Diplomado de Profundización Cisco (Diseño e Implementación de Soluciones Integradas LAN/WAN)

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Universidad Nacional Abierta y a Distancia

Ingeniería de sistema, Cesar

Valledupar, Colombia

2019

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Tesis o trabajo de investigación presentada(o) como requisito parcial para optar al título de:

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Tabla de Contenido

Introducción

Desarrollar y aplicar los conocimientos del Diplomado de Profundización CCNA1 y CCNA2 (Routing and Switching) con la finalidad de resolver las necesidades del cliente usando protocolo RIP, topología NAT, configuraciones CHAT, enrutamiento OSPFv2 entre otros.

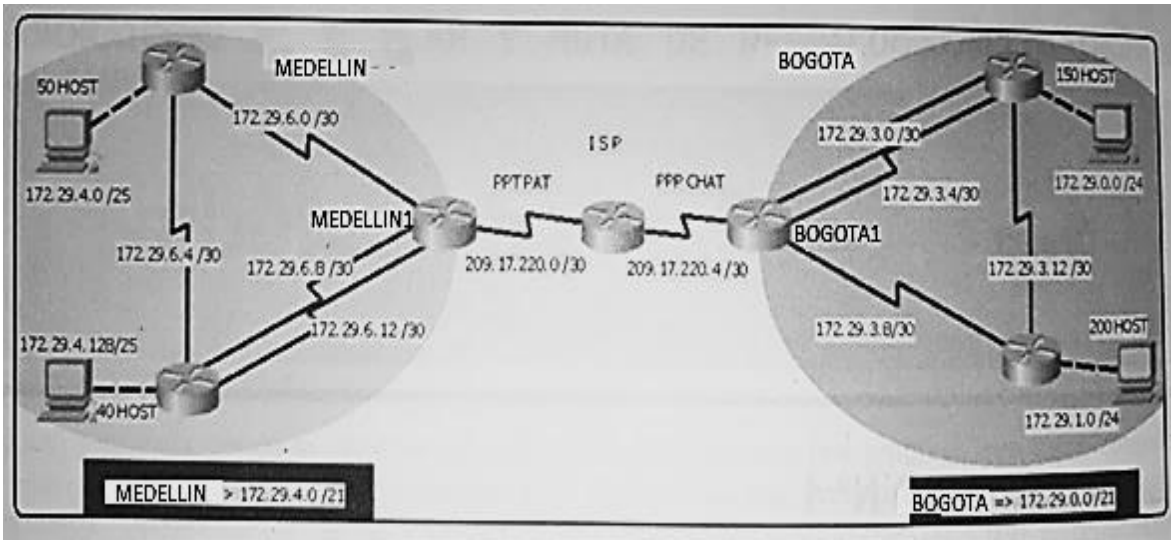
Desarrollar los ejercicios con la herramienta Pack Tracer con el fin de simular redes en los cuales se pondrán en práctica los conocimientos adquiridos a lo largo del curso.

1. Descripción de escenarios propuestos para la prueba de habilidades

1.1 Escenario 1

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

Topología de red



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

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

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

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

Desarrollo

Como trabajo inicial se debe realizar lo siguiente.

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

  Hostname nombre_del_equipo

  Line con 0

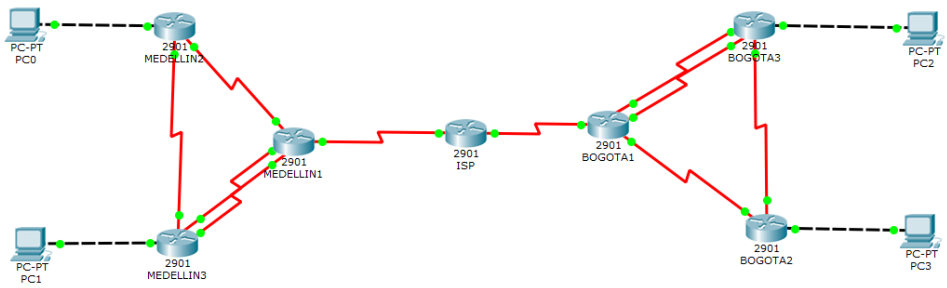
  Password cisco

  Login

  Exit

  Service password-encription

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



Configurar la topología de red, de acuerdo con las siguientes especificaciones.

1.1.1 Configuración del enrutamiento

- Configurar el enrutamiento en la red usando el protocolo RIP versión 2, declare la red principal, desactive la sumarización automática.

  MEDELLIN1

  router rip

  version 2

  redistribute static

```
        passive-interface Serial0/2/1
        network 172.29.0.0
 network 209.17.220.0
 no auto-summary

 MEDELLIN2
 router rip
 version 2
 network 172.29.0.0
 no auto-summary
  MEDELLIN3
  router rip
  version 2
  network 172.29.0.0
  no auto-summary

  BOGOTA1
  router rip
  version 2
  redistribute static
  passive-interface Serial0/3/0
  network 172.29.0.0
  network 209.17.220.0
  no auto-summary

  BOGOTA2
  router rip
  version 2
  network 172.29.0.0
  no auto-summary
  BOGOTA3
  router rip
  version 2
```

network 172.29.0.0

no auto-summary

- 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.

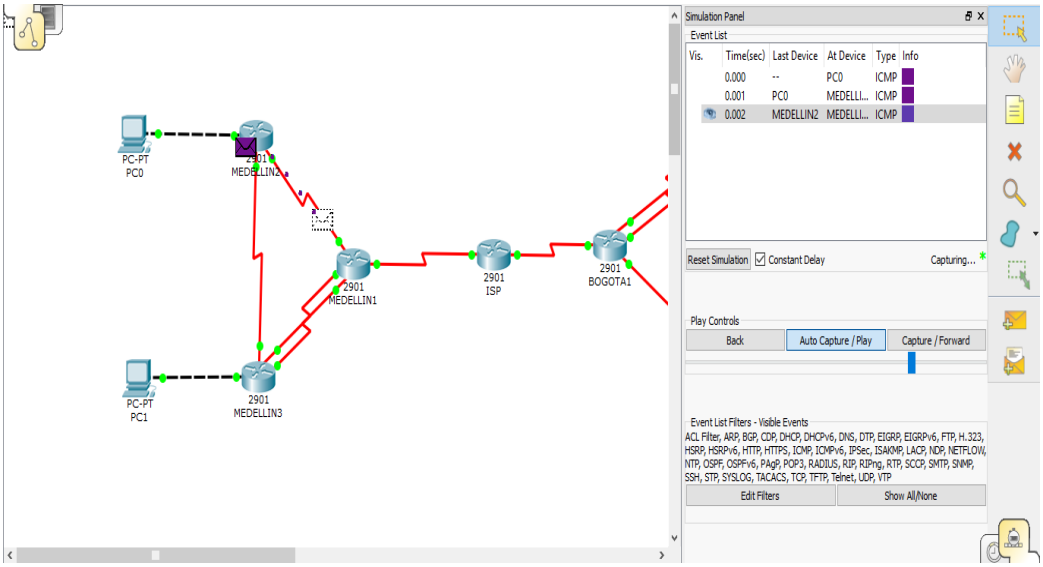
```
L       172.29.6.13/32 is directly connected, Serial0/3/0
     209.17.220.0/24 is variably subnetted, 4 subnets, 2 masks
C       209.17.220.0/30 is directly connected, Serial0/2/0
C       209.17.220.1/32 is directly connected, Serial0/2/0
L       209.17.220.2/32 is directly connected, Serial0/2/0
S       209.17.220.4/30 [1/0] via 209.17.220.1
```

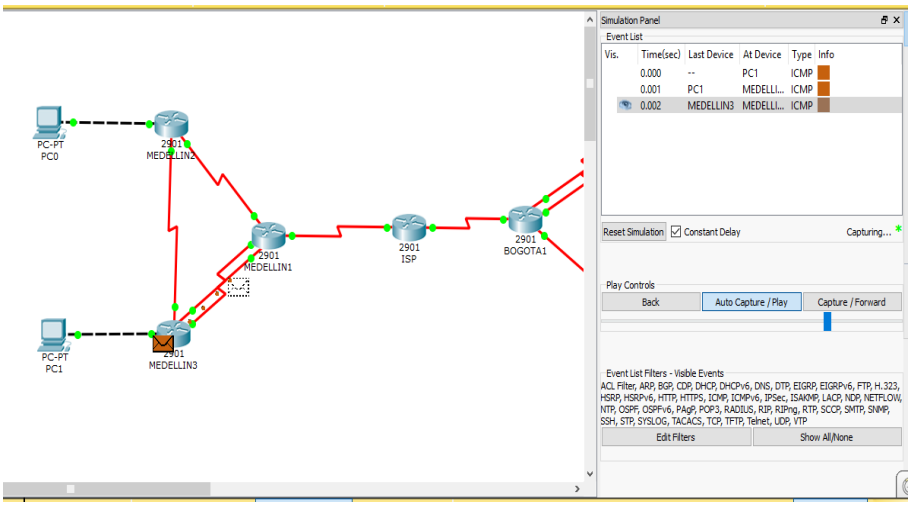
- El router ISP deberá tener una ruta estática dirigida hacia cada red interna de Bogotá y Medellín para el caso se sumarizan las subredes de cada uno a /22.

```
     172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
S       172.29.4.0/25 is directly connected, Serial0/2/0
S       172.29.4.128/25 is directly connected, Serial0/2/0
S       172.29.6.0/30 is directly connected, Serial0/2/0
S       172.29.6.4/30 is directly connected, Serial0/2/0
S       172.29.6.8/30 is directly connected, Serial0/2/0
S       172.29.6.12/30 is directly connected, Serial0/2/0
     209.17.220.0/24 is variably subnetted, 3 subnets, 2 masks
C       209.17.220.0/30 is directly connected, Serial0/2/0
L       209.17.220.1/32 is directly connected, Serial0/2/0
C       209.17.220.2/32 is directly connected, Serial0/2/0
ISP#
```

1.1.2 Tabla de enrutamiento

- Verificar la tabla de enrutamiento en cada uno de los routers para comprobar las redes y sus rutas.
- Verificar el balanceo de carga que presentan los routers.





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

```
     172.29.0.0/16 is variably subnetted, 15 subnets, 4 masks
R       172.29.0.0/24 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
R       172.29.1.0/24 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
R       172.29.3.0/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
R       172.29.3.4/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
R       172.29.3.8/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
R       172.29.3.12/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
C       172.29.4.0/25 is directly connected, GigabitEthernet0/0
L       172.29.4.126/32 is directly connected, GigabitEthernet0/0
R       172.29.4.128/25 [120/1] via 172.29.6.6, 00:00:02, Serial0/2/1
C       172.29.6.0/30 is directly connected, Serial0/2/0
L       172.29.6.2/32 is directly connected, Serial0/2/0
C       172.29.6.4/30 is directly connected, Serial0/2/1
L       172.29.6.5/32 is directly connected, Serial0/2/1
R       172.29.6.8/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
                      [120/1] via 172.29.6.6, 00:00:02, Serial0/2/1
R       172.29.6.12/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
                       [120/1] via 172.29.6.6, 00:00:02, Serial0/2/1
     209.17.220.0/30 is subnetted, 2 subnets
R       209.17.220.0/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
R       209.17.220.4/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
MEDELLIN2#
```

```
     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, 00:00:13, Serial0/2/1
C       172.29.1.0/24 is directly connected, GigabitEthernet0/0
L       172.29.1.254/32 is directly connected, GigabitEthernet0/0
R       172.29.3.0/30 [120/1] via 172.29.3.9, 00:00:24, Serial0/2/0
                      [120/1] via 172.29.3.13, 00:00:13, Serial0/2/1
R       172.29.3.4/30 [120/1] via 172.29.3.9, 00:00:24, Serial0/2/0
                      [120/1] via 172.29.3.13, 00:00:13, Serial0/2/1
C       172.29.3.8/30 is directly connected, Serial0/2/0
L       172.29.3.10/32 is directly connected, Serial0/2/0
C       172.29.3.12/30 is directly connected, Serial0/2/1
L       172.29.3.14/32 is directly connected, Serial0/2/1
BOGOTA2#
```

- Las tablas de los routers restantes deben permitir visualizar rutas redundantes para el caso de la ruta por defecto.
- El router ISP solo debe indicar sus rutas estáticas adicionales a las directamente conectadas.

```
      172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
S        172.29.4.0/25 is directly connected, Serial0/2/0
S        172.29.4.128/25 is directly connected, Serial0/2/0
S        172.29.6.0/30 is directly connected, Serial0/2/0
S        172.29.6.4/30 is directly connected, Serial0/2/0
S        172.29.6.8/30 is directly connected, Serial0/2/0
S        172.29.6.12/30 is directly connected, Serial0/2/0
      209.17.220.0/24 is variably subnetted, 3 subnets, 2 masks
C        209.17.220.0/30 is directly connected, Serial0/2/0
L        209.17.220.1/32 is directly connected, Serial0/2/0
C        209.17.220.2/32 is directly connected, Serial0/2/0
ISP#
```

1.1.3 Deshabilitar la propagación del protocolo RIP

- 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

MEDELLIN1

```
router rip
version 2
redistribute static
passive-interface Serial0/2/1
network 172.29.0.0
network 209.17.220.0
no auto-summary
```

```
BOGOTA1
router rip
version 2
redistribute static
passive-interface Serial0/3/0
network 172.29.0.0
network 209.17.220.0
no auto-summary
```

1.1.4 Verificación del protocolo RIP

- 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.
- 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.

```
     172.29.0.0/16 is variably subnetted, 15 subnets, 4 masks
R       172.29.0.0/24 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
R       172.29.1.0/24 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
R       172.29.3.0/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
R       172.29.3.4/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
R       172.29.3.8/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
R       172.29.3.12/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
C       172.29.4.0/25 is directly connected, GigabitEthernet0/0
L       172.29.4.126/32 is directly connected, GigabitEthernet0/0
R       172.29.4.128/25 [120/1] via 172.29.6.6, 00:00:02, Serial0/2/1
C       172.29.6.0/30 is directly connected, Serial0/2/0
L       172.29.6.2/32 is directly connected, Serial0/2/0
C       172.29.6.4/30 is directly connected, Serial0/2/1
L       172.29.6.5/32 is directly connected, Serial0/2/1
R       172.29.6.8/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
                      [120/1] via 172.29.6.6, 00:00:02, Serial0/2/1
R       172.29.6.12/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
                       [120/1] via 172.29.6.6, 00:00:02, Serial0/2/1
     209.17.220.0/30 is subnetted, 2 subnets
R       209.17.220.0/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
R       209.17.220.4/30 [120/1] via 172.29.6.1, 00:00:27, Serial0/2/0
MEDELLIN2#
```

```
     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, 00:00:13, Serial0/2/1
C       172.29.1.0/24 is directly connected, GigabitEthernet0/0
L       172.29.1.254/32 is directly connected, GigabitEthernet0/0
R       172.29.3.0/30 [120/1] via 172.29.3.9, 00:00:24, Serial0/2/0
                      [120/1] via 172.29.3.13, 00:00:13, Serial0/2/1
R       172.29.3.4/30 [120/1] via 172.29.3.9, 00:00:24, Serial0/2/0
                      [120/1] via 172.29.3.13, 00:00:13, Serial0/2/1
C       172.29.3.8/30 is directly connected, Serial0/2/0
L       172.29.3.10/32 is directly connected, Serial0/2/0
C       172.29.3.12/30 is directly connected, Serial0/2/1
L       172.29.3.14/32 is directly connected, Serial0/2/1
BOGOTA2#
```

```
     172.29.0.0/16 is variably subnetted, 16 subnets, 4 masks
R       172.29.0.0/24 [120/1] via 172.29.6.13, 00:00:24, Serial0/3/1
R       172.29.1.0/24 [120/1] via 172.29.6.13, 00:00:24, Serial0/3/1
R       172.29.3.0/30 [120/1] via 172.29.6.13, 00:00:24, Serial0/3/1
R       172.29.3.4/30 [120/1] via 172.29.6.13, 00:00:24, Serial0/3/1
R       172.29.3.8/30 [120/1] via 172.29.6.13, 00:00:24, Serial0/3/1
R       172.29.3.12/30 [120/1] via 172.29.6.13, 00:00:24, Serial0/3/1
R       172.29.4.0/25 [120/1] via 172.29.6.5, 00:00:10, Serial0/2/0
C       172.29.4.128/25 is directly connected, GigabitEthernet0/0
L       172.29.4.254/32 is directly connected, GigabitEthernet0/0
R       172.29.6.0/30 [120/1] via 172.29.6.5, 00:00:10, Serial0/2/0
                      [120/1] via 172.29.6.13, 00:00:24, Serial0/3/1
C       172.29.6.4/30 is directly connected, Serial0/2/0
L       172.29.6.6/32 is directly connected, Serial0/2/0
C       172.29.6.8/30 is directly connected, Serial0/3/0
L       172.29.6.10/32 is directly connected, Serial0/3/0
C       172.29.6.12/30 is directly connected, Serial0/3/1
L       172.29.6.14/32 is directly connected, Serial0/3/1
     209.17.220.0/30 is subnetted, 2 subnets
R       209.17.220.0/30 [120/1] via 172.29.6.13, 00:00:24, Serial0/3/1
R       209.17.220.4/30 [120/1] via 172.29.6.13, 00:00:24, Serial0/3/1
MEDELLIN3#
```

```
     172.29.0.0/16 is variably subnetted, 10 subnets, 3 masks
C       172.29.0.0/24 is directly connected, GigabitEthernet0/0
L       172.29.0.254/32 is directly connected, GigabitEthernet0/0
R       172.29.1.0/24 [120/1] via 172.29.3.14, 00:00:04, Serial0/3/0
C       172.29.3.0/30 is directly connected, Serial0/2/0
L       172.29.3.2/32 is directly connected, Serial0/2/0
C       172.29.3.4/30 is directly connected, Serial0/2/1
L       172.29.3.6/32 is directly connected, Serial0/2/1
R       172.29.3.8/30 [120/1] via 172.29.3.1, 00:00:09, Serial0/2/0
                      [120/1] via 172.29.3.14, 00:00:04, Serial0/3/0
C       172.29.3.12/30 is directly connected, Serial0/3/0
L       172.29.3.13/32 is directly connected, Serial0/3/0
BOGOTA3#
```

```
    172.29.0.0/16 is variably subnetted, 15 subnets, 4 masks
S       172.29.0.0/24 is directly connected, Serial0/2/0
S       172.29.1.0/24 is directly connected, Serial0/2/0
S       172.29.3.0/30 is directly connected, Serial0/2/0
S       172.29.3.4/30 is directly connected, Serial0/2/0
S       172.29.3.8/30 is directly connected, Serial0/2/0
S       172.29.3.12/30 is directly connected, Serial0/2/0
R       172.29.4.0/25 [120/1] via 172.29.6.2, 00:00:03, Serial0/3/1
R       172.29.4.128/25 [120/1] via 172.29.6.10, 00:00:22, Serial0/2/1
                        [120/1] via 172.29.6.14, 00:00:22, Serial0/3/0
C       172.29.6.0/30 is directly connected, Serial0/3/1
L       172.29.6.1/32 is directly connected, Serial0/3/1
R       172.29.6.4/30 [120/1] via 172.29.6.2, 00:00:03, Serial0/3/1
                      [120/1] via 172.29.6.10, 00:00:22, Serial0/2/1
                      [120/1] via 172.29.6.14, 00:00:22, Serial0/3/0
C       172.29.6.8/30 is directly connected, Serial0/2/1
L       172.29.6.9/32 is directly connected, Serial0/2/1
C       172.29.6.12/30 is directly connected, Serial0/3/0
L       172.29.6.13/32 is directly connected, Serial0/3/0
    209.17.220.0/24 is variably subnetted, 4 subnets, 2 masks
C       209.17.220.0/30 is directly connected, Serial0/2/0
C       209.17.220.1/32 is directly connected, Serial0/2/0
L       209.17.220.2/32 is directly connected, Serial0/2/0
S       209.17.220.4/30 [1/0] via 209.17.220.1
MEDELLIN1#
```

```
     172.29.0.0/16 is variably subnetted, 9 subnets, 3 masks
R       172.29.0.0/24 [120/1] via 172.29.3.6, 00:00:14, Serial0/3/0
                      [120/1] via 172.29.3.2, 00:00:14, Serial0/2/1
R       172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:25, Serial0/3/1
C       172.29.3.0/30 is directly connected, Serial0/2/1
L       172.29.3.1/32 is directly connected, Serial0/2/1
C       172.29.3.4/30 is directly connected, Serial0/3/0
L       172.29.3.5/32 is directly connected, Serial0/3/0
C       172.29.3.8/30 is directly connected, Serial0/3/1
L       172.29.3.9/32 is directly connected, Serial0/3/1
R       172.29.3.12/30 [120/1] via 172.29.3.6, 00:00:14, Serial0/3/0
                       [120/1] via 172.29.3.2, 00:00:14, Serial0/2/1
                       [120/1] via 172.29.3.10, 00:00:25, Serial0/3/1
BOGOTA1#
```

1.1.5 Configurar encapsulamiento y autenticación PPP

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

- El enlace Bogotá1 con ISP se debe configurar con autenticación CHAT

  interface Serial0/2/0

  ip address 209.17.220.6 255.255.255.252

  encapsulation ppp

  ppp authentication chap

  ppp pap sent-username BOGOTA1 password 0 cisco1

  ip nat outside

  clock rate 2000000

  MEDELLIN1

  interface Serial0/2/0

  ip address 209.17.220.2 255.255.255.252

  encapsulation ppp

  ppp authentication pap

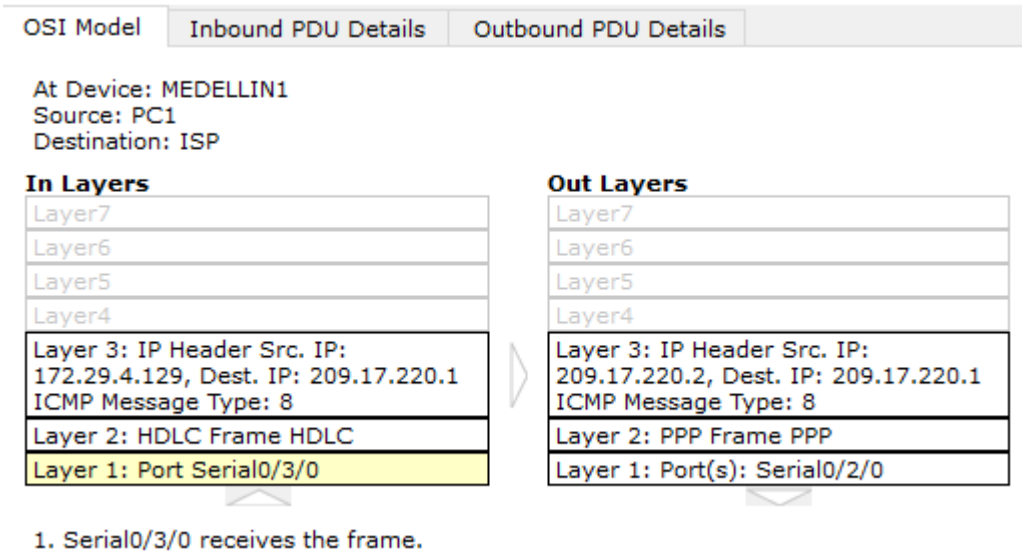
  ppp pap sent-username MEDELLIN1 password 0 cisco1

  ip nat outside

  clock rate 2000000

1.1.6 Configuración PAT

- 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.
- 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.



- 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.

  MEDELLIN1

  ```
  access-list 1 permit 172.29.6.0 0.0.0.3
  access-list 1 permit 172.29.6.4 0.0.0.3
  access-list 1 permit 172.29.6.8 0.0.0.3
  access-list 1 permit 172.29.6.12 0.0.0.3
  access-list 1 permit 172.29.4.0 0.0.0.127
  access-list 1 permit 172.29.4.128 0.0.0.127
  ip nat inside source list 1 interface Serial0/2/0 overload
  interface Serial0/2/0
  ip address 209.17.220.2 255.255.255.252
  encapsulation ppp
  ppp authentication pap
  ppp pap sent-username MEDELLIN1 password 0 cisco1
  ip nat outside
  clock rate 2000000
  !
  interface Serial0/2/1
  ip address 172.29.6.9 255.255.255.252
  ip nat inside
  clock rate 2000000
  !
  interface Serial0/3/0
  ip address 172.29.6.13 255.255.255.252
  ip nat inside
  clock rate 2000000
  ```

```
!
interface Serial0/3/1
        ip address 172.29.6.1 255.255.255.252
        ip nat inside
        clock rate 2000000

        BOGOTA1

        access-list 1 permit 172.29.3.0 0.0.0.3

        access-list 1 permit 172.29.3.4 0.0.0.3

        access-list 1 permit 172.29.3.8 0.0.0.3

        access-list 1 permit 172.29.3.12 0.0.0.3

        access-list 1 permit 172.29.0.0 0.0.0.255

        access-list 1 permit 172.29.1.0 0.0.0.255

        ip nat inside source list 1 interface Serial0/2/0 overload

        interface Serial0/2/0

        ip address 209.17.220.6 255.255.255.252

        encapsulation ppp

        ppp authentication chap

        ppp pap sent-username BOGOTA1 password 0 cisco1

        ip nat outside

        clock rate 2000000

        !

        interface Serial0/2/1

        ip address 172.29.3.1 255.255.255.252

        ip nat inside

        clock rate 2000000

        !

        interface Serial0/3/0
```

```
        ip address 172.29.3.5 255.255.255.252
    ip nat inside
    clock rate 2000000
    !
    interface Serial0/3/1
    ip address 172.29.3.9 255.255.255.252
    ip nat inside
    clock rate 2000000
```

1.1.7 Configuración del servicio DHCP

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

  ```
  interface GigabitEthernet0/0
  ip address 172.29.4.254 255.255.255.128
  ip helper-address 172.29.6.5
  duplex auto
  speed auto
  ```

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

  ```
  ip dhcp pool LAN_BOGOTA2
  network 172.29.1.0 255.255.255.0
  default-router 172.29.1.254
  ip dhcp pool LAN_BOGOTA3
  network 172.29.0.0 255.255.255.0
  default-router 172.29.0.254
  ```

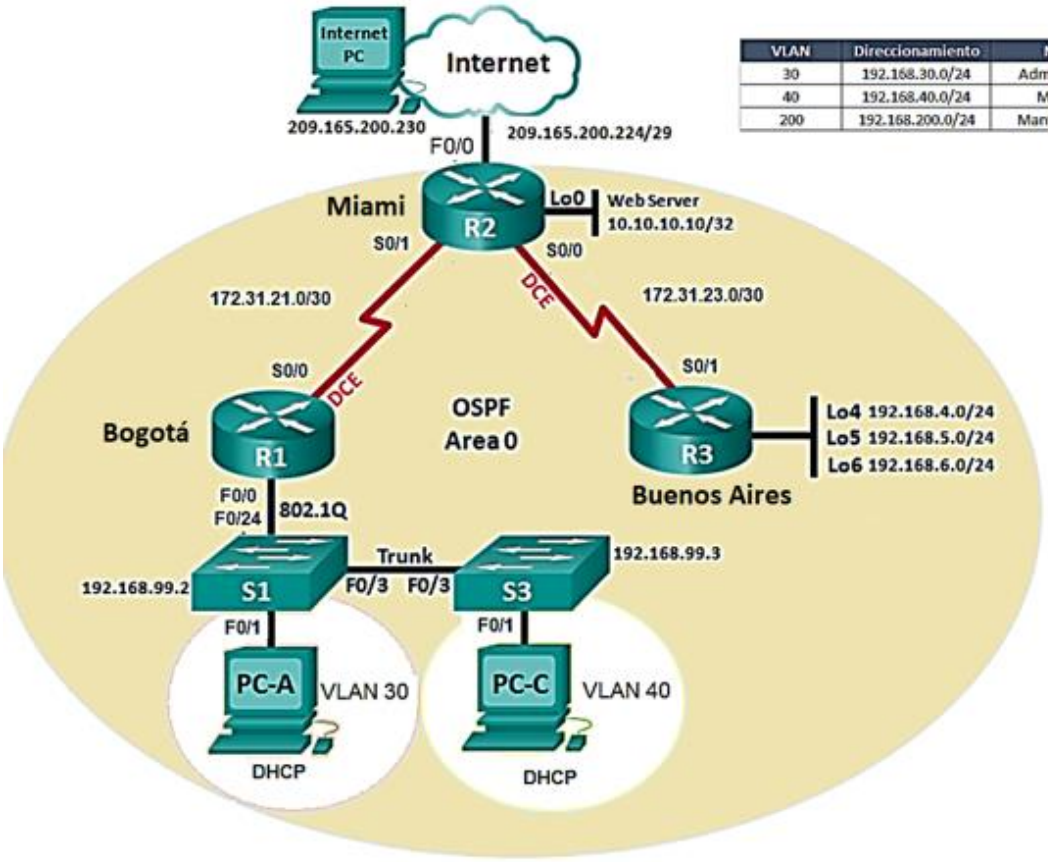
- Configure el router Bogotá1 para que habilite el paso de los mensajes Broadcast hacia la IP del router Bogotá2.

  ```
  interface GigabitEthernet0/0
  ip address 172.29.0.254 255.255.255.0
  ```

ip helper-address 172.29.3.14
duplex auto
speed auto

1.2 Escenario 2

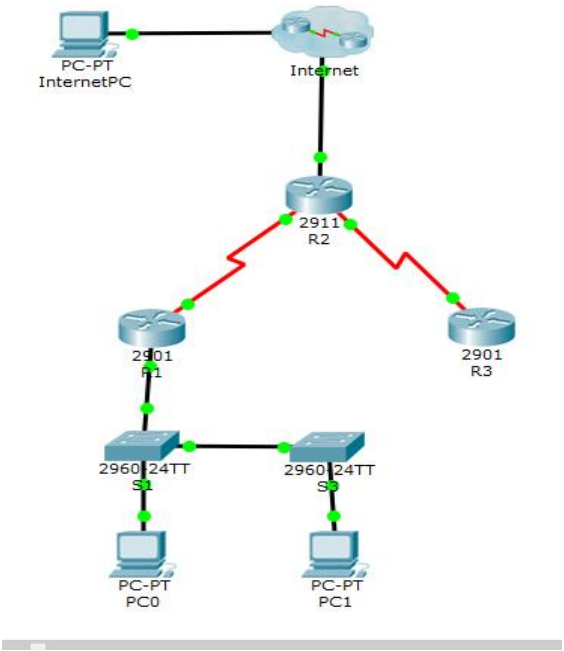
Una empresa de Tecnología posee tres sucursales distribuidas en las ciudades de Miami, Bogotá y Buenos Aires, en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los lineamientos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



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

1.2.1 Desarrollo de la Problemática

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



- 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

R1

```
router ospf 1
 router-id 1.1.1.1
 log-adjacency-changes
 passive-interface GigabitEthernet0/0
 passive-interface GigabitEthernet0/0.30
 passive-interface GigabitEthernet0/0.40
 passive-interface GigabitEthernet0/0.200
 network 192.168.30.0 0.0.0.255 area 0
 network 192.168.40.0 0.0.0.255 area 0
 network 192.168.200.0 0.0.0.255 area 0
 network 192.168.99.0 0.0.0.255 area 0
 network 172.31.21.0 0.0.0.3 area 0
```

R2

```
router ospf 1
 router-id 5.5.5.5
 log-adjacency-changes
 network 10.10.10.10 0.0.0.0 area 0
 network 172.31.21.0 0.0.0.3 area 0
 network 172.31.23.0 0.0.0.3 area 0
 network 209.165.200.224 0.0.0.7 area 0
```

R3

```
router ospf 1
 router-id 8.8.8.8
 log-adjacency-changes
 passive-interface Loopback4
 passive-interface Loopback5
 passive-interface Loopback6
 network 172.31.23.0 0.0.0.3 area 0
 network 192.168.4.0 0.0.0.255 area 0
 network 192.168.5.0 0.0.0.255 area 0
 network 192.168.6.0 0.0.0.255 area 0
```

```
Serial0/2/0 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
```

```
Serial0/2/0 is up, line protocol is up (connected)
  Hardware is HD64570
  Internet address is 172.31.23.1/30
  MTU 1500 bytes, BW 256 Kbit, DLY 95000 usec,
```

Verificar información OSPF

- Visualizar tablas de enrutamiento y routers conectados por OSPFv2

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

```
Gateway of last resort is not set

     10.0.0.0/32 is subnetted, 1 subnets
O       10.10.10.10/32 [110/65] via 172.31.21.1, 00:05:20, Serial0/3/0
     172.31.0.0/16 is variably subnetted, 3 subnets, 2 masks
C       172.31.21.0/30 is directly connected, Serial0/3/0
L       172.31.21.2/32 is directly connected, Serial0/3/0
O       172.31.23.0/30 [110/9564] via 172.31.21.1, 00:05:20, Serial0/3/0
     192.168.4.0/32 is subnetted, 1 subnets
O       192.168.4.254/32 [110/9565] via 172.31.21.1, 00:05:20, Serial0/3/0
     192.168.5.0/32 is subnetted, 1 subnets
O       192.168.5.254/32 [110/9565] via 172.31.21.1, 00:05:20, Serial0/3/0
     192.168.6.0/32 is subnetted, 1 subnets
O       192.168.6.254/32 [110/9565] via 172.31.21.1, 00:05:20, Serial0/3/0
     192.168.30.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.30.0/24 is directly connected, GigabitEthernet0/0.30
L       192.168.30.254/32 is directly connected, GigabitEthernet0/0.30
     192.168.40.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.40.0/24 is directly connected, GigabitEthernet0/0.40
L       192.168.40.254/32 is directly connected, GigabitEthernet0/0.40
     192.168.200.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.200.0/24 is directly connected, GigabitEthernet0/0.200
L       192.168.200.254/32 is directly connected, GigabitEthernet0/0.200
     209.165.200.0/29 is subnetted, 1 subnets
O       209.165.200.224/29 [110/65] via 172.31.21.1, 00:05:20, Serial0/3/0
R1#
```

```
     10.0.0.0/32 is subnetted, 1 subnets
C       10.10.10.10/32 is directly connected, Loopback0
     172.31.0.0/16 is variably subnetted, 4 subnets, 2 masks
C       172.31.21.0/30 is directly connected, Serial0/3/1
L       172.31.21.1/32 is directly connected, Serial0/3/1
C       172.31.23.0/30 is directly connected, Serial0/2/0
L       172.31.23.1/32 is directly connected, Serial0/2/0
     192.168.4.0/32 is subnetted, 1 subnets
O       192.168.4.254/32 [110/9501] via 172.31.23.2, 00:05:57, Serial0/2/0
     192.168.5.0/32 is subnetted, 1 subnets
O       192.168.5.254/32 [110/9501] via 172.31.23.2, 00:05:57, Serial0/2/0
     192.168.6.0/32 is subnetted, 1 subnets
O       192.168.6.254/32 [110/9501] via 172.31.23.2, 00:05:57, Serial0/2/0
O    192.168.30.0/24 [110/65] via 172.31.21.2, 00:05:57, Serial0/3/1
O    192.168.40.0/24 [110/65] via 172.31.21.2, 00:05:57, Serial0/3/1
O    192.168.200.0/24 [110/65] via 172.31.21.2, 00:05:57, Serial0/3/1
     209.165.200.0/24 is variably subnetted, 2 subnets, 2 masks
C       209.165.200.224/29 is directly connected, GigabitEthernet0/0
L       209.165.200.225/32 is directly connected, GigabitEthernet0/0
R2#
```

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

VLAN No	VLAN Name
1	default
30	Administracion
40	Mercadeo
200	Mantenimiento

```
Port        Mode         Encapsulation  Status        Native vlan
Fa0/1       on           802.1q         trunking      1
Fa0/3       auto         n-802.1q       trunking      1

Port        Vlans allowed on trunk
Fa0/1       1-1005
Fa0/3       1-1005

Port        Vlans allowed and active in management domain
Fa0/1       1,30,40,200
Fa0/3       1,30,40,200

Port        Vlans in spanning tree forwarding state and not pruned
Fa0/1       1,30,40,200
Fa0/3       1,30,40,200
S1#
```

```
interface GigabitEthernet0/0.30
 encapsulation dot1Q 30
 ip address 192.168.30.254 255.255.255.0
!
interface GigabitEthernet0/0.40
 encapsulation dot1Q 40
 ip address 192.168.40.254 255.255.255.0
!
interface GigabitEthernet0/0.200
 encapsulation dot1Q 200
 ip address 192.168.200.254 255.255.255.0
!
```

```
Secure Port MaxSecureAddr CurrentAddr SecurityViolation Security Action
               (Count)       (Count)        (Count)
-------------------------------------------------------------------------
        Fa0/2        1           1                 0         Restrict
-------------------------------------------------------------------------
S1#
```

- En el Switch 3 deshabilitar DNS lookup

  no ip domain-lookup
- Asignar direcciones IP a los Switches acorde a los lineamientos.

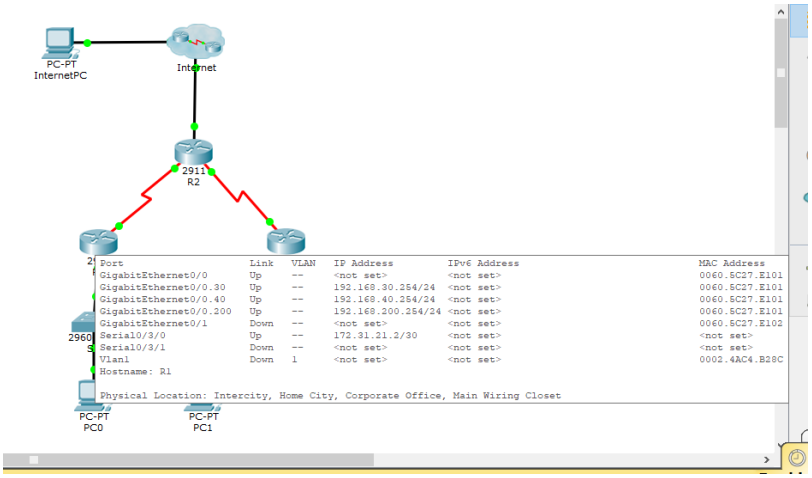
interface Vlan40

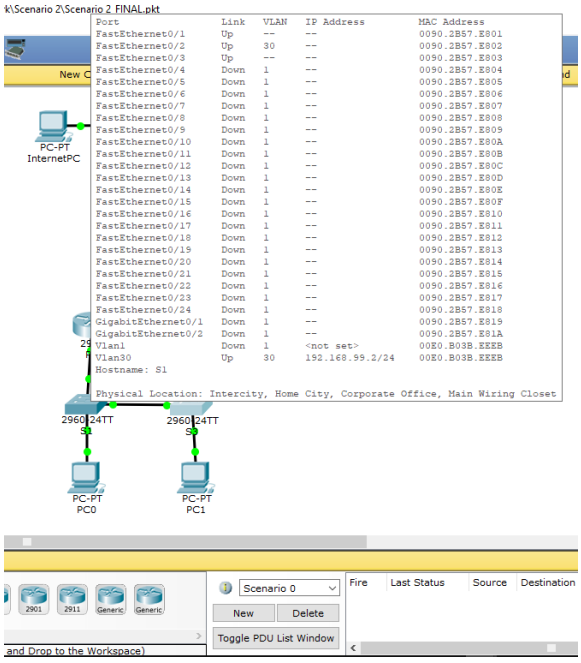
ip address 192.168.99.3 255.255.255.0

!

ip default-gateway 192.168.40.254

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





- Implement DHCP and NAT for IPv4

```
ip dhcp excluded-address 192.168.30.0 192.168.30.30
ip dhcp excluded-address 192.168.40.0 192.168.40.30
!
ip dhcp pool ADMINISTRACION
 network 192.168.30.0 255.255.255.0
 default-router 192.168.30.254
 dns-server 10.10.10.11
ip dhcp pool MERCADEO
 network 192.168.40.0 255.255.255.0
 default-router 192.168.40.254
 dns-server 10.10.10.11
```

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

```
ip dhcp excluded-address 192.168.30.0 192.168.30.30
ip dhcp excluded-address 192.168.40.0 192.168.40.30
!
ip dhcp pool ADMINISTRACION
 network 192.168.30.0 255.255.255.0
 default-router 192.168.30.254
 dns-server 10.10.10.11
ip dhcp pool MERCADEO
 network 192.168.40.0 255.255.255.0
 default-router 192.168.40.254
 dns-server 10.10.10.11
```

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

```
ip dhcp excluded-address 192.168.30.0 192.168.30.30
ip dhcp excluded-address 192.168.40.0 192.168.40.30
!
```

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.

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

```
R2#sh  ip nat  translations
Pro  Inside global     Inside local       Outside local      Outside global
icmp 209.165.200.225:1 192.168.40.31:1    209.165.200.230:1  209.165.200.230:1
icmp 209.165.200.225:2 192.168.40.31:2    209.165.200.230:2  209.165.200.230:2
```

```
.
access-list 1 permit 192.168.30.0 0.0.0.255
access-list 1 permit 192.168.40.0 0.0.0.255
access-list 1 permit 192.168.200.0 0.0.0.255
access-list 1 permit 192.168.99.0 0.0.0.255
access-list 1 permit 192.168.4.0 0.0.0.255
access-list 1 permit 192.168.5.0 0.0.0.255
access-list 1 permit 192.168.6.0 0.0.0.255
```

ip nat inside source list 1 interface GigabitEthernet0/0 overload

interface GigabitEthernet0/0

ip address 209.165.200.225 255.255.255.248

ip nat outside

duplex auto

speed auto

!

interface Serial0/2/0

bandwidth 256

ip address 172.31.23.1 255.255.255.252

ip ospf cost 9500

ip access-group 101 in

ip nat inside

clock rate 2000000

!

interface Serial0/3/1

ip address 172.31.21.1 255.255.255.252

ip access-group 100 in

ip nat inside

clock rate 2000000

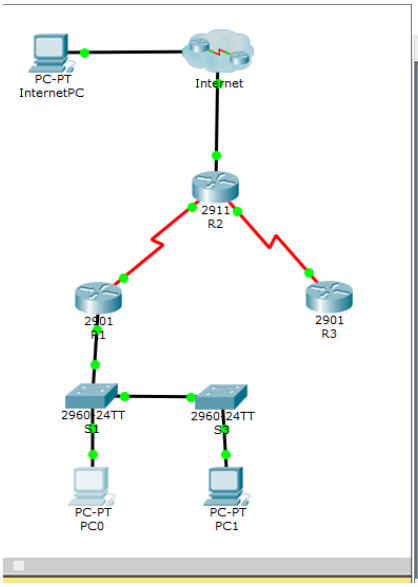
- Configurar al menos dos listas de acceso de tipo estándar a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.

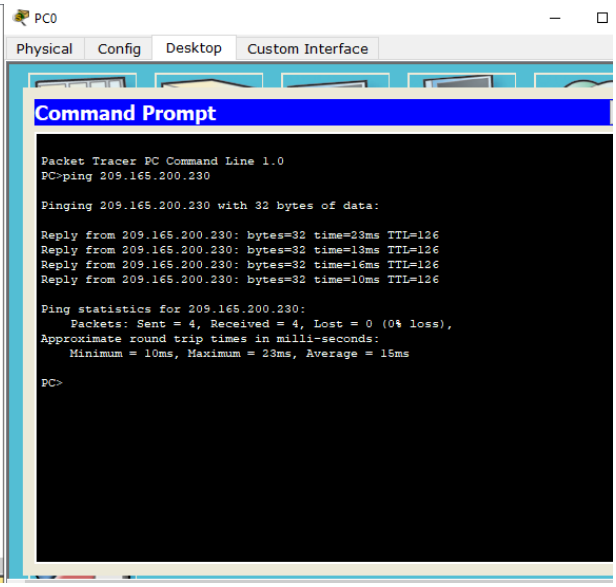
```
access-list 1 permit 192.168.30.0 0.0.0.255
access-list 1 permit 192.168.40.0 0.0.0.255
access-list 1 permit 192.168.200.0 0.0.0.255
access-list 1 permit 192.168.99.0 0.0.0.255
access-list 1 permit 192.168.4.0 0.0.0.255
access-list 1 permit 192.168.5.0 0.0.0.255
access-list 1 permit 192.168.6.0 0.0.0.255
access-list 2 deny any
```

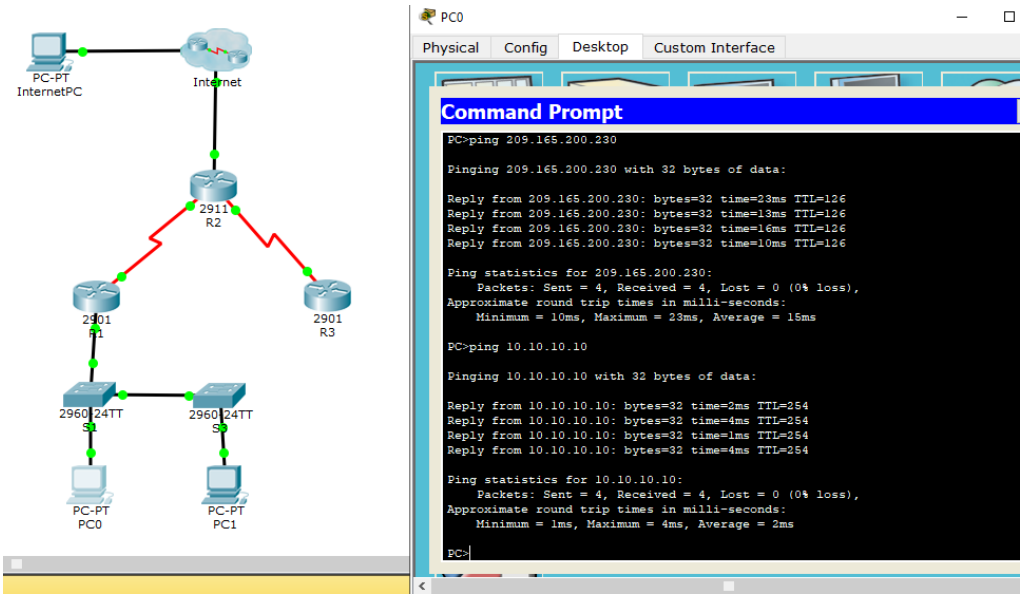
- Configurar al menos dos listas de acceso de tipo extendido o nombradas a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.

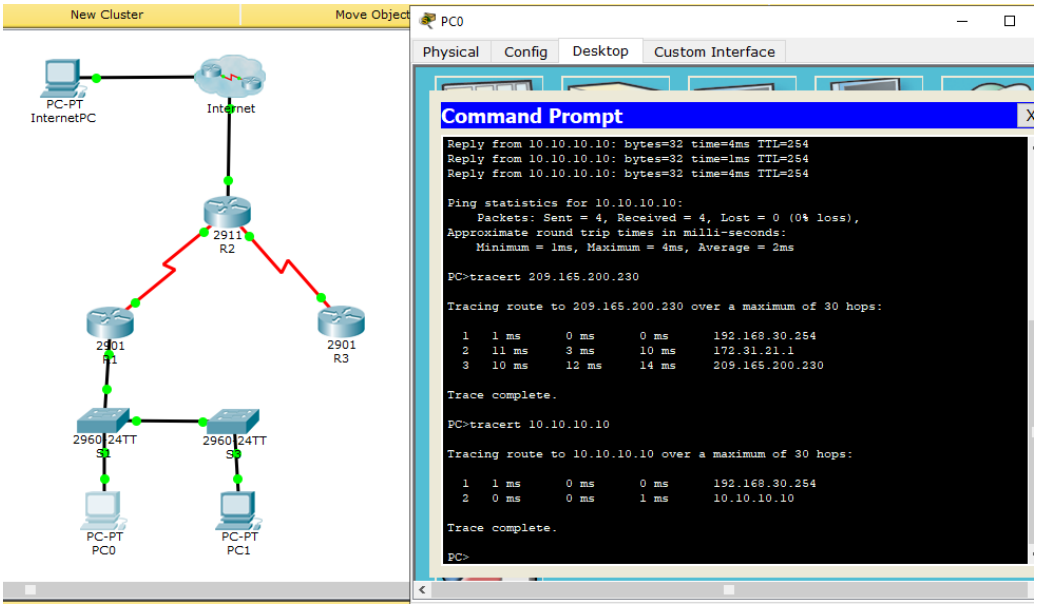
```
access-list 100 permit tcp 192.168.30.0 0.0.0.255 host 10.10.10.11 eq www
access-list 100 permit tcp 192.168.40.0 0.0.0.255 host 10.10.10.11 eq www
access-list 100 permit ospf any any
access-list 100 permit icmp any any
access-list 100 permit icmp 192.168.30.0 0.0.0.255 209.165.200.224 0.0.0.7
access-list 100 permit icmp 192.168.40.0 0.0.0.255 209.165.200.224 0.0.0.7
access-list 101 permit tcp 192.168.4.0 0.0.0.255 host 10.10.10.11 eq www
access-list 101 permit tcp 192.168.5.0 0.0.0.255 host 10.10.10.11 eq www
access-list 101 permit tcp 192.168.6.0 0.0.0.255 host 10.10.10.11 eq www
access-list 101 permit icmp any any
access-list 101 permit ospf any any
```

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






PC-PT
InternetPC
Internet
2911
R2
2901
R1
2901
R3
2960-24TT
S1
2960-24TT
S2
PC-PT
PC0
PC-PT
PC1
PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
PC>ping 209.165.200.230
Pinging 209.165.200.230 with 32 bytes of data:
Reply from 209.165.200.230: bytes=32 time=23ms TTL=126
Reply from 209.165.200.230: bytes=32 time=13ms TTL=126
Reply from 209.165.200.230: bytes=32 time=16ms TTL=126
Reply from 209.165.200.230: bytes=32 time=10ms TTL=126
Ping statistics for 209.165.200.230:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 10ms, Maximum = 23ms, Average = 15ms
PC>ping 10.10.10.10
Pinging 10.10.10.10 with 32 bytes of data:
Reply from 10.10.10.10: bytes=32 time=2ms TTL=254
Reply from 10.10.10.10: bytes=32 time=4ms TTL=254
Reply from 10.10.10.10: bytes=32 time=1ms TTL=254
Reply from 10.10.10.10: bytes=32 time=4ms TTL=254
Ping statistics for 10.10.10.10:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 4ms, Average = 2ms
PC>


New Cluster
Move Object
PC-PT
InternetPC
Internet
2911
R2
2901
R1
2901
R3
2960-24TT
S1
2960-24TT
S2
PC-PT
PC0
PC-PT
PC1
PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
Reply from 10.10.10.10: bytes=32 time=4ms TTL=254
Reply from 10.10.10.10: bytes=32 time=1ms TTL=254
Reply from 10.10.10.10: bytes=32 time=4ms TTL=254
Ping statistics for 10.10.10.10:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 4ms, Average = 2ms
PC>tracert 209.165.200.230
Tracing route to 209.165.200.230 over a maximum of 30 hops:
1 1 ms 0 ms 0 ms 192.168.30.254
2 11 ms 3 ms 10 ms 172.31.21.1
3 10 ms 12 ms 14 ms 209.165.200.230
Trace complete.
PC>tracert 10.10.10.10
Tracing route to 10.10.10.10 over a maximum of 30 hops:
1 1 ms 0 ms 0 ms 192.168.30.254
2 0 ms 0 ms 1 ms 10.10.10.10
Trace complete.
PC>

2. Conclusiones

2.1 Conclusiones

- Se utilizaron diferentes switch Cisco con el fin de desarrollar los ejercicios propuestos, como también se implementaron protocolos de seguridad, enrutamiento OSPFv2, RIP versión 2 y verificación de cada uno de los mismos mediante pruebas de ping.

Bibliografía

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