

EVALUACIÓN – PRUEBA DE HABILIDADES PRACTICAS CCNA

FRANCISCO SANTANA ZAPATA

**UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA
ESCUELA DE CIENCIAS BASICAS, TECNOLOGIA E INGENIERIA
PROGRAMA INGENIERIA DE SISTEMAS
SAN ANDRES, 2019**

EVALUACIÓN – PRUEBA DE HABILIDADES PRACTICAS CCNA

FRANCISCO SANTANA ZAPATA

Grupo: 203092_3

**DIPLOMADO DE PROFUNDIZACION CISCO
(DISEÑO E IMPLEMENTACION DE SOLUCIONES INTEGRADAS LAN/WAN)**

PRESENTADO A:

JOSE IGNACIO CARDONA

INGENIERO DE TELECOMUNICACIONES

**UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA
ESCUELA DE CIENCIAS BASICAS, TECNOLOGIA E INGENIERIA**

PROGRAMA INGENIERIA DE SISTEMAS

SAN ANDRES, 2019

TABLA DE CONTENIDO

INTRODUCCION	4
1. DESARROLLO DE LOS ESCENARIOS	5
1.1. Escenario 1	5
1.1.1. Configuración de parametros basicos de routers.	6
1.1.2. Configuración del enrutamiento	11
1.1.3. Tabla de Enrutamiento y verificacion protocolo RIP.....	14
1.1.4. Verificación del protocolo RIP	18
1.1.5. Configuración encapsulamiento y autenticacion PPP.....	20
1.1.6. Configuración de PAT.	21
1.1.7. Configuración del servicio DHCP.	23
1.2. Escenario 2	25
1.2.1. Configurar el direccionamiento IP acorde con la topología de red para cada uno de los dispositivos que forman parte del escenario.	26
1.2.2. Configuración del protocolo de enrutamiento OSPFv2.....	30
1.2.3. Configuración VLANs, Puertos troncales, puertos de acceso, encapsulamiento, Inter-VLAN Routing y Seguridad en los Switches.	35
1.2.4. Deshabilitación DNS lookup en el Switch 3.	36
1.2.5. Asignación de direcciones IP a los Switches acorde a los lineamientos.	36
1.2.6. Desactivación de todas las interfaces que no sean utilizadas en el esquema de red.	36
1.2.7. Implementación DHCP and NAT for IPv4	36
1.2.8. Configuración R1 como servidor DHCP para las VLANs 30 y 40.	37
1.2.9. Reservar las primeras 30 direcciones IP de las VLAN 30 y 40 para configuraciones estáticas.....	37
1.2.10. Configurar NAT en R2 para permitir que los host puedan salir a internet	38
1.2.11. Configuración de listas de acceso de tipo estándar para restringir o permitir tráfico desde R1 o R3 hacia R2.....	38
1.2.12. 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.....	38

1.2.13. Verificación procesos de comunicación y redireccionamiento de tráfico en los routers mediante el uso de Ping y Traceroute.	39
CONCLUSIONES.....	40
REFERENCIAS BIBLIOGRAFICAS.....	41

INTRODUCCION

Le empresa CISCO System puede ser considera una de las empresas líderes en comunicaciones a nivel mundial. Realiza fabricación de equipos de red tales como enrutadores, interruptores, entre otros.

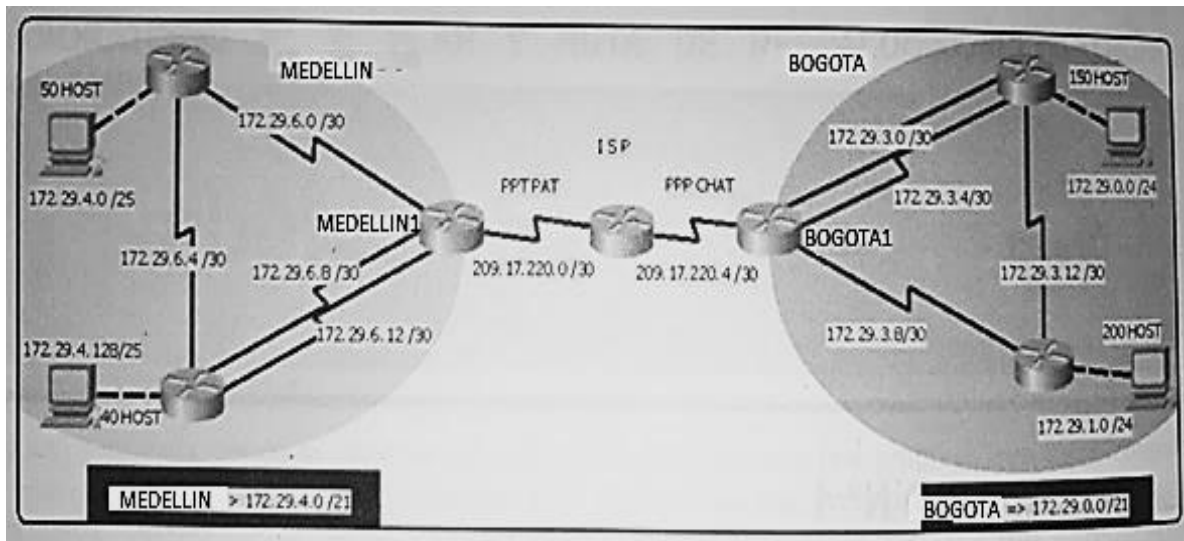
A través de la estrategia de aprendizaje basada en problemas, se logra evidenciar el desarrollo de las competencias necesarias para el diseño y configuración de una red WAN y LAN. Teniendo en cuenta criterios claves para un correcto funcionamiento de la red, garantizando la estabilidad y seguridad de la misma.

1. DESARROLLO DE LOS ESCENARIOS

1.1. Escenario 1

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

Topología de red



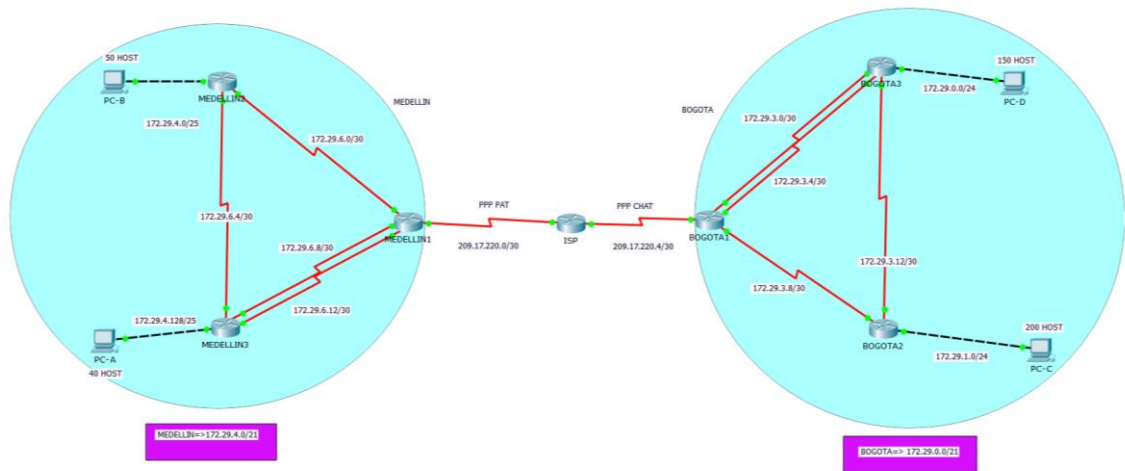
Este escenario plantea el uso de RIP como protocolo de enrutamiento, considerando que se tendrán rutas por defecto redistribuidas; asimismo, habilitar el encapsulamiento PPP y su autenticación.

Los routers Bogota2 y medellin2 proporcionan el servicio DHCP a su propia red LAN y a los routers 3 de cada ciudad.

Debe configurar PPP en los enlaces hacia el ISP, con autenticación.

Debe habilitar NAT de sobrecarga en los routers Bogota1 y medellin1.

1.1.1. Configuración de parametros basicos de routers.



Dispositivo	Interfaz	Direccion IP	Mascara de Subred	Gateway Predeterminado
Medellin1	S0/0/0	172.29.6.10	255.255.255.252	N/A
	S0/0/1	172.29.6.2	255.255.255.252	N/A
	S0/1/0	209.17.220.2	255.255.255.252	N/A
	S0/1/1	172.29.6.14	255.255.255.252	N/A
Medellin2	G0/0	172.29.4.1	255.255.255.128	N/A
	S0/0/0	172.29.6.6	255.255.255.252	N/A
	S0/0/1	172.29.6.1	255.255.255.252	N/A
Medellin3	G0/0	172.29.4.129	255.255.255.128	N/A
	S0/0/0	172.29.6.5	255.255.255.252	N/A
	S0/0/1	172.29.6.9	255.255.255.252	N/A
	S0/1/0	172.29.6.13	255.255.255.252	N/A
Bogota1	S0/0/0	172.29.3.2	255.255.255.252	N/A
	S0/0/1	172.29.3.10	255.255.255.252	N/A
	S0/1/0	209.17.220.6	255.255.255.252	N/A
	S0/1/1	172.29.3.6	255.255.255.252	N/A
Bogota2	G0/0	172.29.1.1	255.255.255.0	N/A
	S0/0/0	172.29.3.13	255.255.255.252	N/A
	S0/0/1	172.29.3.9	255.255.255.252	N/A
Bogota3	G0/0	172.29.0.1	255.255.255.0	N/A
	S0/0/0	172.29.3.14	255.255.255.252	N/A
	S0/0/1	172.29.3.5	255.255.255.252	N/A
	S0/1/0	172.29.3.1	255.255.255.252	N/A
ISP	S0/0/0	209.17.220.5	255.255.255.252	N/A
	S0/0/1	209.17.220.1	255.255.255.252	N/A
PC-A	NIC	DHCP	DHCP	DHCP

PC-B	NIC	DHCP	DHCP	DHCP
PC-C	NIC	DHCP	DHCP	DHCP
PC-D	NIC	DHCP	DHCP	DHCP

Configuracion Router BOGOTA2

```

Router>ena
Router#config t
Router(config)#hostname bogota2
BOGOTA2(config)#enable secret diplomado
BOGOTA2(config)#line console 0
BOGOTA2 (config-line)#password sisco
BOGOTA2 (config-line)#login
BOGOTA2 (config-line)#loggin synchronous
BOGOTA2 (config-line)#line vty 0 15
BOGOTA2 (config-line)#password sisco
BOGOTA2 (config-line)#login
BOGOTA2 (config-line)#loggin synchronous
BOGOTA2 (config-line)#banner motd &Acceso Restringido&
BOGOTA2 (config)#int g0/0
BOGOTA2 (config-if)#ip address 172.29.1.1 255.255.255.0
BOGOTA2 (config-if)#no shutdown
BOGOTA2 (config-if)#int s0/0/0
BOGOTA2 (config-if)#ip address 172.29.3.13 255.255.255.252
BOGOTA2 (config-if)#no shutdown
BOGOTA2 (config-if)#int s0/0/1
BOGOTA2 (config-if)#ip address 172.29.3.9 255.255.255.252
BOGOTA2 (config-if)#no shutdown
BOGOTA2 (config-if)#exit

```

Configuracion Router BOGOTA3

```

Router>ena
Router#config t
Router(config)#hostname BOGOTA3
BOGOTA3(config)#enable secret diplomado
BOGOTA3(config)#line console 0
BOGOTA3(config-line)#password sisco
BOGOTA3(config-line)#login
BOGOTA3(config-line)#loggin synchronous
BOGOTA3(config-line)#line vty 0 15

```

```
BOGOTA3(config-line)#password sisco
BOGOTA3(config-line)#login
BOGOTA3(config-line)#loggin synchronous
BOGOTA3(config-line)#banner motd &Acceso Restringido&
BOGOTA3(config)#int g0/0
BOGOTA3(config-if)#ip address 172.29.0.1 255.255.255.0
BOGOTA3(config-if)#no shutdown
BOGOTA3(config-if)#int s0/0/0
BOGOTA3(config-if)#ip address 172.29.3.14 255.255.255.252
BOGOTA3(config-if)#no shutdown
BOGOTA3(config-if)#int s0/0/1
BOGOTA3(config-if)#ip address 172.29.3.5 255.255.255.252
BOGOTA3(config-if)#no shutdown
BOGOTA3(config-if)#int s0/1/0
BOGOTA3(config-if)#ip address 172.29.3.1 255.255.255.252
BOGOTA3(config-if)#no shutdown
```

Configuracion Router BOGOTA1

```
Router>ena
Router#config t
Router(config)#hostname BOGOTA1
BOGOTA1(config)#enable secret diplomado
BOGOTA1(config)#line console 0
BOGOTA1(config-line)#password sisco
BOGOTA1(config-line)#login
BOGOTA1(config-line)#loggin synchronous
BOGOTA1(config-line)#banner motd &Acceso Restringido&
BOGOTA1(config)#int s0/0/0
BOGOTA1(config-if)#ip address 172.29.3.2 255.255.255.252
BOGOTA1(config-if)#no shutdown
BOGOTA1(config-if)#int s0/0/1
BOGOTA1(config-if)#ip address 172.29.3.10 255.255.255.252
BOGOTA1(config-if)#no shutdown
BOGOTA1(config-if)#int s0/1/0
BOGOTA1(config-if)#ip address 209.17.220.6 255.255.255.252
BOGOTA1(config-if)#no shutdown
BOGOTA1(config-if)#int s0/1/1
BOGOTA1(config-if)#ip address 172.29.3.6 255.255.255.252
BOGOTA1(config-if)#no shutdown
```

Configuracion Router MEDELLIN2

```
Router>ena
Router#config t
Router(config)#hostname MEDELLIN2
MEDELLIN2(config)#enable secret diplomado
MEDELLIN2(config)#line console 0
MEDELLIN2(config-line)#password sisco
MEDELLIN2(config-line)#login
MEDELLIN2(config-line)#loggin synchronous
MEDELLIN2(config-line)#banner motd &Acceso Restringido&
MEDELLIN2(config)#line vty 0 15
MEDELLIN2(config-line)#password sisco
MEDELLIN2(config-line)#login
MEDELLIN2(config-line)#loggin synchronous
MEDELLIN2(config-line)#int g0/0
MEDELLIN2(config-if)#ip address 172.29.4.1 255.255.255.128
MEDELLIN2(config-if)#no shutdown
MEDELLIN2(config-if)#int s0/0/0
MEDELLIN2(config-if)#ip address 172.29.6.6 255.255.255.252
MEDELLIN2(config-if)#no shutdown
MEDELLIN2(config-if)#int s0/0/1
MEDELLIN2(config-if)#ip address 172.29.6.1 255.255.255.252
MEDELLIN2(config-if)#no shutdown
```

Configuracion Router MEDELLIN3

```
Router>ENA
Router#config t
Router(config)#hostname MEDELLIN3
MEDELLIN3(config)#enable secret diplomado
MEDELLIN3(config)#line console 0
MEDELLIN3(config-line)#password sisco
MEDELLIN3(config-line)#login
MEDELLIN3(config-line)#loggin synchronous
MEDELLIN3(config-line)#line vty 0 15
MEDELLIN3(config-line)#password sisco
MEDELLIN3(config-line)#login
MEDELLIN3(config-line)#loggin synchronous
MEDELLIN3(config-line)#banner motd &Acceso Restringido&
MEDELLIN3(config)#int g0/0
MEDELLIN3(config-if)#ip address 172.29.4.129 255.255.255.128
MEDELLIN3(config-if)#no shutdown
```

```
MEDELLIN3(config-if)#int s0/0/0
MEDELLIN3(config-if)#ip address 172.29.6.5 255.255.255.252
MEDELLIN3(config-if)#no shutdown
MEDELLIN3(config-if)#int s0/0/1
MEDELLIN3(config-if)#ip address 172.29.6.9 255.255.255.252
MEDELLIN3(config-if)#no shutdown
MEDELLIN3(config-if)#int s0/1/0
MEDELLIN3(config-if)#ip address 172.29.6.13 255.255.255.252
MEDELLIN3(config-if)#no shutdown
```

Configuracion Router MEDELLIN1

```
Router>ena
Router#config t
Router(config)#hostname MEDELLIN1
MEDELLIN1(config)#enable secret diplomado
MEDELLIN1(config)#line console 0
MEDELLIN1(config-line)#password sisco
MEDELLIN1(config-line)#login
MEDELLIN1(config-line)#login synchronous
MEDELLIN1(config-line)#line vty 0 15
MEDELLIN1(config-line)#password sisco
MEDELLIN1(config-line)#banner motd &Acceso Restringido&
MEDELLIN1(config)#int s0/0/0
MEDELLIN1(config-if)#ip address 172.29.6.10 255.255.255.252
MEDELLIN1(config-if)#no shutdown
MEDELLIN1(config-if)#int s0/0/1
MEDELLIN1(config-if)#ip address 172.29.6.2 255.255.255.252
MEDELLIN1(config-if)#no shutdown
MEDELLIN1(config-if)#int s0/1/0
MEDELLIN1(config-if)#ip address 209.17.220.2 255.255.255.252
MEDELLIN1(config-if)#no shutdown
MEDELLIN1(config-if)#int s0/1/1
MEDELLIN1(config-if)#ip address 172.29.6.14 255.255.255.252
MEDELLIN1(config-if)#no shutdown
```

Configuracion Router ISP

```
Router>ena
Router#config t
Router(config)#hostname ISP
```

```
ISP(config)#enable secret diplomado
ISP(config)#line console 0
ISP(config-line)#password sisco
ISP(config-line)#login
ISP(config-line)#login synchronous
ISP(config-line)#line vty 0 15
ISP(config-line)#password sisco
ISP(config-line)#login
ISP(config-line)#login synchronous
ISP(config-line)#banner motd &Acceso Restringido&
ISP(config)#int s0/0/0
ISP(config-if)#ip address 209.14.220.5 255.255.255.252
ISP(config-if)#no shutdown
ISP(config-if)#int s0/0/1
ISP(config-if)#ip address 209.14.220.1 255.255.255.252
ISP(config-if)#no shutdown
```

1.1.2. Configuración del enrutamiento

Inicialmente se realizara configuración del enrutamiento en la red usando el protocolo RIP versión 2, declarando la red principal y desactivando la sumarización automática.

Configuración del enrutamiento Router BOGOTA1

```
BOGOTA1#config t
BOGOTA1(config)#router rip
BOGOTA1(config-router)#version 2
BOGOTA1(config-router)#passive-interface s0/1/0
BOGOTA1(config-router)#no auto-summary
BOGOTA1(config-router)#network 172.29.3.0
BOGOTA1(config-router)#network 172.29.3.4
BOGOTA1(config-router)#network 172.29.3.8
BOGOTA1(config-router)#end
```

Configuración del enrutamiento Router BOGOTA2

```
BOGOTA2#ena
BOGOTA2#config t
BOGOTA2(config)#router rip
```

```
BOGOTA2(config-router)#version 2
BOGOTA2(config-router)#passive-interface g0/0
BOGOTA2(config-router)#no auto-summary
BOGOTA2(config-router)#network 172.29.1.0
BOGOTA2(config-router)#network 172.29.3.8
BOGOTA2(config-router)#network 172.29.3.12
BOGOTA2(config-router)#end
```

Configuracion del enrutamiento Router BOGOTA3

```
BOGOTA3>ena
BOGOTA3#config t
BOGOTA3(config)#router rip
BOGOTA3(config-router)#version 2
BOGOTA3(config-router)#passive-interface g0/0
BOGOTA3(config-router)#no auto-summary
BOGOTA3(config-router)#network 172.29.0.0
BOGOTA3(config-router)#network 172.29.3.0
BOGOTA3(config-router)#network 172.29.3.4
BOGOTA3(config-router)#network 172.29.3.12
BOGOTA3(config-router)#end
```

Configuracion del enrutamiento Router MEDELLIN1

```
MEDELLIN1>ena
MEDELLIN1#config t
MEDELLIN1(config)#router rip
MEDELLIN1(config-router)#version 2
MEDELLIN1(config-router)#passive-interface s0/1/0
MEDELLIN1(config-router)#no auto-summary
MEDELLIN1(config-router)#network 172.29.6.0
MEDELLIN1(config-router)#network 172.29.6.8
MEDELLIN1(config-router)#network 172.29.6.12
MEDELLIN1(config-router)#end
```

Configuracion del enrutamiento Router MEDELLIN2

```
MEDELLIN2>ena
MEDELLIN2#config t
MEDELLIN2(config)#router rip
MEDELLIN2(config-router)#version 2
```

```
MEDELLIN2(config-router)#passive-interface g0/0
MEDELLIN2(config-router)#no auto-summary
MEDELLIN2(config-router)#network 172.29.4.0
MEDELLIN2(config-router)#network 172.29.6.0
MEDELLIN2(config-router)#network 172.29.6.4
MEDELLIN2(config-router)#end
```

Configuracion del enrutamiento Router MEDELLIN3

```
MEDELLIN3>ena
MEDELLIN3#config t
MEDELLIN3(config)#router rip
MEDELLIN3(config-router)#version 2
MEDELLIN3(config-router)#passive-interface g0/0
MEDELLIN3(config-router)#no auto-summary
MEDELLIN3(config-router)#network 172.29.4.128
MEDELLIN3(config-router)#network 172.29.6.4
MEDELLIN3(config-router)#network 172.29.6.8
MEDELLIN3(config-router)#network 172.29.6.12
MEDELLIN3(config-router)#end
```

Ahora anadimos en los routers BOGOTA1 y MEDELLIN1 configuración de enrutamiento una ruta por defecto hacia el ISP y redistribuirla dentro de las publicaciones de RIP.

Configuracion Router BOGOTA1

```
BOGOTA1>ena
BOGOTA1#config t
BOGOTA1(config)#ip route 0.0.0.0 0.0.0.0 209.17.220.5
BOGOTA1(config)#router rip
BOGOTA1(config-router)#default-information originate
BOGOTA1(config-router)#end
```

Configuracion Router MEDELLIN1

```
MEDELLIN1>ena
MEDELLIN1#config t
MEDELLIN1(config)#ip route 0.0.0.0 0.0.0.0 209.17.220.1
MEDELLIN1(config)#router rip
```

```
MEDELLIN1(config-router)#default-information originate
MEDELLIN1(config-router)#end
```

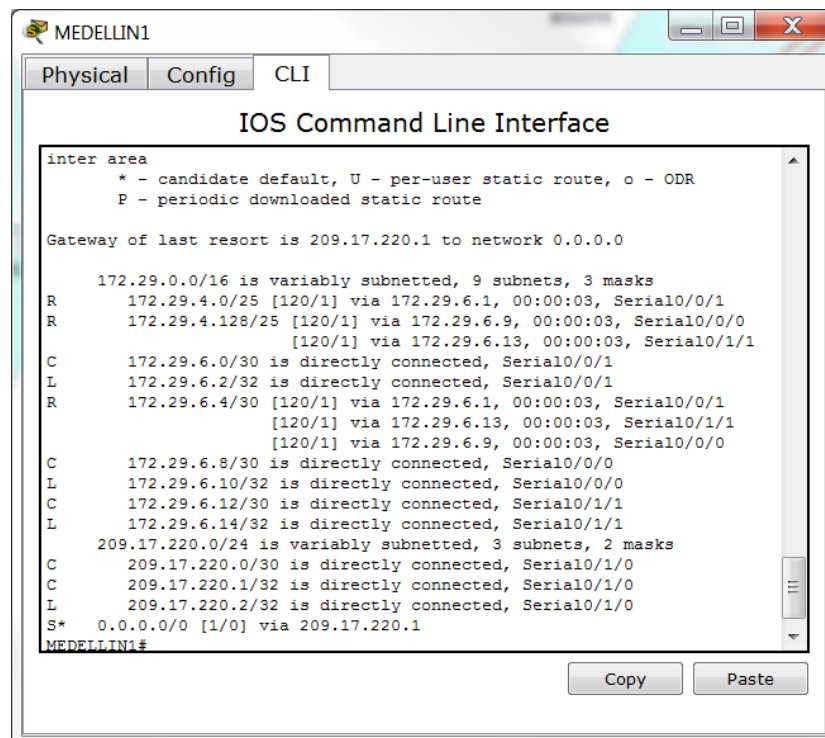
Ahora, se realiza configuracion del router ISP asignando una ruta estática dirigida hacia cada red interna de Bogotá y Medellín las subredes de cada uno a /22.

```
ISP>ena
ISP#config t
ISP(config)#ip route 172.29.0.0 255.255.252.0 209.17.220.6
ISP(config)#ip route 172.29.4.0 255.255.252.0 209.17.220.2
ISP(config)#end
```

1.1.3. Tabla de Enrutamiento y verificacion protocolo RIP.

Con el fin de realizar una verificacion de la tabla de enrutamiento de cada uno de los routers y protocolo RIP, se utiliza el comando show ip route.

Tabla de enrutamiento Router MEDELLIN1

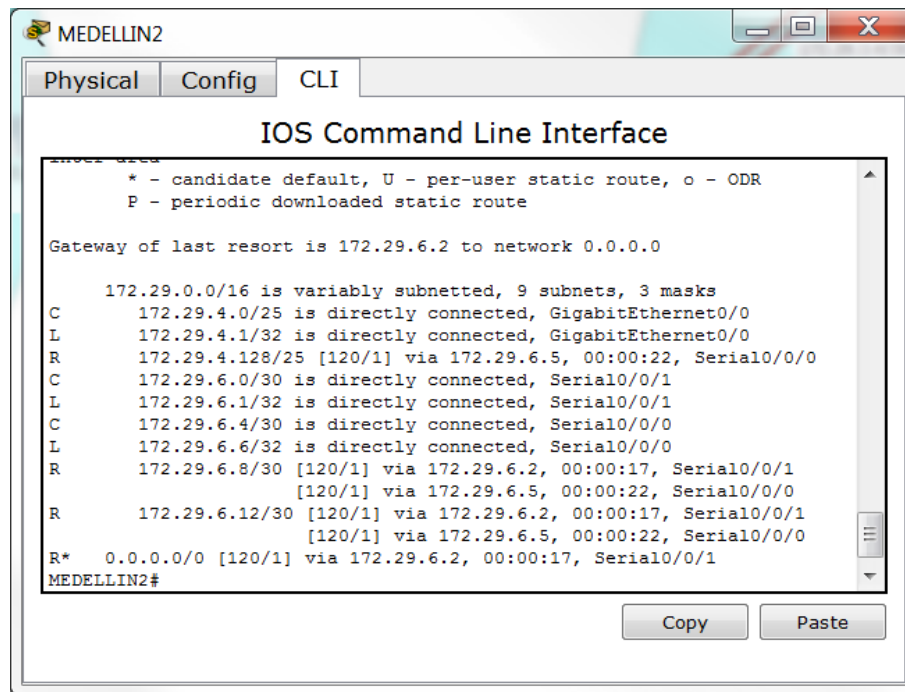


```
MEDELLIN1
Physical Config CLI
IOS Command Line Interface
inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 209.17.220.1 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R 172.29.4.0/25 [120/1] via 172.29.6.1, 00:00:03, Serial0/0/1
R 172.29.4.128/25 [120/1] via 172.29.6.9, 00:00:03, Serial0/0/0
[120/1] via 172.29.6.13, 00:00:03, Serial0/1/1
C 172.29.6.0/30 is directly connected, Serial0/0/1
L 172.29.6.2/32 is directly connected, Serial0/0/1
R 172.29.6.4/30 [120/1] via 172.29.6.1, 00:00:03, Serial0/0/1
[120/1] via 172.29.6.13, 00:00:03, Serial0/1/1
[120/1] via 172.29.6.9, 00:00:03, Serial0/0/0
C 172.29.6.8/30 is directly connected, Serial0/0/0
L 172.29.6.10/32 is directly connected, Serial0/0/0
C 172.29.6.12/30 is directly connected, Serial0/1/1
L 172.29.6.14/32 is directly connected, Serial0/1/1
209.17.220.0/24 is variably subnetted, 3 subnets, 2 masks
C 209.17.220.0/30 is directly connected, Serial0/1/0
C 209.17.220.1/32 is directly connected, Serial0/1/0
L 209.17.220.2/32 is directly connected, Serial0/1/0
S* 0.0.0.0/0 [1/0] via 209.17.220.1
MEDELLIN1#
```

Tabla de enrutamiento Router MEDELLIN2

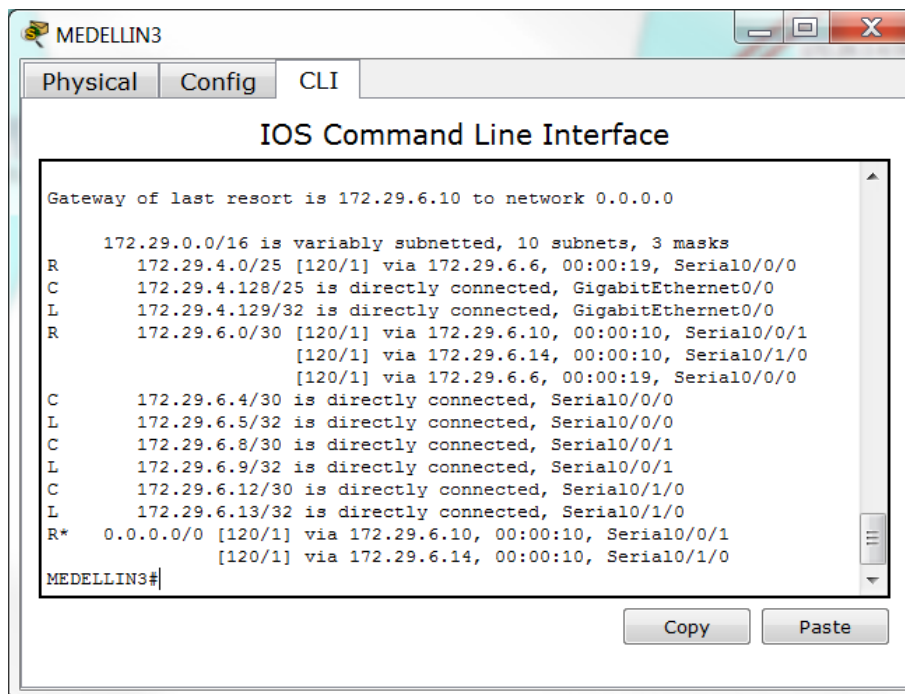


```
MEDELLIN2
Physical Config CLI
IOS Command Line Interface
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 172.29.6.2 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
C 172.29.4.0/25 is directly connected, GigabitEthernet0/0
L 172.29.4.1/32 is directly connected, GigabitEthernet0/0
R 172.29.4.128/25 [120/1] via 172.29.6.5, 00:00:22, Serial0/0/0
C 172.29.6.0/30 is directly connected, Serial0/0/1
L 172.29.6.1/32 is directly connected, Serial0/0/1
C 172.29.6.4/30 is directly connected, Serial0/0/0
L 172.29.6.6/32 is directly connected, Serial0/0/0
R 172.29.6.8/30 [120/1] via 172.29.6.2, 00:00:17, Serial0/0/1
[120/1] via 172.29.6.5, 00:00:22, Serial0/0/0
R 172.29.6.12/30 [120/1] via 172.29.6.2, 00:00:17, Serial0/0/1
[120/1] via 172.29.6.5, 00:00:22, Serial0/0/0
R* 0.0.0.0/0 [120/1] via 172.29.6.2, 00:00:17, Serial0/0/1
MEDELLIN2#
```

Tabla de enrutamiento Router MEDELLIN3

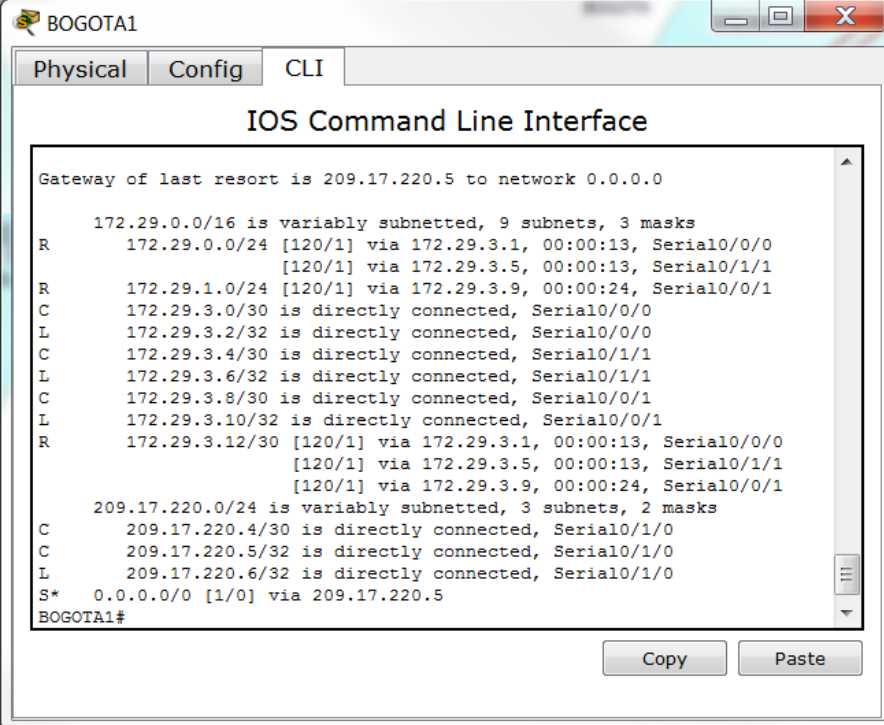


```
MEDELLIN3
Physical Config CLI
IOS Command Line Interface

Gateway of last resort is 172.29.6.10 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 10 subnets, 3 masks
R 172.29.4.0/25 [120/1] via 172.29.6.6, 00:00:19, Serial0/0/0
C 172.29.4.128/25 is directly connected, GigabitEthernet0/0
L 172.29.4.129/32 is directly connected, GigabitEthernet0/0
R 172.29.6.0/30 [120/1] via 172.29.6.10, 00:00:10, Serial0/0/1
[120/1] via 172.29.6.14, 00:00:10, Serial0/1/0
[120/1] via 172.29.6.6, 00:00:19, Serial0/0/0
C 172.29.6.4/30 is directly connected, Serial0/0/0
L 172.29.6.5/32 is directly connected, Serial0/0/0
C 172.29.6.8/30 is directly connected, Serial0/0/1
L 172.29.6.9/32 is directly connected, Serial0/0/1
C 172.29.6.12/30 is directly connected, Serial0/1/0
L 172.29.6.13/32 is directly connected, Serial0/1/0
R* 0.0.0.0/0 [120/1] via 172.29.6.10, 00:00:10, Serial0/0/1
[120/1] via 172.29.6.14, 00:00:10, Serial0/1/0
MEDELLIN3#
```

Tabla de enrutamiento Router BOGOTA1

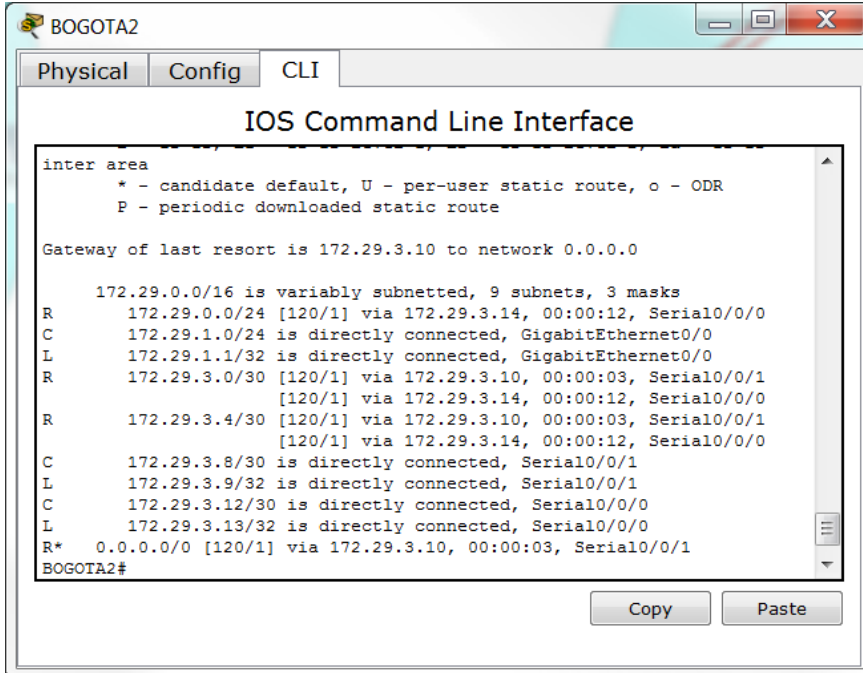


```
BOGOTA1
Physical Config CLI
IOS Command Line Interface

Gateway of last resort is 209.17.220.5 to network 0.0.0.0

 172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R   172.29.0.0/24 [120/1] via 172.29.3.1, 00:00:13, Serial0/0/0
   [120/1] via 172.29.3.5, 00:00:13, Serial0/1/1
R   172.29.1.0/24 [120/1] via 172.29.3.9, 00:00:24, Serial0/0/1
C   172.29.3.0/30 is directly connected, Serial0/0/0
L   172.29.3.2/32 is directly connected, Serial0/0/0
C   172.29.3.4/30 is directly connected, Serial0/1/1
L   172.29.3.6/32 is directly connected, Serial0/1/1
C   172.29.3.8/30 is directly connected, Serial0/0/1
L   172.29.3.10/32 is directly connected, Serial0/0/1
R   172.29.3.12/30 [120/1] via 172.29.3.1, 00:00:13, Serial0/0/0
   [120/1] via 172.29.3.5, 00:00:13, Serial0/1/1
   [120/1] via 172.29.3.9, 00:00:24, Serial0/0/1
 209.17.220.0/24 is variably subnetted, 3 subnets, 2 masks
C   209.17.220.4/30 is directly connected, Serial0/1/0
C   209.17.220.5/32 is directly connected, Serial0/1/0
L   209.17.220.6/32 is directly connected, Serial0/1/0
S*  0.0.0.0/0 [1/0] via 209.17.220.5
BOGOTA1#
```

Tabla de enrutamiento Router BOGOTA2



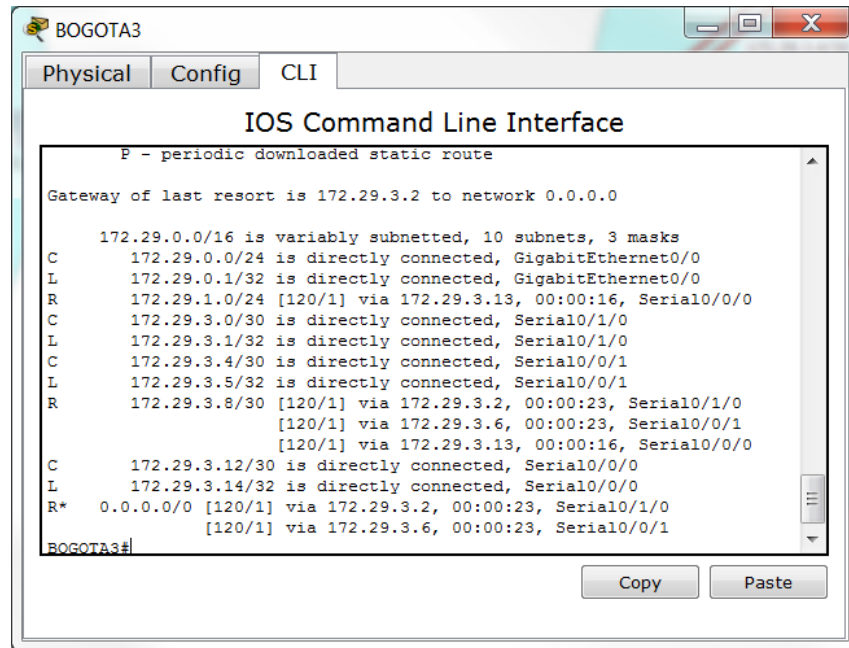
```
BOGOTA2
Physical Config CLI
IOS Command Line Interface

inter area
 * - candidate default, U - per-user static route, o - ODR
 P - periodic downloaded static route

Gateway of last resort is 172.29.3.10 to network 0.0.0.0

 172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R   172.29.0.0/24 [120/1] via 172.29.3.14, 00:00:12, Serial0/0/0
C   172.29.1.0/24 is directly connected, GigabitEthernet0/0
L   172.29.1.1/32 is directly connected, GigabitEthernet0/0
R   172.29.3.0/30 [120/1] via 172.29.3.10, 00:00:03, Serial0/0/1
   [120/1] via 172.29.3.14, 00:00:12, Serial0/0/0
R   172.29.3.4/30 [120/1] via 172.29.3.10, 00:00:03, Serial0/0/1
   [120/1] via 172.29.3.14, 00:00:12, Serial0/0/0
C   172.29.3.8/30 is directly connected, Serial0/0/1
L   172.29.3.9/32 is directly connected, Serial0/0/1
C   172.29.3.12/30 is directly connected, Serial0/0/0
L   172.29.3.13/32 is directly connected, Serial0/0/0
R*  0.0.0.0/0 [120/1] via 172.29.3.10, 00:00:03, Serial0/0/1
BOGOTA2#
```

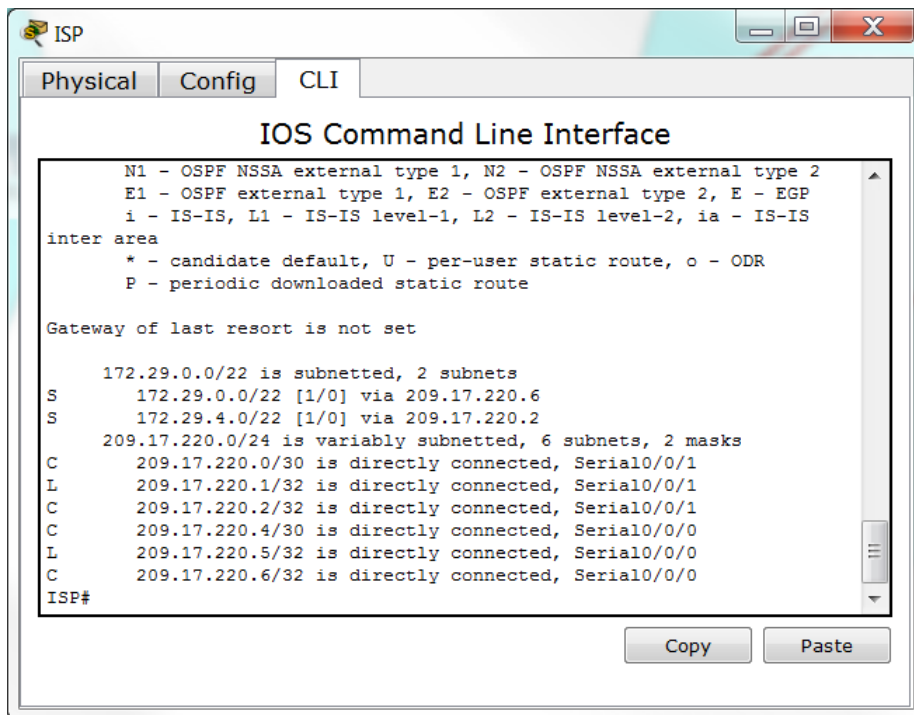
Tabla de enrutamiento Router BOGOTA3



```
Physical Config CLI
IOS Command Line Interface
P - periodic downloaded static route
Gateway of last resort is 172.29.3.2 to network 0.0.0.0

  172.29.0.0/16 is variably subnetted, 10 subnets, 3 masks
C   172.29.0.0/24 is directly connected, GigabitEthernet0/0
L   172.29.0.1/32 is directly connected, GigabitEthernet0/0
R   172.29.1.0/24 [120/1] via 172.29.3.13, 00:00:16, Serial0/0/0
C   172.29.3.0/30 is directly connected, Serial0/1/0
L   172.29.3.1/32 is directly connected, Serial0/1/0
C   172.29.3.4/30 is directly connected, Serial0/0/1
L   172.29.3.5/32 is directly connected, Serial0/0/1
R   172.29.3.8/30 [120/1] via 172.29.3.2, 00:00:23, Serial0/1/0
    [120/1] via 172.29.3.6, 00:00:23, Serial0/0/1
    [120/1] via 172.29.3.13, 00:00:16, Serial0/0/0
C   172.29.3.12/30 is directly connected, Serial0/0/0
L   172.29.3.14/32 is directly connected, Serial0/0/0
R*  0.0.0.0/0 [120/1] via 172.29.3.2, 00:00:23, Serial0/1/0
    [120/1] via 172.29.3.6, 00:00:23, Serial0/0/1
BOGOTA3#
```

Tabla de enrutamiento Router ISP1

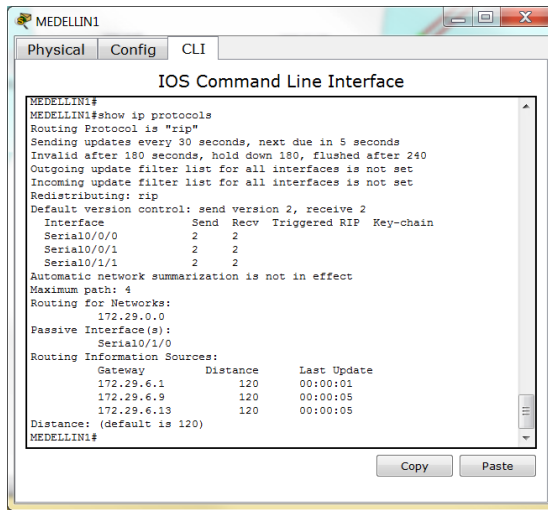


```
Physical Config CLI
IOS Command Line Interface
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is not set

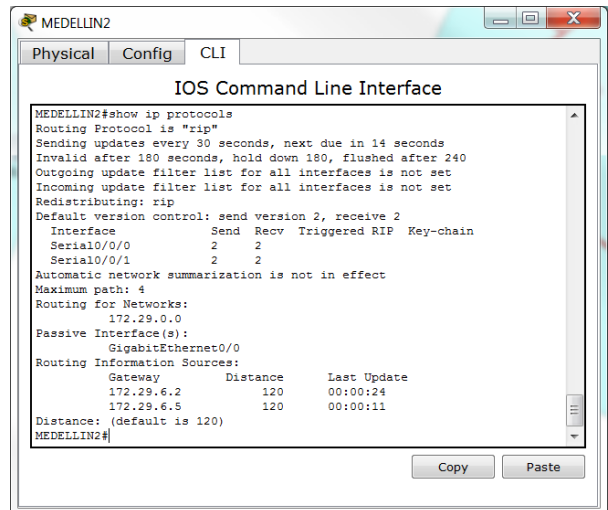
  172.29.0.0/22 is subnetted, 2 subnets
S   172.29.0.0/22 [1/0] via 209.17.220.6
S   172.29.4.0/22 [1/0] via 209.17.220.2
  209.17.220.0/24 is variably subnetted, 6 subnets, 2 masks
C   209.17.220.0/30 is directly connected, Serial0/0/1
L   209.17.220.1/32 is directly connected, Serial0/0/1
C   209.17.220.2/32 is directly connected, Serial0/0/1
C   209.17.220.4/30 is directly connected, Serial0/0/0
L   209.17.220.5/32 is directly connected, Serial0/0/0
C   209.17.220.6/32 is directly connected, Serial0/0/0
ISP#
```

1.1.4. Verificación del protocolo RIP

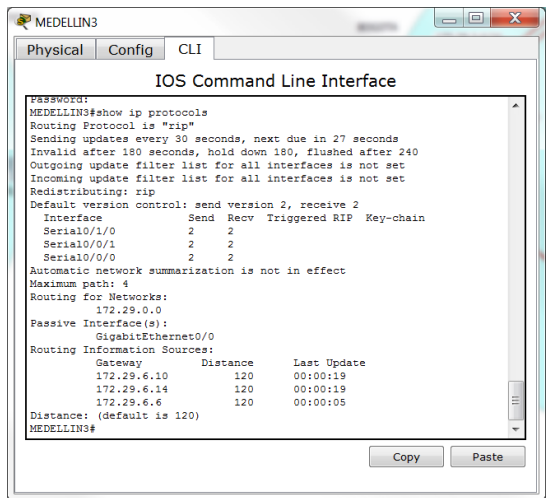
Con el fin de realizar verificación de las opciones de enrutamiento configuradas en los routers, se emplea el comando show ip protocols, obteniendo el siguiente resultado:



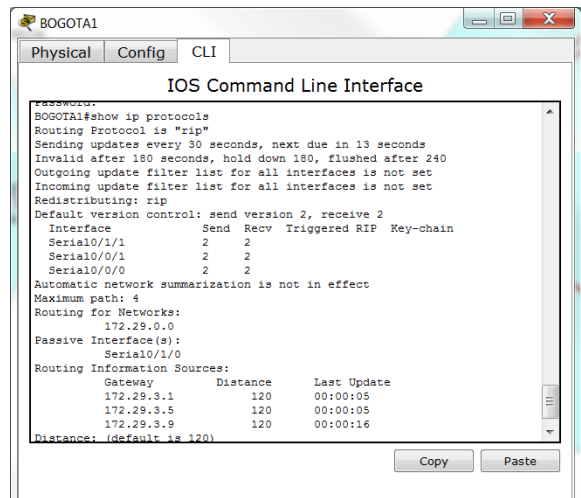
```
MEDELLIN1#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 5 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: 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
  Serial0/1/1        2      2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
  Serial0/1/0
Routing Information Sources:
  Gateway         Distance    Last Update
  172.29.6.1      120        00:00:01
  172.29.6.9      120        00:00:05
  172.29.6.13     120        00:00:05
Distance: (default is 120)
MEDELLIN1#
```



```
MEDELLIN2#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 14 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):
  GigabitEthernet0/0
Routing Information Sources:
  Gateway         Distance    Last Update
  172.29.6.2      120        00:00:24
  172.29.6.5      120        00:00:11
Distance: (default is 120)
MEDELLIN2#
```



```
MEDELLIN3#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 27 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
  Serial0/0/0        2      2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
  GigabitEthernet0/0
Routing Information Sources:
  Gateway         Distance    Last Update
  172.29.6.10     120        00:00:19
  172.29.6.14     120        00:00:19
  172.29.6.6      120        00:00:05
Distance: (default is 120)
MEDELLIN3#
```



```
BOGOTA1#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 13 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
  Serial0/1/1        2      2
  Serial0/0/1        2      2
  Serial0/0/0        2      2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.29.0.0
Passive Interface(s):
  Serial0/1/0
Routing Information Sources:
  Gateway         Distance    Last Update
  172.29.3.1      120        00:00:05
  172.29.3.5      120        00:00:05
  172.29.3.9      120        00:00:16
Distance: (default is 120)
BOGOTA1#
```

```

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
  Serial0/0/1         2      2
  Serial0/0/0         2      2
  Automatic network summarization is not in effect
  Maximum path: 4
  Routing for Networks:
    172.29.0.0
  Passive Interface(s):
    GigabitEthernet0/0
  Routing Information Sources:
    Gateway         Distance    Last Update
  172.29.3.10       120         00:00:23
  172.29.3.14       120         00:00:15
BOGOTA2#

```

```

BOGOTA3#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 24 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
  Serial0/1/0         2      2
  Serial0/0/1         2      2
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    172.29.0.0
  Passive Interface(s):
    GigabitEthernet0/0
  Routing Information Sources:
    Gateway         Distance    Last Update
  172.29.3.2        120         00:00:14
  172.29.3.6        120         00:00:14
  172.29.3.13       120         00:00:13
BOGOTA3#

```

Ahora se verifica la base de datos de RIP de cada uno de los routers mediante el comando show ip route connected, así:

ISP#show ip rou version connected

```

C 209.17.220.0/30 is directly connected, Serial0/0/1
C 209.17.220.2/32 is directly connected, Serial0/0/1
C 209.17.220.4/30 is directly connected, Serial0/0/0
C 209.17.220.6/32 is directly connected, Serial0/0/0

```

MEDELLIN1#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, Serial0/0/0
C 172.29.6.12/30 is directly connected, Serial0/1/1
C 209.17.220.0/30 is directly connected, Serial0/1/0
C 209.17.220.1/32 is directly connected, Serial0/1/0

```

MEDELLIN2#show ip rout connected

```

C 172.29.4.0/25 is directly connected, GigabitEthernet0/0
C 172.29.6.0/30 is directly connected, Serial0/0/1
C 172.29.6.4/30 is directly connected, Serial0/0/0

```

MEDELLIN3#show ip route connected

```

C 172.29.4.128/25 is directly connected, GigabitEthernet0/0
C 172.29.6.4/30 is directly connected, Serial0/0/0
C 172.29.6.8/30 is directly connected, Serial0/0/1
C 172.29.6.12/30 is directly connected, Serial0/1/0

```

BOGOTA1#sho ip ro connected

```

C 172.29.3.0/30 is directly connected, Serial0/0/0
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, Serial0/1/0
C 209.17.220.5/32 is directly connected, Serial0/1/0
```

```
BOGOTA2#sho ip ro connected
C 172.29.1.0/24 is directly connected, GigabitEthernet0/0
C 172.29.3.8/30 is directly connected, Serial0/0/1
C 172.29.3.12/30 is directly connected, Serial0/0/0
```

```
BOGOTA3#show ip route connected
C 172.29.0.0/24 is directly connected, GigabitEthernet0/0
C 172.29.3.0/30 is directly connected, Serial0/1/0
C 172.29.3.4/30 is directly connected, Serial0/0/1
C 172.29.3.12/30 is directly connected, Serial0/0/0
```

1.1.5. Configuración encapsulamiento y autentificación PPP.

De acuerdo a la topología se realiza configuración con autentificación PAP al enlace Medellín1 con ISP.

```
ISP(config)#username MEDELLIN1 password sisco
ISP(config)#int s0/0/1
ISP(config-if)#encapsulation ppp
ISP(config-if)#ppp authentication pap
ISP(config-if)#ppp pap sent-username ISP password sisco
```

```
MEDELLIN1#config t
MEDELLIN1(config)#username ISP password sisco
MEDELLIN1(config)#int s0/1/0
MEDELLIN1(config)# encapsulation ppp
MEDELLIN1(config-if)# ppp pap sent-username MEDELLIN password sisco
```

Así mismo, se realiza configuración con autentificación CHAT al enlace Bogotá1 con ISP.

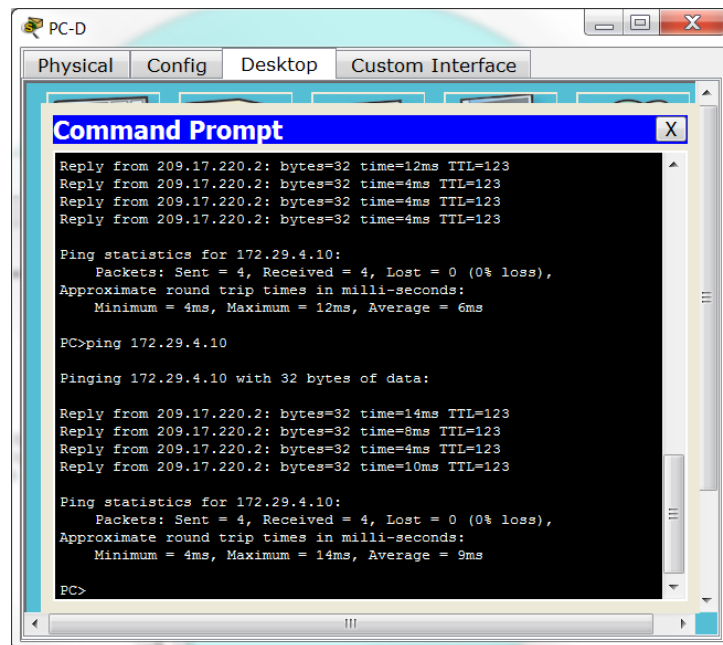
```
ISP#config t
ISP(config)#username BOGOTA1 password sisco
ISP(config)#int s0/0/0
ISP(config-if)#encapsulation ppp
ISP(config-if)#ppp authentication chap
```

```
BOGOTA1#config t
BOGOTA1(config)#username ISP password sisco
BOGOTA1(config)#int s0/1/0
BOGOTA1(config-if)#encapsulation ppp
BOGOTA1(config-if)#ppp authentication chap
```

1.1.6. Configuración de PAT.

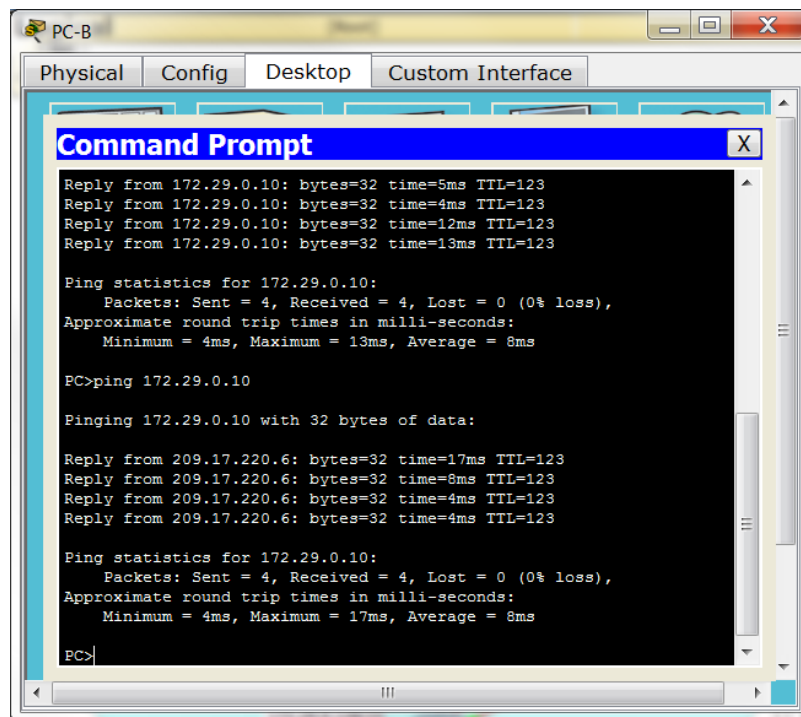
Configuración NAT en router MEDELLIN1

```
MEDELLIN1>ena
MEDELLIN1#config t
MEDELLIN1(config)#ip nat inside source list 1 interface s0/1/0 overload
MEDELLIN1(config)#access-list 1 permit 172.29.4.0 0.0.0.255
MEDELLIN1(config)#int s0/0/0
MEDELLIN1(config-if)#ip nat inside
MEDELLIN1(config-if)#int s0/0/1
MEDELLIN1(config-if)#ip nat inside
MEDELLIN1(config-if)#int s0/1/0
MEDELLIN1(config-if)#ip nat outside
MEDELLIN1(config-if)#int s0/1/1
MEDELLIN1(config-if)#ip nat inside
```



Configuración NAT en router BOGOTA1

```
BOGOTA1>ena
BOGOTA1#config t
BOGOTA1(config)#ip nat inside source list 1 interface s0/1/0 overload
BOGOTA1(config)#access-list 1 permit 172.29.0.0 0.0.7.255
BOGOTA1(config)#int s0/1/0
BOGOTA1(config-if)#ip nat outside
BOGOTA1(config-if)#int s0/0/1
BOGOTA1(config-if)#ip nat inside
BOGOTA1(config-if)#int s0/0/0
BOGOTA1(config-if)#ip nat inside
BOGOTA1(config-if)#int s0/1/1
BOGOTA1(config-if)#ip nat inside
```



The screenshot shows a window titled "PC-B" with tabs for "Physical", "Config", "Desktop", and "Custom Interface". The "Config" tab is active, and a "Command Prompt" window is open. The Command Prompt displays the following output:

```
Reply from 172.29.0.10: bytes=32 time=5ms TTL=123
Reply from 172.29.0.10: bytes=32 time=4ms TTL=123
Reply from 172.29.0.10: bytes=32 time=12ms TTL=123
Reply from 172.29.0.10: bytes=32 time=13ms TTL=123

Ping statistics for 172.29.0.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 13ms, Average = 8ms

PC>ping 172.29.0.10

Pinging 172.29.0.10 with 32 bytes of data:

Reply from 209.17.220.6: bytes=32 time=17ms TTL=123
Reply from 209.17.220.6: bytes=32 time=8ms TTL=123
Reply from 209.17.220.6: bytes=32 time=4ms TTL=123
Reply from 209.17.220.6: bytes=32 time=4ms TTL=123

Ping statistics for 172.29.0.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 17ms, Average = 8ms

PC>
```

1.1.7. Configuración del servicio DHCP.

Configuración DHCP en router MEDELLIN2

```
MEDELLIN2>ena
MEDELLIN2#config t
MEDELLIN2(config)#ip dhcp excluded-address 172.29.4.1 172.29.4.9
MEDELLIN2(config)#ip dhcp excluded-address 172.29.4.129 172.29.4.139
MEDELLIN2(config)#ip dhcp excluded-address 172.29.1.1 172.29.1.9
MEDELLIN2(config)#ip dhcp excluded-address 172.29.0.1 172.29.0.9
MEDELLIN2(config)#ip dhcp pool MEDHCP1
MEDELLIN2(dhcp-config)#network 172.29.4.0 255.255.255.128
MEDELLIN2(dhcp-config)#default-router 172.29.4.1
MEDELLIN2(config)#ip dhcp pool MEDHCP2
MEDELLIN2(dhcp-config)#network 172.29.4.128 255.255.255.128
MEDELLIN2(dhcp-config)#default-router 172.29.4.129
MEDELLIN2(config)#ip dhcp pool BOGDHCP1
MEDELLIN2(dhcp-config)#network 172.29.1.0 255.255.255.0
MEDELLIN2(dhcp-config)#default-router 172.29.1.1
MEDELLIN2(config)#ip dhcp pool BOGDHCP2
MEDELLIN2(dhcp-config)#network 172.29.0.0 255.255.255.0
MEDELLIN2(dhcp-config)#default-router 172.29.0.1
```

Configuración DHCP en router MEDELLIN3

```
MEDELLIN3>ena
MEDELLIN3#config t
MEDELLIN3(config)#int g0/0
MEDELLIN3(config-if)#ip helper-address 172.29.6.6
MEDELLIN3(config-if)#end
```

Configuración DHCP en router BOGOTA2

```
BOGOTA2>ena
BOGOTA2#config t
BOGOTA2(config)# int g0/0
BOGOTA2(config)# ip helper-address 172.29.6.6
```

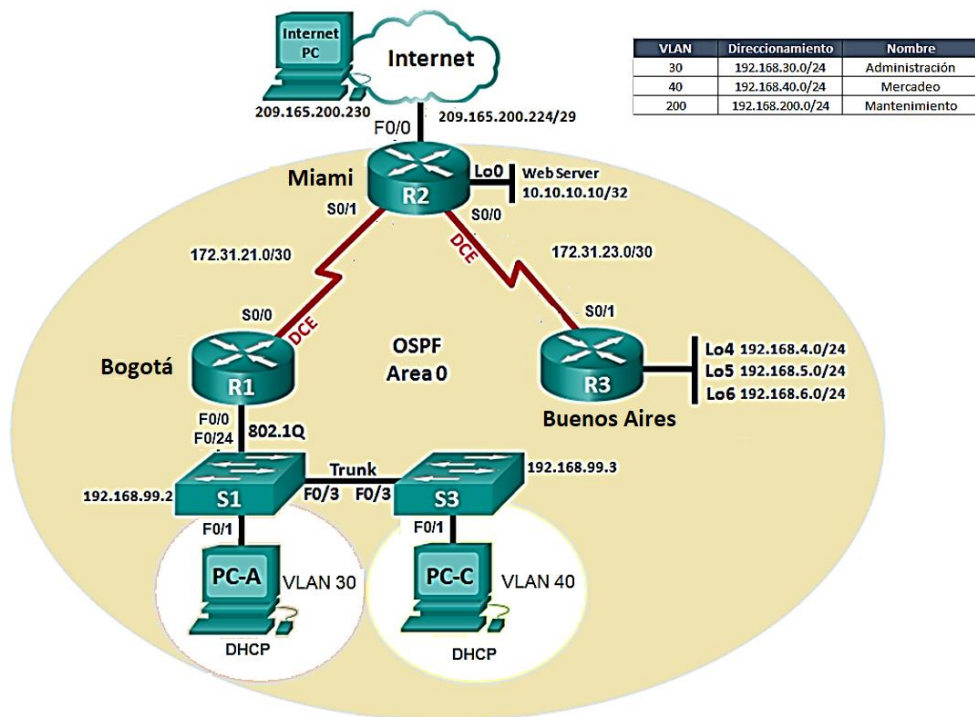
Configuración DHCP en router BOGOTA3

```
BOGOTA3>ena
BOGOTA3#config t
BOGOTA3(config)#int g0/0
BOGOTA3(config-if)# ip helper-address 172.29.6.6
```

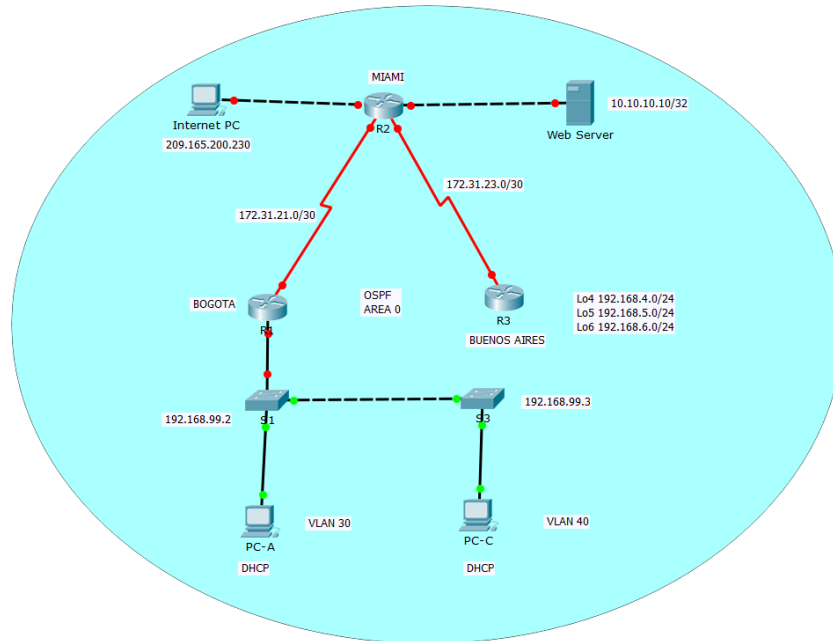
1.2. Escenario 2

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

Topología de red



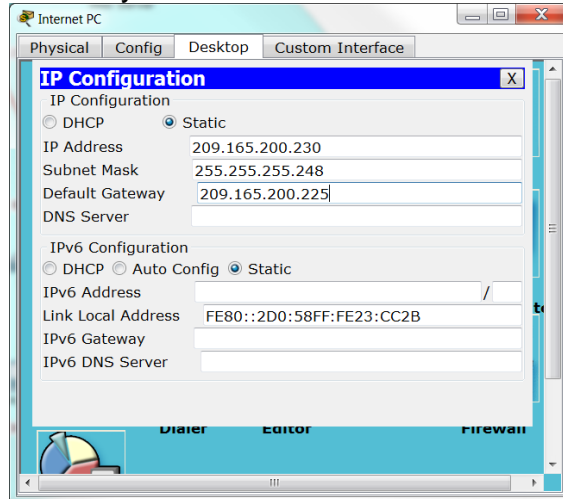
1.2.1. Configurar el direccionamiento IP acorde con la topología de red para cada uno de los dispositivos que forman parte del escenario.



Dispositivo	Interfaz	Dirección IP	Máscara de Subred	Gateway Predeterminado
R1	S0/0/0	172.31.21.1	255.255.255.252	N/A
	G0/1.30	192.168.30.1	255.255.255.0	N/A
	G0/1.40	192.168.40.1	255.255.255.0	N/A
	G0/1.200	192.168.200.1	255.255.255.0	N/A
	S0/1/1			N/A
R2	G0/0	209.165.200.225	255.255.255.248	N/A
	G0/1	10.10.10.1	255.255.255.0	N/A
	S0/0/0	172.31.21.2	255.255.255.252	N/A
	S0/0/1	172.31.23.1	255.255.255.252	N/A
R3	S0/0/0	172.31.23.3	255.255.255.252	N/A
	Lo4	172.31.4.1	255.255.255.0	N/A
	Lo5	172.31.5.1	255.255.255.0	N/A
	Lo6	172.31.6.1	255.255.255.0	N/A
S1	VLAN200	192.168.99.2	255.255.255.0	192.168.99.1
S3	VLAN20	192.168.99.3	255.255.255.0	192.168.99.1
Internet PC	NIC	209.165.200.230	255.255.255.248	209.165.200.225
Webserver	Lo0	10.10.10.10	255.255.255.0	10.10.10.1
PC-A	NIC	DHCP	DHCP	DHCP
PC-C	NIC	DHCP	DHCP	DHCP

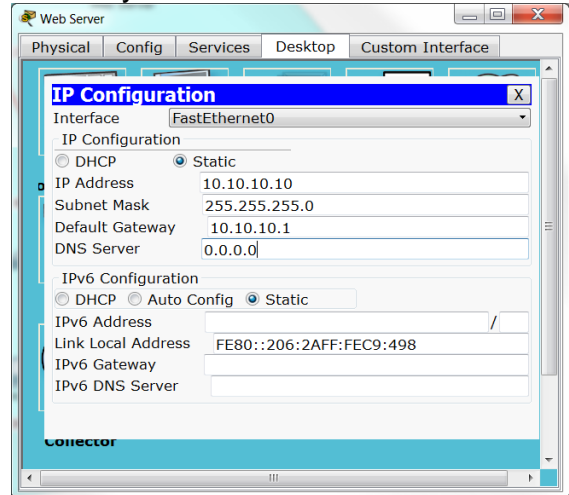
Configuración PC de internet

IP: 209.165.200.230
Mascara: 255.255.255.248
Gateway: 209.165.200.225



Configuración Web Server

IP: 10.10.10.10
Mascara: 255.255.255.0
Gateway: 10.10.10.1



Configuración R1

```
Router>ENA
Router#config t
Router(config)#hostname R1
R1(config)#enable secret sisco
R1(config)#line console 0
R1(config-line)#password diplomado
R1(config-line)#login
R1(config-line)#line vty 0 15
R1(config-line)#password diplomado
R1(config-line)#login
R1(config-line)#exit
R1(config)#service password-encryption
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
R1(config)#int g0/1.30
R1(config-subif)#encapsulation dot1Q 30
R1(config-subif)#ip address 192.168.30.1 255.255.255.0
R1(config-if)#no shutdown

R1(config-subif)#int g0/1.40
```

```
R1(config-subif)#encapsulation dot1Q 40
R1(config-subif)#ip address 192.168.40.1 255.255.255.0
R1(config-if)#no shutdown
R1(config-subif)#int g0/1.200
R1(config-subif)#encapsulation dot1Q 200
R1(config-subif)#ip address 192.168.200.1 255.255.255.0
R1(config-if)#no shutdown
```

Configuración R2

```
Router>ena
Router#config t
Router(config)#hostname R2
R2(config)#enable secret sisco
R2(config)#line console 0
R2(config-line)#password diplomado
R2(config-line)#login
R2(config-line)#line vty 0 15
R2(config-line)#password diplomado
R2(config-line)#login
R2(config-line)#exit
R2(config)#service password-encryption
R2(config)#int s0/0/0
R2(config-if)#ip address 172.31.21.2 255.255.255.252
R2(config-if)#no shutdown
R2(config-if)#int s0/0/1
R2(config-if)#ip address 172.31.23.1 255.255.255.252
R2(config-if)#clock rate 128000
R2(config-if)#no shutdown
R2(config-if)#int g0/0
R2(config-if)#ip address 209.165.200.225 255.255.255.248
R2(config-if)#no shutdown
R2(config-if)#int g0/1
R2(config-if)#ip address 10.10.10.1 255.255.255.0
R2(config-if)#no shutdown
```

Configuración R3

```
Router>ena
Router#config t
Router(config)#hostname R3
```

```
R3(config)#enable secret sisco
R3(config)#line console 0
R3(config-line)#password diplomado
R3(config-line)#login
R3(config-line)#line vty 0 15
R3(config-line)#password diplomado
R3(config-line)#login
R3(config-line)#exit
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)#int Lo4
R3(config-if)#ip address 192.168.4.1 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#int Lo5
R3(config-if)#ip address 192.168.5.1 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#int Lo6
R3(config-if)#ip address 192.168.6.1 255.255.255.0
R3(config-if)#no shutdown
```

Configuración S1

```
Switch>ena
Switch#config t
Switch(config)#hostname S1
S1(config)#enable secret sisco
S1(config)#line console 0
S1(config-line)#password diplomado
S1(config-line)#login
S1(config-line)#line vty 0 15
S1(config-line)#password diplomado
S1(config-line)#login
S1(config-line)#exit
S1(config)#service password-encryption
S1(config)#exit
S1#copy running-config startup-config
```

Configuración S3

```
Switch>ena
Switch#config t
```

```

Switch(config)#hostname S3
S3(config)#enable secret sisco
S3(config)#line console 0
S3(config-line)#password diplomado
S3(config-line)#login
S3(config-line)#line vty 0 15
S3(config-line)#password diplomado
S3(config-line)#login
S3(config-line)#exit
S3(config)#service password-encryption
S3(config)#exit
S3#copy running-config startup-config

```

1.2.2. Configuración del protocolo de enrutamiento OSPFv2

A continuación se relacionan los parámetros utilizados para la configuración de OSPFv2, así:

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 R1

```

R1>ena
R1#config t
R1(config)#router ospf 1
R1(config-router)#router-id 1.1.1.1
R1(config-router)#network 172.31.21.0 0.0.0.3 area 0
R1(config-router)#network 192.168.30.0 0.0.0.255 area 0
R1(config-router)#network 192.168.40.0 0.0.0.255 area 0
R1(config-router)#network 192.168.200.0 0.0.0.255 area 0

```

```
R1(config-router)#passive-interface g0/1.30
R1(config-router)#passive-interface g0/1.40
R1(config-router)#passive-interface g0/1.200
R1(config-router)#auto-cost reference-bandwidth 9500
R1(config-router)#exit
R1(config)#int s0/0/0
R1(config-if)#bandwidth 256
R1(config-if)#ip ospf cost 9500
```

Configuración R2

```
R2>ena
R2#config t
R2(config)#router ospf 1
R2(config-router)#router-id 5.5.5.5
R2(config-router)#network 172.31.21.0 0.0.0.3 area 0
R2(config-router)#network 172.31.23.0 0.0.0.3 area 0
R2(config-router)#network 10.10.10.0 0.0.0.255 area 0
R2(config-router)#passive-interface g0/1
R2(config-router)#passive-interface g0/0
R2(config-router)#auto-cost reference-bandwidth 9500
R2(config-router)#int s0/0/0
R2(config-if)#bandwidth 256
R2(config-if)#int s0/0/1
R2(config-if)#bandwidth 256
R2(config-if)#ip ospf cost 9500
R2(config-if)#exit
```

Configuración R3

```
R3>ena
R3#config t
R3(config)#router ospf 1
R3(config-router)#router-id 8.8.8.8
R3(config-router)#network 172.31.23.0 0.0.0.3 area 0
R3(config-router)#network 192.168.4.0 0.0.3.255 area 0
R3(config-router)#passive-interface Lo4
R3(config-router)#passive-interface Lo5
R3(config-router)#passive-interface Lo6
R3(config-router)# passive-interface g0/0
R3(config-router)# passive-interface g0/1
```

```

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)#exit

```

Verificar información de OSPF

Visualización tablas de enrutamiento y routers conectados por OSPFv2 mediante el comando `#show ip route`.

```

R1
Physical Config CLI
IOS Command Line Interface
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

10.0.0.0/24 is subnetted, 1 subnets
O 10.10.10.0/24 [110/9595] via 172.31.21.2, 00:31:25, Serial0/0/0
172.31.0.0/16 is variably subnetted, 3 subnets, 2 masks
C 172.31.21.0/30 is directly connected, Serial0/0/0
L 172.31.21.1/32 is directly connected, Serial0/0/0
O 172.31.23.0/30 [110/19000] via 172.31.21.2, 00:31:25, Serial0/0/0
192.168.4.0/32 is subnetted, 1 subnets
O 192.168.4.1/32 [110/19001] via 172.31.21.2, 00:27:51, Serial0/0/0
192.168.5.0/32 is subnetted, 1 subnets
O 192.168.5.1/32 [110/19001] via 172.31.21.2, 00:27:51, Serial0/0/0
192.168.6.0/32 is subnetted, 1 subnets
O 192.168.6.1/32 [110/19001] via 172.31.21.2, 00:27:51, Serial0/0/0

```

```

R2
Physical Config CLI
IOS Command Line Interface
inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C 10.10.10.0/24 is directly connected, GigabitEthernet0/1
L 10.10.10.1/32 is directly connected, GigabitEthernet0/1
172.31.0.0/16 is variably subnetted, 4 subnets, 2 masks
C 172.31.21.0/30 is directly connected, Serial0/0/0
L 172.31.21.2/32 is directly connected, Serial0/0/0
C 172.31.23.0/30 is directly connected, Serial0/0/1
L 172.31.23.1/32 is directly connected, Serial0/0/1
192.168.4.0/32 is subnetted, 1 subnets
O 192.168.4.1/32 [110/9501] via 172.31.23.2, 00:31:14, Serial0/0/1
192.168.5.0/32 is subnetted, 1 subnets
O 192.168.5.1/32 [110/9501] via 172.31.23.2, 00:31:14, Serial0/0/1
192.168.6.0/32 is subnetted, 1 subnets
O 192.168.6.1/32 [110/9501] via 172.31.23.2, 00:31:14, Serial0/0/1
209.165.200.0/24 is variably subnetted, 2 subnets, 2 masks
C 209.165.200.224/29 is directly connected, GigabitEthernet0/0
L 209.165.200.225/32 is directly connected, GigabitEthernet0/0
R2>

```

```

R3
Physical Config CLI
IOS Command Line Interface
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

10.0.0.0/24 is subnetted, 1 subnets
O 10.10.10.0/24 [110/6247] via 172.31.23.1, 00:31:42, Serial0/0/1
172.31.0.0/16 is variably subnetted, 3 subnets, 2 masks
O 172.31.21.0/30 [110/12304] via 172.31.23.1, 00:31:42, Serial0/0/1
C 172.31.23.0/30 is directly connected, Serial0/0/1
L 172.31.23.2/32 is directly connected, Serial0/0/1
192.168.4.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.4.0/24 is directly connected, Loopback4
L 192.168.4.1/32 is directly connected, Loopback4
192.168.5.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.5.0/24 is directly connected, Loopback5
L 192.168.5.1/32 is directly connected, Loopback5
192.168.6.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.6.0/24 is directly connected, Loopback6
L 192.168.6.1/32 is directly connected, Loopback6
R3>

```

Visualización de lista resumida de interfaces por OSPF en donde se ilustre el costo de cada interface mediante el comando `#show ip ospf interface`

Parámetros Router R1
R2#show ip ospf interface

```

R1
Physical Config CLI
IOS Command Line Interface
Serial0/0/0 is up, line protocol is up
Internet address is 172.31.21.1/30, Area 0
Process ID 1, Router ID 1.1.1.1, 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 00:00:00
Index 1/1, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1, Adjacent neighbor count is 1
Adjacent with neighbor 5.5.5.5
Suppress hello for 0 neighbor(s)
R1#
Copy Paste

```

Parámetros Router R3
R3#show ip ospf interface

```

R3
Physical Config CLI
IOS Command Line Interface
Serial0/0/1 is up, line protocol is up
Internet address is 172.31.23.2/30, Area 0
Process ID 1, Router ID 8.8.8.8, 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 00:00:03
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 5.5.5.5
Suppress hello for 0 neighbor(s)
Loopback4 is up, line protocol is up
Internet address is 192.168.4.1/24, Area 0
Process ID 1, Router ID 8.8.8.8, Network Type LOOPBACK, Cost: 1
Loopback interface is treated as a stub Host
Loopback5 is up, line protocol is up
Internet address is 192.168.5.1/24, Area 0
Process ID 1, Router ID 8.8.8.8, Network Type LOOPBACK, Cost: 1
Loopback interface is treated as a stub Host
Loopback6 is up, line protocol is up
Internet address is 192.168.6.1/24, Area 0
Process ID 1, Router ID 8.8.8.8, Network Type LOOPBACK, Cost: 1
Loopback interface is treated as a stub Host
R3#
Copy Paste

```

Parámetros Router R2
R3#show ip ospf interface

```

R2
Physical Config CLI
IOS Command Line Interface
Serial0/0/0 is up, line protocol is up
Internet address is 172.31.21.2/30, Area 0
Process ID 1, Router ID 5.5.5.5, Network Type POINT-TO-POINT, Cost: 6152
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:02
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)
Serial0/0/1 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 00:00:02
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)
GigabitEthernet0/1 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 WAITING, Priority 1
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
No Hellos (Passive interface)
Index 3/3, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 0, Adjacent neighbor count is 0
Suppress hello for 0 neighbor(s)
R2#
Copy Paste

```

Visualización de el OSPF Process ID, Router ID, Address summarizations, Routing Networks, and passive interfaces configuradas en cada router mediante el comando #show ip protocols

Configuración Router R1 R1#show ip protocols

```

R1#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 1.1.1.1
  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
    192.168.30.0 0.0.0.255 area 0
    192.168.40.0 0.0.0.255 area 0
    192.168.200.0 0.0.0.255 area 0
  Passive Interface(s):
    GigabitEthernet0/1.30
    GigabitEthernet0/1.40
    GigabitEthernet0/1.200
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1          110          00:07:12
    5.5.5.5          110          00:03:49
    8.8.8.8          110          00:03:49
  Distance: (default is 110)
R1#
  
```

Configuración Router R2 R2#show ip protocols

```

R2#show ip prot
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
  Passive Interface(s):
    GigabitEthernet0/0
    GigabitEthernet0/1
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1          110          00:09:24
    5.5.5.5          110          00:06:01
    8.8.8.8          110          00:06:01
  Distance: (default is 110)
R2#
  
```

Configuración Router R3

R3#show ip protocols

```

R3#sho ip protocols
Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 8.8.8.8
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    172.31.23.0 0.0.0.3 area 0
    192.168.4.0 0.0.3.255 area 0
  Passive Interface(s):
    GigabitEthernet0/0
    GigabitEthernet0/1
    Loopback4
    Loopback5
    Loopback6
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1          110          00:11:51
    5.5.5.5          110          00:08:28
    8.8.8.8          110          00:08:28
  Distance: (default is 110)
R3#
  
```

1.2.3. Configuración VLANs, Puertos troncales, puertos de acceso, encapsulamiento, Inter-VLAN Routing y Seguridad en los Switches.

Configuración S1

```
S1>ena
S1#config t
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 address 192.168.99.2 255.255.255.0
S1(config-if)#no shutdown
S1(config-if)#exit
S1(config)#ip default-gateway 192.168.99.1
S1(config)#int f0/1
S1(config-if)#switchport mode trunk
S1(config-if)#switchport trunk native vlan 1
S1(config-if)#int f0/24
S1(config-if)#switchport mode trunk
S1(config-if)#switchport trunk native vlan 1
```

Configuración S3

```
S3>ena
S3#config t
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)#vlan 200
S3(config-vlan)#exit
S3(config)#int vlan 200
S3(config-if)#ip address 192.168.99.3 255.255.255.0
S3(config-if)#no shutdown
```

```
S3(config-if)#exit
S3(config)#ip default-gateway 192.168.99.1
S3(config)#int fa0/1
S3(config-if)#switchport mode trunk
S3(config-if)#switchport trunk native vlan 1
```

1.2.4. Deshabilitación DNS lookup en el Switch 3.

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

1.2.5. Asignación de direcciones IP a los Switches acorde a los lineamientos.

```
S1(config)#int vlan 200
S1(config-if)#ip address 192.168.99.2 255.255.255.0
S1(config-if)#no shutdown
```

```
S3(config)#int vlan 200
S3(config-if)#ip address 192.168.99.3 255.255.255.0
S3(config-if)#no shutdown
```

1.2.6. Desactivación de todas las interfaces que no sean utilizadas en el esquema de red.

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

```
S3#config t
S3(config)#int range fa0/2,fa0/4-24,g0/1-2
S3(config-if-range)#shutdown
```

1.2.7. Implementación DHCP and NAT for IPv4

```
R1>ena
R1#config t
R1(config)#ip dhcp pool administracion1
```

```

R1(dhcp-config)#network 192.168.30.0 255.255.255.0
R1(dhcp-config)#default-router 192.168.30.1
R1(dhcp-config)#dns-server 10.10.10.11
R1(dhcp-config)#ip dhcp pool mercadeo1
R1(dhcp-config)#network 192.168.40.0 255.255.255.0
R1(dhcp-config)#default-router 192.168.40.1
R1(dhcp-config)#dns-server 10.10.10.11
R1(dhcp-config)#exit

```

```

R2>ena
R2#config t
R2(config)#ip nat inside source static 10.10.10.10 209.165.200.229
R2(config)#int g0/0
R2(config-if)#ip nat outside
R2(config-if)#int g0/1
R2(config-if)#ip nat inside

```

1.2.8. Configuración R1 como servidor DHCP para las VLANs 30 y 40.

```

S1#config t
S1(config)#int f0/3
S1(config-if)#switchport mode access
S1(config-if)#switchport access vlan 30
S1(config-if)#exit
S1(config)#int f0/1
S1(config-if)#switchport mode access
S1(config-if)#switchport access vlan 40
S1(config-if)#exit

```

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

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

```
R1#config t
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
```

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

```
R2>ena
R2#config t
R2(config)#ip nat inside source static 10.10.10.10 209.165.200.230
R2(config)#int g0/0
R2(config-if)#ip nat outside
R2(config-if)#int g0/1
R2(config-if)#ip nat inside
```

- 1.2.11. Configuración de listas de acceso de tipo estándar para restringir o permitir tráfico desde R1 o R3 hacia R2.

```
R2>ena
R2#config t
R2(config)#access-list 1 deny 192.168.30.120 255.255.255.0
R2(config)#access-list 1 deny 192.168.30.121 255.255.255.0
R2(config)#exit
```

- 1.2.12. 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 t
R2(config)#access-list 120 permit tcp host 192.168.4.1 any eq 80
R2(config)#access-list 120 deny ip any any
R2(config)#int s0/0/1
R2(config-if)#ip access-group 120 in
R2(config-if)#exit
R2(config)#exit
```

1.2.13. Verificación procesos de comunicación y redireccionamiento de tráfico en los routers mediante el uso de Ping y Traceroute.

```

R3
-----
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/2/5 ms
R3#ping 192.168.30.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.30.1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/5/10 ms
R3#ping 192.168.40.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.40.1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 7/13/32 ms
R3#ping 192.168.200.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.200.1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/9/15 ms
R3#
  
```

```

R2
-----
Reply to request 3 from 172.31.23.2, 1 ms
Reply to request 4 from 172.31.23.2, 1 ms
R2#ping 172.31.4.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.31.4.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
R2#ping 172.31.21.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.31.21.1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/10/24 ms
R2#ping 192.168.30.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.30.1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/11/27 ms
R2#
  
```

```

R1
-----
Success rate is 0 percent (0/5)
R1#ping 10.10.10.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.10.10.1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/5/7 ms
R1#ping 209.165.200.230
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.200.230, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
R1#ping 172.31.21.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.31.21.2, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/6/21 ms
R1#
  
```

```

R2
-----
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/11/27 ms
R2#tracer
R2#traceroute 10.10.10.10
Type escape sequence to abort.
Tracing the route to 10.10.10.10
  1 * 0 msec 0 msec
R2#traceroute 10.10.10.1
Type escape sequence to abort.
Tracing the route to 10.10.10.1
  1 10.10.10.1 11 msec 19 msec 3 msec
R2#traceroute 172.31.21.1
Type escape sequence to abort.
Tracing the route to 172.31.21.1
  1 172.31.21.1 0 msec 4 msec 1 msec
R2#traceroute 172.31.23.1
Type escape sequence to abort.
Tracing the route to 172.31.23.1
  1 172.31.23.2 0 msec 2 msec 4 msec
  2 172.31.23.1 2 msec 5 msec 11 msec
R2#
  
```

CONCLUSIONES

Mediante el desarrollo de las actividades se puede evidenciar las competencias desarrolladas en el transcurso del curso de profundización Cisco, en las cuales mediante la estrategia de aprendizaje basada en problemas, en donde permitió diseñar una red empresarial eficaz y escalable, instalando, configurando, supervisando y solucionando los problemas planteados.

REFERENCIAS BIBLIOGRAFICAS

CISCO. 2007. Configuring IP Access List. Recuperado de <https://www.cisco.com/c/en/us/support/docs/security/ios-firewall/23602-confaccesslists.html>

CISCO. 2018. Configurar ACL de IP de uso general. Recuperado de https://www.cisco.com/c/es_mx/support/docs/ip/access-lists/26448-ACLsamples.html

Mikroways. 2010. Configuración de PPP y PAP en cisco. Recuperado de <https://www.mikroways.net/2010/02/28/configuracion-de-ppp-y-pap-en-cisco/>

Universidad de Pamplona. Norma Técnica Colombiana – NTC 1486. Recuperado de http://www.unipamplona.edu.co/unipamplona/portallG/home_15/recursos/01_general/09062014/n_icontec.pdf