

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

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**GRUPO 3**

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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.

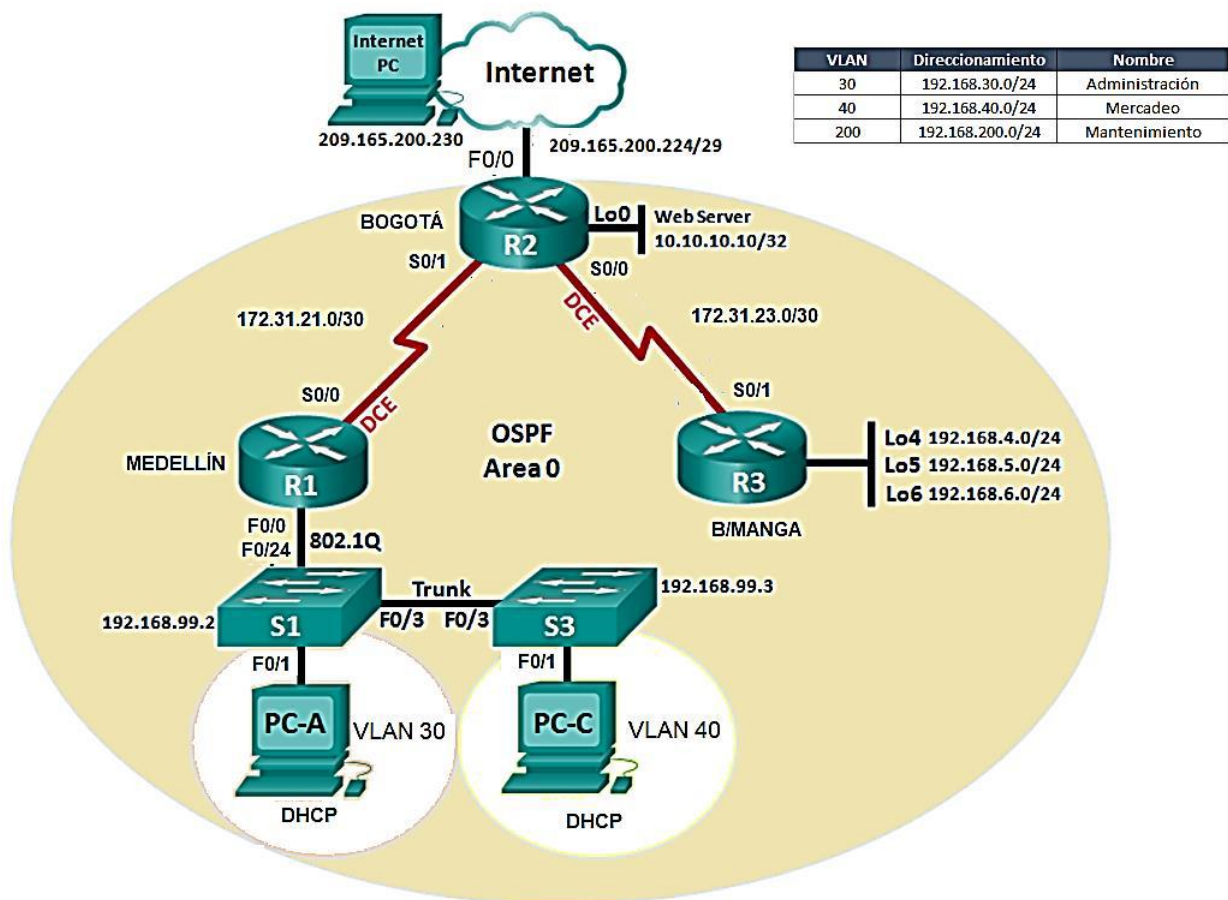
Determinar la configuración necesaria para la implementación de OPSFv2, protocolo dinámico de Routing.

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



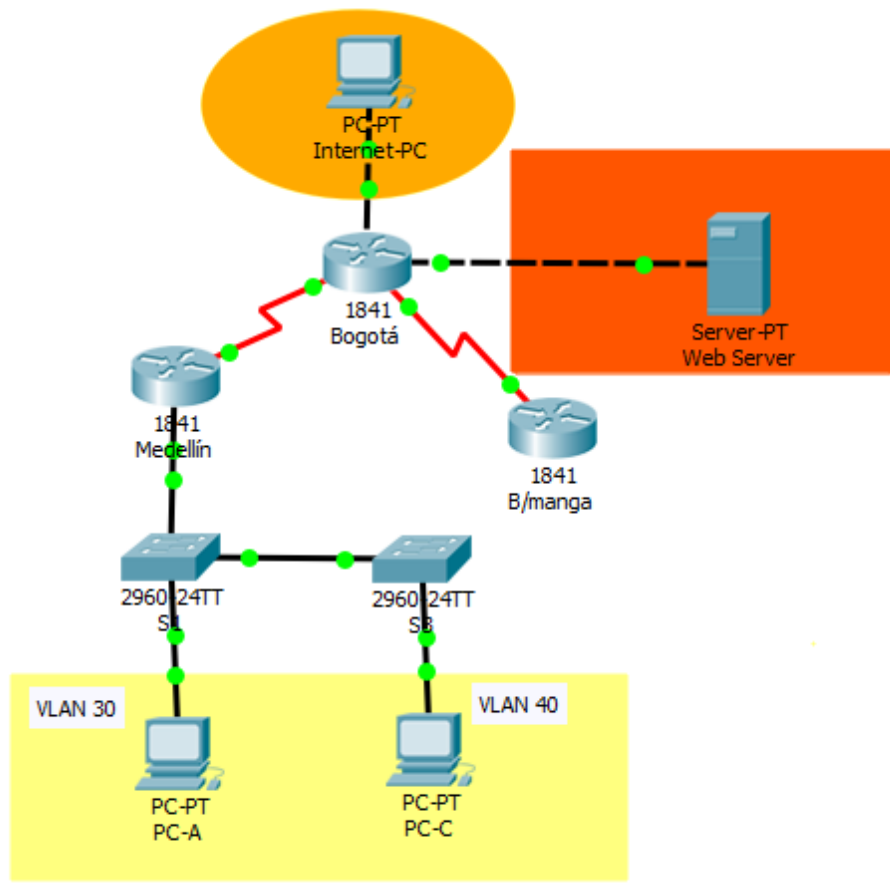
3.3.3.3	Lo4	192.168.4.0	
	Lo5		
	Lo6		
		172.31.23.0	S0/0/1

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

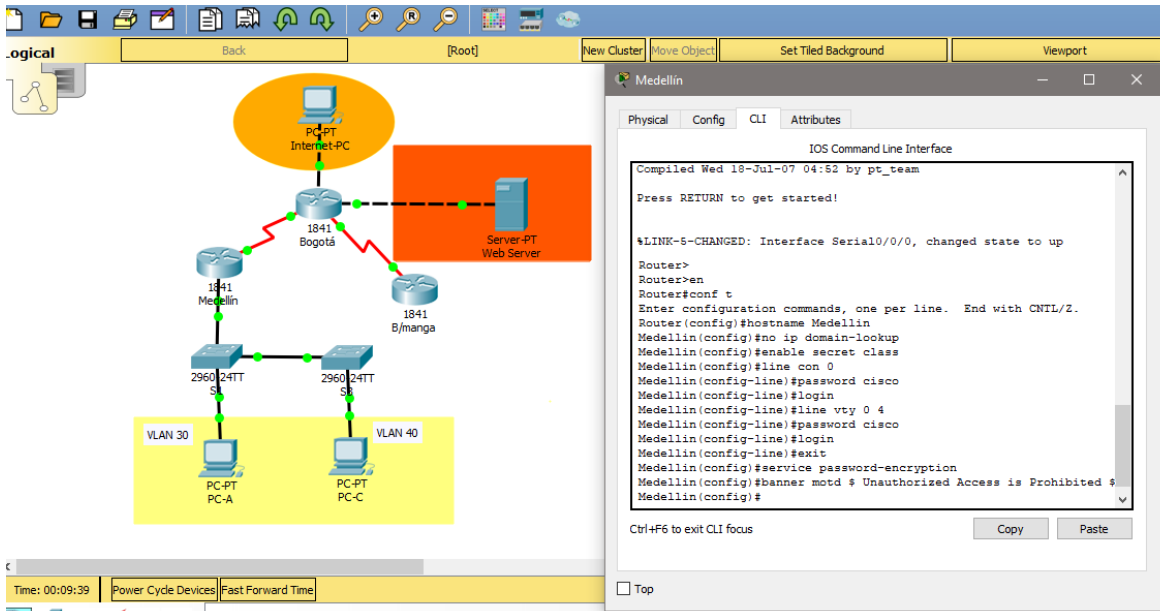
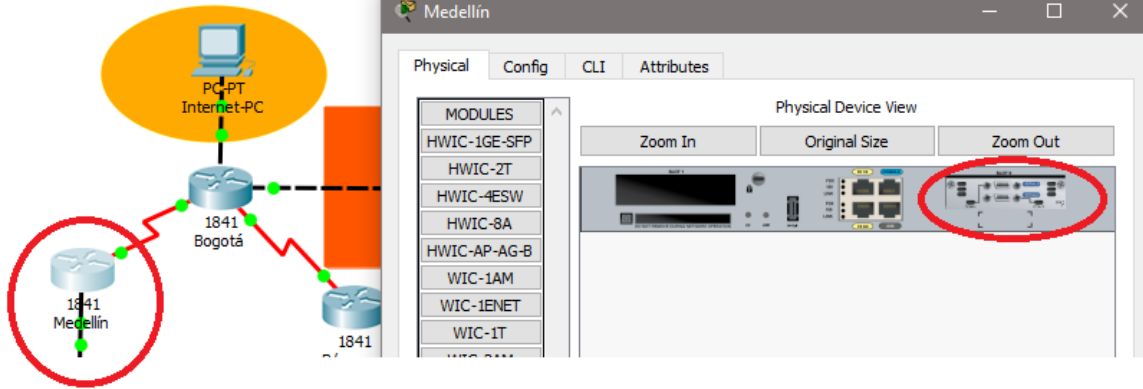


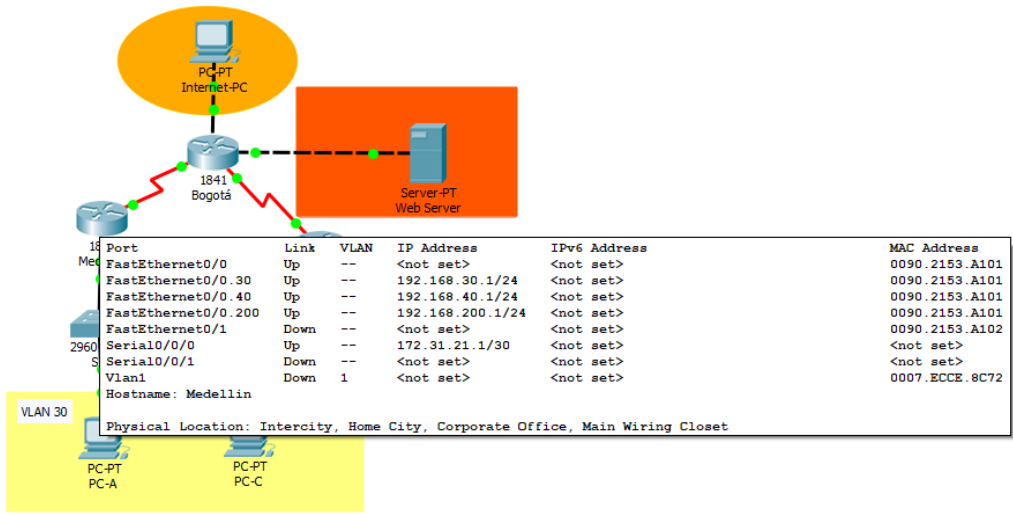
### Configuración básica de dispositivos

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

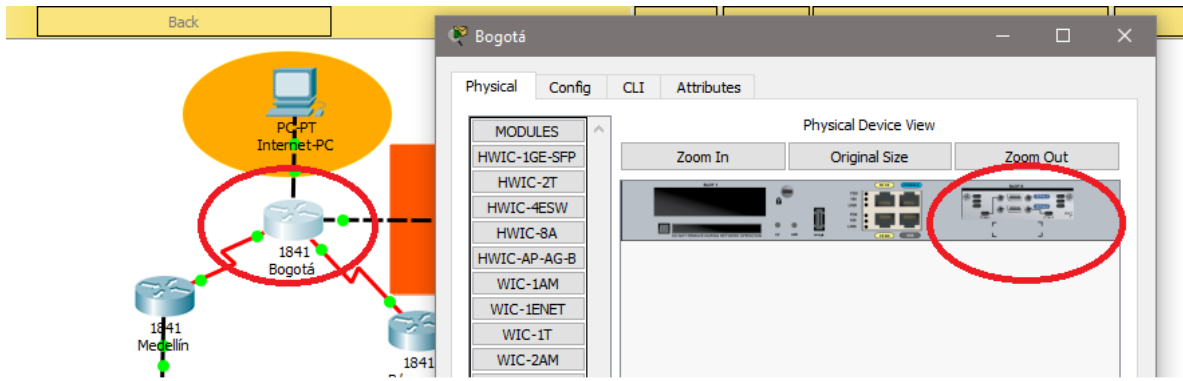
R1: nombrarlo "Medellín", R2: nombrarlo "Bogotá", R3: nombrarlo "Bucaramanga", S1: nombrarlo "S1", S3: nombrarlo "S3", Exec Password: class, Console Access Password: cisco, Telnet Access Password: cisco, Encriptar contraseñas, MOTD banner: Prohibido personal no autorizado, A cada Switch deshabilitar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

### Router 1





Router 2



The diagram shows a network topology with three routers: Bogotá (1841), Medellín (1841), and B/manga (1841). Bogotá is connected to Medellín and B/manga. Medellín is connected to two switches (2960 24TT) which are connected to VLAN 30 (PC-A) and VLAN 40 (PC-C). Bogotá is connected to an Internet-PC and a Web Server. The CLI window shows the configuration for Router 3 (Bogotá):

```

    Router>en
    Router#conf t
    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)#
  
```

The diagram shows Router 3 (Bogotá) with a detailed status table:

Port	Link	VLAN	IP Address	IPv6 Address	MAC Address
FastEthernet0/0	Up	--	209.165.200.225/29	<not set>	00E0.F937.6501
FastEthernet0/1	Up	--	10.10.10.1/24	<not set>	00E0.F937.6502
Serial0/0/0	Up	--	172.31.23.1/30	<not set>	<not set>
Serial0/0/1	Up	--	172.31.21.2/30	<not set>	<not set>
Vlan1	Down	1	<not set>	<not set>	0002.4A6D.9589

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

**Router 3**

Back [Root] New Cluster Move Object Set Tiled Background View

B/manga

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

Back [Root] New Cluster Move Object Set Tiled Background View

B/manga

Physical Config CLI Attributes

IOS Command Line Interface

```

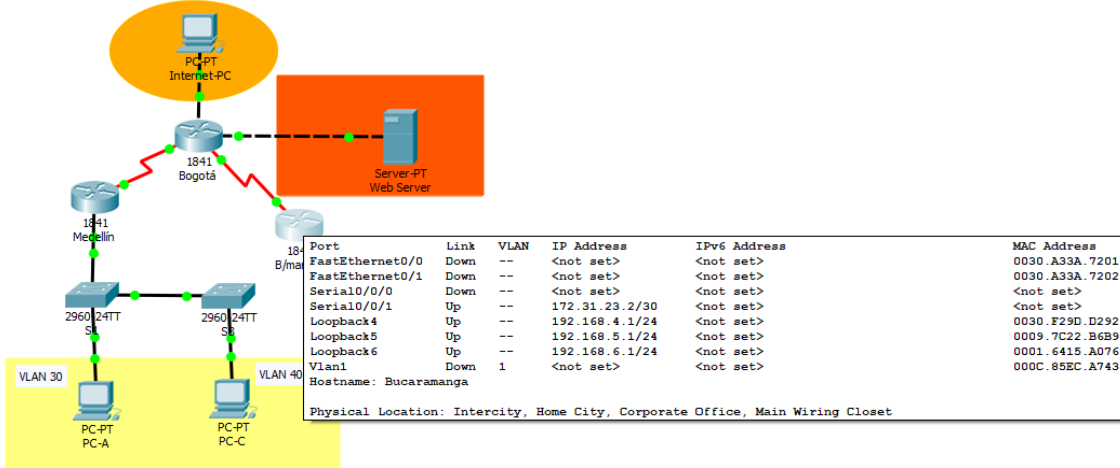
Bad passwords

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)#
  
```

Ctrl+F6 to exit CLI focus

Copy Paste

Back [Root] New Cluster Move Object Set Tiled Background Viewport



## Switch 1

```

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

Time: 00:28:25 | 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

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

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

### Switch 3

```

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!

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)#
  
```

Time: 00:31:39 | Power Cycle Devices | Fast Forward Time

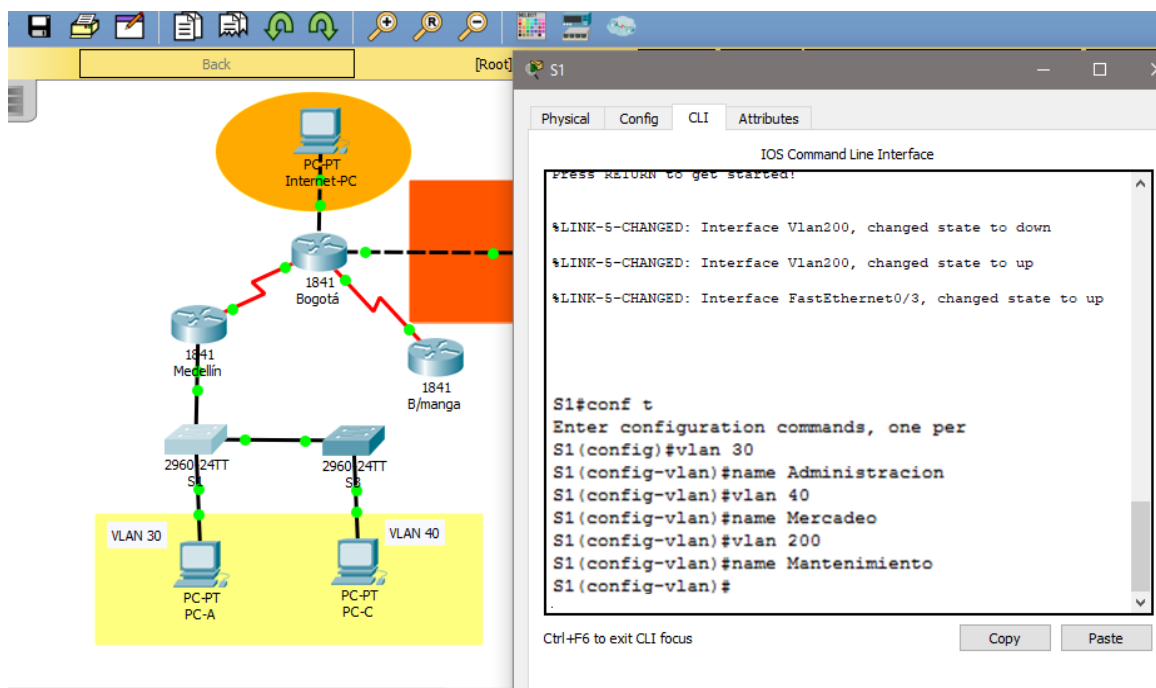


## Parea Configurar en S1 se realiza los siguientes pasos

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 image shows a network diagram on the left and a CLI window on the right. The diagram illustrates a network topology with routers (1841 Bogotá, 1841 Medellín, 1841 B/manga) and switches (2960 24TT S1). PCs are connected to VLAN 30 (PC-A) and VLAN 40 (PC-C). The CLI window shows the configuration commands for S1:

```

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)#
  
```

Below the CLI window, there are buttons for "Copy" and "Paste".

The network diagram shows a central 1841 Bogotá router connected to an 1841 Medellín router and an 1841 B/manga router. The Bogotá router is connected to two 2960 24TT switches. The left switch is connected to PC-A (VLAN 30) and PC-B (VLAN 40). The right switch is connected to PC-C (VLAN 40). An Internet-PC is connected to the Bogotá router. The CLI window shows the following configuration for interface f0/3:

```
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 is identical to the one above. The CLI window shows the configuration for interface f0/24:

```
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 shows a central router (1841 Bogotá) connected to three other routers (1841 Medellín, 1841 B/manga, and PC-PT Internet-PC). Below the Bogotá router are two switches (2960 24TT S1 and 2960 24TT S2) connected to two PCs (PC-PT PC-A and PC-PT PC-C). VLAN 30 is associated with PC-A and VLAN 40 with PC-C.

The CLI window for S1 shows the following commands:

```

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
    
```

The network diagram is identical to the previous one.

The CLI window for S1 shows the following commands:

```

^
% 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

S1(config)#int vlan 200
S1(config-if)#
%LINK-5-CHANGED: Interface Vlan200, changed state to u
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan200

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

### **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 image shows a network simulation environment. On the left, a topology diagram features several components: a PC-PT Internet-PC connected to a 1841 Bogotá router; a 1841 Medellín router connected to the Bogotá router; a 1841 B/manga router connected to the Bogotá router; two 2960 24TT switches (S3) connected to each other and to the Medellín router; and two PC-PT PCs (PC-A and PC-C) connected to the 2960 switches. VLAN 30 is associated with PC-A and PC-C, while VLAN 40 is associated with PC-C. On the right, a CLI window for switch S3 displays the following configuration commands:

```
IOS Command Line Interface
Cisco IOS Software, C2960 Software (C2960-LANBASE-K), 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!

%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)#
```

Network diagram showing a topology with routers (1841 Bogotá, 1841 Medellín, 1841 B/manga), switches (2960 S1, 2960 S2), and PCs (PC-A, PC-C) connected to VLAN 30 and VLAN 40. An Internet-PC is also shown.

```

S3
Physical Config CLI Attributes
IOS Command Line Interface
Cisco IOS Software, C2960 Software (C2960-LANBASE-K), version
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
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
Ctrl+F6 to exit CLI focus
Copy Paste
 Top

```

Network diagram showing a topology with routers (1841 Bogotá, 1841 Medellín, 1841 B/manga), switches (2960 S1, 2960 S2), and PCs (PC-A, PC-C) connected to VLAN 30 and VLAN 40. An Internet-PC is also shown.

```

S3
Physical Config CLI Attributes
IOS Command Line Interface
Cisco IOS Software, C2960 Software (C2960-LANBASE-K), version
S3(config)#int vlan 200
S3(config-if)#
%LINK-5-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)#
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
Ctrl+F6 to exit CLI focus
Copy Paste
 Top

```

## Configurar en "Medellín" la conexión hacia Bogotá

S0/0/0 – R1

The screenshot shows a network simulation environment with a topology on the left and a configuration window for the 'Medellín' router on the right. The topology includes a PC-PT Internet-F, a router 1841 Bogotá, a router 1841 Medellín, a switch 2960 24TT S, and a PC-PT PC-A in a VLAN 30. The configuration window displays the following commands:

```
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 Connction a Bogota
Medellin(config-if)#description Connction 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)#
```

At the bottom of the configuration window, there are buttons for 'Copy' and 'Paste', and a checkbox for 'Top'. The status bar at the bottom of the simulator shows a timer at 01:22:10 and options for 'Power Cycle Devices' and 'Fast Forward Time'.

Ruta de salida S0/0/0 – R1

The screenshot shows a network simulation environment. In the foreground, a configuration window for the 'Medellin' router is open, displaying the following CLI commands:

```

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

Press RETURN to get started!

Medellin(config)#int s0/0/0
Medellin(config-if)#description Connction a Bogota
Medellin(config-if)#description Connction 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
    
```

The background network diagram includes a router labeled '1841 Bogotá' connected to another router labeled '1841 Medellin'. The 'Medellin' router is connected to a switch labeled '2960 24TT S1', which is connected to a PC labeled 'PC-PT PC-A' within a yellow-shaded area labeled 'VLAN 30'. A 'PC-PT Internet-F' is also visible at the top of the diagram.

### 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). An 'Internet-PC' is connected to Bogotá. The CLI window shows the following configuration commands:

```

    Bogota(config-if)#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-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
  
```

### Interface F0/0 – R2 e Interface F0/1 – R2

The network diagram is identical to the previous one. The CLI window shows the configuration for interfaces F0/0 and F0/1:

```

    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 simulation environment. On the left, a network topology is displayed with several routers and PCs. Routers are labeled with their IP addresses: 1841 Bogotá, 1841 Bucaramanga, 1841 Medellin, and 2960. PCs are labeled PC-A, PC-C, and Internet-PC. VLANs 30 and 40 are also shown. On the right, a CLI window for router 'Bucaramanga' is open, showing the following configuration commands:

```
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, ch

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)#
```

The network diagram shows a topology with three 1841 routers: Bogotá, Medellín, and B/manga. Bogotá is connected to Medellín and B/manga. Medellín is connected to two 2960 switches, which are connected to PC-A (VLAN 30) and PC-C (VLAN 40). Bogotá is connected to an Internet-PC. The B/manga router window shows the following CLI 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)#
%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)#
  
```

### Direccionamiento Web Server

The network diagram shows the same topology as above, but with a Server-PT Web Server connected to the Bogotá router. The Web Server configuration window shows the following settings:

Configuration Section	Option / Value
IP Configuration	Static (Selected)
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	Static (Selected)

## 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

```
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
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 shows a network topology in a simulator. On the left, a network diagram includes:
 

- Medellin (R1):** A central router with two 2960 24TT switches connected to it. The switches are labeled VLAN 30 and VLAN 40, each with a PC-PT (PC-A and PC-C).
- Bogotá (R2):** A router connected to Medellin via a serial link.
- B/manga (R3):** A router connected to Bogotá via a serial link.
- Internet-PC:** A PC connected to Bogotá via a serial link.

 On the right, the CLI window for router Medellin shows the following configuration:
 

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

%LINK-5-CHANGED: 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, cha
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, cha
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
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

The screenshot displays a network simulation interface. On the left, a network topology is shown with several routers and PCs. A central router labeled 'Bogotá' (1841) is connected to an 'Internet-PC' and another router. Below it, a 'Medellin' router (1841) is connected to two switches (2960 24TT S1 and 2960 24TT S2), which are in turn connected to two PCs (PC-A and PC-C) in VLAN 30 and VLAN 40 respectively. A CLI window titled 'Bogotá' is open on the right, showing the configuration of OSPF on the Bogotá router. The configuration includes setting the router ID to 2.2.2.2, defining three areas (0, 0, and 255), and configuring interfaces f0/1 and s0/0/0.

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

%LINK-5-CHANGED: Interface Serial10/0/0, changed state to up
%LINK-5-CHANGED: Interface Serial10/0/1, changed state to up

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 Serial10/0/0
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)#

Ctrl+F6 to exit CLI focus
```

### 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

The screenshot shows a network simulator interface. On the left, a network topology is displayed with routers labeled 'Medellin', 'Bogotá', and 'B/manga', and switches labeled '2960 24TT S'. PCs are connected to VLAN 30 and VLAN 40. On the right, a CLI window for router 'B/manga' shows the following configuration commands:

```

IOS Command Line Interface
Unauthorized Access is Prohibited

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 fro
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#

Bogotá

Physical Config CLI Attributes

IOS Command Line Interface

```
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)
```

Ctrl+F6 to exit CLI focus

Copy Paste

Top



The screenshot shows a terminal window titled "Bogotá" with tabs for "Physical", "Config", "CLI", and "Attributes". The active tab is "CLI", displaying the "IOS Command Line Interface". The output of the command "show ip route ospf" is as follows:

```
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#
```

At the bottom of the window, there is a prompt "Ctrl+F6 to exit CLI focus" and two buttons: "Copy" and "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
  
```

The screenshot displays a network simulation environment. The main window shows a network topology with several components:

- Internet-PC:** A PC connected to a router labeled "1841 Bogotá".
- Server-PT Web Server:** A server connected to the "1841 Bogotá" router.
- 1841 Medellin:** A router connected to the "1841 Bogotá" router and a switch labeled "2960 24TT S".
- 1841 B/manga:** A router connected to the "1841 Bogotá" router and another switch labeled "2960 24TT S".
- VLAN 30:** A switch connected to the "1841 Medellin" router, containing a PC labeled "PC-PT PC-A".
- VLAN 40:** A switch connected to the "1841 B/manga" router, containing a PC labeled "PC-PT PC-C".

On the right side, the "Simulation Panel" is open, showing an "Event List" table:

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	

Below the table, there are "Reset Simulation" and "Constant Delay" options. The "Play Controls" section includes "Back", "Auto Capture / Play", and "Capture / Forward" buttons. At the bottom, there are "Event List Filters - Visible Events" and "Edit Filters" options.

The screenshot shows a network simulation environment. The main workspace displays a topology with several devices: a PC-PT Internet-PC, a Server-PT Web Server, and two switches (S1, S3) connected to two routers (R1, R2). The routers are connected to two VLANs (VLAN 30 and VLAN 40) containing PC-PT PC-A and PC-PT PC-C. The Simulation Panel on the right shows an Event List with the following data:

Vis.	Time(sec)	Last Device	At Device	Type	Info
	0.005	Medellin	S1	ICMP	
	0.005	S1	S3	ICMP	
	0.005	S3	PC-C	ICMP	
	0.005	Bogotá	Internet-PC	ICMP	
	0.006	Medellin	S1	ICMP	
	0.006	S1	S3	ICMP	
	0.006	S3	PC-C	ICMP	
	0.006	PC-C	S3	ICMP	
	0.006	Internet-PC	Bogotá	ICMP	

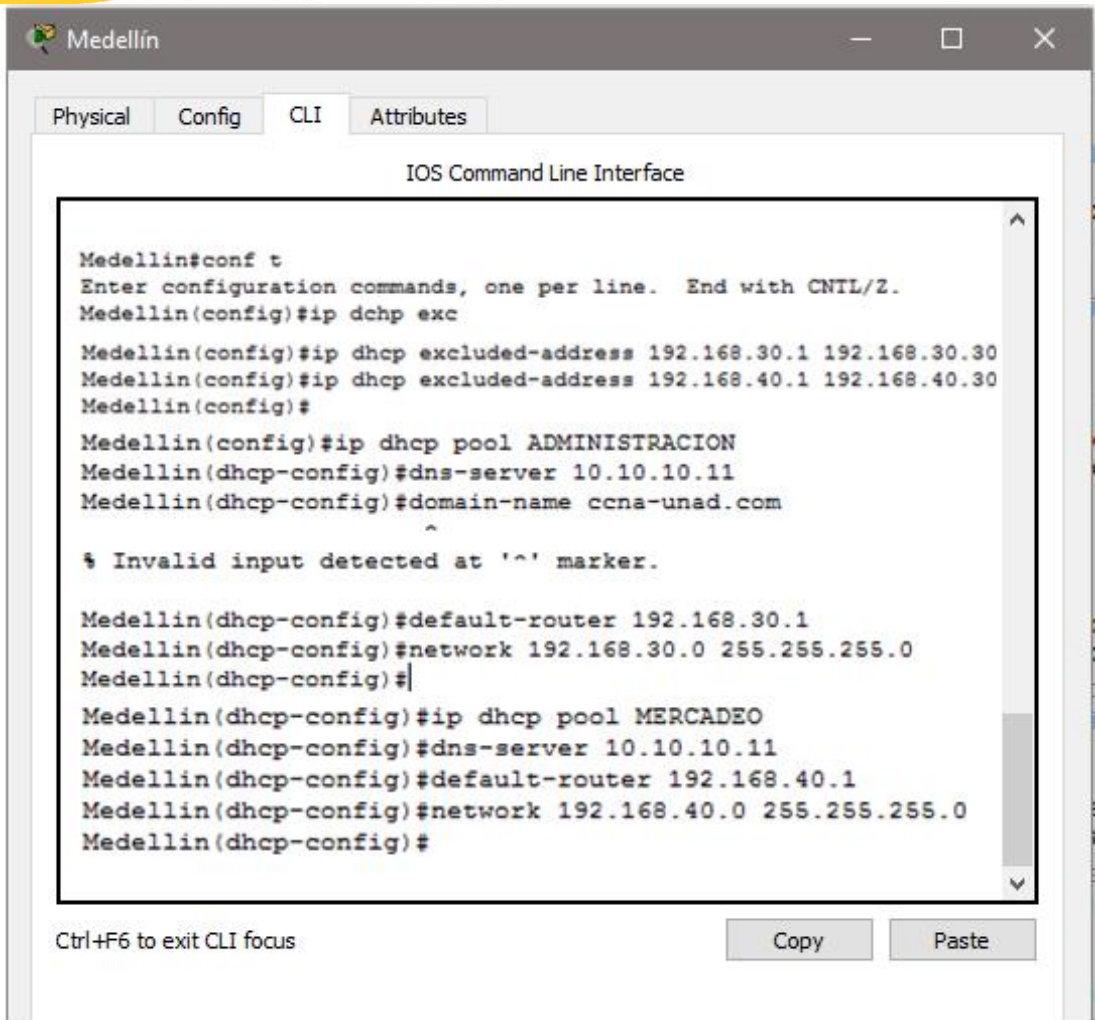
This screenshot shows the same network simulation environment as the previous one, but with a different Event List in the Simulation Panel. The Event List shows traffic from the Internet-PC to PC-C:

Vis.	Time(sec)	Last Device	At Device	Type	Info
	0.001	Internet-PC	Bogotá	ICMP	
	0.001	PC-C	S3	ICMP	
	0.001	--	Internet-PC	ICMP	
	0.002	Web Server	Bogotá	ICMP	
	0.002	Internet-PC	Bogotá	ICMP	
	0.002	S1	Medellin	ICMP	
	0.002	Bogotá	Medellin	ICMP	
	0.002	S3	S1	ICMP	
	0.002	--	Bogotá	ICMP	

## 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

Physical Config CLI Attributes

IOS Command Line Interface

```
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)#

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)#
```

Ctrl+F6 to exit CLI focus

Copy Paste

## 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]



Logical [Root] New Cluster Move Object Set Tiled Background Viewport

Time: 27:10:24 | Power Cycle Devices | Fast Forward Time

PC-C

Physical Config Desktop Programming Attributes

IP Configuration

DHCP  Static

IP Address: 192.168.40.31

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.40.1

DNS Server: 10.10.10.11

IPv6 Configuration

DHCP  Auto Config  Static

IPv6 Address: /

Link Local Address: FE80::202:16FF:FE32:8084

IPv6 Gateway: /

IPv6 DNS Server: /

ical [Root] New Cluster Move Object Set Tiled Background Viewport

Time: 27:11:54 | Power Cycle Devices | Fast Forward Time

PC-A

Physical Config Desktop Programming Attributes

IP Configuration

DHCP  Static

IP Address: 192.168.30.31

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.30.1

DNS Server: 10.10.10.11

IPv6 Configuration

DHCP  Auto Config  Static

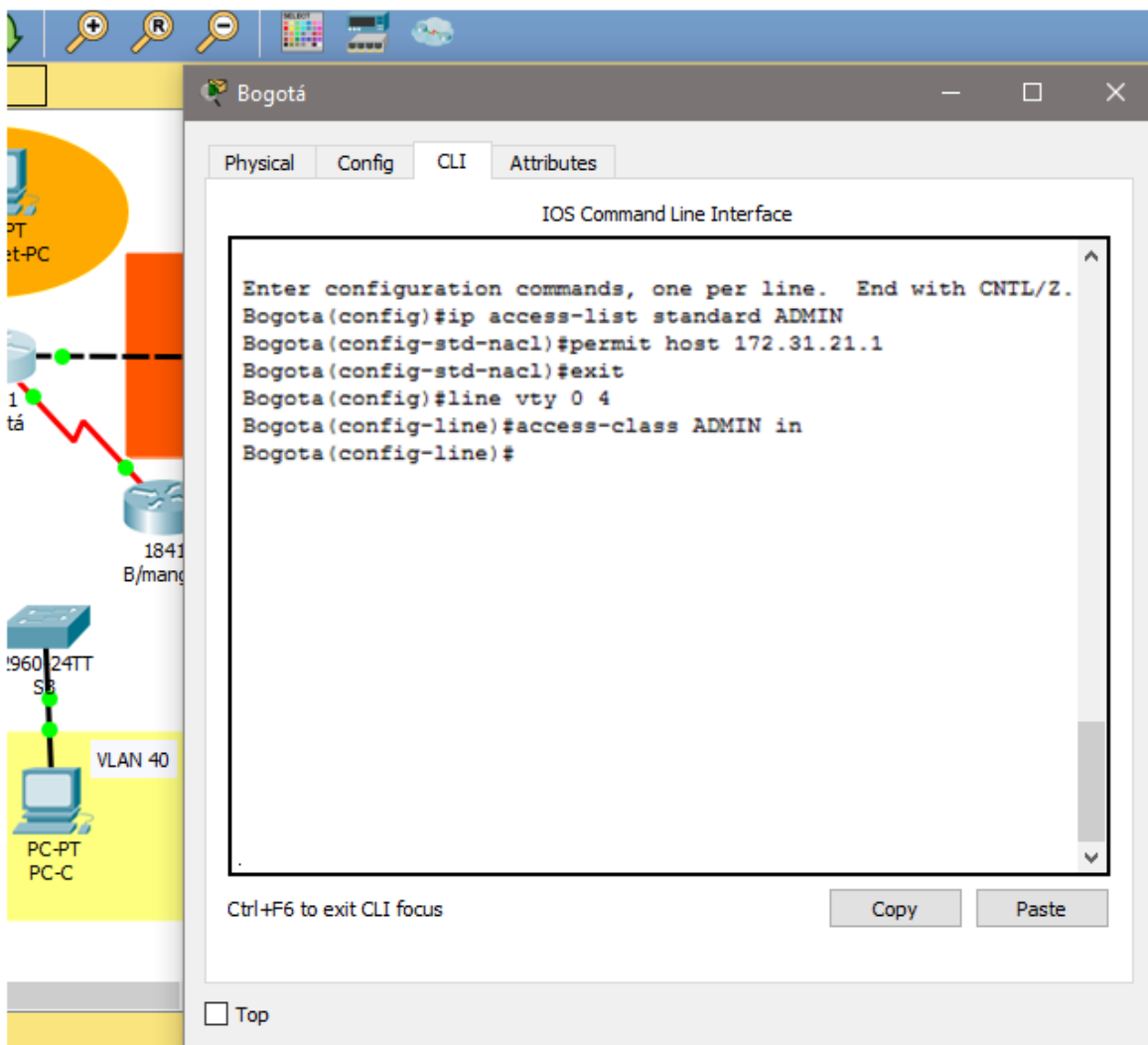
IPv6 Address: /

Link Local Address: FE80::2E0:A3FF:FEC9:9100

IPv6 Gateway: /

IPv6 DNS Server: /

## 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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