



**PRUEBA DE HABILIDADES PRACTICAS CCNA**

**EVALUACION – PRUEBA DE HABILIDADES PRACTICAS CCNA**

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**UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA  
ESCUELA DE CIENCIAS BASICAS Y TECNOLOGIAS  
2018**



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**GRUPO 16**

**DIPLOMADO DE PROFUNDIZACION CISCO  
DISEÑO E IMPLEMENTACION DE SOLUACIONES INTEGRADAS LAN / WLAN**

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**UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA  
ESCUELA DE CIENCIAS BASICAS Y TECNOLOGIAS  
2018**

## INTRODUCCION

El examen de habilidades comprende protocolos de routing dinámico (RIPv2, OSPF), configuración de servers DHCP, Network Address Translation (NAT), Listas de control de acceso (ACL). Estas pueden implementarse en routers para aumentar la seguridad de una red o implementar políticas de entrada y salida de paquetes para ciertos equipos específicos.

Se configuran servidores DHCP, el cual es un protocolo de difusión que trabaja de forma predeterminada en donde sus paquetes no pasan a través de enrutadores. Un agente de retransmisión DHCP recibe cualquier difusión DHCP de la subred y la reenvía a la dirección IP especificada en una subred distinta.

Las redes de datos que usamos en nuestras vidas cotidianas para aprender, jugar y trabajar varían desde pequeñas redes locales hasta grandes internetworks globales. En el hogar, un usuario puede tener un router y dos o más computadoras. En el trabajo, una organización probablemente tenga varios routers y switches para atender las necesidades de comunicación de datos de cientos o hasta miles de computadoras.

## OBJETIVOS

### GENERAL

Implementar todas las habilidades prácticas, teóricas y experiencia por parte de los futuros ingenieros de Telecomunicaciones de la Universidad Nacional Abierta y a Distancia, para identificar y aplicar una solución a un caso o situación estudio de problema de Networking.

### ESPECIFICOS

Identificar que dispositivos utilizar para la construcción de una topología de red.

Realizar configuración básica a dispositivos de comunicación como Routers, Switch, Servidores.

Implementar seguridad en Switch, elaboración de Vlans e inter Vlan Routing.

Determinar la configuración necesaria para la implementación de OPSFv2, protocolo dinámico de Routing.

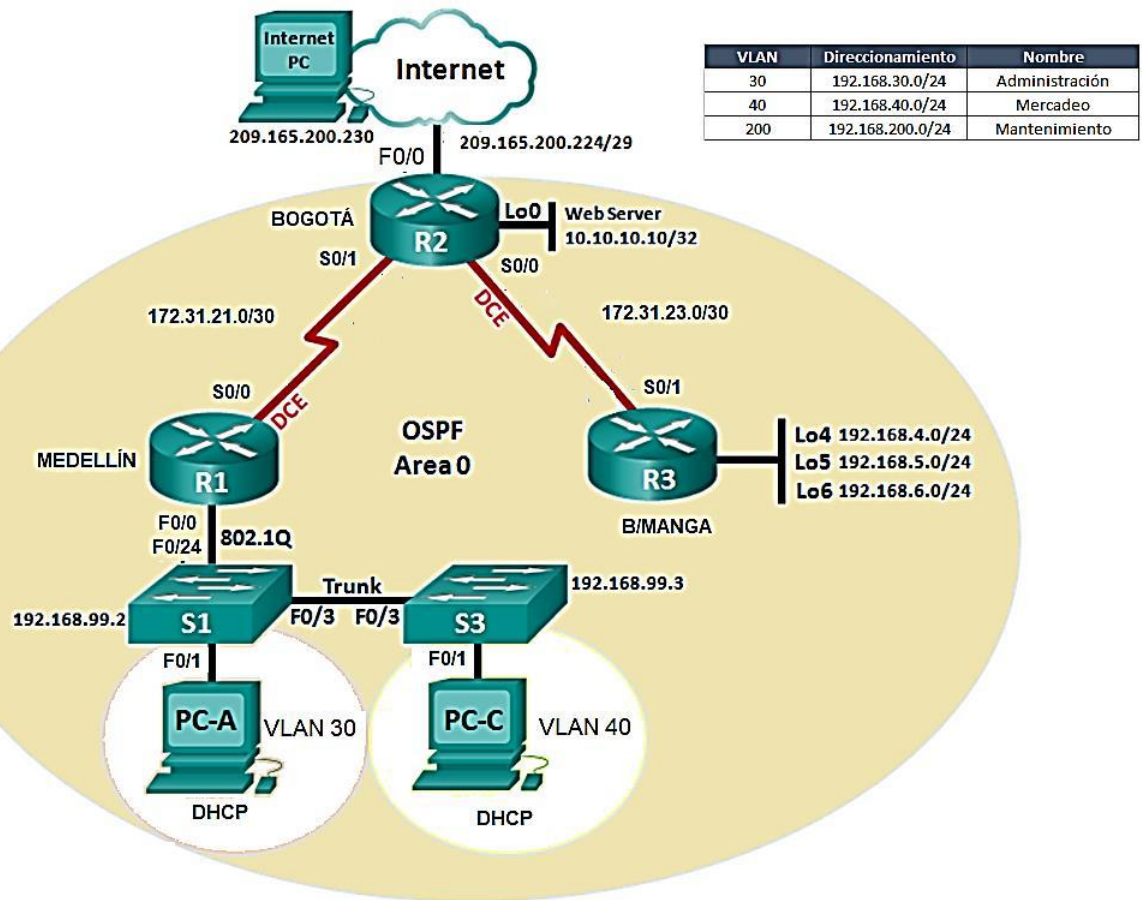
Implementar de DHCP y NAT en dispositivos de comunicación.

Configurar y verificar listas de control de acceso ACL

Verificar conectividad entre los dispositivos de una topología.

Una empresa de Tecnología posee tres sucursales distribuidas en las ciudades de Bogotá, Medellín y Bucaramanga, 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



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

	<b>Dirección IP (Ip Address)</b>	<b>Mascara de Red (Subnet Mask)</b>	<b>Puerta de Enlace Predeterminado (Default Gateway)</b>	<b>Dirección IPv6 (IPv6 Address)</b>	<b>Puerta de Enlace IPv6 (IPv6 Gateway)</b>
Internet Server	209.165.200.230	255.255.255.248	209.165.200.255	2001:DB8:ACAD:2::30/ 64	2001:DB8:ACAD:2:: 1
R1 to R2 S0/0/0	172.31.21.1	255.255.255.252		2001:DB8:ACAD:12::1/ 64	
R2 to R1 S0/0/1	172.31.21.2	255.255.255.252		2001:DB8:ACAD:12::2/ 64	
R2 to R3 S0/0/0	172.31.23.2	255.255.255.252		2001:DB8:ACAD:23::2/ 64	
R2 to Internet Server G0/0	209.165.200.225	255.255.255.248		2001:DB8:ACAD:2::1/6 4	
R2 Lo0 Web Server	10.10.10.10	255.255.255.255	0.0.0.0.0.0.0.0 G0/0	::/0 G0/0	
R3 to R2 S0/0/1	172.31.23.1	255.255.255.252		2001:DB8:ACAD:23::1/ 64	

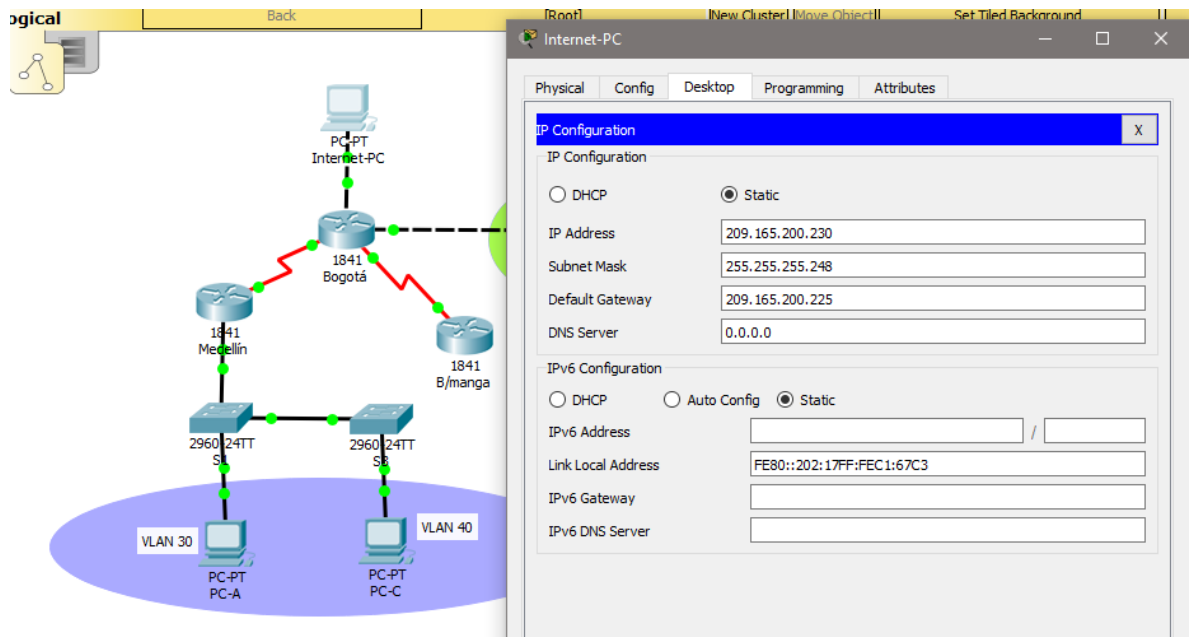
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R3 Lo4	192.168.4.1	255.255.255.0	0.0.0.0.0.0.0.0 S0/0/1	::/0 S0/0/1	
R3 Lo5	192.168.5.1	255.255.255.0	0.0.0.0.0.0.0.0 S0/0/1	::/0 S0/0/1	
R3 Lo6	192.168.6.1	255.255.255	0.0.0.0.0.0.0.0 S0/0/1	::/0 S0/0/1	
S1 Vlan 30, Vlan 40 Vlan 200	192.168.99.2	255.255.255.0			
S3 Vlan 30, Vlan 40 Vlan 200	192.168.99.3	255.255.255.0			
R1 G0/0.30	192.168.30.1	255.255.255.0			
R1 G0/0.40	192.168.40.1	255.255.255.0			
R1 G0/0.200	192.168.200.1	255.255.255.0			

### Dispositivos Requeridos

- 3 Routers (Cisco 1841) con 2 puertos FastEthernet, 2 puertos Seriales
- 2 Switches (Cisco 2960)
- 1 Servidor (Genérico PT)
- 3 PCs con sistema operativo Windows 7, con tarjeta de red
- Cables Serial y Ethernet

Configuración de un PC para ubicarlo como “Internet-PC” en la topología



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	2.2.2.2
Router ID R3	3.3.3.3
Configurar todas las interfaces LAN como pasivas	
Establecer el ancho de banda para enlaces seriales en	128 Kb/s
Ajustar el costo en la métrica de S0/0 a	7500

#### Verificar información de OSPF

- Visualizar tablas de enrutamiento y routers conectados por OSPFv2

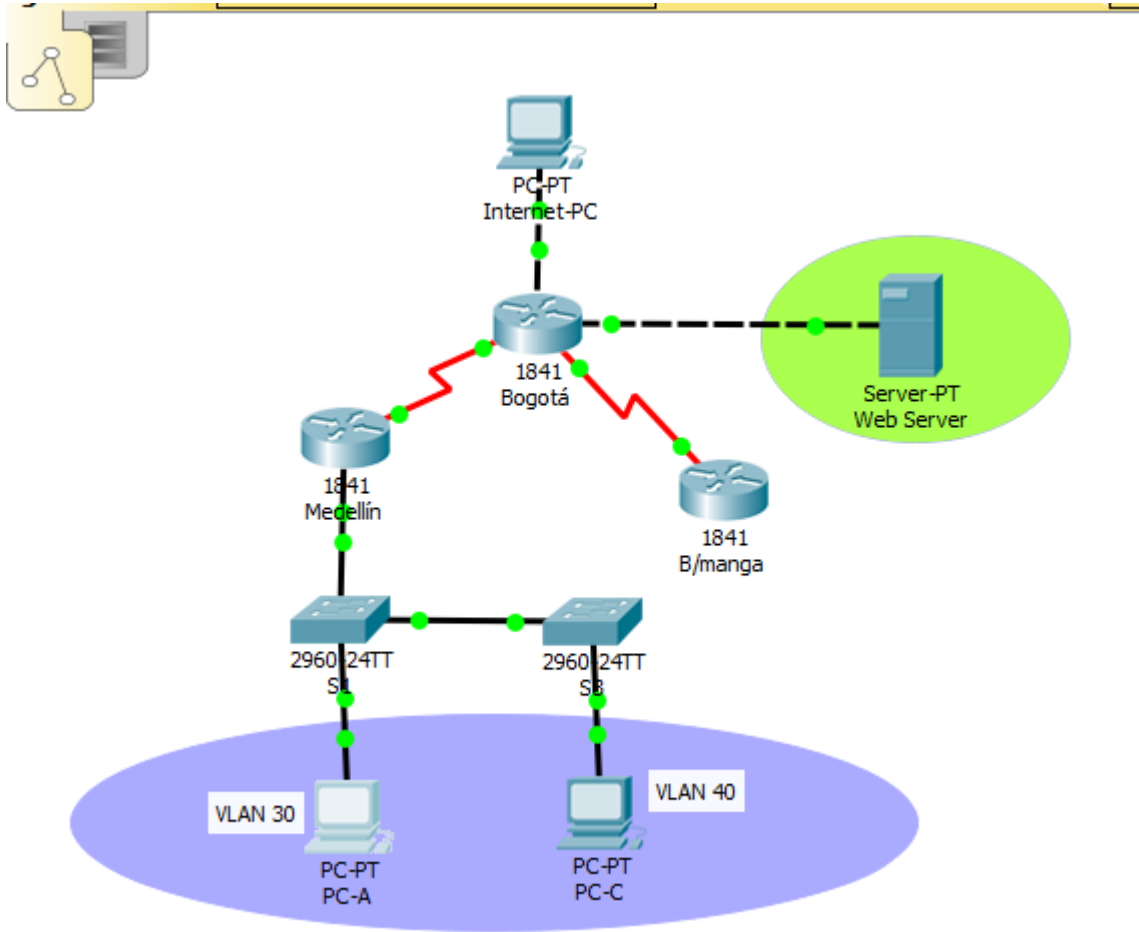


- Visualizar lista resumida de interfaces por OSPF en donde se ilustre el costo de cada interface
- Visualizar el OSPF Process ID, Router ID, Address summarizations, Routing Networks, and passive interfaces configuradas en cada router.

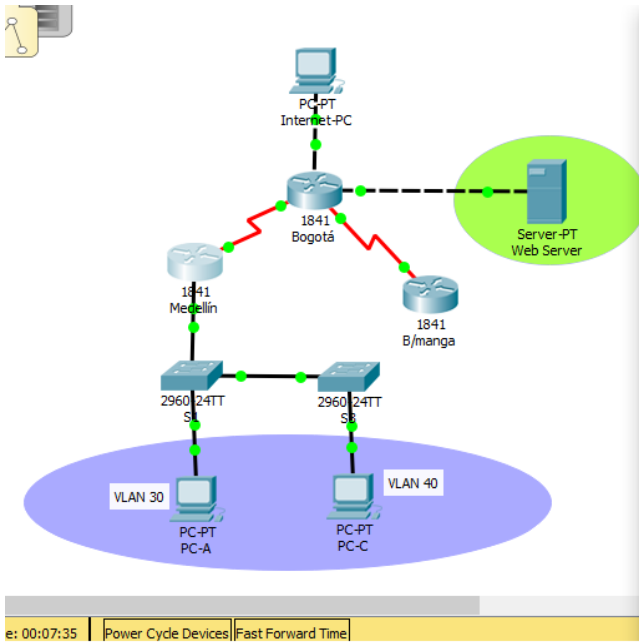
### **Configuración básica de dispositivos**

Aplicar a cada Router y Switch de la topología, las siguientes configuraciones básicas;

- R1: nombrarlo "Medellín"
- R2: nombrarlo "Bogotá"
- R3: nombrarlo "Bucaramanga"
- S1: nombrarlo "S1"
- S3: nombrarlo "S3"
- Exec Password: class
- Console Access Password: cisco
- Telnet Access Password: cisco
- Encriptar contraseñas
- MOTD banner: Prohibido personal no autorizado
- A cada Switch deshabilitar DNS lookup



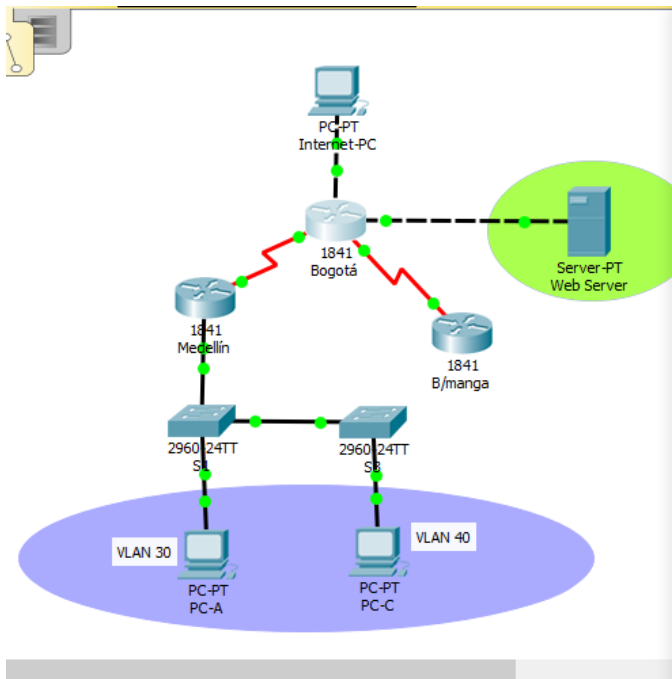
R1



```

Medellin
Physical Config CLI Attributes
IOS Command Line Interface
FastEthernet0/0.40, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/0.200, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
Router>
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Medellin
Medellin(config)#no ip domain-lookup
Medellin(config)#enable secret class
Medellin(config)#line con 0
Medellin(config-line)#password cisco
Medellin(config-line)#login
Medellin(config-line)#line vty 0 4
Medellin(config-line)#password cisco
Medellin(config-line)#login
Medellin(config-line)#exit
Medellin(config)#service password-encryption
Medellin(config)#banner motd $ Unauthorized Access is Prohibited $
Medellin(config)#
Ctrl+F6 to exit CLI focus
Copy Paste
  
```

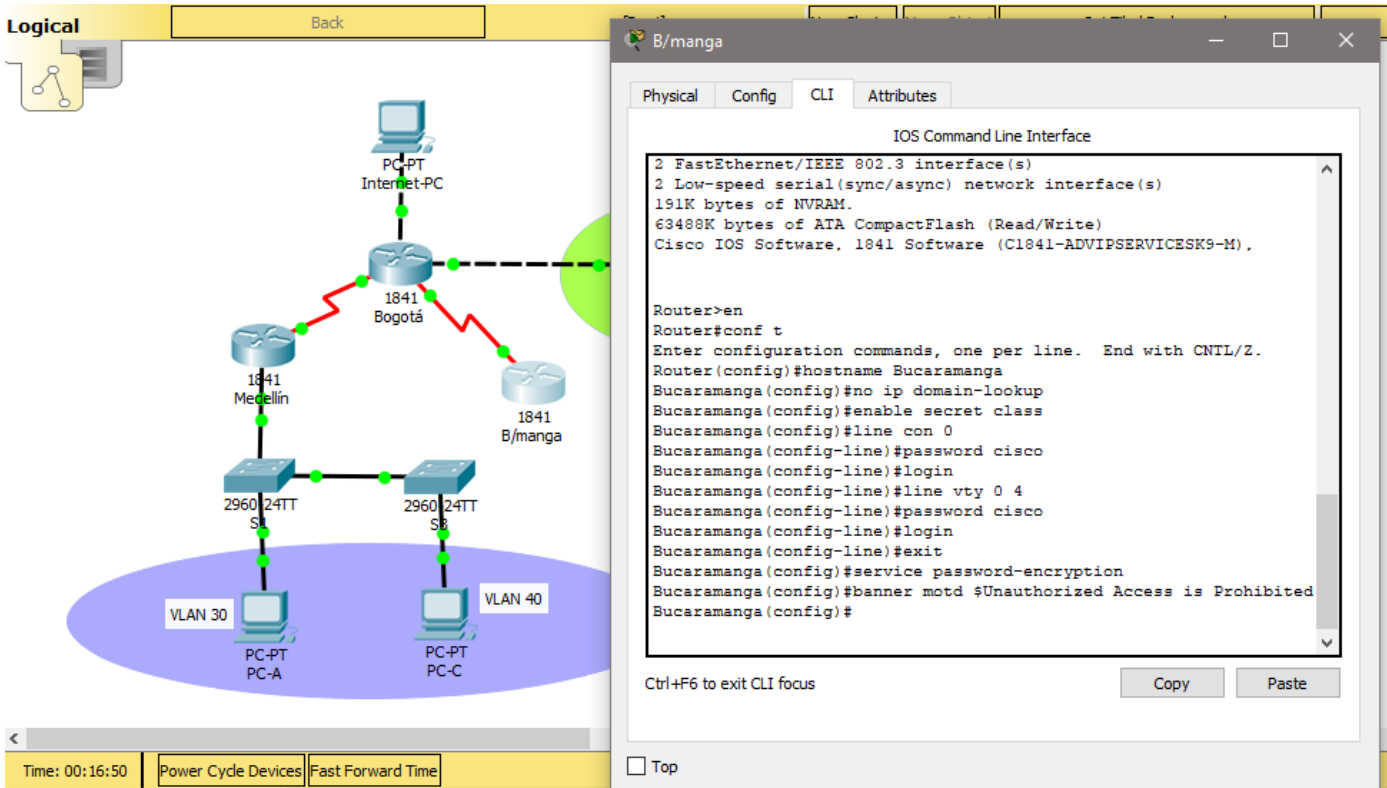
R2



```

Bogota
Physical Config CLI Attributes
IOS Command Line Interface
Press RETURN to get started!
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Bogota
Bogota(config)#no ip domain-lookup
Bogota(config)#enable secret class
Bogota(config)#line con 0
Bogota(config-line)#password cisco
Bogota(config-line)#login
Bogota(config-line)#exit
Bogota(config)#service password-encryption
Bogota(config)#banner motd $ Unauthorized Access is Prohibited $
Bogota(config)#
Ctrl+F6 to exit CLI focus
Copy Paste
  
```

R3



The image shows a network diagram on the left and a CLI configuration window on the right. The network diagram includes three 1841 routers (Medellin, Bogotá, B/manga), two 2960-24TT switches (S1, S3), and several PC-PT devices connected to VLANs 30 and 40. The CLI window shows the configuration for the B/manga router, including hostname, domain-lookup, secret class, console, and vty settings.

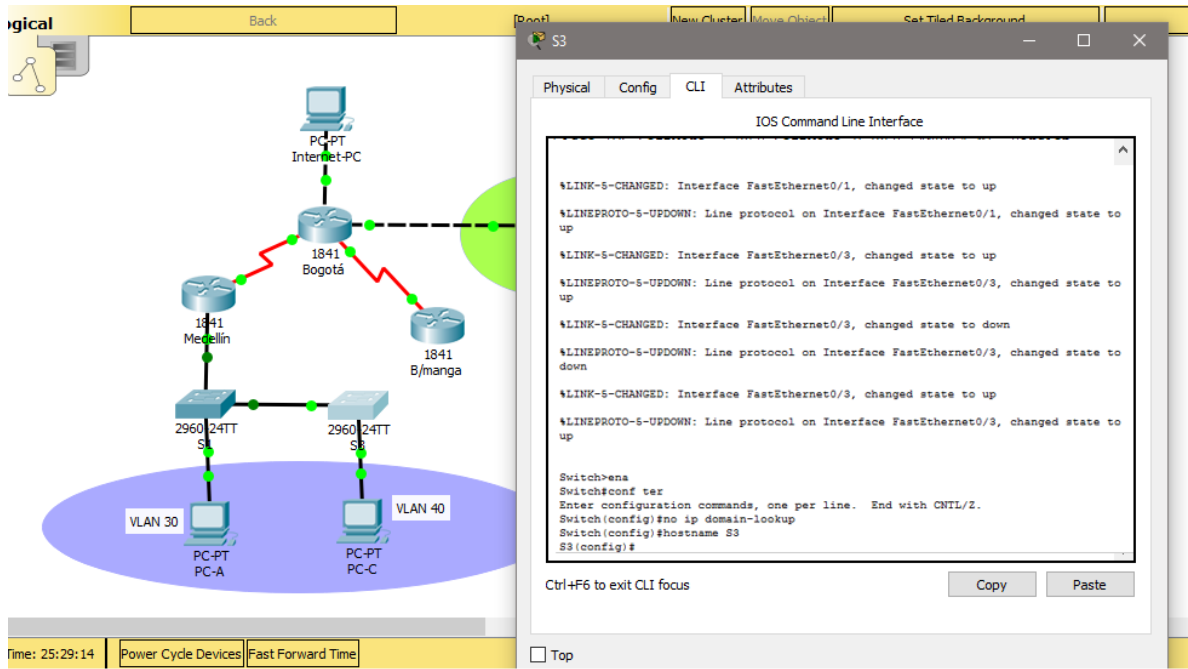
```

IOS Command Line Interface

2 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
191K bytes of NVRAM.
63488K bytes of ATA CompactFlash (Read/Write)
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M),

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Bucaramanga
Bucaramanga(config)#no ip domain-lookup
Bucaramanga(config)#enable secret class
Bucaramanga(config)#line con 0
Bucaramanga(config-line)#password cisco
Bucaramanga(config-line)#login
Bucaramanga(config-line)#line vty 0 4
Bucaramanga(config-line)#password cisco
Bucaramanga(config-line)#login
Bucaramanga(config-line)#exit
Bucaramanga(config)#service password-encryption
Bucaramanga(config)#banner motd $Unauthorized Access is Prohibited
Bucaramanga(config)#
    
```

3. Configurar VLANs, Puertos troncales, puertos de acceso, encapsulamiento, Inter-VLAN Routing y Seguridad en los Switches acorde a la topología de red establecida.
4. En el Switch 3 deshabilitar DNS lookup



The network diagram shows a topology with three routers: Bogotá (1841), Medellín (1841), and B/manga (1841). Bogotá is connected to Medellín and B/manga. Medellín is connected to a 2960 24TT switch, which is connected to PC-A (VLAN 30). B/manga is connected to another 2960 24TT switch, which is connected to PC-C (VLAN 40). An Internet-PC is connected to Bogotá. A CLI window for S3 shows the following output:

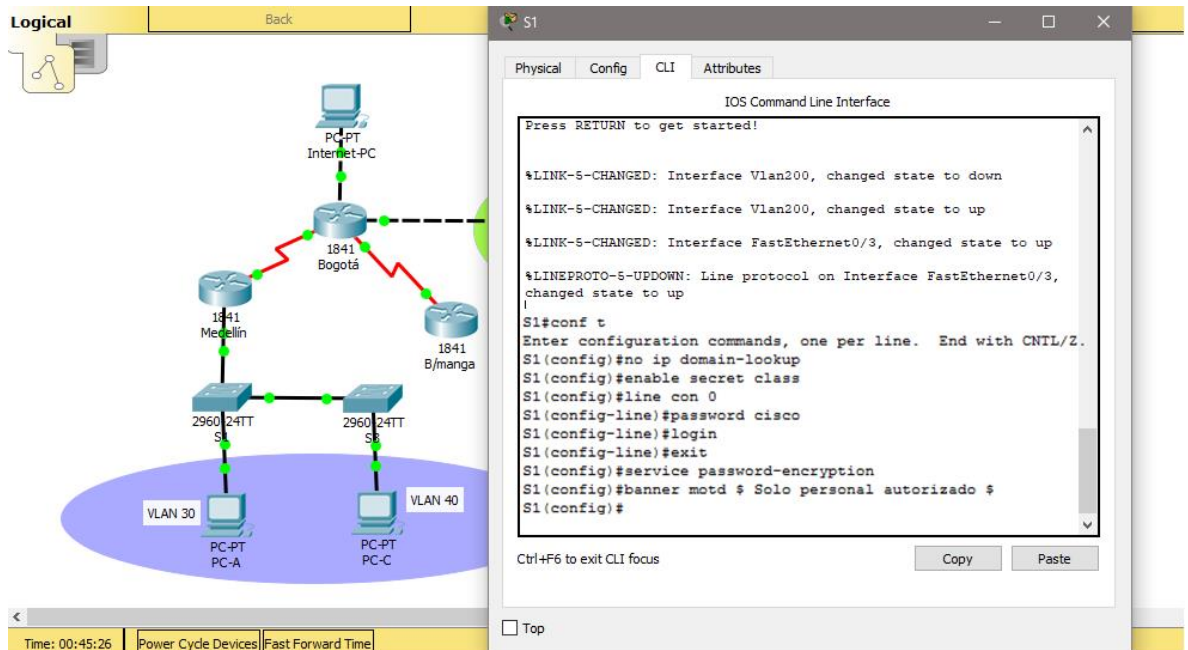
```

IOS Command Line Interface

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up

Switch>ena
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#no ip domain-lookup
Switch(config)#hostname S3
S3(config)#
    
```

Time: 25:29:14 | Power Cycle Devices | Fast Forward Time



The network diagram is identical to the one above. A CLI window for S1 shows the following output:

```

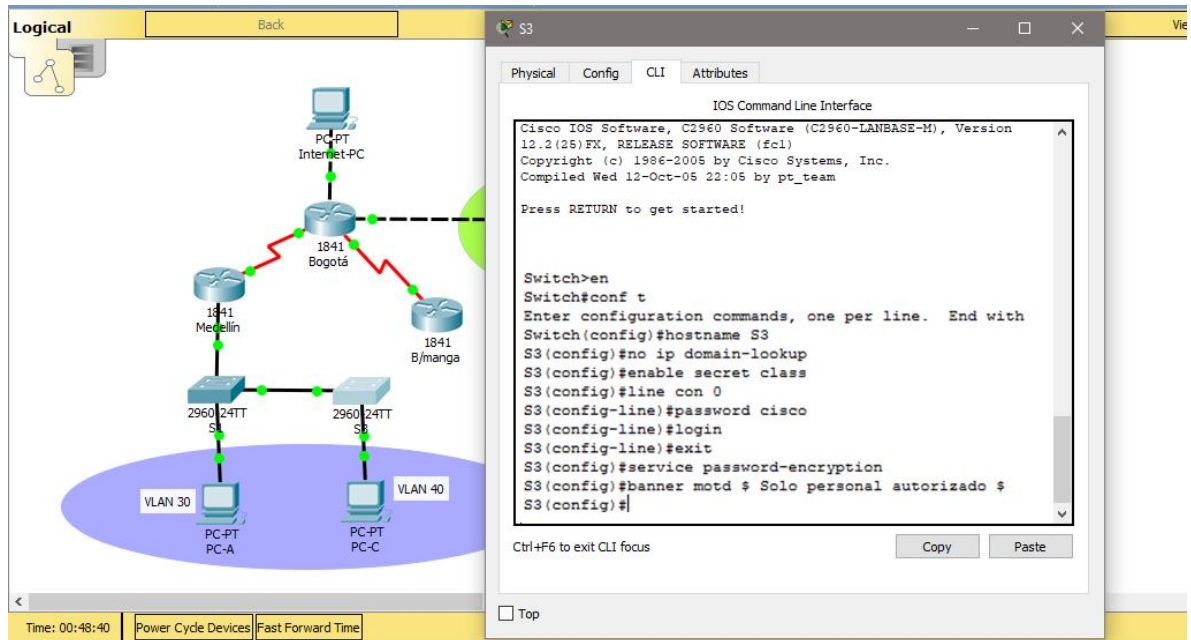
IOS Command Line Interface

Press RETURN to get started!

%LINK-5-CHANGED: Interface Vlan200, changed state to down
%LINK-5-CHANGED: Interface Vlan200, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up

S1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
S1(config)#no ip domain-lookup
S1(config)#enable secret class
S1(config)#line con 0
S1(config-line)#password cisco
S1(config-line)#login
S1(config-line)#exit
S1(config)#service password-encryption
S1(config)#banner motd $ Solo personal autorizado $
S1(config)#
    
```

Time: 00:45:26 | Power Cycle Devices | Fast Forward Time



The screenshot displays a network simulation environment. On the left, a logical network diagram shows a topology with several devices: a PC-PT Internet-PC connected to a central 1841 Bogotà router. This router is connected to two other 1841 routers, labeled 1841 Medellín and 1841 B/manga. Below these, two 2960 24TT switches, S3 and S4, are connected to each other and to the Medellín router. Two PC-PT devices, PC-A and PC-C, are connected to switches S3 and S4 respectively, with VLAN 30 and VLAN 40 indicated. On the right, a CLI window for switch S3 shows the following configuration commands:

```

Cisco IOS Software, C2960 Software (C2960-LANBASE-M), Version
12.2(25)FX, RELEASE SOFTWARE (fc1)
Copyright (c) 1986-2005 by Cisco Systems, Inc.
Compiled Wed 12-Oct-05 22:05 by pt_team

Press RETURN to get started!

Switch>en
Switch#conf t
Enter configuration commands, one per line. End with
Switch(config)#hostname S3
S3(config)#no ip domain-lookup
S3(config)#enable secret class
S3(config)#line con 0
S3(config-line)#password cisco
S3(config-line)#login
S3(config-line)#exit
S3(config)#service password-encryption
S3(config)#banner motd $ Solo personal autorizado $
S3(config)#
  
```

At the bottom of the simulator interface, there is a status bar showing 'Time: 00:48:40', 'Power Cycle Devices', and 'Fast Forward Time'.

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Tener en cuenta la siguiente tabla de VLANs

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

Configurar en S1:	Configurar en S3:
<p><b>VLANS S1</b></p> <pre> S1#conf t Enter configuration commands, one per S1(config)#vlan 30 S1(config-vlan)#name Administracion S1(config-vlan)#vlan 40 S1(config-vlan)#name Mercadeo S1(config-vlan)#vlan 200 S1(config-vlan)#name Mantenimiento S1(config-vlan)# </pre> <p><b>F0/3</b></p>	<p><b>VLANS – S3</b></p> <pre> S3#conf t Enter configuration commands, one per line. End with CNTL/Z. S3(config)#vlan 30 S3(config-vlan)#name Administracion S3(config-vlan)#vlan 40 S3(config-vlan)#name Mercadeo S3(config-vlan)#vlan 200 S3(config-vlan)#name Mantenimiento S3(config-vlan)# </pre> <p><b>VLAN Mantenimiento</b></p>

```
S1(config)#int f0/3
S1(config-if)#switchport mode trunk

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

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to
up

S1(config-if)#switchport trunk native vlan 1
S1(config-if)#
```

### F0/24

```
S1(config-if)#int f0/24
S1(config-if)#switchport mode trunk

S1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to
down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to
up

S1(config-if)#switchport trunk native vlan 1
S1(config-if)#no shutdown
S1(config-if)#
```

### Puertos en mode access

```
S3(config)#int vlan 200
S3(config-if)#
%LINK-5-CHANGED: Interface Vlan200, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan200, changed state to up

S3(config-if)#ip add
S3(config-if)#ip address 192.168.99.3 255.255.255.0
S3(config-if)#
```

### Puerta de enlace predeterminada S3 - VLAN Mantenimiento

```
S3(config-if)#exit
S3(config)#ip default-gateway 192.168.99.1
S3(config)#
```

### F0/3

```
S3(config)#
S3(config)#int f0/3
S3(config-if)#switchport mode trunk
S3(config-if)#switchport trunk native vlan 1
S3(config-if)#
```

### Puertos en mode Access



```
S1(config-if)#switchport trunk native vlan 1
S1(config-if)#int range fa0/1-2, fa0/4-24, g0/1-2
S1(config-if-range)#switchport mode access
S1(config-if-range)#
```

### Puerto F0/1 y apagado de puertos

```

S1(config)#
Enter configuration commands, one per line. End with CNTL/Z.
S1(config)#int f0/1
S1(config-if)#switchport mode access
^
% Invalid input detected at '^' marker.

S1(config-if)#switchport mode access
S1(config-if)#switchport access vlan 30
S1(config-if)#int range fa0/2, fa0/4-24, g0/1-2
S1(config-if-range)#shutdown

```

### VLAN Mantenimiento

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

### Puerto F0/1 y apagado de puertos

```
S3(config-if-range)#exit
S3(config)#int f0/1
S3(config-if)#switchport mode access
S3(config-if)#switchport access vlan 40
S3(config-if)#int range fa0/2, fa0/4-24, g0/1-2
S3(config-if-range)#shutdown
```

### Configurar en “Medellín” la conexión hacia Bogotá

#### S0/0/0 – R1

```
Medellin(config)#int s0/0/0
Medellin(config-if)#description Connetion a Bogota
Medellin(config-if)#description Connetion to Bogota
Medellin(config-if)#ip add
Medellin(config-if)#ip address 172.31.21.1 255.255.255.252
Medellin(config-if)#clock rate 128000
Medellin(config-if)#no shutdown

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

#### Ruta de salida S0/0/0 – R1

```

Enter configuration commands, one per line. End with
S1(config)#int vlan 200
S1(config-if)#
%LINK-5-CHANGED: Interface Vlan200, changed state to u

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan20

S1(config-if)#ip add
S1(config-if)#ip address 192.168.99.2 255.255.255.0
S1(config-if)#

```

```

performance
Medellin(config)#ip route 0.0.0.0 0.0.0.0 s0/0/0

```

Configurar en “Bogotá” las siguientes interfaces

- Configurar conexión hacia Medellín
- Configurar conexión hacia Bucaramanga
- Establecer conexión hacia PC-Internet
- Establecer conexión hacia Web Server

### Interface S0/0/1 – R2

```

Bogota(config)#
Enter configuration commands, one per line. End with CNTL/Z.
Bogota(config)#int s0/0/1
Bogota(config-if)#description connection to Medellin
Bogota(config-if)#ip add
Bogota(config-if)#ip address 172.31.21.2 255.255.255.252
Bogota(config-if)#no shutdown

```

### Interface S0/0/0 – R2

```
Bogota(config-if)#int s0/0/0
Bogota(config-if)#description connection to Bucaramanga
Bogota(config-if)#ip add
Bogota(config-if)#ip address 172.31.23.1 255.255.255.252
Bogota(config-if)#clock rate 128000
Bogota(config-if)#no shutdown

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

### Interface F0/0 – R2

```
-----
Bogota(config-if)#
Bogota(config-if)#int f0/0
Bogota(config-if)#ip add
Bogota(config-if)#ip address 209.165.200.225 255.255.255.248
Bogota(config-if)#no shutdown
```

### Interface F0/1 – R2

```
Bogota(config)#int f0/1
Bogota(config-if)#ip ad
Bogota(config-if)#ip address 10.10.10.10 255.255.255.0
Bogota(config-if)#no shutdown
Bogota(config-if)#
```

Configurar en “Bucaramanga” los siguientes parámetros:

- Configurar la conexión hacia “Bogotá”
- Configurar loopbacks 4 – 5 – 6

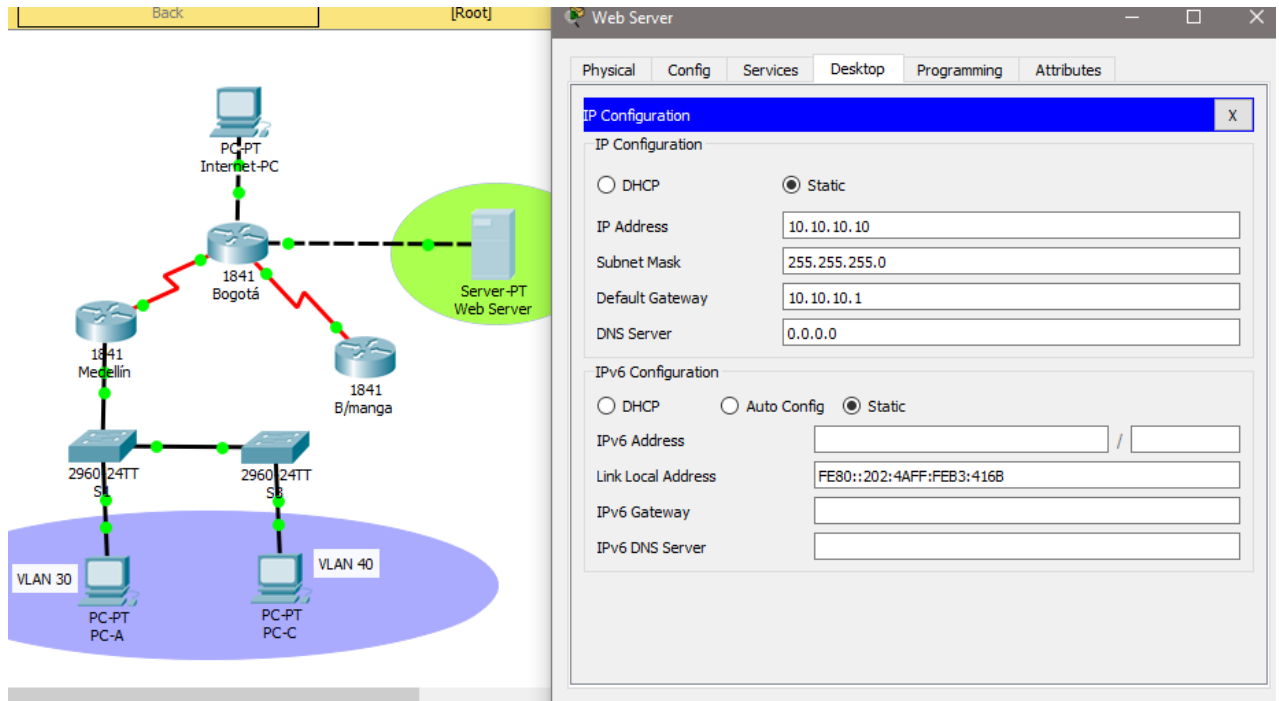
	<p><b>Interface S0/0/1 – R3</b></p> <pre>Bucaramanga(config)#int s0/0/1 Bucaramanga(config-if)#ip add Bucaramanga(config-if)#description connection to Bogota Bucaramanga(config-if)#ip address 172.31.23.2 255.255.255.252 Bucaramanga(config-if)#no shutdown</pre> <p><b>Loopback 4</b></p> <pre>Bucaramanga(config-if)#int lo4 Bucaramanga(config-if)#ip address 192.168.4.1 255.255.255.0</pre> <p><b>Loopback 5</b></p> <pre>Bucaramanga(config-if)#int lo5  Bucaramanga(config-if)# %LINK-5-CHANGED: Interface Loopback5, changed state to up  %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback5, cha  Bucaramanga(config-if)#ip add Bucaramanga(config-if)#ip address 192.168.5.1 255.255.255.0 Bucaramanga(config-if)#no shutdown Bucaramanga(config-if)#</pre> <p><b>Loopback 6</b></p>
--	--

## PRUEBA DE HABILIDADES PRACTICAS CCNA

```
Bucaramanga(config-if)#int lo6  
  
Bucaramanga(config-if)#  
%LINK-5-CHANGED: Interface Loopback6, changed state to up  
  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback6, cha  
  
Bucaramanga(config-if)#ip add  
Bucaramanga(config-if)#ip address 192.168.6.1 255.255.255.0  
Bucaramanga(config-if)#
```

Realizar la configuración del direccionamiento del Web Server

Direccionamiento Web Server



The image shows a network diagram on the left and a configuration window on the right. The network diagram includes:

- PC-PT Internet-PC** connected to **1841 Bogotá**.
- 1841 Bogotá** connected to **1841 Medellín** and **1841 B/manga**.
- 1841 Medellín** connected to **2960 24TT S1**.
- 1841 B/manga** connected to **2960 24TT S2**.
- 2960 24TT S1** connected to **PC-PT PC-A** (VLAN 30).
- 2960 24TT S2** connected to **PC-PT PC-C** (VLAN 40).
- 1841 Bogotá** connected to **Server-PT Web Server**.

The configuration window on the right is titled "Web Server" and shows the "IP Configuration" tab. The settings are:

- IP Configuration:**
  - Static
  - IP Address: 10.10.10.10
  - Subnet Mask: 255.255.255.0
  - Default Gateway: 10.10.10.1
  - DNS Server: 0.0.0.0
- IPv6 Configuration:**
  - DHCP  Auto Config  Static
  - IPv6 Address: [Empty]
  - Link Local Address: FE80::202:4AFF:FEB3:416B
  - IPv6 Gateway: [Empty]
  - IPv6 DNS Server: [Empty]

5. Asignar direcciones IP a los Switches acorde a los lineamientos.
6. Desactivar todas las interfaces que no sean utilizadas en el esquema de red.
7. Implement DHCP and NAT for IPv4
8. Configurar R1 como servidor DHCP para las VLANs 30 y 40.
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.
-----------------------------------	--

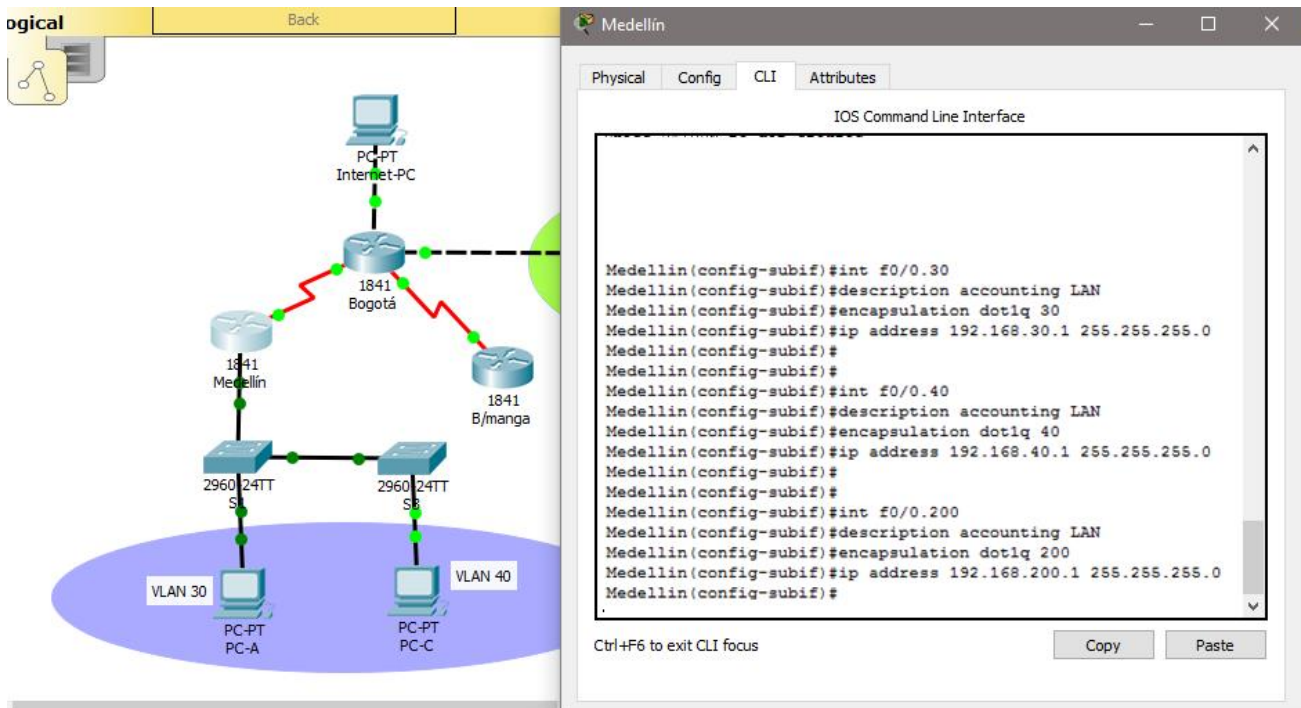
10. Configurar NAT en R2 para permitir que los hosts puedan salir a internet
11. Configurar al menos dos listas de acceso de tipo estándar a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.
12. Configurar al menos dos listas de acceso de tipo extendido o nombradas a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.
13. Verificar procesos de comunicación y redireccionamiento de tráfico en los routers mediante el uso de Ping y Traceroute.

### Configuración de seguridad Switch, VLANs, Inter-VLANs Routing

Configurar en Bogotá, lo siguiente:

- Configure 802.1Q subinterface .30 || descripción de la conexión, asignar VLAN Administración, asignación de la primera dirección viable a esta interface.
- Configure 802.1Q subinterface .40 || descripción de la conexión, asignar VLAN Mercadeo, asignación de la primera dirección viable a esta interface.
- Configure 802.1Q subinterface .200 || descripción de la conexión, asignar VLAN Mantenimiento, asignación de la primera dirección viable a esta interface.
- Activar la conexión hacia S1

802.1Q – R1



The image shows a network diagram on the left and a CLI window on the right. The diagram illustrates a network topology with a central 1841 router in Bogotá connected to an Internet-PC and another 1841 router in B/manga. Below, two 2960 switches are connected to the Bogotá router, each serving a VLAN (VLAN 30 and VLAN 40) with PC-PT devices (PC-A and PC-C).

The CLI window shows the configuration for the Medellin router:

```

Medellin(config-subif)#int f0/0.30
Medellin(config-subif)#description accounting LAN
Medellin(config-subif)#encapsulation dot1q 30
Medellin(config-subif)#ip address 192.168.30.1 255.255.255.0
Medellin(config-subif)#
Medellin(config-subif)#int f0/0.40
Medellin(config-subif)#description accounting LAN
Medellin(config-subif)#encapsulation dot1q 40
Medellin(config-subif)#ip address 192.168.40.1 255.255.255.0
Medellin(config-subif)#
Medellin(config-subif)#int f0/0.200
Medellin(config-subif)#description accounting LAN
Medellin(config-subif)#encapsulation dot1q 200
Medellin(config-subif)#ip address 192.168.200.1 255.255.255.0
Medellin(config-subif)#
  
```

**Interface F0/0**

```

Medellin(config-subif)#int f0/0
Medellin(config-if)#no shutdown

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

%LINK-5-CHANGED: Interface FastEthernet0/0.30, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/0.40, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/0.200, changed state to up
  
```



### Verificación de conectividad

```
S1#ping 192.168.30.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.30.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

S1#ping 192.168.40.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.40.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

S1#
```

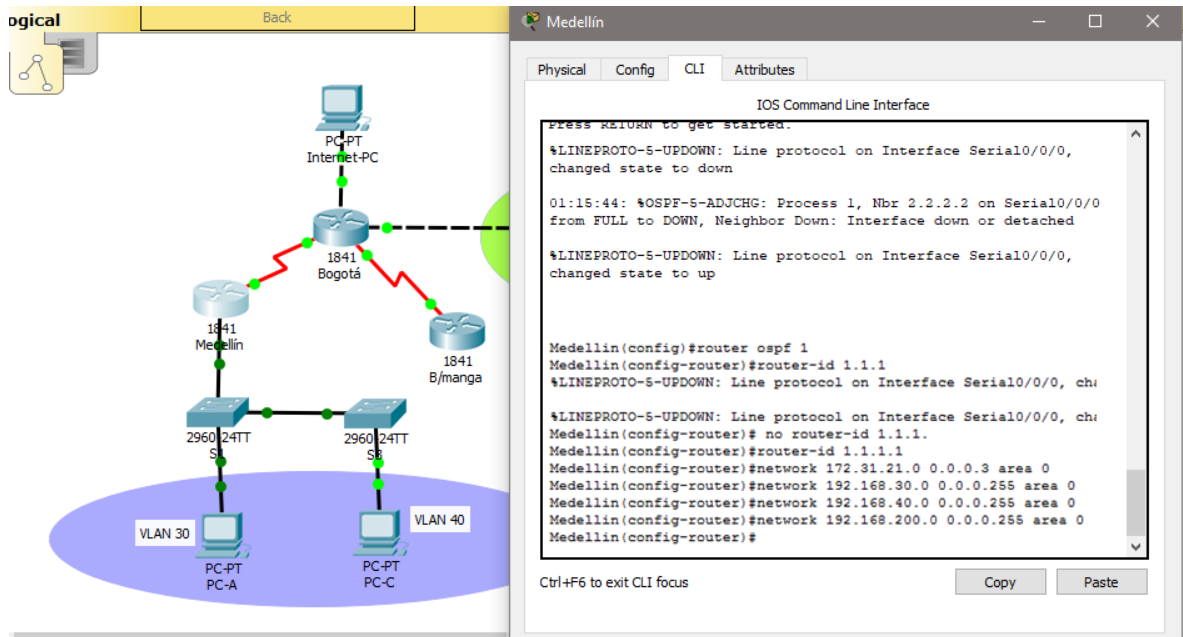
---

### Configuración OPSF y Protocolo Routing Dinámico

Realizar la siguiente configuración en Medellín

- Crear un OSPF
- Identificar R1 con ID 1.1.1.1
- Usar las direcciones de red sin clase, asignarlas a todas las redes conectadas directamente al “área 0”
- Configurar todas las interfaces LAN como pasivas
- Establecer el ancho de banda para los enlaces seriales en 128 Kb/s
- Ajustar el costo en la métrica de S0/0 a 7500

## OSPF área 0 – R1



```

IOS Command Line Interface
Press RETURN to get started.

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

01:15:44: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial0/0/0
from FULL to DOWN, Neighbor Down: Interface down or detached

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

Medellin(config)#router ospf 1
Medellin(config-router)#router-id 1.1.1
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, ch
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, ch
Medellin(config-router)# no router-id 1.1.1
Medellin(config-router)#router-id 1.1.1
Medellin(config-router)#network 172.31.21.0 0.0.0.3 area 0
Medellin(config-router)#network 192.168.30.0 0.0.0.255 area 0
Medellin(config-router)#network 192.168.40.0 0.0.0.255 area 0
Medellin(config-router)#network 192.168.200.0 0.0.0.255 area 0
Medellin(config-router)#

Ctrl+F6 to exit CLI focus
Copy Paste
  
```

## Interfaces LAN pasivas – R1

```

medellin(config-router)#network 192.168.200.0 0.0.0
Medellin(config-router)#passive-interface f0/0.30
Medellin(config-router)#passive-interface f0/0.40
Medellin(config-router)#passive-interface f0/0.200
Medellin(config-router)#
  
```

## Ancho de banda y costo en la métrica – R1

```

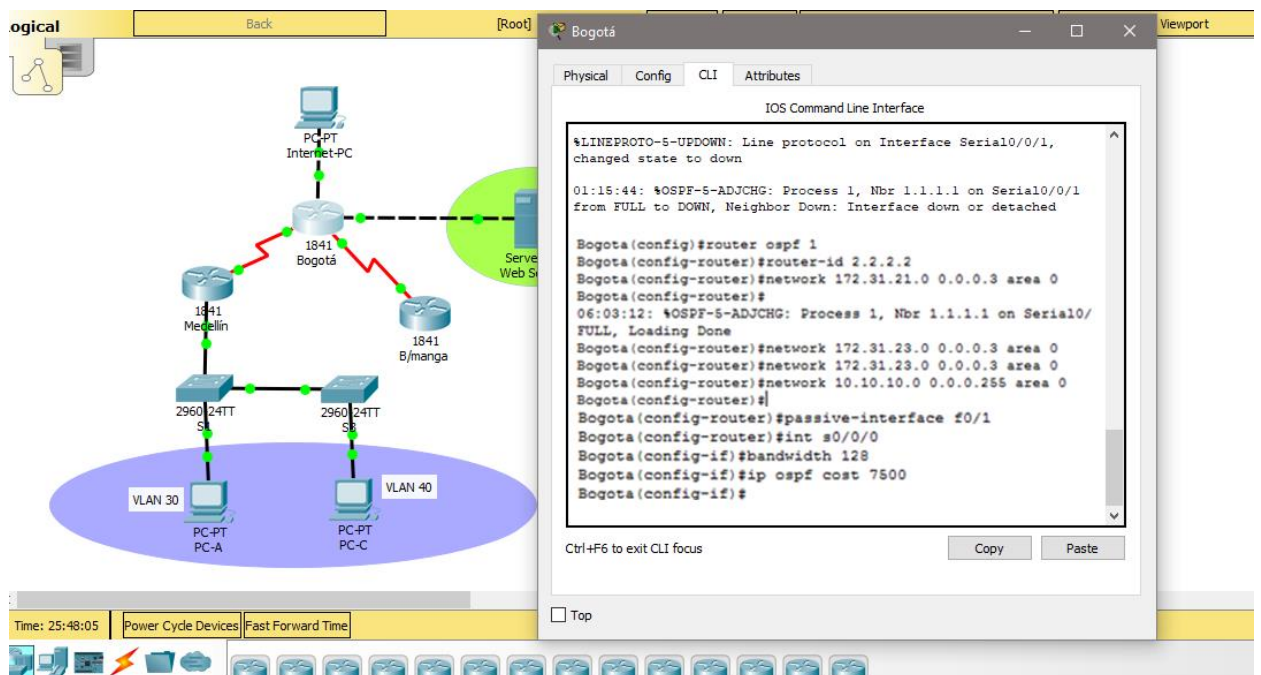
medellin(config-router)#exit
Medellin(config)#int s0/0/0
Medellin(config-if)#bandwidth 128
Medellin(config-if)#ip ospf cost 7500
Medellin(config-if)#
  
```

## Realizar la siguiente configuración en Bogotá

- Crear un OSPF
- Identificar R2 con ID 2.2.2.2

- Usar las direcciones de red sin clase, asignarlas a todas las redes conectadas directamente al “área 0”, con excepción la conexión hacia PC-Internet.
- Configurar todas las interfaces LAN como pasivas, con excepción la conexión hacia PC-Internet
- Establecer el ancho de banda para los enlaces seriales en 128 Kb/s
- Ajustar el costo en la métrica de S0/0 a 7500

## OSPF área 0 – R2



The screenshot shows a network topology in a simulator. On the left, a network diagram includes routers 1841 Medellín, 1841 Bogotá, and 1841 B/manga, connected to two 2960 24TT switches. These switches are connected to PC-PT PC-A (VLAN 30) and PC-PT PC-C (VLAN 40). A PC-PT Internet-PC is connected to the 1841 Bogotá router. A server and web server are also connected to the 1841 Bogotá router. On the right, the CLI window for router Bogotá shows the following configuration:

```

IOS Command Line Interface

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1,
changed state to down

01:15:44: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial0/0/1
from FULL to DOWN, Neighbor Down: Interface down or detached

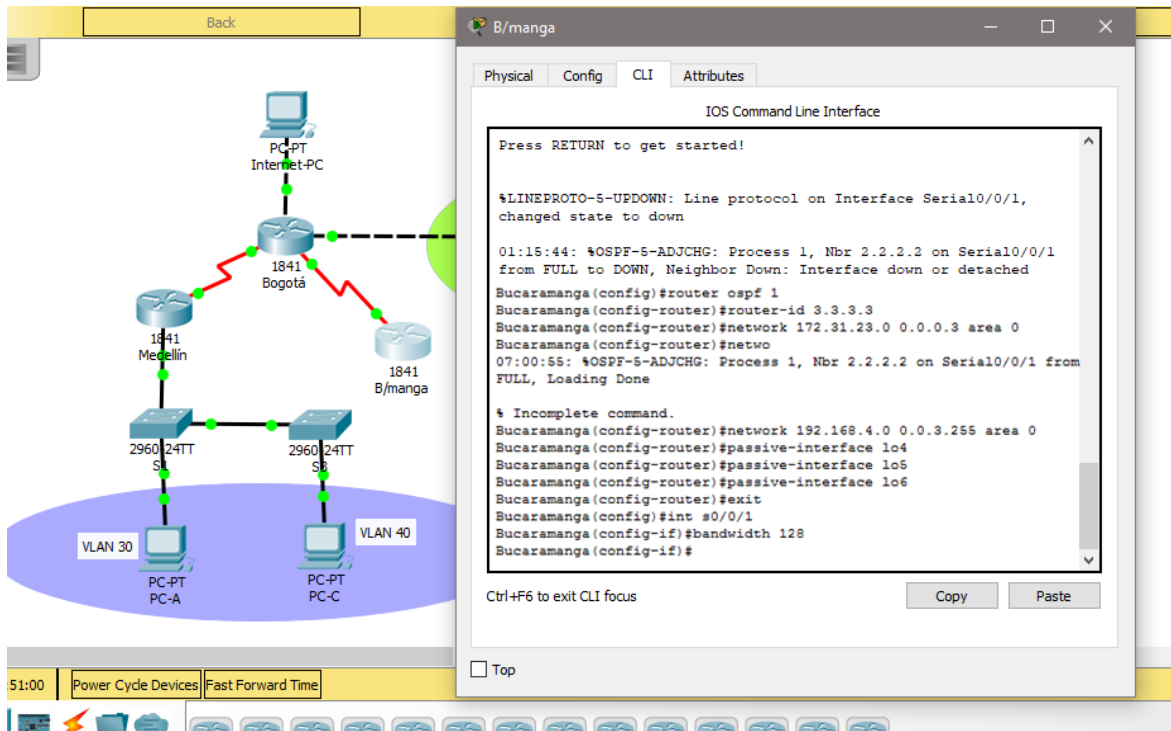
Bogota(config)#router ospf 1
Bogota(config-router)#router-id 2.2.2.2
Bogota(config-router)#network 172.31.21.0 0.0.0.3 area 0
Bogota(config-router)#
06:03:12: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial0/
FULL, Loading Done
Bogota(config-router)#network 172.31.23.0 0.0.0.3 area 0
Bogota(config-router)#network 172.31.23.0 0.0.0.3 area 0
Bogota(config-router)#network 10.10.10.0 0.0.0.255 area 0
Bogota(config-router)#
Bogota(config-router)#passive-interface f0/1
Bogota(config-router)#int s0/0/0
Bogota(config-if)#bandwidth 128
Bogota(config-if)#ip ospf cost 7500
Bogota(config-if)#
    
```

At the bottom of the simulator interface, there is a status bar showing 'Time: 25:48:05', 'Power Cycle Devices', and 'Fast Forward Time'. A taskbar at the very bottom contains various system icons.

Realizar la siguiente configuración en Bucaramanga

- Crear un OSPF
- Identificar R3 con ID 3.3.3.3
- Usar las direcciones de red sin clase, asignarlas a todas las redes conectadas directamente al “área 0”
- Configurar todas las interfaces LAN como pasivas
- Establecer el ancho de banda para los enlaces seriales en 128 Kb/s
- Ajustar el costo en la métrica de S0/0 a 7500

### OSPF área 0 – R2



The screenshot shows a network topology on the left and a CLI window on the right. The topology includes a central router 'Bogotá' (1841) connected to an 'Internet-PC' and another '1841 B/manga' router. Below Bogotá are two '2960 24TT S8' switches connected to '1841 Medellín' and '1841 B/manga' routers. The switches are connected to two VLANs: 'VLAN 30' with 'PC-PT PC-A' and 'VLAN 40' with 'PC-PT PC-C'. The CLI window shows the following configuration steps:

```

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1,
changed state to down

01:15:44: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial0/0/1
from FULL to DOWN, Neighbor Down: Interface down or detached
Bucaramanga(config)#router ospf 1
Bucaramanga(config-router)#router-id 3.3.3.3
Bucaramanga(config-router)#network 172.31.23.0 0.0.0.3 area 0
Bucaramanga(config-router)#netwo
07:00:55: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial0/0/1 from
FULL, Loading Done

% Incomplete command.
Bucaramanga(config-router)#network 192.168.4.0 0.0.3.255 area 0
Bucaramanga(config-router)#passive-interface lo4
Bucaramanga(config-router)#passive-interface lo5
Bucaramanga(config-router)#passive-interface lo6
Bucaramanga(config-router)#exit
Bucaramanga(config)#int s0/0/1
Bucaramanga(config-if)#bandwidth 128
Bucaramanga(config-if)#
    
```

Desde Bucaramanga verificar los OPSF vecinos

```
Bogota#show ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
1.1.1.1	0	FULL/ -	00:00:39	172.31.21.1	Serial0/0/1
3.3.3.3	0	FULL/ -	00:00:34	172.31.23.2	Serial0/0/0

```
Bogota#
```

Verificación de configuraciones

```
Serial0/0/1 is up, line protocol is up
  Internet address is 172.31.21.2/30, Area 0
  Process ID 1, Router ID 2.2.2.2, 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 00:00:03
  Index 1/1, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1 , Adjacent neighbor count is 1
    Adjacent with neighbor 1.1.1.1
  Suppress hello for 0 neighbor(s)
Serial0/0/0 is up, line protocol is up
  Internet address is 172.31.23.1/30, Area 0
  Process ID 1, Router ID 2.2.2.2, Network Type POINT-TO-POINT, Cost: 7500
  Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
  No designated router on this network
  No backup designated router on this network
```

```
Bogota#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 2.2.2.2
```

```
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
```

```
Maximum path: 4
```

```
Routing for Networks:
```

```
172.31.21.0 0.0.0.3 area 0
```

```
172.31.23.0 0.0.0.3 area 0
```

```
10.10.10.0 0.0.0.255 area 0
```

```
Passive Interface(s):
```

```
FastEthernet0/1
```

```
Routing Information Sources:
```

```
Gateway Distance Last Update
```

```
1.1.1.1 110 00:03:20
```

```
2.2.2.2 110 00:12:20
```

```
3.3.3.3 110 00:07:08
```

```
Distance: (default is 110)
```

```
Bogota#show ip route ospf
```

```
192.168.4.0/32 is subnetted, 1 subnets
```

```
O 192.168.4.1 [110/7501] via 172.31.23.2, 00:11:12, Serial0/0/0
```

```
192.168.5.0/32 is subnetted, 1 subnets
```

```
O 192.168.5.1 [110/7501] via 172.31.23.2, 00:11:02, Serial0/0/0
```

```
192.168.6.0/32 is subnetted, 1 subnets
```

```
O 192.168.6.1 [110/7501] via 172.31.23.2, 00:11:02, Serial0/0/0
```

```
O 192.168.30.0 [110/65] via 172.31.21.1, 00:35:27, Serial0/0/1
```

```
O 192.168.40.0 [110/65] via 172.31.21.1, 00:35:27, Serial0/0/1
```

```
O 192.168.200.0 [110/65] via 172.31.21.1, 00:35:27, Serial0/0/1
```

```
Bogota#
```

```
interface FastEthernet0/1
  description connection to Webserver
  ip address 10.10.10.1 255.255.255.0
  duplex auto
  speed auto
!
interface Serial0/0/0
  description connection to Bucaramanga
  bandwidth 128
  ip address 172.31.23.1 255.255.255.252
  ip ospf cost 7500
  clock rate 128000
!
interface Serial0/0/1
  description connection to Medellin
  ip address 172.31.21.2 255.255.255.252
!
interface Vlan1
  no ip address
  shutdown
!
router ospf 1
  router-id 2.2.2.2
  log-adjacency-changes
  passive-interface FastEthernet0/1
  network 172.31.21.0 0.0.0.3 area 0
  network 172.31.23.0 0.0.0.3 area 0
  network 10.10.10.0 0.0.0.255 area 0
```

## NAT y DHCP en R1

Realizar las siguientes conexiones en R1:

- Reservar las primeras 30 direcciones en la VLAN 30 y la VLAN 40
- Crear un DHCP pool VLAN 30
- Crear un DHCP pool VLAN 40

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

```
Medellin#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Medellin(config)#ip dhcp exc

Medellin(config)#ip dhcp excluded-address 192.168.30.1 192.168.30.30
Medellin(config)#ip dhcp excluded-address 192.168.40.1 192.168.40.30
Medellin(config)#
```

### DHCP pool VLAN 30

```
-----
Medellin(config)#ip dhcp pool ADMINISTRACION
Medellin(dhcp-config)#dns-server 10.10.10.11
Medellin(dhcp-config)#domain-name ccna-unad.com
^
% Invalid input detected at '^' marker.

Medellin(dhcp-config)#default-router 192.168.30.1
Medellin(dhcp-config)#network 192.168.30.0 255.255.255.0
Medellin(dhcp-config)#
```

### DHCP pool VLAN 40

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

### NAT en R2



```
bogota>en
Password:
Bogota#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Bogota(config)#user webuser privilege 15 secret cisco12345
Bogota(config)#ip http server
^
% Invalid input detected at '^' marker.

Bogota(config)#ip http authentication local
^
% Invalid input detected at '^' marker.

Bogota(config)#ip nat inside source static 10.10.10.10 209.165.200.229
Bogota(config)#int f0/0
Bogota(config-if)#ip nat outside
Bogota(config-if)#int f0/1
Bogota(config-if)#ip nat inside
Bogota(config-if)#

Enter configuration commands, one per line.  End with CNTL/Z.
Bogota(config)#access-list 1 permit 192.168.30.0 0.0.0.255
Bogota(config)#access-list 1 permit 192.168.40.0 0.0.0.255
Bogota(config)#
Bogota(config)#
Bogota(config)#access-list 1 permit 192.168.4.0.0.3.255
^
% Invalid input detected at '^' marker.

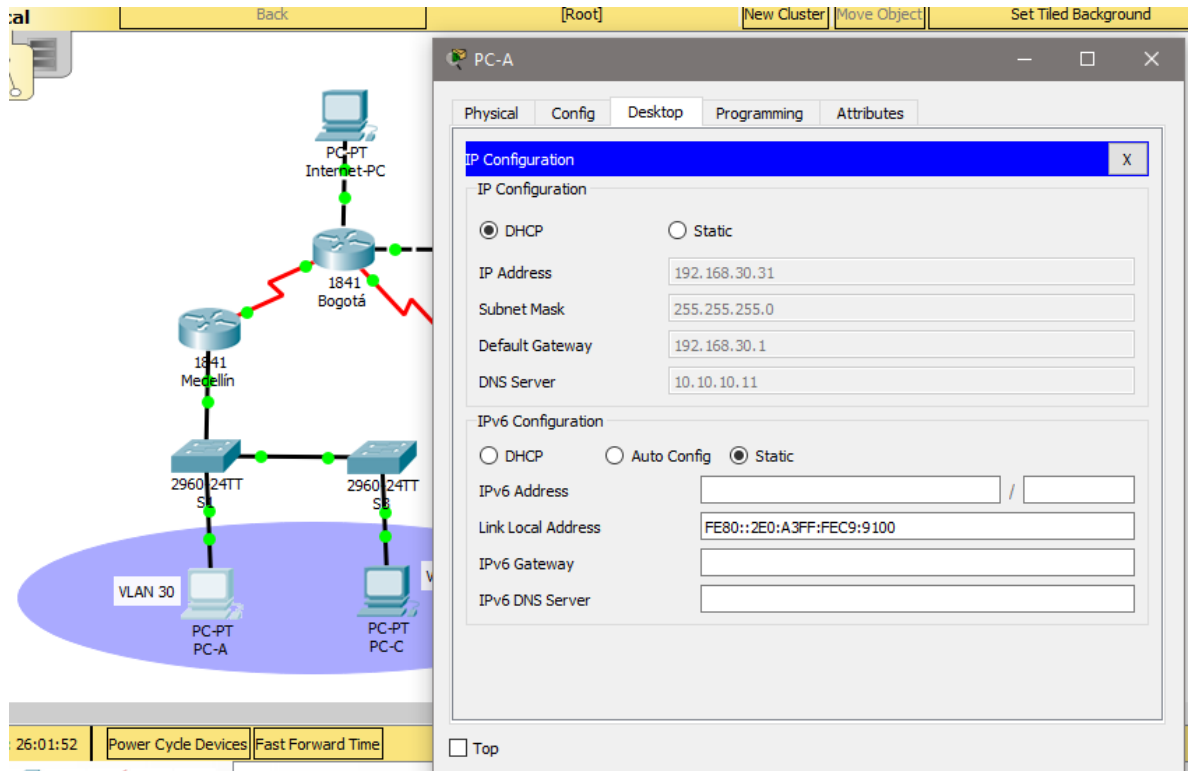
Bogota(config)#access-list 1 permit 192.168.4.0 0.0.3.255
Bogota(config)#
-----
Bogota(config)#ip nat pool INTERNET 209.165.200.225 209.165.200.229 netmask
255.255.255.248
Bogota(config)#
```

Verificación de asignación direccionamiento DHCP en VLANs

### VLAN 40

The image shows a network diagram on the left and a PC configuration window on the right. The network diagram illustrates a multi-tier topology. At the top, a PC-PT Internet-PC is connected to a central 1841 Bogotá router. This router is connected to two other 1841 routers: one in Medellín and one in B/maná. The Medellín router is connected to a 2960 24TT S switch, which is connected to a 2960 24TT S switch in B/maná. The B/maná switch is connected to two PC-PT PCs: PC-A (in VLAN 30) and PC-C (in VLAN 40). The PC configuration window on the right is titled 'PC-C' and shows the 'IP Configuration' tab. Under 'IP Configuration', the 'DHCP' radio button is selected. The fields are filled with: IP Address: 192.168.40.31, Subnet Mask: 255.255.255.0, Default Gateway: 192.168.40.1, and DNS Server: 10.10.10.11. Under 'IPv6 Configuration', the 'Static' radio button is selected. The fields are: IPv6 Address: (empty), Link Local Address: FE80::202:16FF:FE32:8084, IPv6 Gateway: (empty), and IPv6 DNS Server: (empty).

### VLAN 30



Configuración R1 solo tenga acceso a R2 Telnet y aplicarlas a las líneas VTY

```
Bogota#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota(config)#ip access-list standard ADMIN
Bogota(config-std-nacl)#permit host 172.31.21.1
Bogota(config-std-nacl)#exit
Bogota(config)#line vty 0 4
Bogota(config-line)#access-class ADMIN in
Bogota(config-line)#
```

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

```
-  
Enter configuration commands, one per line. End with CNTL/Z.  
Bogota(config)#access-list 100 permit tcp any host  
209.165.200.229 eq www  
Bogota(config)#access-list 100 permit icmp any any echo-reply  
^  
% Invalid input detected at '^' marker.  
  
Bogota(config)#access-list 100 permit icmp any any echo-reply  
Bogota(config)#
```

## CONCLUSIONES

Con el desarrollo de esta actividad de habilidades practica se realiza un numero amplio de tareas importantes para el buen desarrollo de los ejercicios propuestos, en este se ejecutan funciones como la de verificar una conexión entre los dispositivos proporcionada en la configuración inicial de la topología, se configura la ACL de los Routers, esto con el objetivo de mitigar los ataques de forma remota y por supuesto no podrían faltar la verificación de la funcionalidad de las actividades ejecutadas con anterioridad.

(ACL) para permitir el acceso de direcciones IP específicas, lo que asegura que solo la computadora del administrador tenga permiso para acceder al router mediante telnet o SSH.

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<http://blog.capacityacademy.com/2014/01/09/cisco-ccna-como-configurar-dhcp-en-cisco-router/>

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Configuración troncal 802.1Q

[https://www.cisco.com/c/es\\_mx/support/docs/switches/catalyst-4000-series-switches/24064-171.html](https://www.cisco.com/c/es_mx/support/docs/switches/catalyst-4000-series-switches/24064-171.html)