PRUEBA DE HABILIDADES PRÁCTICAS CCNA

ESCENARIOS 1 Y 2

CISCO

Por

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA

ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA

INGENIERIA DE SISTEMAS

BOGOTA

JUNIO DE 2019

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DIPLOMADO DE PROFUNDIZACIÓN CISCO COMO OPCIÓN DE GRADO EN INGENIERÍA DE SISTEMAS

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PROGRAMA DE INGENIERIA DE SISTEMAS

BOGOTA,

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NOTA DE ACEPTACION

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Agradezco a Dios por bendecirnos la vida, por guiarnos a lo largo de nuestra existencia, ser el apoyo y fortaleza en aquellos momentos de dificultad y de debilidad.

El presente trabajo está dedicado a mi familia por haber sido mi apoyo a lo largo de toda mi carrera universitaria y a lo largo de mi vida. A todas las personas especiales que me acompañaron en esta etapa, aportando a mi formación tanto profesional y como ser humano.

TABLA DE CONTENIDO

1. INTRODUCCION 12

2. OBJETIVOS 13

3. ESCENARIO 1 14

4. ESCENARIO 2 50

5. CONCLUSIONES 72

6. REFERENCIAS 73

LISTA DE TABLAS

Pág

Tabla 1. Interfaces 32

Tabla 2. OSPFv2 area 0 56

Tabla 3. configuración DHCP.....69

LISTA DE FIGURAS

Pág

Figura 1: Topología de red… 14

Figura 2: la topología de red escenario 1… 18

Figura 3: ping de Bogotá a Medellin2..... 22

Figura 4: ISP a BOGOTA..... 44

Figura 5: Ping de PC2 a ISP… 45

Figura 6: Ping de PC2 a ISP… 46

Figura 7: Ping de PC2 a PC0.....46

Figura 8: verificar conectividad 48

Figura 9: escenario 2…..... 50

Figura 10: topología red escenario… 51

Figura 11: Ping R1 a R2.....69

Figura 12: Ping R3 a R2.....70

Figura 13: Ping R2 a R1.....70

Figura 14: Ping WebServer a puerta de enlace… 70

Figura 15: Ping PCA VLAN 30 a PCC VLAN 40…..... 71

Figura 16: Ping PCC VLAN 40 a PCA VLAN 30 71

RESUMEN

En el actual trabajo se vincula la estructura, arquitectura, funciones, componentes, y diferentes modelos de internet y diferentes computadoras. Se analizan distintos escenarios, donde se desarrollan dos ejercicios conforme su conceptualización medios y operaciones de Ethernet son introducidos para brindarnos una base para la realización del plan de funciones.

Durante este proceso nos instruimos, practicamos y aprendemos, tambien entendemos diferentes aspectos como que el ancho de banda debe ser el mas conveniente para por ejemplo sostener una conversación telefónica PC a PC a través de Internet con una excelente calidad.

Tenemos en cuenta las exigencias de la empresa de tecnología que tiene 3 sucursales distribuidas en las ciudades de Miami, Bogotá y Buenos Aires, y donde como estudiantes seremos administradores de la red, y tenemos que configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, de acuerdo a los lineamientos establecidos para el direccionamiento IP, protocolos de enrutamiento y todos los aspectos que forman parte de la topología de red. Todo esto es con el fin de practicar y aprender a construir redes LAN simples, elaborar configuraciones básicas para routers y switches, e implementar IP.

GLOSARIO

DHCP El protocolo de configuración dinámica de host es un protocolo de red de tipo cliente/servidor mediante el cual un servidor DHCP asigna dinámicamente una dirección IP y otros parámetros de configuración de red a cada dispositivo en una red para que puedan comunicarse con otras redes IP[2]

ADSL Es una tecnología de acceso a Internet de banda ancha, lo que implica una velocidad superior a una conexión por módem en la transferencia de datos, ya que el módem utiliza la banda de voz y por tanto impide el servicio de voz mientras se use y viceversa.[1]

ETHERNET Es un estándar de redes de área local para computadores, por sus siglas en español Acceso Múltiple con Escucha de Portadora y Detección de Colisiones.[3]

IP Es un número que identifica, de manera lógica y jerárquica, a una Interfaz en red de un dispositivo que utilice el protocolo IP o, que corresponde al nivel de red del modelo TCP/IP[4]

IPV Es una versión del Internet Protocol, definida en el RFC 2460 y diseñada para reemplazar a Internet Protocol version 4 RFC 791, que a 2016 se está implementando en la gran mayoría de dispositivos que acceden a Internet[5]

LAN Es una red de computadoras que abarca un área reducida a una casa, un departamento o un edificio. La topología de red define la estructura de una red. Una

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1 (WIKIPEDIA)
2 (WIKIPEDIA)
3 (WIKIPEDIA)
4 (WIKIPEDIA)
5 (Masadelante.com)

parte de la definición topológica es la topología física, que es la disposición real de los cables o medios.[6]

OSPFV2 Es un protocolo de red para encaminamiento jerárquico de pasarela interior o Interior Gateway Protocol, que usa el algoritmo Dijkstra, para calcular la ruta más corta entre dos nodos[6]

ROUTER Es un dispositivo que proporciona conectividad a nivel de red[7]

SERVIDOR Es una aplicación en ejecución capaz de atender las peticiones de un cliente y devolverle una respuesta en concordancia[8]

SWITCH "Es un dispositivo de interconexión utilizado para conectar equipos en red formando lo que se conoce como una red de área local (LAN) y cuyas especificaciones técnicas siguen el estándar conocido como Ethernet Una red de área local inalámbrica, también conocida como WLAN (del inglés wireless local area network), es un sistema de comunicación inalámbrico para minimizar las conexiones cableadas.[9]

VLAN acrónimo de virtual LAN, es un método para crear redes lógicas independientes dentro de una misma red física. Varias VLAN pueden coexistir en un único conmutador físico o en una única red física[10]

WLAN"Una red de área local inalámbrica, también conocida como WLAN (del inglés wireless local area network), es un sistema de comunicación inalámbrico para minimizar las conexiones cableadas.[10]

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[6] (Cisco Network)
[7] (Kurose, 2008)
[8] (WIKIPEDIA)
[9] (Gonzales J, 2013)
[10] (Wikipedia)

1. INTRODUCCION

Como podemos analizar el Internet se llama a menudo la "red de redes", ya que no solo conecta ordenadores individuales sino también redes de computadoras entre sí. De esta manera, internet pone en contacto redes más pequeñas y amplía su alcance hasta convertirse en una auténtica red global.[11]

Este mundo globalizado ha estado en constante evolución al punto que se hace necesario el estar conectados, todo se mueve por medio de la tecnología de la información. Hoy dia cada vez que un dispositivo accede a Internet, se le asigna una dirección IP numérica única.

Para enviar datos de una computadora a otra a través de la web, se debe transferir un paquete de datos a través de la red que contiene las direcciones IP de ambos dispositivos. Sin direcciones IP, las computadoras no podrían lograr comunicarse y enviarse datos entre ellas. Es fundamental para la infraestructura de la web. Desde los diferentes escenarios de direccionamiento Ipv4 e Ipv6; agregando el sistema ADSL que se basa en la transmisión de datos digitales apoyada en el cable de pares simétricos de cobre que lleva la línea telefónica convencional o línea de abonado (Red Telefónica Conmutada, PSTN), todo esto siempre y cuando la longitud de línea sea de hasta inclusive 10 km medidos desde la central telefónica, o no exista otros servicios por el mismo cable que puedan interferir.

11 (APSER IT, 2017)

2. OBJETIVOS

2.1 GENERALES

Reconocer el grado de desarrollo de competencias y habilidades que se adquirieron a lo largo del diplomado. Lo mas importante es poner a prueba los niveles de comprensión y resolución de problemas relacionados con distintos aspectos de Networking.

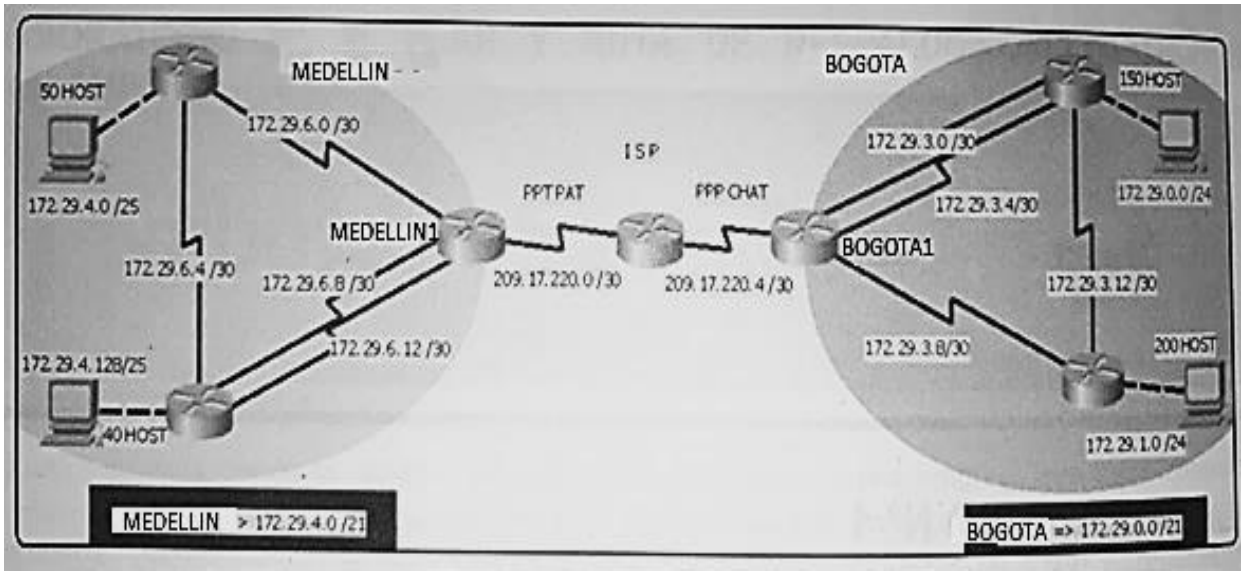
2.2 ESPECIFICOS

- Comprender el manejo de la herramienta Cisco Packet Tracer.
- Diseñar las topologías de los casos de estudio CCNA1 Y CCNA2 utilizando PKT.
- Definir la cantidad de Host y subredes de una red.
- Enlazar y conectar dispositivos y desarrollar un esquema de direccionamiento y prueba.
- Conectar y configurar redes utilizando los comandos IOS de Cisco para Routers y Switches.
- Identificar los protocolos de rutas estáticas, de enrutamiento dinámico y de enrutamiento IP.
- Determinar la mejor ruta de un Router

3. 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

Figura 1: Topologia de red escenario 1



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

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

Desarrollo
Como trabajo inicial se debe realizar lo siguiente.

- Realizar las rutinas de diagnóstico y dejar los equipos listos para su configuración (asignar nombres de equipos, asignar claves de seguridad, etc).

BOGOTA1

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

BOGOTA 2

```
Router>EN
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#service password-encryption
Router(config)#enable secret class
Router(config)#banner motd %acceso restringiodo%
Router(config)#ip domain-name cisco.com
Router(config)#line console 0
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#line vty 0 15
Router(config-line)#password class
Router(config-line)#login
Router(config-line)#hostname BOGOTA2
```

BOGOTA 3

```
Router>EN
```

```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#service password-encryption
Router(config)#enable secret class
Router(config)#banner motd %acceso restringiodo%
Router(config)#ip domain-name cisco.com
Router(config)#line console 0
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#line vty 0 15
Router(config-line)#password class
Router(config-line)#login
Router(config-line)#hostname BOGOTA3
```

MEDELLIN1

```
MEDELLIN>
MEDELLIN>ENAB
MEDELLIN#config t
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN(config)#no ip domain-lookup
MEDELLIN(config)#service password-encryption
MEDELLIN(config)#enable secret class
MEDELLIN(config)#banner motd %acceso restringiodo%
MEDELLIN(config)#ip domain-name cisco.com
MEDELLIN(config)#line console 0
MEDELLIN(config-line)#password cisco
MEDELLIN(config-line)#login
MEDELLIN(config-line)#line vty 0 15
MEDELLIN(config-line)#password class
MEDELLIN(config-line)#login
MEDELLIN(config-line)#end
MEDELLIN#
```

MEDELLIN 2

```
Router>EN
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#service password-encryption
```

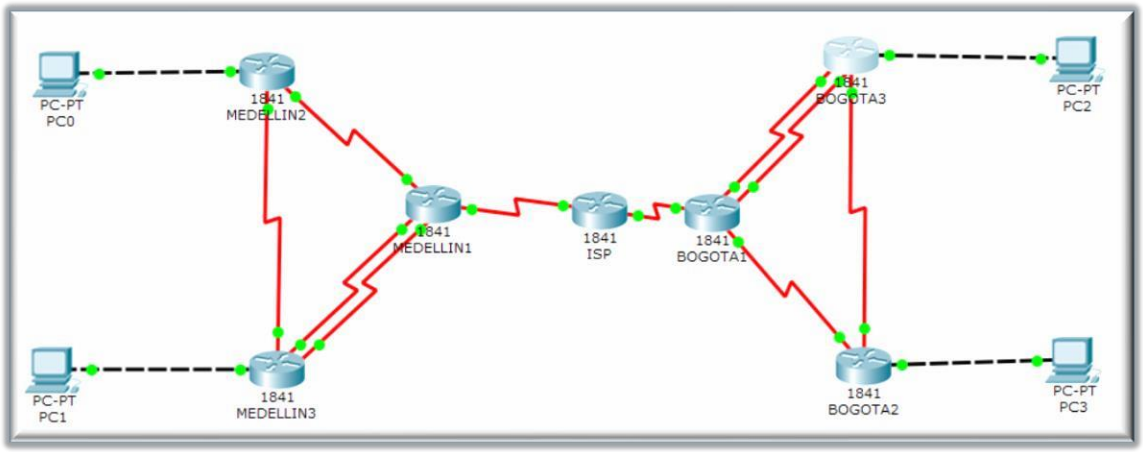
Router(config)#enable secret class
Router(config)#banner motd %acceso restringiodo%
Router(config)#ip domain-name cisco.com
Router(config)#line console 0
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#line vty 0 15
Router(config-line)#password class
Router(config-line)#login
Router(config-line)#exit
Router(config)#hostname MEDELLIN2
MEDELLIN2(config)#

MEDELLIN 3

Router>
Router>EN
Router#CONFIG
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#service password-encryption
Router(config)#enable secret class
Router(config)#banner motd %acceso restringiodo%
Router(config)#ip domain-name cisco.com
Router(config)#line console 0
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#line vty 0 15
Router(config-line)#password class
Router(config-line)#login
Router(config-line)#exit
Router(config)#hostname MEDELLIN3

- Realizar la conexión fisica de los equipos con base en la topología de red

Figura 2: la topología de red escenario 1



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.

MEDELLIN 1
Router>EN
Router#CONFIG T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#route rip
Router(config-router)#version 2
Router(config-router)#no auto-summary
Router(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
Router(config-router)#network 172.29.6.0
Router(config-router)#network 172.29.6.8
Router(config-router)#network 172.29.6.12
Router(config-router)#passive-interface s0/0/0
Router(config-router)#

MEDELLIN 2

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#route rip
Router(config-router)#version 2
Router(config-router)#no auto summary
Router(config-router)#do show ip route connected
C 172.29.4.0/25 is directly connected, FastEthernet0/0
C 172.29.6.0/30 is directly connected, Serial0/0/0
C 172.29.6.4/30 is directly connected, Serial0/0/1
Router(config-router)#network 172.29.4.0
Router(config-router)#network 172.29.6.0
Router(config-router)#network 172.29.6.4
Router(config-router)#passive-interface f0/0
Router(config-router)#
```

MEDELLIN 3

```
Router#enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#route rip
Router(config-router)#version 2
Router(config-router)#no auto-summary
Router(config-router)#do show ip route connected
C 172.29.4.128/25 is directly connected, FastEthernet0/0
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
Router(config-router)#network 172.29.4.128
Router(config-router)#network 172.29.6.4
Router(config-router)#network 172.29.6.8
Router(config-router)#network 172.29.6.12
Router(config-router)#passive-interface f0/0
```

BOGOTA 1

```
Router>EN
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#route rip
Router(config-router)#version 2
```

Router(config-router)#no auto summary
Router(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
Router(config-router)#network 172.29.3.0
Router(config-router)#network 172.29.3.4
Router(config-router)#network 172.29.3.8
Router(config-router)#passive-interface s0/0/0
Router(config-router)#
Router#

BOGOTA 2
Router#en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#route rip
Router(config-router)#version 2
Router(config-router)#no auto-summary
Router(config-router)#do show ip route connected
C 172.29.1.0/24 is directly connected, FastEthernet0/0
C 172.29.3.8/30 is directly connected, Serial0/0/0
C 172.29.3.12/30 is directly connected, Serial0/0/1
Router(config-router)#network 172.29.1.0
Router(config-router)#network 172.29.3.8
Router(config-router)#network 172.29.3.12
Router(config-router)#passive-interface f0/0

BOGOTA 3
Router(config-if)#route rip
Router(config-router)#version 2
Router(config-router)#no auto-summary
Router(config-router)#do show ip route connected
C 172.29.0.0/24 is directly connected, FastEthernet0/0
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
Router(config-router)#network 172.29.0.0
Router(config-router)#network 172.29.3.0
Router(config-router)#network 172.29.3.4
Router(config-router)#passive-interface f0/0
Router(config-router)#

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

MEDELLIN1

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

- Se verifica en medellin 2

```
R* 0.0.0.0/0 [120/1] via 172.29.6.1, 00:00:16, Serial0/0/0
```

BOGOTA 1

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

- Se verifica en Bogota 2

```
R* 0.0.0.0/0 [120/1] via 172.29.3.9, 00:00:07, Serial0/0/0
```

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

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

Se verifica con un ping de Bogota a Medellin2

Figura 3: ping de Bogotá a Medellin2

```
BOGOTA#ping 172.29.6.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.29.6.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/15/34 ms

BOGOTA#
```

Parte 2: Tabla de Enrutamiento.
a. Verificar la tabla de enrutamiento en cada uno de los routers para comprobar las redes y sus rutas.

ISP
Router>en
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip address 209.17.220.1 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
Router(config-if)#
Router(config-if)#int s0/0/1
Router(config-if)#ip address 209.17.220.5 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shut down
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Router(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

MEDELLIN 1

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip address 209.17.220.2 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
Router(config-if)#int s0/0/1
Router(config-if)#ip address 172.29.6.1 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Router(config-if)#int s0/1/0
Router(config-if)#ip address 172.29.6.9 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
Router(config-if)#int s0/1/1
Router(config-if)#ip address 172.29.6.13 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
Router(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
%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
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to up
```

MEDELLIN 2

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip address 172.29.6.2 255.255.255.252
Router(config-if)#no shut
Router(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
Router(config-if)#int s0/0/1
Router(config-if)#ip address 172.29.6.5 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Router(config-if)#int g0/0
%Invalid interface type and number
Router(config)#int f0/0
Router(config-if)#ip address 172.29.4.1 255.255.255.128
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state
to up
```

MEDELLIN 3

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip address 172.29.6.10 255.255.255.252
Router(config-if)#no shutdown
Router(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
Router(config-if)#int s0/0/1
Router(config-if)#ip address 172.29.6.14 255.255.255.252
```

```
Router(config-if)#no shutdown
Router(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

Router(config-if)#int s0/1/0
Router(config-if)#ip address 172.29.6.6 255.255.255.252
Router(config-if)#no shut
Router(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
Router(config-if)#int f0/0
Router(config-if)#ip address 172.29.4.129 255.255.255.128
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up
```

BOGOTA1

```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip address 209.17.220.6 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Router(config-if)#int s0
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up
Router(config-if)#int s0/0/1
Router(config-if)#ip address 172.29.3.9 255.255.255.252
Router(config-if)#clock rate
% Incomplete command.
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Router(config-if)#int s0/1/0
Router(config-if)#ip address 172.29.3.1 255.255.255.252
Router(config-if)#clock rate 4000000
```

```
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
Router(config-if)#int s0/1/1
Router(config-if)#ip address 172.29.3.5 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
Router(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
%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
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state
to up
```

BOGOTA 2

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip address 172.29.3.10 255.255.255.252
Router(config-if)#no sh
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Router(config-if)#int s0/0/
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up
Router(config-if)#int s0/0/1
Router(config-if)#ip address 172.29.3.13 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no sh
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Router(config-if)#int f0/0
Router(config-if)#ip address 172.29.1.1 255.255.255.0
Router(config-if)#no sh
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up
```

BOGOTA 3

```
Router>
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip address 172.29.3.2 255.255.255.252
Router(config-if)#no sh
Router(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
Router(config-if)#int s0/0/1
Router(config-if)#ip address 172.29.3.6 255.255.255.252
Router(config-if)#no sh
Router(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
Router(config-if)#int s0/1/0
Router(config-if)#ip address 172.29.3.14 255.255.255.252
Router(config-if)#no sh
Router(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
Router(config-if)#int f0/0
Router(config-if)#ip address 172.29.0.1 255.255.255.0
Router(config-if)#no sh
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up
```

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

```
R*   0.0.0.0/0 is possibly down, routing via 172.29.3.1, Serial0/0/0
                is possibly down, routing via 172.29.3.5, Serial0/0/1
```

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.

MEDELLIN 1

```
Router>EN
Router#CONFIG T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#route rip
Router(config-router)#version 2
Router(config-router)#no auto-summary
Router(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
Router(config-router)#network 172.29.6.0
Router(config-router)#network 172.29.6.8
Router(config-router)#network 172.29.6.12
Router(config-router)#passive-interface s0/0/0
Router(config-router)#
```

BOGOTA1

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

DIRECCIONAMIENTO

MEDELLIN 1

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip address 209.17.220.2 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up
Router(config-if)#int s0/0/1
Router(config-if)#ip address 172.29.6.1 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Router(config-if)#int s0/1/0
Router(config-if)#ip address 172.29.6.9 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
Router(config-if)#int s0/1/1
Router(config-if)#ip address 172.29.6.13 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
Router(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
%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
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state
to up
```

BOGOTA1

```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
```

Router(config-if)#ip address 209.17.220.6 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Router(config-if)#int s0
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
Router(config-if)#int s0/0/1
Router(config-if)#ip address 172.29.3.9 255.255.255.252
Router(config-if)#clock rate
% Incomplete command.
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Router(config-if)#int s0/1/0
Router(config-if)#ip address 172.29.3.1 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
Router(config-if)#int s0/1/1
Router(config-if)#ip address 172.29.3.5 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
Router(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
%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
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to up

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

MEDELLIN 2
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#route rip

```
Router(config-router)#version 2
Router(config-router)#no auto summary
Router(config-router)#do show ip route connected
C 172.29.4.0/25 is directly connected, FastEthernet0/0
C 172.29.6.0/30 is directly connected, Serial0/0/0
C 172.29.6.4/30 is directly connected, Serial0/0/1
Router(config-router)#network 172.29.4.0
Router(config-router)#network 172.29.6.0
Router(config-router)#network 172.29.6.4
Router(config-router)#passive-interface f0/0
Router(config-router)#
```

BOGOTA 2

```
Router#en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#route rip
Router(config-router)#version 2
Router(config-router)#no auto-summary
Router(config-router)#do show ip route connected
C 172.29.1.0/24 is directly connected, FastEthernet0/0
C 172.29.3.8/30 is directly connected, Serial0/0/0
C 172.29.3.12/30 is directly connected, Serial0/0/1
Router(config-router)#network 172.29.1.0
Router(config-router)#network 172.29.3.8
Router(config-router)#network 172.29.3.12
Router(config-router)#passive-interface f0/0
```

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

El balanceo de cargas son rutas redundantes, cuando hay mas de un camino

```
R* 0.0.0.0/0 is possibly down, routing via 172.29.3.1, Serial0/0/0
                is possibly down, routing via 172.29.3.5, Serial0/0/1
```

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

```
Router(config)#ip route 172.29.4.0 255.255.252.0 209.17.220.2
```

Router(config)#ip route 172.29.0.0 255.255.252.0 209.17.220.6

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.

Tabla 1. Interfaces

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

MEDELLIN 1

Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip address 209.17.220.2 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

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

MEDELLIN 2

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip address 172.29.6.2 255.255.255.252
Router(config-if)#no shut
Router(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
Router(config-if)#int s0/0/1
Router(config-if)#ip address 172.29.6.5 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
```

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Router(config-if)#int g0/0
%Invalid interface type and number
Router(config)#int f0/0
Router(config-if)#ip address 172.29.4.1 255.255.255.128
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

MEDELLIN 3

Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip address 172.29.6.10 255.255.255.252
Router(config-if)#no shutdown
Router(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
Router(config-if)#int s0/0/1
Router(config-if)#ip address 172.29.6.14 255.255.255.252
Router(config-if)#no shutdown
Router(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

Router(config-if)#int s0/1/0
Router(config-if)#ip address 172.29.6.6 255.255.255.252
Router(config-if)#no shut
Router(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
Router(config-if)#int f0/0
Router(config-if)#ip address 172.29.4.129 255.255.255.128

Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

BOGOTA1

Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip address 209.17.220.6 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Router(config-if)#int s0
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
Router(config-if)#int s0/0/1
Router(config-if)#ip address 172.29.3.9 255.255.255.252
Router(config-if)#clock rate
% Incomplete command.
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Router(config-if)#int s0/1/0
Router(config-if)#ip address 172.29.3.1 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
Router(config-if)#int s0/1/1
Router(config-if)#ip address 172.29.3.5 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
Router(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
%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
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up

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

BOGOTA 2

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip address 172.29.3.10 255.255.255.252
Router(config-if)#no sh
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Router(config-if)#int s0/0/
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
Router(config-if)#int s0/0/1
Router(config-if)#ip address 172.29.3.13 255.255.255.252
Router(config-if)#clock rate 4000000
Router(config-if)#no sh
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Router(config-if)#int f0/0
Router(config-if)#ip address 172.29.1.1 255.255.255.0
Router(config-if)#no sh
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
```

BOGOTA 3

```
Router>
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip address 172.29.3.2 255.255.255.252
Router(config-if)#no sh
Router(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
Router(config-if)#int s0/0/1
Router(config-if)#ip address 172.29.3.6 255.255.255.252
```

Router(config-if)#no sh
Router(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
Router(config-if)#int s0/1/0
Router(config-if)#ip address 172.29.3.14 255.255.255.252
Router(config-if)#no sh
Router(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
Router(config-if)#int f0/0
Router(config-if)#ip address 172.29.0.1 255.255.255.0
Router(config-if)#no sh
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

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.

MEDELLIN 1
Router(config-router)#passive-interface s0/0/0
Router(config)#route rip
Router(config-router)#version 2
MEDELLIN 2
Router(config-router)#passive-interface f0/0
Router(config)#route rip
Router(config-router)#version 2

MEDELLIN 3
Router(config-router)#passive-interface f0/0
Router(config)#route rip
Router(config-router)#version 2

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

Router(config)#route rip
Router(config-router)#version 2

BOGOTA 2
Router(config-router)#passive-interface f0/0
Router(config)#route rip
Router(config-router)#version 2

BOGOTA 3
Router(config-router)#passive-interface f0/0
Router(config)#route rip
Router(config-router)#version 2

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.

MEDELLIN 1
Router>enable
Router#show ip route
Codes: C - connected, S - static, I - IGRP, 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, 6 subnets, 2 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 172.29.6.14, 00:00:14, Serial0/1/1
[120/1] via 172.29.6.10, 00:00:14, Serial0/1/0
C 172.29.6.0/30 is directly connected, Serial0/0/1
R 172.29.6.4/30 [120/1] via 172.29.6.14, 00:00:14, Serial0/1/1
[120/1] via 172.29.6.10, 00:00:14, Serial0/1/0
[120/1] via 172.29.6.2, 00:00:19, 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
209.17.220.0/30 is subnetted, 1 subnets
C 209.17.220.0 is directly connected, Serial0/0/0

S* 0.0.0.0/0 [1/0] via 209.17.220.1

MEDELLIN 2

Router>enable
Router#show ip route
Codes: C - connected, S - static, I - IGRP, 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, 6 subnets, 2 masks
C 172.29.4.0/25 is directly connected, FastEthernet0/0
R 172.29.4.128/25 [120/1] via 172.29.6.6, 00:00:04, Serial0/0/1
C 172.29.6.0/30 is directly connected, Serial0/0/0
C 172.29.6.4/30 is directly connected, Serial0/0/1
R 172.29.6.8/30 [120/1] via 172.29.6.6, 00:00:04, Serial0/0/1
[120/1] via 172.29.6.1, 00:00:26, Serial0/0/0
R 172.29.6.12/30 [120/1] via 172.29.6.1, 00:00:26, Serial0/0/0
[120/1] via 172.29.6.6, 00:00:04, Serial0/0/1

MEDELLIN 3

Router>enable
Router#show ip route
Codes: C - connected, S - static, I - IGRP, 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, 6 subnets, 2 masks
R 172.29.4.0/25 [120/1] via 172.29.6.5, 00:00:07, Serial0/1/0
C 172.29.4.128/25 is directly connected, FastEthernet0/0
R 172.29.6.0/30 [120/1] via 172.29.6.5, 00:00:07, Serial0/1/0
[120/1] via 172.29.6.13, 00:00:24, Serial0/0/1

[120/1] via 172.29.6.9, 00:00:24, Serial0/0/0
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

BOGOTA 1
Router#show ip route
Codes: C - connected, S - static, I - IGRP, 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, 6 subnets, 2 masks
R 172.29.0.0/24 [120/1] via 172.29.3.2, 00:00:03, Serial0/1/0
[120/1] via 172.29.3.6, 00:00:04, Serial0/1/1
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
C 172.29.3.4/30 is directly connected, Serial0/1/1
C 172.29.3.8/30 is directly connected, Serial0/0/1
R 172.29.3.12/30 [120/1] via 172.29.3.6, 00:00:04, Serial0/1/1
[120/1] via 172.29.3.10, 00:00:09, Serial0/0/1
[120/1] via 172.29.3.2, 00:00:03, Serial0/1/0
209.17.220.0/30 is subnetted, 1 subnets
C 209.17.220.4 is directly connected, Serial0/0/0
S* 0.0.0.0/0 [1/0] via 209.17.220.5

BOGOTA 2
Router>enable
Router#show ip route
Codes: C - connected, S - static, I - IGRP, 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, 6 subnets, 2 masks
R 172.29.0.0/24 [120/1] via 172.29.3.14, 00:00:14, Serial0/0/1
C 172.29.1.0/24 is directly connected, FastEthernet0/0
R 172.29.3.0/30 [120/1] via 172.29.3.14, 00:00:14, Serial0/0/1
[120/1] via 172.29.3.9, 00:00:21, Serial0/0/0
R 172.29.3.4/30 [120/1] via 172.29.3.14, 00:00:14, Serial0/0/1
[120/1] via 172.29.3.9, 00:00:21, Serial0/0/0
C 172.29.3.8/30 is directly connected, Serial0/0/0
C 172.29.3.12/30 is directly connected, Serial0/0/1

BOGOTA 3

Router>
Router>enable
Router#show ip route
Codes: C - connected, S - static, I - IGRP, 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, 6 subnets, 2 masks
C 172.29.0.0/24 is directly connected, FastEthernet0/0
R 172.29.1.0/24 [120/1] via 172.29.3.13, 00:00:25, Serial0/1/0
C 172.29.3.0/30 is directly connected, Serial0/0/0
C 172.29.3.4/30 is directly connected, Serial0/0/1
R 172.29.3.8/30 [120/1] via 172.29.3.5, 00:00:22, Serial0/0/1
[120/1] via 172.29.3.13, 00:00:25, Serial0/1/0
[120/1] via 172.29.3.1, 00:00:22, Serial0/0/0
C 172.29.3.12/30 is directly connected, Serial0/1/0

Parte 5: Configurar encapsulamiento y autenticación PPP.
a. **Según la topología se requiere que el enlace Medellín1 con ISP sea configurado con autenticación PAT**.

Se configura en el ISP la serial 0/0/0 se cambia la encapsulación a PPP luego se autentica PAP

ISP

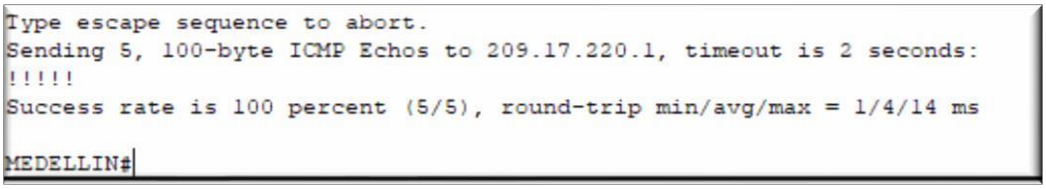
```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname ISP
ISP(config)#username MEDELLIN password acceso
ISP(config)#int s0/0/0
ISP(config-if)#encapsulation ppp
ISP(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, 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 acceso
ISP(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up
```

De igual forma en MEDELLIN

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

Se verifica por medio de ping de MEDELLIN a ISP



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

ISP
ISP>ENABLE
ISP#config t
Enter configuration commands, one per line. End with CNTL/Z.
ISP(config)#username BOGOTA password acceso
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)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

BOGOTA 1
Router> EN
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname BOGOTA
BOGOTA(config)#username ISP password acceso
BOGOTA(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to down
BOGOTA(config)#int s0/0/0
BOGOTA(config-if)#encapsulation ppp
BOGOTA(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

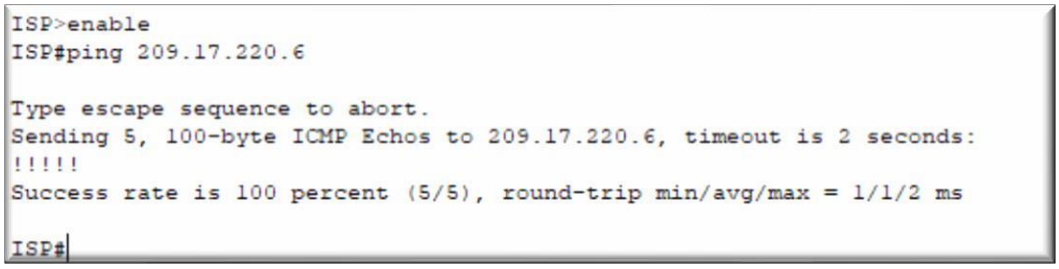
BOGOTA(config-if)#ppp authentication chap
BOGOTA(config-if)#

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

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

Se verifica con ping desde ISP a BOGOTA

Figura 4: ISP a BOGOTA



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.

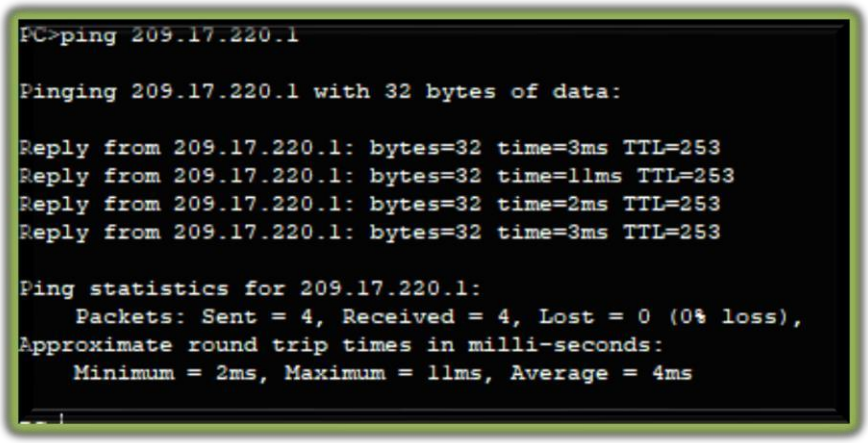
MEDELLIN 1
MEDELLIN>
MEDELLIN>EN
MEDELLIN#config t
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN(config)#ip nat inside source list 1 interface s0/0/0 overload
MEDELLIN(config)#access-list 1 permit 172.29.4.0 0.0.3.255
MEDELLIN(config)#int s0/0/0
MEDELLIN(config-if)#ip nat outside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

BOGOTA1

```
BOGOTA>en
BOGOTA#config t
Enter configuration commands, one per line. End with CNTL/Z.
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
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)#
```

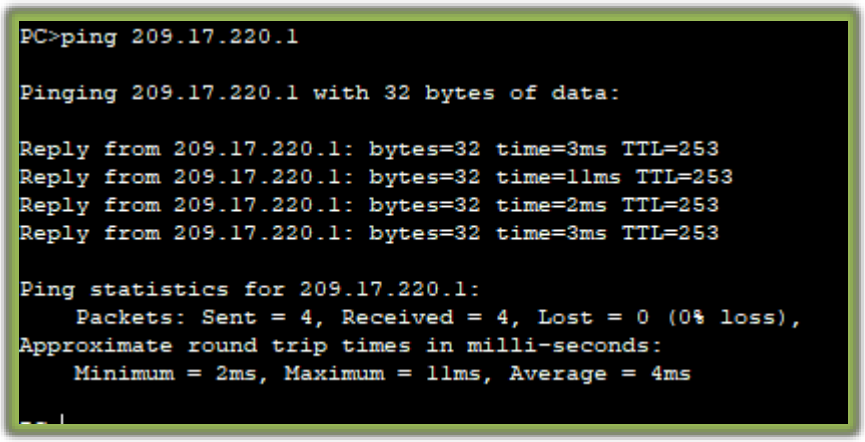
Ping de PC2 a ISP

Figura 5: Ping de PC2 a ISP



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.

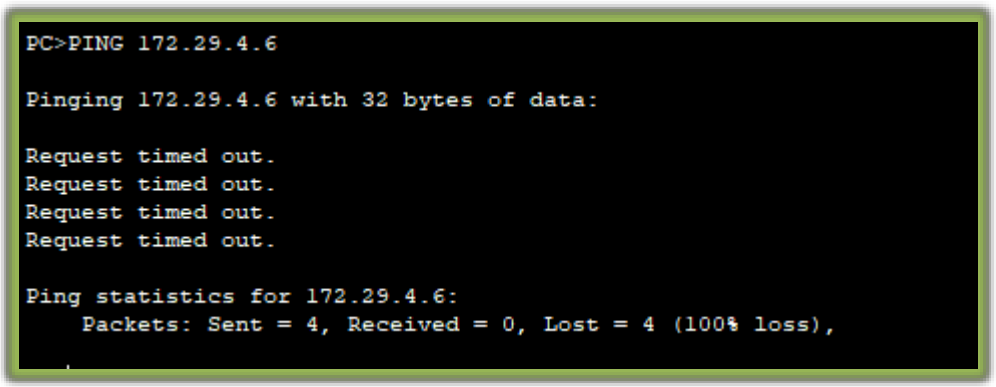
Figura 6: Ping de PC2 a ISP



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.

Ping de PC2 a PC0
Este ping falla debido a que se bloquea la traducción

Figura 7: Ping de PC2 a PC0



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.

MEDELLIN 2

```
Router>ENABLE
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip dhcp excluded-address 172.29.4.1 172.29.4.5
Router(config)#ip dhcp excluded-address 172.29.4.129 172.29.4.133
Router(config)#ip dhcp pool MEDELLIN2
Router(dhcp-config)#network 172.29.4.0 255.255.255.128
Router(dhcp-config)#default-router 172.29.4.1
Router(dhcp-config)#dns-server 8.8.8.8
Router(dhcp-config)#exit
Router(config)#ip dhcp pool MEDELLIN3
Router(dhcp-config)#network 172.29.4.128 255.255.255.128
Router(dhcp-config)#default-router 172.19.4.129
Router(dhcp-config)#dns-server 8.8.8.8
Router(dhcp-config)#exit
```

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

- Se configura medellin 3 para que el PC1 pueda conectarse con DHCP

```
Router>EN
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int f0/0
Router(config-if)#ip helper-address 172.29.6.5
Router(config-if)#
Router#
```

c. Configurar la red Bogotá2 y Bogotá3 donde el router Medellín2 debe ser el servidor DHCP para ambas redes Lan.

BOGOTA 2

```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip dhcp excluded-address 172.29.1.1 172.29.1.5
Router(config)#ip dhcp excluded-address 172.29.0.1 172.29.0.5
Router(config)#ip dhcp pool BOGOTA2
```

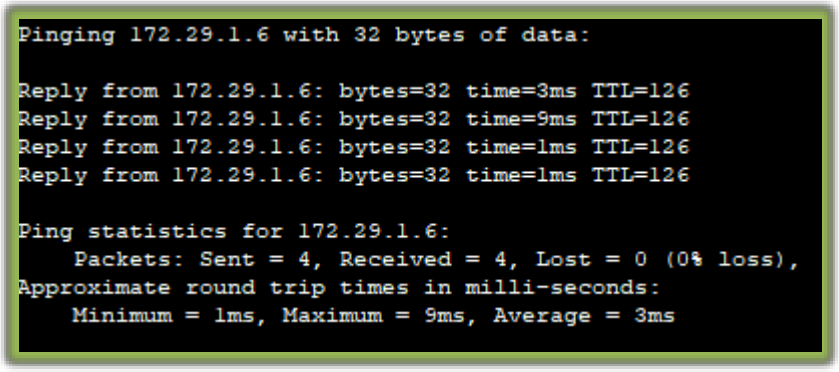
Router(dhcp-config)#network 172.29.1.0 255.255.255.0
Router(dhcp-config)#default-router 172.29.1.1
Router(dhcp-config)#dns-server 8.8.8.8
Router(dhcp-config)#ip dhcp pool BOGOTA3
Router(dhcp-config)#network 172.29.0.0 255.255.255.0
Router(dhcp-config)#default-router 172.29.0.1
Router(dhcp-config)#dns-server 8.8.8.8
Router(dhcp-config)#

BOGOTA3

Router>EN
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int f0/0
Router(config-if)#ip helper-address 172.29.3.13
Router(config-if)#
Router#

Se activa dhcp en PC2 y en el PC3 verificamos la conectividad

Figura 8: verificar conectividad



De PC2 a PC0

PC>PING 172.29.4.6

Pinging 172.29.4.6 with 32 bytes of data:

Reply from 172.29.4.6: bytes=32 time=19ms TTL=123
Reply from 172.29.4.6: bytes=32 time=13ms TTL=123

Reply from 172.29.4.6: bytes=32 time=12ms TTL=123
Reply from 172.29.4.6: bytes=32 time=12ms TTL=123

Ping statistics for 172.29.4.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 12ms, Maximum = 19ms, Average = 14ms

De PC2 a PC0

PC> ping 172.29.4.134

Pinging 172.29.4.134 with 32 bytes of data:

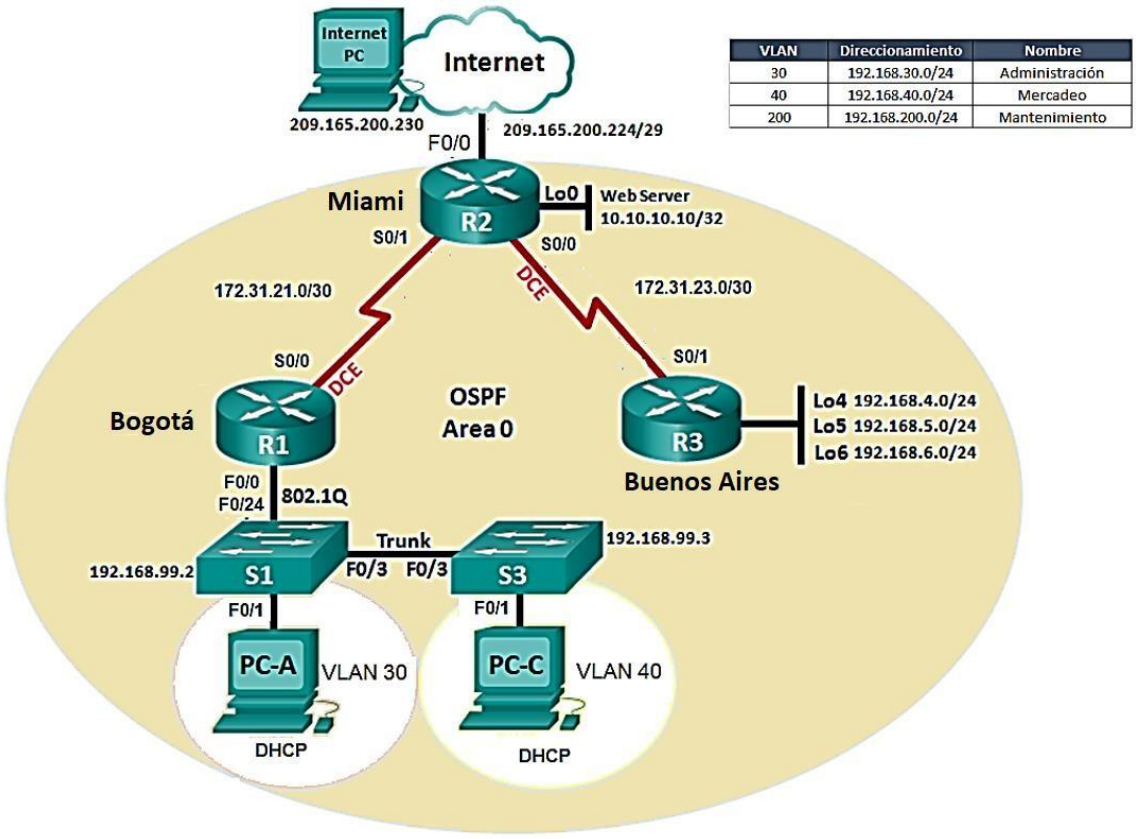
Reply from 172.29.4.134: bytes=32 time=11ms TTL=123
Reply from 172.29.4.134: bytes=32 time=12ms TTL=123
Reply from 172.29.4.134: bytes=32 time=13ms TTL=123
Reply from 172.29.4.134: bytes=32 time=13ms TTL=123

Ping statistics for 172.29.4.134:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 11ms, Maximum = 13ms, Average = 12ms

ESCENARIO 2

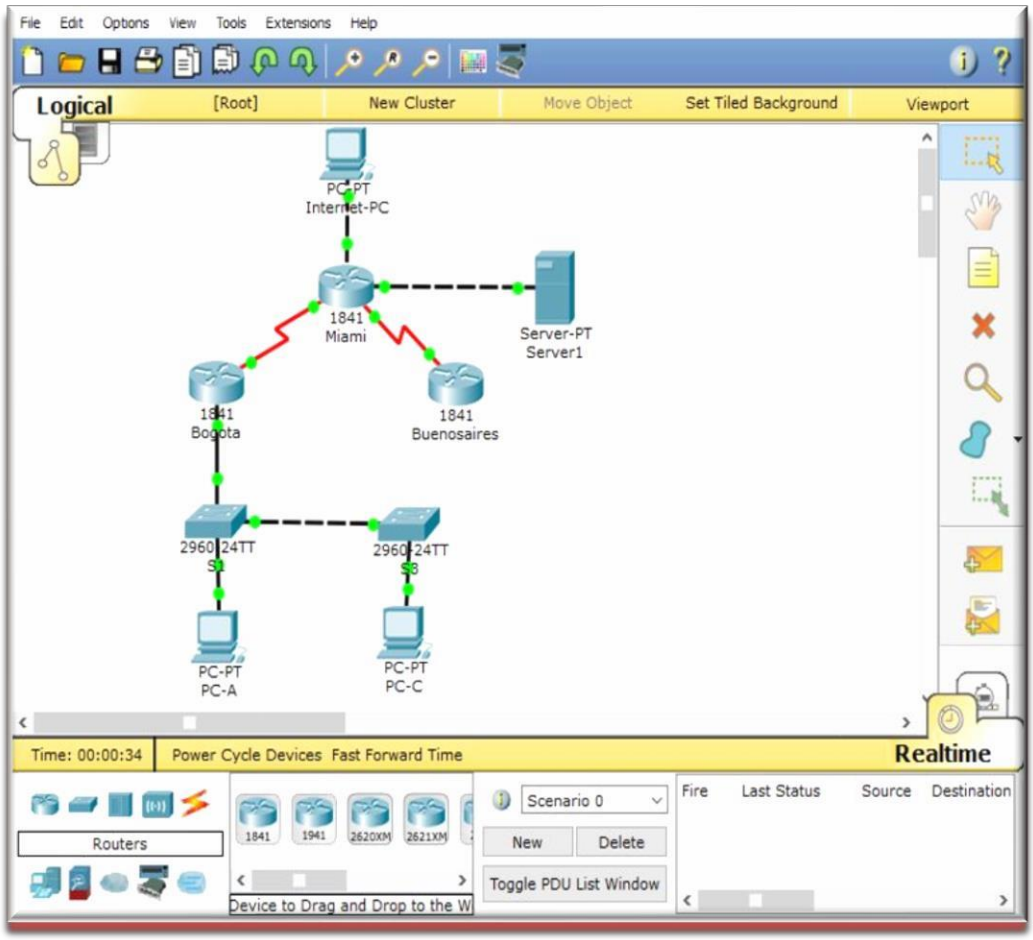
Escenario: Una empresa de Tecnología posee tres sucursales distribuidas en las ciudades de Miami, Bogotá y Buenos Aires, en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los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

Figura 9: escenario 2



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

Figura 10: topología red escenario



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

PC-A – IP ADDRESS 192.168.30.5
SUBNET MASK 192.168.30.1
DEFAULT GATEWAY 10.10.10.11

INTERNET PC – IP ADDRESS 209.165.200.230
SUBNET MASK 255.255.255.248
DEFAULT GATEWAY 209.165.200.255

PC-C- IP ADDRESS 192.168.40.5
SUBNET MASK 255.255.0.0
DEFAULT GATEWAY 192.168.40.1
DNS SERVER 10.10.10.11

WEB-SERVER IP ADDRESS 10.10.10.10
SUBNET MASK 255.255.255.0
DEFAULT GATEWAY10.10.10.1

R1

Router>enable
Router#
Router#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#Hostname R1
R1(config)#int s0/0/0
R1(config-if)#description Bogota
R1(config-if)#ip address 172.31.21.1 255.255.255.252
R1(config-if)#clock rate 128000
This command applies only to DCE interfaces
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)#int s0/0/1
R1(config-if)#no ip address
R1(config-if)#clock rate 2000000
R1(config-if)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#
%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
R1>
R1>enable
R1#config t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#int fa0/0
R1(config-if)#no sh
R1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

R1(config-if)#
R1#
%SYS-5-CONFIG_I: Configured from console by console

R2

Router>enable
Router#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R2
R2(config)#int fa0/0
R2(config-if)#description Internet
R2(config-if)#ip address 209.165.200.225 255.255.255.248
R2(config-if)#duplex auto
R2(config-if)#speed auto
R2(config-if)#int fa0/1
R2(config-if)#description conexion webserver
R2(config-if)#ip address 10.10.10.1 255.255.255.0
R2(config-if)#duplex auto
R2(config-if)#speed auto
R2(config-if)#int s0/0/0
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)#int s0/0/1
R2(config-if)#description MIAMI
R2(config-if)#ip address 172.31.21.2 255.255.255.252
R2(config-if)#exit
R2(config)#interface fa0/0
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

R2(config-if)#exit
R2(config)#interface fa0/1
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

R2(config-if)#exit
R2(config)#interface Serial0/0/0
R2(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R2(config-if)#
R2(config-if)#exit
R2(config)#interface Serial0/0/1
R2(config-if)#no sh

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

%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

R2(config-if)#exit
R2(config)#int fa0/1
R2(config-if)#no sh
R2(config-if)#no shutdown
R2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

R2#
%SYS-5-CONFIG_I: Configured from console by console

R3

Router>enable
Router#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.

```
Router(config)#hostname R3
R3(config)#int s0/0/0
R3(config-if)#no ip address
R3(config-if)#clock rate 2000000
R3(config-if)#shutdown
R3(config-if)#int s0/0/1
R3(config-if)#ip address 172.31.23.2 255.255.255.252
R3(config-if)#description Buenos Aires
R3(config-if)#no shutdown

R3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

R3(config-if)#exit
R3(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state
to up

R3(config)#interface loopback4

R3(config-if)#
%LINK-5-CHANGED: Interface Loopback4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback4, changed state
to up

R3(config-if)#ip address 192.168.4.1 255.255.255.0
R3(config-if)#interface loopback5

R3(config-if)#
%LINK-5-CHANGED: Interface Loopback5, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback5, changed state
to up

R3(config-if)#ip address 192.168.5.1 255.255.255.0
R3(config-if)#interface loopback6

R3(config-if)#
%LINK-5-CHANGED: Interface Loopback6, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback6, changed state
to up
```

R3(config-if)#ip address 192.168.6.1 255.255.255.0
R3(config-if)#exit
R3(config)#

S1

Switch>ENABLE
Switch#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname S1
S3(config)#no ip domain-lookup
S1(config)#EXIT
S1#

S3

Switch>enable
Switch#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname S3
S3(config)#ip domain-lookup
S3(config)#exit

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

OSPFv2 area 0

Tabla 2. 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

CONFIGURACIÓN OSPF V2

R1

```
R1#config
Configuring from terminal, memory, or network [terminal]?
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 0.0.0.0 area 0
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 192.168.200.0 0.0.0.3 area 0
R1(config-router)#int s0/0/0
R1(config-if)#bandwidth 256
R1(config-if)#ip ospf cost 9500
R1(config-if)#exit
R1(config)#router ospf 1
R1(config-router)#auto-cost refere
% Incomplete command.
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)#
00:35:27: %OSPF-5-ADJCHG: Process 1, Nbr 5.5.5.5 on Serial0/0/0 from
LOADING to FULL, Loading Done

R1(config-router)#exit
R1(config)#exit
R1#

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

R2

```
R2#config
Configuring from terminal, memory, or network [terminal]?
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)#
00:34:54: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial0/0/1 from
LOADING to FULL, Loading Done
```

```
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-router)#int s0/0/0
R2(config-if)#bandwidth 256
R2(config-if)#
00:36:20: %OSPF-5-ADJCHG: Process 1, Nbr 8.8.8.8 on Serial0/0/0 from
LOADING to FULL, Loading Done

R2(config-if)#exit
R2(config)#exit
R2#
```

R3

```
R3>enable
R3#config
Configuring from terminal, memory, or network [terminal]?
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)#
R3(config-router)#
01:21:10: %OSPF-5-ADJCHG: Process 1, Nbr 5.5.5.5 on Serial0/0/1 from
LOADING to FULL, Loading Done

R3(config-router)#
R3(config-router)#network 192.168.4.0 0.0.3.255 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)#auto-cost reference-bandwidth 9500
R3(config-router)#exit
R3(config)#int s0/0/1
R3(config-if)#bandwidth 256
```

R3(config-if)#
R3(config-if)#exit
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console

Verificar información de OSPF

- Visualizar tablas de enrutamiento y routers conectados por OSPFv2

R1

R1#show ip ospf neighbor
Neighbor ID Pri State Dead Time Address Interface
5.5.5.5 0 FULL/ - 00:00:36 172.31.21.2 Serial0/0/0

R2

R2#show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface
8.8.8.8 0 FULL/ - 00:00:36 172.31.23.2 Serial0/0/0
1.1.1.1 0 FULL/ - 00:00:39 172.31.21.1 Serial0/0/1
R2#

R3

R3#show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface
5.5.5.5 0 FULL/ - 00:00:33 172.31.23.1 Serial0/0/1
R3#

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

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 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
Hello due in 00:00:05
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 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
Hello due in 00:00:09
Index 2/2, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1 , Adjacent neighbor count is 1
Adjacent with neighbor 8.8.8.8
Suppress hello for 0 neighbor(s)
FastEthernet0/1 is up, line protocol is up
Internet address is 10.10.10.1/24, Area 0
Process ID 1, Router ID 5.5.5.5, Network Type BROADCAST, Cost: 95
Transmit Delay is 1 sec, State DR, Priority 1
Designated Router (ID) 5.5.5.5, Interface address 10.10.10.1
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:05
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)

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

```
R2#show ip protocols
Routing Protocol is "ospf 1"
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Router ID 5.5.5.5
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Maximum path: 4
Routing for Networks:
172.31.21.0 0.0.0.3 area 0
172.31.23.0 0.0.0.3 area 0
10.10.10.0 0.0.0.255 area 0
Routing Information Sources:
Gateway Distance Last Update
1.1.1.1 110 00:18:18
5.5.5.5 110 00:18:18
8.8.8.8 110 00:18:18
Distance: (default is 110)

R2#show ip route ospf
192.168.4.0/32 is subnetted, 1 subnets
O 192.168.4.1 [110/391] via 172.31.23.2, 00:06:56, Serial0/0/0
192.168.5.0/32 is subnetted, 1 subnets
O 192.168.5.1 [110/391] via 172.31.23.2, 00:06:56, Serial0/0/0
192.168.6.0/32 is subnetted, 1 subnets
O 192.168.6.1 [110/391] via 172.31.23.2, 00:06:56, Serial0/0/0
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.

S1

```
S1>enable
S1#config
Configuring from terminal, memory, or network [terminal]?
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)#end
S1#

%SYS-5-CONFIG_I: Configured from console by console

S3

S3>enable
S3#config
Configuring from terminal, memory, or network [terminal]?
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

S3(config-if)#ip add 192.168.99.3 255.255.255.0
S3(config-if)#no shut
S3(config-if)#end
S3#
%SYS-5-CONFIG_I: Configured from console by console

S3#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
S3(config)#ip default-gateway 192.168.99.1
S3(config)#int f0/3
S3(config-if)#switchport mode trunk

S3(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

S3(config-if)#switchport trunk native vlan 1
S3(config-if)#int f0/1
S3(config-if)#switchport mode acces
S3(config-if)#switchport acces vlan 40
S3(config-if)#

CONFIGURACION ENCAPSULAMIENTO

R1

R1>enable
R1#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#int f0/0
R1(config-if)#int f0/0.30
R1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.30, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.30, changed state to up

R1(config-subif)#description Administracion LAN
R1(config-subif)#encapsulation dot1Q 30
R1(config-subif)#ip add 192.168.30.1 255.255.255.0
R1(config-subif)#int f0/0.40
R1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.40, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.40, changed state to up

R1(config-subif)#description Mercadeo LAN
R1(config-subif)#encapsulation dot1Q 40
R1(config-subif)#ip add 192.168.40.1 255.255.255.0
R1(config-subif)#int f0/0.200

R1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.200, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.200, changed state to up

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)#
R1#

4. ***En el Switch 3 deshabilitar DNS lookup***

S3#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
S3(config)#no ip domain-lookup
S3(config)#end
S3#
%SYS-5-CONFIG_I: Configured from console by console

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

S1

S1>enable
S1#config
Configuring from terminal, memory, or network [terminal]?
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)#ip add 192.168.99.2 255.255.255.0
S1(config-if)#no shut
S1(config-if)#end

```
S1#
%SYS-5-CONFIG_I: Configured from console by console

S1#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
S1(config)#ip defaul
% Incomplete command.
S1(config)#ip default-gateway 192.168.99.1
S1(config)#
```

S3

```
S3>enable
S3#config
Configuring from terminal, memory, or network [terminal]?
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

S3(config-if)#ip add 192.168.99.3 255.255.255.0
S3(config-if)#no shut
S3(config-if)#end
S3#
%SYS-5-CONFIG_I: Configured from console by console

S3#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
S3(config)#ip default-gateway 192.168.99.1
S3(config)#int f0/3
S3(config-if)#switchport mode trunk

S3(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

S3(config-if)#switchport trunk native vlan 1
S3(config-if)#int f0/1
S3(config-if)#switchport mode acces
S3(config-if)#switchport acces vlan 40
S3(config-if)#
S3(config-if)#END
S3#
%SYS-5-CONFIG_I: Configured from console by console

S3#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
S3(config)#no ip domain-lookup
S3(config)#end
S3#
%SYS-5-CONFIG_I: Configured from console by console

S3#config
Configuring from terminal, memory, or network [terminal]?
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)#ip add 192.168.99.3 255.255.255.0
S3(config-if)#no shut
S3(config-if)#end
S3#
%SYS-5-CONFIG_I: Configured from console by console

```
S3#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
S3(config)#ip default-gateway 192.168.99.1
S3(config)#int f0/3
S3(config-if)#switchport mode trunk
S3(config-if)#switchport trunk native vlan 1
S3(config-if)#end
```

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

```
S1#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
S1(config)#int f0/2
S1(config-if)#shutdown

%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to administratively
down
```

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

R1

```
R1>enable
R1#config
Configuring from terminal, memory, or network [terminal]?
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)#domain-name ccna-unad.edu.co
R1(dhcp-config)#default-router 192.168.30.1
R1(dhcp-config)#network 192.168.30.0 255.255.255.0
R1(dhcp-config)#exit
R1(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)#
```

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

```
R2>ENABLE
R2#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ip nat inside source static 10.10.10.10 209.165.200.209
R2(config)#
R2#
```

9. ***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#config
Configuring from terminal, memory, or network [terminal]?
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 0.0.3.255
R2(config)#
```

10. **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>enable
R2#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#access-li
```

```
% Incomplete command.
R2(config)#access-list 101 permit tcp any host 209.165.200.229 eq www
R2(config)#int f0/0
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 f0/1
R2(config-if)#ip access-group 101 out
R2(config-if)#exit
R2(config)#end
R2#
```

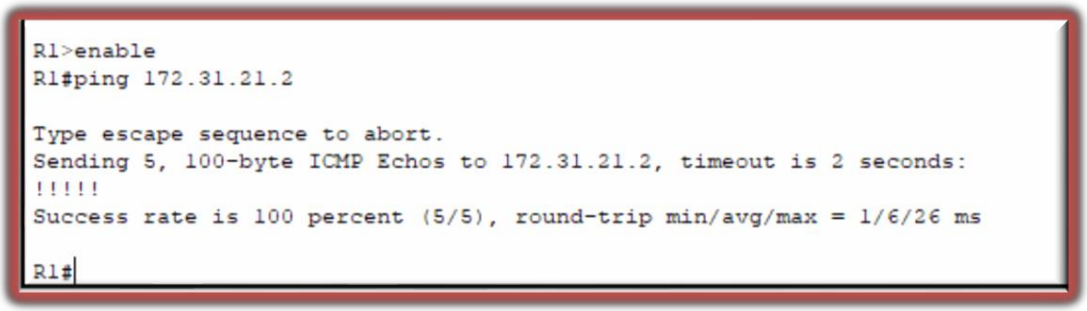
Tabla 3. configuración DHCP

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

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

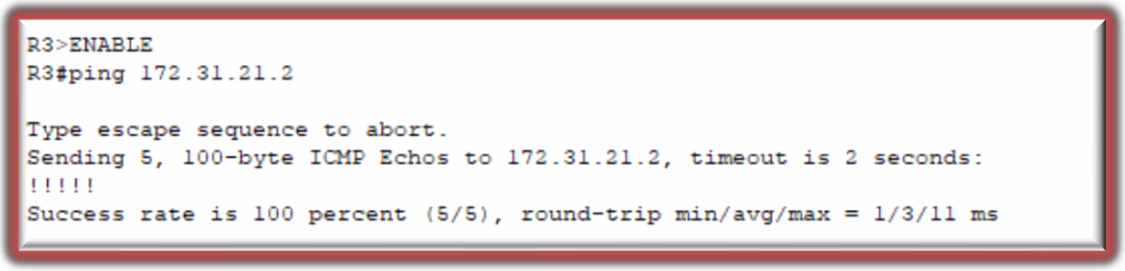
Ping R1 a R2

Figura 11: Ping R1 a R2



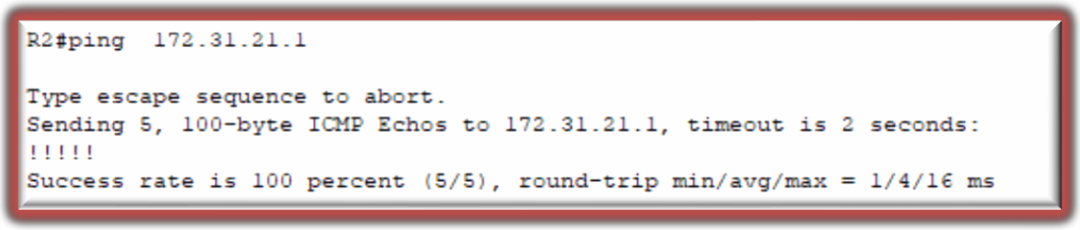
Ping R3 a R2

Figura 12: Ping R3 a R2



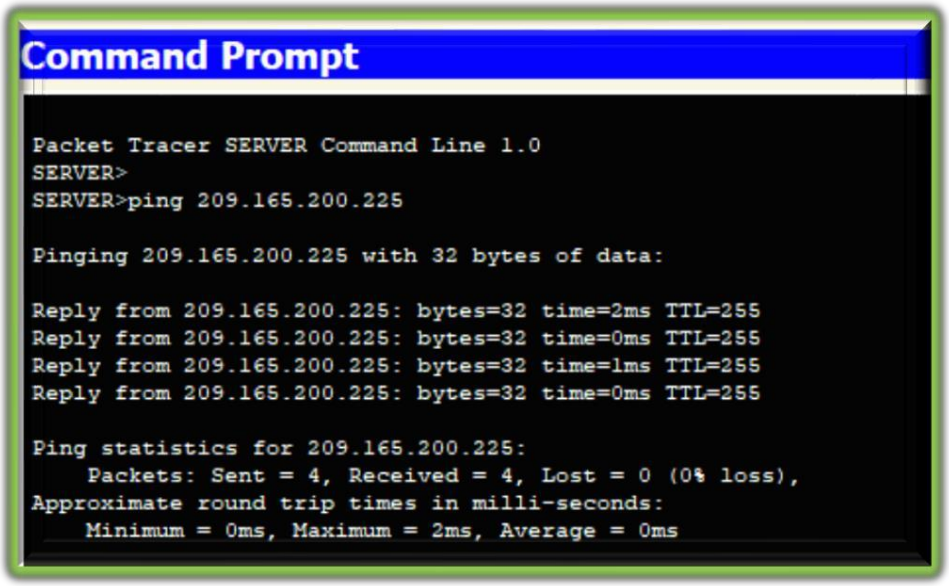
Ping R2 a R1

Figura 13: Ping R2 a R1



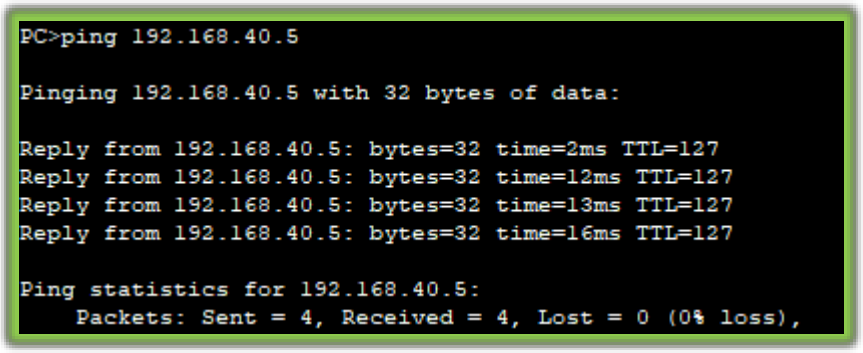
Ping WebServer a puerta de enlace.

Figura 14: Ping WebServer a puerta de enlace



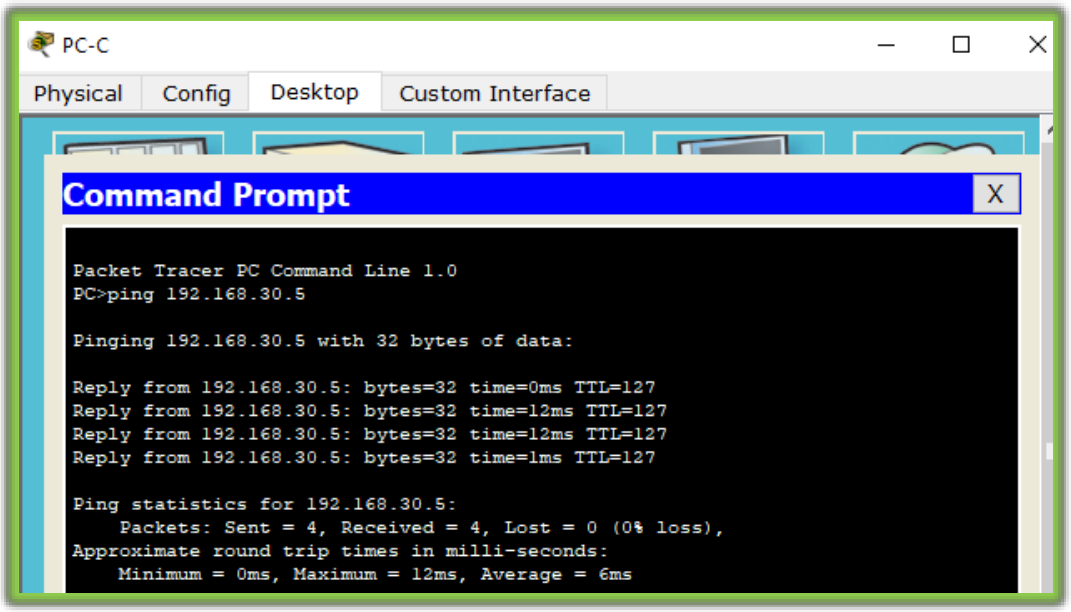
Ping PCA VLAN 30 a PCC VLAN 40

Figura 15: Ping PCA VLAN 30 a PCC VLAN 40



Ping PCC VLAN 40 a PCA VLAN 30

Figura 16: Ping PCC VLAN 40 a PCA VLAN 30



5. CONCLUSIONES

Este documento nos permitio fortalecer la actividad de la prueba de habilidades práctica final, en el desarrollo de acuerdo a los dos estudios dados, se ha aplicado los conocimientos proporcionados en el material de apoyo emanado por la empresa CISCO en el desarrollo del aprendizaje autónomo promovido para este tipo de ambientes virtuales. Se logró una satisfactoria conexión, configuración y simulación de los dispositivos de la red en el correspondiente caso de estudio.

Además de la importancia del ADSL como una tecnología de acceso a Internet de banda ancha, lo que implica una velocidad superior a una conexión por módem en la transferencia de datos, ya que el módem utiliza la banda de voz y por tanto impide el servicio de voz mientras se use y viceversa. Del protocolo DHCP es un protocolo de configuración de host dinámico) es un protocolo que permite que un equipo conectado a una red pueda obtener su configuración (principalmente, su configuración de red) en forma dinámica (es decir, sin una intervención especial).

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