DIPLOMADO CISCO CCNA1 Y CCNA2-UNAD
OPCION DE GRADO

AUTOR
EDWIN GIOVANY PATIÑO CASTRILLÓN

PRUEBA DE HABILIDADES PRÁCTICAS
DIPLOMADO

ASESOR
JUAN CARLOS VESGA

UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA
ESCUELA DE CIENCIAS BASICAS, TECNOLOGIA E INGENIERIA
DIPLOMADO DE ESPECIALIZACION CISCO
INGENIERIA DE SISTEMAS
CEAD PASTO
2019

CONTENIDO

ANEXO

INTRODUCCION

Las temáticas abordadas son es una parte importante de la experiencia de aprendizaje de las tecnologías de la información y comunicación que nos ayudan a desarrollar las aptitudes necesarias para planificar e implementar redes pequeñas que admitan una variedad de aplicaciones. A continuación, se presenta la configuración y el análisis de los principios básicos de routing y switching de una amplia variedad de dispositivos y tecnologías que facilitan la manera en la que las personas trabajan, viven, juegan y aprenden mediante comunicaciones de voz, vídeo y otros datos, además se explica cómo configurar y solucionar problemas en las ACL estándar IPv4 en un router Cisco como parte de una solución de seguridad. Se incluyen consejos, consideraciones, recomendaciones y pautas generales sobre cómo utilizar las ACL. Además, se explora la funcionalidad, la configuración y la resolución de problemas de DHCPv4 y de DHCPv6. Se analiza cómo se utiliza NAT combinada con el espacio de direcciones privadas para conservar y usar de forma más eficaz las direcciones IPv4, a fin de proporcionar acceso a Internet a las redes de todos los tamaños. Se explica las herramientas que pueden usar los administradores de redes para la detección, la administración y el mantenimiento de una amplia variedad de dispositivos y tecnologías que facilitan la manera en la que las personas trabajan, viven, juegan y aprenden mediante comunicaciones de voz, vídeo y otros datos. El objetivo es implementar los conceptos y tecnologías básicos de redes para dar solución a los estudios de caso correspondientes a la UNIDAD 4, donde se abarcan temas correspondientes a conceptos de listas de control de acceso, DHCP, NAT para IPv4; detección, administración y mantenimiento de equipos.

Desarrollar las aptitudes necesarias para planificar e implementar los conceptos y tecnologías básicas de redes informáticas (conceptos de routing, routing estático, routing dinámico, redes conmutadas, configuración del switch y VLAN´s, etc) para dar solución a los estudios de caso correspondientes, en relación a las redes computacionales que admiten una variedad de aplicaciones en relación a la arquitectura, los componentes y el funcionamiento de los routers, switches y dispositivos finales.

Configurar y verificar NAT para IPv4.

Configurar y solucionar los problemas de las VLAN y del routing entre VLAN.

Configurar y verificar el routing estático y el routing predeterminado.

Configurar, supervisar y solucionar los problemas de las ACL para IPv4.

Configurar y verificar DHCPv4 y DHCPv6.

Configurar y supervisar las redes mediante las herramientas de detección de dispositivos, administración y mantenimiento.

Configurar y solucionar los problemas de operaciones básicas de una red conmutada pequeña.

Llevará a cabo la configuración y resolución de problemas de las operaciones básicas de los routers en una red enrutada pequeña.

PRUEBA DE HABILIDADES PRÁCTICAS CCNA
RESUMEN

La evaluación denominada “Prueba de habilidades prácticas”, forma parte de las actividades evaluativas del Diplomado de Profundización CCNA, y busca identificar el grado de desarrollo de competencias y habilidades que fueron adquiridas a lo largo del diplomado. Lo esencial es poner a prueba los niveles de comprensión y solución de problemas relacionados con diversos aspectos de Networking.

Para esta actividad, el estudiante dispone de cerca de dos semanas para realizar las tareas asignadas en cada uno de los **dos (2) escenarios propuestos**, acompañado de los respectivos procesos de documentación de la solución, correspondientes al registro de la configuración de cada uno de los dispositivos, 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 comandos **ping, traceroute, show ip route, entre otros.**

Teniendo en cuenta que la Prueba de habilidades está conformada por dos (2) escenarios, el estudiante deberá realizar el proceso de configuración de usando cualquiera de las siguientes herramientas: **Packet Tracer** o **GNS3**.

- Es muy importante mencionar que esta actividad es de carácter **INDIVIDUAL y OBLIGATORIA.**

- Toda evidencia de **copy-paste o plagio (de la web o de otros informes)** será penalizada con severidad.

Lineamientos para la elaboración del Informe

Finalmente, el informe a presentar deberá cumplir con las normas **ICONTEC 1486** para la presentación de trabajos escritos e incluir los siguientes elementos en su contenido:

- **Portada**
- **Tabla de contenido**
- **Introducción**
- **Desarrollo de los dos escenarios**

  IMPORTANTE: Para cada uno de los escenarios se debe describir el paso a paso de cada punto realizado y deben digitar el código de configuración

aplicado (no incluir imágenes ni capturas de pantalla). Las imágenes o capturas de pantalla sólo serán usadas para evidenciar los resultados de comandos como **ping, traceroute, show ip route, entre otros.**

- **Conclusiones**
- **Referencias Bibliográficas**

El informe deberá estar acompañado de las respectivas evidencias de configuración de los dispositivos (Packet Tracer ó GNS3), las cuales generarán veracidad al trabajo realizado. **El informe deberá ser entregado en el espacio creado para tal fin en el Campus Virtual de la UNAD**.

IMPORTANTE: Teniendo en cuenta que este documento deberá ser entregado al final del curso en el Repositorio Institucional, acorde con los lineamientos institucionales para grado. El procedimiento será socializado al finalizar el curso.

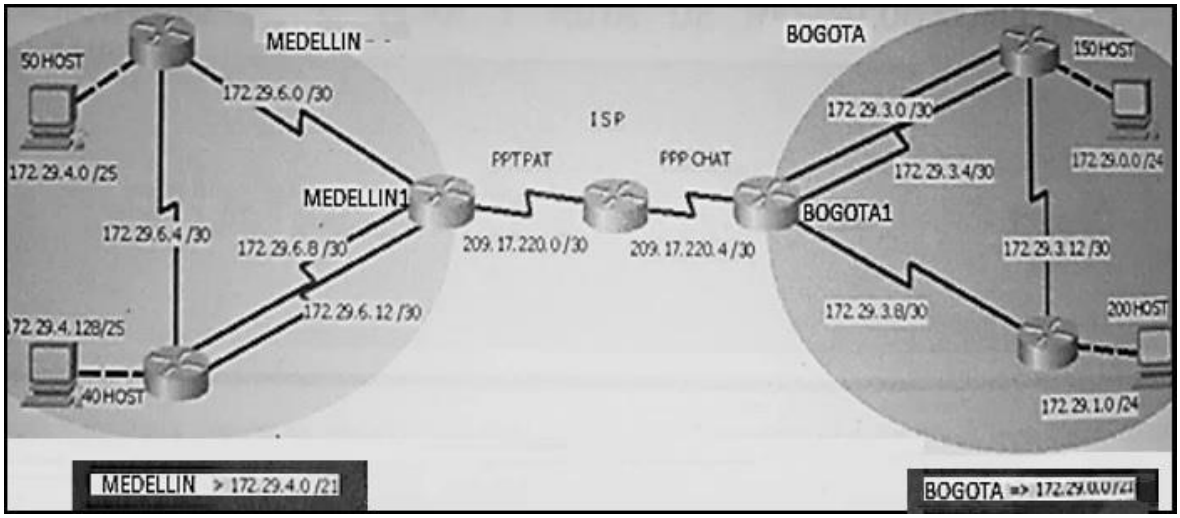
Palabras claves: NAT IPV4, VLAN, ROUTING ESTÁTICO, ROUTING PREDETERMINADO, ACL IPV4, DHCPV4, DHCPV6, REDES INFORMATICAS, RED CONMUTADA PEQUEÑA, RED ENRUTADA PEQUEÑA.

DESCRIPCIÓN DE ESCENARIO PROPUESTO PARA LA PRUEBA DE HABILIDADES

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 tendran rutas por defecto redistribuidas; asimismo, habilitar el encapsulamiento PPP y su autenticación.

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

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

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

Como trabajo inicial se debe realizar lo siguiente.

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

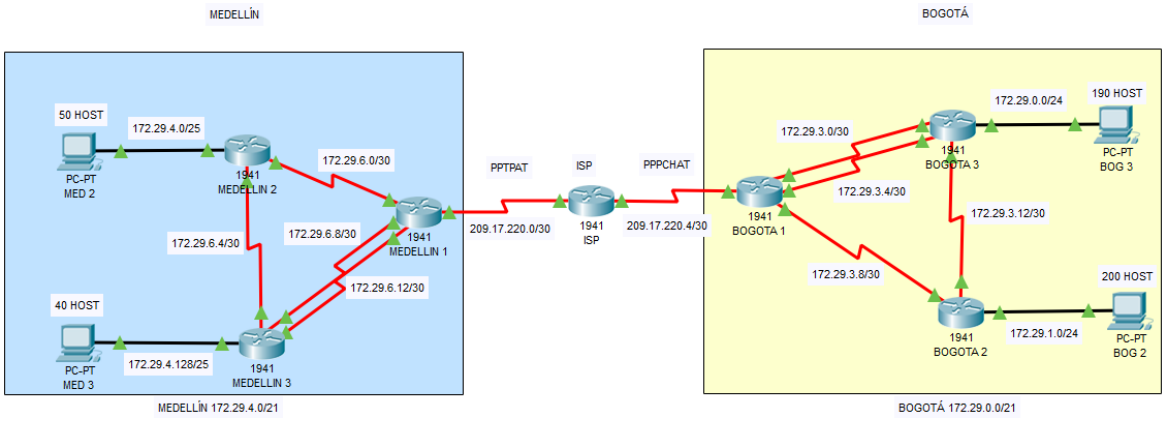


Tabla No. 1 Direccionamiento

Sucursal	Equipo	Interfaz	Direccionamiento IP	Mascara de subred	Gateway
Medellín	Medellín 1	Se0/0/0	172.29.6.1	255.255.255.252	NA
		Se0/0/1	172.29.6.9	255.255.255.252	NA
		Se0/1/0	172.29.6.13	255.255.255.252	NA
		Se0/1/1	209.17.220.1	255.255.255.252	NA
	Medellín 2	Se0/0/0	172.29.6.2	255.255.255.252	NA
		Se0/1/1	172.29.6.5	255.255.255.252	NA
		G0/0	172.29.4.1	255.255.255.128	NA
	Medellín 3	Se0/0/1	172.29.6.10	255.255.255.252	NA
		Se0/1/0	172.29.6.14	255.255.255.252	NA
		Se0/1/1	172.29.6.6	255.255.255.252	NA
		G0/0	172.29.4.129	255.255.255.128	NA
	PC-MED 1	Fa0	DHCP		
	PC-MED 2	Fa0	DHCP		
Bogotá	Bogotá 1	Se0/0/0	172.29.3.1	255.255.255.252	NA
		Se0/1/1	172.29.3.5	255.255.255.252	NA
		Se0/0/1	172.29.3.9	255.255.255.252	NA
		Se0/1/0	209.17.220.5	255.255.255.252	NA
	Bogotá 3	Se0/0/0	172.29.3.2	255.255.255.252	NA
		Se0/1/1	172.29.3.6	255.255.255.252	NA
		Se0/1/0	172.29.3.13	255.255.255.252	NA
		G0/0	172.29.0.1	255.255.255.0	NA

	Bogotá 2	Se0/0/1	172.29.3.10	255.255.255.252	NA
		Se0/1/0	172.29.3.14	255.255.255.252	NA
		G0/0	172.29.1.1	255.255.255.0	NA
	PC-BOG 1	Fa0	DHCP		
	PC-BOG 2	Fa0	DHCP		
Proveedor	ISP	Se0/1/1	209.17.220.2	255.255.255.252	NA
		Se0/1/0	209.17.220.6	255.255.255.252	N/A

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

Tabla No. 2 Configuración-Router

Router-Medellin1

```
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname medellin1
medellin1(config)#enable secret class
medellin1(config)#line console 0
medellin1(config-line)#password cisco
medellin1(config-line)#login
medellin1(config-line)#exec-timeout 5 0
medellin1(config-line)#line vty 0 15
medellin1(config-line)#password cisco
medellin1(config-line)#login
medellin1(config-line)#exit
medellin1(config)#service password-encryption
medellin1(config)#banner motd #El acceso no autorizado esta prohibido#
medellin1(config)#exit
medellin1#
%SYS-5-CONFIG_I: Configured from console by console

medellin1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
medellin1#
```

Router-Medellin2

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname medellin2
medellin2(config)#enable secret class
```

```
medellin2(config)#line console 0
medellin2(config-line)#password cisco
medellin2(config-line)#login
medellin2(config-line)#exec-timeout 5 0
medellin2(config-line)#line vty 0 15
medellin2(config-line)#password cisco
medellin2(config-line)#login
medellin2(config-line)#exit
medellin2(config)#service password-encryption
medellin2(config)#banner motd #El acceso no autorizado esta prohibido#
medellin2(config)#exit
medellin2#
%SYS-5-CONFIG_I: Configured from console by console

medellin2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
medellin2#
```

Router-Medellin3

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname medellin3
medellin3(config)#enable secret class
medellin3(config)#line console 0
medellin3(config-line)#password cisco
medellin3(config-line)#login
medellin3(config-line)#exec-timeout 5 0
medellin3(config-line)#line vty 0 15
medellin3(config-line)#password cisco
medellin3(config-line)#login
medellin3(config-line)#exit
medellin3(config)#service password-encryption
medellin3(config)#banner motd #El acceso no autorizado esta prohibido#
medellin3(config)#exit
medellin3#
%SYS-5-CONFIG_I: Configured from console by console

medellin3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
medellin3#
```

Router-ISP
Router>enable Router#configure terminal Enter configuration commands, one per line. End with CNTL/Z. Router(config)#hostname ISP ISP(config)#enable secret class ISP(config)#line console 0 ISP(config-line)#password cisco ISP(config-line)#login ISP(config-line)#exec-timeout 5 0 ISP(config-line)#line vty 0 15 ISP(config-line)#password cisco ISP(config-line)#login ISP(config-line)#exit ISP(config)#service password-encryption ISP(config)#banner motd #El acceso no autorizado esta prohibido# ISP(config)#exit ISP# %SYS-5-CONFIG_I: Configured from console by console ISP#copy running-config startup-config Destination filename [startup-config]? Building configuration... [OK] ISP#
Router-bogota1
Router>enable Router#configure terminal Enter configuration commands, one per line. End with CNTL/Z. Router(config)#hostname bogota1 bogota1(config)#enable secret class bogota1(config)#line console 0 bogota1(config-line)#password cisco bogota1(config-line)#login bogota1(config-line)#exec-timeout 5 0 bogota1(config-line)#line vty 0 15 bogota1(config-line)#password cisco bogota1(config-line)#login bogota1(config-line)#exit bogota1(config)#service password-encryption bogota1(config)#banner motd #El acceso no autorizado esta prohibido# bogota1(config)#exit bogota1# %SYS-5-CONFIG_I: Configured from console by console

```
bogota1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
bogota1#
```

Router-bogota2

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname bogota2
bogota2(config)#enable secret class
bogota2(config)#line console 0
bogota2(config-line)#password cisco
bogota2(config-line)#login
bogota2(config-line)#exec-timeout 5 0
bogota2(config-line)#line vty 0 15
bogota2(config-line)#password cisco
bogota2(config-line)#login
bogota2(config-line)#exit
bogota2(config)#service password-encryption
bogota2(config)#banner motd #El acceso no autorizado esta prohibido#
bogota2(config)#exit
bogota2#
%SYS-5-CONFIG_I: Configured from console by console

bogota2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
bogota2#
```

Router-bogota3

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname bogota3
bogota3(config)#enable secret class
bogota3(config)#line console 0
bogota3(config-line)#password cisco
bogota3(config-line)#login
bogota3(config-line)#exec-timeout 5 0
bogota3(config-line)#line vty 0 15
bogota3(config-line)#password cisco
bogota3(config-line)#login
```

```
bogota3(config-line)#exit
bogota3(config)#service password-encryption
bogota3(config)#banner motd #El acceso no autorizado esta prohibido#
bogota3(config)#exit
bogota3#
%SYS-5-CONFIG_I: Configured from console by console

bogota3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
bogota3#
```

Tabla No. 3 Direccionamiento-Router

Router-Medellin1				
Equipo	Interfaz	Direccionamiento IP	Mascara de subred	Gateway
Medellín 1	Se0/0/0	172.29.6.1	255.255.255.252	NA
	Se0/0/1	172.29.6.9	255.255.255.252	NA
	Se0/1/0	172.29.6.13	255.255.255.252	NA
	Se0/1/1	209.17.220.1	255.255.255.252	NA

medellin1-ISP

```
medellin1>enable
Password:
medellin1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
medellin1(config)#interface serial 0/1/1
medellin1(config-if)#description ENLACE A ISP
medellin1(config-if)#ip address 209.17.220.1 255.255.255.252
medellin1(config-if)#clock rate 128000
medellin1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
medellin1(config-if)#
```

medellin1-medellin2

```
medellin1>enable
Password:
medellin1#configure terminal
```

```
Enter configuration commands, one per line.  End with CNTL/Z.
medellin1(config)#interface serial 0/0/0
medellin1(config-if)#description ENLACE A MEDELLIN2
medellin1(config-if)#ip address 172.29.6.1 255.255.255.252
medellin1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
medellin1(config-if)#clock rate 128000
medellin1(config-if)#exit
medellin1(config)#
```

medellin1-medellin3 enlace principal

```
medellin1>enable
Password:
medellin1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
medellin1(config)#interface serial 0/1/0
medellin1(config-if)#ip address 172.29.6.13 255.255.255.252
medellin1(config-if)#description ENLACE PRINCIPAL A MEDELLIN3
medellin1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
medellin1(config-if)#
```

medellin1-medellin3 enlace secundario

```
medellin1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
medellin1(config)#interface serial 0/0/1
medellin1(config-if)#ip address 172.29.6.9 255.255.255.252
medellin1(config-if)#description ENLACE SECUNDARIO A MEDELLIN3
medellin1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
medellin1(config-if)#
```

Router-medellin2

Equipo	Interfaz	Direccionamiento IP	Mascara de subred	Gateway
Medellín 2	Se0/0/0	172.29.6.2	255.255.255.252	NA
	Se0/1/1	172.29.6.5	255.255.255.252	NA
	G0/0	172.29.4.1	255.255.255.128	NA

medellin2-medellin1

```
medellin2>enable
```

```
Password:
medellin2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
medellin2(config)#interface serial 0/0/0
medellin2(config-if)#description ENLACE A MEDELLIN1
medellin2(config-if)#ip address 172.29.6.2 255.255.255.252
medellin2(config-if)#clock rate 128000
medellin2(config-if)#no shutdown

medellin2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

medellin2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

medellin2(config-if)#exit
```

medellin2-medellin3

```
medellin2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
medellin2(config)#interface serial 0/1/1
medellin2(config-if)#description ENLACE A MEDELLIN3
medellin2(config-if)#ip address 172.29.6.5 255.255.255.252
medellin2(config-if)#clock rate 128000
medellin2(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
medellin2(config-if)#
medellin2#
%SYS-5-CONFIG_I: Configured from console by console

medellin2#
```

medellin2-med2 (50 host)

```
medellin2>enable
Password:
medellin2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
medellin2(config)#interface gigabitethernet 0/0
medellin2(config-if)#description ENLACE A LAN MEDELLIN 50 HOTS
medellin2(config-if)#ip address 172.29.4.1 255.255.255.128
medellin2(config-if)#no shutdown

medellin2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
```

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router-Medellin3

Equipo	Interfaz	Direccionamiento IP	Mascara de subred	Gateway
Medellín 3	Se0/0/1	172.29.6.10	255.255.255.252	NA
	Se0/1/0	172.29.6.14	255.255.255.252	NA
	Se0/1/1	172.29.6.6	255.255.255.252	NA
	G0/0	172.29.4.129	255.255.255.128	NA

medellin3-medellin1 enlace principal

```
medellin3>enable
Password:
medellin3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
medellin3(config)#interface serial 0/1/0
medellin3(config-if)#ip address 172.29.6.14 255.255.255.252
medellin3(config-if)#description ENLACE PRINCIPAL A MEDELLIN1
medellin3(config-if)#clock rate 128000
medellin3(config-if)#no shutdown

medellin3(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

medellin3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

medellin3(config-if)#
```

nedellin3-medellin1 enlace secundario

```
medellin3(config)#interface serial 0/0/1
medellin3(config-if)#ip address 172.29.6.10 255.255.255.252
medellin3(config-if)#description ENLACE SECUNDARIO A MEDELLIN1
medellin3(config-if)#clock rate 128000
medellin3(config-if)#no shutdown

medellin3(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
```

medellin3(config-if)#

nedellin3-medellin2

```
medellin3>enable
Password:
medellin3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
medellin3(config)#interface serial 0/1/1
medellin3(config-if)#ip address 172.29.6.6 255.255.255.252
medellin3(config-if)#description ENLACE A MEDELLIN2
medellin3(config-if)#clock rate 128000
This command applies only to DCE interfaces
medellin3(config-if)#no shutdown

medellin3(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up

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

medellin2-med2 (40 host)

```
medellin3>enable
Password:
medellin3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
medellin3(config)#interface gigabitethernet 0/0
medellin3(config-if)#description ENLACE A LAN MEDELLIN 40 HOTS
medellin3(config-if)#ip address 172.29.4.129 255.255.255.128
medellin3(config-if)#no shutdown

medellin3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

medellin3(config-if)#
```

Router-ISP

Equipo	Interfaz	Direccionamiento IP	Mascara de subred	Gateway
ISP	Se0/1/1	209.17.220.2	255.255.255.252	NA
	Se0/1/0	209.17.220.6	255.255.255.252	N/A

ISP-medellin1

```
ISP>enable
Password:
ISP#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
ISP(config)#interface serial 0/1/1
ISP(config-if)#description ENLACE A MEDELLIN1
ISP(config-if)#ip address 209.17.220.2 255.255.255.252
ISP(config-if)#clock rate 128000
ISP(config-if)#no shutdown

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

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

ISP(config-if)#
```

ISP-bogota1

```
ISP>enable
Password:
ISP#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
ISP(config)#interface serial 0/1/0
ISP(config-if)#description ENLACE A BOGOTA1
ISP(config-if)#ip address 209.17.220.6 255.255.255.252
ISP(config-if)#clock rate 128000
ISP(config-if)#no shutdown

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

Router-bogota1

Equipo	Interfaz	Direccionamiento IP	Mascara de subred	Gateway
Bogotá 1	Se0/0/0	172.29.3.1	255.255.255.252	NA
	Se0/1/1	172.29.3.5	255.255.255.252	NA
	Se0/0/1	172.29.3.9	255.255.255.252	NA
	Se0/1/0	209.17.220.5	255.255.255.252	NA

bogota1-ISP
bogota1>enable Password: bogota1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. bogota1(config)#interface serial 0/1/0 bogota1(config-if)#description ENLACE A ISP bogota1(config-if)#ip address 209.17.220.5 255.255.255.252 bogota1(config-if)#clock rate 128000 bogota1(config-if)#no shutdown bogota1(config-if)# %LINK-5-CHANGED: Interface Serial0/1/0, changed state to up bogota1(config-if)# %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up bogota1(config-if)#
bogota1-bogota2 enlace principal
bogota1>enable Password: bogota1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. bogota1(config)#interface serial 0/0/0 bogota1(config-if)#description ENLACE PRINCIPAL A BOGOTA2 bogota1(config-if)#ip address 172.29.3.1 255.255.255.252 bogota1(config-if)#no shutdown %LINK-5-CHANGED: Interface Serial0/0/0, changed state to down bogota1(config-if)#
bogota1-bogota2 enlace secundario
bogota1>enable Password: bogota1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. bogota1(config)#interface serial 0/1/1 bogota1(config-if)#description ENLACE SECUNDARIO A BOGOTA2 bogota1(config-if)#ip address 172.29.3.5 255.255.255.252 bogota1(config-if)#no shutdown %LINK-5-CHANGED: Interface Serial0/1/1, changed state to down bogota1(config-if)#
bogota1-bogota3

```
bogota1>enable
Password:
bogota1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
bogota1(config)#interface serial 0/0/1
bogota1(config-if)#description ENLACE A BOGOTA3
bogota1(config-if)#ip address 172.29.3.9 255.255.255.252
bogota1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
bogota1(config-if)#
```

Router-bogota3

Equipo	Interfaz	Direccionamiento IP	Mascara de subred	Gateway
Bogotá 3	Se0/0/0	172.29.3.2	255.255.255.252	NA
	Se0/1/1	172.29.3.6	255.255.255.252	NA
	Se0/1/0	172.29.3.13	255.255.255.252	NA
	G0/0	172.29.0.1	255.255.255.0	NA

bogota3-bogota1 enlace principal

```
bogota3>enable
Password:
bogota3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
bogota3(config)#interface serial 0/0/0
bogota3(config-if)#description ENLACE PRINCIPAL A BOGOTA1
bogota3(config-if)#ip address 172.29.3.2 255.255.255.252
bogota3(config-if)#clock rate 128000
bogota3(config-if)#no shutdown

bogota3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

Bogota3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
```

bogota3-bogota1 enlace secundario

```
bogota3>enable
Password:
bogota3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
```

```
bogota3(config)#interface serial 0/1/1
bogota3(config-if)#description ENLACE SECUNDARIO A BOGOTA1
bogota3(config-if)#ip address 172.29.3.6 255.255.255.252
bogota3(config-if)#clock rate 128000
bogota3(config-if)#no shutdown

bogota3(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up

bogota3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to up

bogota3(config-if)#
```

bogota3-bogota2

```
bogota3>enable
Password:
bogota3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
bogota3(config)#interface serial 0/1/0
bogota3(config-if)#description ENLACE A BOGOTA2
bogota3(config-if)#ip address 172.29.3.13 255.255.255.252
bogota3(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
bogota3(config-if)#
```

Bogota3-bog3 (190 HOST)

```
bogota3>enable
Password:
bogota3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
bogota3(config)#interface gigabitethernet 0/0
bogota3(config-if)#description ENLACE A LAN BOGOTA1 190 HOST
bogota3(config-if)#ip address 172.29.0.1 255.255.255.0
bogota3(config-if)#no shutdown

bogota3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

bogota3(config-if)#
```

Router-bogota2

Equipo	Interfaz	Direccionamiento IP	Mascara de subred	Gateway
Bogotá 2	Se0/0/1	172.29.3.10	255.255.255.252	NA
	Se0/1/0	172.29.3.14	255.255.255.252	NA
	G0/0	172.29.1.1	255.255.255.0	NA

bogota2-bogota1

```
bogota2>enable
Password:
bogota2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
bogota2(config)#interface serial 0/0/1
bogota2(config-if)#description ENLACE A BOGOTA1
bogota2(config-if)#ip address 172.29.3.10 255.255.255.252
bogota2(config-if)#clock rate 128000
bogota2(config-if)#no shutdown

bogota2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

bogota2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

bogota2(config-if)#
```

bogota2-bogota3

```
bogota2>enable
Password:
bogota2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
bogota2(config)#interface serial 0/1/0
bogota2(config-if)#description ENLACE A BOGOTA3
bogota2(config-if)#ip address 172.29.3.14 255.255.255.252
bogota2(config-if)#clock rate 128000
bogota2(config-if)#no shutdown

bogota2(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

bogota2(config-if)#
```

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up bogota2(config-if)#
bogota2- bog2 (200 HOST)
bogota2>enable Password: bogota2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. bogota2(config)#interface gigabitethernet 0/0 bogota2(config-if)#description ENLACE A LAN BOGOTA1 200 HOST bogota2(config-if)#ip address 172.29.1.1 255.255.255.0 bogota2(config-if)#no shutdown bogota2(config-if)# %LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up bogota2(config-if)#

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.

Tabla No. 4 Configuración RIP versión 2-red principal- sumarización automática
Router-medellin1
medellin1>enable Password: medellin1#configure terminal 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)#network 172.29.6.0 medellin1(config-router)#network 172.29.6.12 medellin1(config-router)#
Router-medellin2
medellin2>enable Password:

```
medellin2#configure terminal
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)#network 172.29.6.0
medellin2(config-router)#network 172.29.6.4
medellin2(config-router)#
```

Router-medellin3

```
medellin3>enable
Password:
medellin3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
medellin3(config)#router rip
medellin3(config-router)#version 2
medellin3(config-router)#no auto-summary
medellin3(config-router)#network 172.29.6.4
medellin3(config-router)#network 172.29.6.12
medellin3(config-router)#
```

Router-bogota1

```
bogota1>enable
Password:
bogota1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
bogota1(config)#router rip
bogota1(config-router)#version 2
bogota1(config-router)#no auto-summary
bogota1(config-router)#network 172.29.3.0
bogota1(config-router)#network 172.29.3.8
bogota1(config-router)#
```

Router-bogota2

```
bogota2>enable
Password:
bogota2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
bogota2(config)#router rip
bogota2(config-router)#version 2
bogota2(config-router)#no auto-summary
bogota2(config-router)#network 172.29.3.8
bogota2(config-router)#network 172.29.3.12
bogota2(config-router)#
```

Router-bogota3

```
bogota3>enable
Password:
```

```
bogota3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
bogota3(config)#router rip
bogota3(config-router)#version 2
bogota3(config-router)#no auto-summary
bogota3(config-router)#network 172.29.3.0
bogota3(config-router)#network 172.29.3.12
bogota3(config-router)#
```

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

Tabla No. 5 Enrutamiento por defecto hacia el ISP- Redistribución por RIP

Router-medellin1

```
medellin1>enable
Password:
medellin1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
medellin1(config)#ip route 0.0.0.0 0.0.0.0 209.17.220.2
medellin1(config)#router rip
medellin1(config-router)#default-information originate
medellin1(config-router)#
```

Router-bogota1

```
bogota1>enable
Password:
bogota1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
bogota1(config)#ip route 0.0.0.0 0.0.0.0 209.17.220.6
bogota1(config)#router rip
bogota1(config-router)#default-information originate
bogota1(config-router)#
```

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

Tabla No. 6 Ruta estática en ISP-Sumarización

Router-ISP

```
ISP>enable
Password:
ISP#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
```

```
ISP(config)#ip route 172.29.4.0 255.255.252.0 209.17.220.1
ISP(config)#ip route 172.29.0.0 255.255.252.0 209.17.220.5
ISP(config)#
```

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 No.7 Tabla de enrutamiento

Router-medellin1

```
medellin1>enable

Password:

medellin1#show ip route

Gateway of last resort is 209.17.220.2 to network 0.0.0.0
172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R       172.29.4.0/25 [120/1] via 172.29.6.2, 00:00:13, Serial0/0/0
R       172.29.4.128/25 [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
C       172.29.6.0/30 is directly connected, Serial0/0/0
L       172.29.6.1/32 is directly connected, Serial0/0/0
R       172.29.6.4/30 [120/1] via 172.29.6.10, 00:00:10, Serial0/0/1
[120/1] via 172.29.6.2, 00:00:13, Serial0/0/0
[120/1] via 172.29.6.14, 00:00:10, Serial0/1/0
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
209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks
C       209.17.220.0/30 is directly connected, Serial0/1/1
L       209.17.220.1/32 is directly connected, Serial0/1/1
S*   0.0.0.0/0 [1/0] via 209.17.220.2
```

Router-medellin2

```
medellin2>enable
Password:
medellin2#show ip route

Gateway of last resort is 172.29.6.1 to network 0.0.0.0

        172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
C       172.29.4.0/25 is directly connected, GigabitEthernet0/0
L       172.29.4.1/32 is directly connected, GigabitEthernet0/0
R       172.29.4.128/25 [120/1] via 172.29.6.6, 00:00:18, Serial0/1/1
C       172.29.6.0/30 is directly connected, Serial0/0/0
```

```
L       172.29.6.2/32 is directly connected, Serial0/0/0
C       172.29.6.4/30 is directly connected, Serial0/1/1
L       172.29.6.5/32 is directly connected, Serial0/1/1
R       172.29.6.8/30 [120/1] via 172.29.6.6, 00:00:18, Serial0/1/1
[120/1] via 172.29.6.1, 00:00:13, Serial0/0/0
R       172.29.6.12/30 [120/1] via 172.29.6.1, 00:00:13, Serial0/0/0
[120/1] via 172.29.6.6, 00:00:18, Serial0/1/1
R*   0.0.0.0/0 [120/1] via 172.29.6.1, 00:00:13, Serial0/0/0
```

Router-medellin3

```
medellin3>enable
Password:
medellin3#show ip route

Gateway of last resort is 172.29.6.9 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 10 subnets, 3 masks
R       172.29.4.0/25 [120/1] via 172.29.6.5, 00:00:10, Serial0/1/1
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 172.29.6.5, 00:00:10, Serial0/1/1
[120/1] via 172.29.6.9, 00:00:01, Serial0/0/1
[120/1] via 172.29.6.13, 00:00:01, Serial0/1/0
C       172.29.6.4/30 is directly connected, Serial0/1/1
L       172.29.6.6/32 is directly connected, Serial0/1/1
C       172.29.6.8/30 is directly connected, Serial0/0/1
L       172.29.6.10/32 is directly connected, Serial0/0/1
C       172.29.6.12/30 is directly connected, Serial0/1/0
L       172.29.6.14/32 is directly connected, Serial0/1/0
R*   0.0.0.0/0 [120/1] via 172.29.6.9, 00:00:01, Serial0/0/1
[120/1] via 172.29.6.13, 00:00:01, Serial0/1/0
```

Router-ISP

```
ISP>enable
Password:
ISP#show ip 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 209.17.220.5
S       172.29.4.0/22 [1/0] via 209.17.220.1
209.17.220.0/24 is variably subnetted, 4 subnets, 2 masks
C       209.17.220.0/30 is directly connected, Serial0/1/1
L       209.17.220.2/32 is directly connected, Serial0/1/1
C       209.17.220.4/30 is directly connected, Serial0/1/0
```

```
L       209.17.220.6/32 is directly connected, Serial0/1/0
```

Router-bogota1

```
bogota1>enable
Password:
bogota1#show ip route

Gateway of last resort is 209.17.220.6 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 172.29.3.2, 00:00:19, Serial0/0/0
[120/1] via 172.29.3.6, 00:00:19, Serial0/1/1
R       172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:07, Serial0/0/1
C       172.29.3.0/30 is directly connected, Serial0/0/0
L       172.29.3.1/32 is directly connected, Serial0/0/0
C       172.29.3.4/30 is directly connected, Serial0/1/1
L       172.29.3.5/32 is directly connected, Serial0/1/1
C       172.29.3.8/30 is directly connected, Serial0/0/1
L       172.29.3.9/32 is directly connected, Serial0/0/1
R       172.29.3.12/30 [120/1] via 172.29.3.2, 00:00:19, Serial0/0/0
[120/1] via 172.29.3.6, 00:00:19, Serial0/1/1
[120/1] via 172.29.3.10, 00:00:07, Serial0/0/1
209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks
C       209.17.220.4/30 is directly connected, Serial0/1/0
L       209.17.220.5/32 is directly connected, Serial0/1/0
S*   0.0.0.0/0 [1/0] via 209.17.220.6
```

Router-bogota2

```
bogota2>enable
Password:
bogota2#show ip route

Gateway of last resort is 172.29.3.9 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R       172.29.0.0/24 [120/1] via 172.29.3.13, 00:00:16, Serial0/1/0
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 172.29.3.13, 00:00:16, Serial0/1/0
[120/1] via 172.29.3.9, 00:00:06, Serial0/0/1
R       172.29.3.4/30 [120/1] via 172.29.3.13, 00:00:16, Serial0/1/0
[120/1] via 172.29.3.9, 00:00:06, Serial0/0/1
C       172.29.3.8/30 is directly connected, Serial0/0/1
L       172.29.3.10/32 is directly connected, Serial0/0/1
C       172.29.3.12/30 is directly connected, Serial0/1/0
L       172.29.3.14/32 is directly connected, Serial0/1/0
```

R* 0.0.0.0/0 [120/1] via 172.29.3.9, 00:00:06, Serial0/0/1

Router-bogota3

```
bogota3>enable
Password:
bogota3#show ip route

Gateway of last resort is 172.29.3.1 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 10 subnets, 3 masks
C       172.29.0.0/24 is directly connected, GigabitEthernet0/0
L       172.29.0.1/32 is directly connected, GigabitEthernet0/0
R       172.29.1.0/24 [120/1] via 172.29.3.14, 00:00:17, Serial0/1/0
C       172.29.3.0/30 is directly connected, Serial0/0/0
L       172.29.3.2/32 is directly connected, Serial0/0/0
C       172.29.3.4/30 is directly connected, Serial0/1/1
L       172.29.3.6/32 is directly connected, Serial0/1/1
R       172.29.3.8/30 [120/1] via 172.29.3.1, 00:00:17, Serial0/0/0
[120/1] via 172.29.3.5, 00:00:17, Serial0/1/1
[120/1] via 172.29.3.14, 00:00:17, Serial0/1/0
C       172.29.3.12/30 is directly connected, Serial0/1/0
L       172.29.3.13/32 is directly connected, Serial0/1/0
R*   0.0.0.0/0 [120/1] via 172.29.3.1, 00:00:17, Serial0/0/0
[120/1] via 172.29.3.5, 00:00:17, Serial0/1/1
```

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

Tabla No.8 Balanceo de carga en los routers

Router-medellin1

```
medellin1>enable

Password:

medellin1#show ip route

Gateway of last resort is 209.17.220.2 to network 0.0.0.0
172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R       172.29.4.0/25 [120/1] via 172.29.6.2, 00:00:13, Serial0/0/0
R       172.29.4.128/25 [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
C       172.29.6.0/30 is directly connected, Serial0/0/0
L       172.29.6.1/32 is directly connected, Serial0/0/0
R       172.29.6.4/30 [120/1] via 172.29.6.10, 00:00:10, Serial0/0/1
                      [120/1] via 172.29.6.2, 00:00:13, Serial0/0/0
                      [120/1] via 172.29.6.14, 00:00:10, Serial0/1/0
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
209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks
C 209.17.220.0/30 is directly connected, Serial0/1/1
L 209.17.220.1/32 is directly connected, Serial0/1/1
S* 0.0.0.0/0 [1/0] via 209.17.220.2

Router-medellin2

medellin2>enable
Password:
medellin2#show ip route

Gateway of last resort is 172.29.6.1 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
C 172.29.4.0/25 is directly connected, GigabitEthernet0/0
L 172.29.4.1/32 is directly connected, GigabitEthernet0/0
R 172.29.4.128/25 [120/1] via 172.29.6.6, 00:00:18, Serial0/1/1
C 172.29.6.0/30 is directly connected, Serial0/0/0
L 172.29.6.2/32 is directly connected, Serial0/0/0
C 172.29.6.4/30 is directly connected, Serial0/1/1
L 172.29.6.5/32 is directly connected, Serial0/1/1
R 172.29.6.8/30 [120/1] via 172.29.6.6, 00:00:18, Serial0/1/1
[120/1] via 172.29.6.1, 00:00:13, Serial0/0/0
R 172.29.6.12/30 [120/1] via 172.29.6.1, 00:00:13, Serial0/0/0
[120/1] via 172.29.6.6, 00:00:18, Serial0/1/1
R* 0.0.0.0/0 [120/1] via 172.29.6.1, 00:00:13, Serial0/0/0

Router-medellin3

medellin3>enable
Password:
medellin3#show ip route

Gateway of last resort is 172.29.6.9 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 10 subnets, 3 masks
R 172.29.4.0/25 [120/1] via 172.29.6.5, 00:00:10, Serial0/1/1
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 172.29.6.5, 00:00:10, Serial0/1/1
[120/1] via 172.29.6.9, 00:00:01, Serial0/0/1
[120/1] via 172.29.6.13, 00:00:01, Serial0/1/0
C 172.29.6.4/30 is directly connected, Serial0/1/1
L 172.29.6.6/32 is directly connected, Serial0/1/1
C 172.29.6.8/30 is directly connected, Serial0/0/1

```
L       172.29.6.10/32 is directly connected, Serial0/0/1
C       172.29.6.12/30 is directly connected, Serial0/1/0
L       172.29.6.14/32 is directly connected, Serial0/1/0
R*   0.0.0.0/0 [120/1] via 172.29.6.9, 00:00:01, Serial0/0/1
                   [120/1] via 172.29.6.13, 00:00:01, Serial0/1/0
```

Router-ISP

```
ISP>enable
Password:
ISP#show ip 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 209.17.220.5
S       172.29.4.0/22 [1/0] via 209.17.220.1
        209.17.220.0/24 is variably subnetted, 4 subnets, 2 masks
C       209.17.220.0/30 is directly connected, Serial0/1/1
L       209.17.220.2/32 is directly connected, Serial0/1/1
C       209.17.220.4/30 is directly connected, Serial0/1/0
L       209.17.220.6/32 is directly connected, Serial0/1/0
```

Router-bogota1

```
bogota1>enable
Password:
bogota1#show ip route

Gateway of last resort is 209.17.220.6 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 172.29.3.2, 00:00:19, Serial0/0/0
                      [120/1] via 172.29.3.6, 00:00:19, Serial0/1/1
R       172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:07, Serial0/0/1
C       172.29.3.0/30 is directly connected, Serial0/0/0
L       172.29.3.1/32 is directly connected, Serial0/0/0
C       172.29.3.4/30 is directly connected, Serial0/1/1
L       172.29.3.5/32 is directly connected, Serial0/1/1
C       172.29.3.8/30 is directly connected, Serial0/0/1
L       172.29.3.9/32 is directly connected, Serial0/0/1
R       172.29.3.12/30 [120/1] via 172.29.3.2, 00:00:19, Serial0/0/0
                       [120/1] via 172.29.3.6, 00:00:19, Serial0/1/1
                       [120/1] via 172.29.3.10, 00:00:07, Serial0/0/1
209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks
C       209.17.220.4/30 is directly connected, Serial0/1/0
L       209.17.220.5/32 is directly connected, Serial0/1/0
S*   0.0.0.0/0 [1/0] via 209.17.220.6
```

Router-bogota2

```
bogota2>enable
Password:
bogota2#show ip route

Gateway of last resort is 172.29.3.9 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R       172.29.0.0/24 [120/1] via 172.29.3.13, 00:00:16, Serial0/1/0
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 172.29.3.13, 00:00:16, Serial0/1/0
                      [120/1] via 172.29.3.9, 00:00:06, Serial0/0/1
R       172.29.3.4/30 [120/1] via 172.29.3.13, 00:00:16, Serial0/1/0
                      [120/1] via 172.29.3.9, 00:00:06, Serial0/0/1
C       172.29.3.8/30 is directly connected, Serial0/0/1
L       172.29.3.10/32 is directly connected, Serial0/0/1
C       172.29.3.12/30 is directly connected, Serial0/1/0
L       172.29.3.14/32 is directly connected, Serial0/1/0
R*   0.0.0.0/0 [120/1] via 172.29.3.9, 00:00:06, Serial0/0/1
```

Router-bogota3

```
bogota3>enable
Password:
bogota3#show ip route

Gateway of last resort is 172.29.3.1 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 10 subnets, 3 masks
C       172.29.0.0/24 is directly connected, GigabitEthernet0/0
L       172.29.0.1/32 is directly connected, GigabitEthernet0/0
R       172.29.1.0/24 [120/1] via 172.29.3.14, 00:00:17, Serial0/1/0
C       172.29.3.0/30 is directly connected, Serial0/0/0
L       172.29.3.2/32 is directly connected, Serial0/0/0
C       172.29.3.4/30 is directly connected, Serial0/1/1
L       172.29.3.6/32 is directly connected, Serial0/1/1
R       172.29.3.8/30 [120/1] via 172.29.3.1, 00:00:17, Serial0/0/0
                      [120/1] via 172.29.3.5, 00:00:17, Serial0/1/1
                      [120/1] via 172.29.3.14, 00:00:17, Serial0/1/0
C       172.29.3.12/30 is directly connected, Serial0/1/0
L       172.29.3.13/32 is directly connected, Serial0/1/0
R*   0.0.0.0/0 [120/1] via 172.29.3.1, 00:00:17, Serial0/0/0
                  [120/1] via 172.29.3.5, 00:00:17, Serial0/1/1
```

c. Obsérvese en los routers Bogotá1 y Medellín1 cierta similitud por su ubicación, por tener dos enlaces de conexión hacia otro router y por la ruta por defecto que manejan.

Tabla No.9 Routers medellin1 y bogota1-Similitud

Router-medellin1	Router-bogota1
medellin1>enable Password: medellin1#show ip route Gateway of last resort is 209.17.220.2 to network 0.0.0.0 172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks R 172.29.4.0/25 [120/1] via 172.29.6.2, 00:00:13, Serial0/0/0 **R 172.29.4.128/25 [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** C 172.29.6.0/30 is directly connected, Serial0/0/0 L 172.29.6.1/32 is directly connected, Serial0/0/0 **R 172.29.6.4/30 [120/1] via 172.29.6.10, 00:00:10, Serial0/0/1 [120/1] via 172.29.6.2, 00:00:13, Serial0/0/0 [120/1] via 172.29.6.14, 00:00:10, Serial0/1/0** 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, Serial0/1/0 209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks C 209.17.220.0/30 is directly connected, Serial0/1/1 L 209.17.220.1/32 is directly	bogota1>enable Password: bogota1#show ip route Gateway of last resort is 209.17.220.6 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 172.29.3.2, 00:00:19, Serial0/0/0 [120/1] via 172.29.3.6, 00:00:19, Serial0/1/1** R 172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:07, Serial0/0/1 C 172.29.3.0/30 is directly connected, Serial0/0/0 L 172.29.3.1/32 is directly connected, Serial0/0/0 C 172.29.3.4/30 is directly connected, Serial0/1/1 L 172.29.3.5/32 is directly connected, Serial0/1/1 C 172.29.3.8/30 is directly connected, Serial0/0/1 L 172.29.3.9/32 is directly connected, Serial0/0/1 **R 172.29.3.12/30 [120/1] via 172.29.3.2, 00:00:19, Serial0/0/0 [120/1] via 172.29.3.6, 00:00:19, Serial0/1/1 [120/1] via 172.29.3.10, 00:00:07, Serial0/0/1** 209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks C 209.17.220.4/30 is directly connected, Serial0/1/0 L 209.17.220.5/32 is directly

connected, Serial0/1/1 S* 0.0.0.0/0 [1/0] via 209.17.220.2	connected, Serial0/1/0 S* 0.0.0.0/0 [1/0] via 209.17.220.6

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

Tabla No.10 Routers medellin2 y bogota2-RIP

Router-medellin2	Router-bogota2
medellin2>enable Password: medellin2#show ip route Gateway of last resort is 172.29.6.1 to network 0.0.0.0 172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks C 172.29.4.0/25 is directly connected, GigabitEthernet0/0 L 172.29.4.1/32 is directly connected, GigabitEthernet0/0 **R 172.29.4.128/25 [120/1] via 172.29.6.6, 00:00:18, Serial0/1/1** C 172.29.6.0/30 is directly connected, Serial0/0/0 L 172.29.6.2/32 is directly connected, Serial0/0/0 C 172.29.6.4/30 is directly connected, Serial0/1/1 L 172.29.6.5/32 is directly connected, Serial0/1/1 **R 172.29.6.8/30 [120/1] via 172.29.6.6, 00:00:18, Serial0/1/1** **[120/1] via 172.29.6.1, 00:00:13, Serial0/0/0** **R 172.29.6.12/30 [120/1] via 172.29.6.1, 00:00:13, Serial0/0/0** **[120/1] via 172.29.6.6, 00:00:18, Serial0/1/1** **R* 0.0.0.0/0 [120/1] via 172.29.6.1, 00:00:13, Serial0/0/0**	bogota2>enable Password: bogota2#show ip route Gateway of last resort is 172.29.3.9 to network 0.0.0.0 172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks **R 172.29.0.0/24 [120/1] via 172.29.3.13, 00:00:27, Serial0/1/0** 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 172.29.3.9, 00:00:20, Serial0/0/1** **[120/1] via 172.29.3.13, 00:00:27, Serial0/1/0** **R 172.29.3.4/30 [120/1] via 172.29.3.9, 00:00:20, Serial0/0/1** **[120/1] via 172.29.3.13, 00:00:27, Serial0/1/0** C 172.29.3.8/30 is directly connected, Serial0/0/1 L 172.29.3.10/32 is directly connected, Serial0/0/1 C 172.29.3.12/30 is directly connected, Serial0/1/0 L 172.29.3.14/32 is directly connected, Serial0/1/0 **R* 0.0.0.0/0 [120/1] via 172.29.3.9, 00:00:20, Serial0/0/1**

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

Tabla No.11 Routers medellin2 y bogota2-RIP

Router-medellin3	Router-bogota3
medellin3>enable Password: medellin3#show ip route Gateway of last resort is 172.29.6.9 to network 0.0.0.0 172.29.0.0/16 is variably subnetted, 10 subnets, 3 masks R 172.29.4.0/25 [120/1] via 172.29.6.5, 00:00:04, Serial0/1/1 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 172.29.6.5, 00:00:04, Serial0/1/1 [120/1] via 172.29.6.9, 00:00:14, Serial0/0/1 [120/1] via 172.29.6.13, 00:00:14, Serial0/1/0 C 172.29.6.4/30 is directly connected, Serial0/1/1 L 172.29.6.6/32 is directly connected, Serial0/1/1 C 172.29.6.8/30 is directly connected, Serial0/0/1 L 172.29.6.10/32 is directly connected, Serial0/0/1 C 172.29.6.12/30 is directly connected, Serial0/1/0 L 172.29.6.14/32 is directly connected, Serial0/1/0 **R* 0.0.0.0/0 [120/1] via 172.29.6.9, 00:00:14, Serial0/0/1** **[120/1] via 172.29.6.13, 00:00:14, Serial0/1/0**	bogota3>enable Password: bogota3#show ip route Gateway of last resort is 172.29.3.1 to network 0.0.0.0 172.29.0.0/16 is variably subnetted, 10 subnets, 3 masks C 172.29.0.0/24 is directly connected, GigabitEthernet0/0 L 172.29.0.1/32 is directly connected, GigabitEthernet0/0 R 172.29.1.0/24 [120/1] via 172.29.3.14, 00:00:17, Serial0/1/0 C 172.29.3.0/30 is directly connected, Serial0/0/0 L 172.29.3.2/32 is directly connected, Serial0/0/0 C 172.29.3.4/30 is directly connected, Serial0/1/1 L 172.29.3.6/32 is directly connected, Serial0/1/1 R 172.29.3.8/30 [120/1] via 172.29.3.1, 00:00:17, Serial0/0/0 [120/1] via 172.29.3.5, 00:00:17, Serial0/1/1 [120/1] via 172.29.3.14, 00:00:17, Serial0/1/0 C 172.29.3.12/30 is directly connected, Serial0/1/0 L 172.29.3.13/32 is directly connected, Serial0/1/0 **R* 0.0.0.0/0 [120/1] via 172.29.3.1, 00:00:17, Serial0/0/0** **[120/1] via 172.29.3.5, 00:00:17, Serial0/1/1**

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

Tabla No.12 Rutas estaticas

Router-ISP
ISP>enable Password: ISP#show ip 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 209.17.220.5** **S 172.29.4.0/22 [1/0] via 209.17.220.1** 209.17.220.0/24 is variably subnetted, 4 subnets, 2 masks C 209.17.220.0/30 is directly connected, Serial0/1/1 L 209.17.220.2/32 is directly connected, Serial0/1/1 C 209.17.220.4/30 is directly connected, Serial0/1/0 L 209.17.220.6/32 is directly connected, Serial0/1/0

Parte 3: Deshabilitar la propagación del protocolo RIP.

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

ROUTER	**INTERFAZ**
Bogota1	SERIAL0/0/1; SERIAL0/1/0; SERIAL0/1/1
Bogota2	SERIAL0/0/0; SERIAL0/0/1
Bogota3	SERIAL0/0/0; SERIAL0/0/1; SERIAL0/1/0
Medellín1	SERIAL0/0/0; SERIAL0/0/1; SERIAL0/1/1
Medellín2	SERIAL0/0/0; SERIAL0/0/1
Medellín3	SERIAL0/0/0; SERIAL0/0/1; SERIAL0/1/0
ISP	No lo requiere

Tabla No.13 Deshabilitar RIP
Router-bogota1
Se0/0/0
bogota1>enable Password: bogota1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. bogota1(config)#router rip bogota1(config-router)#passive-interface s0/0/0 bogota1(config-router)#end bogota1# %SYS-5-CONFIG_I: Configured from console by console
Router-bogota2
G0/0
bogota2>enable Password: bogota2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. bogota2(config)#router rip bogota2(config-router)#passive-interface g0/0 bogota2(config-router)#end bogota2# %SYS-5-CONFIG_I: Configured from console by console
Router-bogota3
G0/0
bogota3>enable Password: bogota3#configure terminal Enter configuration commands, one per line. End with CNTL/Z. bogota3(config)#router rip bogota3(config-router)#passive-interface g0/0 bogota3(config-router)#end bogota3# %SYS-5-CONFIG_I: Configured from console by console
Router ISP
-
No lo requiere
Medellin1
S0/1/0
medellin1>enable Password: medellin1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. medellin1(config)#router rip

medellin1(config-router)#passive-interface s0/1/0 medellin1(config-router)#end medellin1# %SYS-5-CONFIG_I: Configured from console by console
Medellin2
G0/0
medellin2>enable Password: medellin2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. medellin2(config)#router rip medellin2(config-router)#passive-interface g0/0 medellin2(config-router)#end medellin2# %SYS-5-CONFIG_I: Configured from console by console
Medellin3
G0/0
medellin3>enable Password: medellin3#configure terminal Enter configuration commands, one per line. End with CNTL/Z. medellin3(config)#router rip medellin3(config-router)#passive-interface g0/0 medellin3(config-router)#end medellin3# %SYS-5-CONFIG_I: Configured from console by console

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.

Tabla No.14 Passive interface-Version RIP-Interfaces
Router-medellin1
medellin1>enable Password: medellin1#show ip protocols Routing Protocol is "rip" Sending updates every 30 seconds, next due in 12 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):
Serial0/1/0
Routing Information Sources:
Gateway         Distance      Last Update
172.29.6.2           120      00:00:07
172.29.6.10          120      00:00:17
172.29.6.14          120      00:00:17
Distance: (default is 120)
medellin1#
```

Router-medellin2

```
medellin2>enable
Password:
medellin2#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
Serial0/1/1          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
172.29.6.1           120      00:00:13
172.29.6.6           120      00:00:17
Distance: (default is 120)
```

```
medellin2#
```

Router-medellin3

```
medellin3>enable
Password:
medellin3#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 9 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
Serial0/1/0           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
172.29.6.9           120      00:00:09
172.29.6.5           120      00:00:25
Distance: (default is 120)
medellin3#
```

Router-bogota1

```
bogota1>enable
Password:
bogota1#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 18 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
Serial0/1/1           2     2
Automatic network summarization is not in effect
Maximum path: 4
```

```
Routing for Networks:
172.29.0.0
Passive Interface(s):
Serial0/0/0
Routing Information Sources:
Gateway         Distance      Last Update
172.29.3.6           120      00:00:23
172.29.3.2           120      00:00:23
172.29.3.10           120      00:00:09
Distance: (default is 120)
bogota1#
```

Router-bogota2

```
bogota2>enable
Password:
bogota2#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 17 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
Serial0/1/0           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
172.29.3.9           120      00:00:15
172.29.3.13           120      00:00:03
Distance: (default is 120)
bogota2#
```

Router-bogota3

```
bogota3>enable
Password:
bogota3#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 6 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
Serial0/0/0          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
172.29.3.5           120      00:00:04
172.29.3.14          120      00:00:03
Distance: (default is 120)
Bogota3#
```

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.

Tabla No.14 Passive interface-Version RIP-Interfaces

Router-medellin1

```
medellin1>enable
Password:
medellin1#show ip rip database
0.0.0.0/0    auto-summary
0.0.0.0/0
[0] via 0.0.0.0, 00:00:00
172.29.4.0/25    auto-summary
172.29.4.0/25
[1] via 172.29.6.2, 00:00:08, Serial0/0/0
172.29.4.128/25    auto-summary
172.29.4.128/25
[1] via 172.29.6.10, 00:00:24, Serial0/0/1        [1] via 172.29.6.14, 00:00:24, Serial0/1/0
172.29.6.0/30    auto-summary
172.29.6.0/30    directly connected, Serial0/0/0
172.29.6.4/30    auto-summary
172.29.6.4/30
```

[1] via 172.29.6.10, 00:00:24, Serial0/0/1 [1] via 172.29.6.2, 00:00:08, Serial0/0/0 [1] via 172.29.6.14, 00:00:24, Serial0/1/0
172.29.6.8/30 auto-summary
172.29.6.8/30 directly connected, Serial0/0/1
172.29.6.12/30 auto-summary
172.29.6.12/30 directly connected, Serial0/1/0
medellin1#

Router-medellin2

medellin2>enable
Password:
medellin2#show ip rip database
0.0.0.0/0 auto-summary
0.0.0.0/0
[1] via 172.29.6.1, 00:00:14, Serial0/0/0
172.29.4.0/25 auto-summary
172.29.4.0/25 directly connected, GigabitEthernet0/0
172.29.4.128/25 auto-summary
172.29.4.128/25
[1] via 172.29.6.6, 00:00:25, Serial0/1/1
172.29.6.0/30 auto-summary
172.29.6.0/30 directly connected, Serial0/0/0
172.29.6.4/30 auto-summary
172.29.6.4/30 directly connected, Serial0/1/1
172.29.6.8/30 auto-summary
172.29.6.8/30
[1] via 172.29.6.1, 00:00:14, Serial0/0/0 [1] via 172.29.6.6, 00:00:25, Serial0/1/1
172.29.6.12/30 auto-summary
172.29.6.12/30
[1] via 172.29.6.1, 00:00:14, Serial0/0/0 [1] via 172.29.6.6, 00:00:25, Serial0/1/1
medellin2#

Router-medellin3

medellin3>enable
Password:
medellin3#show ip rip database
0.0.0.0/0 auto-summary
0.0.0.0/0
[1] via 172.29.6.9, 00:00:08, Serial0/0/1
172.29.4.0/25 auto-summary
172.29.4.0/25
[1] via 172.29.6.5, 00:00:03, Serial0/1/1
172.29.4.128/25 auto-summary
172.29.4.128/25 directly connected, GigabitEthernet0/0

172.29.6.0/30 auto-summary
172.29.6.0/30
[1] via 172.29.6.9, 00:00:08, Serial0/0/1 [1] via 172.29.6.5, 00:00:03, Serial0/1/1
172.29.6.4/30 auto-summary
172.29.6.4/30 directly connected, Serial0/1/1
172.29.6.8/30 auto-summary
172.29.6.8/30 directly connected, Serial0/0/1
172.29.6.12/30 auto-summary
172.29.6.12/30 directly connected, Serial0/1/0
medellin3#

Router-bogota1

bogota1>enable
Password:
bogota1#show ip rip database
0.0.0.0/0 auto-summary
0.0.0.0/0
[0] via 0.0.0.0, 00:00:00
172.29.0.0/24 auto-summary
172.29.0.0/24
[1] via 172.29.3.6, 00:00:20, Serial0/1/1 [1] via 172.29.3.2, 00:00:20, Serial0/0/0
172.29.1.0/24 auto-summary
172.29.1.0/24
[1] via 172.29.3.10, 00:00:01, Serial0/0/1
172.29.3.0/30 auto-summary
172.29.3.0/30 directly connected, Serial0/0/0
172.29.3.4/30 auto-summary
172.29.3.4/30 directly connected, Serial0/1/1
172.29.3.8/30 auto-summary
172.29.3.8/30 directly connected, Serial0/0/1
172.29.3.12/30 auto-summary
172.29.3.12/30
[1] via 172.29.3.6, 00:00:20, Serial0/1/1 [1] via 172.29.3.2, 00:00:20, Serial0/0/0 [1] via 172.29.3.10, 00:00:01, Serial0/0/1
bogota1#

Router-bogota2

bogota2>enable
Password:
bogota2#show ip rip database
0.0.0.0/0 auto-summary
0.0.0.0/0
[1] via 172.29.3.9, 00:00:04, Serial0/0/1
172.29.0.0/24 auto-summary

```
172.29.0.0/24
[1] via 172.29.3.13, 00:00:03, Serial0/1/0
172.29.1.0/24    auto-summary
172.29.1.0/24    directly connected, GigabitEthernet0/0
172.29.3.0/30    auto-summary
172.29.3.0/30
[1] via 172.29.3.9, 00:00:04, Serial0/0/1        [1] via 172.29.3.13, 00:00:03, Serial0/1/0
172.29.3.4/30    auto-summary
172.29.3.4/30
[1] via 172.29.3.9, 00:00:04, Serial0/0/1        [1] via 172.29.3.13, 00:00:03, Serial0/1/0
172.29.3.8/30    auto-summary
172.29.3.8/30    directly connected, Serial0/0/1
172.29.3.12/30    auto-summary
172.29.3.12/30    directly connected, Serial0/1/0
bogota2#
```

Router-bogota3

```
bogota3>enable
Password:
bogota3#show ip rip database
0.0.0.0/0    auto-summary
0.0.0.0/0
[1] via 172.29.3.5, 00:00:24, Serial0/1/1
172.29.0.0/24    auto-summary
172.29.0.0/24    directly connected, GigabitEthernet0/0
172.29.1.0/24    auto-summary
172.29.1.0/24
[1] via 172.29.3.14, 00:00:05, Serial0/1/0
172.29.3.0/30    auto-summary
172.29.3.0/30    directly connected, Serial0/0/0
172.29.3.4/30    auto-summary
172.29.3.4/30    directly connected, Serial0/1/1
172.29.3.8/30    auto-summary
172.29.3.8/30
[1] via 172.29.3.5, 00:00:24, Serial0/1/1        [1] via 172.29.3.14, 00:00:05, Serial0/1/0
172.29.3.12/30    auto-summary
172.29.3.12/30    directly connected, Serial0/1/0
bogota3#
```

Parte 5: Configurar encapsulamiento y autenticación PPP.

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

Tabla No.15 Nombre y password-PAT-Autenticación PPP
Nombre y password
Router medellin1
medellin1>enable Password: medellin1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. medellin1(config)#username ISP password cisco medellin1(config)#
Router ISP
ISP>enable Password: ISP#configure terminal Enter configuration commands, one per line. End with CNTL/Z. ISP(config)#username medellin1 password cisco ISP(config)#
Autenticación PPP
Router medellin1
medellin1>enable Password: medellin1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. medellin1(config)#interface serial 0/1/1 medellin1(config-if)#encapsulation ppp medellin1(config-if)# %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to down medellin1(config-if)#
Router ISP
ISP>enable Password: ISP#configure terminal Enter configuration commands, one per line. End with CNTL/Z. ISP(config)#interface serial 0/1/1 ISP(config-if)#encapsulation ppp

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

Envío de password y usuario-Router
Router medellin1
medellin1>enable Password: medellin1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. medellin1(config)#interface serial 0/1/1 medellin1(config-if)#ppp pap sent-username medellin1 password cisco medellin1(config-if)#
Router ISP
ISP>enable Password: ISP#configure terminal Enter configuration commands, one per line. End with CNTL/Z. ISP(config)#interface serial 0/1/1 ISP(config-if)#ppp pap sent-username ISP password cisco ISP(config-if)#
Ping medellin1-ISP
medellin1#ping 209.17.220.2 Type escape sequence to abort. Sending 5, 100-byte ICMP Echos to 209.17.220.2, timeout is 2 seconds: !!!!! Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/7 ms medellin1#
Ping ISP-medellin1
ISP#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 = 1/2/6 ms ISP#

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

Tabla No.16 Nombre y password-PAT-Autenticación PPP
Nombre y password
Router bogota1
bogota1>enable Password: bogota1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. bogota1(config)#username ISP password cisco bogota1(config)#
Router ISP
ISP>enable Password: ISP#configure terminal Enter configuration commands, one per line. End with CNTL/Z. ISP(config)#username bogota1 password cisco ISP(config)#
Autenticación PPP
Router bogota1
bogota1>enable Password: bogota1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. bogota1(config)#interface serial 0/1/0 bogota1(config-if)#encapsulation ppp bogota1(config-if)# %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to down bogota1(config-if)#
Router ISP
ISP>enable Password: ISP#configure terminal Enter configuration commands, one per line. End with CNTL/Z. ISP(config)#interface serial 0/1/0 ISP(config-if)#encapsulation ppp ISP(config-if)# %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed

state to up
Activación autenticación CHAT
Router bogota1
bogota1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. bogota1(config)#interface serial 0/1/0 bogota1(config-if)#ppp authentication chap bogota1(config-if)# %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to down bogota1(config-if)# %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
Router ISP
ISP>enable Password: ISP#configure terminal Enter configuration commands, one per line. End with CNTL/Z. ISP(config)#interface serial 0/1/0 ISP(config-if)#ppp authentication chap ISP(config-if)# %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
Ping bogota1-ISP
bogota1#ping 209.17.220.6 Type escape sequence to abort. Sending 5, 100-byte ICMP Echos to 209.17.220.6, timeout is 2 seconds: !!!!! Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/5 ms bogota1#
Ping ISP-bogota1
ISP#ping 209.17.220.5 Type escape sequence to abort. Sending 5, 100-byte ICMP Echos to 209.17.220.5, timeout is 2 seconds: !!!!! Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/6 ms ISP#

Parte 6: Configuración de PAT.

a. En la topología, si se activa NAT en cada equipo de salida (Bogotá1 y Medellín1), los routers internos de una ciudad no podrán llegar hasta los routers internos en el otro extremo, sólo existirá comunicación hasta los routers Bogotá1, ISP y Medellín1.

NAT-bogota1

```
bogota1>enable
Password:
bogota1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
bogota1(config)#access-list 1 permit 172.29.0.0 0.0.3.255
bogota1(config)#ip nat inside source list 1 interface serial 0/1/0 overload
bogota1(config)#interface serial 0/1/0
bogota1(config-if)#ip nat outside
bogota1(config-if)#exit
bogota1(config)#interface serial 0/0/0
bogota1(config-if)#ip nat inside
bogota1(config-if)#exit
bogota1(config)#interface serial 0/1/1
bogota1(config-if)#ip nat inside
bogota1(config-if)#exit
bogota1(config)#interface serial 0/0/1
bogota1(config-if)#ip nat inside
bogota1(config-if)#
```

NAT-medellin1

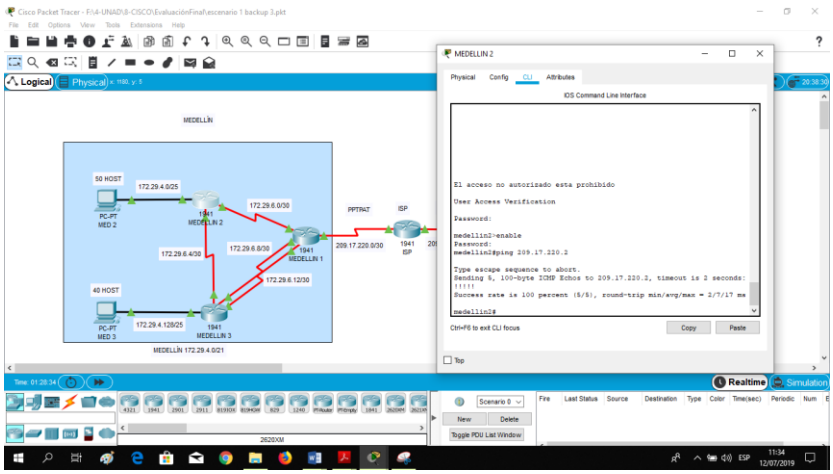
```
medellin1>enable
Password:
medellin1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
medellin1(config)#access-list 1 permit 172.29.4.0 0.0.3.255
medellin1(config)#ip nat inside source list 1 interface serial 0/1/1 overload
medellin1(config)#interface serial 0/1/1
```

```
medellin1(config-if)#ip nat outside
medellin1(config-if)#exit
medellin1(config)#interface serial 0/0/0
medellin1(config-if)#ip nat inside
medellin1(config-if)#exit
medellin1(config)#interface serial 0/0/1
medellin1(config-if)#ip nat inside
medellin1(config-if)#exit
medellin1(config)#interface serial 0/1/1
medellin1(config-if)#ip nat inside
medellin1(config-if)#
```

b. Después de verificar lo indicado en el paso anterior proceda a configurar el NAT en el router Medellín1. Compruebe que la traducción de direcciones indique las interfaces de entrada y de salida. Al realizar una prueba de ping, la dirección debe ser traducida automáticamente a la dirección de la interfaz serial 0/1/0 del router Medellín1, cómo diferente puerto.

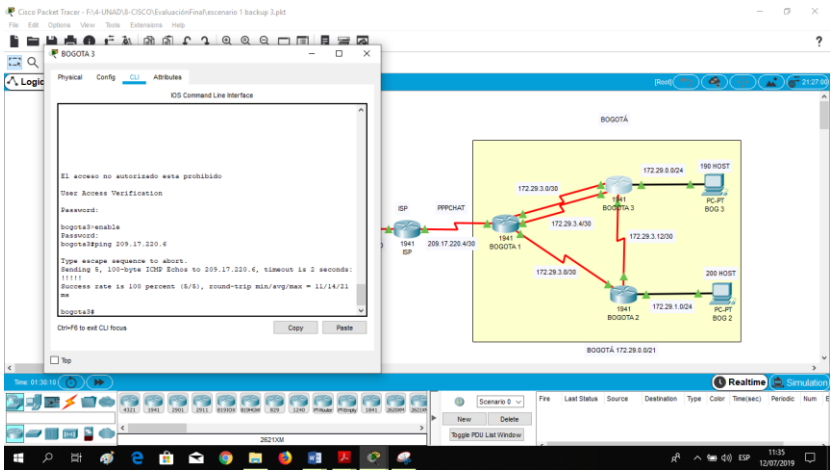
```
medellin2>enable
Password:
medellin2#ping 209.17.220.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.17.220.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/12/22 ms
medellin2#
```



c. Proceda a configurar el NAT en el router Bogotá1. Compruebe que la traducción de direcciones indique las interfaces de entrada y de salida. Al realizar una prueba de ping, la dirección debe ser traducida automáticamente a la dirección de la interfaz serial 0/1/0 del router Bogotá1, cómo diferente puerto.

bogota3>enable
Password:
bogota3#ping 209.17.220.6
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.17.220.6, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/8/22 ms
bogota3#

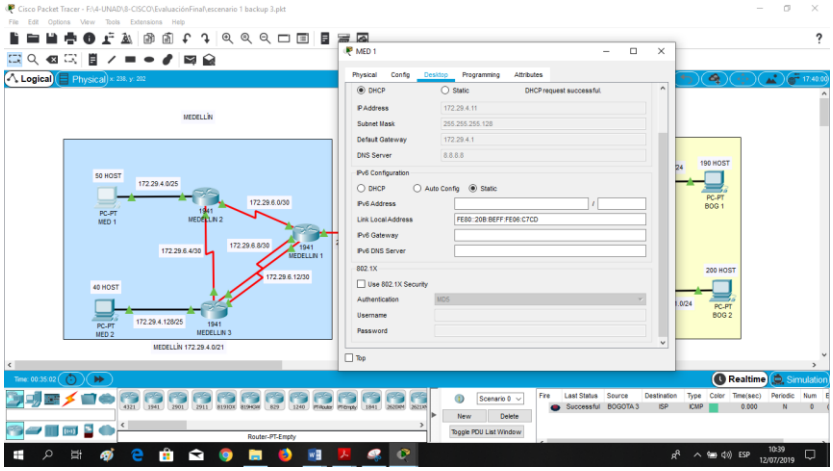


Parte 7: Configuración del servicio DHCP.

a. Configurar la red Medellín2 y Medellín3 donde el router Medellín 2 debe ser el servidor DHCP para ambas redes Lan.

medellin2>enable
Password:
medellin2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
medellin2(config)#ip dhcp excluded-address 172.29.4.1 172.29.4.10
medellin2(config)#ip dhcp excluded-address 172.29.4.129 172.29.4.138
medellin2(config)#ip dhcp pool PMED2
medellin2(dhcp-config)#network 172.29.4.0 255.255.255.128
medellin2(dhcp-config)#default-router 172.29.4.1

medellin2(dhcp-config)#dns-server 8.8.8.8
medellin2(dhcp-config)#



medellin3>enable
Password:
medellin3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
medellin3(config)#ip dhcp excluded-address 172.29.4.1 172.29.4.10
medellin3(config)#ip dhcp excluded-address 172.29.4.129 172.29.4.138
medellin3(config)#ip dhcp pool PMED3
medellin3(dhcp-config)#network 172.29.4.128 255.255.255.128
medellin3(dhcp-config)#default-router 172.29.4.129
medellin3(dhcp-config)#dns-server 8.8.8.8
medellin3(dhcp-config)#

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

medellin3>enable
Password:
medellin3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
medellin3(config)#interface gigabitEthernet 0/0
medellin3(config-if)#ip helper-address 172.29.6.5
medellin3(config-if)#exit
medellin3(config)#exit

medellin3#

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

medellin3#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

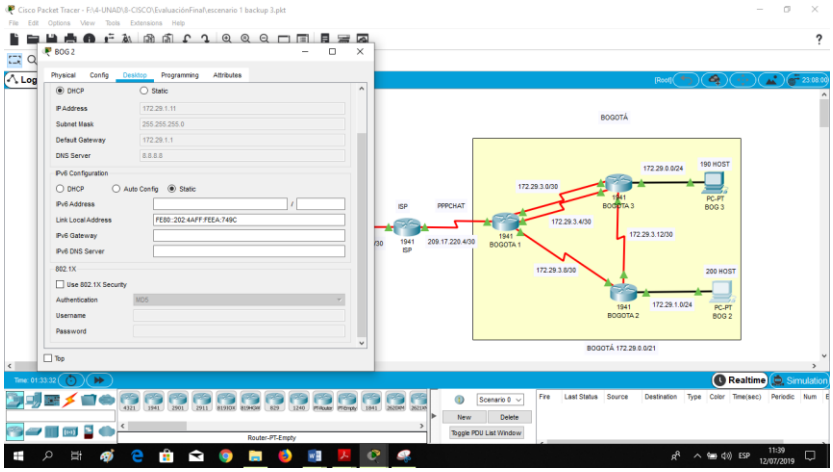
[OK]

medellin3#

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

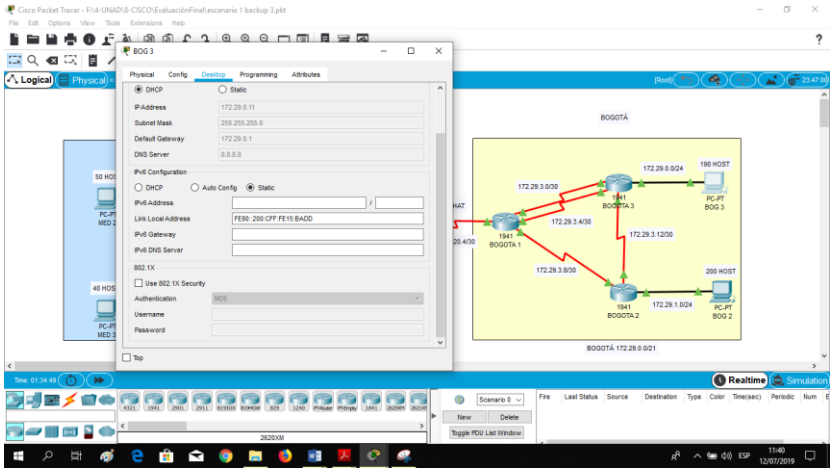
bogota2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
bogota2(config)#ip dhcp excluded-address 172.29.0.1 172.29.0.10
bogota2(config)#ip dhcp excluded-address 172.29.1.1 172.29.1.10
bogota2(config)#ip dhcp pool PBOG2
bogota2(dhcp-config)#network 172.29.1.0 255.255.255.0
bogota2(dhcp-config)#default-router 172.29.1.1
bogota2(dhcp-config)#dns-server 8.8.8.8
bogota2(dhcp-config)#exit
bogota2(config)#exit
bogota2#
%SYS-5-CONFIG_I: Configured from console by console

bogota2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
bogota2#



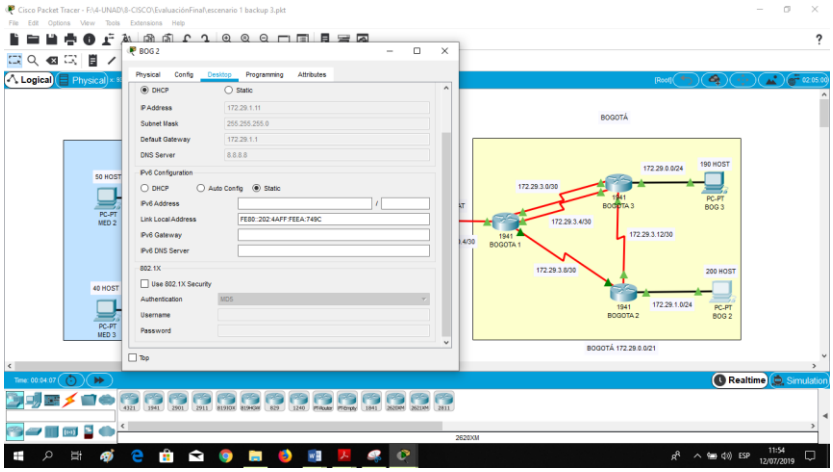
```
bogota3>enable
Password:
bogota3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
bogota3(config)#ip dhcp excluded-address 172.29.0.1 172.29.0.10
bogota3(config)#ip dhcp excluded-address 172.29.1.1 172.29.1.10
bogota3(config)#ip dhcp pool BOG3
bogota3(dhcp-config)#network 172.29.0.0 255.255.255.0
bogota3(dhcp-config)#default-router 172.29.0.1
bogota3(dhcp-config)#dns-server 8.8.8.8
bogota3(dhcp-config)#exit
bogota3(config)#exit
bogota3#
%SYS-5-CONFIG_I: Configured from console by console

bogota3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
bogota3#
```



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

bogota2>enable
Password:
bogota2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
bogota2(config)#interface gigabitEthernet 0/0
bogota2(config-if)#ip helper-address 172.29.3.13
bogota2(config-if)#exit
bogota2(config)#exit
bogota2#
%SYS-5-CONFIG_I: Configured from console by console
copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
bogota2#

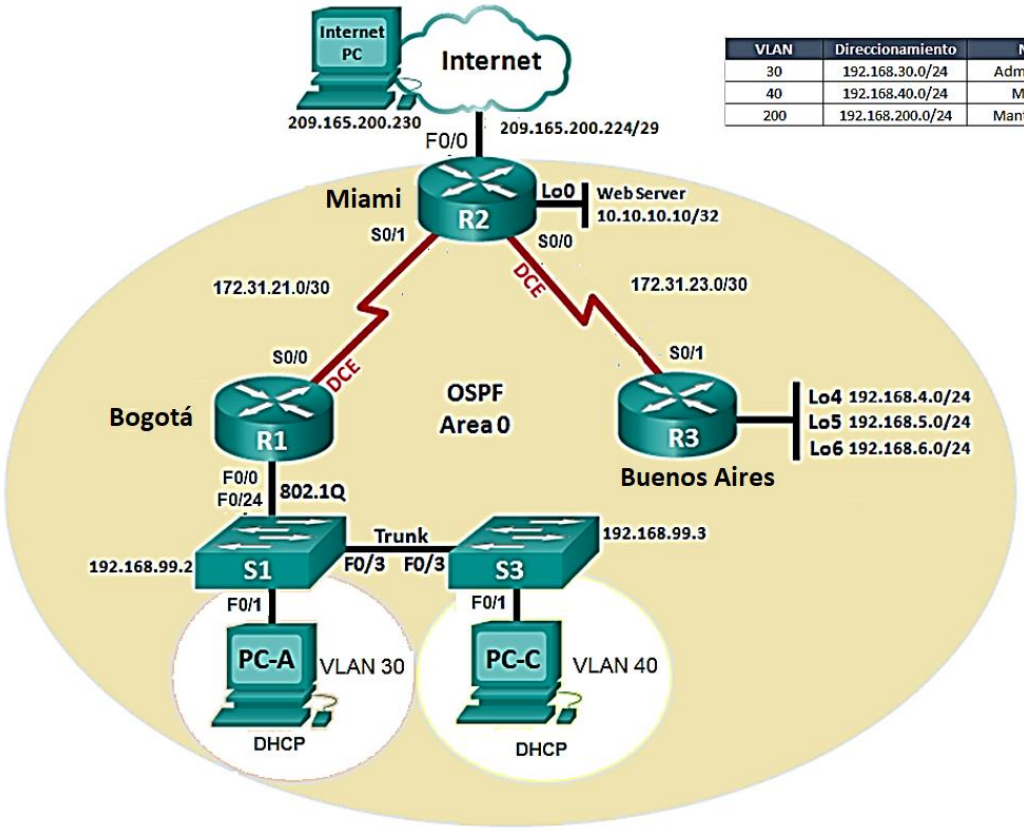

BOG 2
Physical
Config
Desktop
Programming
Attributes
DHCP
Static
IP Address
172.29.1.11
Subnet Mask
255.255.255.0
Default Gateway
172.29.1.1
DNS Server
8.8.8.8
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address
FE80::202:4AFF:FEEA:749C
IPv6 Gateway
IPv6 DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top
BOGOTÁ
172.29.0.0/24
190 HOST
172.29.3.0/30
1941
BOGOTA 3
PC-PT
BOG 3
172.29.3.4/30
1941
BOGOTA 1
172.29.3.12/30
172.29.3.8/30
200 HOST
1941
BOGOTA 2
172.29.1.0/24
PC-PT
BOG 2
BOGOTÁ 172.29.0.0/21
50 HOST
PC-PT
MED 2
40 HOST
PC-PT
MED 3
Logical
Physical
Realtime
Simulation
2620XM
ESP
11:54
12/07/2019

DESCRIPCIÓN DE ESCENARIO PROPUESTO PARA LA PRUEBA DE HABILIDADES

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.

Topología de red



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

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

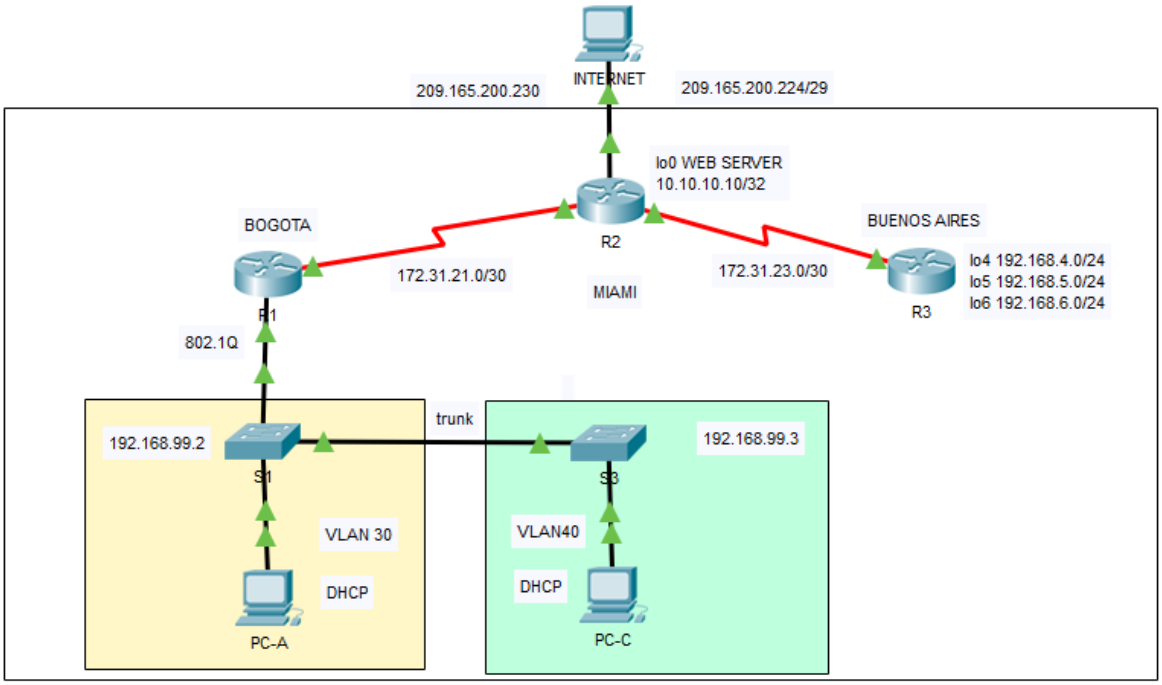


Tabla No.1 Configuración-Router
Router1-Bogota
Router>enable Router#configure terminal Enter configuration commands, one per line. End with CNTL/Z. Router(config)#hostname R1 R1(config)#enable secret class R1(config)#line console 0 R1(config-line)#password cisco R1(config-line)#login R1(config-line)#loggin synchronous R1(config-line)#exec-timeout 5 0 R1(config-line)#line vty 0 15 R1(config-line)#password cisco R1(config-line)#login R1(config-line)#exit R1(config)#service password-encryption R1(config)#banner motd #El acceso no autorizado esta prohibido# R1(config)#exit R1#

```
%SYS-5-CONFIG_I: Configured from console by console
R1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R1#
```

Router2-Miami

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R2
R2(config)#enable secret class
R2(config)#line console 0
R2(config-line)#password cisco
R2(config-line)#login
R2(config-line)#loggin synchronous
R2(config-line)#exec-timeout 5 0
R2(config-line)#line vty 0 15
R2(config-line)#password cisco
R2(config-line)#login
R2(config-line)#exit
R2(config)#service password-encryption
R2(config)#banner motd #El acceso no autorizado esta prohibido#
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console
R2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R2#
```

Router3-Buenos Aires

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R3
R3(config)#enable secret class
R3(config)#line console 0
R3(config-line)#password cisco
R3(config-line)#login
R3(config-line)#loggin synchronous
R3(config-line)#exec-timeout 5 0
R3(config-line)#line vty 0 15
R3(config-line)#password cisco
```

```
R3(config-line)#login
R3(config-line)#exit
R3(config)#service password-encryption
R3(config)#banner motd #El acceso no autorizado esta prohibido#
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console
R3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R3#
```

Tabla No. 2 Direccionamiento-Router

Router1-Bogota
R1>enable Password: R1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R1(config)#interface serial 0/1/0 R1(config-if)#description ENLACE A R2 R1(config-if)#ip address 172.31.21.2 255.255.255.252 R1(config-if)#clock rate 128000 R1(config-if)#no shutdown %LINK-5-CHANGED: Interface Serial0/1/0, changed state to down R1(config-if)#exit R1(config)#exit R1# %SYS-5-CONFIG_I: Configured from console by console R1#copy running-config startup-config Destination filename [startup-config]? Building configuration... [OK] R1#
Router2-Miami
serial 0/1/0
R2>enable Password: R2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R2(config)#interface serial 0/1/0 R2(config-if)#description ENLACE A R3 R2(config-if)#ip address 172.31.23.1 255.255.255.252

```
R2(config-if)#clock rate 128000
R2(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
R2(config-if)#exit
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console
R2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R2#
```

serial 0/1/1

```
R2>enable
Password:
R2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#interface serial 0/1/1
R2(config-if)#description ENLACE A R1
R2(config-if)#ip address 172.31.21.1 255.255.255.252
R2(config-if)#clock rate 128000
R2(config-if)#no shutdown
R2(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up
R2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to up
R2(config-if)#exit
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console
R2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R2#
```

Interface G 0/0

```
R2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#interface gigabitethernet 0/0
R2(config-if)#description ENLACE A INTERNET
R2(config-if)#ip address 209.165.200.225 255.255.255.248
R2(config-if)#no shutdown
R2(config-if)#
```

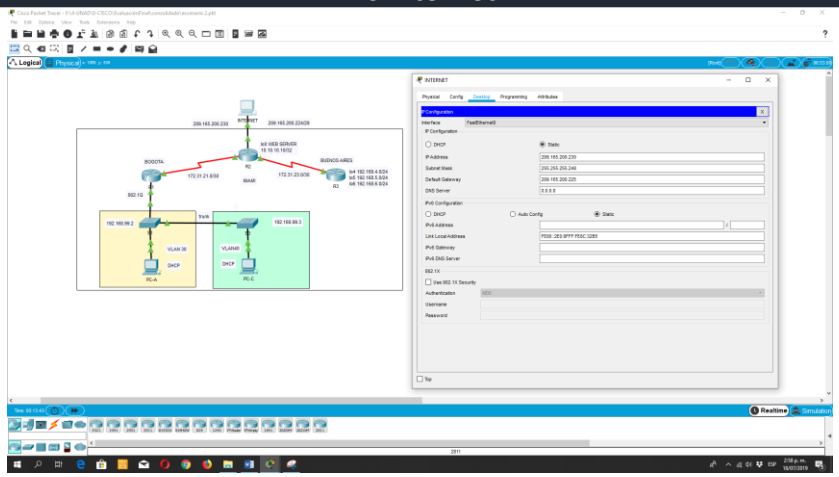
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
R2(config-if)#exit
R2(config)#interface loopback 0
R2(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
R2(config-if)#ip address 10.10.10.10 255.255.255.255
R2(config-if)#exit
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console
R2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R2#

Router3-Buenos Aires
serial 0/1/1

R3>enable
Password:
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#interface serial 0/1/1
R3(config-if)#description ENLACE A R2
R3(config-if)#ip address 172.31.23.2 255.255.255.252
R3(config-if)#clock rate 128000
R3(config-if)#no shutdown
R3(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up
R3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to up
R3(config-if)#exit
R3(config)#interface loopback 4
R3(config-if)#
%LINK-5-CHANGED: Interface Loopback4, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback4, changed state to up
R3(config-if)#ip address 192.168.4.1 255.255.255.0
R3(config-if)#exit
R3(config)#interface loopback 5

```
R3(config-if)#
%LINK-5-CHANGED: Interface Loopback5, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback5, changed state to up
R3(config-if)#ip address 192.168.5.1 255.255.255.0
R3(config-if)#exit
R3(config)#interface loopback 6
R3(config-if)#
%LINK-5-CHANGED: Interface Loopback6, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback6, changed state to up
R3(config-if)#ip address 192.168.6.1 255.255.255.0
R3(config-if)#exit
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console
R3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R3#
```

Pc internet



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

Tabla No. 3 enrutamiento OSPFv2

Router1-Bogota

```
R1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#router-id 1.1.1.1
R1(config-router)#network 172.31.21.0 0.0.0.3 area 0
R1(config-router)#network 192.168.99.0 0.0.0.255 area 0
R1(config-router)#network 192.168.40.0 0.0.0.255 area 0
R1(config-router)#network 192.168.30.0 0.0.0.255 area 0
R1(config-router)#passive-interface gigabitEthernet 0/0
R1(config-router)#exit
R1(config)#interface serial 0/1/1
R1(config-if)#bandwidth 256
R1(config-if)#interface serial 0/1/0
R1(config-if)#bandwidth 256
R1(config-if)#ip ospf cost 9500
R1(config-if)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console
R1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R1#
```

Router2-Miami

```
R2>enable
Password:
R2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#router ospf 1
R2(config-router)#router-id 5.5.5.5
R2(config-router)#network 172.31.23.0 0.0.0.3 area 0
R2(config-router)#network 209.165.200.224 0.0.0.7 area 0
R2(config-router)#network 172.31.21.0 0.0.0.3 area 0
R2(config-router)#network 10.10.10.10 0.0.0.3 area 0
```

```
R2(config-router)#passive-interface gigabitEthernet 0/0
R2(config-if)#interface serial 0/1/0
R2(config-if)#bandwidth 256
R2(config-router)#interface serial 0/1/0
R2(config-if)#bandwidth 256
R2(config-if)#ip ospf cost 9500
R2(config-if)#end
R2#
%SYS-5-CONFIG_I: Configured from console by console
R2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R2#
```

Router3-Buenos Aires

```
R3>enable
Password:
R3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#router-id 8.8.8.8
R3(config-router)#network 192.168.6.0 0.0.0.255 area 0
R3(config-router)#network 192.168.5.0 0.0.0.255 area 0
R3(config-router)#network 192.168.4.0 0.0.0.255 area 0
R3(config-router)#network 172.31.23.0 0.0.0.3 area 0
R3(config-router)#interface serial 0/1/1
R3(config-if)#bandwidth 256
R3(config-if)#interface serial 0/1/0
R3(config-if)#bandwidth 256
R3(config-if)#ip ospf cost 9500
R3(config-if)#end
R3#
%SYS-5-CONFIG_I: Configured from console by console
R3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R3#
```

Verificar información de OSPF

- Visualizar tablas de enrutamiento y routers conectados por OSPFv2

Router1-Bogota
R1>enable Password: R1#show ip route ospf 10.0.0.0/32 is subnetted, 1 subnets O 10.10.10.10 [110/9501] via 172.31.21.1, 00:27:36, Serial0/1/0 172.31.0.0/16 is variably subnetted, 3 subnets, 2 masks O 172.31.23.0 [110/19000] via 172.31.21.1, 00:26:36, Serial0/1/0 192.168.4.0/32 is subnetted, 1 subnets O 192.168.4.1 [110/19001] via 172.31.21.1, 00:18:34, Serial0/1/0 192.168.5.0/32 is subnetted, 1 subnets O 192.168.5.1 [110/19001] via 172.31.21.1, 00:18:34, Serial0/1/0 192.168.6.0/32 is subnetted, 1 subnets O 192.168.6.1 [110/19001] via 172.31.21.1, 00:18:34, Serial0/1/0 209.165.200.0/29 is subnetted, 1 subnets O 209.165.200.224 [110/9501] via 172.31.21.1, 00:27:48, Serial0/1/0 R1#
Routers conectados
R1>enable Password: R1#show ip ospf neighbor Neighbor ID Pri State Dead Time Address Interface 5.5.5.5 0 FULL/ - 00:00:31 172.31.21.1 Serial0/1/0 R1#
Router2-Miami
R2>enable Password: R2#show ip route ospf 192.168.4.0/32 is subnetted, 1 subnets O 192.168.4.1 [110/9501] via 172.31.23.2, 00:13:43, Serial0/1/0 192.168.5.0/32 is subnetted, 1 subnets O 192.168.5.1 [110/9501] via 172.31.23.2, 00:13:43, Serial0/1/0 192.168.6.0/32 is subnetted, 1 subnets O 192.168.6.1 [110/9501] via 172.31.23.2, 00:13:43, Serial0/1/0 R2#
Routers conectados
R2>enable Password: R2#show ip ospf neighbor Neighbor ID Pri State Dead Time Address Interface 8.8.8.8 0 FULL/ - 00:00:32 172.31.23.2 Serial0/1/0 1.1.1.1 0 FULL/ - 00:00:30 172.31.21.2 Serial0/1/1 R2#

Router3-Buenos Aires
R3>enable Password: R3#show ip route ospf 10.0.0.0/32 is subnetted, 1 subnets O 10.10.10.10 [110/391] via 172.31.23.1, 00:17:21, Serial0/1/1 172.31.0.0/16 is variably subnetted, 3 subnets, 2 masks O 172.31.21.0 [110/454] via 172.31.23.1, 00:17:21, Serial0/1/1 209.165.200.0/29 is subnetted, 1 subnets O 209.165.200.224 [110/391] via 172.31.23.1, 00:17:21, Serial0/1/1 R3#
Routers conectados
R3>enable Password: R3#show ip ospf neighbor Neighbor ID Pri State Dead Time Address Interface 5.5.5.5 0 FULL/ - 00:00:34 172.31.23.1 Serial0/1/1 R3#

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

Router1-Bogota
R1>enable Password: R1#show ip ospf interface Serial0/1/0 is up, line protocol is up Internet address is 172.31.21.2/30, 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 00:00:04 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#
Router2-Miami

```
R2#show ip ospf interface

Serial0/1/0 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 00:00:02
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 8.8.8.8
Suppress hello for 0 neighbor(s)
GigabitEthernet0/0 is up, line protocol is up
Internet address is 209.165.200.225/29, Area 0
Process ID 1, Router ID 5.5.5.5, Network Type BROADCAST, Cost: 1
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 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 0, Adjacent neighbor count is 0
Suppress hello for 0 neighbor(s)
Serial0/1/1 is up, line protocol is up
Internet address is 172.31.21.1/30, Area 0
Process ID 1, Router ID 5.5.5.5, Network Type POINT-TO-POINT, Cost: 64
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 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 1 , Adjacent neighbor count is 1
```

```
Adjacent with neighbor 1.1.1.1
Suppress hello for 0 neighbor(s)
Loopback0 is up, line protocol is up
Internet address is 10.10.10.10/32, Area 0
Process ID 1, Router ID 5.5.5.5, Network Type LOOPBACK, Cost: 1
Loopback interface is treated as a stub Host
R2#
```

Router3-Buenos Aires

```
R3>enable
Password:
R3#show ip ospf interface

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
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
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
Serial0/1/1 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: 390
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 00:00:07
Index 4/4, 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)
R3#
```

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

Router1-Bogota

```
R1>enable
Password:
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
192.168.99.0 0.0.0.255 area 0
192.168.40.0 0.0.0.255 area 0
192.168.30.0 0.0.0.255 area 0
Passive Interface(s):
GigabitEthernet0/0
Routing Information Sources:
Gateway         Distance      Last Update
1.1.1.1              110      00:20:16
5.5.5.5              110      00:11:22
8.8.8.8              110      00:11:11
Distance: (default is 110)
R1#
```

Router2-Miami

```
R2>enable
Password:
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:
172.31.23.0 0.0.0.3 area 0
209.165.200.224 0.0.0.7 area 0
172.31.21.0 0.0.0.3 area 0
10.10.10.8 0.0.0.3 area 0
Passive Interface(s):
GigabitEthernet0/0
```

```
Routing Information Sources:
Gateway         Distance      Last Update
1.1.1.1              110      00:20:53
5.5.5.5              110      00:11:58
8.8.8.8              110      00:11:48
Distance: (default is 110)
R2#
```

Router3-Buenos Aires

```
R3>enable
Password:
R3#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 8.8.8.8
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Maximum path: 4
Routing for Networks:
192.168.6.0 0.0.0.255 area 0
192.168.5.0 0.0.0.255 area 0
192.168.4.0 0.0.0.255 area 0
172.31.23.0 0.0.0.3 area 0
Routing Information Sources:
Gateway         Distance      Last Update
1.1.1.1              110      00:21:45
5.5.5.5              110      00:12:50
8.8.8.8              110      00:12:39
Distance: (default is 110)
R3#
```

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

S1

VLAN

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 200
Switch(config-vlan)#name Mantenimiento
Switch(config-vlan)#vlan 40
```

```
Switch(config-vlan)#name Mercadeo
Switch(config-vlan)#vlan 30
Switch(config-vlan)#name Administracion
Switch(config-vlan)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console
Switch#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Switch#
```

Trunk-Acces

```
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface fastEthernet 0/3
Switch(config-if)#switchport mode trunk

Switch(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

Switch(config-if)#interface fastEthernet 0/24
Switch(config-if)#switchport mode trunk
Switch(config-if)#interface fastEthernet 0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

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

Seguridad

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
```

```
Switch(config)#hostname S1
S1(config)#enable secret class
S1(config)#line console 0
S1(config-line)#password cisco
S1(config-line)#login
S1(config-line)#loggin synchronous
S1(config-line)#exec-timeout 5 0
S1(config-line)#line vty 0 15
S1(config-line)#login
S1(config-line)#exit
S1(config)#service password-encryption
S1(config)#banner motd #El acceso no autorizado esta prohibido#
S1(config)#exit
S1#
%SYS-5-CONFIG_I: Configured from console by console
S1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
S1#
```

S3

VLAN

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 200
Switch(config-vlan)#name Mantenimiento
Switch(config-vlan)#vlan 40
Switch(config-vlan)#name Mercadeo
Switch(config-vlan)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

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

Trunk-Accces

```
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface fastEthernet 0/1
Switch(config-if)#switchport mode access
```

```
Switch(config-if)#switchport access vlan 40
Switch(config-if)#interface fastEthernet 0/3
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

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

Seguridad

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname S3
S3(config)#enable secret class
S3(config)#line console 0
S3(config-line)#password cisco
S3(config-line)#login
S3(config-line)#loggin synchronous
S3(config-line)#exec-timeout 5 0
S3(config-line)#line vty 0 15
S3(config-line)#password cisco
S3(config-line)#login
S3(config-line)#exit
S3(config)#service password-encryption
S3(config)#banner motd #El acceso no autorizado esta prohibido#
S3(config)#exit
S3#
%SYS-5-CONFIG_I: Configured from console by console

S3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
S3#
```

Encapsulamiento Inter-VLAN en R1

VLAN 30, 40 y 200.

```
R1>enable
Password:
R1#configure terminal
```

```
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#interface gigabitEthernet 0/0.200
R1(config-subif)#encapsulation dot1q 200
R1(config-subif)#ip address 192.168.200.1 255.255.255.0
R1(config-subif)#interface gigabitEthernet 0/0.40
R1(config-subif)#encapsulation dot1q 40
R1(config-subif)#ip address 192.168.40.1 255.255.255.0
R1(config-subif)#interface gigabitEthernet 0/0.30
R1(config-subif)#encapsulation dot1q 30
R1(config-subif)#ip address 192.168.30.1 255.255.255.0
R1(config-subif)#exit
R1(config)#interface gigabitEthernet 0/0
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/0.30, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.30, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/0.40, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.40, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/0.200, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.200, changed state to up

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

R1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
R1#
```

4. En el Switch 3 deshabilitar DNS lookup

```
S3>enable
Password:
S3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
S3(config)#no ip domain-lookup
S3(config)#exit
S3#
%SYS-5-CONFIG_I: Configured from console by console

S3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
S3#
```

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

S1
S1>enable Password: S1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. S1(config)#interface vlan 1 S1(config-if)#ip address 192.168.99.2 255.255.255.0 S1(config-if)#no shutdown S1(config-if)# %LINK-5-CHANGED: Interface Vlan1, changed state to up %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up S1(config-if)#exit S1(config)#exit S1# %SYS-5-CONFIG_I: Configured from console by console S1#copy running-config startup-config Destination filename [startup-config]? Building configuration... [OK] S1#

S3
S3#configure terminal Enter configuration commands, one per line. End with CNTL/Z. S3(config)#interface vlan 1 S3(config-if)#ip address 192.168.99.3 255.255.255.0 S3(config-if)#no shutdown S3(config-if)# %LINK-5-CHANGED: Interface Vlan1, changed state to up %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up S3(config-if)#exit S3(config)#exit S3# %SYS-5-CONFIG_I: Configured from console by console S3#copy running-config startup-config Destination filename [startup-config]? Building configuration... [OK] S3#

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

S1
S1>enable Password: S1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. S1(config)#interface range gigabitEthernet 0/1-2 S1(config-if-range)#shutdown %LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to administratively down %LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to administratively down S1(config-if-range)#interface range fastEthernet 0/4-23 S1(config-if-range)#shutdown %LINK-5-CHANGED: Interface FastEthernet0/4, changed state to administratively down %LINK-5-CHANGED: Interface FastEthernet0/5, changed state to administratively down

```
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/11, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/12, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/13, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/14, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/16, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/17, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/18, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/19, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/20, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/21, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/22, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/23, changed state to
administratively down
S1(config-if-range)#interface fastEthernet 0/2
S1(config-if)#shutdown
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to
administratively down
S1(config-if)#exit
S1(config)#exit
S1#
%SYS-5-CONFIG_I: Configured from console by console
```

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

S3

```
S3>enable
Password:
S3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
S3(config)#interface range gigabitEthernet 0/1-2
S3(config-if-range)#shutdown

%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to
administratively down

%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to
administratively down
S3(config-if-range)#interface range fastEthernet 0/4-24
S3(config-if-range)#shutdown

%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/11, changed state to
administratively down

%LINK-5-CHANGED: Interface FastEthernet0/12, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/13, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/14, changed state to
administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/16, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/17, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/18, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/19, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/20, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/21, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/22, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/23, changed state to
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to
administratively down
S3(config-if-range)#interface fastEthernet 0/2
S3(config-if)#shutdown
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to
administratively down
S3(config-if)#exit
S3(config)#exit
S3#
%SYS-5-CONFIG_I: Configured from console by console
S3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
S3#
```

7. Implement DHCP and NAT for IPv4

   NAT for IPv4 y DHCP se realiza con los siguientes puntos 8, 9, 10**:**

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

VLANs 30 y 40
VLAN 30
R1>enable Password: R1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R1(config)#ip dhcp pool ADMINISTRACION R1(dhcp-config)#network 192.168.30.0 255.255.255.0 R1(dhcp-config)#dns-server 10.10.10.11 R1(dhcp-config)#default-router 192.168.30.1 R1(dhcp-config)#domain-name www.unad.edu.co R1(dhcp-config)#exit R1(config)#exit R1# %SYS-5-CONFIG_I: Configured from console by console R1#copy running-config startup-config Destination filename [startup-config]? Building configuration... [OK] R1#
VLAN 40
R1>enable Password: R1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R1(config)#ip dhcp pool MERCADEO R1(dhcp-config)#network 192.168.40.0 255.255.255.0 R1(dhcp-config)#dns-server 10.10.10.11 R1(dhcp-config)#default-router 192.168.40.1 R1(dhcp-config)#domain-name www.unad.edu.co R1(dhcp-config)#exit R1(config)#exit R1# %SYS-5-CONFIG_I: Configured from console by console R1#copy running-config startup-config Destination filename [startup-config]? Building configuration... [OK] R1#

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

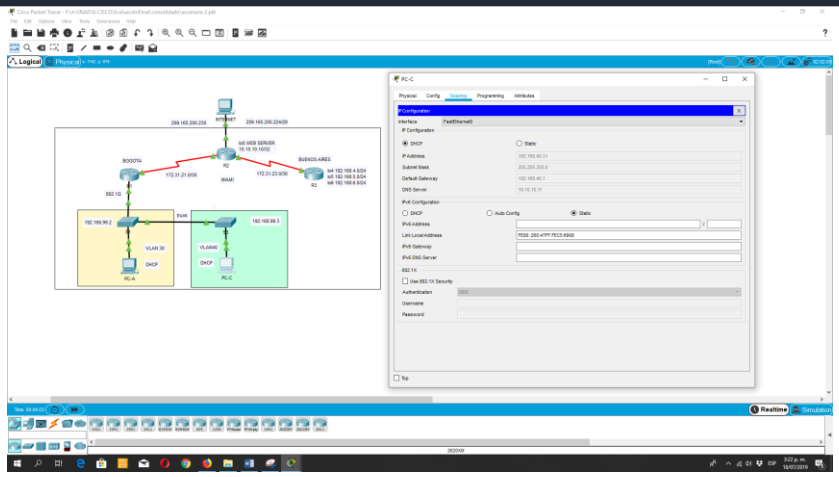
Configurar DHCP pool para VLAN 30	Name: ADMINISTRACION DNS-Server: 10.10.10.11 Domain-Name: ccna-unad.com Establecer default gateway.
Configurar DHCP pool para VLAN 40	Name: MERCADEO DNS-Server: 10.10.10.11 Domain-Name: ccna-unad.com Establecer default gateway.

DHCP

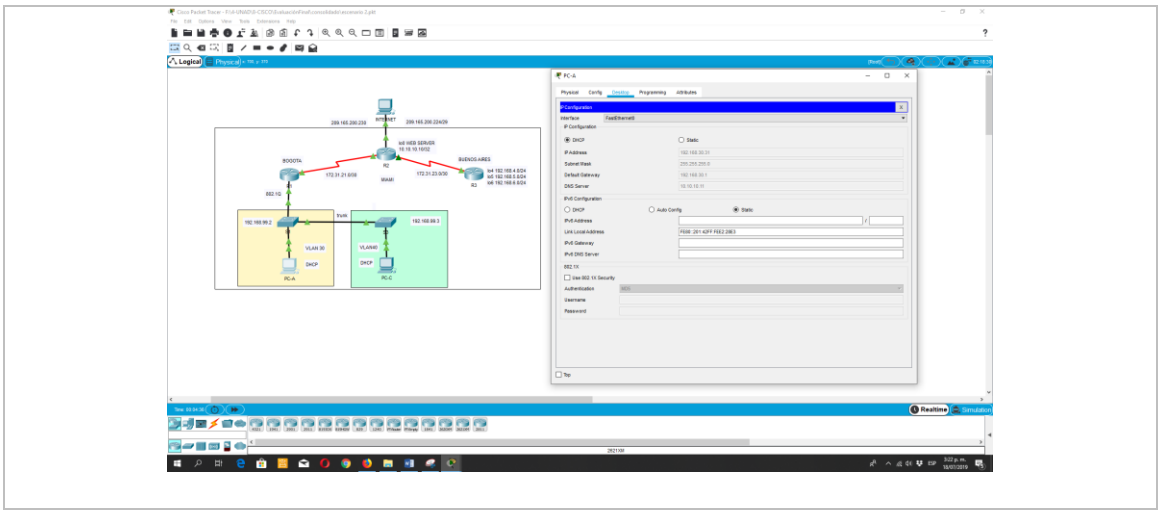
```
R1>enable
Password:
R1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ip dhcp excluded-address 192.168.40.1 192.168.40.30
R1(config)#ip dhcp excluded-address 192.168.30.1 192.168.30.30
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R1#
```

PC-C



PC-A



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

```
R2>enable
Password:
R2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#interface gigabitEthernet 0/0
R2(config-if)#ip nat inside
R2(config-if)#interface serial 0/1/1
R2(config-if)#ip nat outside
R2(config-if)#interface serial 0/1/0
R2(config-if)#ip nat outside
R2(config-if)#exit
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console
R2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R2#
```

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>enable
Password:
R2#configure terminal
```

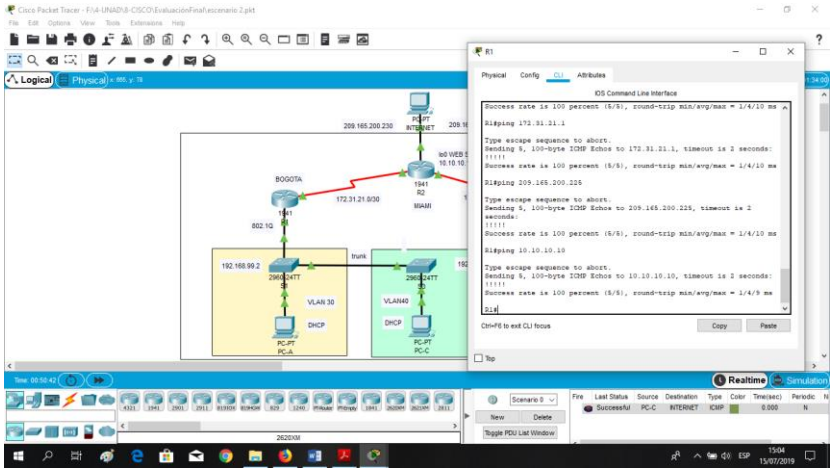
```
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#access-list 1 permit host 192.168.40.31
R2(config)#access-list 1 permit host 192.168.30.31
R2(config)#access-list 1 permit any
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface serial 0/1/1
R2(config-if)#ip access-group 1 in
R2(config-if)#exit
R2(config)#do write
Building configuration...
[OK]
R2(config)#
```

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.

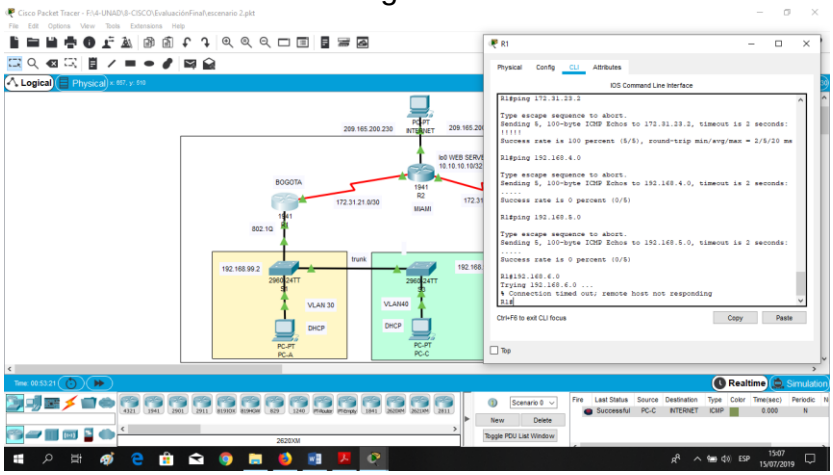
```
R2>enable
Password:
R2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#access-list 110 permit ip 192.168.4.0 0.0.0.255 172.31.23.1 0.0.0.3
R2(config)#access-list 110 permit ip 192.168.5.0 0.0.0.255 172.31.23.1 0.0.0.3
R2(config)#access-list 110 permit ip 192.168.6.0 0.0.0.255 172.31.23.1 0.0.0.3
R2(config)#access-list 110 permit ip any any
R2(config)#interface serial 0/1/0
R2(config-if)#ip access-group 1 in
R2(config-if)#exit
R2(config)#do write
Building configuration...
[OK]
R2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R2#
```

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

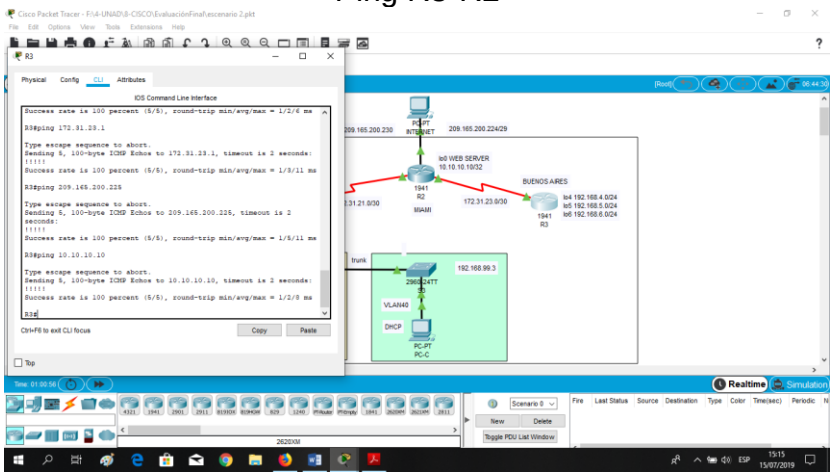
Ping R1-R2



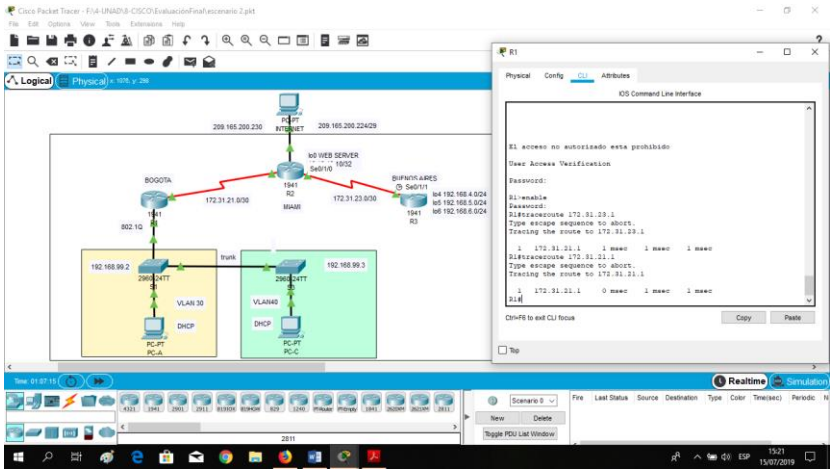
Ping R1-R3



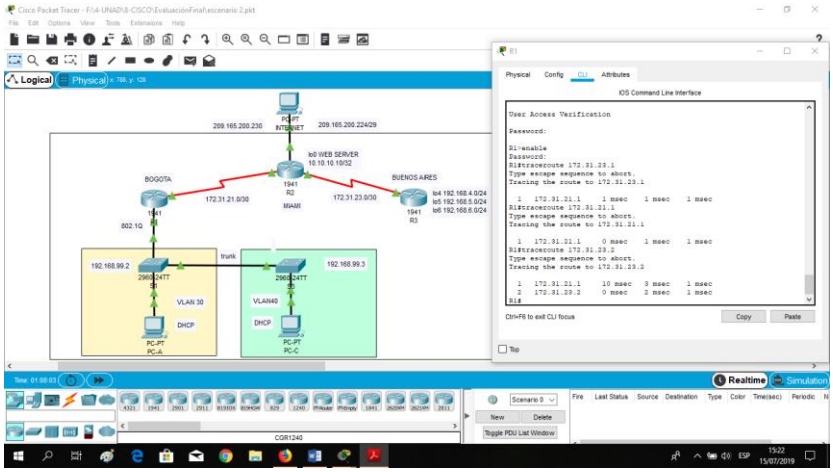
Ping R3-R2



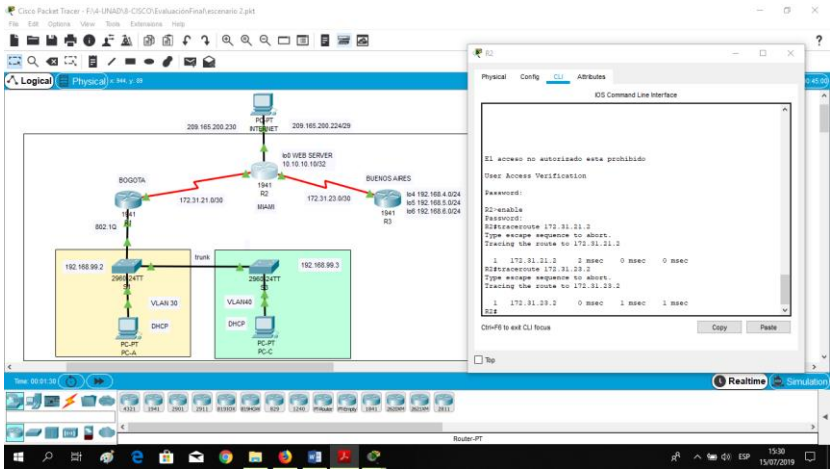
Traceroute R1-R2



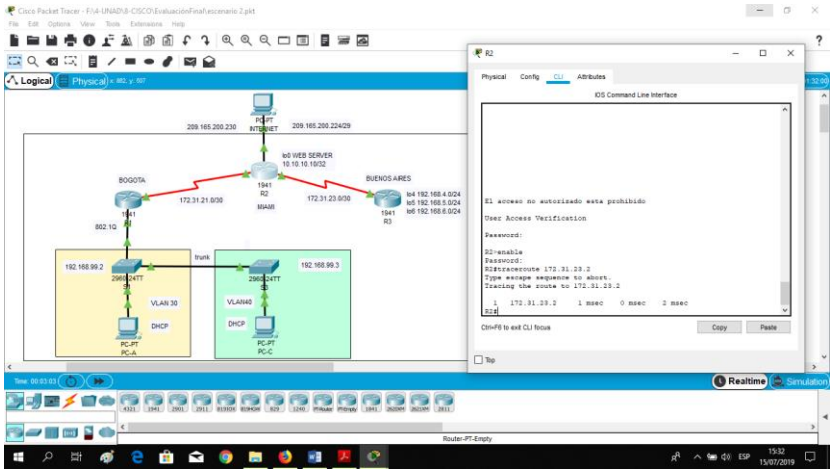
Traceroute R1-R3



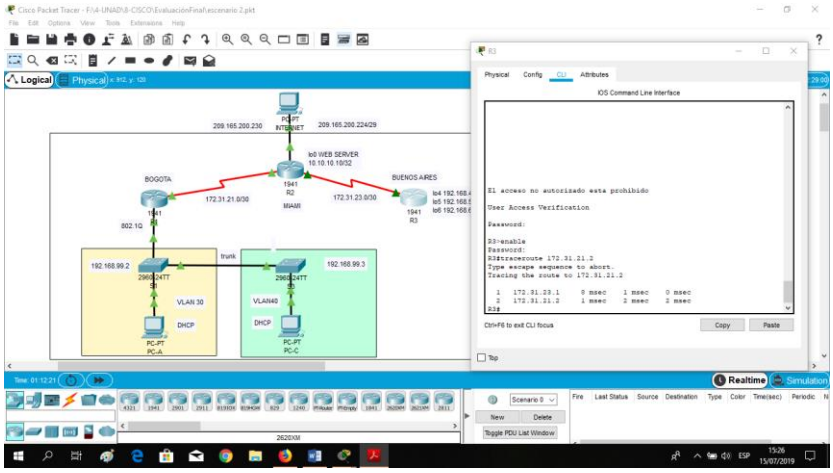
Traceroute R2-R1



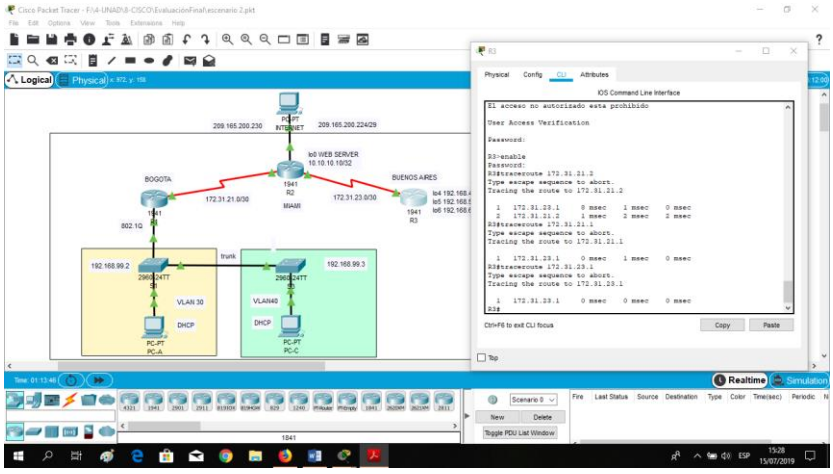
Traceroute R2-R3



Traceroute R3-R1



Traceroute R3-R2



CONCLUSIONES

Los routers conectan una red a otra red, es el responsable de la entrega de paquetes a través de distintas redes.

Los componentes de la tabla de routing IPv6 son muy similares a los de la tabla de routing IPv4. Por ejemplo, se completa con las interfaces conectadas directamente, con las rutas estáticas y con las rutas descubiertas de forma dinámica.

Las redes generalmente utilizan una combinación de routing estático y dinámico. El routing dinámico es la mejor opción para las redes grandes, y el routing estático es más adecuado para las redes de rutas internas.

El enrutamiento es fundamental para cualquier red de datos, ya que transfiere información a través de una internetwork de origen a destino.

Los routers y switches Cisco tienen muchas similitudes. Admiten sistemas operativos modales y estructuras de comandos similares, así como muchos de los mismos comandos.

El cargador de arranque lleva a cabo la inicialización de la CPU de bajo nivel. Inicializa los registros de la CPU, que controlan dónde está asignada la memoria física, la cantidad de memoria y su velocidad.

Los routers no filtran tráfico de manera predeterminada. El tráfico que ingresa al router se enruta solamente en función de la información de la tabla de routing.

Se utiliza NAT para contribuir a mitigar el agotamiento del espacio de direcciones IPv4.

Los administradores utilizan las ACL para detener el tráfico o para permitir solamente tráfico específico en sus redes.

Todo dispositivo que se conecta a una red necesita una dirección IP única. Los administradores de red asignan direcciones IP estáticas a los routers, a los servidores, a las impresoras y a otros dispositivos de red cuyas ubicaciones (físicas y lógicas) probablemente no cambien.

Una ACL es una lista secuencial de instrucciones permit o deny. La última instrucción de una ACL siempre es una instrucción deny implícita que bloquea todo el tráfico. Para evitar que la instrucción deny any implícita al final de la ACL bloquee todo el tráfico, es posible agregar la instrucción permit any.

Un puerto de un switch es un puerto de acceso o un puerto de enlace troncal. Los puertos de acceso transportan el tráfico de una VLAN específica asignada al puerto. Un puerto de enlace troncal pertenece a todas las VLAN de manera predeterminada; por lo tanto, transporta el tráfico para todas las VLAN.

Los switches Ethernet funcionan en la capa de enlace de datos, la capa 2, y se utilizan para reenviar tramas de Ethernet entre dispositivos dentro de una misma red.

El objetivo principal de un router es conectar múltiples redes y reenviar paquetes desde una red a la siguiente. Esto significa que un router normalmente tiene múltiples interfaces. Cada interfaz es un miembro o host en una red IP diferente.

Cuando las direcciones IP de origen y destino están en distintas redes, la trama de Ethernet se debe enviar a un router.

El destino de un paquete IP puede ser un servidor web en otro país o un servidor de correo electrónico en la red de área local.

El router usa su tabla de routing para encontrar la mejor ruta para reenviar un paquete. Es responsabilidad de los routers entregar esos paquetes a su debido tiempo.

Los protocolos de enrutamiento dinámico se ajustan automáticamente a los cambios sin intervención alguna del administrador de la red.

Las redes permiten que las personas se comuniquen, colaboren e interactúen a través de páginas web, mediante teléfonos IP, videoconferencias, competir en juegos interactivos, realizar compras en Internet, completar trabajos de cursos en línea, y más.

La efectividad de las comunicaciones de internetwork depende, en gran medida, de la capacidad de los routers de reenviar paquetes de la manera más eficiente posible.

La tecnología de switching permita la diseminación de los flujos de datos de voz y video.

Las tablas de routing brindan información valiosa para diseñadores y administradores de red.

Las rutas estáticas son muy comunes y no requieren la misma cantidad de procesamiento y sobrecarga que los protocolos de routing dinámico.

Todos los dispositivos de red Cisco utilizan un sistema operativo conocido también como sistema operativo internetwork o IOS.

El routing ayuda a crear tablas de routing, que proporcionan una gran cantidad de información sobre las rutas de otras redes.

Una característica que distingue a los switches de los routers es el tipo de interfaces que admite cada uno.

Los firewalls son soluciones de hardware o de software que aplican las políticas de seguridad de la red.

Cuando el tráfico de la red atraviesa una interfaz configurada con una ACL, el router compara la información dentro del paquete con cada entrada, en orden secuencial, para determinar si el paquete coincide con una de las instrucciones. Si se encuentra una coincidencia, el paquete se procesa según corresponda.

El mantenimiento de dispositivos incluye las siguientes tareas: realizar copias de respaldo, restaurar a partir de copias de respaldo y actualizar tanto imágenes como archivos de configuración de IOS. Actualizar una imagen de IOS también implica tareas relacionadas con licencias de software.

Todas las direcciones IPv4 públicas que se usan en Internet deben registrarse en un registro regional de Internet (RIR).
La NAT para IPv4 permite que los administradores de red utilicen el espacio de direcciones privadas definido en RFC 1918, a la vez que proporciona conectividad a Internet, mediante una única dirección pública o una cantidad limitada de estas.

Una de las habilidades más importantes que necesita un administrador de redes es el dominio de las listas de control de acceso (ACL). Las ACL proporcionan seguridad a una red.

Un servidor de protocolo de configuración dinámica de host (DHCP) en la red local simplifica la asignación de direcciones IP tanto a los dispositivos de escritorio como a los móviles.

Las ACL se configuran para aplicarse al tráfico entrante o al tráfico saliente.

En un router Cisco, puede configurar un firewall simple que proporcione capacidades básicas de filtrado de tráfico mediante ACL.

NTP sincroniza la hora del día entre un conjunto de servidores de tiempo y clientes distribuidos.

CDP es un protocolo patentado de Cisco para detección de red en la capa de enlace de datos. Puede compartir información como nombres de dispositivos y versiones de IOS con otros dispositivos físicamente conectados de Cisco.

Las ACL estándar se pueden utilizar para permitir o denegar el tráfico de direcciones IPv4 de origen únicamente. El destino del paquete y los puertos involucrados no se evalúan. La regla básica para la colocación de una ACL estándar es colocarla cerca del destino.

Las organizaciones pueden arrendar direcciones públicas de un proveedor de servicios. El titular registrado de una dirección IP pública puede asignar esa dirección a un dispositivo de red.

El uso de un servidor de DHCP centralizado permite a las organizaciones administrar todas las asignaciones de direcciones IP desde un único servidor. Esta práctica hace que la administración de direcciones IP sea más eficaz y asegura la coherencia en toda la organización, incluso en las sucursales.

El tráfico de red se puede permitir o denegar.

Las ACL extendidas filtran paquetes según varios atributos: el tipo de protocolo, la dirección IPv4 de origen o de destino y los puertos de origen o de destino. La regla básica para la colocación de una ACL extendida es colocarla lo más cerca posible del origen.

Una ACL es una serie de comandos del IOS que controlan si un router reenvía o descarta paquetes según la información que se encuentra en el encabezado del paquete. Las ACL son una de las características del software IOS de Cisco más utilizadas.

Con un máximo teórico de 4300 millones de direcciones, el espacio de direcciones IPv4 es muy limitado.

DHCPv4 asigna dinámicamente, o arrienda, una dirección IPv4 de un conjunto de direcciones durante un período limitado según lo configurado en el servidor o hasta que el cliente ya no necesite la dirección.

El comando de configuración global access-list define una ACL estándar con un número entre 1 y 99. El nombre ip access-list standard se utiliza para crear una ACL con nombre estándar.

GLOSARIO

NAT: tiene muchos usos, pero el principal es conservar las direcciones IPv4 públicas. Esto se logra al permitir que las redes utilicen direcciones IPv4 privadas internamente y al proporcionar la traducción a una dirección pública solo cuando sea necesario. NAT tiene el beneficio adicional de proporcionar cierto grado de privacidad y seguridad adicional a una red, ya que oculta las direcciones IPv4 internas de las redes externas.

VLAN: permite crear redes que lógicamente son independientes, aunque estas se encuentren dentro de una misma red física. De esta forma, un usuario podría disponer de varias VLANs dentro de un mismo router o switch. Podría decirse que cada una de estas redes agrupa los equipos de un determinado segmento de red. Crear estas particiones tiene unas ventajas bastante claras a la hora de administrar una red.

ROUTING ESTÁTICO: las Rutas Estáticas o Enrutamiento Estático son la manera más simple y la menos escalable de armar una tabla de rutas. De manera simple podemos decir que el enrutamiento es el proceso que el router utiliza para decidir donde enviar un paquete. Podemos imaginar el router como un centro de tratamiento de cartas del correo, ahí lo que hacen es recibir todas las cartas, separar de acuerdo a su destino y enviarlas por el mejor camino.

ROUTING PREDETERMINADO: una ruta predeterminada es una ruta estática que coincide con todos los paquetes. En lugar de almacenar todas las rutas para todas las redes en la tabla de routing, un router puede almacenar una única ruta predeterminada que represente cualquier red que no esté en la tabla de routing.

ACL IPV4: las ACL estándar se pueden utilizar para permitir o denegar el tráfico de direcciones IPv4 de origen únicamente. El destino del paquete y los puertos involucrados no se evalúan

DHCPV4: asigna direcciones IPv4 y otra información de configuración de red en forma dinámica. Dado que los clientes de escritorio suelen componer gran parte de los nodos de red, DHCPv4 es una herramienta extremadamente útil para los administradores de red y que ahorra mucho tiempo. Un servidor de DHCPv4 dedicado es escalable y relativamente fácil de administrar. Sin embargo, en una sucursal pequeña o ubicación SOHO, se puede configurar un router Cisco para proporcionar servicios DHCPv4 sin necesidad de un servidor dedicado.

DHCPV6: Protocolo de Configuración Dinámica de Hosts para IPv6 (DHCPv6) es un protocolo cliente-servidor, definido en la RFC 3315 de la IETF, que proporciona una configuración administrada de dispositivos sobre IPv6. El protocolo IPv6 tiene

como principal característica y justificativa para su desarrollo, el aumento en la cantidad de direcciones ruteadas válidas para internet.

REDES INFORMATICAS: Una red informática son dos o más ordenadores conectados entre sí y que comparten recursos, ya sea hardware (periféricos, sistemas de almacenamiento) o software (archivos, datos, programas, aplicaciones). Una red informática permite que varios usuarios puedan intercambiar información, pasar archivos, compartir periféricos como las impresoras e incluso ejecutar programas en otros ordenadores conectados a la red.

CONMUTACION: se define como el conjunto de elementos constituido por todos los medios de transmisión y conmutación necesarios para enlazar a voluntad dos equipos terminales mediante un circuito físico, específico para la comunicación. Se trata, por tanto, de una red de telecomunicaciones conmutada.

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OVA Unidad 4 - Video - Principios de Enrutamiento

Este Objeto Virtual de Aprendizaje, titulado Video - Principios de Enrutamiento, tiene como objetivo, orientar al estudiante sobre la configuración básica de Switches y Routers.

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Recursos educativos adicionales para el curso. (Bibliografía complementaria)

Las referencias bibliográficas complementarias sirven de apoyo pra ampliar información relacionada con el tema de la unidad y puede ser consultada por el estudiante cuando así lo requiera, especialmente, para complementar información que le permita desarrollar las diferentes actividades propuestas para esta unidad.

Las referencias complementarias son las siguientes:

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