

**DIPLOMADO DE PROFUNDIZACIÓN CISCO (DISEÑO E IMPLEMENTACIÓN  
DE SOLUCIONES INTEGRADAS LAN / WAN)**

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ESCUELA DE CIENCIAS BASICAS Y TECNOLOGIAS  
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## INTRODUCCION

Esta prueba 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.

Se configura también el protocolo de información de enrutamiento (RIP) para permitir que el servidor intercambie información de enrutamiento con otros servidores y determine cuál es la mejor ruta para enviar paquetes salientes.

## **OBJETIVOS**

### **GENERAL**

Desarrollar la Evaluación – Prueba de habilidades prácticas CCNA, aplicando todos los conocimientos adquiridos durante el semestre

### **ESPECIFICOS**

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

Inicializar dispositivos de Networking

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

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

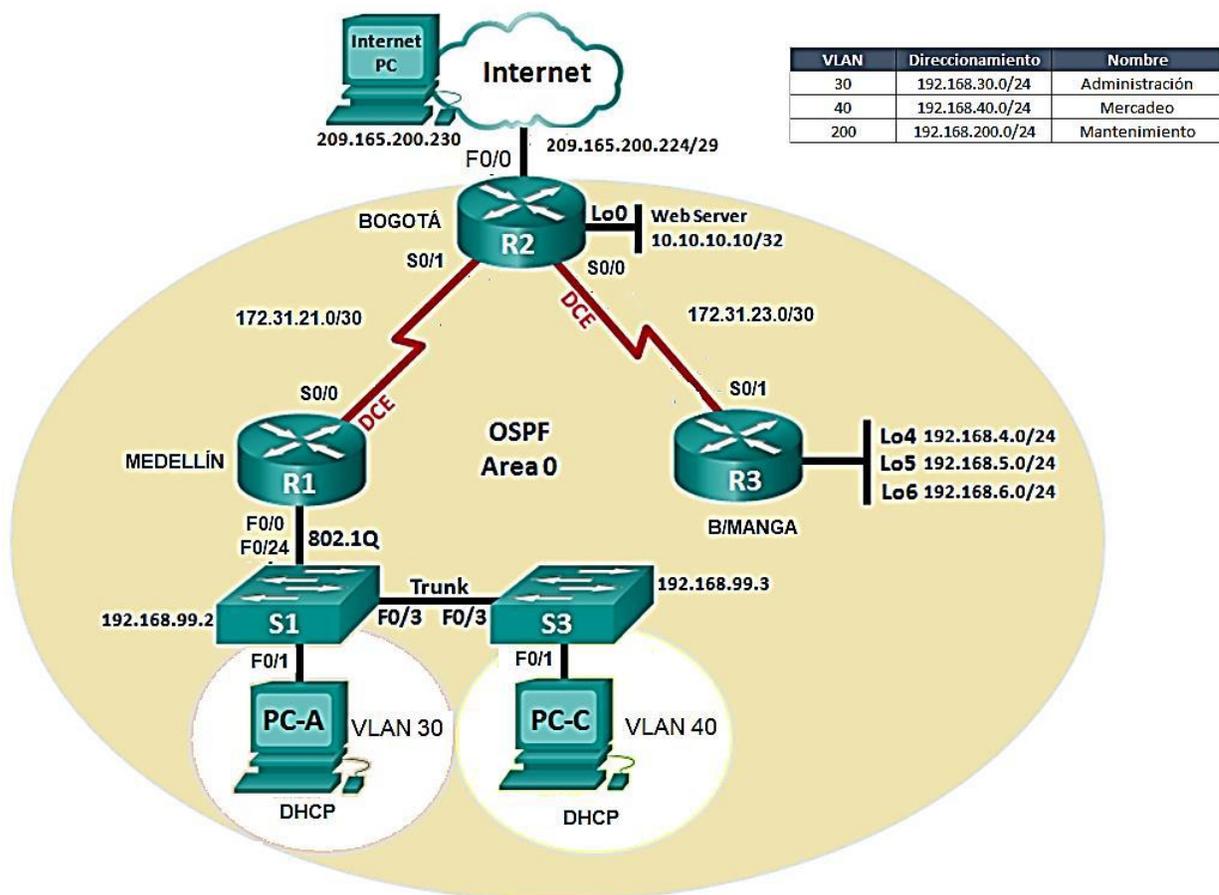
Determinar la configuración necesaria para la implementación de OPSFv2, protocolo dinámico de Routing.

Verificar conectividad entre los dispositivos de una topología.

## Descripción del escenario propuesto para la prueba de habilidades

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
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

Figura 1. Tabla de configuración OSPFv2, para cada Router

### 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.
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
  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.
-----------------------------------	--

Figura 2. Información de configuración DHCP pool Vlan 30

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

Figura 3. Información de configuración DHCP pool Vlan 40

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.



F0/0	209.165.200.225	255.255.255.248						
F0/1	10.10.10.1	255.255.255.0						
S0/0/0	172.31.23.1	255.255.255.252			128Kb/s	7500	128000	
s0/0/1	172.31.21.2	255.255.255.252						
NAT Pool Internet	209.165.200.225	255.255.255.248						209.165.200.229
NAT inside	10.10.10.10							209.165.200.229
Telnet (ADMIN)	172.31.21.1							

R2 OSPF			
ID	Passive Interface	Área 0	Interface
2.2.2.2	F0/1	192.168.30.0	
		172.31.21.0	S0/0/1
		172.31.23.0	S0/0/0

R3 Bucaramanga	Dirección IP	Mascara
Lo4	192.168.4.1	255.255.255.0
Lo5	192.168.5.1	255.255.255.0
Lo6	192.168.6.1	255.255.255.0
S0/0/0	172.31.23.2	255.255.255.252

R3 OPSF			
ID	Passive Interface	Área 0	Interface

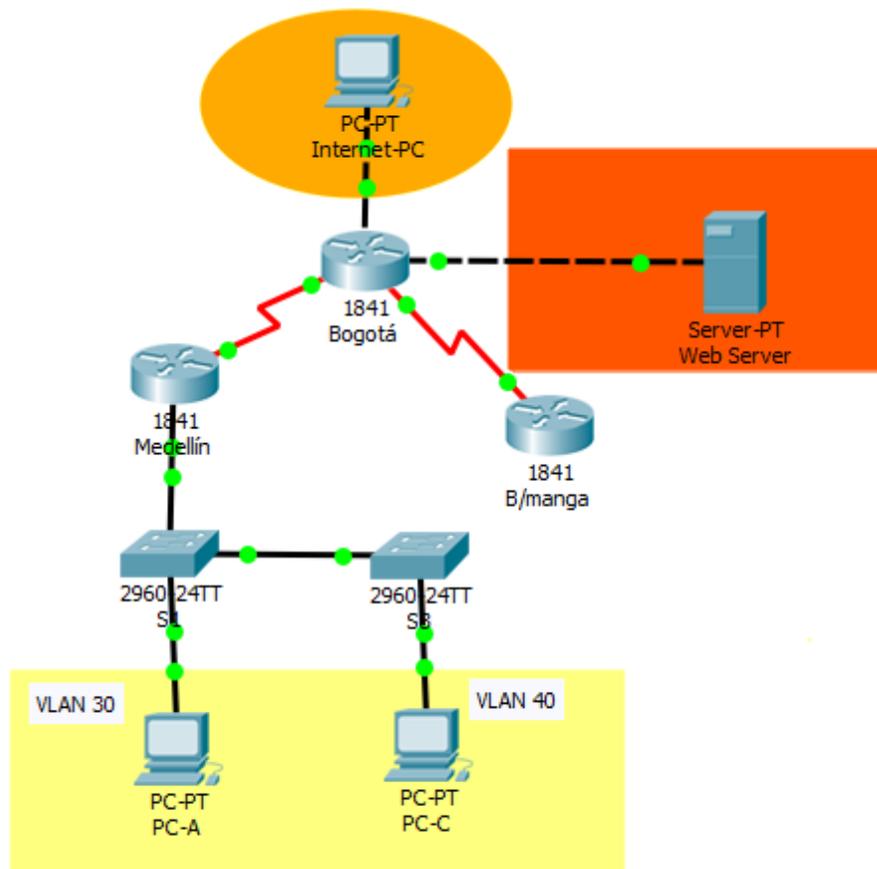
3.3.3.3	Lo4	192.168.4.0	
	Lo5		
	Lo6		
		172.31.23.0	S0/0/1

S1	Dirección IP	Mascara
F0/1 Vlan 30		
F0/3 Trunk		
F0/24 Trunk		
Vlan 200	192.168.99.2	255.255.255.0

S3	Dirección IP	Mascara
F0/1 Vlan 40		
F0/3 Trunk		
Vlan 200	192.168.99.3	255.255.255.0

PC- Internet	Dirección IP	Mascara	Gateway
FastEthernet	209.165.200.230	255.255.255.248	209.165.200.225

Web Server	Dirección IP	Mascara	Gateway
FastEthernet	10.10.10.10	255.255.255.0	10.10.10.1



### 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

# Router 1

Medellin

Physical Config CLI Attributes

Physical Device View

Zoom In Original Size Zoom Out

MODULES

- HWIC-1GE-SFP
- HWIC-2T
- HWIC-4ESW
- HWIC-8A
- HWIC-AP-AG-B
- WIC-1AM
- WIC-1ENET
- WIC-1T

Medellin

Physical Config CLI Attributes

IOS Command Line Interface

Compiled Wed 18-Jul-07 04:52 by pt\_team

Press RETURN to get started!

```

%LINK-5--CHANGED: Interface Serial0/0/0, changed state to up
Router>
Router#conf t
Router(config)#hostname Medellin
Medellin(config)#no ip domain-lookup
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

Time: 00:09:39 Power Cycle Devices Fast Forward Time

Medellin

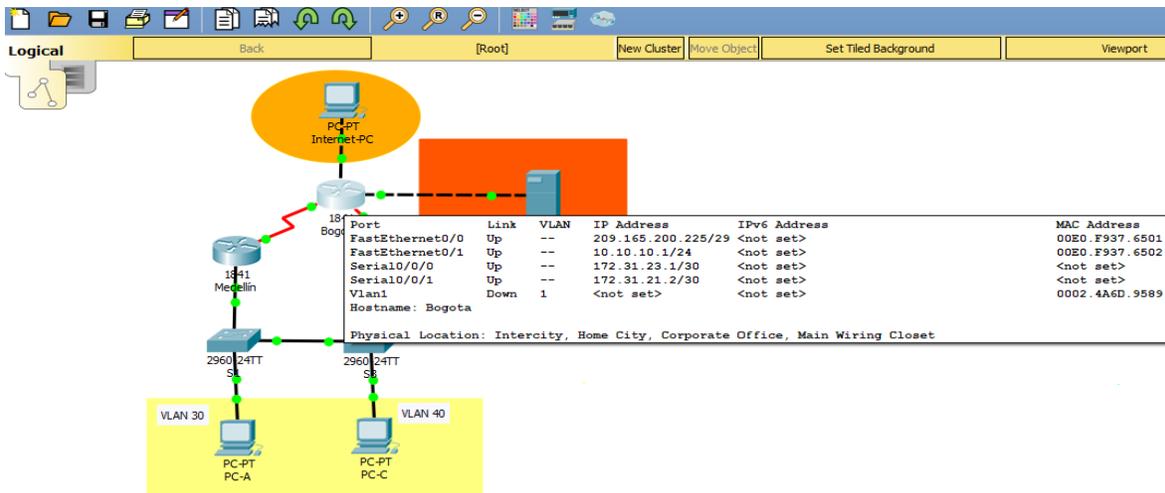
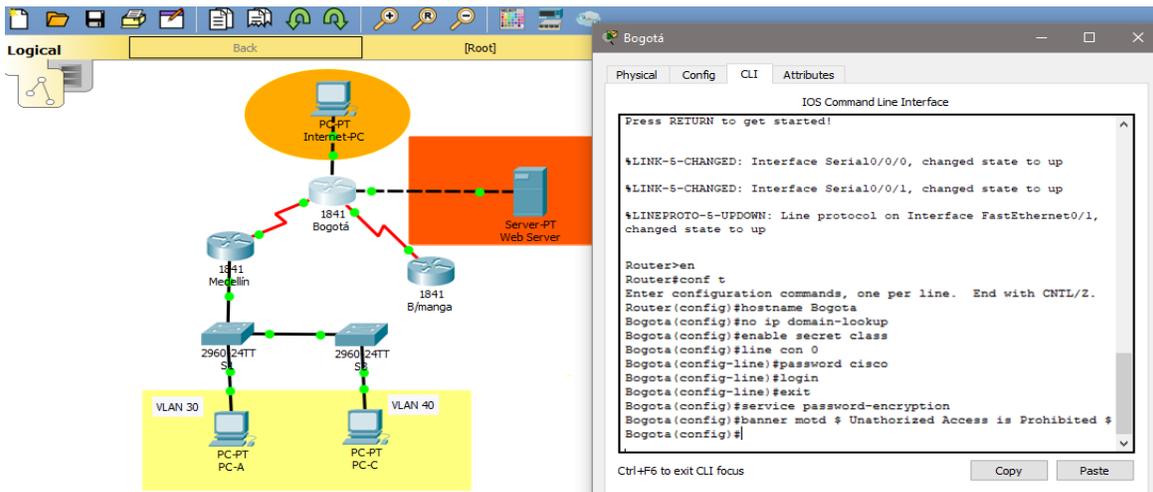
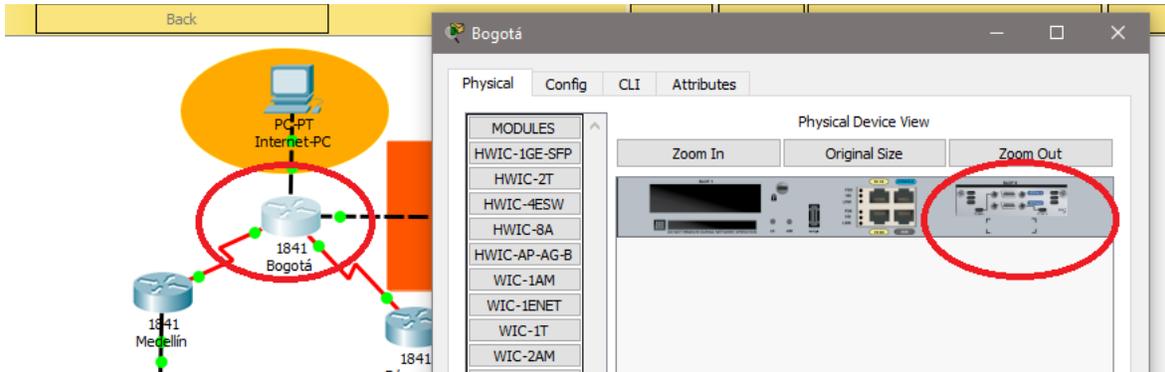
Port	Link	VLAN	IP Address	IPv6 Address	MAC Address
FastEthernet0/0	Up	--	<not set>	<not set>	0090.2153.A101
FastEthernet0/0.30	Up	--	192.168.30.1/24	<not set>	0090.2153.A101
FastEthernet0/0.40	Up	--	192.168.40.1/24	<not set>	0090.2153.A101
FastEthernet0/0.200	Up	--	192.168.200.1/24	<not set>	0090.2153.A101
FastEthernet0/1	Down	--	<not set>	<not set>	0090.2153.A102
Serial0/0/0	Up	--	172.31.21.1/30	<not set>	<not set>
Serial0/0/1	Down	--	<not set>	<not set>	<not set>
Vlan1	Down	1	<not set>	<not set>	0007.ECCE.8C72

Hostname: Medellin

Physical Location: Intercity, Home City, Corporate Office, Main Wiring Closet

Time: 00:12:51 Power Cycle Devices Fast Forward Time

# Router 2



# Router 3

The top screenshot shows a network diagram with three 1841 routers: Medellín, Bogotá, and B/manga. B/manga is highlighted with a red circle. An inset window titled 'B/manga' shows the 'Physical Device View' of the router hardware, with a red circle around the front panel ports.

The middle screenshot shows a more detailed network diagram including two 2960 switches (S1 and S2) connected to B/manga. S1 is connected to PC-A (VLAN 30) and S2 to PC-C (VLAN 40). A 'Serv Web' server is also connected to B/manga. An inset window shows the 'IOS Command Line Interface' with the following configuration:

```

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)#
    
```

The bottom screenshot shows the network diagram with a 'Server-PT Web Server' connected to B/manga. An inset window displays the router's status table:

Port	Link	VLAN	IP Address	IPv6 Address	MAC Address
FastEthernet0/0	Down	--	<not set>	<not set>	0030.A33A.7201
FastEthernet0/1	Down	--	<not set>	<not set>	0030.A33A.7202
Serial0/0/0	Down	--	<not set>	<not set>	<not set>
Serial0/0/1	Up	--	172.31.23.2/30	<not set>	<not set>
Loopback4	Up	--	192.168.4.1/24	<not set>	0030.F29D.D292
Loopback5	Up	--	192.168.5.1/24	<not set>	0009.7C22.B639
Loopback6	Up	--	192.168.6.1/24	<not set>	0001.6415.A076
Vlan1	Down	1	<not set>	<not set>	000C.85EC.A743

Physical Location: Intercity, Home City, Corporate Office, Main Wiring Closet

# Switch 1

Time: 00:28:25 | Power Cycle Devices | Fast Forward Time

S1

Physical Config CLI Attributes

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

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)#
    
```

Ctrl+F6 to exit CLI focus

Copy Paste

Top

Time: 00:30:27 | Power Cycle Devices | Fast Forward Time

FastEthernet0/2	Down	1	--	0090.2160.4902
FastEthernet0/3	Up	--	--	0090.2160.4903
FastEthernet0/4	Down	1	--	0090.2160.4904
FastEthernet0/5	Down	1	--	0090.2160.4905
FastEthernet0/6	Down	1	--	0090.2160.4906
FastEthernet0/7	Down	1	--	0090.2160.4907
FastEthernet0/8	Down	1	--	0090.2160.4908
FastEthernet0/9	Down	1	--	0090.2160.4909
FastEthernet0/10	Down	1	--	0090.2160.490A
FastEthernet0/11	Down	1	--	0090.2160.490B
FastEthernet0/12	Down	1	--	0090.2160.490C
FastEthernet0/13	Down	1	--	0090.2160.490D
FastEthernet0/14	Down	1	--	0090.2160.490E
FastEthernet0/15	Down	1	--	0090.2160.490F
FastEthernet0/16	Down	1	--	0090.2160.4910
FastEthernet0/17	Down	1	--	0090.2160.4911
FastEthernet0/18	Down	1	--	0090.2160.4912
FastEthernet0/19	Down	1	--	0090.2160.4913
FastEthernet0/20	Down	1	--	0090.2160.4914
FastEthernet0/21	Down	1	--	0090.2160.4915
FastEthernet0/22	Down	1	--	0090.2160.4916
FastEthernet0/23	Down	1	--	0090.2160.4917
FastEthernet0/24	Up	--	--	0090.2160.4918
GigabitEthernet0/1	Down	1	--	0090.2160.4919
GigabitEthernet0/2	Down	1	--	0090.2160.491A
Vlan1	Down	1	<not set>	0001.961A.8474
Vlan200	Up	200	192.168.99.2/24	0001.961A.8401

Hostname: S1

Physical Location: Intercity, Home City, Corporate Office, Main Wiring Closet

## Switch 3

The screenshot shows a network simulation interface with a topology diagram on the left and a CLI window for Switch S3 on the right. The topology includes three 1841 routers (Medellin, Bogotá, B/manga) and two 2960 switches (S1, S2). PC-A and PC-C are connected to S1 in VLAN 30, while PC-B is connected to S2 in VLAN 40. An Internet-PC is connected to the Bogotá router. The CLI window shows the following configuration:

```

IOS Command Line Interface
Cisco IOS Software, C2960 Software (C2960-LANBASE-M), Version
12.2(25)FX, RELEASE SOFTWARE (fcl)
Copyright (c) 1986-2006 by Cisco Systems, Inc.
Compiled Wed 12-Oct-05 22:05 by pt_team

Press RETURN to get started!

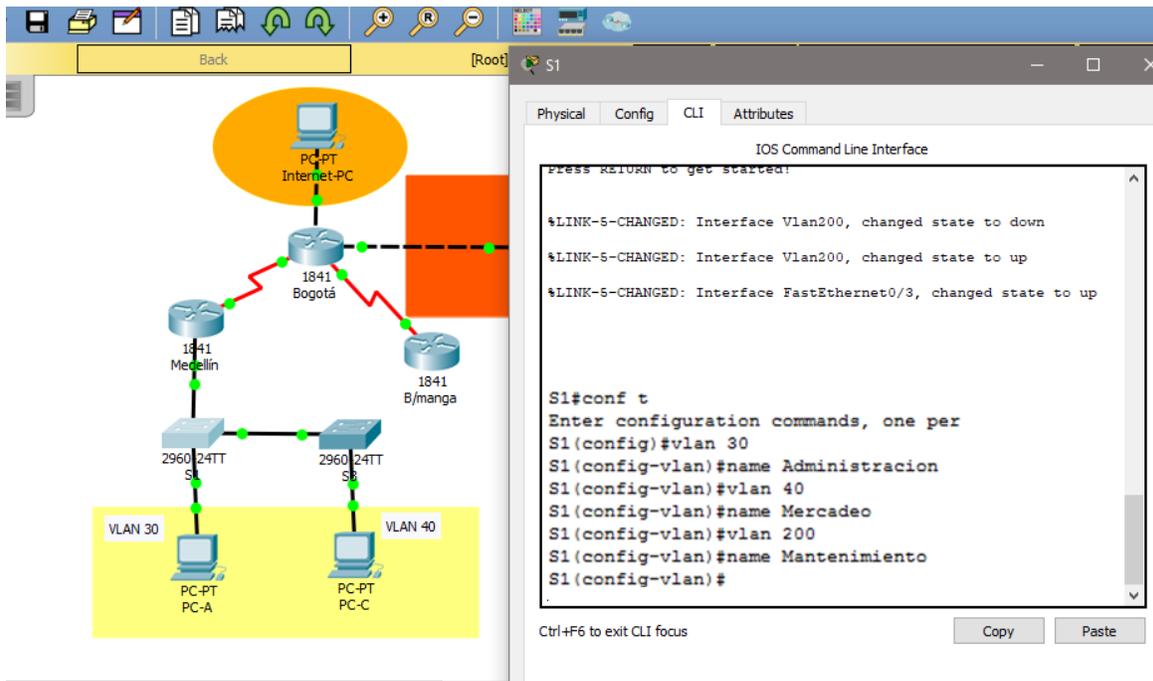
Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname S3
S3(config)#no ip domain-lookup
S3(config)#enable secret class
S3(config)#line con 0
S3(config-line)#password cisco
S3(config-line)#login
S3(config-line)#exit
S3(config)#service password-encryption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

### Parea Configurar en S1 se realiza los siguientes pasos

Modo trunk el puerto F0/3 en la nativa VLAN 1, Modo trunk el puerto F0/24 en la nativa VLAN 1, Configurar “mode access” los puertos restantes, Deshabilitar los puertos que no se usaran, Asignar el puerto F0/1 a la VLAN 30, Configurar las VLANs correspondientes, Asignar la dirección 192.168.99.2 a la VLAN Mantenimiento

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

# VLANS S1

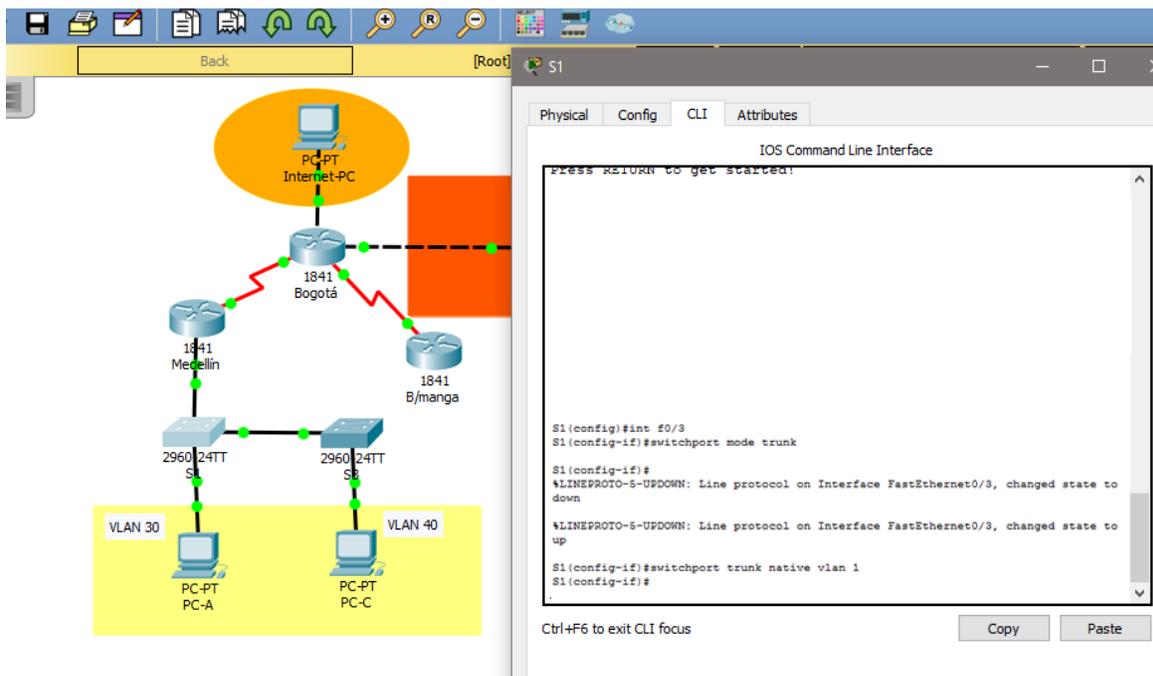


The network diagram shows a central switch S1 (2960 24TT) connected to three routers: 1841 Medellin, 1841 Bogotá, and 1841 B/manga. The 1841 Bogotá router is connected to an Internet-PC. Two PCs, PC-A and PC-C, are connected to S1 and are part of VLAN 30 and VLAN 40 respectively. The CLI window shows the configuration of S1:

```
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

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)#
.
```



The network diagram is identical to the one above. The CLI window shows the configuration of S1:

```
IOS Command Line Interface
PRESS RETURN to get started:

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)#
.
```

The network diagram shows a central 1841 Bogotá router connected to an Internet-PC. It is also connected to 1841 Medellín and 1841 B/manga routers. The Medellín router is connected to a 2960 24TT switch, which is connected to PC-A (VLAN 30). The B/manga router is connected to another 2960 24TT switch, which is connected to PC-C (VLAN 40). The Bogotá router is connected to a 2960 24TT switch, which is connected to PC-B (VLAN 40).

The CLI window for S1 shows the following configuration:

```

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

S1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to
down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to
up
S1(config-if)#switchport trunk native vlan 1
S1(config-if)#

S1(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)#
  
```

The network diagram is identical to the one above, showing the network topology with routers and switches connected to PCs in different VLANs.

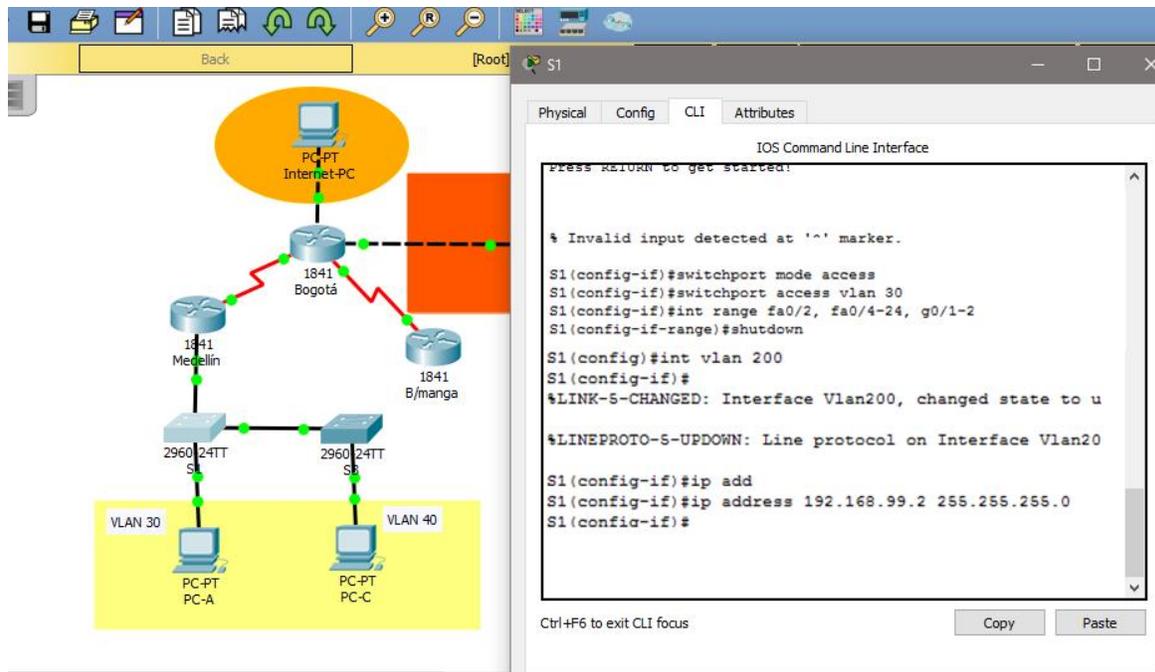
The CLI window for S1 shows the following configuration:

```

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)#

Enter configuration commands, one per line. End with CNTL/Z.
S1(config)#int f0/1
S1(config-if)#swtichport 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
  
```



### **Parea Configurar en S3 se realiza los siguientes pasos**

Modo trunk el puerto F0/3 en la nativa VLAN 1, Configurar las VLANS correspondientes, Configurar “mode access” los puertos restantes, Deshabilitar los puertos que no se usaran, Asignar el puerto F0/1 a la VLAN 40, Configurar la dirección 192.168.99.3 a la VLAN Mantenimiento, Configurar puerta de enlace predeterminada correspondiente

# VLANs - S3

The network diagram shows a central switch S3 (2960-24TT) connected to three routers: 1841 Medellín, 1841 Bogotá, and 1841 B/manga. S3 is also connected to two other switches (2960-24TT) which are connected to PC-A and PC-C (VLAN 30) and PC-B (VLAN 40). An Internet-PC is connected to the 1841 Bogotá router. The CLI window shows the initial state of the switch:

```
IOS Command Line Interface
Cisco IOS Software, C2960 Software (C2960-LANBASE-M), version
12.2(25)FX, RELEASE SOFTWARE (fcl)
Copyright (c) 1986-2005 by Cisco Systems, Inc.
Compiled Wed 12-Oct-05 22:05 by pt_team

Press RETURN to get started!

%LINK-5-CHANGED: Interface Vlan200, changed state to down

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)#
```

The network diagram is identical to the first image. The CLI window shows the configuration of VLAN 200 and the trunking of the switch ports:

```
IOS Command Line Interface
Cisco IOS Software, C2960 Software (C2960-LANBASE-M), version
12.2(25)FX, RELEASE SOFTWARE (fcl)
Copyright (c) 1986-2005 by Cisco Systems, Inc.
Compiled Wed 12-Oct-05 22:05 by pt_team

Press RETURN to get started!

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

S3(config-if)#ip add
S3(config-if)#ip address 192.168.99.3 255.255.255.0
S3(config-if)#
S3(config-if)#exit
S3(config)#ip default-gateway 192.168.99.1
S3(config)#
S3(config)#int f0/3
S3(config-if)#switchport mode trunk
S3(config-if)#switchport trunk native vlan 1
S3(config-if)#
S3(config-if)#
S3(config-if)#int range fa0/1-2, fa0/4-24, g0/1-2
S3(config-if-range)#switchport mode access
```

IOS Command Line Interface

```

Cisco IOS Software, C2960 Software (C2960-LANBAS-K), version
S3(config)#int vlan 200
S3(config-if)#
%LINK-6-CHANGED: Interface Vlan200, changed state to up
S3(config)#int f0/3
S3(config-if)#switchport mode trunk
S3(config-if)#switchport trunk native vlan 1
S3(config-if)#
S3(config-if)#int range fa0/1-2, fa0/4-24, g0/1-2
S3(config-if-range)#switchport mode access
S3(config)#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

IOS Command Line Interface

```

Compiled Wed 18-Jul-07 04:52 by pc_team
Press RETURN to get started!
Medellin(config)#int s0/0/0
Medellin(config-if)#description Connexion a Bogota
Medellin(config-if)#description Connexion 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

The screenshot shows a network simulation environment. On the left, a network diagram includes a router labeled '1841 Bogotá' connected to a router labeled '1841 Medellín'. The Medellín router is connected to a switch labeled '2960 24TT S1', which is connected to a PC labeled 'PC-A' in a yellow-shaded area labeled 'VLAN 30'. Another PC labeled 'PC-PT Internet-f' is connected to the Bogotá router. A red line indicates a connection between the Bogotá and Medellín routers. The main window is titled 'Medellin' and shows the 'CLI' tab. The CLI window displays the following text:

```
IOS Command Line Interface
Compiled Wed 18-Jul-07 04:52 by pt_team
Press RETURN to get started!
Medellin(config)#int s0/0/0
Medellin(config-if)#description Connexion a Bogota
Medellin(config-if)#description Connexion 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)#
Medellin(config)#ip route 0.0.0.0 0.0.0.0 s0/0/0
```

At the bottom of the CLI window, there are buttons for 'Copy' and 'Paste', and a note 'Ctrl+F6 to exit CLI focus'. The bottom status bar shows a timer at ': 01:22:10' and buttons for 'Power Cycle Devices' and 'Fast Forward Time'.

## 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 e Interface S0/0/0 – R2**

The network diagram shows a central router 'Bogotá' (1841) connected to 'Medellín' (1841) and 'B/manga' (1841). 'Medellín' is connected to a switch '2960 24TT S1', which is connected to 'PC-A' (VLAN 30). 'B/manga' is connected to a switch '2960 24TT S2', which is connected to 'PC-C' (VLAN 40). 'Bogotá' is also connected to an 'Internet-PC' (PC-PT) and another 'PC-PT' (PC-C). The CLI window shows the following commands and output:

```

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

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
Bogota(config)#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 e Interface F0/1 – R2

The network diagram is identical to the previous one. The CLI window shows the following commands and output:

```

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

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
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

**Interface S0/0/1 – R3 , Loopback 4, Loopback 5, Loopback 6**

The image shows a network diagram and a CLI configuration window for a router named 'Bucaramanga'.

**Network Diagram:**

- Router 1841 Bogotá:** Connected to PC-PT Internet-PC and Router 1841 Bucaramanga.
- Router 1841 Bucaramanga:** Connected to Router 1841 Bogotá and Router 1841 Medellin.
- Router 1841 Medellin:** Connected to Router 1841 Bucaramanga and Router 2960 24TT S.
- Router 2960 24TT S:** Connected to Router 1841 Medellin and Router 2960 24TT SB.
- Router 2960 24TT SB:** Connected to Router 2960 24TT S and connected to PC-PT PC-A (VLAN 30) and PC-PT PC-C (VLAN 40).

**CLI Configuration Window (B/manga):**

```
IOS Command Line Interface
Unauthorized Access is Prohibited

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
Bucaramanga(config-if)#int lo4
Bucaramanga(config-if)#ip address 192.168.4.1 255.255.255.0
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, changed state to down

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)#
```

Bottom status bar: 01:36:27 | Power Cycle Devices | Fast Forward Time | 1941 | 2901 | 2911 | 81910X | 819HGW | 829

The network diagram shows a topology with three routers: Internet-PC (1841), Bogotá (1841), and Medellín (1841). Bogotá is connected to Medellín and B/manga (1841). Medellín is connected to two switches (2960 24TT) which are connected to PC-A (VLAN 30) and PC-C (VLAN 40). Bogotá is connected to a Server-PT Web Server. The CLI window for B/manga shows the following configuration:

```

IOS Command Line Interface
Unauthorized Access is Prohibited
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)#
Bucaramanga(config-if)#int lo6
Bucaramanga(config-if)#
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)#
  
```

## Direccinamiento Web Server

The network diagram is similar to the previous one, but now includes a Server-PT Web Server connected to the Bogotá router. The configuration window for the Web Server shows the following settings:

Section	Option	Value
IP Configuration	IP Configuration	X
	IP Configuration	
	IP Configuration	<input type="radio"/> DHCP
	IP Configuration	<input checked="" type="radio"/> Static
	IP Configuration	IP Address: 10.10.10.10
IP Configuration	IP Configuration	Subnet Mask: 255.255.255.0
	IP Configuration	Default Gateway: 10.10.10.1
	IP Configuration	DNS Server: 0.0.0.0
	IP Configuration	
IPv6 Configuration	IPv6 Configuration	<input type="radio"/> DHCP
	IPv6 Configuration	<input type="radio"/> Auto Config
	IPv6 Configuration	<input checked="" type="radio"/> Static

## 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 simulation environment. On the left, a logical topology diagram displays a central router labeled '1841 Bogotá' connected to two other routers: '1841 Medellin' and '1841 B/manga'. Below the Bogotá router, two switches labeled '2960 24TT S1' and '2960 24TT S2' are connected. The S1 switch is connected to two PCs labeled 'PC-PT PC-A' and 'PC-PT PC-C', with VLAN 30 and VLAN 40 respectively. The S2 switch is also connected to a PC labeled 'PC-PT PC-C'. The Bogotá router is connected to an 'Internet-PC' and a red rectangular area representing a network. On the right, a CLI window for the 'Medellin' router shows the following configuration:

```
IOS Command Line Interface
Completed Wed 18-Jul-07 04:52 By pt_team

Press RETURN to get started!

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
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 OSPF 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

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

```
IOS Command Line Interface
Compiled Wed 18-Jul-07 04:52 by pt_team
Press RETURN to get started!

%LINK-S-CHANGED: Interface Serial0/0/0, changed state to up

Medellin(config)#router ospf 1
Medellin(config-router)#router-id 1.1.1
%LINEPROTO-S-UPDOWN: Line protocol on Interface Serial0/0/0, ch

%LINEPROTO-S-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)#
```

## Interfaces LAN pasivas – R1

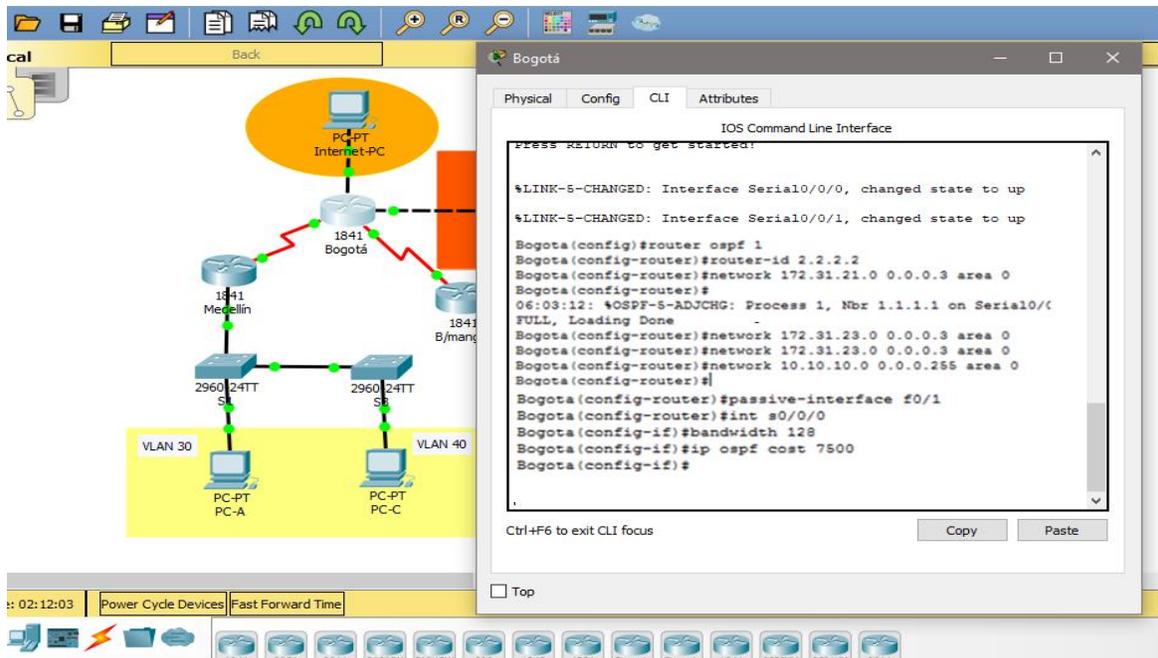
```
medellin(config-router)#network 192.168.200.0 0.0.0.0
Medellin(config-router)#passive-interface f0/0.30
Medellin(config-router)#passive-interface f0/0.40
Medellin(config-router)#passive-interface f0/0.200
Medellin(config-router)#
```

## 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)#
```

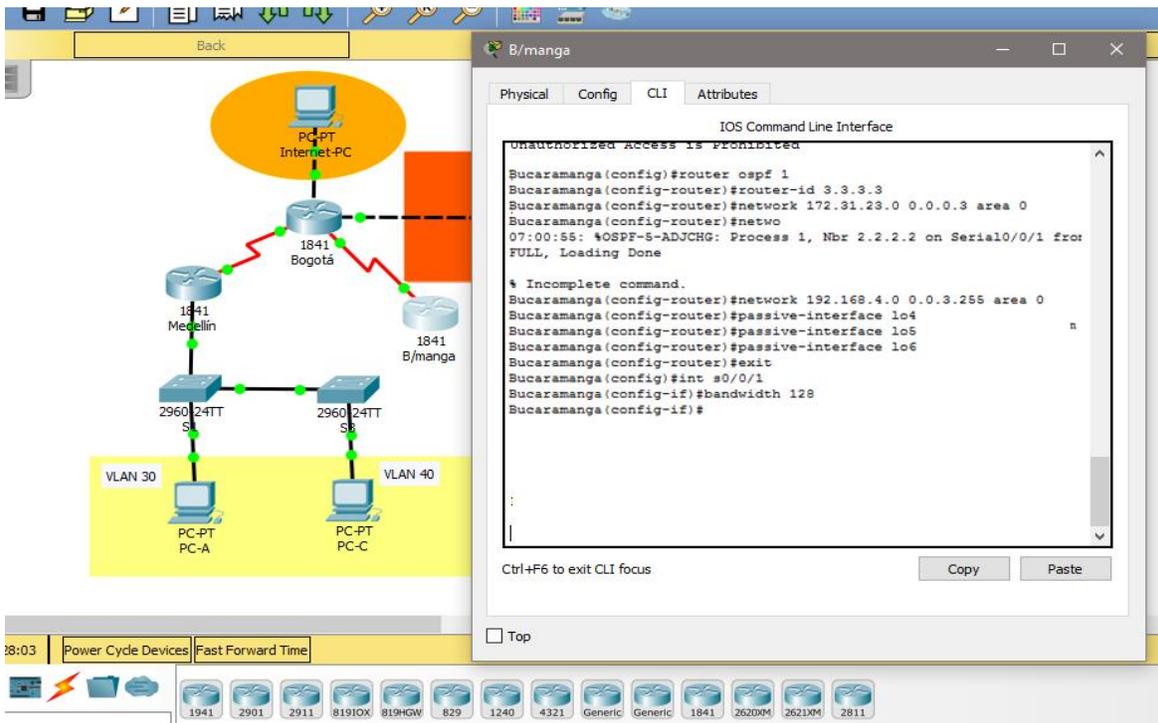
## Realizar la siguiente configuración en Bogotá

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



## 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



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#

The screenshot shows a window titled "Bogotá" with tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is active, displaying the "IOS Command Line Interface". The command entered is "Bogota#show ip protocols". The output shows the following configuration details:

```
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)
```

At the bottom of the CLI window, there is a "Ctrl+F6 to exit CLI focus" message, "Copy" and "Paste" buttons, and a "Top" button.

Bogotá

Physical Config CLI Attributes

IOS Command Line Interface

```

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#

```

Ctrl+F6 to exit CLI focus

Copy Paste

```

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

```

Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type	Info
<input type="checkbox"/>	0.000	--	PC-A	ICMP	
<input type="checkbox"/>	0.000	--	Web Server	ICMP	
<input type="checkbox"/>	0.000	--	Internet-PC	ICMP	

Reset Simulation  Constant Delay Captured to: 0.000 s

Play Controls: Back, Auto Capture / Play, Capture / Forward

Event List Filters - Visible Events  
 ACL Filter, ARP, BGP, CDP, DHCP, DHCPv6, DNS, DTP, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, LACP, NDP, NETFLOW, NTP, OSPF, OSPFv6, PaP, POP3, RADIUS, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, VTP

Edit Filters Show All/None

26:56:53.759 Power Cycle Devices PLAY CONTROLS: Back Auto Capture / Play Capture / Forward Event List Sim

Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type	Info
<input type="checkbox"/>	0.005	Medellin	S1	ICMP	
<input type="checkbox"/>	0.005	S1	S3	ICMP	
<input type="checkbox"/>	0.005	S3	PC-C	ICMP	
<input type="checkbox"/>	0.005	Bogotá	Internet-PC	ICMP	
<input type="checkbox"/>	0.006	Medellin	S1	ICMP	
<input type="checkbox"/>	0.006	S1	S3	ICMP	
<input type="checkbox"/>	0.006	S3	PC-C	ICMP	
<input type="checkbox"/>	0.006	PC-C	S3	ICMP	
<input type="checkbox"/>	0.006	Internet-PC	Bogotá	ICMP	

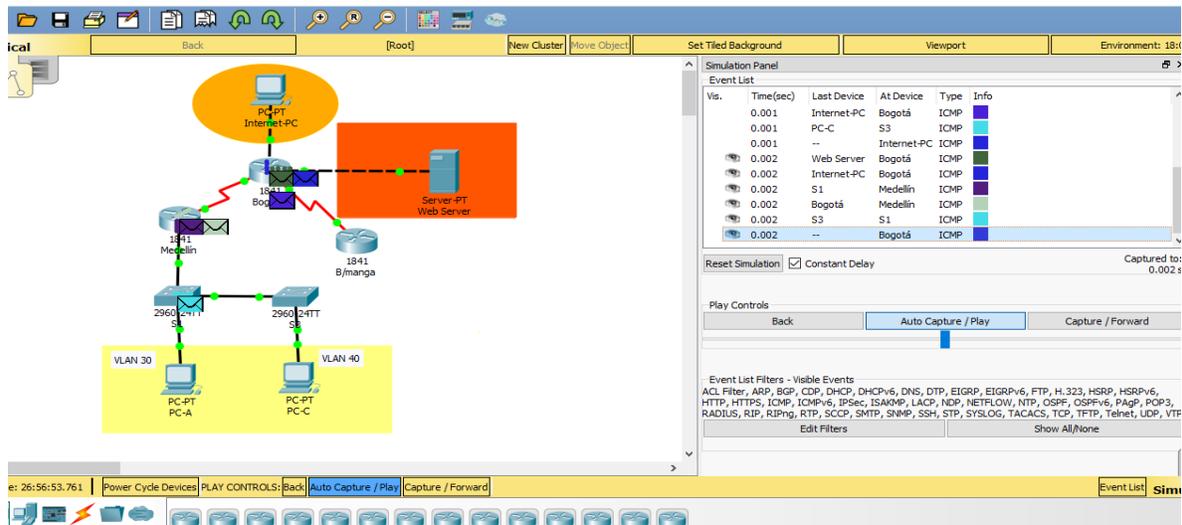
Reset Simulation  Constant Delay Captured to: 0.006 s

Play Controls: Back, Auto Capture / Play, Capture / Forward

Event List Filters - Visible Events  
 ACL Filter, ARP, BGP, CDP, DHCP, DHCPv6, DNS, DTP, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, LACP, NDP, NETFLOW, NTP, OSPF, OSPFv6, PaP, POP3, RADIUS, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, VTP

Edit Filters Show All/None

26:56:53.765 Power Cycle Devices PLAY CONTROLS: Back Auto Capture / Play Capture / Forward Event List Sim



## 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**

The screenshot shows the **Medellin** router's CLI interface with the following configuration commands:

```

Medellin#conf t
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)#
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)#
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)#
  
```

At the bottom of the window, there is a prompt **Ctrl+F6 to exit CLI focus** and **Copy** and **Paste** buttons.

## Configurar NAT en Bogotá

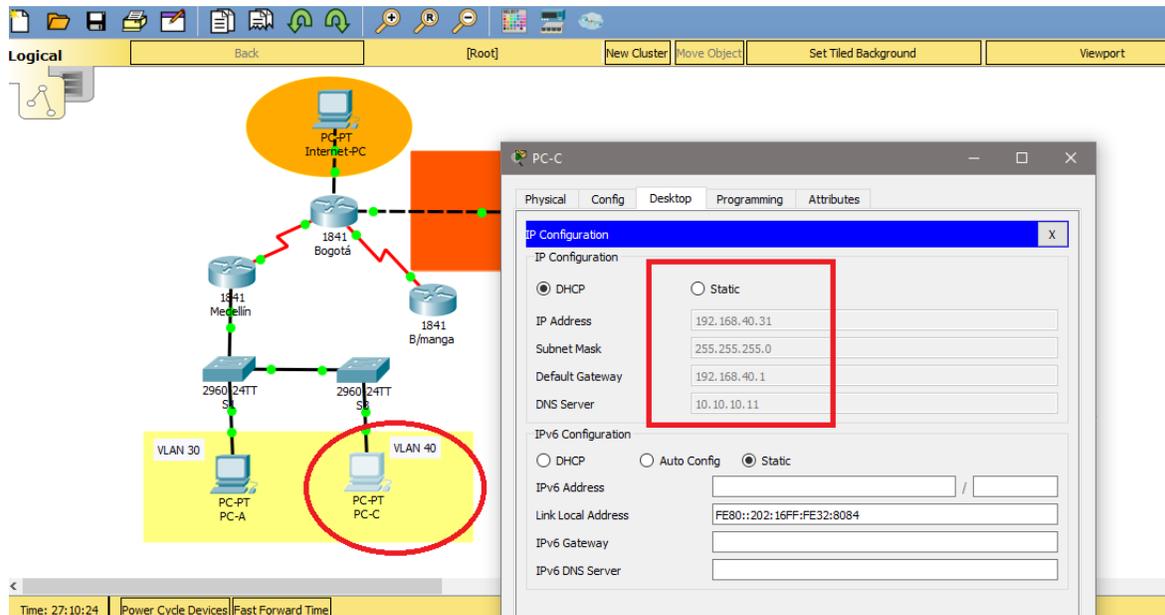
```
Password:
Bogota#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota(config)#user webuser privilege 15 secret cisco12345
Bogota(config)#ip http server
      ^
% Invalid input detected at '^' marker.

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.

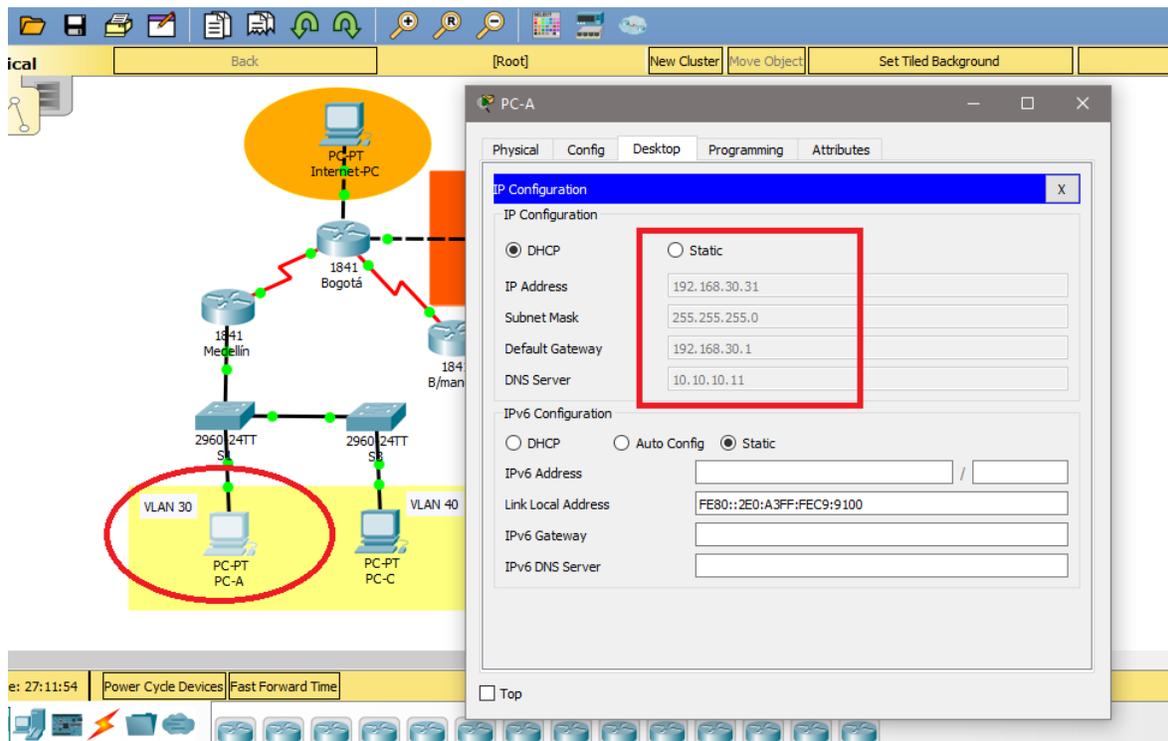
Bogota(config)#access-list 1 permit 192.168.4.0 0.0.3.255
Bogota(config)#
Bogota(config)#ip nat pool INTERNET 209.165.200.225 209.165.200.229 netmask
255.255.255.248
Bogota(config)#
```

## Verificación de asignación direccionamiento DHCP en VLANs [VLAN 40 y VLAN 30]



The network diagram shows a topology with three routers: Bogotá (1841), Medellín (1841), and B/manga (1841). PC-PT Internet-PC is connected to Bogotá. VLAN 30 contains PC-A and VLAN 40 contains PC-C. The PC-C configuration window shows DHCP selected with the following settings:

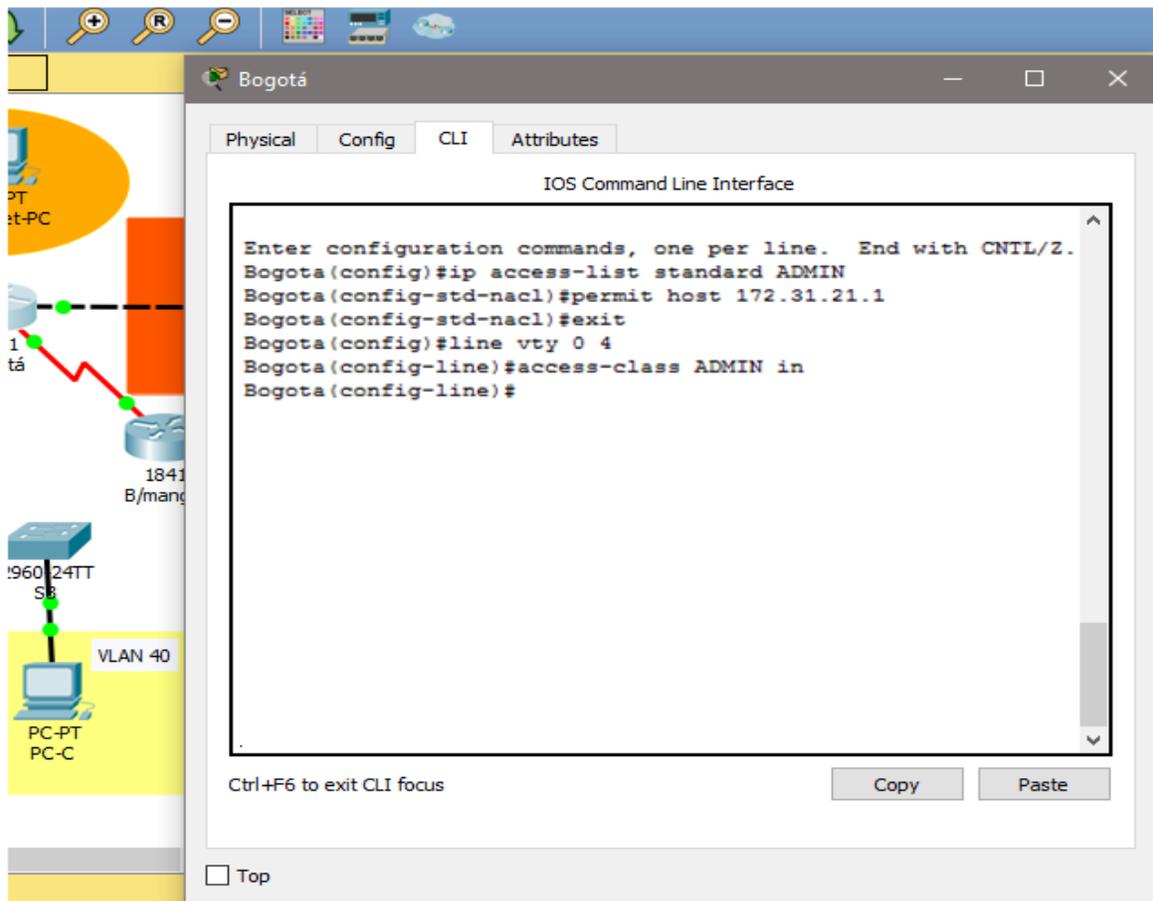
Field	Value
IP Configuration	<input checked="" type="radio"/> DHCP
IP Address	192.168.40.31
Subnet Mask	255.255.255.0
Default Gateway	192.168.40.1
DNS Server	10.10.10.11



The network diagram is identical to the first one, but PC-A is highlighted in a red circle. The PC-A configuration window shows DHCP selected with the following settings:

Field	Value
IP Configuration	<input checked="" type="radio"/> DHCP
IP Address	192.168.30.31
Subnet Mask	255.255.255.0
Default Gateway	192.168.30.1
DNS Server	10.10.10.11

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



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

En esta prueba de habilidades 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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Cisco CCNA – configuraicón DHCP

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

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