31.23.2	Serial0/0/1
1.1.1.1	0	FULL/ -	00:00:33	172.31.21.1	Serial0/0/0

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



The screenshot shows the CLI of router R2 with the command `show ip ospf interface` executed. The output displays the configuration and status for the Serial0/0/0 interface.

```
R2#show ip ospf interface
Serial0/0/0 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: 6152
  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
```

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

```

!
router ospf 1
router-id 2.2.2.2
log-adjacency-changes
passive-interface GigabitEthernet0/1
auto-cost reference-bandwidth 7500
network 172.31.21.0 0.0.0.3 area 0
network 172.31.23.0 0.0.0.3 area 0
network 10.10.10.0 0.0.0.255 area 0
!

```

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

```

Enter configuration commands, one per line. End with CNTL/Z.
S1(config)#vlan 30
S1(config-vlan)#name administracion
S1(config-vlan)#vlan 40
S1(config-vlan)#name Mercadeo
S1(config-vlan)#vlan 200
S1(config-vlan)#name Mantenimiento
S1(config-vlan)#exit
S1(config)#int vlan 200
S1(config-if)#
%LINK-5-CHANGED: Interface Vlan200, changed state to up

S1(config-if)#int vlan 200
S1(config-if)#ip address 192.168.99.2 255.255.255.0
S1(config-if)#no shut
S1(config-if)#exit
S1(config)#ip default-gateway 192.168.99.1
S1(config)#int f0/3
S1(config-if)#switchport mode trunk

S1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3,
changed state to down

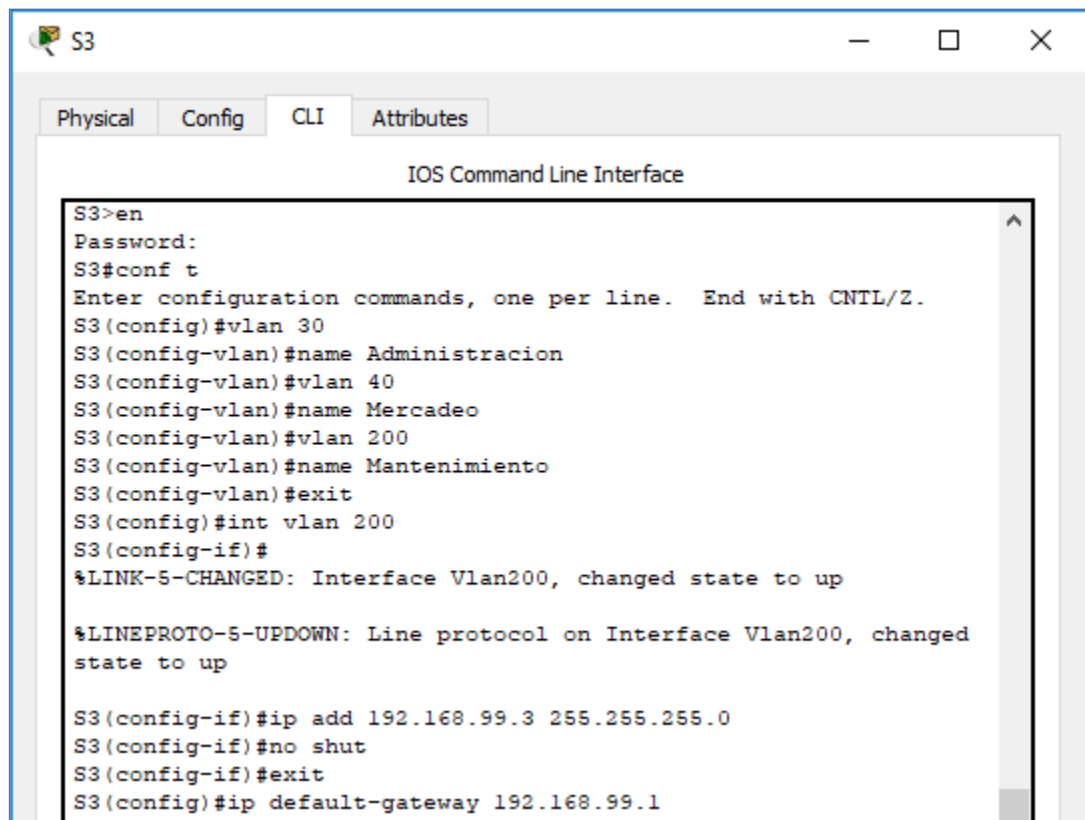
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3,
changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan200, changed
state to up

S1(config-if)#switchport trunk native vlan 1
S1(config-if)#int f0/24
S1(config-if)#switchport mode trunk
S1(config-if)#switchport trunk native vlan1
^
% Invalid input detected at '^' marker.

S1(config-if)#switchport trunk native vlan 1
S1(config-if)#int range fa0/2, fa0/4-23, g0/1-2
S1(config-if-range)#switch mode access
S1(config-if-range)#int fa0/1
S1(config-if)#switch mode access
S1(config-if)#switch access vlan
% Incomplete command.
S1(config-if)#switch access vlan 30
S1(config-if)#int range fa0/2, fa0/4-23, g0/1-2
S1(config-if-range)#shutdown

```

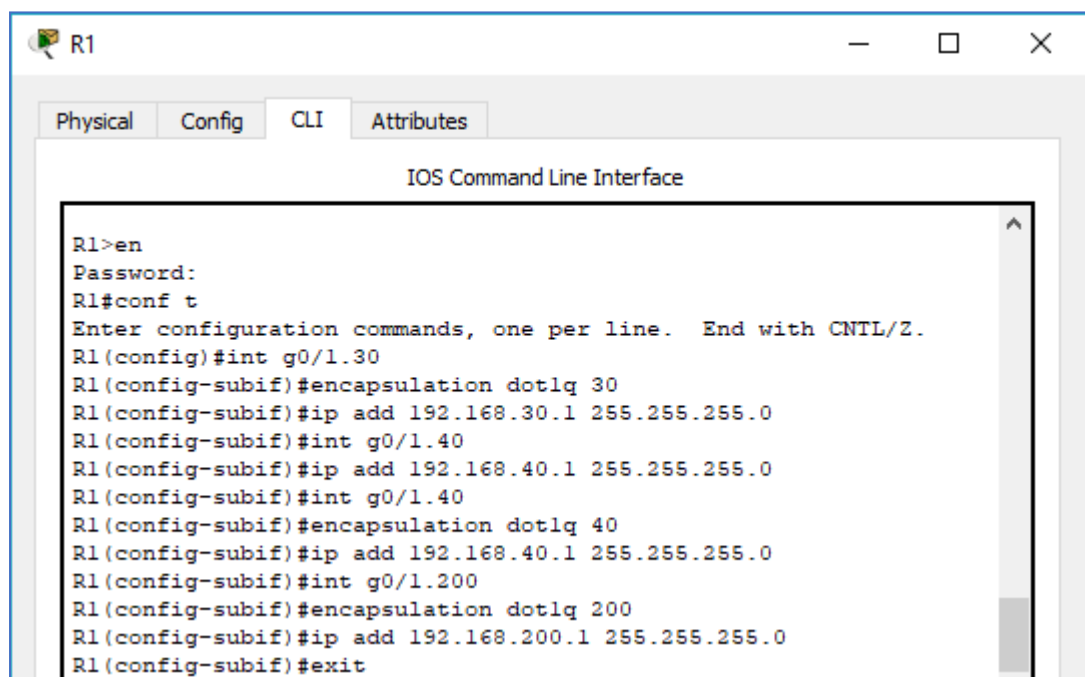


The screenshot shows a window titled 'S3' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The terminal output shows the following commands and responses:

```
S3>en
Password:
S3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
S3(config)#vlan 30
S3(config-vlan)#name Administracion
S3(config-vlan)#vlan 40
S3(config-vlan)#name Mercadeo
S3(config-vlan)#vlan 200
S3(config-vlan)#name Mantenimiento
S3(config-vlan)#exit
S3(config)#int vlan 200
S3(config-if)#
%LINK-5-CHANGED: Interface Vlan200, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan200, changed
state to up

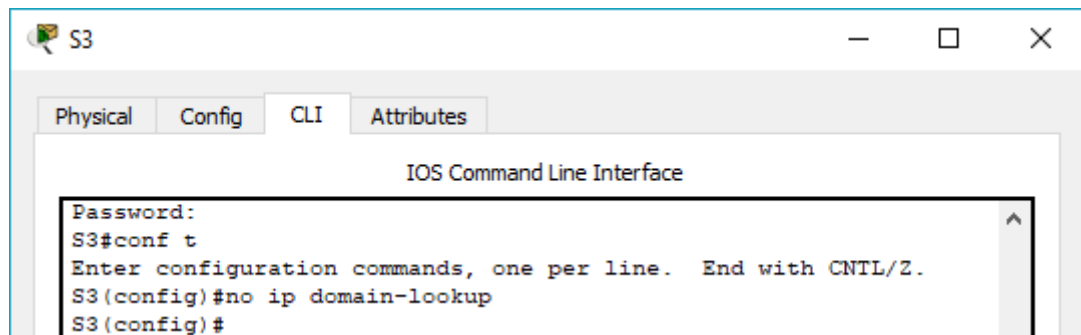
S3(config-if)#ip add 192.168.99.3 255.255.255.0
S3(config-if)#no shut
S3(config-if)#exit
S3(config)#ip default-gateway 192.168.99.1
```



The screenshot shows a window titled 'R1' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The terminal output shows the following commands and responses:

```
R1>en
Password:
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#int g0/1.30
R1(config-subif)#encapsulation dot1q 30
R1(config-subif)#ip add 192.168.30.1 255.255.255.0
R1(config-subif)#int g0/1.40
R1(config-subif)#ip add 192.168.40.1 255.255.255.0
R1(config-subif)#int g0/1.40
R1(config-subif)#encapsulation dot1q 40
R1(config-subif)#ip add 192.168.40.1 255.255.255.0
R1(config-subif)#int g0/1.200
R1(config-subif)#encapsulation dot1q 200
R1(config-subif)#ip add 192.168.200.1 255.255.255.0
R1(config-subif)#exit
```

4. En el Switch 3 deshabilitar DNS lookup



```
S3
Physical Config CLI Attributes
IOS Command Line Interface
Password:
S3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
S3(config)#no ip domain-lookup
S3(config)#
```

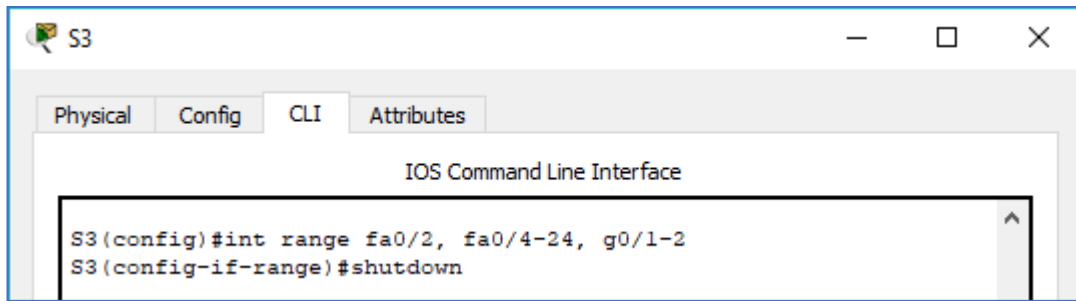
5. Asignar direcciones IP a los Switches acorde a los lineamientos.

```
S1(config-if)#ip add 192.168.99.2 255.255.255.0
S1(config-if)#no shut
S1(config-if)#exit
```

```
S3(config-if)#ip add 192.168.99.3 255.255.255.0
S3(config-if)#no shut
S3(config-if)#exit
S3(config)#ip default-gateway 192.168.99.1
```

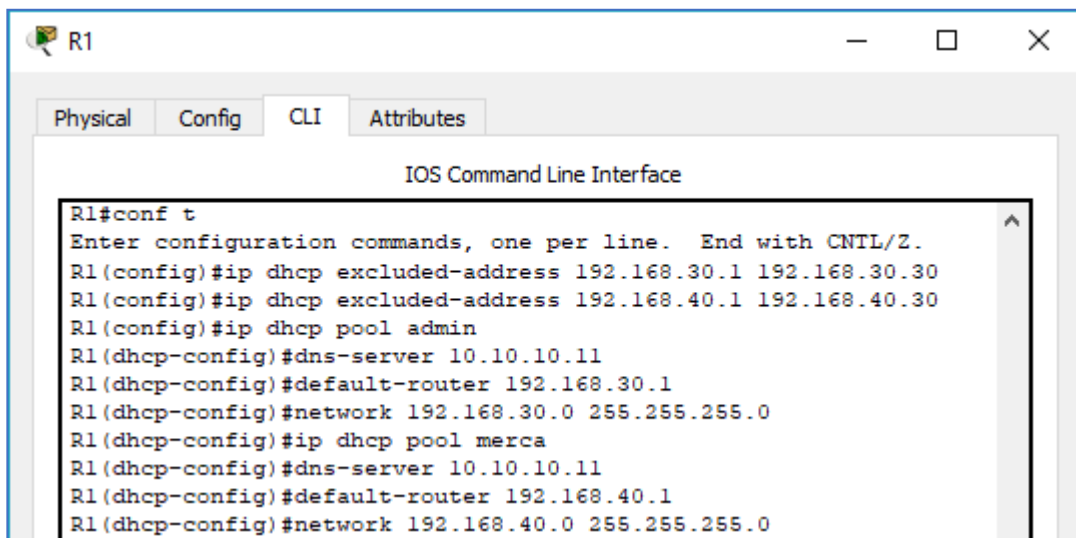
6. Desactivar todas las interfaces que no sean utilizadas en el esquema de red.

```
S1(config-if)#int range fa0/2, fa0/4-23, g0/1-2
S1(config-if-range)#shutdown
```

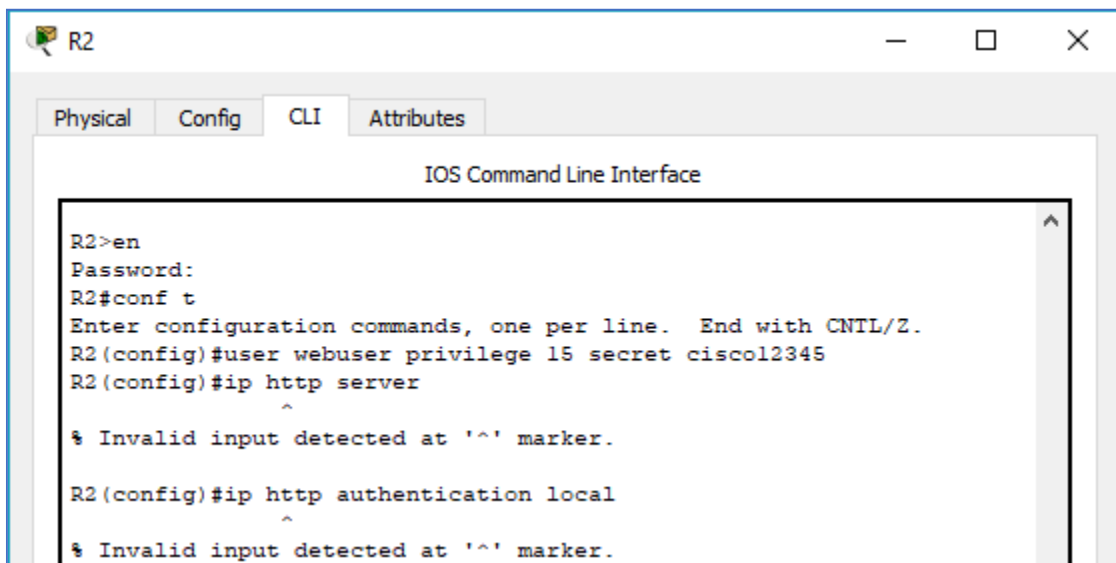
```
S3
Physical Config CLI Attributes
IOS Command Line Interface
S3(config)#int range fa0/2, fa0/4-24, g0/1-2
S3(config-if-range)#shutdown
```

7. Implement DHCP and NAT for IPv4
8. Configurar R1 como servidor DHCP para las VLANs 30 y 40.
9. Reservar las primeras 30 direcciones IP de las VLAN 30 y 40 para configuraciones estáticas.



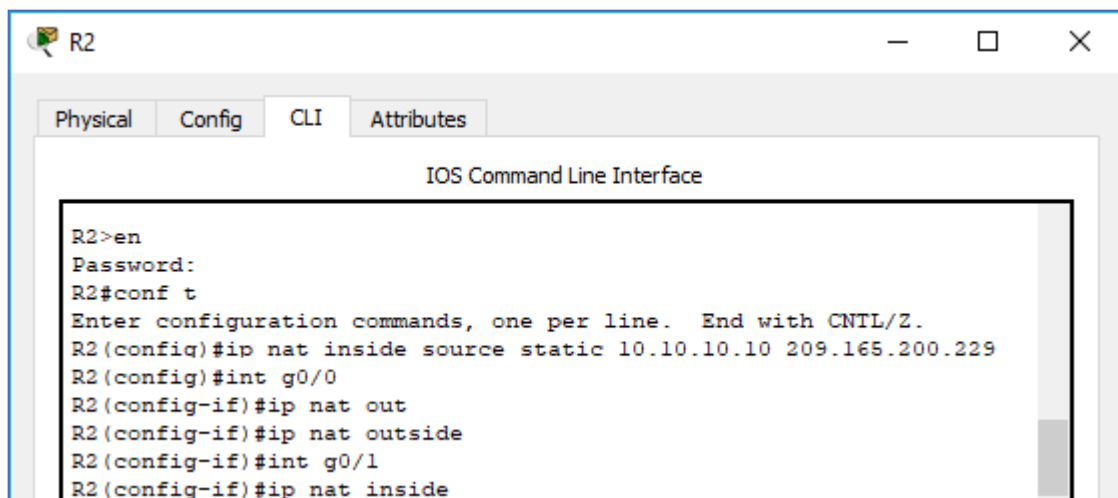
```
R1
Physical Config CLI Attributes
IOS Command Line Interface
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ip dhcp excluded-address 192.168.30.1 192.168.30.30
R1(config)#ip dhcp excluded-address 192.168.40.1 192.168.40.30
R1(config)#ip dhcp pool admin
R1(dhcp-config)#dns-server 10.10.10.11
R1(dhcp-config)#default-router 192.168.30.1
R1(dhcp-config)#network 192.168.30.0 255.255.255.0
R1(dhcp-config)#ip dhcp pool merca
R1(dhcp-config)#dns-server 10.10.10.11
R1(dhcp-config)#default-router 192.168.40.1
R1(dhcp-config)#network 192.168.40.0 255.255.255.0
```

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



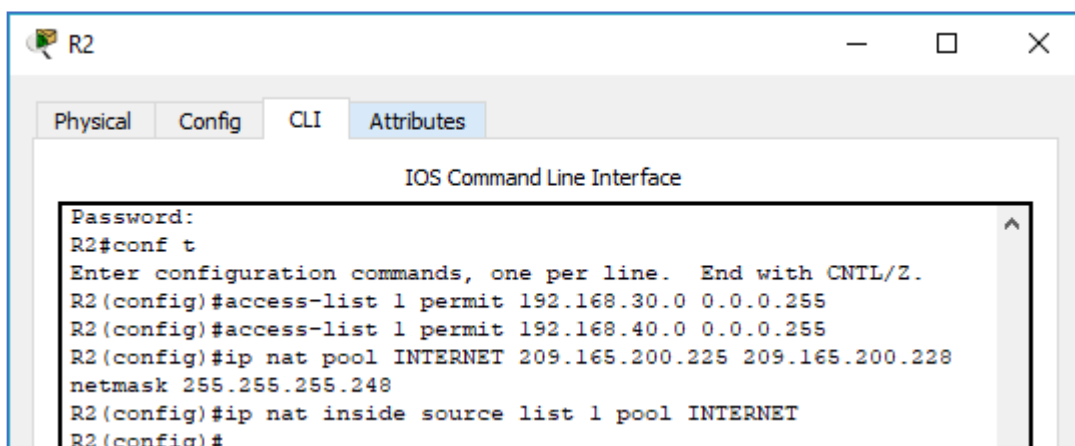
```
R2
Physical Config CLI Attributes
IOS Command Line Interface
R2>en
Password:
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#user webuser privilege 15 secret cisco12345
R2(config)#ip http server
^
% Invalid input detected at '^' marker.
R2(config)#ip http authentication local
^
% Invalid input detected at '^' marker.
```

Nota: dado que no se pueden utilizar los comandos: *ip http server* y *ip http authentication* local, se emplea un servidor dentro de la topología.

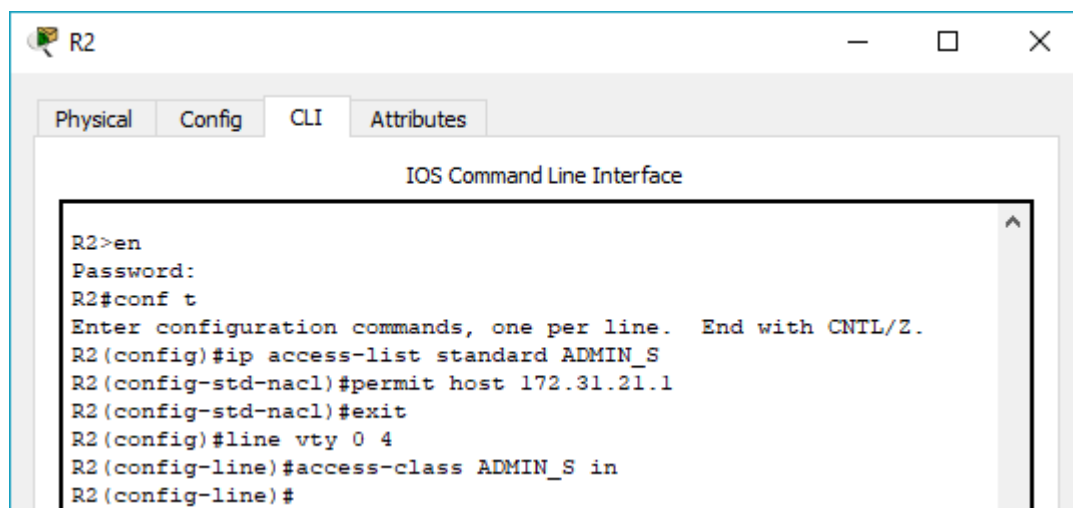


```
R2>en
Password:
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ip nat inside source static 10.10.10.10 209.165.200.229
R2(config)#int g0/0
R2(config-if)#ip nat out
R2(config-if)#ip nat outside
R2(config-if)#int g0/1
R2(config-if)#ip nat inside
```

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.

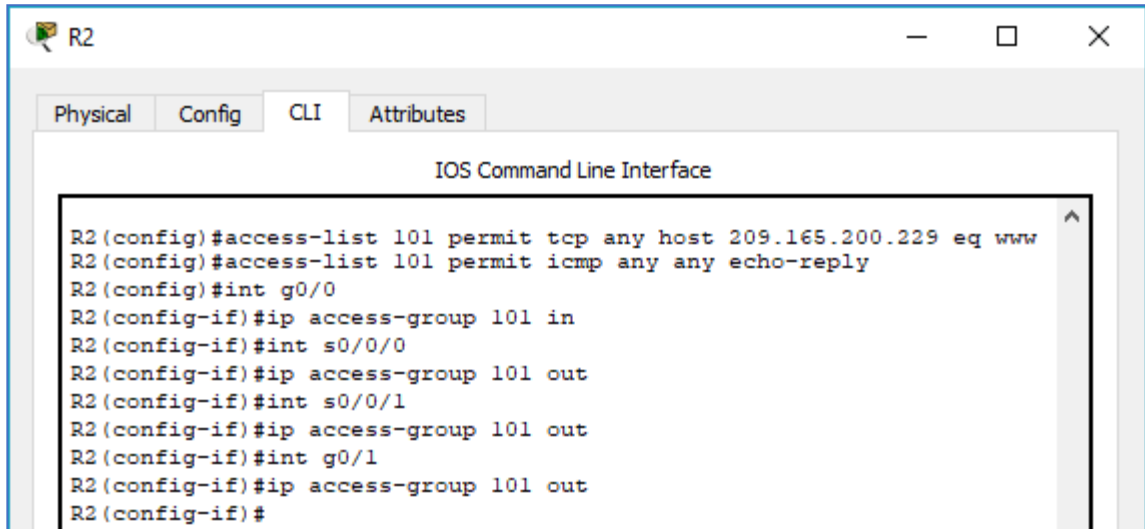


```
R2>en
Password:
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#access-list 1 permit 192.168.30.0 0.0.0.255
R2(config)#access-list 1 permit 192.168.40.0 0.0.0.255
R2(config)#ip nat pool INTERNET 209.165.200.225 209.165.200.228
netmask 255.255.255.248
R2(config)#ip nat inside source list 1 pool INTERNET
R2(config)#
```



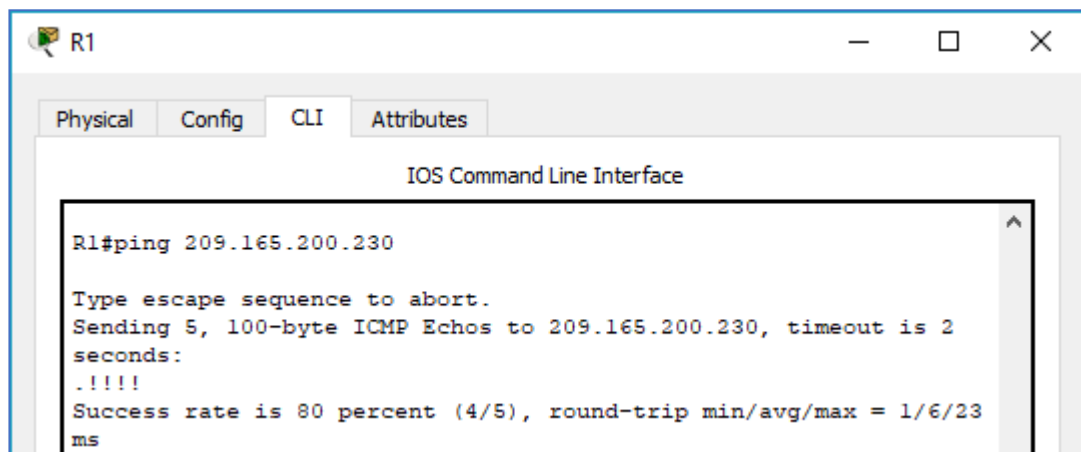
```
R2>en
Password:
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ip access-list standard ADMIN_S
R2(config-std-nacl)#permit host 172.31.21.1
R2(config-std-nacl)#exit
R2(config)#line vty 0 4
R2(config-line)#access-class ADMIN_S in
R2(config-line)#
```

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.

A screenshot of a network simulator window titled 'R2'. The window has tabs for 'Physical', 'Config', 'CLI', and 'Attributes', with 'CLI' selected. The main area shows the 'IOS Command Line Interface' with the following configuration commands:

```
R2(config)#access-list 101 permit tcp any host 209.165.200.229 eq www
R2(config)#access-list 101 permit icmp any any echo-reply
R2(config)#int g0/0
R2(config-if)#ip access-group 101 in
R2(config-if)#int s0/0/0
R2(config-if)#ip access-group 101 out
R2(config-if)#int s0/0/1
R2(config-if)#ip access-group 101 out
R2(config-if)#int g0/1
R2(config-if)#ip access-group 101 out
R2(config-if)#
```

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

A screenshot of a network simulator window titled 'R1'. The window has tabs for 'Physical', 'Config', 'CLI', and 'Attributes', with 'CLI' selected. The main area shows the 'IOS Command Line Interface' with the following output from a ping command:

```
R1#ping 209.165.200.230

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.200.230, timeout is 2
seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 1/6/23
ms
```

CONCLUSIONES

A lo largo del curso podemos identificar muchos factores, los cuales nos permiten una mejor configuración de los dispositivos que requerimos usar, para este proyecto notamos como podemos interconectar varias sedes como lo haríamos en un entorno real, se deben tener en cuenta los conceptos, las configuraciones que usamos nos permiten hacer un uso correcto y óptimo de dispositivos, en vez de conectar cada sede separada podemos centralizar toda la información en una sola y a través de Vlan's y restricciones podemos brindar acceso a varios dispositivos.

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