

DIPLOMADO DE PROFUNDIZACIÓN CISCO CCNA  
PRUEBA DE HABILIDADES PRÁCTICAS

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## **AGRADECIMIENTOS**

A Dios, que con su gran generosidad me provee cada día de nuevas oportunidades.

A mis padres, que gracias a su ejemplo de dedicación y constancia me han enseñado que cada meta propuesta se puede conseguir por difícil que parezca, y que la educación es el camino al progreso, que cada esfuerzo realizado en función del cumplimiento de una meta tiene su recompensa.

A toda mi familia, que con su apoyo han aportado a que esta meta sea hoy un logro cumplido.

A las personas a mí alrededor, que de alguna manera me han impulsado a adquirir un mayor aprendizaje y a creer en mis capacidades, en especial aquellos que se han convertido en maestros y guías.

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## INTRODUCCIÓN

Hoy en día las telecomunicaciones son una herramienta primaria para la competitividad global, que implica el desarrollo de competencias necesarias en la creación de redes eficaces y escalables; así como instalar, configurar, supervisar, y solucionar problemas en los equipos pertenecientes a la infraestructura de dichas redes. Para dar soluciones confiables, seguras y eficientes se requiere del desarrollo de competencias adecuadas; por lo cual es necesario que los profesionales profundicen en el campo de las Redes y Telecomunicaciones, de tal manera que con la realización del diplomado de profundización CISCO se esté en capacidad de responder a la demanda de personal especializado en el área de las Tecnologías de la Información.

Con la solución de los dos escenarios planteados se busca identificar el grado alcanzado en el desarrollo de competencias y habilidades fundamentales en la comprensión y resolución de situaciones relacionadas con el Networking, cuyos conocimientos fueron obtenidos a lo largo del desarrollo del diplomado.

Cada escenario se soluciona con el fin de adquirir las competencias necesarias para el desenvolvimiento en el campo laboral, en la implementación de redes empresariales

## OBJETIVOS

### GENERAL

Brindar soluciones a dos diferentes escenarios propuestos como trabajo final del diplomado de profundización CCNA, aplicando los conocimientos adquiridos sobre la configuración y diseño de una red, y otros aspectos relacionados con Networking.

### ESPECIFICOS

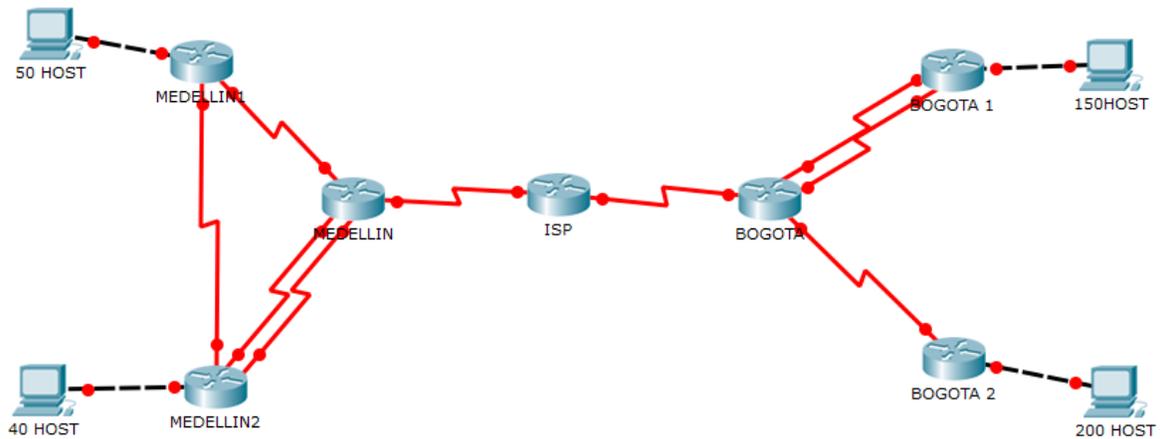
- Documentar a solución de los escenarios planteados, detallando la configuración de cada uno de los dispositivos involucrados en cada uno
- Describir paso a paso cada uno de los procesos realizados en la configuración, desarrollo y verificación de conectividad, usando comandos como ping, traceroute, show iproute, entre otros.



## 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).



### Router MEDELLIN

```
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 Restringido $
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 cisco
Router(config-line)#login^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

## Router MEDELLIN1

```
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 Restringido $
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 cisco
Router(config-line)#login
Router(config-line)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

## Router MEDELLIN 2

```
Router>enable
Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
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 Restringido $
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 cisco
Router(config-line)#login
Router(config-line)#hostname MEDELLIN2
MEDELLIN2 (config)#^Z
MEDELLIN2#
%SYS-5-CONFIG_I: Configured from console by console
```

## Router BOGOTA

```
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 Restringido $
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 cisco
Router(config-line)#login
Router(config-line)#hostname BOGOTA
BOGOTA(config)#^Z
BOGOTA#
%SYS-5-CONFIG_I: Configured from console by console
```

## Router BOGOTA1

```
Router>enable
Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
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 Restringido $
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 cisco
Router(config-line)#login
Router(config-line)#hostname BOGOTA1
BOGOTA1(config)#^Z
BOGOTA1#
%SYS-5-CONFIG_I: Configured from console by console
```

## Router BOGOTA2

```
Router>enable
Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
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 Restringido $
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 cisco
Router(config-line)#login
Router(config-line)#hostname BOGOTA2
BOGOTA2(config)#^Z
BOGOTA2#
%SYS-5-CONFIG_I: Configured from console by console
```

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

## ISP

```
Router>enable
Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int s0/0/0
Router(config-if)#ip add 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)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#int s0/0/1
Router(config-if)#ip add 209.17.220.5 255.255.255.252
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)#exit
Router(config)#
```

---

## MEDELLIN-IPS

```
Password:
Password:
MEDELLIN>enable
Password:
MEDELLIN#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
MEDELLIN#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN(config)#int s0/0/0
MEDELLIN(config-if)#ip add 209.17.220.2 255.255.255.252
MEDELLIN(config-if)#clock rate4000000
      ^
% Invalid input detected at '^' marker.

MEDELLIN(config-if)#clock rate 4000000
This command applies only to DCE interfaces
MEDELLIN(config-if)#no shutdown

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

## MEDELLIN-MEDELLIN1

```
MEDELLIN(config)#int s0/0/1
MEDELLIN(config-if)#ip add 172.29.6.1 255.255.255.252
MEDELLIN(config-if)#clock rate 4000000
MEDELLIN(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
MEDELLIN(config-if)#exit
MEDELLIN(config)#
```

## MEDELLIN

```
MEDELLIN(config-if)#exit
MEDELLIN(config)#int s0/0/1
MEDELLIN(config-if)#ip add 172.29.6.1 255.255.255.252
MEDELLIN(config-if)#clock rate 4000000
MEDELLIN(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
MEDELLIN(config-if)#exit
MEDELLIN(config)#int s0/1/0
MEDELLIN(config-if)#ip add 172.29.6.9 255.255.255.252
MEDELLIN(config-if)#clock rate 4000000
This command applies only to DCE interfaces
MEDELLIN(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
MEDELLIN(config-if)#exit
MEDELLIN(config)#int s0/1/1
MEDELLIN(config-if)#ip add 172.29.6.13 255.255.255.25
Bad mask 0xFFFFF19 for address 172.29.6.13
MEDELLIN(config-if)#clock rate 4000000
This command applies only to DCE interfaces
MEDELLIN(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
MEDELLIN(config-if)#exit
MEDELLIN(config)#
```

## MEDELLIN1

```
Password:
MEDELLIN1>enable
Password:
MEDELLIN1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
MEDELLIN1#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN1(config)#int s0/0/0
MEDELLIN1(config-if)#ip add 172.29.6.2 255.255.255.252
MEDELLIN1(config-if)#clock rate 4000000
This command applies only to DCE interfaces
MEDELLIN1(config-if)#no shutdown

MEDELLIN1(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

MEDELLIN1(config-if)#exit
MEDELLIN1(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
```

```

MEDELLIN1(config)#int s0/0/1
MEDELLIN1(config-if)#ip add 172.29.6.5 255.255.255.252
MEDELLIN1(config-if)#clock rate 4000000
This command applies only to DCE interfaces
MEDELLIN1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
MEDELLIN1(config-if)#exit
MEDELLIN1(config)#int f0/0
MEDELLIN1(config-if)#ip add 172.29.4.1 255.255.255.128
MEDELLIN1(config-if)#no shutdown

MEDELLIN1(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

MEDELLIN1(config-if)#exit

```

## MEDELLIN2

```

MEDELLIN2(config)#int s0/0/0
MEDELLIN2(config-if)#ip add 172.29.6.10 255.255.255.252
MEDELLIN2(config-if)#no shutdown

MEDELLIN2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

MEDELLIN2(config-if)#EXIT
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

MEDELLIN2(config)#int s0/0/1
MEDELLIN2(config-if)#ip add 172.29.6.14 255.255.255.252
MEDELLIN2(config-if)#no shutdown

MEDELLIN2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

MEDELLIN2(config-if)#EXIT
MEDELLIN2(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up
|

MEDELLIN2(config)#int s0/1/0
MEDELLIN2(config-if)#ip add 172.29.3.14 255.255.255.252
MEDELLIN2(config-if)#no shutdown
MEDELLIN2(config-if)#EXIT
MEDELLIN2(config)#int f0/0
MEDELLIN2(config-if)#ip add 172.29.4.129 255.255.255.128
MEDELLIN2(config-if)#
MEDELLIN2#
%SYS-5-CONFIG_I: Configured from console by console

```

## BOGOTA

```
BOGOTA#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA(config)#int s0/0/0
BOGOTA(config-if)#ip add 209.17.220.6 255.255.255.252
BOGOTA(config-if)#no shutdown

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

BOGOTA(config)#int s0/0/1
BOGOTA(config-if)#ip add 172.29.3.9 255.255.255.252
BOGOTA(config-if)#clock rate 4000000
BOGOTA(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
BOGOTA(config-if)#exit
BOGOTA(config)#
```

---

```
BOGOTA(config)#int s0/1/0
BOGOTA(config-if)#ip add 172.29.3.1 255.255.255.252
BOGOTA(config-if)#clock rate 4000000
BOGOTA(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
BOGOTA(config-if)#EXIT
BOGOTA(config)#int s0/1/1
BOGOTA(config-if)#ip add 172.29.3.5 255.255.255.252
BOGOTA(config-if)#clock rate 4000000
BOGOTA(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
BOGOTA(config-if)#EXIT
BOGOTA(config)#
```

---

## BOGOTA1

```
BOGOTA1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA1(config)#int s0/0/0
BOGOTA1(config-if)#ip add 172.29.3.10 255.255.255.252
BOGOTA1(config-if)#no shutdown

BOGOTA1(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

BOGOTA1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

BOGOTA1(config-if)#int s0/0/1
BOGOTA1(config-if)#ip add 172.9.3.13 255.255.255.252
BOGOTA1(config-if)#clock rate 4000000
This command applies only to DCE interfaces
BOGOTA1(config-if)#no shutdown

BOGOTA1(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
```

```

BOGOTA1(config-if)#int f0/0
BOGOTA1(config-if)#ip add 172.29.1.1 255.255.255.0
BOGOTA1(config-if)#no shutdown

BOGOTA1(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(config-if)#ip add 172.29.3.15 255.255.255.252
Bad mask /30 for address 172.29.3.15
BOGOTA1(config-if)#no shutdown

```

## BOGOTA2

```

BOGOTA2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA2(config)#int s0/0/0
BOGOTA2(config-if)#ip add 172.29.3.2 255.255.255.252
BOGOTA2(config-if)#no shutdown

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

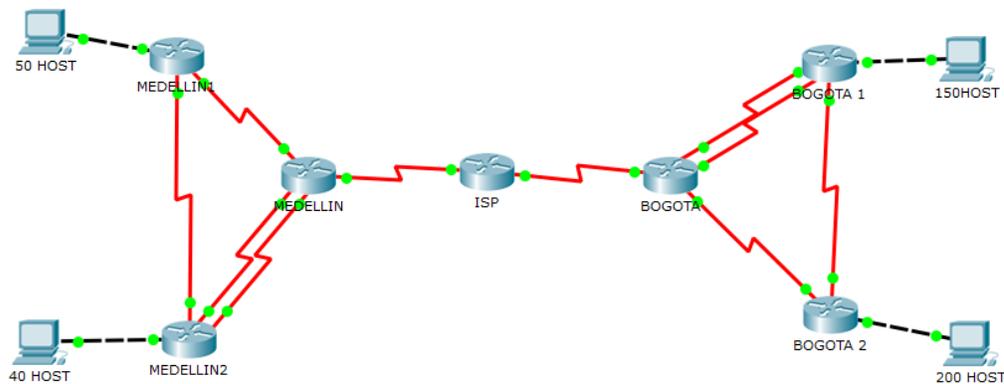
BOGOTA2(config-if)#int s0/0/1
BOGOTA2(config-if)#ip add 172.29.3.6 255.255.255.252
BOGOTA2(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
BOGOTA2(config-if)#int f0/0
BOGOTA2(config-if)#ip add 172.29.0.1 255.255.255.0
BOGOTA2(config-if)#no shutdown

BOGOTA2(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

```



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

```
MEDELLIN#config ter
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN(config)#router rip
MEDELLIN(config-router)#version 2
MEDELLIN(config-router)#no auto-summary
MEDELLIN(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 209.17.220.0/30 is directly connected, Serial0/0/0
MEDELLIN(config-router)#network 172.29.6.0
MEDELLIN(config-router)#network 172.29.6.8
MEDELLIN(config-router)#network 172.29.6.12
MEDELLIN(config-router)#passive-interface s0/0/0
```

### MEDELLIN1

```
MEDELLIN1#config ter
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN1(config)#router rip
MEDELLIN1(config-router)#version 2
MEDELLIN1(config-router)#no auto-summary
MEDELLIN1(config-router)#do show ip route connected
C 172.29.4.0/25 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
MEDELLIN1(config-router)#network 172.29.4.0
MEDELLIN1(config-router)#network 172.29.6.0
MEDELLIN1(config-router)#network 172.29.6.4
MEDELLIN1(config-router)#passive-interface f0/0
```

### MEDELLIN2

```
MEDELLIN2#config ter
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN2(config)#router rip
MEDELLIN2(config-router)#version 2
MEDELLIN2(config-router)#no auto-summary
MEDELLIN2(config-router)#do show ip route connected
C 172.29.3.12/30 is directly connected, Serial0/1/0
C 172.29.4.0/25 is directly connected, FastEthernet0/0
C 172.29.6.8/30 is directly connected, Serial0/0/0
C 172.29.6.12/30 is directly connected, Serial0/0/1
MEDELLIN2(config-router)#network 172.29.4.128
MEDELLIN2(config-router)#network 172.29.6.4
MEDELLIN2(config-router)#network 172.29.6.8
MEDELLIN2(config-router)#network 172.29.6.12
MEDELLIN2(config-router)#passive-interface f0/0
```

## BOGOTA

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

## BOGOTA1

```
BOGOTA1#config ter
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA1(config)#
BOGOTA1(config)#router rip
BOGOTA1(config-router)#version 2
BOGOTA1(config-router)#no auto-summary
BOGOTA1(config-router)#do show ip route connected
C 172.9.3.12/30 is directly connected, Serial0/0/1
C 172.29.1.0/24 is directly connected, FastEthernet0/0
C 172.29.3.8/30 is directly connected, Serial0/0/0
BOGOTA1(config-router)#network 172.9.3.12
BOGOTA1(config-router)#network 172.29.1.0
BOGOTA1(config-router)#network 172.29.3.8
BOGOTA1(config-router)#passive-interface f0/0
```

## BOGOTA2

```
BOGOTA2#config ter
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA2(config)#router rip
BOGOTA2(config-router)#version 2
BOGOTA2(config-router)#
BOGOTA2(config-router)#no auto-summary
BOGOTA2(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
BOGOTA2(config-router)#network 172.29.0.0
BOGOTA2(config-router)#network 172.29.3.0
BOGOTA2(config-router)#network 172.29.3.4
BOGOTA2(config-router)#network 172.29.3.12
BOGOTA2(config-router)#passive-interface f0/0
```

## VERIFICACION BOGOTA

```
BOGOTA#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
```

```
172.29.0.0/30 is subnetted, 3 subnets
C    172.29.3.0 is directly connected, Serial0/1/0
C    172.29.3.4 is directly connected, Serial0/1/1
C    172.29.3.8 is directly connected, Serial0/0/1
209.17.220.0/30 is subnetted, 1 subnets
C    209.17.220.4 is directly connected, Serial0/0/0
```

## VERIFICACION MEDELLIN

```
MEDELLIN#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    172.29.3.12/30 [120/1] via 172.29.6.10, 00:00:24, Serial0/1/0
R    172.29.4.0/25 [120/1] via 172.29.6.2, 00:00:21, Serial0/0/1
      [120/1] via 172.29.6.10, 00:00:24, Serial0/1/0
C    172.29.6.0/30 is directly connected, Serial0/0/1
R    172.29.6.4/30 [120/1] via 172.29.6.2, 00:00:21, Serial0/0/1
C    172.29.6.8/30 is directly connected, Serial0/1/0
R    172.29.6.12/30 [120/1] via 172.29.6.10, 00:00:24, Serial0/1/0
209.17.220.0/30 is subnetted, 1 subnets
C    209.17.220.0 is directly connected, Serial0/0/0
```

- 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.

## MEDELLIN

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

## VERIFICANDO EN MEDELLIN1

```
MEDELLIN1#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 172.29.6.1 to network 0.0.0.0
```

```
       172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
R       172.29.3.12/30 [120/2] via 172.29.6.1, 00:00:16, Serial0/0/0
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
R       172.29.6.8/30 [120/1] via 172.29.6.1, 00:00:16, Serial0/0/0
R       172.29.6.12/30 [120/2] via 172.29.6.1, 00:00:16, Serial0/0/0
R*      0.0.0.0/0 [120/1] via 172.29.6.1, 00:00:16, Serial0/0/0
```

## BOGOTA

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

## VERIFICANDO EN BOGOTA2

```
BOGOTA2#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, 2 subnets, 2 masks
C       172.29.0.0/24 is directly connected, FastEthernet0/0
C       172.29.3.0/30 is directly connected, 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 suman las subredes de cada uno a /22.

```
ISP#config term
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
```

## Parte 2: Tabla de Enrutamiento.

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

### TABLA MEDELLIN

```
MEDELLIN#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       172.29.3.12/30 [120/1] via 172.29.6.10, 00:00:08, Serial0/1/0
R       172.29.4.0/25 [120/1] via 172.29.6.2, 00:00:21, Serial0/0/1
        [120/1] via 172.29.6.10, 00:00:08, Serial0/1/0
C       172.29.6.0/30 is directly connected, Serial0/0/1
R       172.29.6.4/30 [120/1] via 172.29.6.2, 00:00:21, Serial0/0/1
C       172.29.6.8/30 is directly connected, Serial0/1/0
R       172.29.6.12/30 [120/1] via 172.29.6.10, 00:00:08, Serial0/1/0
    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
```

### TABLA MEDELLIN1

```
MEDELLIN1#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 172.29.6.1 to network 0.0.0.0

    172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
R       172.29.3.12/30 [120/2] via 172.29.6.1, 00:00:22, Serial0/0/0
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
R       172.29.6.8/30 [120/1] via 172.29.6.1, 00:00:22, Serial0/0/0
R       172.29.6.12/30 [120/2] via 172.29.6.1, 00:00:22, Serial0/0/0
R*    0.0.0.0/0 [120/1] via 172.29.6.1, 00:00:22, Serial0/0/0
```

## TABLA MEDELLIN2

```
MEDELLIN2#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 172.29.6.9 to network 0.0.0.0

```
172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
C    172.29.3.12/30 is directly connected, Serial0/1/0
C    172.29.4.0/25 is directly connected, FastEthernet0/0
R    172.29.6.0/30 [120/1] via 172.29.6.9, 00:00:15, Serial0/0/0
R    172.29.6.4/30 [120/2] via 172.29.6.9, 00:00:15, Serial0/0/0
C    172.29.6.8/30 is directly connected, Serial0/0/0
C    172.29.6.12/30 is directly connected, Serial0/0/1
R*   0.0.0.0/0 [120/1] via 172.29.6.9, 00:00:15, Serial0/0/0
```

## TABLA BOGOTA

```
BOGOTA#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

```
172.29.0.0/30 is subnetted, 3 subnets
C    172.29.3.0 is directly connected, Serial0/1/0
C    172.29.3.4 is directly connected, Serial0/1/1
C    172.29.3.8 is directly connected, Serial0/0/1
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
```

## TABLA BOGOTA1

```
BOGOTA1#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

```
172.9.0.0/30 is subnetted, 1 subnets
C    172.9.3.12 is directly connected, Serial0/0/1
172.29.0.0/16 is variably subnetted, 2 subnets, 2 masks
C    172.29.1.0/24 is directly connected, FastEthernet0/0
C    172.29.3.8/30 is directly connected, Serial0/0/0
```

## TABLA BOGOTA2

```
BOGOTA2#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

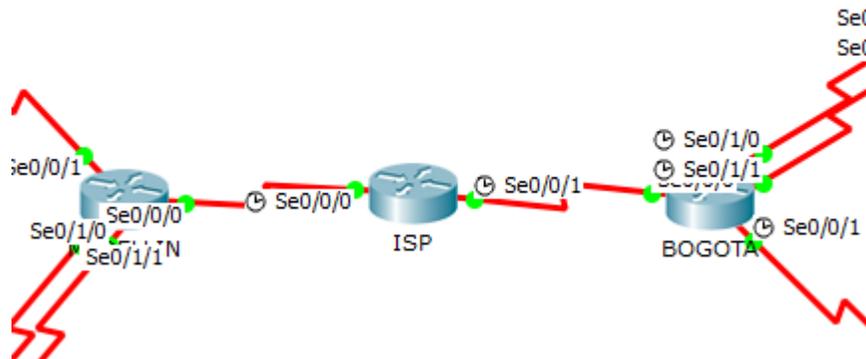
Gateway of last resort is not set

      172.29.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.29.0.0/24 is directly connected, FastEthernet0/0
C       172.29.3.0/30 is directly connected, Serial0/0/0
```

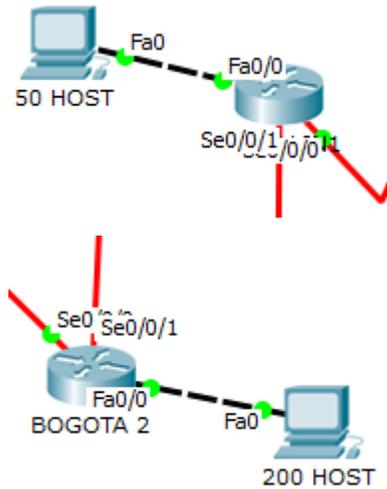
- b. Verificar el balanceo de carga que presentan los routers.

Se realiza entre los routers con dos conexiones, en nuestro caso entre MEDELLIN y MEDELLIN2, y BOGOTA y BOGOTA2

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



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



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

BOGOTA

R 172.29.0.0/24 [120/1] via 172.29.3.6, 00:00:06, Serial0/1/1  
 [120/1] via 172.29.3.2, 00:00:06, Serial0/1/0

BOGOTA 2

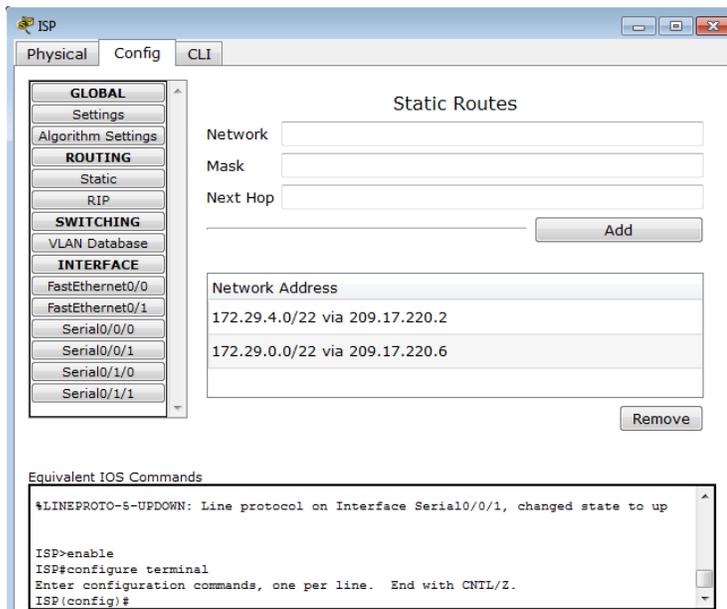
R 172.9.3.12 [120/2] via 172.29.3.5, 00:00:25, Serial0/0/1  
 [120/2] via 172.29.3.1, 00:00:25, Serial0/0/0

R 172.29.1.0/24 [120/2] via 172.29.3.5, 00:00:25, Serial0/0/1  
 [120/2] via 172.29.3.1, 00:00:25, Serial0/0/0 R 172.29.3.8/30 [120/1] via  
 172.29.3.5, 00:00:25, Serial0/0/1

[120/1] via 172.29.3.1, 00:00:25, Serial0/0/0 R\* 0.0.0.0/0 [120/1] via 172.29.3.5,  
 00:00:25, Serial0/0/1

[120/1] via 172.29.3.1, 00:00:25, Serial0/0/0

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



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

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

ROUTER	INTERFAZ
<b>Bogota</b>	SERIAL0/0/1; SERIAL0/1/0; SERIAL0/1/1
<b>Bogota1</b>	SERIAL0/0/0; SERIAL0/0/1
<b>Bogota2</b>	SERIAL0/0/0; SERIAL0/0/1; SERIAL0/1/0
<b>Medellín</b>	SERIAL0/0/0; SERIAL0/0/1; SERIAL0/1/1
<b>Medellín1</b>	SERIAL0/0/0; SERIAL0/0/1
<b>Medellín2</b>	SERIAL0/0/0; SERIAL0/0/1; SERIAL0/1/0
<b>ISP</b>	No lo requiere

Durante la configuración de RIP se realizó esta desactivación.

#### 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

```
MEDELLIN#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 22 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send Recv Triggered RIP Key-chain
  Serial0/1/0        2     2
  Serial0/0/1        2     2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
  Serial0/0/0
Routing Information Sources:
  Gateway           Distance      Last Update
  172.29.6.10       120           00:00:14
  172.29.6.2        120           00:00:00
Distance: (default is 120)
```

#### MEDELLIN1

```
MEDELLIN1#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 10 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send Recv Triggered RIP Key-chain
  Serial0/0/0        2     2
  Serial0/0/1        2     2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
  FastEthernet0/0
Routing Information Sources:
  Gateway           Distance      Last Update
  172.29.6.1        120           00:00:23
Distance: (default is 120)
```

## MEDELLIN2

```
MEDELLIN2#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 10 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send Recv Triggered RIP Key-chain
  Serial0/0/0        2    2
  Serial0/0/1        2    2
  Serial0/1/0        2    2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
  FastEthernet0/0
Routing Information Sources:
  Gateway           Distance      Last Update
  172.29.6.9        120           00:00:15
Distance: (default is 120)
```

## BOGOTA

```
BOGOTA#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 1 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send Recv Triggered RIP Key-chain
  Serial0/1/0        2    2
  Serial0/1/1        2    2
  Serial0/0/1        2    2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
Routing Information Sources:
  Gateway           Distance      Last Update
Distance: (default is 120)
```

## BOGOTA1

```
BOGOTA1#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 21 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send Recv Triggered RIP Key-chain
  Serial0/0/0        2    2
  Serial0/0/1        2    2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.9.0.0
  172.29.0.0
Passive Interface(s):
  FastEthernet0/0
Routing Information Sources:
  Gateway           Distance      Last Update
Distance: (default is 120)
```

## BOGOTA2

```
BOGOTA2#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 4 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send Recv Triggered RIP Key-chain
  Serial0/0/0         2     2
  Serial0/0/1         2     2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
  FastEthernet0/0
Routing Information Sources:
  Gateway            Distance      Last Update
Distance: (default is 120)
```

- 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.

MEDELLIN1

Physical Config CLI

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

FastEthernet0/0

FastEthernet0/1

Serial0/0/0

Serial0/0/1

Serial0/1/0

Serial0/1/1

RIP Routing (v2)

Network

Add

Network Address

172.29.0.0

Remove

Equivalent IOS Commands

Gateway	Distance	Last Update
172.29.6.10	120	00:00:14
172.29.6.2	120	00:00:00

Distance: (default is 120)

```
MEDELLIN1#
MEDELLIN1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN1(config)#router rip
MEDELLIN1(config-router)#
```

MEDELLIN1

Physical Config CLI

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

FastEthernet0/0

FastEthernet0/1

Serial0/0/0

Serial0/0/1

Serial0/1/0

Serial0/1/1

RIP Routing (v2)

Network

Add

Network Address

172.29.0.0

Remove

Equivalent IOS Commands

Gateway	Distance	Last Update
172.29.6.1	120	00:00:23

Distance: (default is 120)

```
MEDELLIN1#
MEDELLIN1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN1(config)#router rip
MEDELLIN1(config-router)#
```

MEDELLIN2

Physical Config CLI

### RIP Routing (v2)

Network  Add

Network Address

172.29.0.0

Remove

Equivalent IOS Commands

```

MEDELLIN2#show ip route
Routing Information Sources:
  Gateway         Distance      Last Update
  172.29.6.9      120           00:00:15
MEDELLIN2#
MEDELLIN2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN2(config)#router rip
MEDELLIN2(config-router)#

```

BOGOTA

Physical Config CLI

### RIP Routing (v2)

Network  Add

Network Address

172.29.0.0

Remove

Equivalent IOS Commands

```

BOGOTA#show ip route
Passive Interface(s):
Routing Information Sources:
  Gateway         Distance      Last Update
  172.29.6.9      120           00:00:15
BOGOTA#
BOGOTA#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA(config)#router rip
BOGOTA(config-router)#

```

BOGOTA1

Physical Config CLI

### RIP Routing (v2)

Network  Add

Network Address

172.29.0.0

172.29.0.0

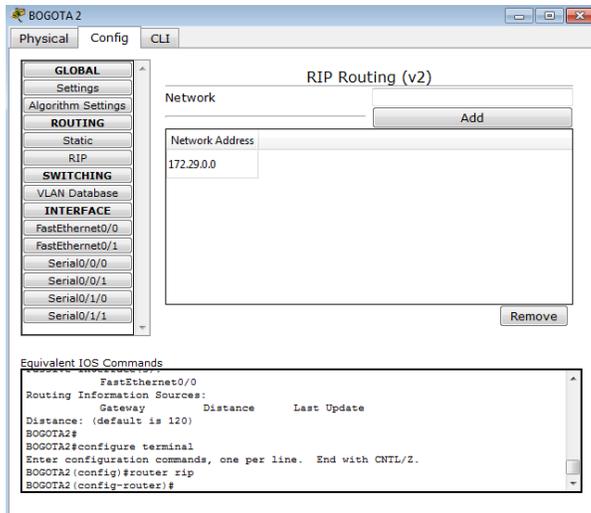
Remove

Equivalent IOS Commands

```

BOGOTA1#show ip route
FastEthernet0/0
Routing Information Sources:
  Gateway         Distance      Last Update
  172.29.6.9      120           00:00:15
BOGOTA1#
BOGOTA1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA1(config)#router rip
BOGOTA1(config-router)#

```



## Parte 5: Configurar encapsulamiento y autenticación PPP.

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

### ISP autenticación PAP

```
ISP>enable
ISP#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
ISP#config term
Enter configuration commands, one per line. End with CNTL/Z.
ISP(config)#username MEDELLIN
ISP(config)#username MEDELLIN password M1
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 PSI
```

## MEDELLIN autenticación PAP

```
MEDELLIN#config term
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN(config)#username ISP password PSI
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 M1
MEDELLIN(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

MEDELLIN(config-if)#^Z
MEDELLIN#
%SYS-5-CONFIG_I: Configured from console by console

MEDELLIN#ping 209.17.220.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.17.220.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/6/27 ms
```

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

## ISP autenticación CHAP

```
ISP#config term
Enter configuration commands, one per line. End with CNTL/Z.
ISP(config)#username BOGOTA password B1
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
```

## BOGOTA autenticación CHAP

```
BOGOTA#config term
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA(config)#username ISP password PSI
BOGOTA(config)#int s0/0/0
BOGOTA(config-if)#
BOGOTA(config-if)#encapsulation ppp
BOGOTA(config-if)#ppp authentication chap
BOGOTA(config-if)#^Z
BOGOTA#
%SYS-5-CONFIG_I: Configured from console by console

BOGOTA#ping 209.17.220.5

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.17.220.5, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
```

## Parte 6: Configuración de PAT.

- a. En la topología, si se activa NAT en cada equipo de salida (Bogotá y Medellín), 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 Medellín.
- b. Después de verificar lo indicado en el paso anterior proceda a configurar el NAT en el router Medellín. 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, como diferente puerto.
- 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, como diferente puerto.

### Configurando MEDELLIN

```
MEDELLIN#config term
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)#
```

---

### Configurando BOGOTA

```
BOGOTA#config term
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 s0/1/0
BOGOTA(config-if)#ip nat inside
BOGOTA(config-if)#int s0/1/1
BOGOTA(config-if)#ip nat inside
```

## Parte 7: Configuración del servicio DHCP.

- a. Configurar la red Medellín1 y Medellín2 donde el router Medellín1 debe ser el servidor DHCP para ambas redes Lan.

```
MEDELLIN1#config term
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN1(config)#ip dhcp excluded-address 172.29.4.1 172.29.4.5
MEDELLIN1(config)#ip dhcp excluded-address 172.29.4.129 172.29.4.133
MEDELLIN1(config)#ip dhcp pool MEDELLIN1
MEDELLIN1(dhcp-config)#network 172.29.4.0 255.255.255.128
MEDELLIN1(dhcp-config)#default-router 172.29.4.1
MEDELLIN1(dhcp-config)#dns-server 4.4.4.4
MEDELLIN1(dhcp-config)#exit
MEDELLIN1(config)#ip dhcp pool MEDELLIN2
MEDELLIN1(dhcp-config)#network 172.29.4.128 255.255.255.128
MEDELLIN1(dhcp-config)#default-router 172.29.4.129
MEDELLIN1(dhcp-config)#dns-server 4.4.4.4
MEDELLIN1(dhcp-config)#exit
```

- b. El router Medellín2 deberá habilitar el paso de los mensajes broadcast hacia la IP del router Medellín1.

```
MEDELLIN2(config)#int f0/0
MEDELLIN2(config-if)#ip helper-address 172.29.6.5
MEDELLIN2(config-if)#
```

- c. Configurar la red Bogotá1 y Bogotá2 donde el router Medellín1 debe ser el servidor DHCP para ambas redes Lan.

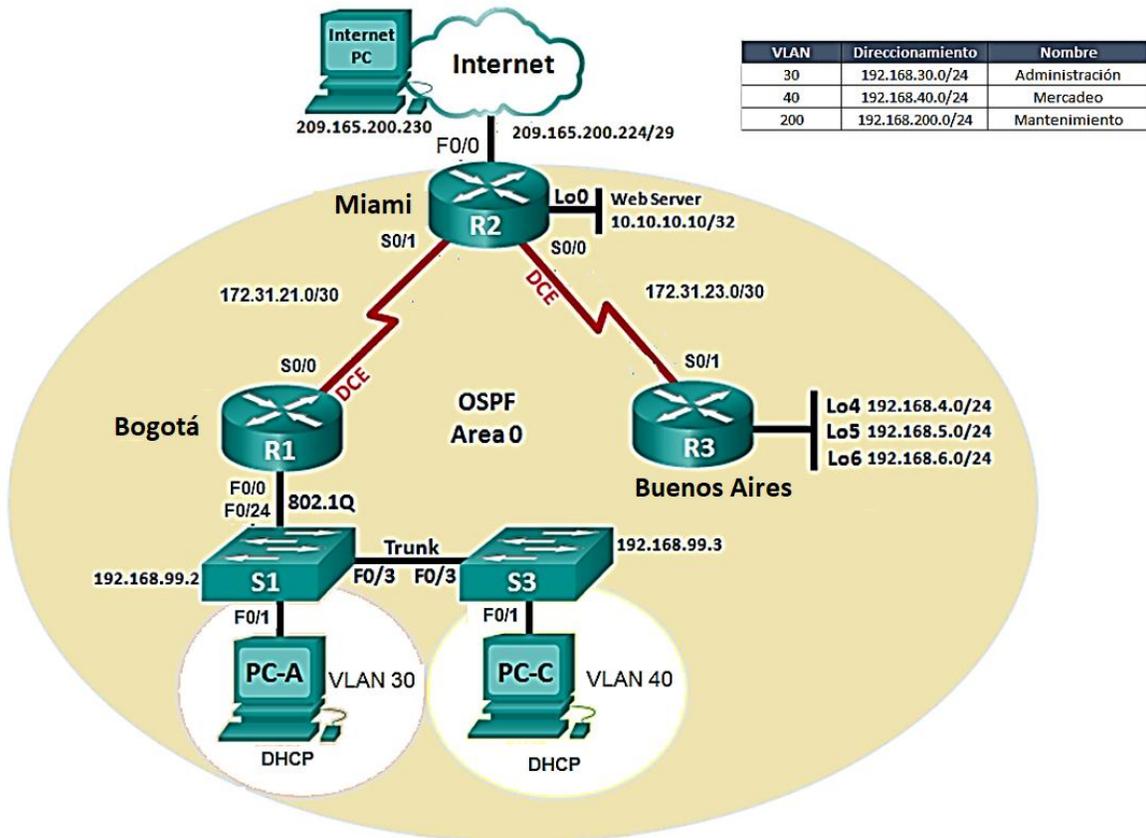
```
BOGOTA1#config term
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA1(config)#ip dhcp excluded-address 172.29.1.1 172.29.1.5
BOGOTA1(config)#ip dhcp excluded-address 172.29.0.1 172.29.0.5
BOGOTA1(config)#ip dhcp pool BTA2
BOGOTA1(dhcp-config)#network 172.29.1.0 255.255.255.0
BOGOTA1(dhcp-config)#default-router 172.29.1.1
BOGOTA1(dhcp-config)#dns-server 4.4.4.4
BOGOTA1(dhcp-config)#ip dhcp pool BTA3
BOGOTA1(dhcp-config)#network 172.29.0.0 255.255.255.0
BOGOTA1(dhcp-config)#default-router 172.29.0.1
BOGOTA1(dhcp-config)#dns-server 4.4.4.4
```

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

```
BOGOTA2#config term
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA2(config)#int f0/0
BOGOTA2(config-if)#ip helper-address 172.29.3.13
```

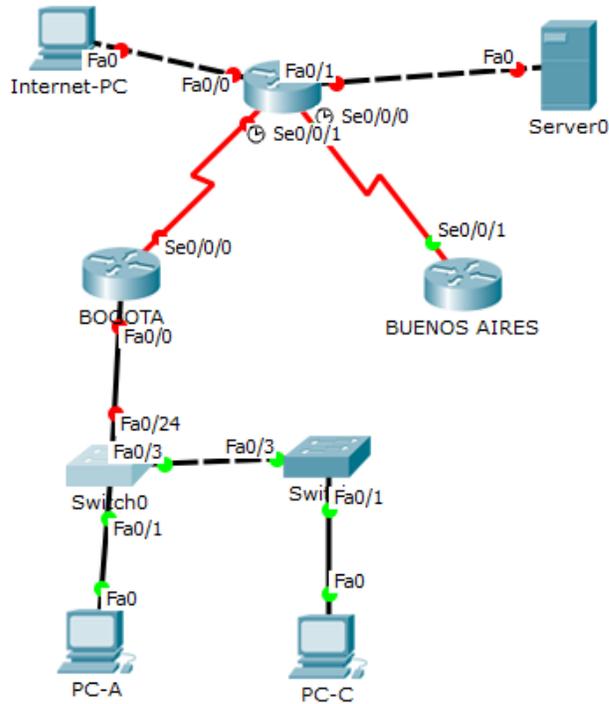
## ESCENARIO 2

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.

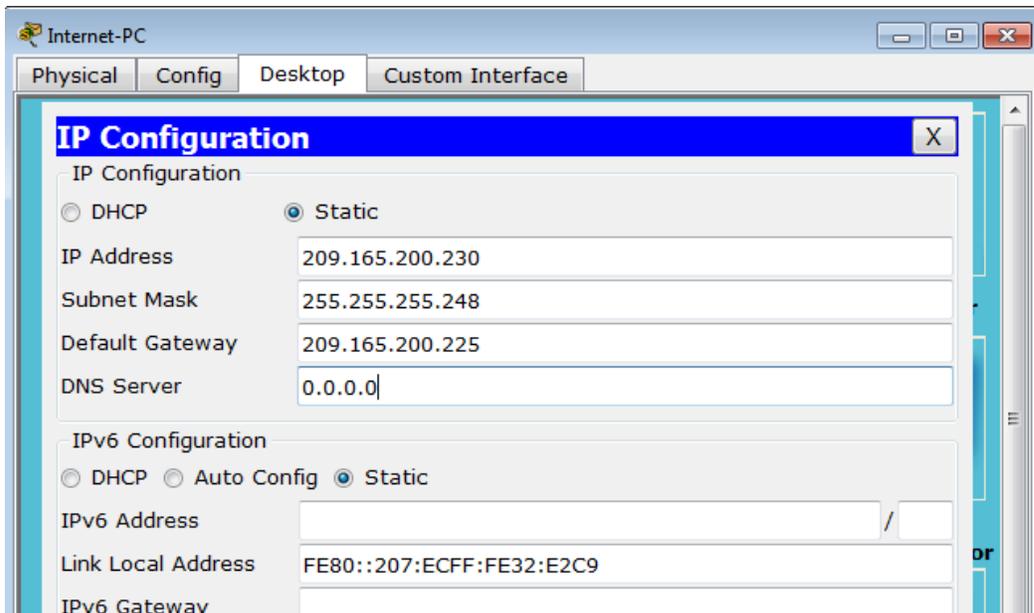


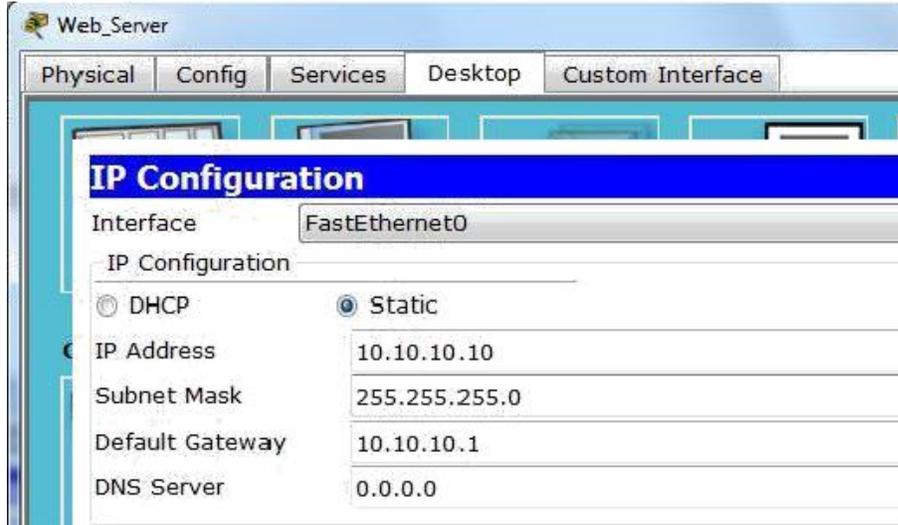
**Parte 1: Configurar el direccionamiento IP** acorde con la topología de red para cada uno de los dispositivos que forman parte del escenario.

Diseño de la topología en packet tracer



Configuración IP





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

### OSPFv2 area 0

Configuration Item or Task	Specification
Router ID R1	1.1.1.1
Router ID R2	5.5.5.5
Router ID R3	8.8.8.8
Configurar todas las interfaces LAN como pasivas	
Establecer el ancho de banda para enlaces seriales en	256 Kb/s
Ajustar el costo en la métrica de S0/0 a	9500

### 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.

### Configurando R1

```
R1#config term
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#no ip domain-lookup Router
R1(config)#enable secret class R1
R1(config)#line con
% Incomplete command.
R1(config)#line con 0
R1(config-line)#pass cisco
R1(config-line)#login
R1(config-line)#line vty 0 15
R1(config-line)#pass cisco
R1(config-line)#login
R1(config-line)#exit
R1(config)#service password-encryption
R1(config)#banner motd #Acceso solo a personal autorizado#
R1(config)#int s0/0/0
R1(config-if)#ip address 172.31.21.1 255.255.255.252
R1(config-if)#clock rate 128000
R1(config-if)#no shutdown

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

### Configurando R2

```
R2#config term
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#enable secret class
R2(config)#no ip domain-lookup
R2(config)#line con 0
^
% Invalid input detected at '^' marker.

R2(config)#line con 0
R2(config-line)#pass cisco
R2(config-line)#login
R2(config-line)#line vty 0 15
R2(config-line)#pass cisco
R2(config-line)#login
R2(config-line)#exit
R2(config)#service password- encryption
^
% Invalid input detected at '^' marker.

R2(config)#service password-encryption
R2(config)#banner motd #Acceso solo a personal autorizado#
R2(config)#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)#no shutdown

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

## Configurando R3

```
R3#config term
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#no ip domain-lookup
R3(config)#enable secret class
R3(config)#line con 0
R3(config-line)#pass cisco
R3(config-line)#login
R3(config-line)#line vty 0 15
R3(config-line)#pass cisco
R3(config-line)#login
R3(config-line)#exit
R3(config)#banner motd #Acceso solo a personal autorizado#
R3(config)#service password-encryption
R3(config)#int s0/0/1
R3(config-if)#ip address 172.31.23.2 255.255.255.252
R3(config-if)#no shutdown

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

## Verificar información de OSPF

```
R2#show ip ospf neigh

Neighbor ID      Pri   State           Dead Time   Address        Interface
8.8.8.8          0    FULL/ -         00:00:39   172.31.23.2   Serial0/0/0
1.1.1.1          0    FULL/ -         00:00:38   172.31.21.1   Serial0/0/1
R2#
```

```
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 00:00:09
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: 9500
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:03
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)
R2#
```

```

!
router ospf 1
  router-id 5.5.5.5
  log-adjacency-changes
  passive-interface FastEthernet0/0
  auto-cost reference-bandwidth 9500
  network 172.31.21.0 0.0.0.3 area 0
  network 172.31.23.0 0.0.0.3 area 0
  network 10.10.10.0 0.0.0.255 area 0
!
ip classless

```

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

### **VLANs S1**

```

Switch>enable
Switch#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#no ip domain-lookup
Switch(config)#hostname S1
S1(config)#enable secret class
S1(config)#line con 0
S1(config-line)#password cisco
S1(config-line)#login
S1(config-line)#exit
S1(config)#service password-encryption
S1(config)#banner motd $ Solo Personal Autorizado $
S1(config)#
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)#
S1(config-vlan)#exit

S1(config)#int f0/3
S1(config-if)#switchport mode trunk
S1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed
state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed
state to up

```

```

S1(config-if)#switchport trunk native vlan 1 S1(config-if)#
S1#
S1#enable
S1#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
S1(config)#int f0/24
S1(config-if)#switchport mode trunk
S1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed
state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to up
S1(config-if)#switchport trunk native vlan 1
S1(config-if)#no shutdown
S1(config-if)# S1#
S1(config-if)#switchport trunk native vlan 1
S1(config-if)#int range fa0/1-2, fa0/4-24, g0/1-2
S1(config-if-range)#switch mode access
S1(config-if-range)#
S1(config)#int f0/1
S1(config-if)#switchport mode access
S1(config-if)#switchport access vlan 30
S1(config-if)#int range fa0/2, fa0/4-24, g0/1-2
S1(config-if-range)#shutdown

```

### **VLANS S3**

```

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)#
S3(config)#int vlan 200
S3(config-if)#
%LINK-5-CHANGED: Interface Vlan200, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan200, changed state to up
S3(config-if)#ip add 192.168.99.3 255.255.255.0
S3(config-if)#
S3(config-if)#exit
S3(config)#ip default-gateway 192.168.99.1
S3(config)#
S3(config)#int f0/3
S3(config-if)#switchport mode trunk
S3(config-if)#switchport trunk native vlan 1 S3(config-if)#
S3(config-if)#int range fa0/1-2, fa0/4-24, g0/1-2
S3(config-if-range)#switchport mode access S3(config-if-range)#
S3(config)#int f0/1
S3(config-if)#switchport mode access

```

```
S3(config-if)#switchport access vlan 40
S3(config-if)#int range fa0/2, fa0/4-24, g0/1-2
S3(config-if-range)#shutdown
```

**Parte 4: En el Switch 3 deshabilitar DNS lookup**

**Parte 5: Asignar direcciones IP a los Switches, acorde a los lineamientos.**

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

**Parte 7: Implement DHCP and NAT for IPv4**

**Parte 8: Configurar R1 como servidor DHCP, para las VLANs 30 y 40.**

**Parte 9: Reservar las primeras 30 direcciones IP, de las VLAN 30 y 40 para configuraciones estáticas.**

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

### Reservar VLAN 30 y VLAN 40 las primeras 30 direcciones

```
Bogota#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
Bogota(config)#ip dhcp exc
Bogota(config)#ip dhcp excluded-address 192.168.30.1 192.168.30.30
Bogota(config)#ip dhcp ex
Bogota(config)#ip dhcp excluded-address 192.168.40.1 192.168.40.30
Bogota(config)#
```

### DHCP pool VLAN 30

```
Bogota(config)#ip dhcp pool ADMINISTRACION
Bogota(dhcp-config)#dns-server 10.10.10.11
Bogota(dhcp-config)#default-router 192.168.30.1
Bogota(dhcp-config)#network 192.168.30.0 255.255.255.0
```

### DHCP pool VLAN 40

```
Bogota(dhcp-config)#ip dhcp pool MERCADEO
Bogota(dhcp-config)#dns-server 10.10.10.11
Bogota(dhcp-config)#default-router 192.168.40.1
Bogota(dhcp-config)#network 192.168.40.0 255.255.255.0
```

## Parte 10: Configurar NAT en R2, para permitir que los host puedan salir a internet

### NAT en R2

```
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)#int f0/0
R2(config-if)#ip nat outside
R2(config-if)#int f0/1
R2(config-if)#ip nat inside
R2(config-if)#
R2(config-if)#access-list 1 permit 192.168.30.0 0.0.0.255
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)#ip nat pool INTERNET 209.165.200.225 209.165.200.229 netmask 255.255.255.248
```

## Parte 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(config)#access-list 1 permit 192.168.30.0 0.0.0.255
R2(config)#access-list 1 permit 192.168.40.0 0.0.0.255
R2(config)#ip nat pool INTERNET 209.165.200.225
209.165.200.228 netmask 255.255.255.248
```

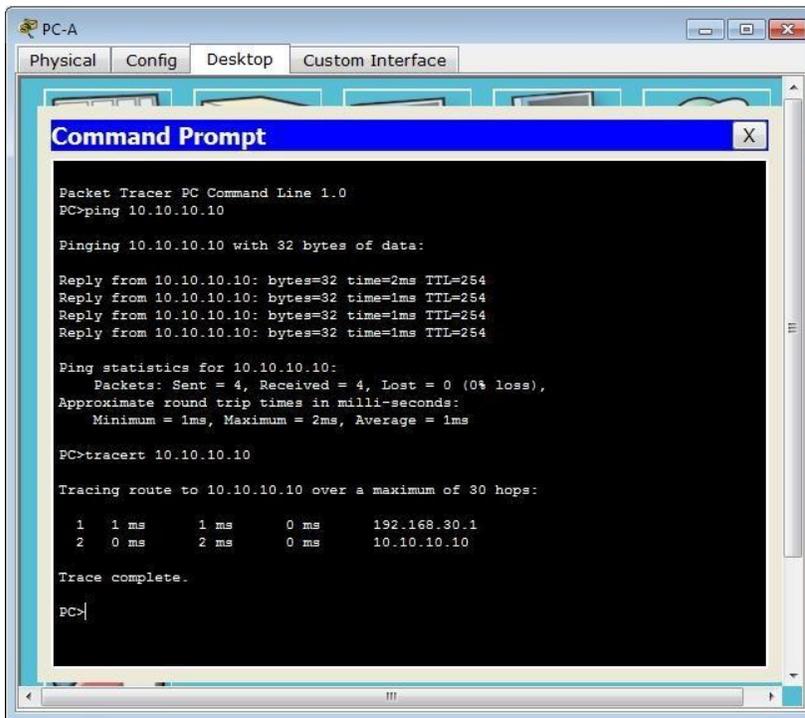
```
R2(config)#ip nat inside source list 1 pool INTERNET
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console
R2(config)#ip access-list standard ADMIN_S
R2(config-std-nacl)#permit host 172.31.21.1
R2(configstdnacl)
R2#exit
R2(config)#line vty 0 4
R2(configline)#access-class ADMIN_S in
R2(config-line)#
```

**Parte 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.

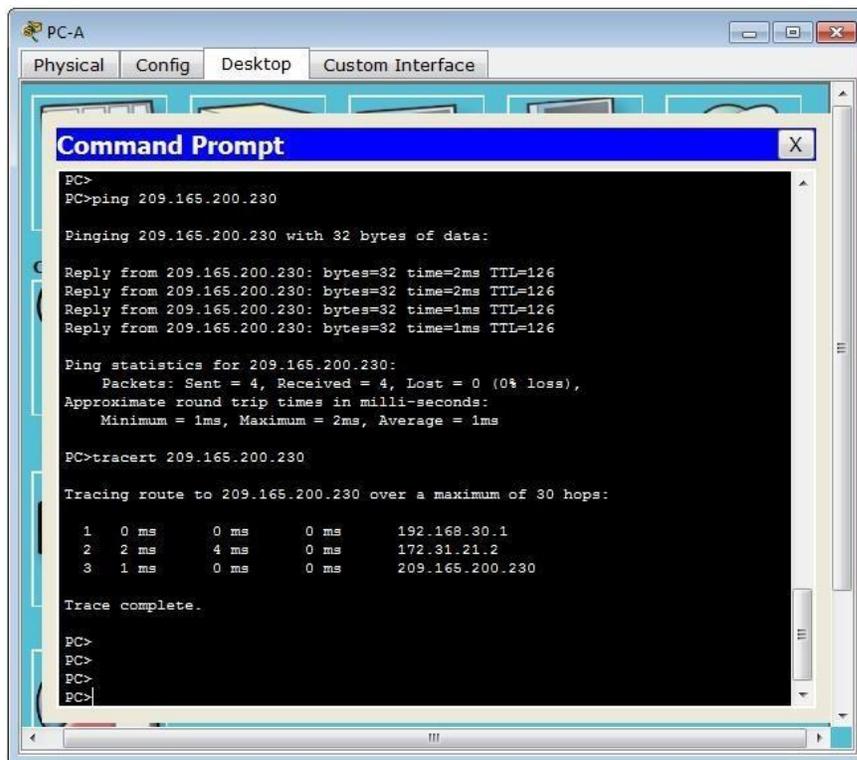
```
R2(config)#access-list 101 permit tcp any host 209.165.200.229 eq
R2(config)#access-list 101 permit icmp any any echo-reply
R2(config)#int f0/0
R2(config-if)#ip access-group 101 in
R2(config-if)#int s0/0/0
R2(config-if)#ip access-group 101 out
R2(config-if)#int s0/0/1
R2(config-if)#ip access-group 101 out
R2(config-if)#int f0/1
R2(config-if)#ip access-group 101 out
R2(config-if)
```

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

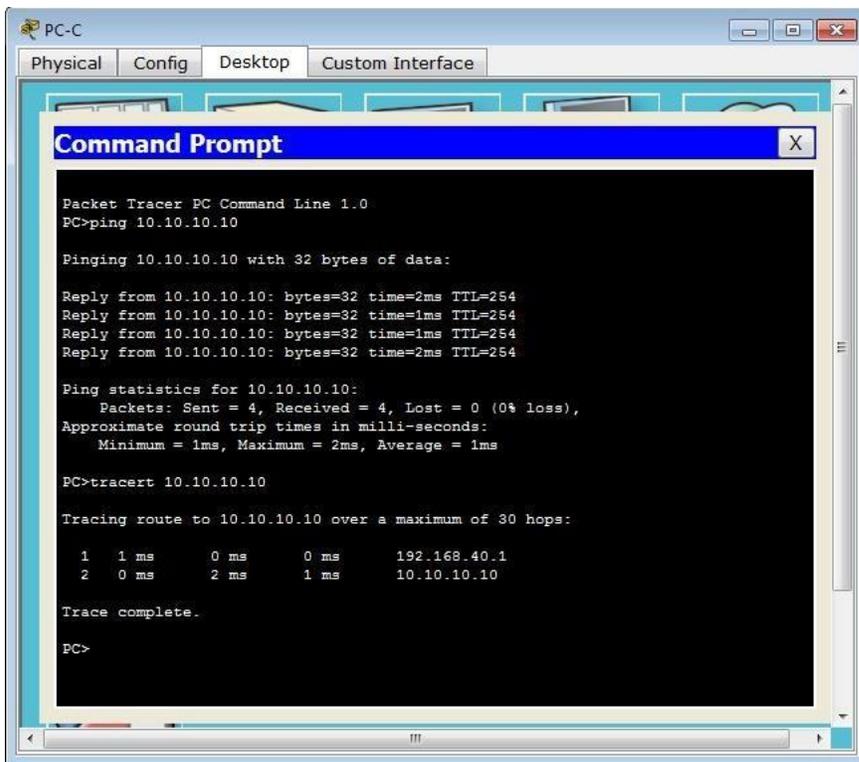
Ping y Tracer desde PC-A hasta Web Server



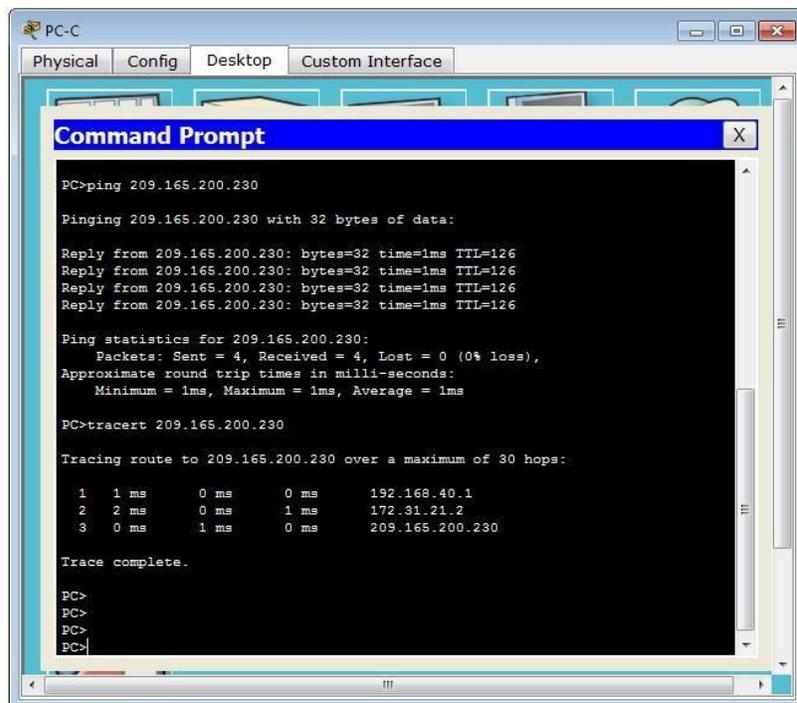
Ping y Tracer desde PC-A hasta Internet-PC



Ping y Tracert desde PC-C hasta Web Server



Ping y Tracert desde PC-A hasta Internet-PC



## CONCLUSIONES

Con base en los conocimientos adquiridos a lo largo del curso, correspondientes a la configuración de seguridad del puerto de los Switch, protocolos de Enrutamiento, Implementación de soluciones soportadas en enrutamiento, configuración y activación del enlace troncal de sistemas de red soportados en VLANs, y administración, seguridad y escalabilidad en redes conmutadas, se tomas estos principios y se aplican en el entono de diferentes escenarios, observando las limitaciones posibles a través de las simulaciones realizadas en el software de Packet Tracer. Por medio del diplomado de profundización se adquirieron conocimientos más concretos y enfáticos sobre el Routing and Switching en la tecnología de redes CISCO. Con el desarrollo de las soluciones de los diferentes escenarios se comprender como se puede implementar y configurar una red que este soportada por VLANs, al realizar estas pruebas se comprende que la seguridad del puerto en el Switch permite restringir el tráfico de entrada de un puerto al limitar las direcciones MAC que pueden enviar tráfico al puerto. También que las VLAN son útiles en la administración de grupos lógicos, lo que permite que los miembros de un grupo se muevan, cambien o agreguen fácilmente. Se realiza la descripción detallada del paso a paso de cada una de las etapas realizadas durante su desarrollo, el registro de los procesos de verificación de conectividad mediante el uso de los comandos requeridos para cada caso, empleando la herramienta de simulación Packet Tracer

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