

PRUEBA DE HABILIDADES PRÁCTICAS CCNA

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA – UNAD
ESCUELA E CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA – EBCTI
INGENIERÍA DE SISTEMAS
CCAV PAMPLONA

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CONTENIDO

INTRODUCCIÓN.....	5
OBJETIVOS.....	6
DESARROLLO DEL ESCENARIO PLANTEADO.....	7
ESCENARIO 1	7
ESCENARIO 2	35
CONCLUSIONES.....	57
REFERENCIAS BIBLIOGRÁFICAS.....	58

LISTA DE TABLAS

Tabla 1. Direccionamiento IP.....	35
Tabla 2. Protocolo de Enrutamiento OSPFv2.....	43
Tabla 3. Direcciones IP de las VLAN 30 y 40.....	49

INTRODUCCIÓN

La Prueba de habilidades prácticas busca evidencia el proceso formativo realizado durante este periodo académico, en donde en el presente trabajo se mostrará la solución de dos escenarios prácticos fueron propuestos como parte de la culminación del diplomado, en el que se mostrará todas las habilidades adquiridas durante el curso.

La adaptación en la utilización de diferentes tipos de software que permite el desarrollo de los conocimientos adquiridos, poner a prueba los niveles de comprensión y solución de problemas relacionados con diversos aspectos de Networking.

En la solución del trabajo se muestran los algoritmos utilizados, imágenes adjuntas de la utilización del software Cisco Packet tracer.

OBJETIVOS

Generales

- En cada escenario identificar los componentes, ejecutar la respectiva configuración para obtener conectividad en los dispositivos propuestos y de esa manera generar la solución en cada escenario.

Objetivos específicos

- Realizar las configuraciones necesarias en cada dispositivo
- Verificar la configuración del enrutamiento en la red usando el protocolo Rip
- Identificar los dispositivos que se utilizan en los diferentes tipos de topología de red
- Establecer la configuración del servicio DHCP
- Definir el encapsulamiento y autenticación PPP
- Utilizar los comandos necesarios para verificar la conectividad(ping)
- Analizar la configuración PAT
- Examinar el protocolo de enrutamiento OSPFv2
- Plantear la configuración de las VLAN's, puertos troncales y switches
- Generar la configuración NAT en los routes

DESARROLLO DE LOS ESCENARIO PROPUESTOS

ESCENARIO 1

Se debe realizar la actividad.

- 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

Topología Planteada

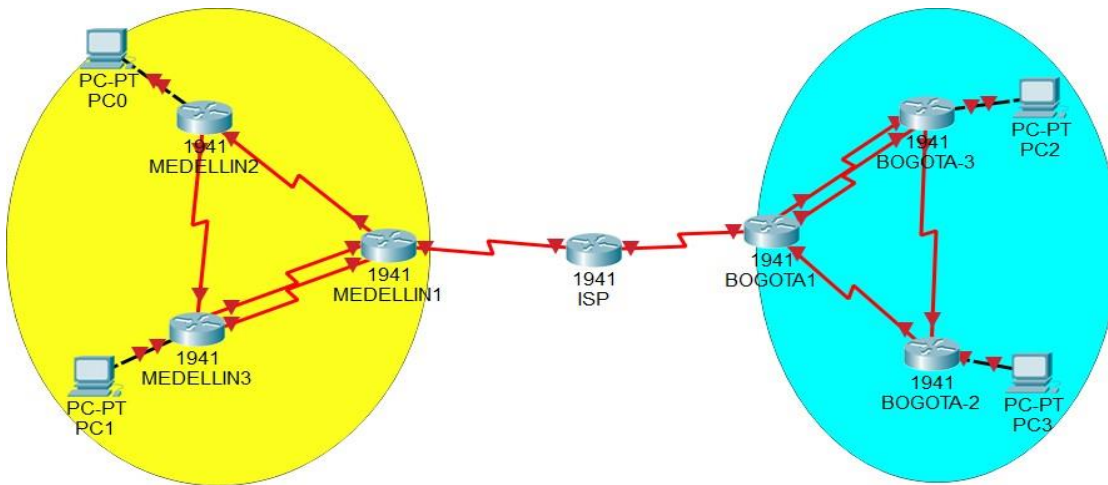


Ilustración 1. Topología planteada

Topología Encendida

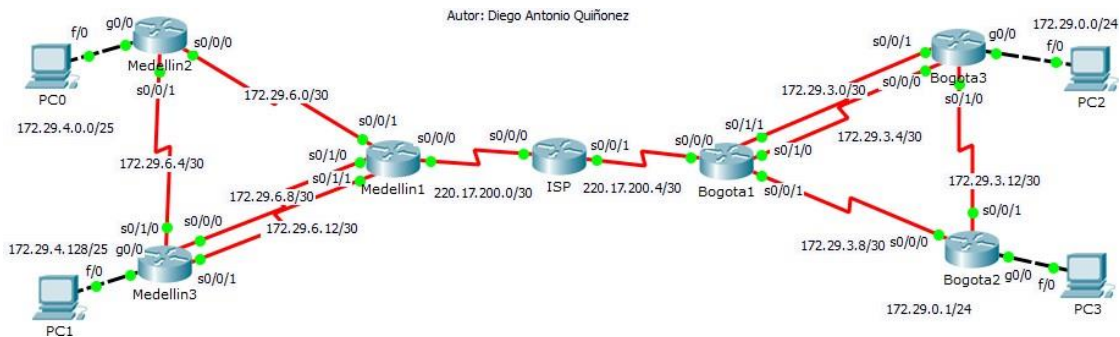


Ilustración 2. Topología Encendida

//Configurar Router Bogota1

```
Router>en
```

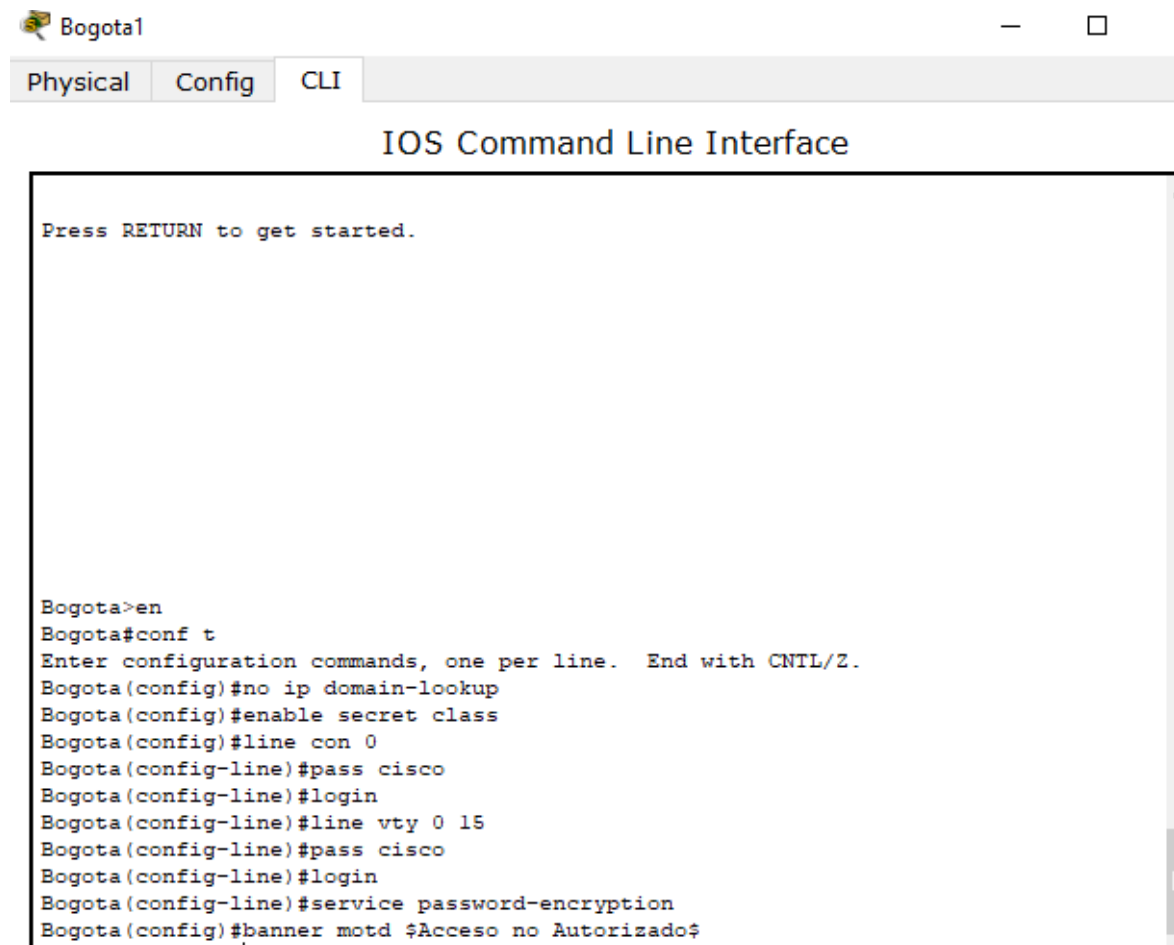
```
Router#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

// asignar nombre

```
Router(config)#hostname Bogota1
```

//Asignar clave de seguridad



```
Bogota1
Physical Config CLI
IOS Command Line Interface
Press RETURN to get started.

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

Ilustración 3. Asignación clave Router Bogota1

//configuración al ISP

```
Bogota1(config)#int s0/0/0
```

```
Bogota1(config-if)#ip add 209.17.220.6 255.255.255.252
```

```
Bogota1(config-if)#no shut
```

//configuración s0/0/1

```
Bogota1(config-if)#int s0/0/1
```

```
Bogota1(config-if)#ip add 172.29.3.9 255.255.255.252
```

```
Bogota1(config-if)#clock rate 128000
```

```
Bogota1(config-if)#no shut
```

```
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
```


//configuración al Router Bogota3

```
Bogota1(config-if)#int s0/1/0
Bogota1(config-if)#ip add 172.29.3.1 255.255.255.252
Bogota1(config-if)#clock rate 128000
This command applies only to DCE interfaces
Bogota1(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
Bogota1(config-if)#int s0/1/1
Bogota1(config-if)#ip add 172.29.3.5 255.255.255.252
Bogota1(config-if)#clock rate 128000
Bogota1(config-if)#no shut
```


Configuración Bogota2

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

// asignar nombre

```
Router(config)#hostname Bogota2
```

//Asignar clave de seguridad



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

Ilustración 4. Asignación clave Router Bogota2

//configuración al Router Bogota1

```
Bogota2(config)#int s0/0/0
Bogota2(config-if)#ip add 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)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
```

//configuración al Router Bogota3

```
Bogota2(config-if)#int s0/0/1
Bogota2(config-if)#ip add 172.29.3.13 255.255.255.252
Bogota2(config-if)#clock rate 128000
This command applies only to DCE interfaces
Bogota2(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
```

//Configuración Router Bogota2 a la PC2

```
Bogota2(config-if)#int g0/0
Bogota2(config-if)#ip add 172.29.1.1 255.255.255.0
Bogota2(config-if)#no shut
```

Configuración Bogota3

```
Router>en
```

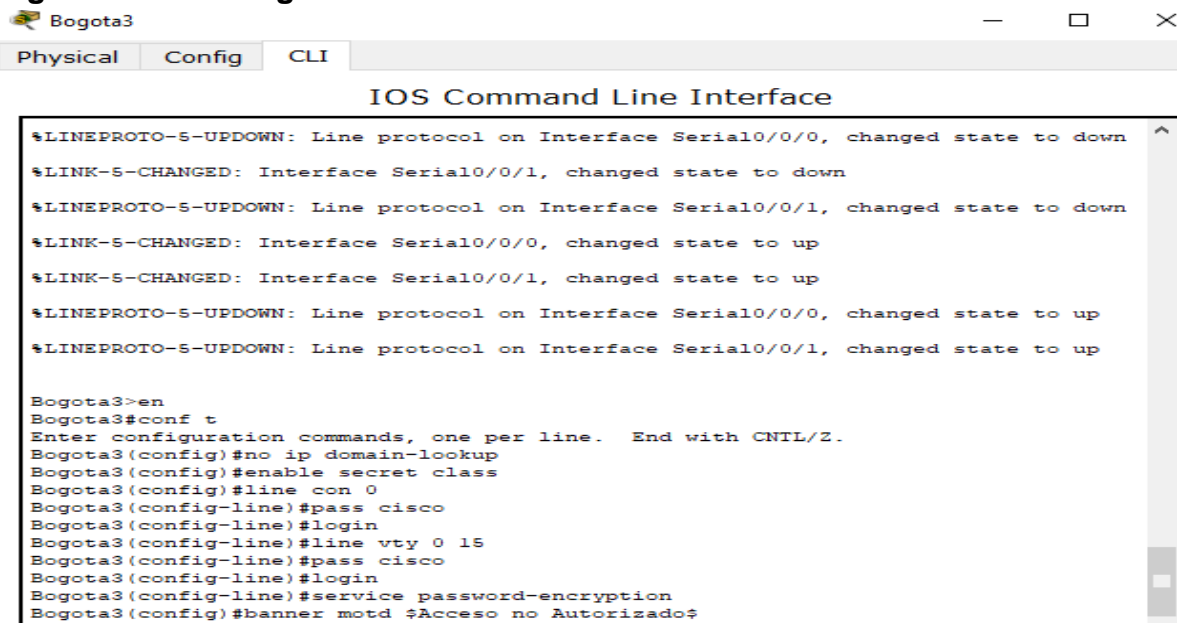
```
Router#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

// asignar nombre

```
Router(config)#hostname Bogota3
```

//Asignar clave de seguridad



```
Bogota3
Physical Config CLI
IOS Command Line Interface
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to down
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to down
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up
Bogota3>en
Bogota3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota3(config)#no ip domain-lookup
Bogota3(config)#enable secret class
Bogota3(config)#line con 0
Bogota3(config-line)#pass cisco
Bogota3(config-line)#login
Bogota3(config-line)#line vty 0 15
Bogota3(config-line)#pass cisco
Bogota3(config-line)#login
Bogota3(config-line)#service password-encryption
Bogota3(config)#banner motd $Acceso no Autorizado$
```

Ilustración 5. Asignación clave Router Bogota3

//configuración hacia el Router Bogota1

```
Bogota3(config)#int s0/0/0
Bogota3(config-if)#ip add 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)#int s0/0/1
%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 add 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 g0/0
Bogota3 (config-if)#ip add 172.29.0.1 255.255.255.0
Bogota3 (config-if)#no shut
```

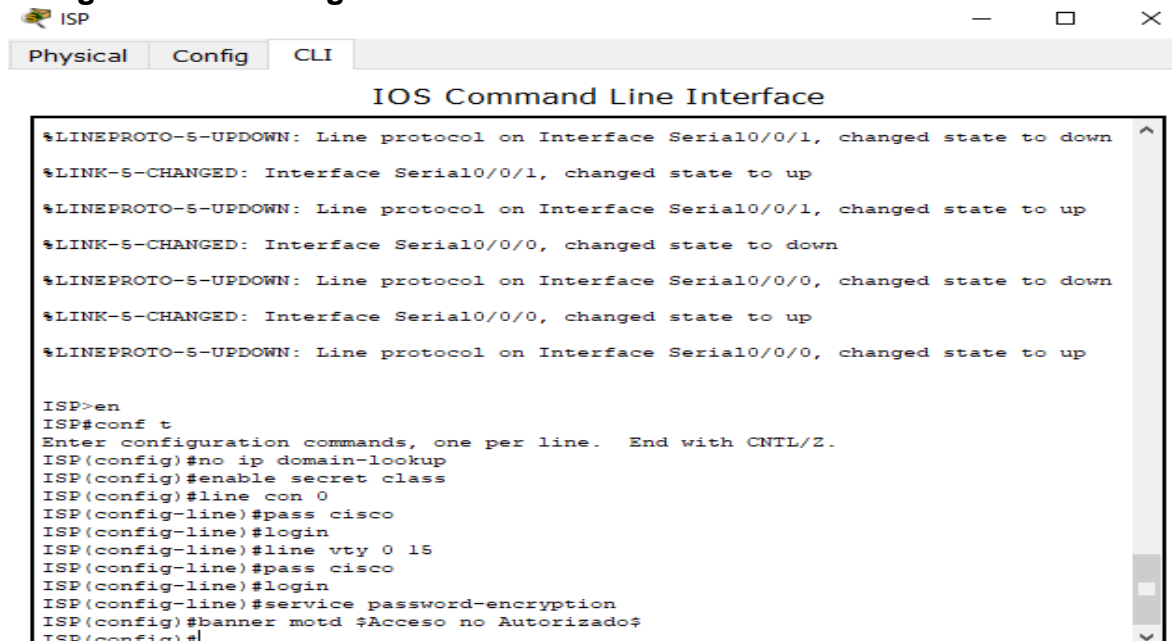
Configuración Router ISP

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

// asignar nombre

```
Router#hostname ISP
```

//Asignar clave de seguridad



```
ISP
Physical Config CLI
IOS Command Line Interface
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to down
%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
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to down
%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

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

Ilustración 6. Asignación clave Router ISP

//configuración hacia el Router medellin1

```
ISP (config)#int s0/0/0
ISP (config-if)#ip add 209.17.220.1 255.255.255.252
ISP (config-if)#clock rate 128000
ISP (config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
```

//configuración hacia el Router Bogota1

```
ISP (config-if)#int s0/0/1
ISP (config-if)#ip add 209.17.220.5 255.255.255.252
ISP (config-if)#clock rate 128000
ISP (config-if)#no shut
```

Configuración Router Medellin1

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

// asignar nombre

```
Router#hostname Medellin1
```

//Asignar clave de seguridad

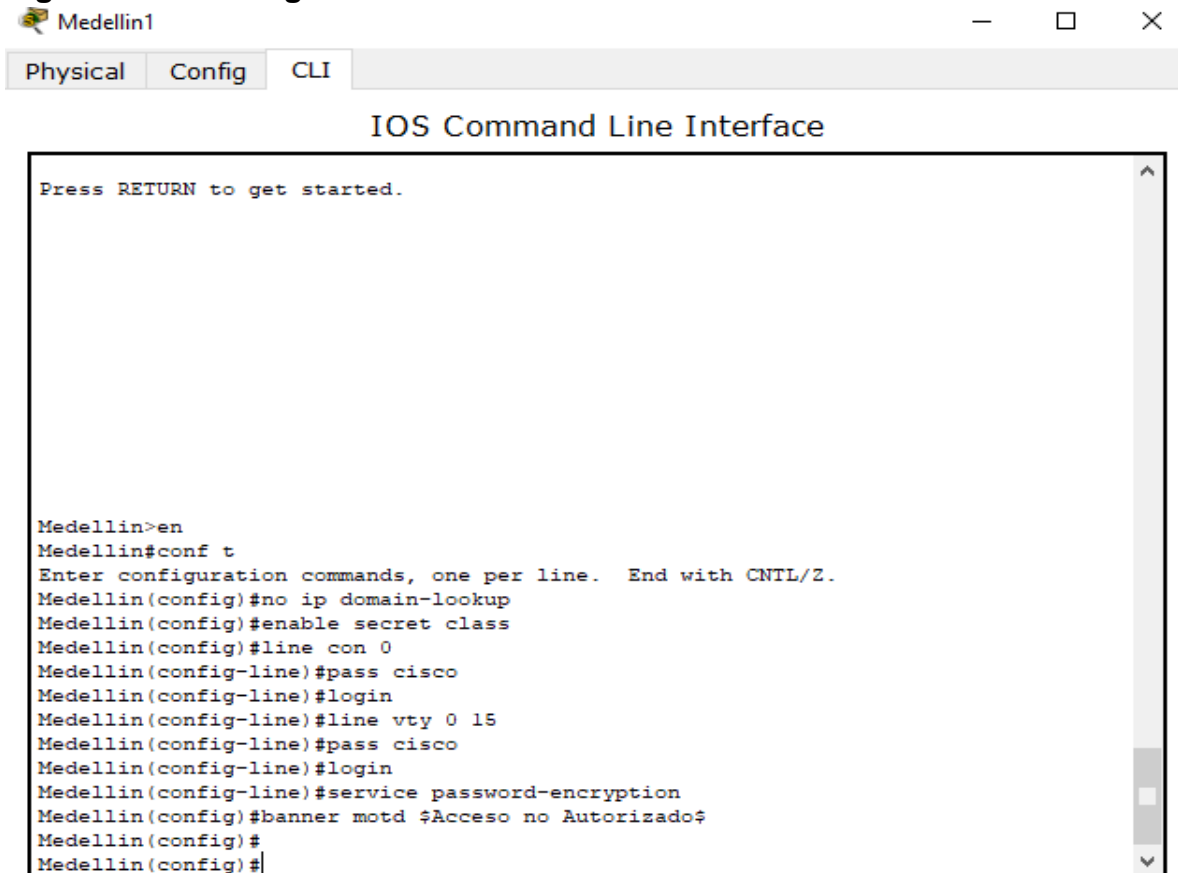


Ilustración 7. Asignación clave Router Medellin1

//configuración hacia el Router medellin1

```
Medellin1 (config)#int s0/0/0
Medellin1 (config-if)#ip add 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
```

//configuración hacia el Router medellin2

```
Medellin1 (config-if)#int s0/0/1
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
Medellin1 (config-if)#ip add 172.29.6.1 255.255.255.252
Medellin1 (config-if)#clock rate 128000
Medellin1 (config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
```

//configuración hacia el Router medellin3

```
Medellin1 (config-if)#int s0/1/0
Medellin1 (config-if)#ip add 172.29.6.9 255.255.255.252
Medellin1 (config-if)#clock rate 128000
Medellin1 (config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
Medellin1 (config-if)#int s0/1/1
Medellin1 (config-if)#ip add 172.29.6.13 255.255.255.252
Medellin1 (config-if)#clock rate 128000
Medellin1 (config-if)#no shut
```

//Configuración Router Medellin2

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

// asignar nombre

```
Router(config)#hostname Medellin2
```

//Asignar clave de seguridad

```

IOS Command Line Interface
Press RETURN to get started:

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

Medellin2>en
Medellin2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin2(config)#no ip domain-lookup
Medellin2(config)#enable secret class
Medellin2(config)#line con 0
Medellin2(config-line)#pass cisco
Medellin2(config-line)#login
Medellin2(config-line)#line vty 0 15
Medellin2(config-line)#pass cisco
Medellin2(config-line)#login
Medellin2(config-line)#service password-encryption
Medellin2(config)#banner motd #Acceso no Autorizado#
Medellin2(config)#

```

Ilustración 8. Asignación clave Router Medellin2

//configuración hacia el router Medellin1

```

Medellin2(config)#int s0/0/0
Medellin2(config-if)#ip add 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
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

```

//configuración hacia el Router medellin3

```

Medellin2(config-if)#int s0/0/1
Medellin2(config-if)#ip add 172.29.6.5 255.255.255.252
Medellin2(config-if)#clock rate 128000
This command applies only to DCE interfaces
Medellin2(config-if)#no shut
Medellin2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
Medellin2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

```

//configuración hacia la PC0

```

Medellin2(config-if)#int g0/0
Medellin2(config-if)#ip add 172.29.4.1 255.255.255.128
Medellin2(config-if)#no shut

```

Configuración de Router Medellin3

```

Router>en
Router#conf t

```

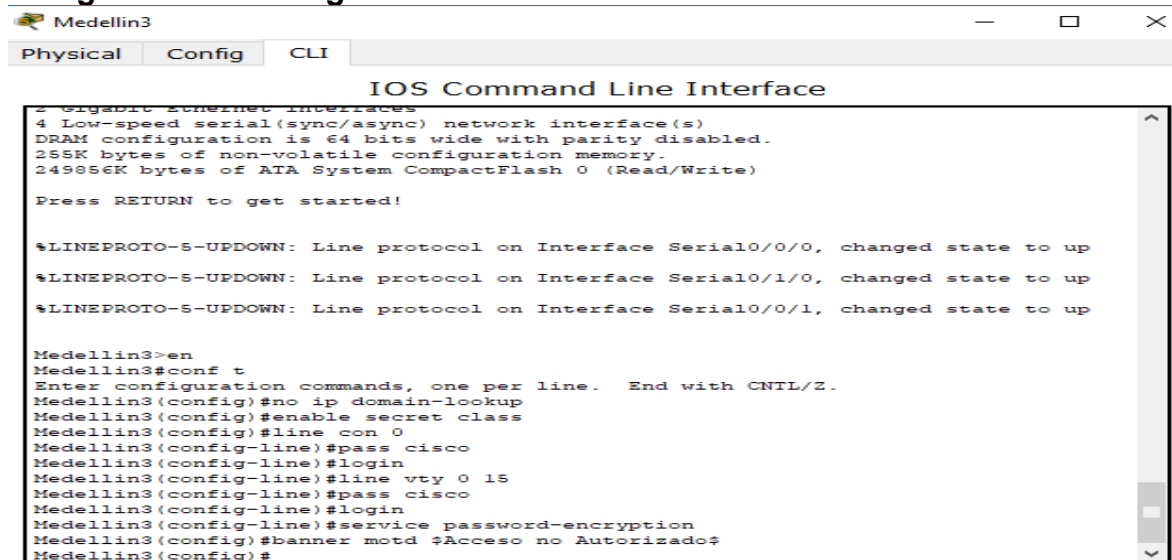
Enter configuration commands, one per line. End with CNTL/Z.

// asignar nombre

```
Router#hostname Medellin3
```

Enter configuration commands, one per line. End with CNTL/Z.

//Asignar clave de seguridad



```
Medellin3
Physical Config CLI
IOS Command Line Interface
- Gigabit Ethernet interfaces
4 Low-speed serial(sync/async) network interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

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

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

Ilustración 9. Asignación clave Router Medellin3

//configuración hacia el Router medellin1

```
Medellin3(config)#int s0/0/0
```

```
Medellin3(config-if)#ip add 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
```

```
Medellin3(config)#int s0/0/1
```

```
Medellin3(config-if)#ip add 172.29.6.14 255.255.255.252
```

```
Medellin3(config)#no shut
```

//configuración hacia el Router medellin2

```
Medellin3(config-if)#int s0/1/0
```

```
Medellin3(config-if)#ip add 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
```

//configuración hacia la PC1

```
Medellin3(config-if)#int g0/0
```

```
Medellin3(config-if)#ip add 172.29.4.129 255.255.255.128
```

```
Medellin3(config-if)#no shut
```

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.

- **Configurar Red con protocolo Rip V2 Router Medellin1**

```
Medellin1>en
Medellin1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin1(config-router)#router rip
Medellin1(config-router)#ver 2
Medellin1(config-router)#no auto-summary
Medellin1(config-router)#do sh 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)#net 172.29.6.0
Medellin1(config-router)#net 172.29.6.8
Medellin1(config-router)#net 172.29.6.12
Medellin1(config-router)#passive-interface s0/0/0
Medellin1(config-router)#
```

- **Configurar Red con protocolo Rip V2 Router Medellin2**

```
Medellin2>en
Medellin2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin2(config)#router rip
Medellin2(config-router)#ver 2
Medellin2(config-router)#no auto-summary
Medellin2(config-router)#do sh 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)#net 172.29.4.0
Medellin2(config-router)#net 172.29.6.0
Medellin2(config-router)#net 172.29.6.4
Medellin2(config-router)#passive-interface g0/0
```

- **Configurar Red con protocolo Rip V2 Router Medellin3**

```
Medellin3>en
Medellin3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
```



```
Medellin3(config)#router rip
Medellin3(config-router)#ver 2
Medellin3(config-router)#no auto-summary
Medellin3(config-router)#do sh 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)#net 172.29.4.128
Medellin3(config-router)#net 172.29.6.4
Medellin3(config-router)#net 172.29.6.8
Medellin3(config-router)#net 172.29.6.12
Medellin3(config-router)#passive-interface g0/0
```

- **Configurar Red con protocolo Rip V2 Router Bogota1**

```
Bogota1>en
Bogota1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota1(config)#router rip
Bogota1(config-router)#ver 2
Bogota1(config-router)#no auto-summary
Bogota1(config-router)#do sh 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)#net 172.29.3.0
Bogota1(config-router)#net 172.29.3.4
Bogota1(config-router)#net 172.29.3.8
Bogota1(config-router)#passive-interface s0/0/0
```

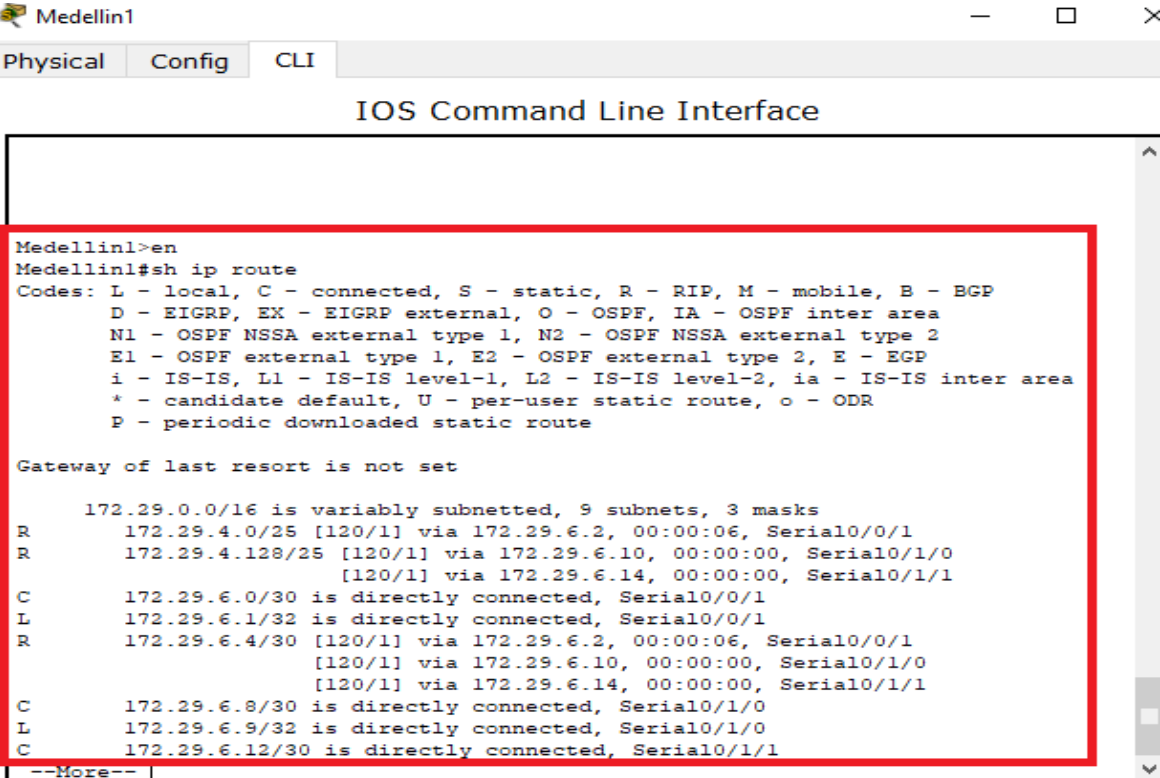
- **Configurar Red con protocolo Rip V2 Router Bogota2**

```
Bogota2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota2(config)#router rip
Bogota2(config-router)#ver 2
Bogota2(config-router)#no auto-summary
Bogota2(config-router)#do sh 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 172.29.3.8
```

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

Configurar Red con protocolo Rip V2 Router Bogota3

```
Bogota3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota3(config)#router rip
Bogota3(config-router)#ver 2
Bogota3(config-router)#no auto-summary
Bogota3(config-router)#do sh 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 172.29.3.0
Bogota3(config-router)#net 172.29.3.4
Bogota3(config-router)#net 172.29.3.12
Bogota3(config-router)#passive-interface g0/0
```



```
Medellin1
Physical Config CLI
IOS Command Line Interface
Medellin1>en
Medellin1#sh 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, 00:00:06, Serial0/0/1
R       172.29.4.128/25 [120/1] via 172.29.6.10, 00:00:00, Serial0/1/0
          [120/1] via 172.29.6.14, 00:00:00, 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, 00:00:06, Serial0/0/1
          [120/1] via 172.29.6.10, 00:00:00, Serial0/1/0
          [120/1] via 172.29.6.14, 00:00:00, 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
--More--
```

Ilustración 10. Imprime en pantalla la tabla de enrutamiento Medellin1

```

Bogota1>en
Bogota1#sh 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 172.29.3.2, 00:00:25, Serial0/1/0
        [120/1] via 172.29.3.6, 00:00:25, Serial0/1/1
R       172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:28, 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, 00:00:28, Serial0/0/1
        [120/1] via 172.29.3.2, 00:00:25, Serial0/1/0
        [120/1] via 172.29.3.6, 00:00:25, Serial0/1/1
C       209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks
C       209.17.220.4/30 is directly connected, Serial0/0/0
--More--

```

Ilustración 11. Imprime en pantalla la tabla de enrutamiento Bogota1

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

```

Medellin1>en
Medellin1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin1(config)#ip route 0.0.0.0 0.0.0.0 209.17.200.220.1
% Invalid input detected at '^' marker.
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)#

```

Ilustración 12. Asigna una ruta por defecto Router Medellín1

```

Medellin2>en
Medellin2#sh 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 172.29.6.1 to network 0.0.0.0

     172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
C       172.29.4.0/25 is directly connected, GigabitEthernet0/0
L       172.29.4.1/32 is directly connected, GigabitEthernet0/0
R       172.29.4.128/25 [120/1] via 172.29.6.6, 00:00:23, Serial0/0/1
C       172.29.6.0/30 is directly connected, Serial0/0/0
L       172.29.6.2/32 is directly connected, Serial0/0/0
C       172.29.6.4/30 is directly connected, Serial0/0/1
L       172.29.6.5/32 is directly connected, Serial0/0/1
R       172.29.6.8/30 [120/1] via 172.29.6.1, 00:00:14, Serial0/0/0
        [120/1] via 172.29.6.6, 00:00:23, Serial0/0/1
R       172.29.6.12/30 [120/1] via 172.29.6.1, 00:00:14, Serial0/0/0
        [120/1] via 172.29.6.6, 00:00:23, Serial0/0/1
R*    0.0.0.0/0 [120/1] via 172.29.6.1, 00:00:14, Serial0/0/0

```

Ilustración 13. Imprime en pantalla la tabla de enrutamiento Medellin2

```

Bogotal con0 is now available

Press RETURN to get started.

Bogotal>en
Bogotal#conf 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)#

```

Ilustración 14. Asigna una ruta por defecto Router Bogota1

```

IOS Command Line Interface

Bogota3>en
Bogota3#sh 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

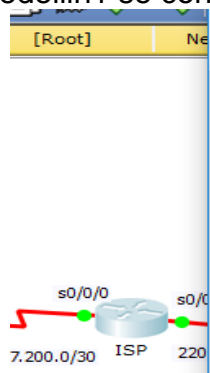
Gateway of last resort is 172.29.3.1 to network 0.0.0.0

    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, 00:00:05, 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 172.29.3.13, 00:00:05, Serial0/1/0
        [120/1] via 172.29.3.1, 00:00:08, Serial0/0/0
        [120/1] via 172.29.3.5, 00:00:08, Serial0/0/1
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, 00:00:08, Serial0/0/0
        [120/1] via 172.29.3.5, 00:00:08, Serial0/0/1
Bogota3#
Bogota3#

```

Ilustración 15. Imprime en pantalla la tabla de enrutamiento Bogota3

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. Medellín1 se conecta a internet, lo mismo el Router de Bogota1



```

IOS Command Line Interface

Press RETURN to get started.

%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

ISP>en
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)#

```

Ilustración 16. Asigna ruta estática al Router ISP

Parte 2: Tabla de Enrutamiento.

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

Se realiza ping al Router Bogota3, a Bogota1

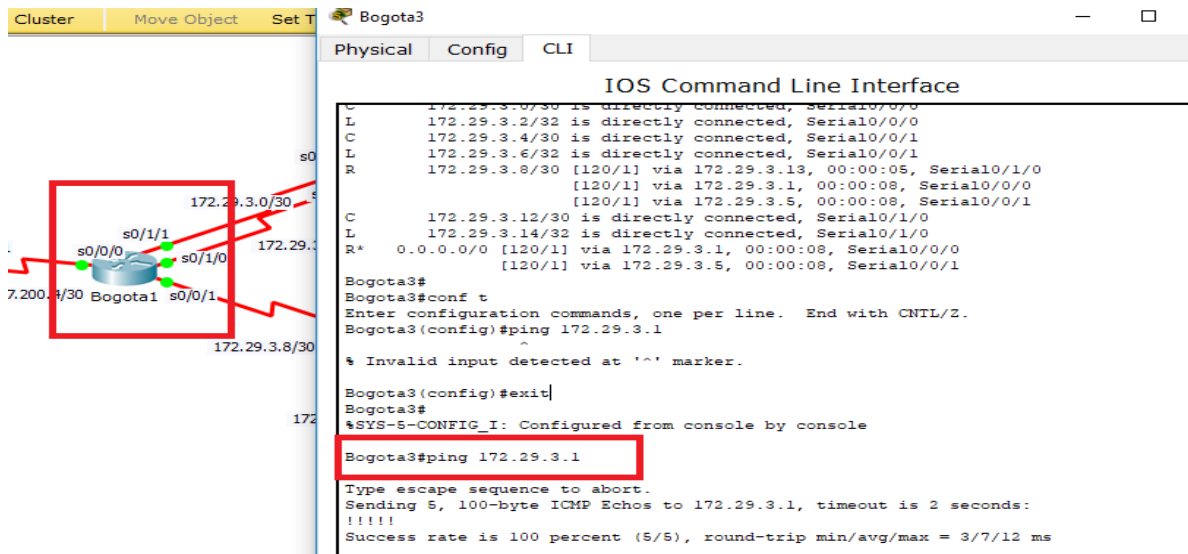


Ilustración 17. Se realiza ping al Router Bogota1

Ping de Router Bogota3 al router medellin3 s0/0/0

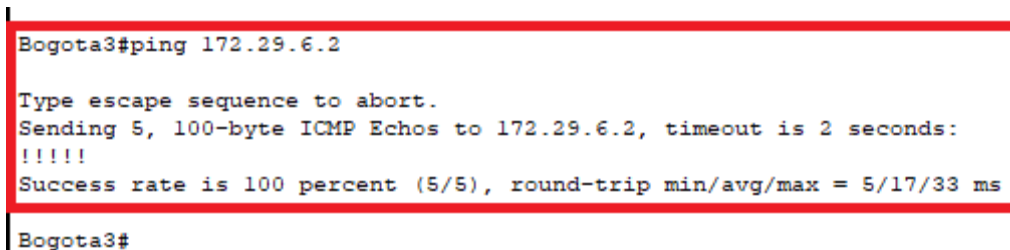


Ilustración 18. Se realiza ping al Router Medellin3

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.

Son muy similares

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

```
Bogota3>en
Bogota3#sh 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, 00:00:15, 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 172.29.3.13, 00:00:15, Serial0/1/0
        [120/1] via 172.29.3.1, 00:00:20, Serial0/0/0
        [120/1] via 172.29.3.5, 00:00:20, Serial0/0/1
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, 00:00:20, Serial0/0/0
        [120/1] via 172.29.3.5, 00:00:20, Serial0/0/1
Bogota3#
Bogota3#
```

Ilustración 19. Imprime en pantalla la tabla de enrutamiento Bogota3

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

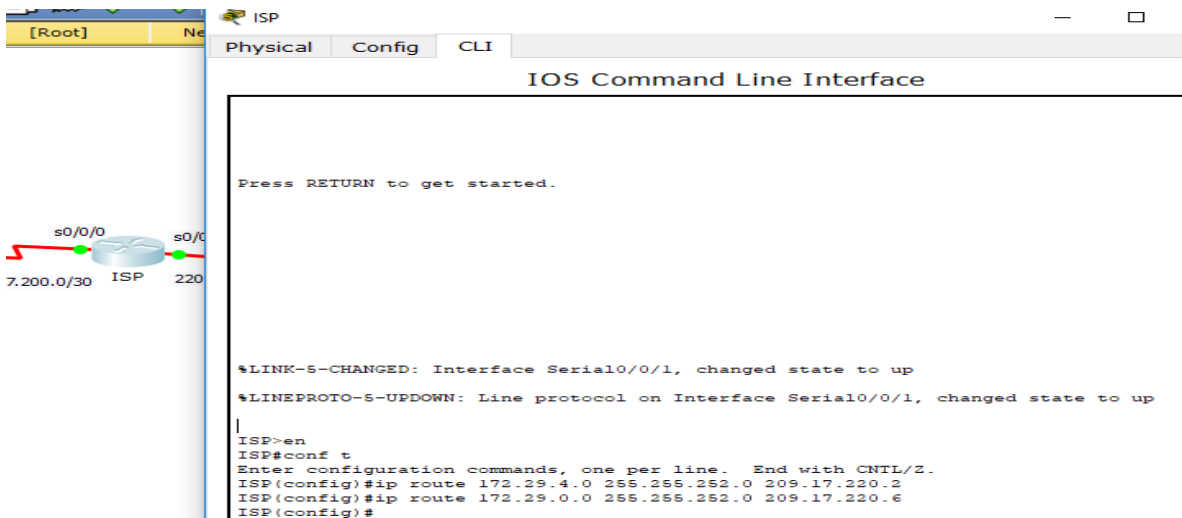


Ilustración 20. Asigna al Router ISP rutas estáticas

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.

Nota: se realizó anteriormente en el punto 1.

Parte 4: Verificación del protocolo RIP.

a. Verificar y documentar las opciones de enrutamiento configuradas en los routers, como el passive interface para la conexión hacia el ISP, la versión de RIP y las interfaces que participan de la publicación entre otros datos.

Anteriormente se hicieron las interfaces pasivas

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.

Anteriormente se realizó la conexión a RIP.

Parte 5: Configurar encapsulamiento y autenticación PPP.

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

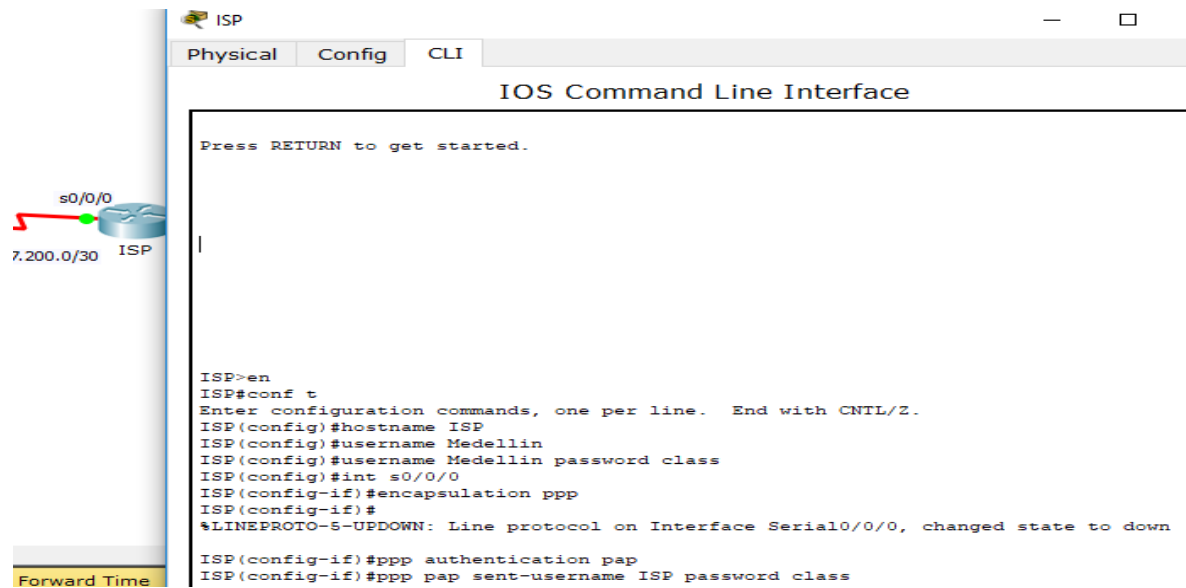


Ilustración 21. Autenticación con PAP

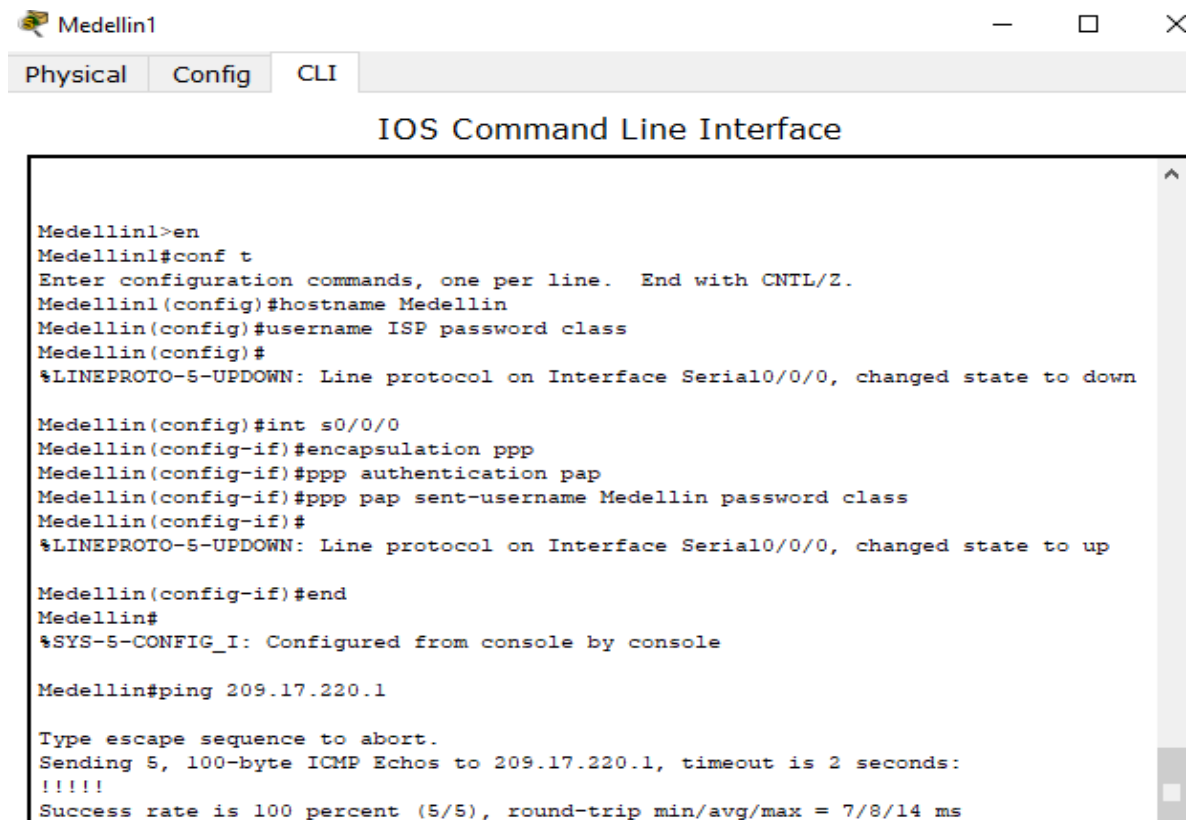


Ilustración 22. Se realiza ping de Medellin1 al ISP

```

Medellin1>en
Medellin1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Medellin1(config)#hostname Medellin1
Medellin1(config)#username ISP password class
Medellin1(config)#int s0/1/0
Medellin1(config-if)#encapsulation ppp
Medellin1(config-if)#ppp authentication pap
Medellin1(config-if)#ppp pap sent-username Medellin1 password class
Medellin1(config-if)#end
Medellin1#
%SYS-5-CONFIG_I: Configured from console by console

```

Ilustración 23. Autenticación PAP y el nombre de usuario y contraseña

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

```

ISP>en
ISP#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
ISP(config)#hostname ISP
ISP(config)#username Medellin
ISP(config)#username Medellin password class
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 ISP password class
ISP(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

ISP(config-if)#exit
ISP(config)#username Bogota password class1
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

```

Ilustración 24. Configuración PPP con CHAP

Se realiza ping para comprobar

```
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 = 1/8/14 ms
```

Ilustración 25. Ping del ISP al Router Medellin1

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
Physical Config CLI
IOS Command Line Interface

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

Medellin>en
Medellin#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin(config)#ip nat inside source list 1 interface s0/0/0 overload
Medellin(config)#access-list 1 permit 172.29.4.0 0.0.3.255
~
% Invalid input detected at '^' marker.
Medellin(config)#access-list 1 permit 172.29.4.0 0.0.3.255
Medellin(config)#int s0/0/0
Medellin(config-if)#ip nat outside
Medellin(config-if)#int s0/0/1
Medellin(config-if)#ip nat inside
Medellin(config-if)#int s0/1/1
Medellin(config-if)#ip nat inside
Medellin(config-if)#
```

Ilustración 26. Indica las interfaces de entrada y salida Medellin1

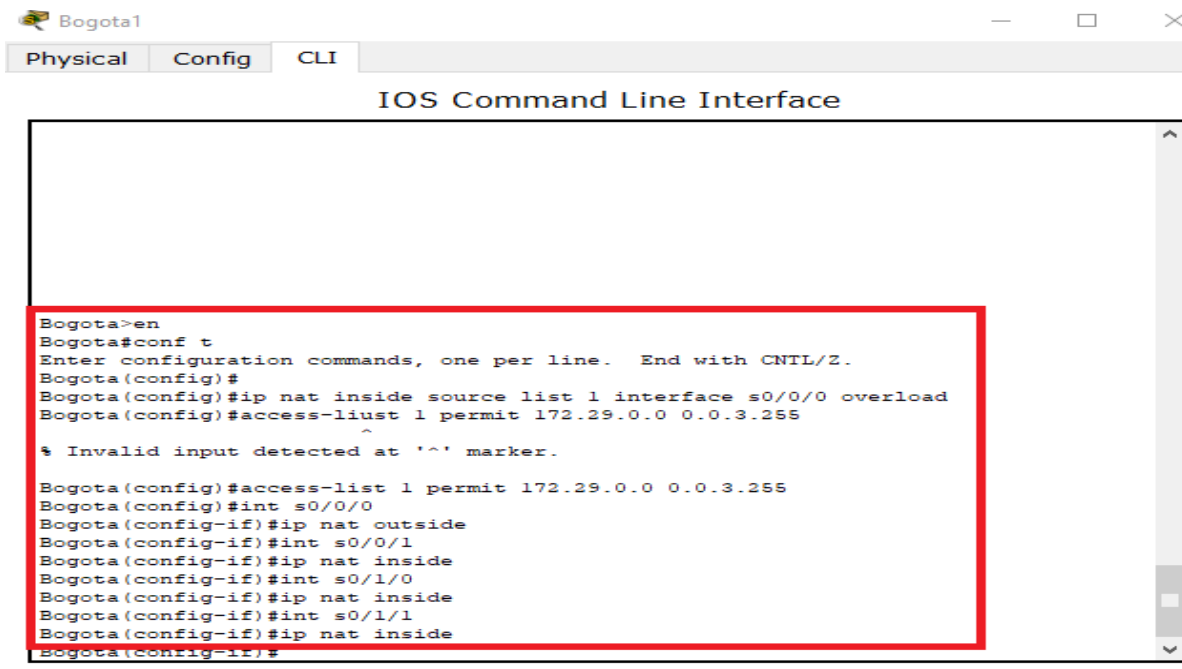


Ilustración 27. Indica las interfaces de entrada y salida Bogota1

Ping de PC0 al ISP

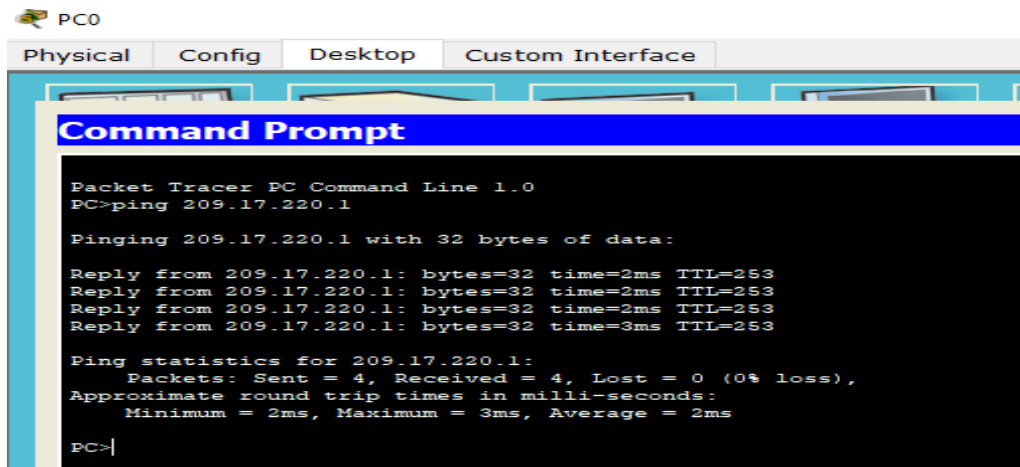
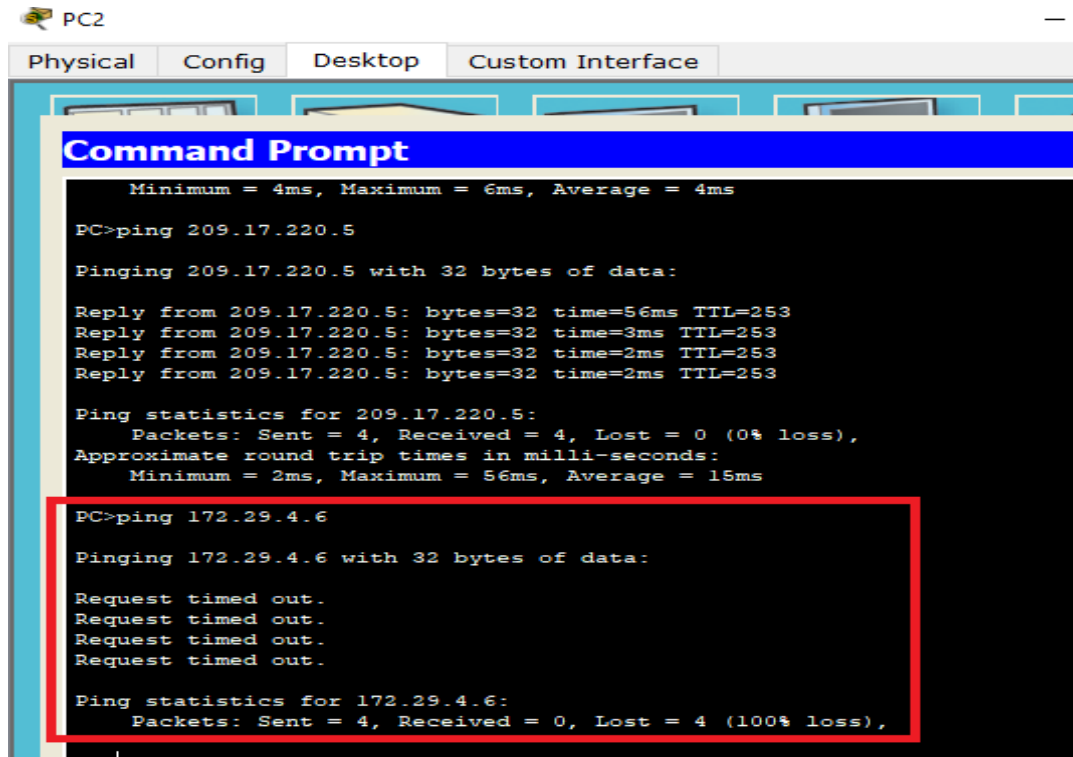


Ilustración 28. Ping del PC0 al ISP

Ping de la PC2 a la PC0



The screenshot shows a Command Prompt window on PC2. The window title is 'PC2' and it has tabs for 'Physical', 'Config', 'Desktop', and 'Custom Interface'. The Command Prompt displays the following text:

```
Minimum = 4ms, Maximum = 6ms, Average = 4ms

PC>ping 209.17.220.5

Pinging 209.17.220.5 with 32 bytes of data:

Reply from 209.17.220.5: bytes=32 time=56ms TTL=253
Reply from 209.17.220.5: bytes=32 time=3ms 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 = 56ms, Average = 15ms

PC>ping 172.29.4.6

Pinging 172.29.4.6 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 172.29.4.6:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Ilustración 29. Ping del PC2 al PC0

Este ping falla porque NAT bloquea la traducción de afuera hacia adentro.

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
Physical Config CLI
IOS Command Line Interface

Bogota>en
Bogota#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota(config)#
Bogota(config)#ip nat inside source list 1 interface s0/0/0 overload
Bogota(config)#access-list 1 permit 172.29.0.0 0.0.3.255
^
% Invalid input detected at '^' marker.

Bogota(config)#access-list 1 permit 172.29.0.0 0.0.3.255
Bogota(config)#int s0/0/0
Bogota(config-if)#ip nat outside
Bogota(config-if)#int s0/0/1
Bogota(config-if)#ip nat inside
Bogota(config-if)#int s0/1/0
Bogota(config-if)#ip nat inside
Bogota(config-if)#int s0/1/1
Bogota(config-if)#ip nat inside
Bogota(config-if)#ip nat inside
Bogota(config-if)#ip nat inside

```

Ilustración 30. Indica las interfaces de entrada y salida Bogota1

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>en
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 Medellin-2
Medellin2(dhcp-config)#net 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)#ip dhcp
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to
down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to
down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up
% Incomplete command.
Medellin2(config)#ip dhcp pool Medellin-3
Medellin2(dhcp-config)#net 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
```

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

```
Medellin3>en
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 Medellín2 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 Bogota-2
Bogota2(dhcp-config)#net 172.29.1.0 255.255.255.0
Bogota2(dhcp-config)#dns-server 8.8.8.8
Bogota2(dhcp-config)#ip dhcp pool Bogota-3
Bogota2(dhcp-config)#net 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
```

//Configuración Router Bogota3

```
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
```

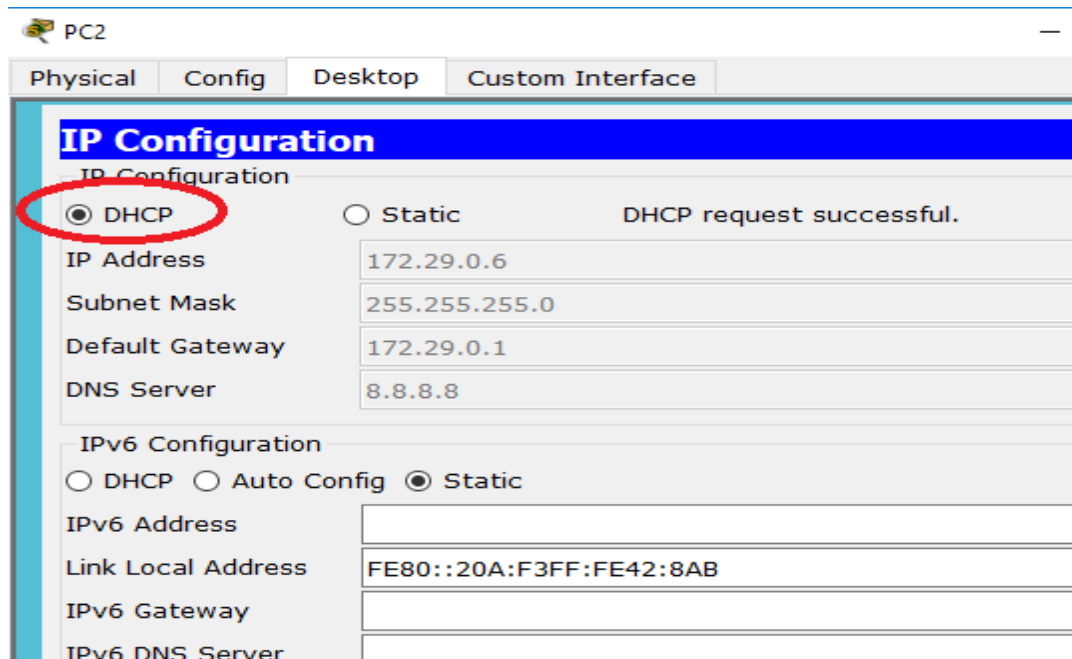


Ilustración 31. Configuración DHCP en el PC2

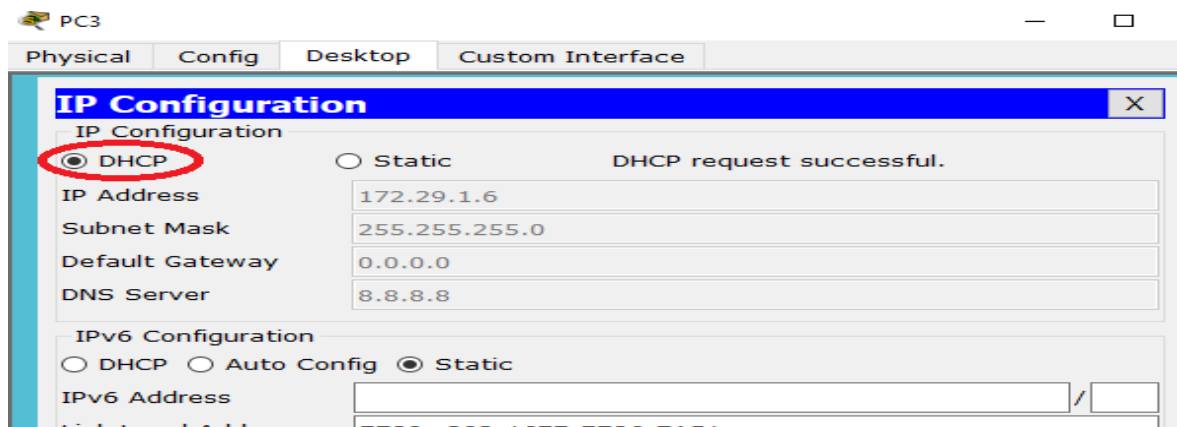


Ilustración 32. Configuración DHCP en el PC3

d. Configure el router Bogotá1 para que habilite el paso de los mensajes Broadcast hacia la IP del router Bogotá2.

Se guarda la configuración

Copy run start

Se reinician cada Router

Reload

Ping de PC2 al PC3

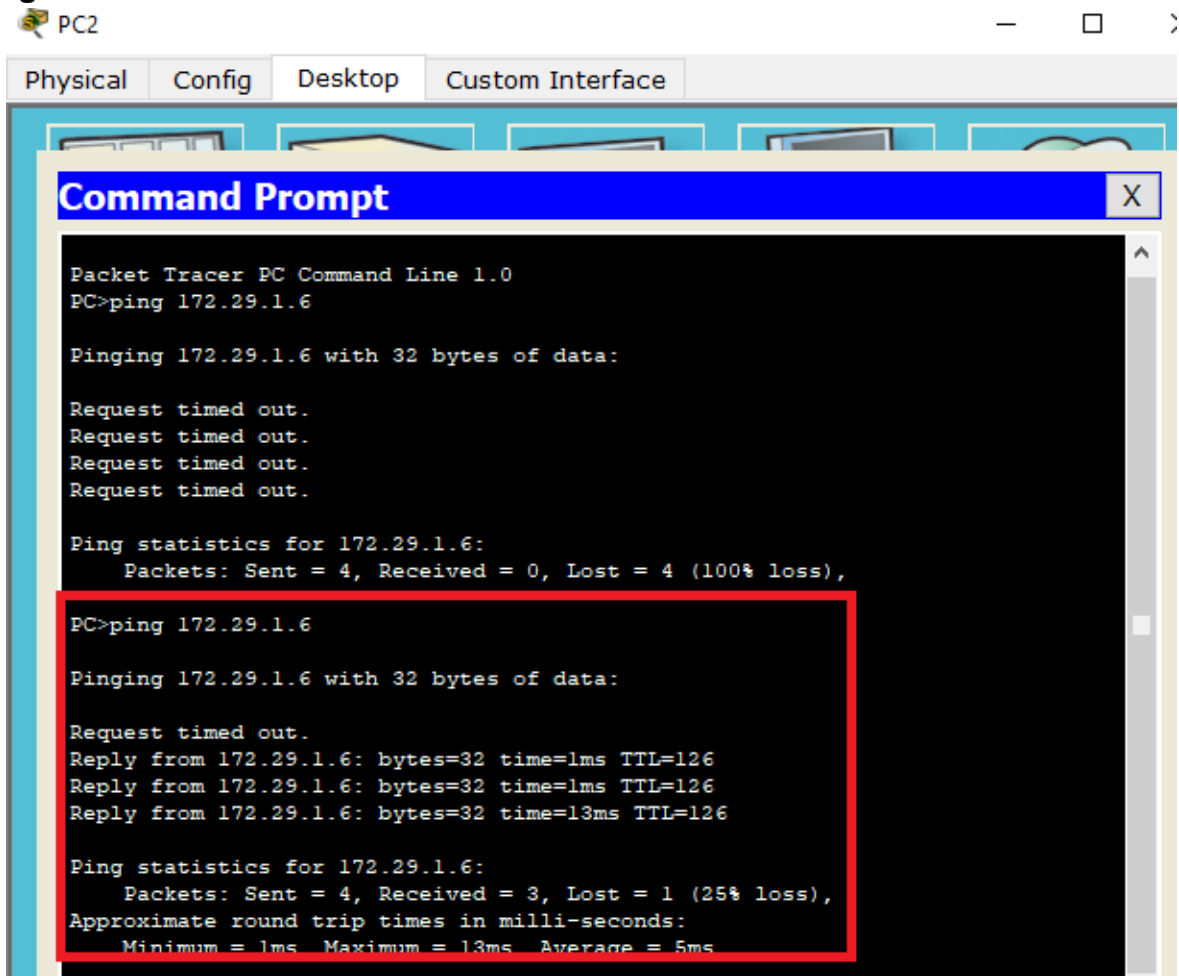
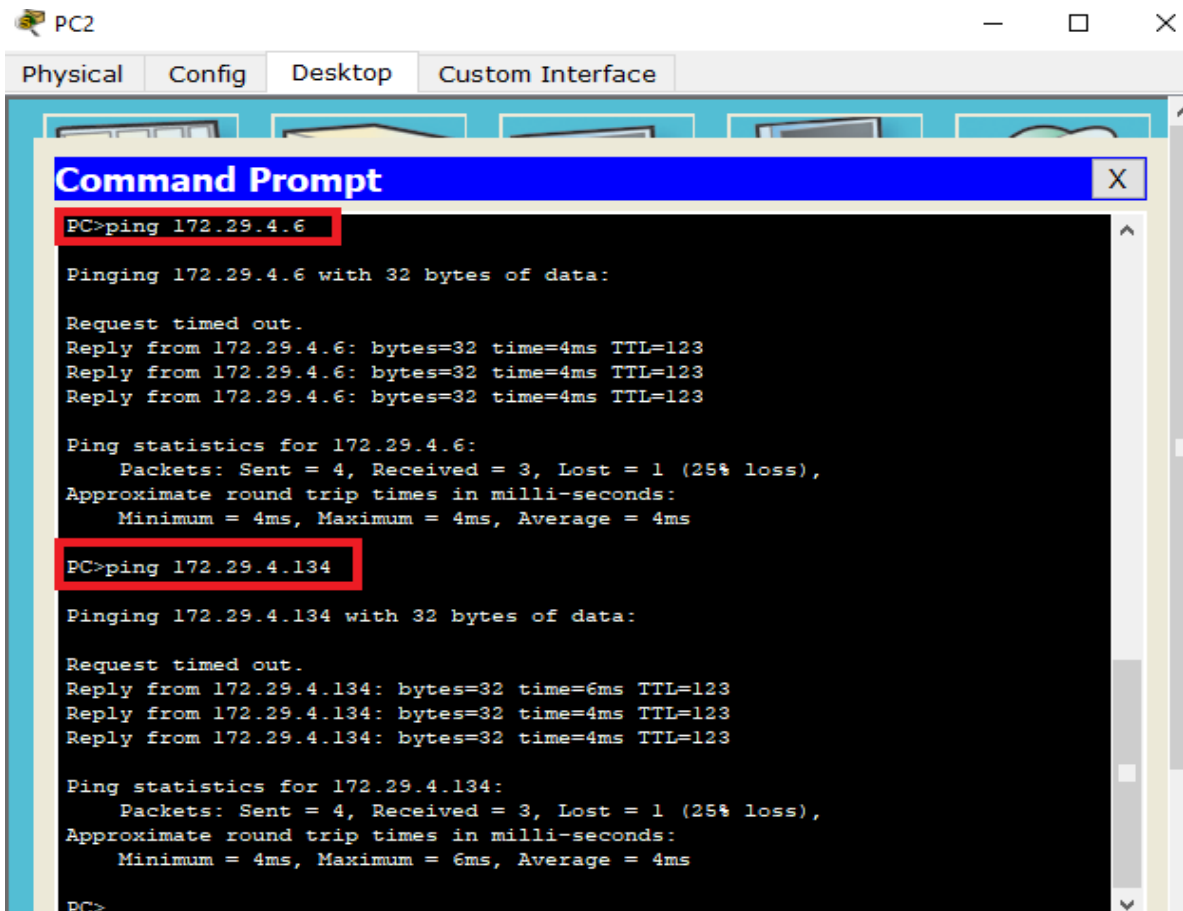


Ilustración 33. Ping de PC2 A PC3

Pin del PC-2 al PC0 y PC1



The screenshot shows a Windows desktop environment with a window titled "PC2". The window has tabs for "Physical", "Config", "Desktop", and "Custom Interface". A "Command Prompt" window is open, displaying the following text:

```
PC>ping 172.29.4.6

Pinging 172.29.4.6 with 32 bytes of data:

Request timed out.
Reply from 172.29.4.6: bytes=32 time=4ms TTL=123
Reply from 172.29.4.6: bytes=32 time=4ms TTL=123
Reply from 172.29.4.6: bytes=32 time=4ms TTL=123

Ping statistics for 172.29.4.6:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 4ms, Average = 4ms

PC>ping 172.29.4.134

Pinging 172.29.4.134 with 32 bytes of data:

Request timed out.
Reply from 172.29.4.134: bytes=32 time=6ms TTL=123
Reply from 172.29.4.134: bytes=32 time=4ms TTL=123
Reply from 172.29.4.134: bytes=32 time=4ms TTL=123

Ping statistics for 172.29.4.134:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 6ms, Average = 4ms

PC>
```

Ilustración 34. Ping de PC2 al PC0 y PC1

ESCENARIO 2

Escenario: Una empresa de Tecnología posee tres sucursales distribuidas en las ciudades de Bogotá, Medellín y Bucaramanga, 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

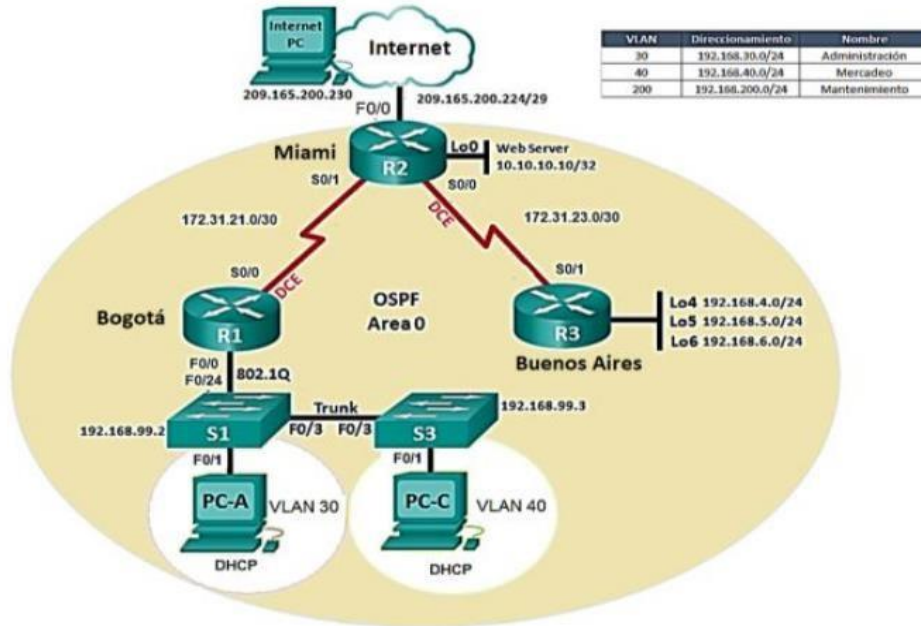


Ilustración 35. Topología de red

TABLA DIRECCIONAMIENTO IP

Tabla 1. Direccionamiento IP

DISPOSITIVO	INTERFACE	DIRECCIÓN IP	MASCARA DE SUBRED
Internet pc	G 0/0	209.165.200.230	255.255.255.248
Web Server	Fa/0	10.10.10.10	255.255.255.0
R1	S 0/0	172.31.21.0	255.255.255.252
R1	F 0/0	192.168.20.1	255.255.255.0
R2	F 0/0	209.165.200.255	255.255.255.248
R2	S 0/0	172.31.23.2	255.255.255.252
R2	S 0/1	172.31.23.1	255.255.255.252

R2	G0/1	10.10.10.1	255.255.255.0
R3	S 0/1	172.31.23.2	255.255.255.252
R3	Lop4	192.168.4.1	255.255.255.0
R3	Lop5	192.168.5.1	255.255.255.0
R3	Lop6	192.168.6.1	255.255.255.0
S1	Fa/24	192.168.99.2	255.255.255.0
S2	Fa0/3	192.168.99.3	255.255.255.0
PC-A	Fa/0	192.168.30.31	255.255.255.0
PC-C	Fa/0	192.168.40.31	255.255.255.0

Topología planteada

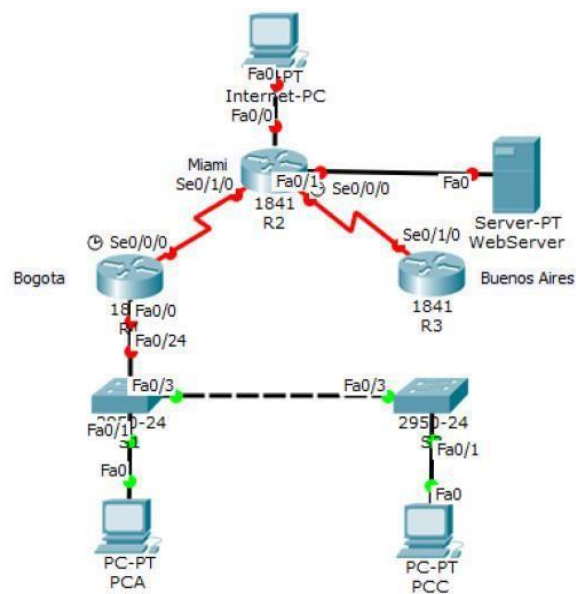


Ilustración 36. Topología Planteada Packet Tracer

Topología Encendida

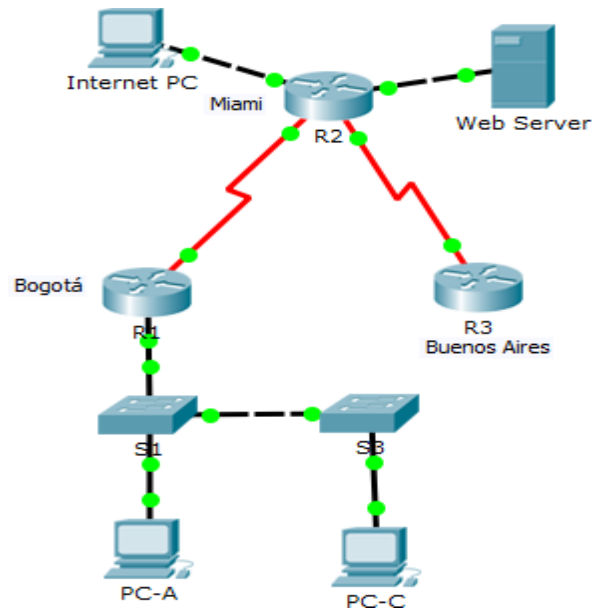


Ilustración 37. Topología Encendida en Packet Tracer

1. Configurar el direccionamiento IP acorde con la topología de red para cada uno de los dispositivos

□ Configurar R1

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
//se cambia el nombre al router
Router(config)#hostname R1
//se asigna clave
R1(config)#enable secret class
R1(config)#line console 0
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#exit
R1(config)#line vty 0 4
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#exit
R1(config)#service pass
R1(config)#service password-encryption
R1(config)#banner motd $Acceso no Autorizado$
```

//configurar la interface serial0/0/0

```
R1(config)#interface serial0/0/0
R1(config-if)#description Conection to R2
R1(config-if)#ip add 172.31.21.1 255.255.255.252
R1(config-if)#clock rate 128000
R1(config-if)#no shut
```

//configurar interface g0/1 con el S1

```
R1(config-if)#interface g0/1.40
R1(config-subif)#no description Administracion LAN
R1(config-subif)#encapsulation dot1q 40
R1(config-subif)#ip add 192.168.40.1 255.255.255.0
R1(config-subif)#exit
R1(config)#interface g0/1.30
R1(config-subif)#description Mercadeo LAN
R1(config-subif)#encapsulation dot1q 30
R1(config-subif)#ip add 192.168.30.1 255.255.255.0
R1(config-subif)#exit
R1(config)#interface g0/1.200
R1(config-subif)#description Mantenimiento LAN
R1(config-subif)#encapsulation dot1Q 200
R1(config-subif)#ip add 192.168.200.1 255.255.255.0
R1(config-subif)#int g0/1
R1(config-if)#no shut
```

□ Configurar R2

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
//se asigna nombre
Router(config)#hostname R2
//se asigna la clave
R2(config)#enable secret class
R2(config)#line console 0
R2(config-line)#password cisco
R2(config-line)#login
R2(config-line)#exit
R2(config)#line vty 0 4
R2(config-line)#password cisco
R2(config-line)#login
R2(config-line)#exit
R2(config)#service password-encryption
R2(config)#banner motd $Acceso no Autorizado$
```

//configurar la interface serial0/0/0

```
R2(config)#interface serial0/0/0
R2(config-if)#ip add 172.31.23.1 255.255.255.252
R2(config-if)#exit
```

//configurar la interface serial0/0/1

```
R2(config)#interface serial0/0/1
R2(config-if)#description Conexion to R1
R2(config-if)#ip add 172.31.21.2 255.255.255.252
R2(config-if)#no shut
R2(config-if)#clock rate 128000
R2(config-if)#exit
```

//configurar la interface g0/0

```
R2(config)#interface g0/0
R2(config-if)#description Conexion a Internet
R2(config-if)#ip add 209.165.200.225 255.255.255.248
R2(config-if)#no shut
R2(config-if)#exit
```

//configurar la interface g0/1

```
R2(config)#interface g0/1
R2(config-if)#ip add 10.10.10.1 255.255.255.0
R2(config-if)#no shut
R2(config-if)#
R2(config-if)#description Coneccion a Server Web
R2(config-if)#exit
```

□ Configurar web server

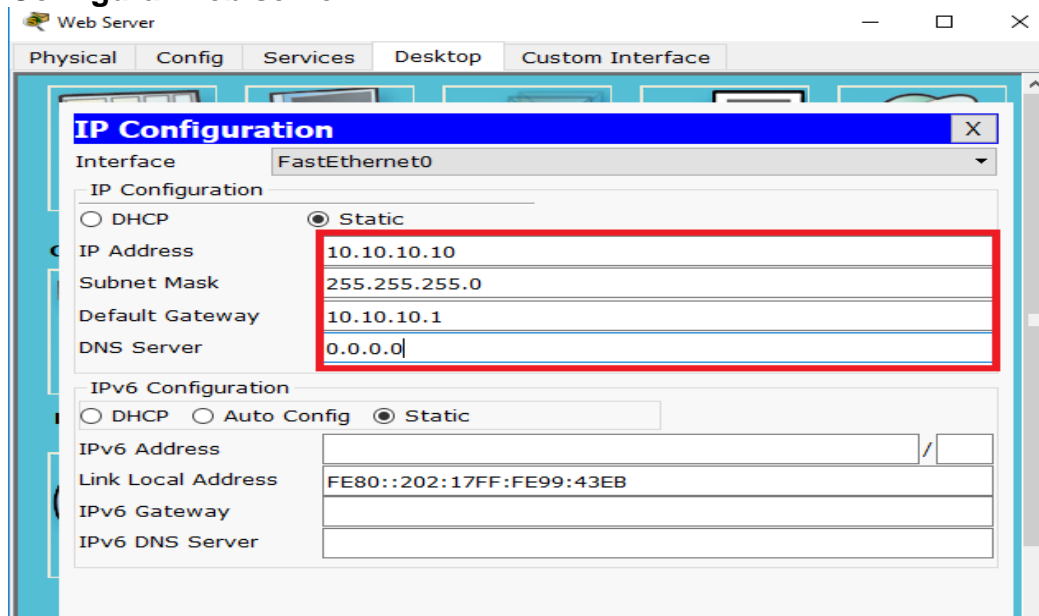


Ilustración 38. Configuración Web Ser

□ **Configurar internet pc**

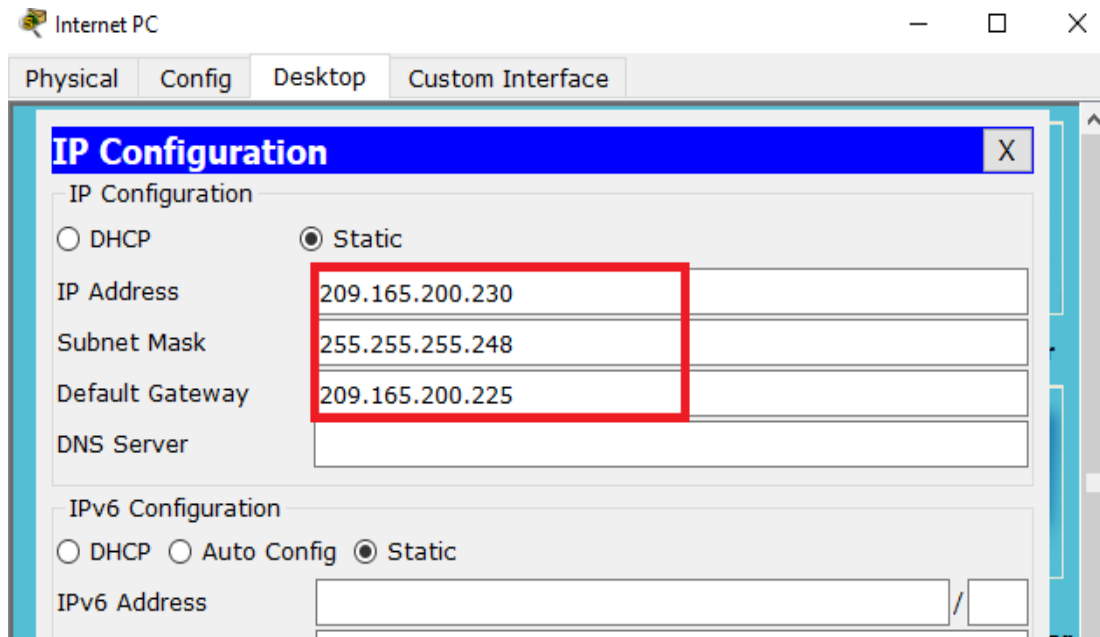


Ilustración 39. Configuración Internet PC

□ **Configurar router 3**

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#hostname R3
R3(config)#enable secret class
R3(config)#line console 0
R3(config-line)#password cisco
R3(config-line)#login
R3(config-line)#exit
R3(config)#line vty 0 4
R3(config-line)#password cisco
R3(config-line)#login
R3(config-line)#exit
R3(config)#service password-encryption
R3(config)#banner motd $Acceso no Autorizado$

//configurar la int s0/0/1
R3(config)#interface serial0/0/1
R3(config-if)#description Coneccion a R2
R3(config-if)#ip add 172.31.23.2 255.255.255.252
```



```
R3(config-if)#no shut
```

//configurar loopback 4

```
R3(config-if)#interface lo4  
R3(config-if)#ip add 192.168.4.1 255.255.255.0  
R3(config-if)#no shut
```

//configurar loopback 5

```
R3(config-if)#interface lo5  
R3(config-if)#ip add 192.168.5.1 255.255.255.0  
R3(config-if)#no shut
```

//configurar loopback 6

```
R3(config-if)#interface lo6  
R3(config-if)#ip add 192.168.6.1 255.255.255.0  
R3(config-if)#no shut  
R3(config-if)#exit  
R3(config)#exit  
R3#
```

□ Configurar S1

```
Switch>en  
Switch#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
Switch(config)#hostname S1  
S1(config)#enable secret class  
S1(config)#line console 0  
S1(config-line)#password cisco  
S1(config-line)#login  
S1(config-line)#exit  
S1(config)#line vty 0 4  
S1(config-line)#password cisco  
S1(config-line)#login  
S1(config-line)#exit  
S1(config)#service password-encryption  
S1(config)#banner motd $Acceso no Autorizado$
```

□ Configurar S3

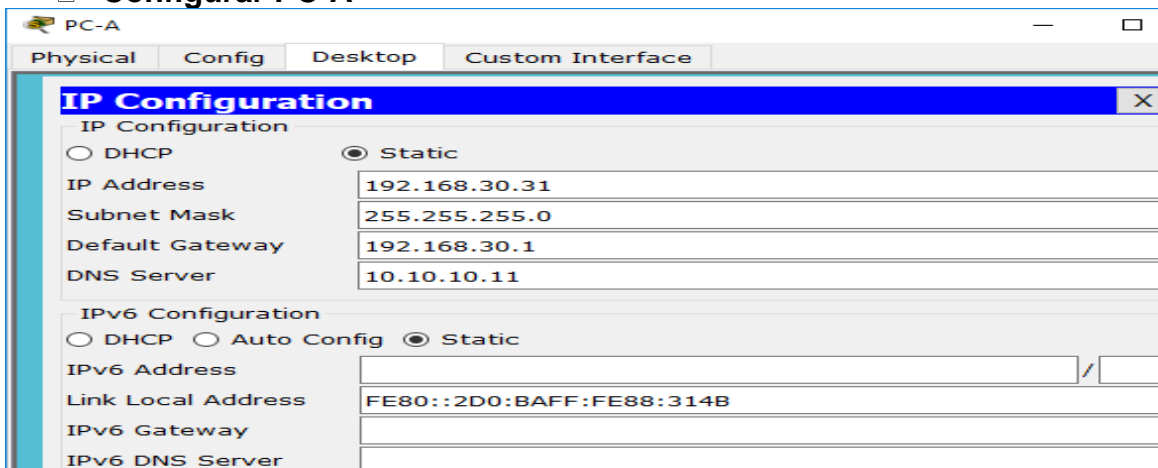
```
Switch>en  
Switch#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
Switch(config)#hostname S3  
S3(config)#enable secret class  
S3(config)#line console 0
```

```

S3(config-line)#password cisco
S3(config-line)#login
S3(config-line)#line vty 0 4
S3(config-line)#password cisco
S3(config-line)#login
S3(config-line)#exit
S3(config)#service password-encryption
S3(config)#banner motd $Acceso no Autorizado$
S3(config)#exit
S3#

```

□ Configurar PC-A



PC-A

Physical Config Desktop Custom Interface

IP Configuration

IP Configuration

DHCP Static

IP Address: 192.168.30.31

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.30.1

DNS Server: 10.10.10.11

IPv6 Configuration

DHCP Auto Config Static

IPv6 Address: /

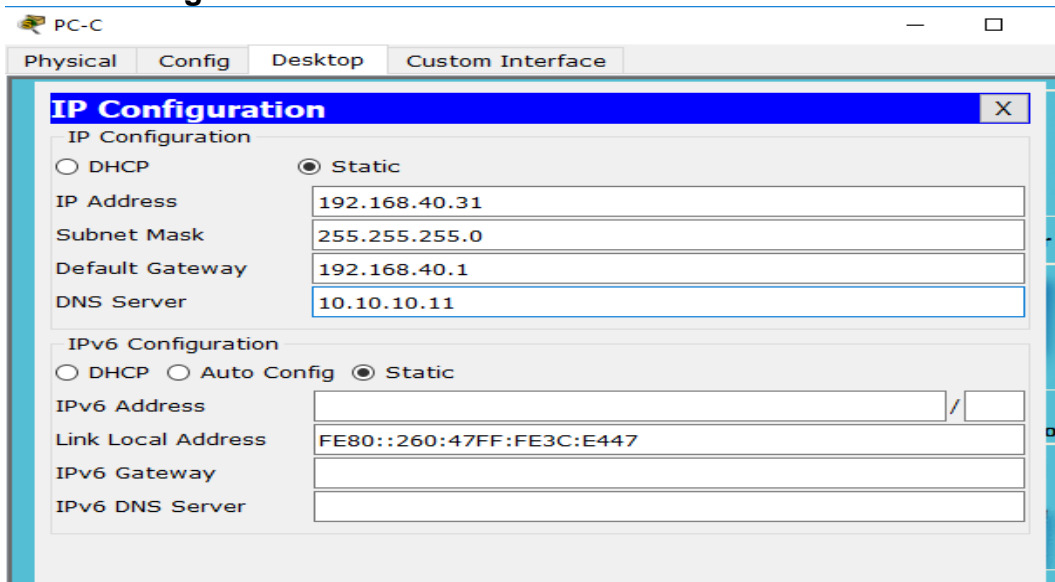
Link Local Address: FE80::2D0:BAFF:FE88:314B

IPv6 Gateway: /

IPv6 DNS Server: /

Ilustración 40. Configuración PC-A

□ Configurar PC-C



PC-C

Physical Config Desktop Custom Interface

IP Configuration

IP Configuration

DHCP Static

IP Address: 192.168.40.31

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.40.1

DNS Server: 10.10.10.11

IPv6 Configuration

DHCP Auto Config Static

IPv6 Address: /

Link Local Address: FE80::260:47FF:FE3C:E447

IPv6 Gateway: /

IPv6 DNS Server: /

Ilustración 41. Configuración PC-C

**2. Configurar el protocolo de enrutamiento OSPFv2 bajo los siguientes criterios:
OSPFv2 area 0**

Tabla 2. Protocolo de Enrutamiento OSPFv2

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

□ **Configurar R1 ID R1**

```
R1>en
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 192.168.30.0 0.0.0.255 area 0
R1(config-router)#network 192.168.40.0 0.0.0.255 area 0
R1(config-router)#network 192.168.200.0 0.0.0.255 area 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 256
R1(config-if)#ip ospf cost 9500
```

□ **Configurar Router ID R2**

```
Router>en
Router#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)#
```

```
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)#auto-cost reference-bandwidth 9500
% OSPF: Reference bandwidth is changed.
Please ensure reference bandwidth is consistent across all routers.
R2(config)#interface s0/0/0
R2(config-if)#interface serial0/0/0
R2(config-if)#bandw 256
R2(config-if)#interface serial0/0/1
R2(config-if)#bandw 256
R2(config-if)#ip ospf cost 9500
R2(config-if)#exit
```

Configurar Router ID R3

```
R3>en
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 192.31.23.0 0.0.0.3 area 0
01:03:57: %OSPF-5-ADJCHG: Process 1, Nbr 5.5.5.5 on Serial0/0/1 from LOADING to
FULL, Loading Done
```

```
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)#interface serial0/0/1
R3(config-if)#bandwidth 256
R3(config-if)#exit
```

Verificar información de OSPF

- Visualizar tablas de enrutamiento y routers conectados por OSPFv2
- Visualizar lista resumida de interfaces por OSPF en donde se ilustre el costo de cada interface
- Visualizar el OSPF Process ID, Router ID, Address summarizations, Routing Networks, and passive interfaces configuradas en cada router.

```

R2
Physical Config CLI
IOS Command Line Interface

Press RETURN to get started.

Acceso no Autorizado
User Access Verification
Password:
R2>en
Password:
R2#show ip ospf neighbor

Neighbor ID      Pri   State           Dead Time   Address         Interface
3.3.3.3          0     FULL/ -         00:00:37   172.31.23.2    Serial0/0/0
1.1.1.1          0     FULL/ -         00:00:33   172.31.21.1    Serial0/0/1

```

Ilustración 42. Verificación de interfaces del R1

```

R2
Physical Config CLI
IOS Command Line Interface

Neighbor ID      Pri   State           Dead Time   Address         Interface
3.3.3.3          0     FULL/ -         00:00:37   172.31.23.2    Serial0/0/0
1.1.1.1          0     FULL/ -         00:00:33   172.31.21.1    Serial0/0/1

R2#show ip ospf interface

Serial0/0/1 is up, line protocol is up
 Internet address is 172.31.21.2/30, Area 0
 Process ID 1, Router ID 2.2.2.2, Network Type POINT-TO-POINT, Cost: 781
 Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
 No designated router on this network
 No backup designated router on this network
 Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
 Hello due in 00:00:00
 Index 1/1, flood queue length 0
 Next 0x0(0)/0x0(0)
 Last flood scan length is 1, maximum is 1
 Last flood scan time is 0 msec, maximum is 0 msec
 Neighbor Count is 1 , Adjacent neighbor count is 1
   Adjacent with neighbor 1.1.1.1
 Suppress hello for 0 neighbor(s)
Serial0/0/0 is up, line protocol is up
 Internet address is 172.31.23.1/30, Area 0
 Process ID 1, Router ID 2.2.2.2, Network Type POINT-TO-POINT, Cost: 781
 Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
 No designated router on this network
 No backup designated router on this network
--More--

```

Ilustración 43. Verificación de interfaces del R2

```

R2
Physical Config CLI
IOS Command Line Interface
NO HELLO (Passive Interface)
Index 3/3, 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 0, Adjacent neighbor count is 0
Suppress hello for 0 neighbor(s)
R2#
R2#show ip protocols

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 2.2.2.2
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    172.31.21.0 0.0.0.3 area 0
    172.31.23.0 0.0.0.3 area 0
    10.10.10.0 0.0.0.255 area 0
  Passive Interface(s):
    GigabitEthernet0/1
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1          110          00:12:14
    2.2.2.2          110          00:11:17
    3.3.3.3          110          00:11:49
  Distance: (default is 110)
R2#

```

Ilustración 44. Verificación de EIGRP con IPv4 en R2

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

□ Configurar S1

```

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-line)#exit
S1(config)#interface vlan 200
S1(config-if)#
%LINK-5-CHANGED: Interface Vlan200, changed state to up
S1(config-vlan)#exit
S1(config)#interface vlan 200
S1(config-if)#
%LINK-5-CHANGED: Interface Vlan200, changed state to up

```

```
S1(config-if)#ip add 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)#
S1(config)#interface 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)#interface f0/24
S1(config-if)#switchport mode trunk
S1(config-if)#switchport trunk native vlan 1
S1(config)#interface range
S1(config-if-range)#exit
S1(config)#interface fa0/1
S1(config-if)# switchport mode access
S1(config-if)# switchport access vlan 30
```

4. En el Switch 3 deshabilitar DNS lookup

```
S3(config)#
S3(config)#no ip domain-lookup
```

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

SWITCH 1

```
S1(config-if)#int vlan 200
S1(config-if)#ip add 192.168.99.2 255.255.255.0
S1(config-if)#no shut
S1(config-if)#exit
```

SWITCH 3

```
S3(config-if)#int vlan 200
S3(config-if)# ip add 192.168.99.3 255.255.255.0
S3(config-if)#no shut
S3(config-if)#exit
```

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

SWITCH 1

```
S1(config-if)#interface range fa0/2, fa0/4-23
```

```
S1(config-if-range)#shut
```

SWITCH 3

```
S3(config)#interface range fa0/2, fa0/4-24
```

```
S3(config-if-range)#shut
```

7. Implement DHCP and NAT for IPv4

```
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 nat inside source static 10.10.10.10 209.165.200.229
```

```
R2(config)#interface g0/0
```

```
R2(config-if)#ip nat outside
```

```
R2(config-if)#ip g0/1
```

```
R2(config-if)#interface g0/1
```

```
R2(config-if)#ip nat inside
```

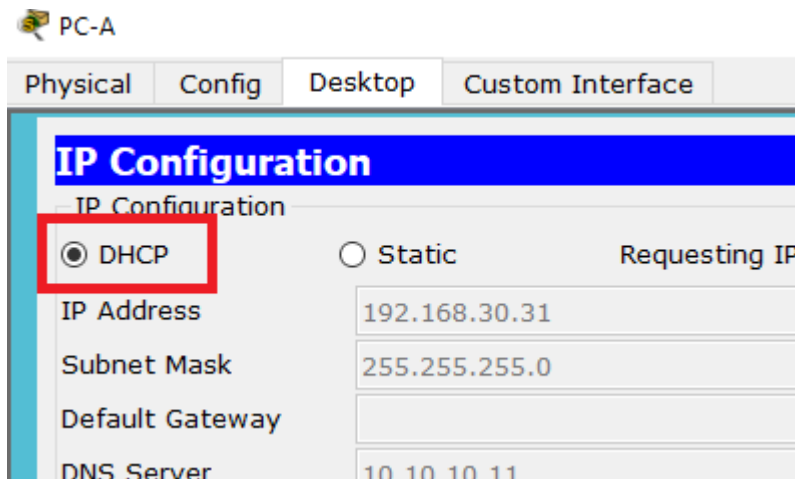


Ilustración 45. Configuración DHCP PC-A

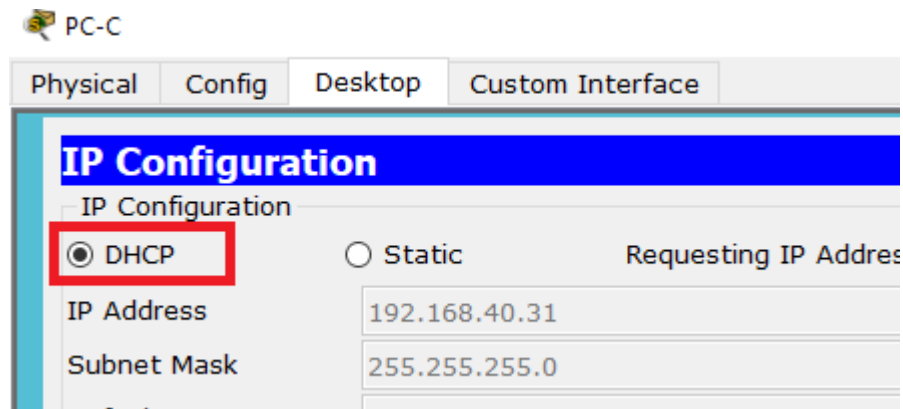


Ilustración 46. Configuración DHCP PC-C

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

```
R1>en
Password:
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 Administracion
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 Mercadeo
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
```

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

Tabla 3. Direcciones IP de las VLAN 30 y 40

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-

□ **Ingresamos al R1**

```
Router>en
Router#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 ADMINISTRACION
R1(dhcp-config)#ip dhcp pool 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 MERCADEO
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
R1(dhcp-config)#
```

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

```
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 nat inside source static 10.10.10.10 209.165.200.229
R2(config)#interface g0/0
R2(config-if)#ip nat outside
R2(config-if)#interface g0/1
R2(config-if)#ip nat inside
R2(config-if)#
```

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#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)#access-list 1 permit 192.168.4.0 0.0.0.255
```

```

R2(config)#access-list 1 permit 192.168.4.0 0.0.3.255
R2(config)#ip nat pool INTERNET 209.165.200.225 200.165.200.228 netmask
255.255.255.148
%Pool INTERNET mask 255.255.255.148 too small; should be at least 0.0.0.0
%Start and end addresses on different subnets
R2(config)#ip nat pool INTERNET 209.165.200.225 200.165.200.228 netmask
255.255.255.248
%Pool INTERNET mask 255.255.255.248 too small; should be at least 0.0.0.0
%Start and end addresses on different subnets
R2(config)#no ip nat pool INTERNET 209.165.200.225 200.165.200.228 netmask
255.255.255.148
R2(config)#ip nat pool INTERNET 209.165.200.225 200.165.200.228 netmask
255.255.255.248
%Pool INTERNET mask 255.255.255.248 too small; should be at least 0.0.0.0
%Start and end addresses on different subnets
R2(config)#ip access-list standard ADMIN123
R2(config-std-nacl)#permit host 172.31.21.1

```

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

```

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)#access-list 1 permit 192.168.4.0 0.0.0.255
R2(config)#access-list 1 permit 192.168.4.0 0.0.3.255
R2(config)#ip nat pool INTERNET 209.168.200.225 200.165.200.228 netmask
255.255.255.148
%Pool INTERNET mask 255.255.255.148 too small; should be at least 0.0.0.0
%Start and end addresses on different subnets
R2(config)#ip nat pool INTERNET 209.168.200.225 200.165.200.228 netmask
255.255.255.248
%Pool INTERNET mask 255.255.255.248 too small; should be at least 0.0.0.0
%Start and end addresses on different subnets
R2(config)#no ip nat pool INTERNET 209.165.200.225 200.165.200.228 netmask
255.255.255.148
R2(config)#no ip nat pool INTERNET 209.165.200.225 200.165.200.228 netmask
255.255.255.148
%Pool INTERNET not found
R2(config)#ip access-list standard ADMIN123

```

```
R2(config-std-nacl)#permit host 172.31.21.1
R2(config-std-nacl)#exit
R2(config)#access-list 101 permit tcp any host 209.168.200.229 eq www
R2(config)#
```

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

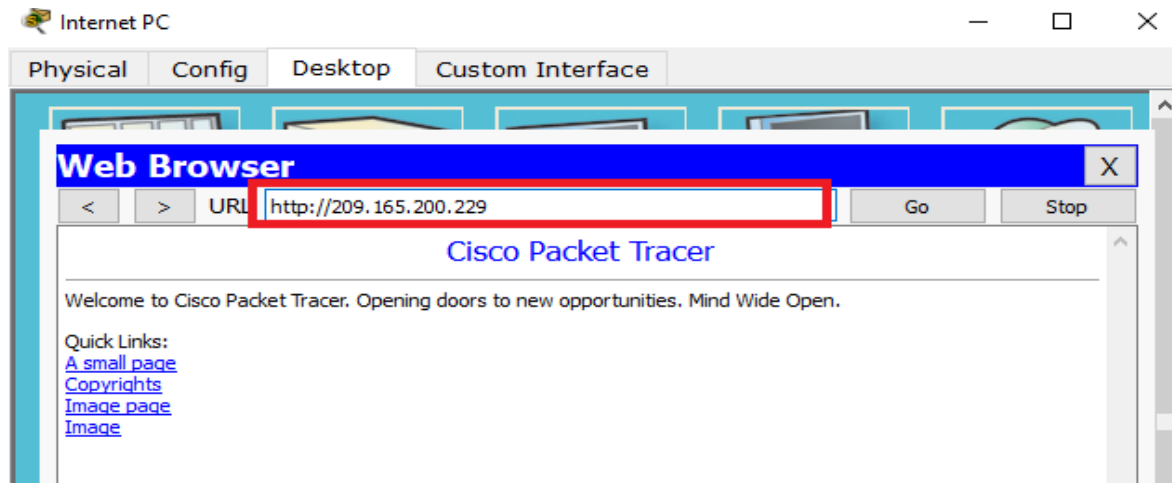


Ilustración 47. Verificación de conectividad en Internet PC

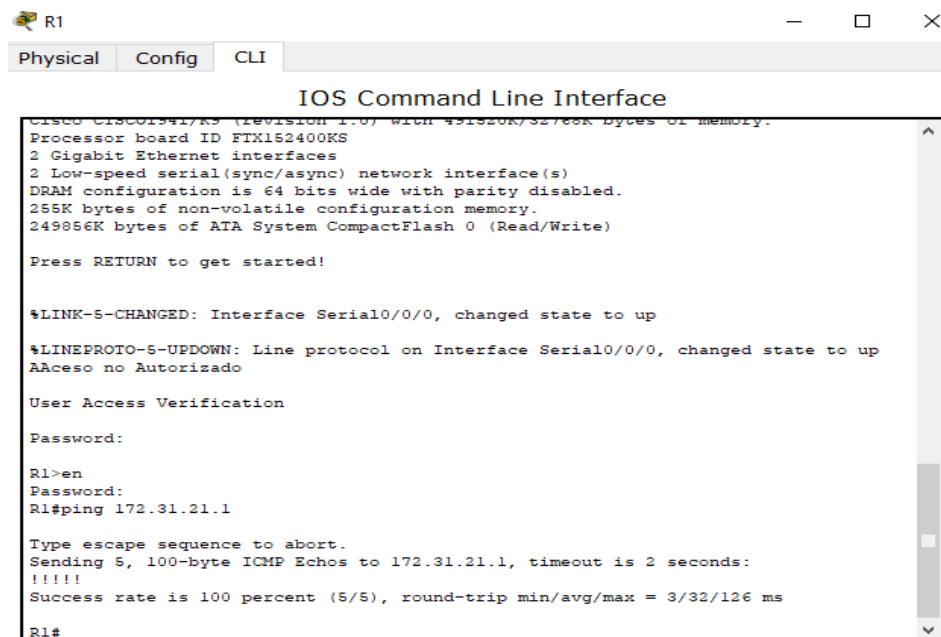


Ilustración 48. Ping de R1 al R2

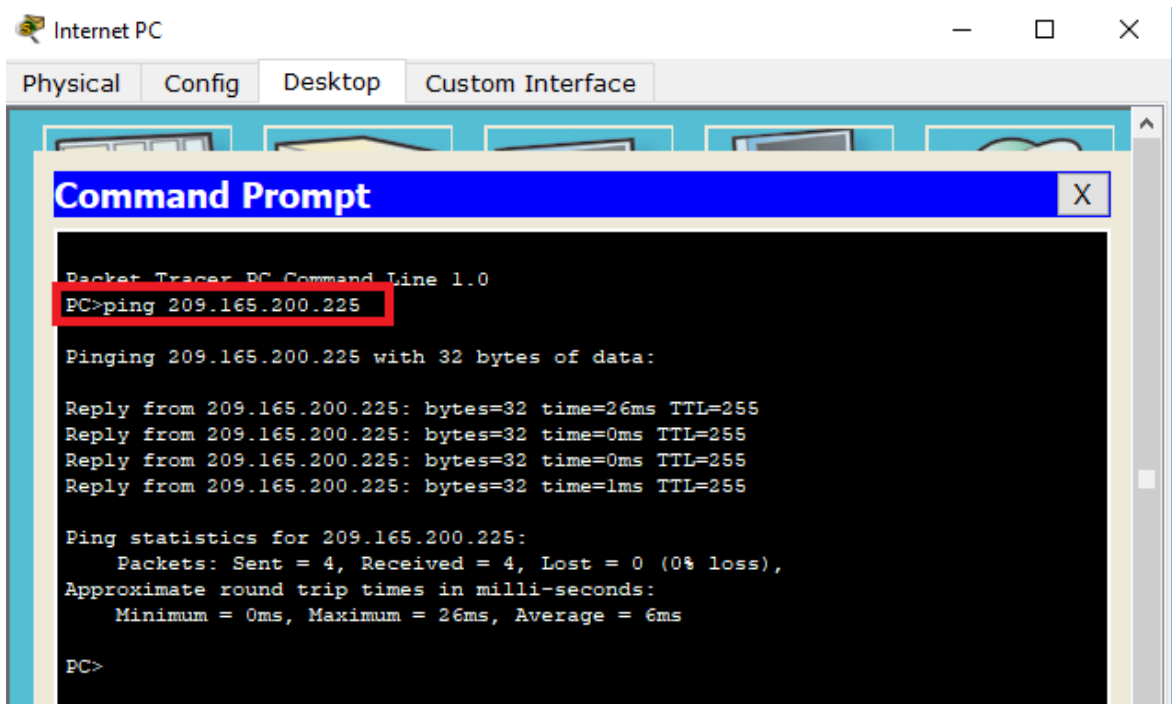


Ilustración 49. Ping de Internet PC a R2

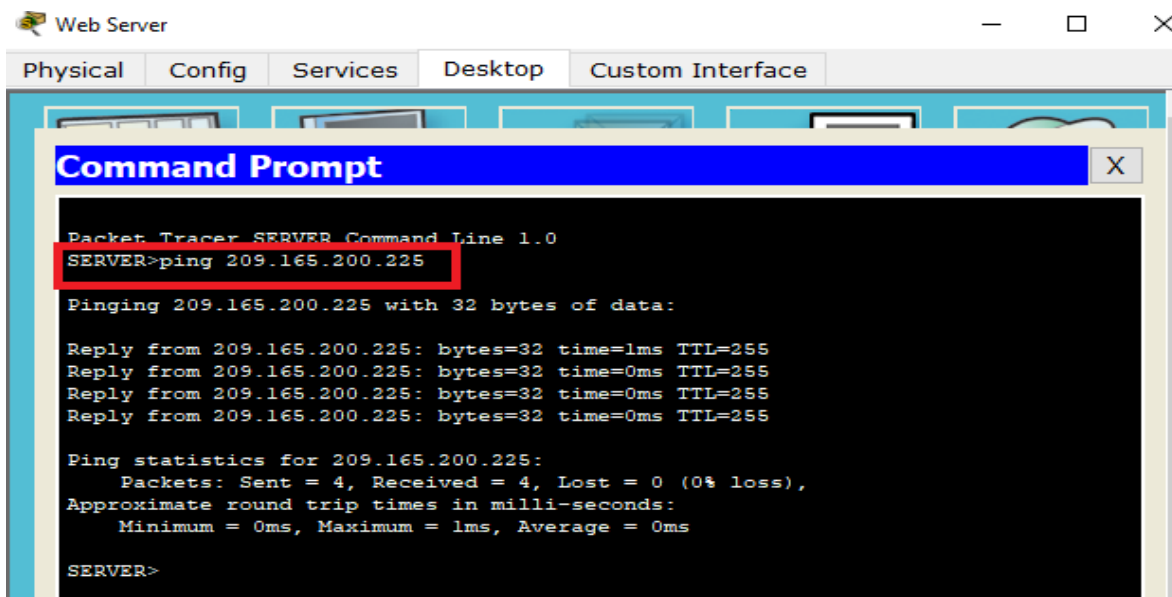


Ilustración 50. Ping de Web Server a R2

```
R1
Physical Config CLI
IOS Command Line Interface

Acceso no Autorizado
User Access Verification
Password:
R1>en
Password:
R1#ping 192.168.30.31

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.30.31, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

R1#
R1#ping 192.168.40.31

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.40.31, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

R1#
```

Ilustración 51. Ping de R1 al S1

Ping de R1 a Internet PC

```
R1
Physical Config CLI
IOS Command Line Interface

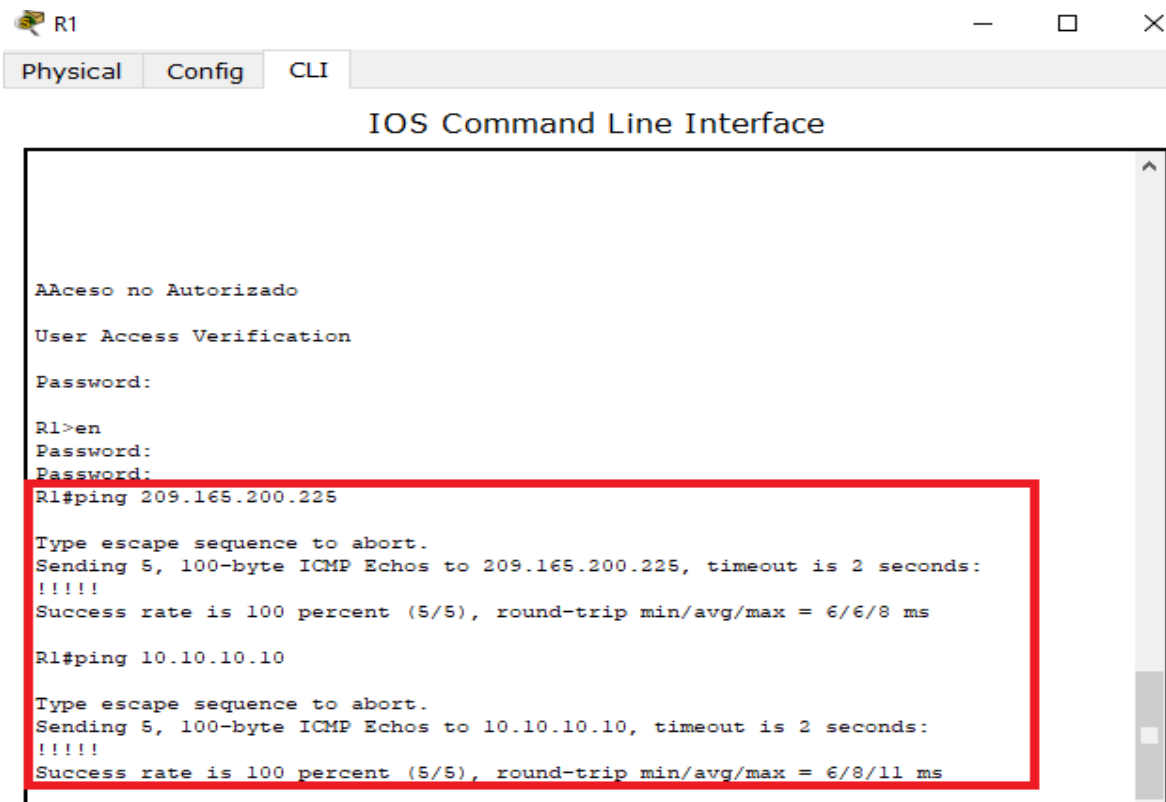
Press RETURN to get started.

AAcceso no Autorizado
User Access Verification
Password:
R1>en
Password:
R1#ping 209.165.200.225

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.200.225, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 6/6/8 ms
```

Ilustración 52. Ping de R1 Internet PC

Ping de R1 a Web server

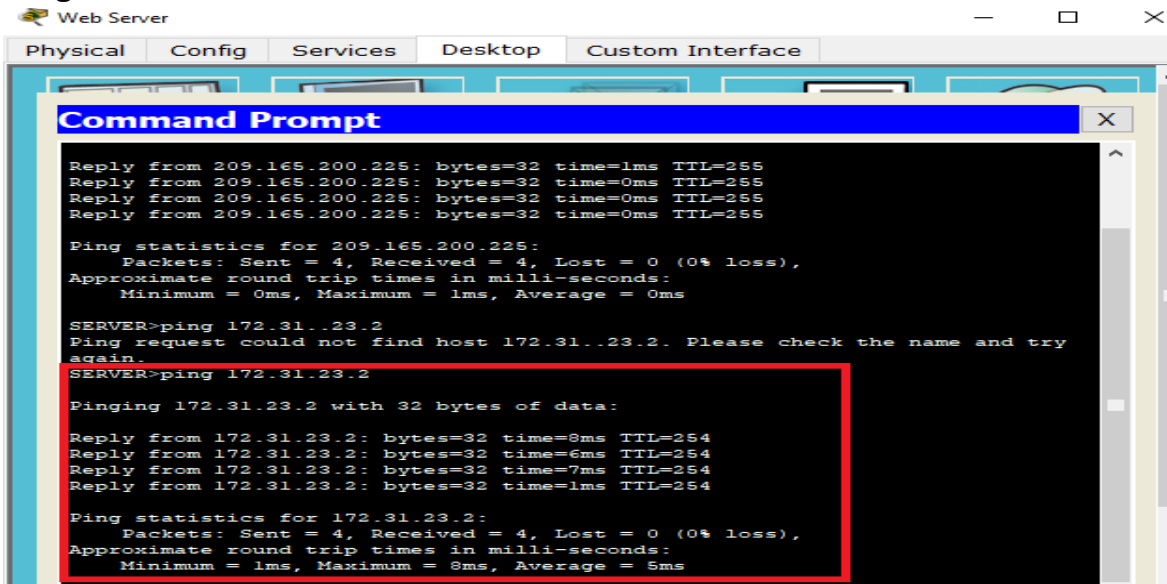


The screenshot shows the CLI interface of a device named R1. The tabs at the top are Physical, Config, and CLI. The main window displays the following text:

```
AAceso no Autorizado
User Access Verification
Password:
R1>en
Password:
Password:
R1#ping 209.165.200.225
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.200.225, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 6/6/8 ms
R1#ping 10.10.10.10
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.10.10.10, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 6/8/11 ms
```

Ilustración 53. Ping de R1 a Web Server

Ping de Web Server a R3



The screenshot shows the Command Prompt window of a device named Web Server. The tabs at the top are Physical, Config, Services, Desktop, and Custom Interface. The main window displays the following text:

```
Reply from 209.165.200.225: bytes=32 time=1ms TTL=255
Reply from 209.165.200.225: bytes=32 time=0ms TTL=255
Reply from 209.165.200.225: bytes=32 time=0ms TTL=255
Reply from 209.165.200.225: bytes=32 time=0ms TTL=255
Ping statistics for 209.165.200.225:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
SERVER>ping 172.31.23.2
Ping request could not find host 172.31.23.2. Please check the name and try
again.
SERVER>ping 172.31.23.2
Pinging 172.31.23.2 with 32 bytes of data:
Reply from 172.31.23.2: bytes=32 time=8ms TTL=254
Reply from 172.31.23.2: bytes=32 time=6ms TTL=254
Reply from 172.31.23.2: bytes=32 time=7ms TTL=254
Reply from 172.31.23.2: bytes=32 time=1ms TTL=254
Ping statistics for 172.31.23.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 8ms, Average = 5ms
```

Ilustración 54. Ping de Web Server a R3

Ping de Web Server a R1

The diagram illustrates a network topology with three routers: R1 (Bogotá), R2 (Miami), and R3 (Buenos Aires). R1 is connected to PC-A and PC-C. R2 is connected to an Internet PC and a Web Server. R3 is connected to PC-C. A red path highlights the connection from the Web Server to R2, then to R1, and finally to PC-A. The command prompt shows the following output:

```
Web Server
Physical Config Services Desktop Custom Interface

Command Prompt

Pinging 172.168.31.21 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 172.168.31.21:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

SERVER>ping 172.168.31.21.1
Ping request could not find host 172.168.31.21.1. Please check the name and try again.
SERVER>ping 172.31.21.1

Pinging 172.31.21.1 with 32 bytes of data:
Reply from 172.31.21.1: bytes=32 time=1ms TTL=254
Reply from 172.31.21.1: bytes=32 time=8ms TTL=254
Reply from 172.31.21.1: bytes=32 time=5ms TTL=254
Reply from 172.31.21.1: bytes=32 time=1ms TTL=254

Ping statistics for 172.31.21.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 8ms, Average = 3ms
```

Ilustración 55. Ping de Web Server a R1

CONCLUSIONES

- Los conocimientos adquiridos en base a los contenidos vistos en el curso Diplomado de Profundización Cisco CCNA, permiten tener entendimiento y habilidad en codificación necesaria al momento de programar dispositivos en Red, protocolos adecuados al momento de configurar una Red y brindarle seguridad expuesta a factores que la vulneren ante cualquier ataque, se hace extenso el conocimiento de uso de las herramientas como packet tracer y otros softwares muy útiles en el mercado.
- El protocolo DHCP ahorra 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.
- El diplomado CCNA fue muy importante, dado que este permitio acceder a conocimiento sobre la introducción a las redes y enrutamiento, el uso de Packet Tracer nos permite simular la red de forma real, muy práctico y fácil de usar.

REFERENCIAS BIBLIOGRÁFICAS

CISCO. (s.f.). Principios básicos de routing y switching: Listas de Control de Acceso. (2017), Tomado de:
<https://staticcourseassets.s3.amazonaws.com/RSE503/es/index.html#9.0.1>

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

Cisco Networking Academy - CP CCAN1 I-2019. (S.F). Introduction to Networks. Recuperado de: <https://static-course-assets.s3.amazonaws.com/ITN51/es/index.html>

Cisco Networking Academy - CP CCAN2 I-2019. (S.F). Routing and Switching. Recuperado de: <https://1314297.netacad.com/courses/821609/modules>