



EVALUACION PRUEBA DE HABILIDADES PRACTICAS CCNA

**EDNA VIVIANA LAVAO GUEVARA**

Asesor: JUAN CARLOS VESGA

UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA  
ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA  
DIPLOMADO DE PROFUNDIZACIÓN CISCO

2019

## RESUMEN

La universidad Nacional Abierta y a Distancia, ofrece como opción de grado el diplomado de profundización CISCO, el cual brinda capacitación sobre la implementación de redes, el cual tiene como metodología de aprendizaje el desarrollo de las temáticas por medio de ejercicios que se desarrollan en el software de Packet Tracer, que es una herramienta de aprendizaje que permite simulaciones de redes de una manera interactiva; además de las evaluaciones que se realizan en la plataforma de CISCO, que ayudan a afianzar conocimientos, sobre el diseño e implementación soluciones Networking. La evaluación de habilidades prácticas que se desarrolla en este trabajo tiene como propósito poner a pruebas las capacidades adquiridas en el transcurso del diplomado, por medio de la solución de dos escenarios, cada uno con unos requerimientos específicos.

## ABSTRACT

The National Open and Distance University offers as a degree option the deepening diploma CISCO, which provides training on the implementation of networks, which has as a learning methodology the development of the themes through exercises developed in the software from Packet Tracer, which is a learning tool that allows network simulations in an interactive way; In addition to the evaluations carried out in the CISCO platform, which help to consolidate knowledge about the design and implementation of network solutions. The evaluation of practical skills developed in this work is intended to test the skills acquired in the course of the diploma, through the solution of two environments, each with specific requirements.

## TABLA DE CONTENIDO

<b>Introducción</b> .....	<b>5</b>
<b>Objetivos</b> .....	<b>6</b>
<b>1. Escenario uno</b> .....	<b>7</b>
1.1. Topología de la red .....	7
1.2. Configuración de equipos .....	8
1.3. Conexión física de los equipos .....	10
1.4. Parte 1. Asignación de las direcciones IP .....	10
1.5. Parte 2. Configuración Básica .....	11
1.6. Parte 3. Configuración de enrutamiento .....	17
1.7. Parte 4. Configuración de listas de control de acceso .....	25
1.8. Parte 5. Comprobación de la red instalada .....	28
<b>2. Escenario dos</b> .....	<b>29</b>
2.1. Topología de la red .....	29
2.2. Configuración de la topología .....	30
<b>Conclusiones</b> .....	<b>60</b>
<b>Referencias</b> .....	<b>61</b>
<b>Anexos</b> .....	<b>62</b>

## INTRODUCCION

En el lapso de tiempo en que se desarrolló el diplomado de profundización CCNA, se realizaron diferentes ejercicios con los que se ponían en práctica las diferentes temáticas, y el desarrollo de esta actividad tiene como finalidad identificar las habilidades adquiridas durante el estudio, así como también, evidenciar el nivel de entendimiento y la mejor forma de dar solución a una problemática relacionada con Networking.

## OBJETIVO GENERAL

Demostrar las habilidades obtenidas en el diplomado, por medio de dos escenarios en los que se realiza una red completa, implementando todos los conocimientos obtenidos para dar solución a los requerimientos dispuestos.

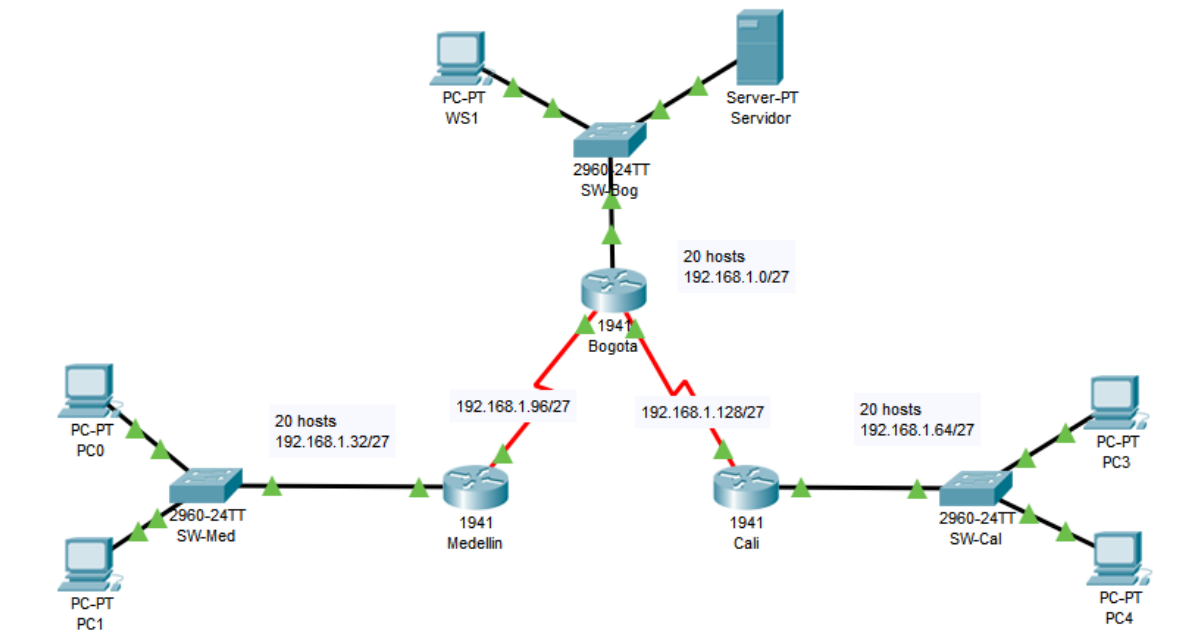
## **OBJETIVOS ESPECÍFICOS**

- ✓ Configurar cada uno de los dispositivos seleccionados para el desarrollo de la práctica.
- ✓ Administrar la seguridad de las redes teniendo en cuenta los requerimientos establecidos.
- ✓ Comprobar el funcionamiento de los dos escenarios por medio de los comandos.

### **1. ESCENARIO UNO**

Una empresa posee sucursales distribuidas en las ciudades de Bogotá, Medellín y Cali 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.

### 1.1. Topología de la Red



### 1.2. Configuración de equipos.

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

## Configuración Router – Bogota

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Bogota
Bogota(config)#no ip domain-lookup
Bogota(config)#service password-encryption
Bogota(config)#enable secret class
Bogota (config)#banner motd #
Enter TEXT message. End with the character '#'.
Acceso no autorizado est estrictamente prohibido.#
Bogota(config)#line console 0
Bogota(config-line)#password cisco
Bogota(config-line)#login
Bogota(config-line)#logging synchronous
Bogota(config-line)#line vty 0 15
Bogota(config-line)#password cisco
Bogota(config-line)#logging synchronous
Bogota(config-line)#login
Bogota(config-line)#exit
Bogota(config)#end
Bogota#
%SYS-5-CONFIG_I: Configured from console by console
Bogota #copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

## Configuración Router – Medellin

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Medellin
Medellin(config)#no ip domain-lookup
Medellin(config)#service password-encryption
Medellin(config)#enable secret class
Medellin(config)#banner motd #
Enter TEXT message. End with the character '#'.
Acceso no autorizado est estrictamente prohibido.#
Medellin(config)#line console 0
Medellin(config-line)#password cisco
Medellin(config-line)#login
```



```
Medellin(config-line)#logging synchronous
Medellin(config-line)#line vty 0 15
Medellin(config-line)#password cisco
Medellin(config-line)#logging synchronous
Medellin(config-line)#login
Medellin(config-line)#end
Medellin#
%SYS-5-CONFIG_I: Configured from console by console
Medellin#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

### Configuracion Router - Cali

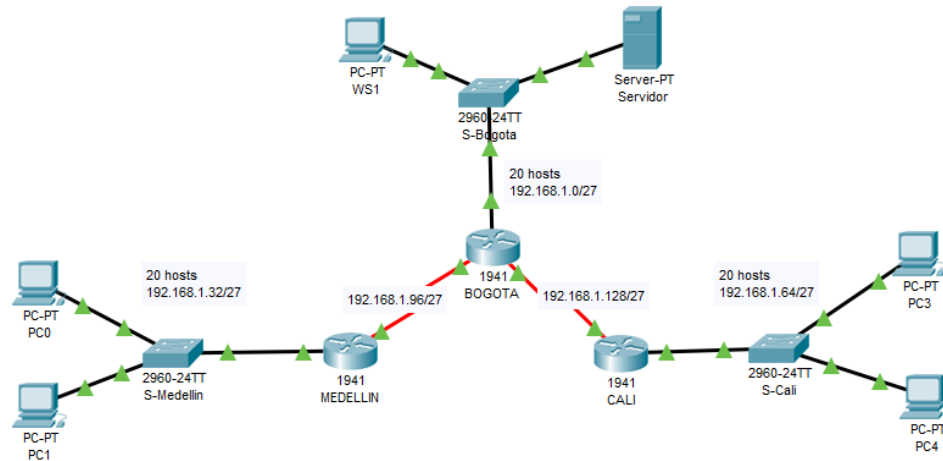
```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Cali
Cali(config)#no ip domain-lookup
Cali(config)#service password-encryption
Cali(config)#enable secret class
Cali(config)#banner motd #
Enter TEXT message. End with the character '#'.
Acceso no autorizado est estrictamente prohibido.#
Cali(config)#line console 0
Cali(config-line)#password cisco
Cali(config-line)#login
Cali(config-line)#logging synchronous
Cali(config-line)#line vty 0 15
Cali(config-line)#password cisco
Cali(config-line)#logging synchronous
Cali(config-line)#login
Cali(config-line)#end
Cali#
%SYS-5-CONFIG_I: Configured from console by console
Cali#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

### 1.3. Conexión física de los equipos.

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

### Dipositivos requeridos

- 3 Routers (cisco 1941)
- 3 Switch (cisco 2960-24TT)
- 1 Servidor
- 5 PCs con Windows 7
- Cables Serial y Ethernet



#### 1.4. Parte 1. Asignación de direcciones IP.

- a. Se debe dividir (subnetear) la red creando una segmentación en ocho partes, para permitir crecimiento futuro de la red corporativa.
- b. Asignar una dirección IP a la red.

Tabla 1		
Nombre de Subred	Dirección de Red	Máscara de Subred
Bogota LAN	192.168.1.0	255.255.255.224
Medellín LAN	192.168.1.32	255.255.255.224
Cali LAN	192.168.1.64	255.255.255.224
Bogota Medellín	192.168.1.96	255.255.255.224
Bogota Cali	192.168.1.128	255.255.255.224
Proxima	192.168.1.160	255.255.255.224
Proxima	192.168.1.192	255.255.255.224
Proxima	192.168.1.224	255.255.255.224

#### 1.5. Parte 2. Configuración básica.

- a. Completar la siguiente tabla con la configuración básica de los routers, teniendo en cuenta las subredes diseñadas.

<b>Tabla 2</b>			
	<b>R1</b>	<b>R2</b>	<b>R3</b>
<b>Nombre de Host</b>	<b>MEDELLIN</b>	<b>BOGOTA</b>	<b>CALI</b>
Dirección de Ip en interfaz Serial 0/0	192.168.1.99	192.168.1.98	192.168.1.131
Dirección de Ip en interfaz Serial 0/1		192.168.1.130	
Dirección de Ip en interfaz FA 0/0	192.168.1.33	192.168.1.1	192.168.1.65
<b>Protocolo de enrutamiento</b>	<b>Eigrp</b>	<b>Eigrp</b>	<b>Eigrp</b>
Sistema Autónomo	200	200	200
Afirmaciones de red	192.168.1.0	192.168.1.0	192.168.1.0

### Configuration Router – Medellin

```

Medellin>enable
Password:
Medellin#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Medellin(config)#interface s0/0/0
Medellin(config-if)#ip address 192.168.1.99 255.255.255.224
Medellin(config-if)#no shutdown
Medellin(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Medellin(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
Medellin(config-if)#interface g0/0
Medellin(config-if)#ip address 192.168.1.33 255.255.255.224
Medellin(config-if)#no shutdown
Medellin(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state
to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0, changed state to up
Medellin(config-if)#router eigrp 200
Medellin(config-router)#no auto-summary
Medellin(config-router)#do show ip route connected
C 192.168.1.32/27 is directly connected, GigabitEthernet0/0
C 192.168.1.96/27 is directly connected, Serial0/0/0
Medellin(config-router)#network 192.168.1.32 0.0.0.31
Medellin(config-router)#network 192.168.1.96 0.0.0.31

```

```
Medellin(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 200: Neighbor 192.168.1.98
(Serial0/0/0) is up: new adjacency
```

## Configuración Router – Bogotá

```
Bogota>enable
Password:
Bogota#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Bogota(config)#interface s0/0/0
Bogota(config-if)#ip address 192.168.1.98 255.255.255.224
Bogota(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
Bogota(config-if)#interface s0/0/1
Bogota(config-if)#ip address 192.168.1.130 255.255.255.224
Bogota(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Bogota(config-if)#interface g0/0
Bogota(config-if)#ip address 192.168.1.1 255.255.255.224
Bogota(config-if)#no shutdown
Bogota(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state
to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0, changed state to up
Bogota(config-if)#router eigrp 200
Bogota(config-router)#no auto-summary
Bogota(config-router)#do show ip route connected
C 192.168.1.0/27 is directly connected, GigabitEthernet0/0
```

## Configuration Router – Cali

```
Cali>enable
Password:
Cali#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Cali(config)#interface s0/0/0
Cali(config-if)#ip address 192.168.1.131 255.255.255.224
Cali(config-if)#no shutdown
Cali(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Cali(config-if)#
```

```

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
Cali(config-if)#interface g0/0
Cali(config-if)#ip address 192.168.1.65 255.255.255.224
Cali(config-if)#no shutdown
Cali(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state
to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0, changed state to up
Cali(config-if)#router eigrp 200
Cali(config-router)#no auto-summary
Cali(config-router)#do show ip route connected
C 192.168.1.64/27 is directly connected, GigabitEthernet0/0
C 192.168.1.128/27 is directly connected, Serial0/0/0
Cali(config-router)#network 192.168.1.64 0.0.0.31
Cali(config-router)#network 192.168.1.128 0.0.0.31
Cali(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 200: Neighbor 192.168.1.130
(Serial0/0/0) is up: new adjacency

```

b. Después de cargada la configuración en los dispositivos, verificar la tabla de enrutamiento en cada uno de los routers para comprobar las redes y sus rutas.

**Bogota#show ip route**

```

Codes: L - local, C - connected, S - static, R - RIP, M -
mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type
2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

```

Gateway of last resort is not set

```

192.168.1.0/24 is variably subnetted, 8 subnets, 2 masks
C 192.168.1.0/27 is directly connected, GigabitEthernet0/0
L 192.168.1.1/32 is directly connected, GigabitEthernet0/0
D 192.168.1.32/27 [90/2170112] via 192.168.1.99, 00:00:44,
Serial0/0/0

```

```
D 192.168.1.64/27 [90/2170112] via 192.168.1.131, 00:00:43,
Serial0/0/1
C 192.168.1.96/27 is directly connected, Serial0/0/0
L 192.168.1.98/32 is directly connected, Serial0/0/0
C 192.168.1.128/27 is directly connected, Serial0/0/1
L 192.168.1.130/32 is directly connected, Serial0/0/1
```

**Medellin#show ip route**

```
Codes: L - local, C - connected, S - static, R - RIP, M -
mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type
2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
```

Gateway of last resort is not set

```
192.168.1.0/24 is variably subnetted, 7 subnets, 2 masks
D 192.168.1.0/27 [90/2170112] via 192.168.1.98, 00:02:01,
Serial0/0/0
C 192.168.1.32/27 is directly connected, GigabitEthernet0/0
L 192.168.1.33/32 is directly connected, GigabitEthernet0/0
D 192.168.1.64/27 [90/2682112] via 192.168.1.98, 00:02:00,
Serial0/0/0
C 192.168.1.96/27 is directly connected, Serial0/0/0
L 192.168.1.99/32 is directly connected, Serial0/0/0
D 192.168.1.128/27 [90/2681856] via 192.168.1.98, 00:02:00,
Serial0/0/0
```

**Cali#show ip route**

```
Codes: L - local, C - connected, S - static, R - RIP, M -
mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type
2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
* - candidate default, U - per-user static route, o - ODR
```

P - periodic downloaded static route

Gateway of last resort is not set

```
192.168.1.0/24 is variably subnetted, 7 subnets, 2 masks
D 192.168.1.0/27 [90/2170112] via 192.168.1.130, 00:06:10,
Serial0/0/0
D 192.168.1.32/27 [90/2682112] via 192.168.1.130, 00:06:10,
Serial0/0/0
C 192.168.1.64/27 is directly connected, GigabitEthernet0/0
L 192.168.1.65/32 is directly connected, GigabitEthernet0/0
D 192.168.1.96/27 [90/2681856] via 192.168.1.130, 00:06:10,
Serial0/0/0
C 192.168.1.128/27 is directly connected, Serial0/0/0
L 192.168.1.131/32 is directly connected, Serial0/0/0
```

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

**Bogota#show ip eigrp topology**

IP-EIGRP Topology Table for AS 200/ID(192.168.1.130)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,

r - Reply status

```
P 192.168.1.0/27, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0
P 192.168.1.32/27, 1 successors, FD is 2170112
via 192.168.1.99 (2170112/2816), Serial0/0/0
P 192.168.1.64/27, 1 successors, FD is 2170112
via 192.168.1.131 (2170112/2816), Serial0/0/1
P 192.168.1.96/27, 1 successors, FD is 2169856
via Connected, Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2169856
via Connected, Serial0/0/1
```

**Medellin#show ip eigrp topology**

IP-EIGRP Topology Table for AS 200/ID(192.168.1.99)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,

r - Reply status

```
P 192.168.1.0/27, 1 successors, FD is 2170112
via 192.168.1.98 (2170112/2816), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0
```

```
P 192.168.1.64/27, 1 successors, FD is 2682112
via 192.168.1.98 (2682112/2170112), Serial0/0/0
P 192.168.1.96/27, 1 successors, FD is 2169856
via Connected, Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2681856
via 192.168.1.98 (2681856/2169856), Serial0/0/0
```

**Cali#show ip eigrp topology**

IP-EIGRP Topology Table for AS 200/ID(192.168.1.131)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,

r - Reply status

```
P 192.168.1.0/27, 1 successors, FD is 2170112
via 192.168.1.130 (2170112/2816), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 2682112
via 192.168.1.130 (2682112/2170112), Serial0/0/0
P 192.168.1.64/27, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0
P 192.168.1.96/27, 1 successors, FD is 2681856
via 192.168.1.130 (2681856/2169856), Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2169856
via Connected, Serial0/0/0
```

d. Realizar un diagnóstico de vecinos usando el comando cdp.

**Bogota#show cdp neighbor**

Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge

S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone

Device ID Local Infrfce Holdtme Capability Platform Port ID

```
S-Bogota Gig 0/0 138 S 2960 Gig 0/1
Medellin Ser 0/0/0 145 R C1900 Ser 0/0/0
Cali Ser 0/0/1 138 R C1900 Ser 0/0/0
```

**Medellin#show cdp neighbor**

Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge

S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone

Device ID Local Infrfce Holdtme Capability Platform Port ID

```
S-Medellin Gig 0/0 156 S 2960 Gig 0/1
Bogota Ser 0/0/0 155 R C1900 Ser 0/0/0
```

**Cali#show cdp neighbor**

Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge



```
S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone
Device ID Local Intrfce Holdtme Capability Platform Port ID
S-Cali Gig 0/0 169 S 2960 Gig 0/1
Bogota Ser 0/0/0 169 R C1900 Ser 0/0/1
```

e. Realizar una prueba de conectividad en cada tramo de la ruta usando Ping.

**Medellin#ping 192.168.1.99**

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.99, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
3/11/15 ms
```

**Medellin#ping 192.168.1.131**

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.131, timeout is 2
seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
3/9/16 ms
```

### 1.6. Parte 3. Configuration de enrutamiento.

- a. Asignar el protocolo de enrutamiento EIGRP a los routers considerando el direccionamiento diseñado.
- b. Verificar si existe vecindad con los routers configurados con EIGRP.

**Bogota#show ip eigrp neighbor**

```
IP-EIGRP neighbors for process 200
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 192.168.1.131 Se0/0/1 11 00:48:46 40 1000 0 29
1 192.168.1.99 Se0/0/0 11 00:12:28 40 1000 0 7
```

**Medellin#show ip eigrp neighbor**

```
IP-EIGRP neighbors for process 200
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 192.168.1.98 Se0/0/0 11 00:14:07 40 1000 0 25
```

**Cali#show ip eigrp neighbor**

```
IP-EIGRP neighbors for process 200
H Address Interface Hold Uptime SRTT RTO Q Seq
```

```
(sec) (ms) Cnt Num
0 192.168.1.130 Se0/0/0 12 00:51:39 40 1000 0 24
```

## SHOW IP EIGRP TOPOLOGY

### Bogota#show ip eigrp topology

```
IP-EIGRP Topology Table for AS 200/ID(192.168.1.130)
Codes: P - Passive, A - Active, U - Update, Q - Query, R -
Reply,
r - Reply status
P 192.168.1.0/27, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0
P 192.168.1.32/27, 1 successors, FD is 2170112
via 192.168.1.99 (2170112/2816), Serial0/0/0
P 192.168.1.64/27, 1 successors, FD is 2170112
via 192.168.1.131 (2170112/2816), Serial0/0/1
P 192.168.1.96/27, 1 successors, FD is 2169856
via Connected, Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2169856
via Connected, Serial0/0/1
```

### Medellin#show ip eigrp topology

```
IP-EIGRP Topology Table for AS 200/ID(192.168.1.99)
Codes: P - Passive, A - Active, U - Update, Q - Query, R -
Reply,
r - Reply status
P 192.168.1.0/27, 1 successors, FD is 2170112
via 192.168.1.98 (2170112/2816), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0
P 192.168.1.64/27, 1 successors, FD is 2682112
via 192.168.1.98 (2682112/2170112), Serial0/0/0
P 192.168.1.96/27, 1 successors, FD is 2169856
via Connected, Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2681856
via 192.168.1.98 (2681856/2169856), Serial0/0/0
```

### Cali#show ip eigrp topology

```
IP-EIGRP Topology Table for AS 200/ID(192.168.1.131)
Codes: P - Passive, A - Active, U - Update, Q - Query, R -
Reply,
r - Reply status
P 192.168.1.0/27, 1 successors, FD is 2170112
via 192.168.1.130 (2170112/2816), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 2682112
```

```

via 192.168.1.130 (2682112/2170112), Serial0/0/0
P 192.168.1.64/27, 1 successors, FD is 2816
via Connected, GigabitEthernet0/0
P 192.168.1.96/27, 1 successors, FD is 2681856
via 192.168.1.130 (2681856/2169856), Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2169856
via Connected, Serial0/0/0

```

- c. Realizar la comprobación de las tablas de enrutamiento en cada uno de los routers para verificar cada una de las rutas establecidas.

**Bogota#show ip route**

```

Codes: L - local, C - connected, S - static, R - RIP, M -
mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF
inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA
external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2,
E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia
- IS-IS inter area
        * - candidate default, U - per-user static route, o -
ODR
        P - periodic downloaded static route

```

Gateway of last resort is not set

```

        192.168.1.0/24 is variably subnetted, 8 subnets, 2 masks
C 192.168.1.0/27 is directly connected, GigabitEthernet0/0
L 192.168.1.1/32 is directly connected, GigabitEthernet0/0
D 192.168.1.32/27 [90/2170112] via 192.168.1.99, 00:23:50,
Serial0/0/0
D 192.168.1.64/27 [90/2170112] via 192.168.1.131, 01:00:08,
Serial0/0/1
C 192.168.1.96/27 is directly connected, Serial0/0/0
L 192.168.1.98/32 is directly connected, Serial0/0/0
C 192.168.1.128/27 is directly connected, Serial0/0/1
L 192.168.1.130/32 is directly connected, Serial0/0/1

```

**Medellin#show ip route**

```

Codes: L - local, C - connected, S - static, R - RIP, M -
mobile, B - BGP

```

```
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type
2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
```

Gateway of last resort is not set

```
192.168.1.0/24 is variably subnetted, 7 subnets, 2 masks
D 192.168.1.0/27 [90/2170112] via 192.168.1.98, 00:26:11,
Serial0/0/0
C 192.168.1.32/27 is directly connected, GigabitEthernet0/0
L 192.168.1.33/32 is directly connected, GigabitEthernet0/0
D 192.168.1.64/27 [90/2682112] via 192.168.1.98, 00:26:11,
Serial0/0/0
C 192.168.1.96/27 is directly connected, Serial0/0/0
L 192.168.1.99/32 is directly connected, Serial0/0/0
D 192.168.1.128/27 [90/2681856] via 192.168.1.98, 00:26:11,
Serial0/0/0
```

### **Cali#show ip route**

```
Codes: L - local, C - connected, S - static, R - RIP, M -
mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type
2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
```

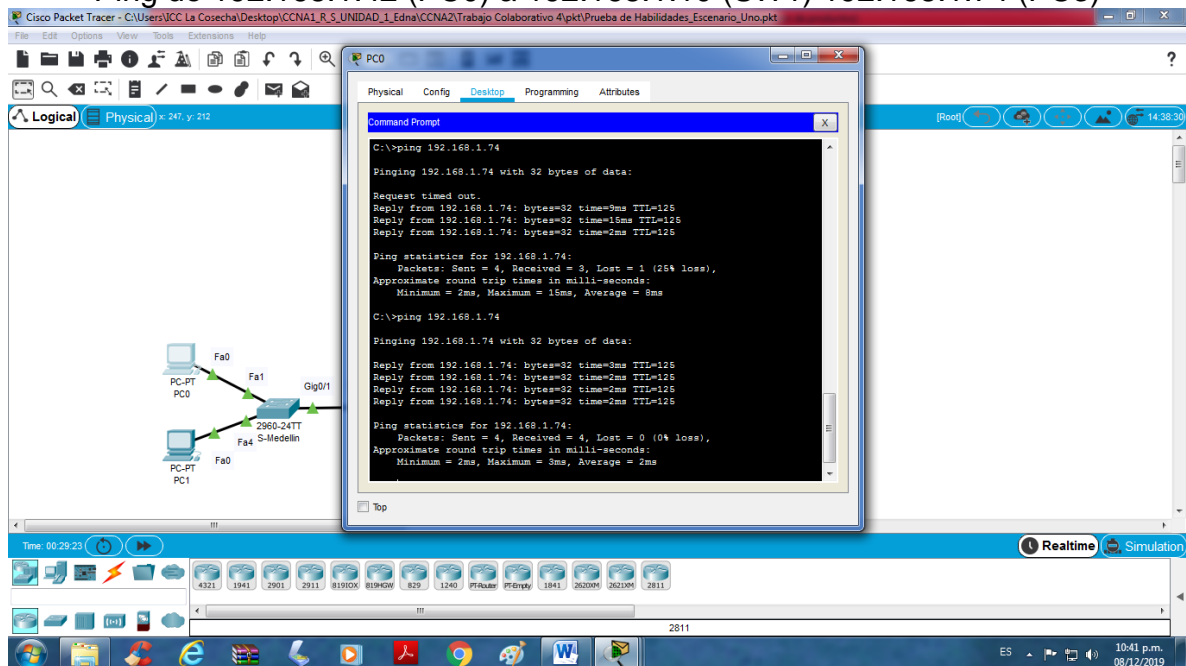
Gateway of last resort is not set

```
192.168.1.0/24 is variably subnetted, 7 subnets, 2 masks
D 192.168.1.0/27 [90/2170112] via 192.168.1.130, 00:52:00,
Serial0/0/0
D 192.168.1.32/27 [90/2682112] via 192.168.1.130, 00:27:04,
Serial0/0/0
C 192.168.1.64/27 is directly connected, GigabitEthernet0/0
```

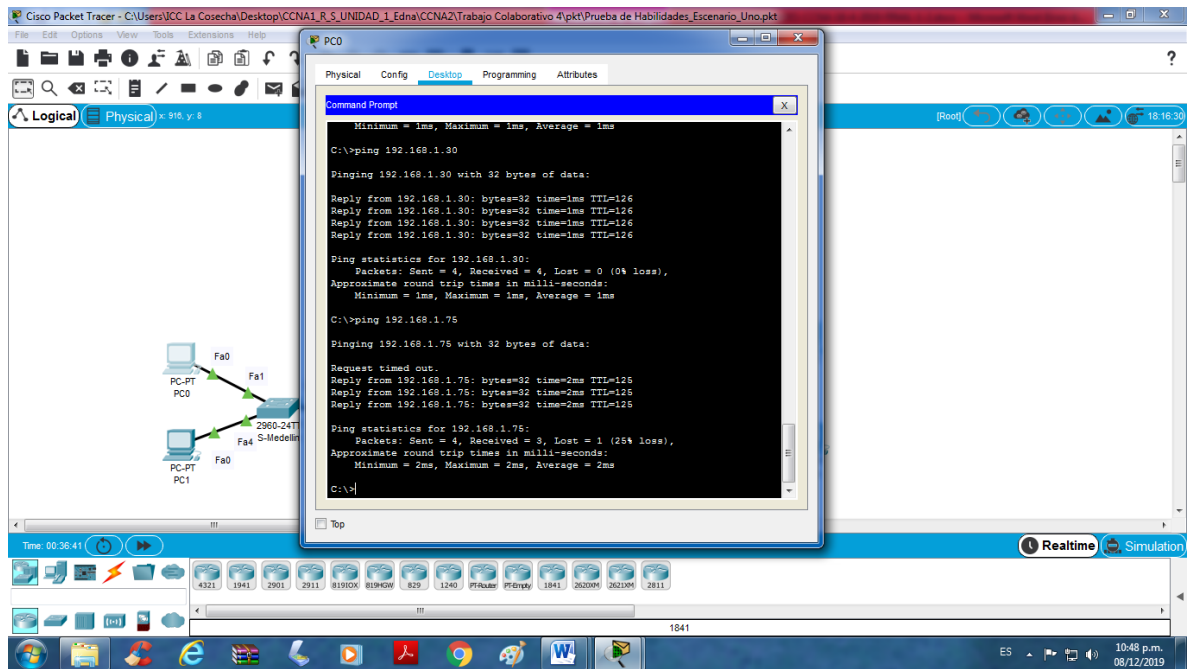
```
L 192.168.1.65/32 is directly connected, GigabitEthernet0/0
D 192.168.1.96/27 [90/2681856] via 192.168.1.130, 00:27:11,
Serial0/0/0
C 192.168.1.128/27 is directly connected, Serial0/0/0
L 192.168.1.131/32 is directly connected, Serial0/0/0
```

- d. Realizar un diagnóstico para comprobar que cada uno de los puntos de la red se puedan ver y tengan conectividad entre sí. Realizar esta prueba desde un host de la red LAN del router CALI, primero a la red de MEDELLIN y luego al servidor.

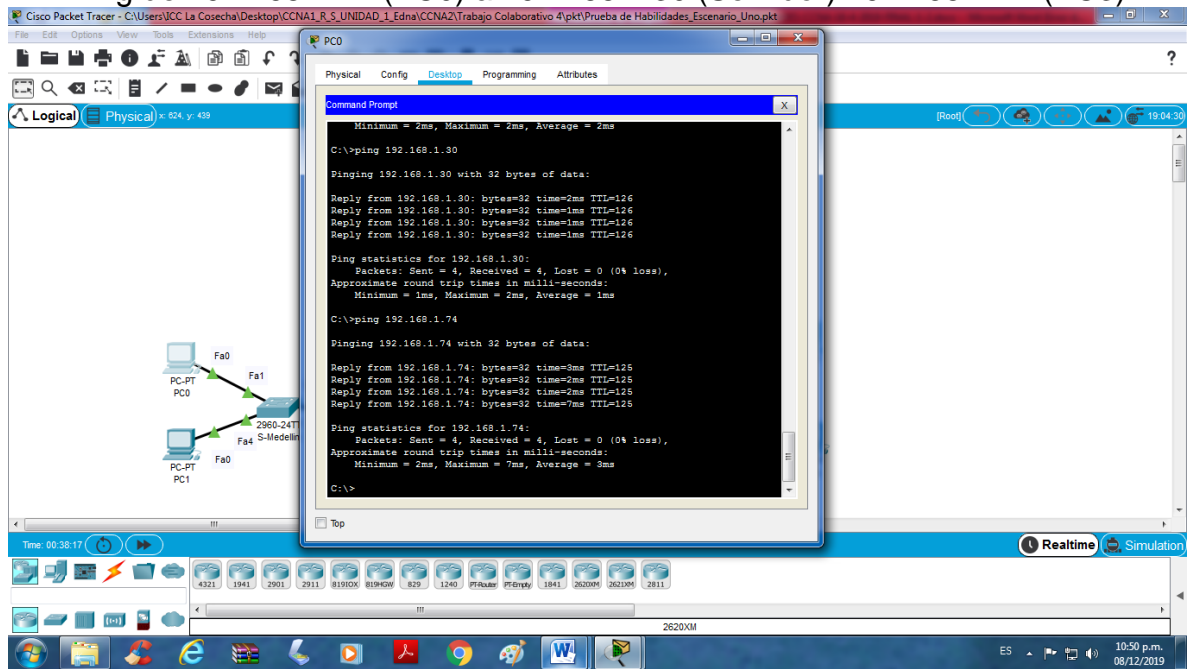
Ping de 192.168.1.42 (PC0) a 192.168.1.10 (SW1) 192.168.1.74 (PC3)



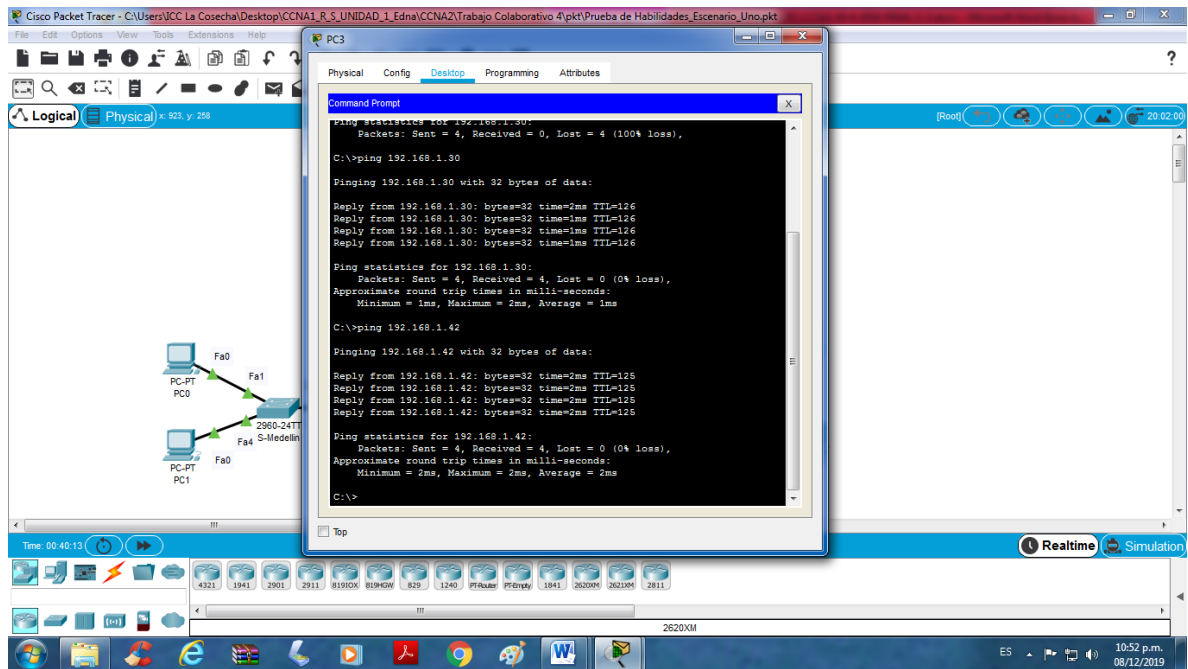
Ping de 192.168.1.42 (PC0) a 192.168.1.30 (Servidor) 192.168.1.75 (PC4)



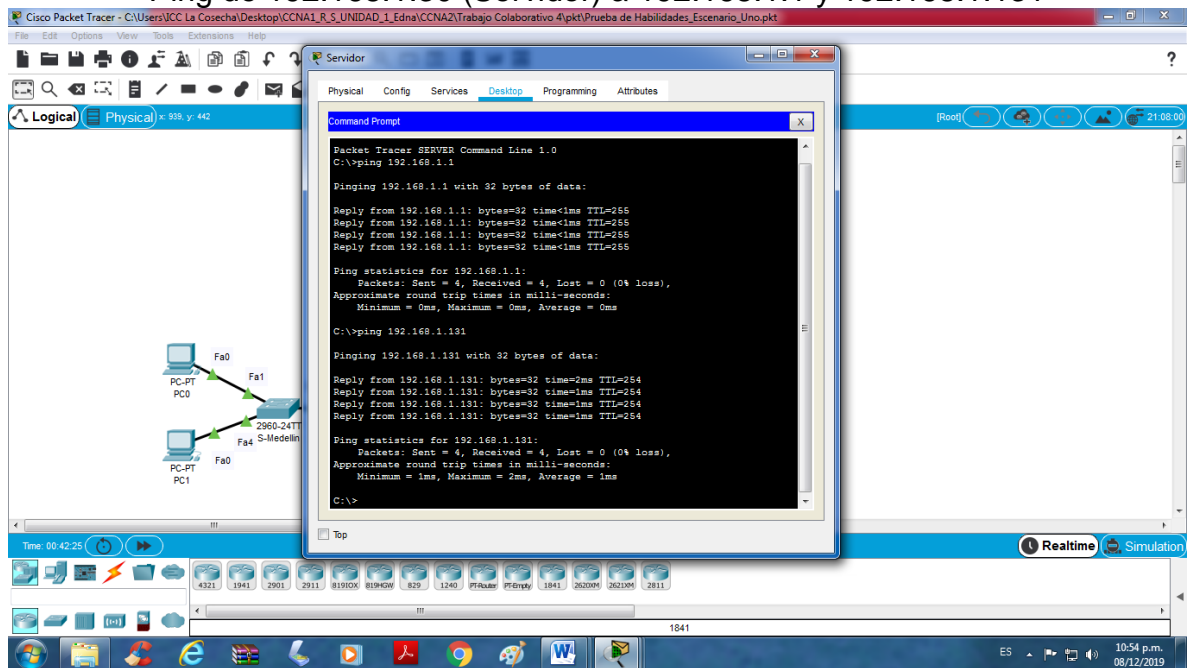
Ping de 192.168.1.42 (PC0) a 192.168.1.30 (Servidor) 192.168.1.74 (PC3)



Ping 192.168.1.74 (PC3) a 192.168.1.30 (Servidor) 192.168.1.42 (PC0)

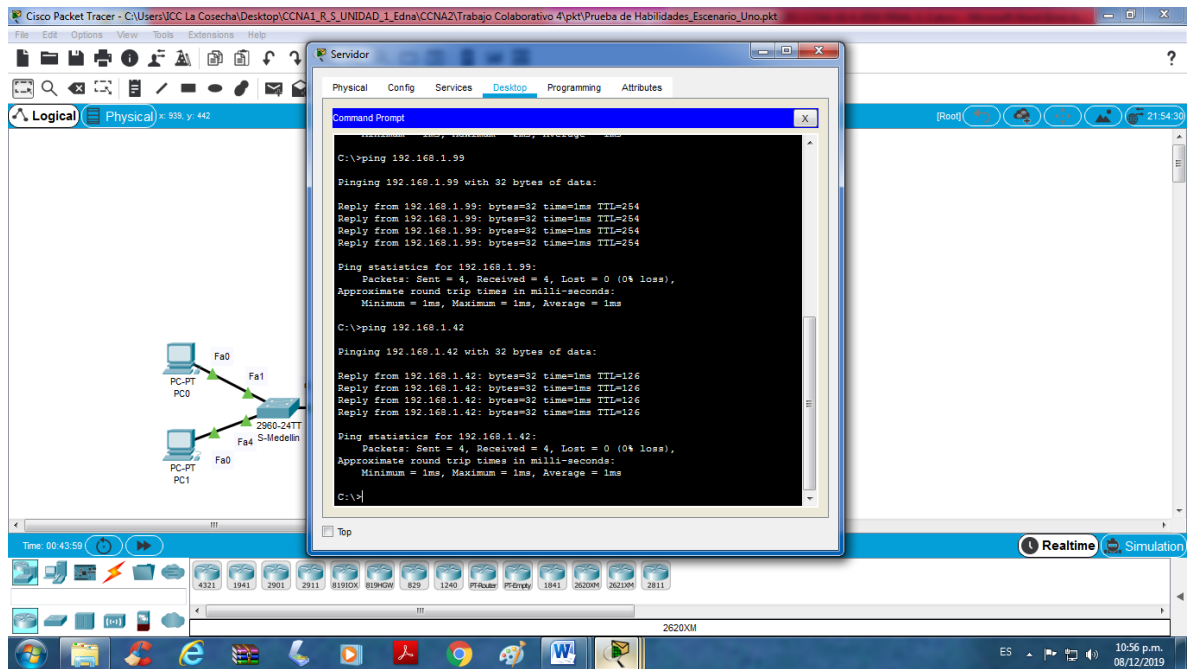


### Ping de 192.168.1.30 (Servidor) a 192.168.1.1 y 192.168.1.131

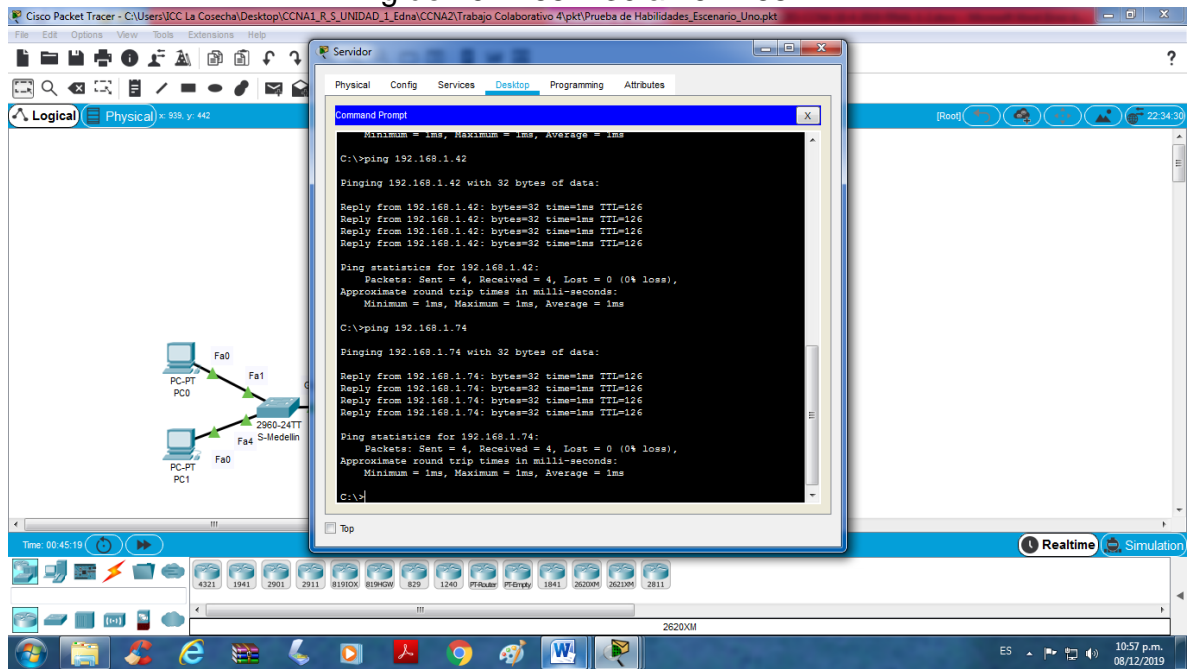


### Ping de 192.168.1.30 a 192.168.1.99 y 192.168.1.42





### Ping de 192.168.1.30 a 192.168.1.74



## 1.7. Parte 4. Configuración de las listas de control de acceso.



En este momento cualquier usuario de la red tiene acceso a todos sus dispositivos y estaciones de trabajo. El jefe de redes le solicita implementar seguridad en la red. Para esta labor se decide configurar listas de control de acceso (ACL) a los routers.

Las condiciones para crear las ACL son las siguientes:

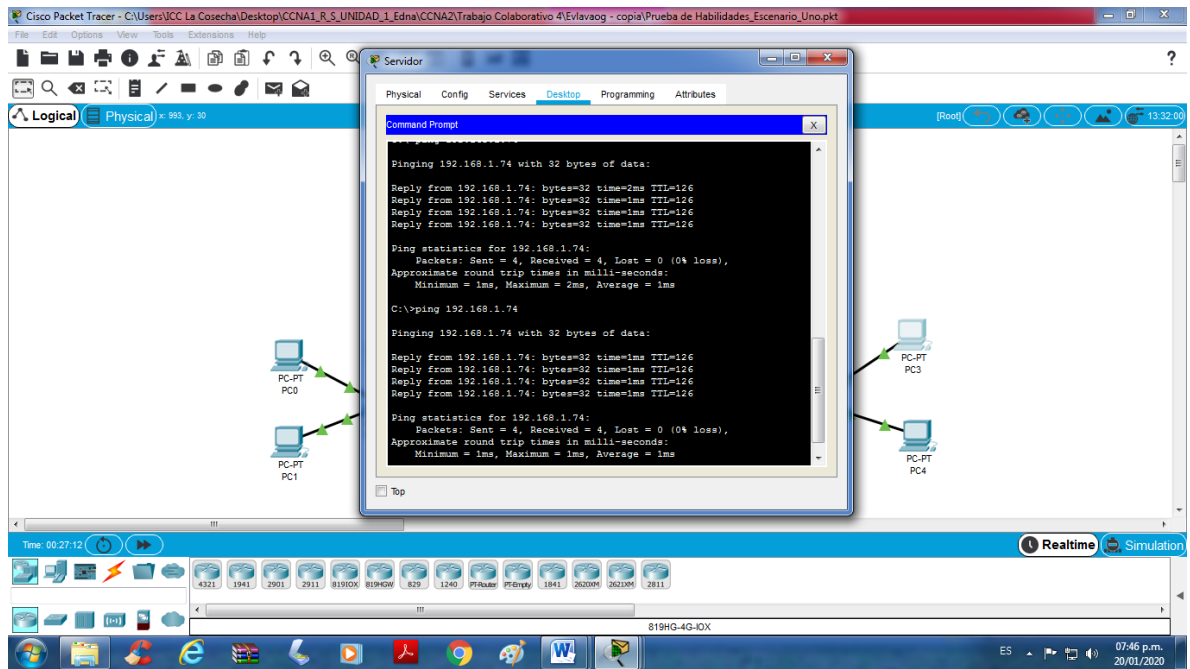
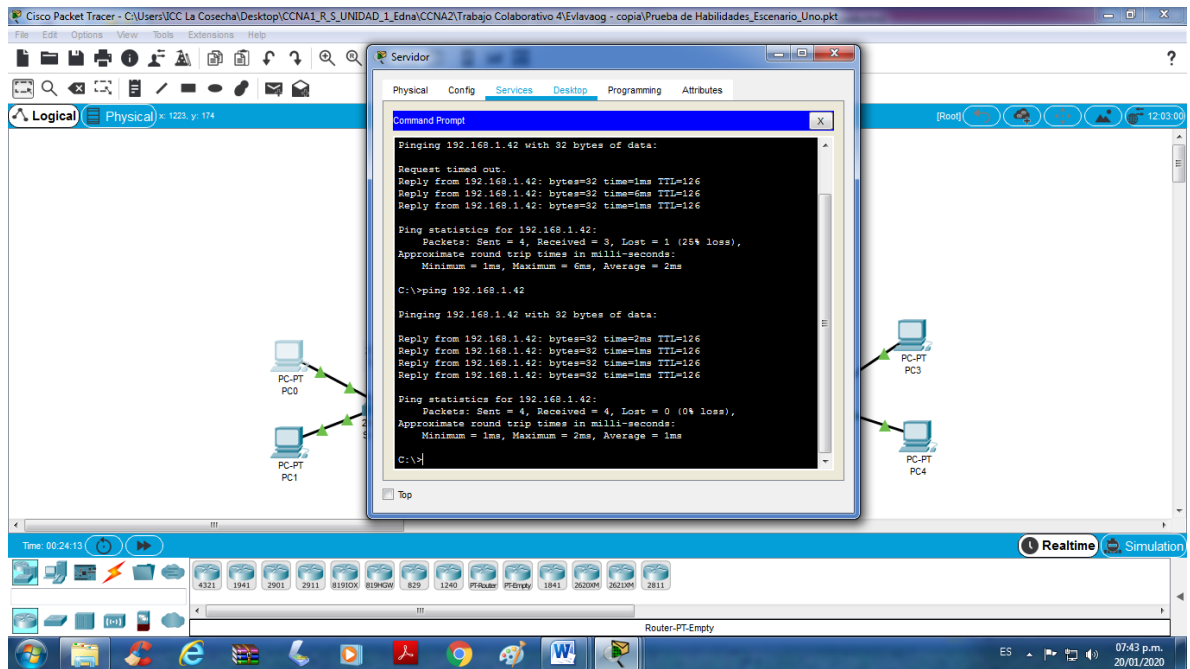
a. Cada router debe estar habilitado para establecer conexiones Telnet con los demás routers y tener acceso a cualquier dispositivo en la red.

```
Bogota(config)#line console 0
Bogota(config-line)#password cisco
Bogota(config-line)#login
Bogota(config-line)#logging synchronous
Bogota(config-line)#line vty 0 15
Bogota(config-line)#password cisco
Bogota(config-line)#logging synchronous
Bogota(config-line)#login
Bogota(config-line)#exit
Bogota(config)#end
```

b. El equipo WS1 y el servidor se encuentran en la subred de administración. Solo el servidor de la subred de administración debe tener acceso a cualquier otro dispositivo en cualquier parte de la red.

**Bogota#configure terminal**

```
Enter configuration commands, one per line. End with CNTL/Z.
Bogota(config)#access-list 101 permit ip host 192.168.1.30
any
Bogota(config)#interface g0/0
Bogota(config-if)#ip access-group 101 in
```



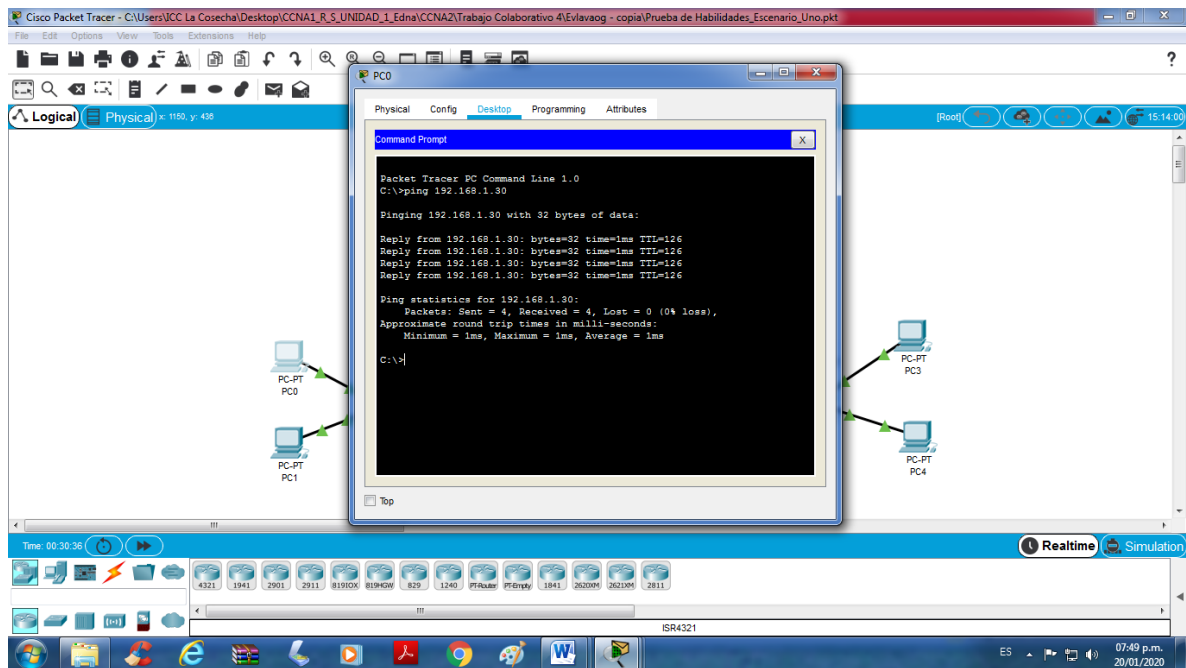
c. Las estaciones de trabajo en las LAN de MEDELLIN y CALI no deben tener acceso a ningún dispositivo fuera de su subred, excepto para interconectar con el servidor.

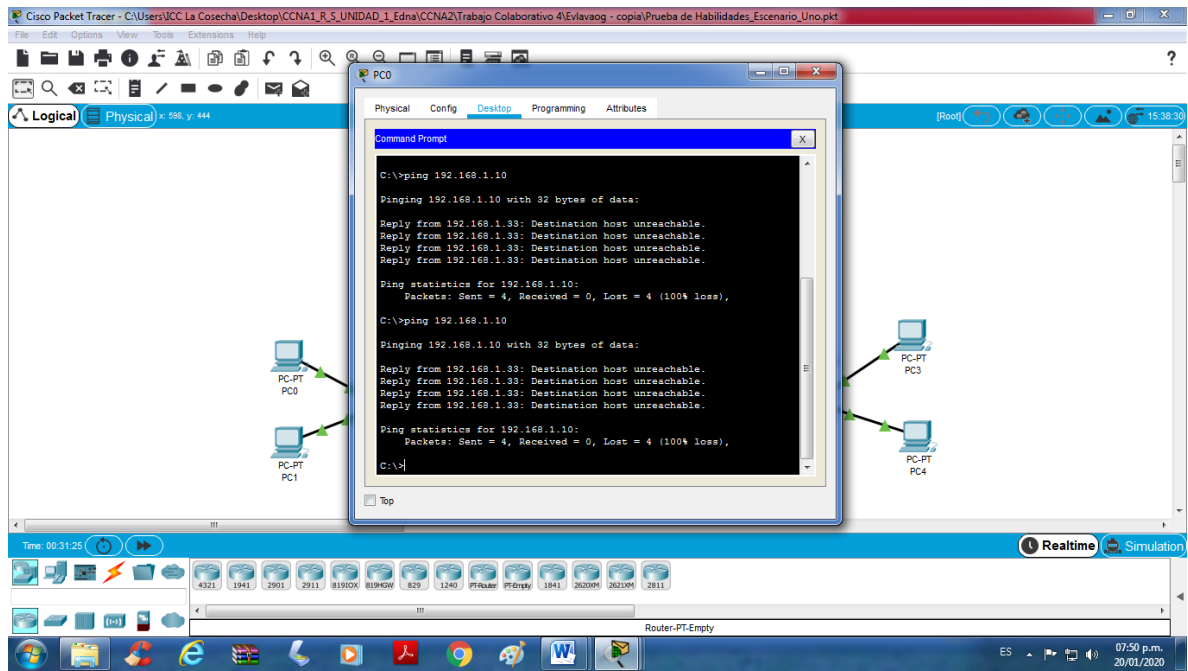
**Medellin#configure terminal**

```
Enter configuration commands, one per line. End with CNTL/Z.
Medellin(config)#access-list 101 permit ip 192.168.1.32
0.0.0.31 host 192.168.1.30
Medellin(config)#interface g0/0
Medellin(config-if)#ip access-group 101 in
```

**Cali#configure terminal**

```
Enter configuration commands, one per line. End with CNTL/Z.
Cali(config)#access-list 101 permit ip 192.168.1.64 0.0.0.31
host 192.168.1.30
Cali(config)#interface g0/0
Cali(config-if)#ip access-group 101 in
```





### 1.8. Parte 5. Comprobación de la red instalada.

- a. Se debe probar que la configuración de las listas de acceso fue exitosa.
- b. Comprobar y Completar la siguiente tabla de condiciones de prueba para confirmar el óptimo funcionamiento de la red.

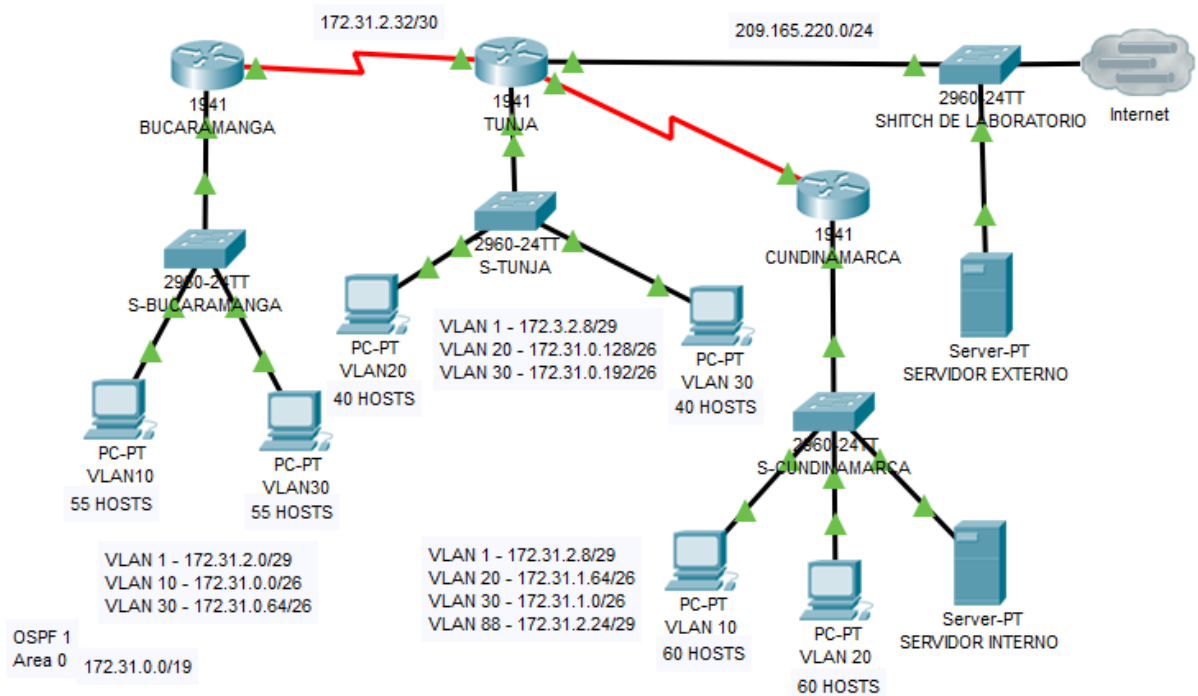
<b>Tabla 3</b>			
	<b>ORIGEN</b>	<b>DESTINO</b>	<b>RES</b>
<b>TELNET</b>	<b>Router MEDELLIN</b>	<b>Router CALI</b>	Exitosa
	<b>WS_1</b>	<b>Router BOGOTA</b>	Fallida
	<b>Servidor</b>	<b>Router CALI</b>	Exitosa
	<b>Servidor</b>	<b>Router MEDELLIN</b>	Exitosa
<b>TELNET</b>	<b>LAN del Router MEDELLIN</b>	<b>Router CALI</b>	Fallida
	<b>LAN del Router CALI</b>	<b>Router CALI</b>	Fallida
	<b>LAN del Router MEDELLIN</b>	<b>Router MEDELLIN</b>	Fallida
	<b>LAN del Router CALI</b>	<b>Router MEDELLIN</b>	Fallida
<b>PING</b>	<b>LAN del Router CALI</b>	<b>WS_1</b>	Fallida
	<b>LAN del Router MEDELLIN</b>	<b>WS_1</b>	Fallida
	<b>LAN del Router MEDELLIN</b>	<b>LAN del Router CALI</b>	Fallida
<b>PING</b>	<b>LAN del Router CALI</b>	<b>Servidor</b>	Exitosa
	<b>LAN del Router MEDELLIN</b>	<b>Servidor</b>	Exitosa
	<b>Servidor</b>	<b>LAN del Router MEDELLIN</b>	Exitosa
	<b>Servidor</b>	<b>LAN del Router CALI</b>	Exitosa
	<b>Router CALI</b>	<b>LAN del Router MEDELLIN</b>	Fallida
	<b>Router MEDELLIN</b>	<b>LAN del Router CALI</b>	Fallida

## 2. Escenario dos

Una empresa tiene la conexión a internet en una red Ethernet, lo cual deben adaptarlo para facilitar que sus routers y las redes que incluyen puedan, por esa vía, conectarse a internet, pero empleando las direcciones de la red LAN original.

### 2.1. Topología de la red.

- 3 Routers (cisco 1941)
- 4 Switch (cisco 2960-24TT)
- 1 Servidor
- 5 PCs con Windows 7
- Cables Serial y Ethernet



## 2.2. Configuración de la red.

Los siguientes son los requerimientos necesarios:

1. Todos los routers deberán tener los siguiente:

a. Configuración básica.

### Configuración Router - Bucaramanga

```
Bucaramanga#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Bucaramanga(config)#interface g0/0.1
Bucaramanga(config-subif)#encapsulation dot1q 1
Bucaramanga(config-subif)#ip address 172.31.2.1
255.255.255.248
Bucaramanga(config-subif)#interface g0/0.10
Bucaramanga(config-subif)#encapsulation dot1q 10
Bucaramanga(config-subif)#ip address 172.31.0.1
255.255.255.192
Bucaramanga(config-subif)#interface g0/0.30
Bucaramanga(config-subif)#encapsulation dot1q 30
Bucaramanga(config-subif)#ip address 172.31.0.65
255.255.255.192
Bucaramanga(config-subif)#interface g0/0
Bucaramanga(config-if)#no shutdown
Bucaramanga(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state
to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/0.1, changed
state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0.1, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/0.10, changed
state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0.10, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/0.30, changed
state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0.30, changed state to up

Bucaramanga(config-if)#exit
Bucaramanga(config)#interface s0/0/0
```

```
Bucaramanga(config-if)#ip address 172.31.2.34 255.255.255.252
Bucaramanga(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
Bucaramanga(config-if)#router ospf 1
Bucaramanga(config-router)#do show ip route connected
C 172.31.0.0/26 is directly connected, GigabitEthernet0/0.10
C 172.31.0.64/26 is directly connected, GigabitEthernet0/0.30
C 172.31.2.0/29 is directly connected, GigabitEthernet0/0.1
C 172.31.2.32/30 is directly connected, Serial0/0/0
```

```
Cundinamarca(config-router)#network 172.31.1.0 0.0.0.63 area
0
Cundinamarca(config-router)#network 172.31.1.64 0.0.0.63 area
0
Cundinamarca(config-router)#network 172.31.2.8 0.0.0.7 area 0
Cundinamarca(config-router)#network 172.31.2.24 0.0.0.7 area
0
Cundinamarca(config-router)#network 172.31.2.36 0.0.0.3 area
0
Cundinamarca(config-router)#
01:10:54: %OSPF-5-ADJCHG: Process 1, Nbr 209.165.220.1 on
Serial0/0/0 from LOADING to FULL, Loading Done
```

```
Bucaramanga#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M -
mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type
2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
```

Gateway of last resort is not set

```
172.3.0.0/29 is subnetted, 1 subnets
O 172.3.2.8/29 [110/65] via 172.31.2.33, 00:15:56,
Serial0/0/0
172.31.0.0/16 is variably subnetted, 15 subnets, 4 masks
C 172.31.0.0/26 is directly connected, GigabitEthernet0/0.10
L 172.31.0.1/32 is directly connected, GigabitEthernet0/0.10
C 172.31.0.64/26 is directly connected, GigabitEthernet0/0.30
L 172.31.0.65/32 is directly connected, GigabitEthernet0/0.30
```

```
O 172.31.0.128/26 [110/65] via 172.31.2.33, 00:15:56,
Serial0/0/0
O 172.31.0.192/26 [110/65] via 172.31.2.33, 00:15:56,
Serial0/0/0
O 172.31.1.0/26 [110/129] via 172.31.2.33, 00:07:05,
Serial0/0/0
O 172.31.1.64/26 [110/129] via 172.31.2.33, 00:07:05,
Serial0/0/0
C 172.31.2.0/29 is directly connected, GigabitEthernet0/0.1
L 172.31.2.1/32 is directly connected, GigabitEthernet0/0.1
O 172.31.2.8/29 [110/129] via 172.31.2.33, 00:07:05,
Serial0/0/0
O 172.31.2.24/29 [110/129] via 172.31.2.33, 00:07:05,
Serial0/0/0
C 172.31.2.32/30 is directly connected, Serial0/0/0
L 172.31.2.34/32 is directly connected, Serial0/0/0
O 172.31.2.36/30 [110/128] via 172.31.2.33, 00:09:20,
Serial0/0/0
```

## Configuración Router – Tunja

```
Tunja#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Tunja(config)#int g0/0.1
Tunja(config-subif)#encapsulation dot1q 1
Tunja(config-subif)#ip address 172.3.2.9 255.255.255.248
Tunja(config-subif)#int g0/0.20
Tunja(config-subif)#encapsulation dot1q 20
Tunja(config-subif)#ip address 172.31.0.129 255.255.255.192
Tunja(config-subif)#int g0/0.30
Tunja(config-subif)#encapsulation dot1q 30
Tunja(config-subif)#ip address 172.31.0.193 255.255.255.192
Tunja(config-subif)#int g0/0
Tunja(config-if)#no shutdown

Tunja(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state
to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/0.1, changed
state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0.1, changed state to up
```



```
%LINK-5-CHANGED: Interface GigabitEthernet0/0.20, changed
state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0.20, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/0.30, changed
state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0.30, changed state to up

Tunja(config-if)#int s0/0/0
Tunja(config-if)#ip address 172.31.2.33 255.255.255.252
Tunja(config-if)#no shutdown
Tunja(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Tunja(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
Tunja(config-if)#int s0/0/1
Tunja(config-if)#ip address 172.31.2.37 255.255.255.252
Tunja(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
Tunja(config-if)#int g0/1
Tunja(config-if)#ip address 209.165.220.1 255.255.255.0
Tunja(config-if)#no shutdown
Tunja(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state
to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/1, changed state to up
Tunja(config-if)#router ospf 1
Tunja(config-router)#do show ip route connected
C 172.3.2.8/29 is directly connected, GigabitEthernet0/0.1
C 172.31.0.128/26 is directly connected,
GigabitEthernet0/0.20
C 172.31.0.192/26 is directly connected,
GigabitEthernet0/0.30
C 172.31.2.32/30 is directly connected, Serial0/0/0
C 209.165.220.0/24 is directly connected, GigabitEthernet0/1

Tunja(config-router)#network 172.3.2.8 0.0.0.7 area 0
Tunja(config-router)#network 172.31.0.128 0.0.0.63 area 0
Tunja(config-router)#network 172.31.0.192 0.0.0.63 area 0
Tunja(config-router)#network 172.31.2.32 0.0.0.3 area 0
Tunja(config-router)#
```

```
01:22:18: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.34 on
Serial0/0/0 from LOADING to FULL, Loading Done
```

```
Tunja(config-router)#network 172.31.2.36 0.0.0.3 area 0
Tunja(config-router)#network 172.3.2.8 0.0.0.7 area 0
Tunja(config-router)#network 172.31.0.128 0.0.0.63 area 0
Tunja(config-router)#network 172.31.0.192 0.0.0.63 area 0
Tunja(config-router)#network 172.31.2.32 0.0.0.3 area 0
Tunja(config-router)#end
Tunja#
%SYS-5-CONFIG_I: Configured from console by console
```

### **Tunja#show ip route**

```
Codes: L - local, C - connected, S - static, R - RIP, M -
mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type
2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
```

```
Gateway of last resort is not set
```

```
172.3.0.0/16 is variably subnetted, 2 subnets, 2 masks
C 172.3.2.8/29 is directly connected, GigabitEthernet0/0.1
L 172.3.2.9/32 is directly connected, GigabitEthernet0/0.1
172.31.0.0/16 is variably subnetted, 9 subnets, 4 masks
O 172.31.0.0/26 [110/65] via 172.31.2.34, 00:01:17,
Serial0/0/0
O 172.31.0.64/26 [110/65] via 172.31.2.34, 00:01:17,
Serial0/0/0
C 172.31.0.128/26 is directly connected,
GigabitEthernet0/0.20
L 172.31.0.129/32 is directly connected,
GigabitEthernet0/0.20
C 172.31.0.192/26 is directly connected,
GigabitEthernet0/0.30
L 172.31.0.193/32 is directly connected,
GigabitEthernet0/0.30
O 172.31.2.0/29 [110/65] via 172.31.2.34, 00:01:17,
Serial0/0/0
```

```
C 172.31.2.32/30 is directly connected, Serial0/0/0
L 172.31.2.33/32 is directly connected, Serial0/0/0
209.165.220.0/24 is variably subnetted, 2 subnets, 2 masks
C 209.165.220.0/24 is directly connected, GigabitEthernet0/1
L 209.165.220.1/32 is directly connected, GigabitEthernet0/1
```

## Configuración Router – Cundinamarca

```
Cundinamarca#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Cundinamarca(config)#int g0/0.1
Cundinamarca(config-subif)#encapsulation dot1q 1
Cundinamarca(config-subif)#ip address 172.31.2.9
255.255.255.248
Cundinamarca(config-subif)#int g0/0.20
Cundinamarca(config-subif)#encapsulation dot1q 20
Cundinamarca(config-subif)#ip address 172.31.1.65
255.255.255.192
Cundinamarca(config-subif)#int g0/0.30
Cundinamarca(config-subif)#encapsulation dot1q 30
Cundinamarca(config-subif)#ip address 172.31.1.1
255.255.255.192
Cundinamarca(config-subif)#int g0/0.88
Cundinamarca(config-subif)#encapsulation dot1q 88
Cundinamarca(config-subif)#ip address 172.31.2.25
255.255.255.248
Cundinamarca(config-subif)#int g0/0
Cundinamarca(config-if)#no shutdown

Cundinamarca(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state
to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/0.1, changed
state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0.1, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/0.20, changed
state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0.20, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/0.30, changed
state to up
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0.30, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/0.88, changed
state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0.88, changed state to up

Cundinamarca(config-if)#int s0/0/0
Cundinamarca(config-if)#ip address 172.31.2.38
255.255.255.252
Cundinamarca(config-if)#no shutdown

Cundinamarca(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Cundinamarca(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
Cundinamarca(config-if)#router ospf 1
Cundinamarca(config-router)#do show ip route connected
C 172.31.1.0/26 is directly connected, GigabitEthernet0/0.30
C 172.31.1.64/26 is directly connected, GigabitEthernet0/0.20
C 172.31.2.8/29 is directly connected, GigabitEthernet0/0.1
C 172.31.2.24/29 is directly connected, GigabitEthernet0/0.88
C 172.31.2.36/30 is directly connected, Serial0/0/0

Cundinamarca(config-router)#network 172.31.1.0 0.0.0.63 area 0
Cundinamarca(config-router)#network 172.31.1.64 0.0.0.63 area
0
Cundinamarca(config-router)#network 172.31.2.8 0.0.0.7 area 0
Cundinamarca(config-router)#network 172.31.2.24 0.0.0.7 area
0
Cundinamarca(config-router)#network 172.31.2.36 0.0.0.3 area
0
Cundinamarca(config-router)#
01:10:54: %OSPF-5-ADJCHG: Process 1, Nbr 209.165.220.1 on
Serial0/0/0 from LOADING to FULL, Loading Done

Cundinamarca(config-router)#end
Cundinamarca#
%SYS-5-CONFIG_I: Configured from console by console

Cundinamarca#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M -
mobile, B - BGP
```

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area  
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2  
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP  
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area  
\* - candidate default, U - per-user static route, o - ODR  
P - periodic downloaded static route

Gateway of last resort is not set

```
172.3.0.0/29 is subnetted, 1 subnets
O 172.3.2.8/29 [110/65] via 172.31.2.37, 00:00:33,
Serial0/0/0
172.31.0.0/16 is variably subnetted, 16 subnets, 4 masks
O 172.31.0.0/26 [110/129] via 172.31.2.37, 00:00:33,
Serial0/0/0
O 172.31.0.64/26 [110/129] via 172.31.2.37, 00:00:33,
Serial0/0/0
O 172.31.0.128/26 [110/65] via 172.31.2.37, 00:00:33,
Serial0/0/0
O 172.31.0.192/26 [110/65] via 172.31.2.37, 00:00:33,
Serial0/0/0
C 172.31.1.0/26 is directly connected, GigabitEthernet0/0.30
L 172.31.1.1/32 is directly connected, GigabitEthernet0/0.30
C 172.31.1.64/26 is directly connected, GigabitEthernet0/0.20
L 172.31.1.65/32 is directly connected, GigabitEthernet0/0.20
O 172.31.2.0/29 [110/129] via 172.31.2.37, 00:00:33,
Serial0/0/0
C 172.31.2.8/29 is directly connected, GigabitEthernet0/0.1
L 172.31.2.9/32 is directly connected, GigabitEthernet0/0.1
C 172.31.2.24/29 is directly connected, GigabitEthernet0/0.88
L 172.31.2.25/32 is directly connected, GigabitEthernet0/0.88
O 172.31.2.32/30 [110/128] via 172.31.2.37, 00:00:33,
Serial0/0/0
C 172.31.2.36/30 is directly connected, Serial0/0/0
L 172.31.2.38/32 is directly connected, Serial0/0/0
```

### Configuracion Switch – Bucaramanga

```
S-Bucaramanga#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
S-Bucaramanga(config)#vlan 1
S-Bucaramanga(config-vlan)#vlan 10
```

```
S-Bucaramanga(config-vlan)#vlan 30
S-Bucaramanga(config-vlan)#int f0/1
S-Bucaramanga(config-if)#switchport mode access
S-Bucaramanga(config-if)#switchport access vlan 10
S-Bucaramanga(config-if)#int f0/4
S-Bucaramanga(config-if)#switchport mode access
S-Bucaramanga(config-if)#switchport access vlan 30
S-Bucaramanga(config-if)#int g0/1
S-Bucaramanga(config-if)#switchport mode trunk

S-Bucaramanga(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/1, changed state to up
S-Bucaramanga(config-if)#end
S-Bucaramanga#
%SYS-5-CONFIG_I: Configured from console by console
S-Bucaramanga#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
S-Bucaramanga(config)#int vlan 1
S-Bucaramanga(config-if)#ip address 172.31.2.3
255.255.255.248
S-Bucaramanga(config-if)#no shutdown
S-Bucaramanga(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1,
changed state to up
S-Bucaramanga(config-if)#ip default-gateway 172.31.2.1
```

### Configuracion Switch – Tunja

```
S-Tunja#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
S-Tunja(config)#vlan 1
S-Tunja(config-vlan)#vlan 20
S-Tunja(config-vlan)#vlan 30
S-Tunja(config-vlan)#int f0/1
S-Tunja(config-if)#switchport mode access
S-Tunja(config-if)#switchport access vlan 20
S-Tunja(config-if)#int f0/4
S-Tunja(config-if)#switchport mode access
S-Tunja(config-if)#switchport access vlan 30
S-Tunja(config-if)#int g0/1
S-Tunja(config-if)#switchport mode trunk
```

```
S-Tunja(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/1, changed state to up
S-Tunja(config-if)#end
S-Tunja#
%SYS-5-CONFIG_I: Configured from console by console
S-Tunja#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
S-Tunja(config)#int vlan 1
S-Tunja(config-if)#ip address 172.3.2.11 255.255.255.248
S-Tunja(config-if)#no shutdown
S-Tunja(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1,
changed state to up

S-Tunja(config-if)#ip default-gateway 172.3.2.9
```

### **Configuración Switch – Cundinamarca**

```
S-Cundinamarca(config)#vlan 1
S-Cundinamarca(config-vlan)#vlan 20
S-Cundinamarca(config-vlan)#vlan 30
S-Cundinamarca(config-vlan)#vlan 88
S-Cundinamarca(config-vlan)#exit
S-Cundinamarca(config)#int f0/1
S-Cundinamarca(config-if)#switchport mode access
S-Cundinamarca(config-if)#switchport access vlan 20
S-Cundinamarca(config-if)#int f0/4
S-Cundinamarca(config-if)#switchport mode access
S-Cundinamarca(config-if)#switchport access vlan 30
S-Cundinamarca(config-if)#int f0/24
S-Cundinamarca(config-if)#switchport mode access
S-Cundinamarca(config-if)#switchport access vlan 88
S-Cundinamarca(config-if)#int g0/1
S-Cundinamarca(config-if)#switchport mode trunk

S-Cundinamarca(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/1, changed state to down
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/1, changed state to up

S-Cundinamarca(config-if)#exit
S-Cundinamarca(config)#int vlan 1
S-Cundinamarca(config-if)#ip address 172.31.2.11
255.255.255.248
S-Cundinamarca(config-if)#no shutdown
S-Cundinamarca(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1,
changed state to up
S-Cundinamarca(config-if)#ip default-gateway 172.31.2.9
```

#### **b. Autenticación local con AAA.**

##### **Autenticación AAA - Bucaramanga**

```
Bucaramanga#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Bucaramanga(config)#username edna password 1234
Bucaramanga(config)#aaa new-model
Bucaramanga(config)#aaa authentication login AUTHLOCAL local
Bucaramanga(config)#line console 0
Bucaramanga(config-line)#login authentication AUTHLOCAL
Bucaramanga(config-line)#line vty 0 15
Bucaramanga(config-line)#login authentication AUTHLOCAL
```

##### **Autenticación AAA – Tunja**

```
Tunja(config)#username edna secret 1234
Tunja(config)#aaa new-model
Tunja(config)#aaa authentication login AUTHLOCAL local
Tunja(config)#line console 0
Tunja(config-line)#login authentication AUTHLOCAL
Tunja(config-line)#line vty 0 15
Tunja(config-line)#login authentication AUTHLOCAL
```

##### **Autenticación AAA – Cundinamarca**

```
Cundinamarca#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Cundinamarca(config)#username edna secret 1234
Cundinamarca(config)#aaa new-model
Cundinamarca(config)#aaa authentication login AUTHLOCAL local
Cundinamarca(config)#line console 0
Cundinamarca(config-line)#login authentication AUTHLOCAL
```



```
Cundinamarca(config-line)#line vty 0 15
Cundinamarca(config-line)#login authentication AUTHLOCAL
```

### c. Cifrado de contraseñas.

#### Configuración contraseñas – Bucaramanga

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Bogota
Bucaramanga(config)#no ip domain-lookup
Bucaramanga(config)#service password-encryption
Bucaramanga(config)#enable secret class
Bucaramanga(config)#banner motd #
Enter TEXT message. End with the character '#'.
Acceso no autorizado est estrictamente prohibido.#
Bucaramanga(config)#line console 0
Bucaramanga(config-line)#password cisco
Bucaramanga(config-line)#login
Bucaramanga(config-line)#logging synchronous
Bucaramanga(config-line)#line vty 0 15
Bucaramanga(config-line)#password cisco
Bucaramanga(config-line)#logging synchronous
Bucaramanga(config-line)#login
Bucaramanga(config-line)#exit
Bucaramanga(config)#end
Bogota#
%SYS-5-CONFIG_I: Configured from console by console
Bogota #copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

#### Configuración contraseñas – Tunja

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Tunja
Tunja(config)#no ip domain-lookup
Tunja(config)#service password-encryption
Tunja(config)#enable secret class
Tunja(config)#banner motd #
Enter TEXT message. End with the character '#'.
Acceso no autorizado est estrictamente prohibido.#
Tunja(config)#line console 0
Tunja(config-line)#password cisco
```

```
Tunja(config-line)#login
Tunja(config-line)#logging synchronous
Tunja(config-line)#line vty 0 15
Tunja(config-line)#password cisco
Tunja(config-line)#logging synchronous
Tunja(config-line)#login
Tunja(config-line)#end
Tunja#
%SYS-5-CONFIG_I: Configured from console by console
Tunja#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

### Configuración contraseñas – Cundinamarca

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Cundinamarca
Cundinamarca(config)#no ip domain-lookup
Cundinamarca(config)#service password-encryption
Cundinamarca(config)#enable secret class
Cundinamarca(config)#banner motd #
Enter TEXT message. End with the character '#'.
Acceso no autorizado est estrictamente prohibido.#
Cundinamarca(config)#line console 0
Cundinamarca(config-line)#password cisco
Cundinamarca(config-line)#login
Cundinamarca(config-line)#logging synchronous
Cundinamarca(config-line)#line vty 0 15
Cundinamarca(config-line)#password cisco
Cundinamarca(config-line)#logging synchronous
Cundinamarca(config-line)#login
Cundinamarca(config-line)#end
Cundinamarca#
%SYS-5-CONFIG_I: Configured from console by console
Cundinamarca#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

- d. Un máximo de internos para acceder al router.
- e. Máximo tiempo de acceso al detectar ataques.

### Máximo de Intentos - Bucaramanga

```
Bucaramanga#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Bucaramanga(config)#line console 0
Bucaramanga(config-line)#login block-for 10 attempts 3 within 60
```

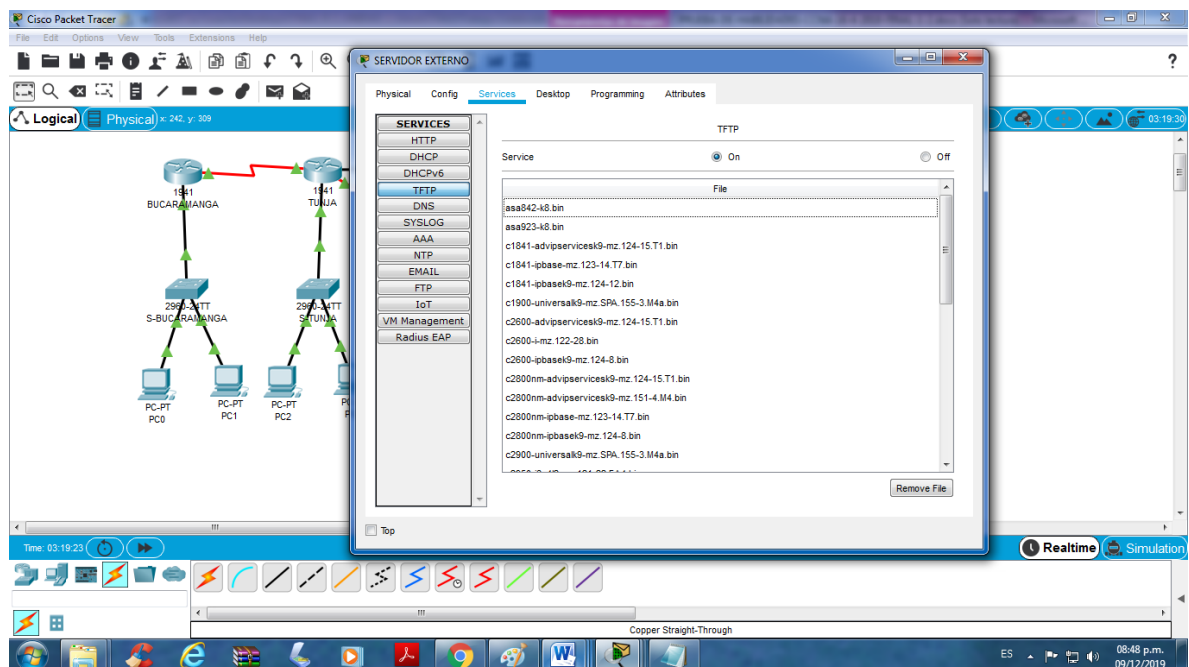
### Máximo de Intentos – Tunja

```
Tunja#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Tunja(config)#line console 0
Tunja(config-line)#login block-for 10 attempts 3 within 60
```

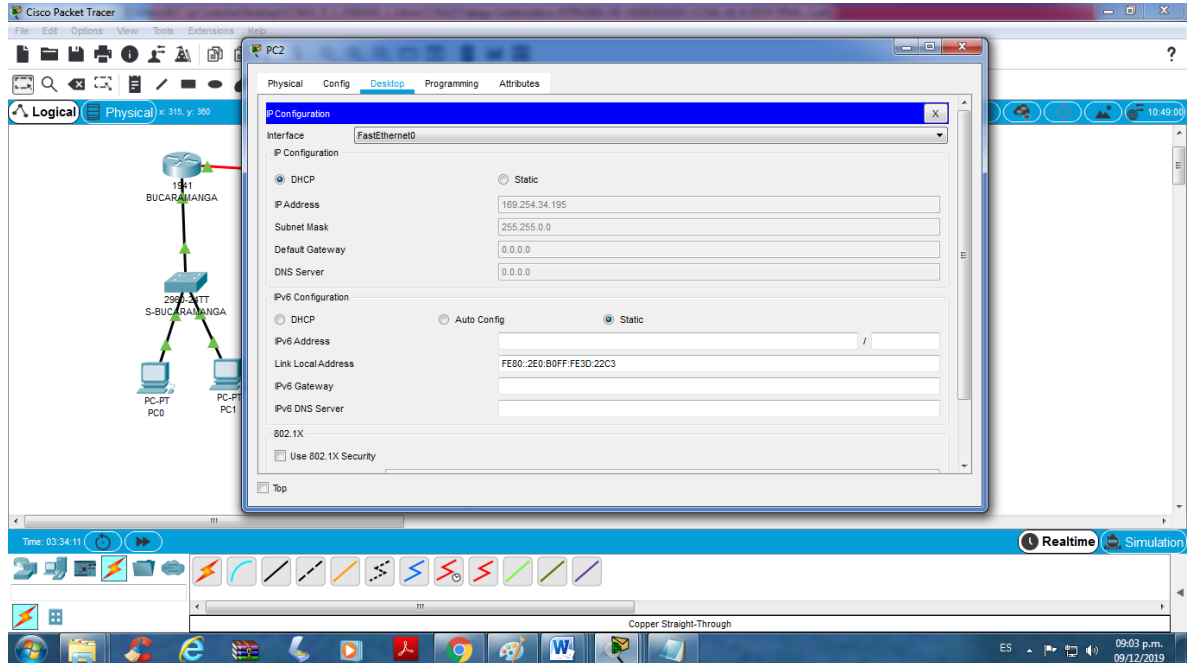
### Máximo de Intentos – Cundinamarca

```
Cundinamarca#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Cundinamarca(config)#line console 0
Cundinamarca(config-line)#login block-for 10 attempts 3 within 60
```

- f. Establezca un servidor TFTP y almacene todos los archivos necesarios de los routers.



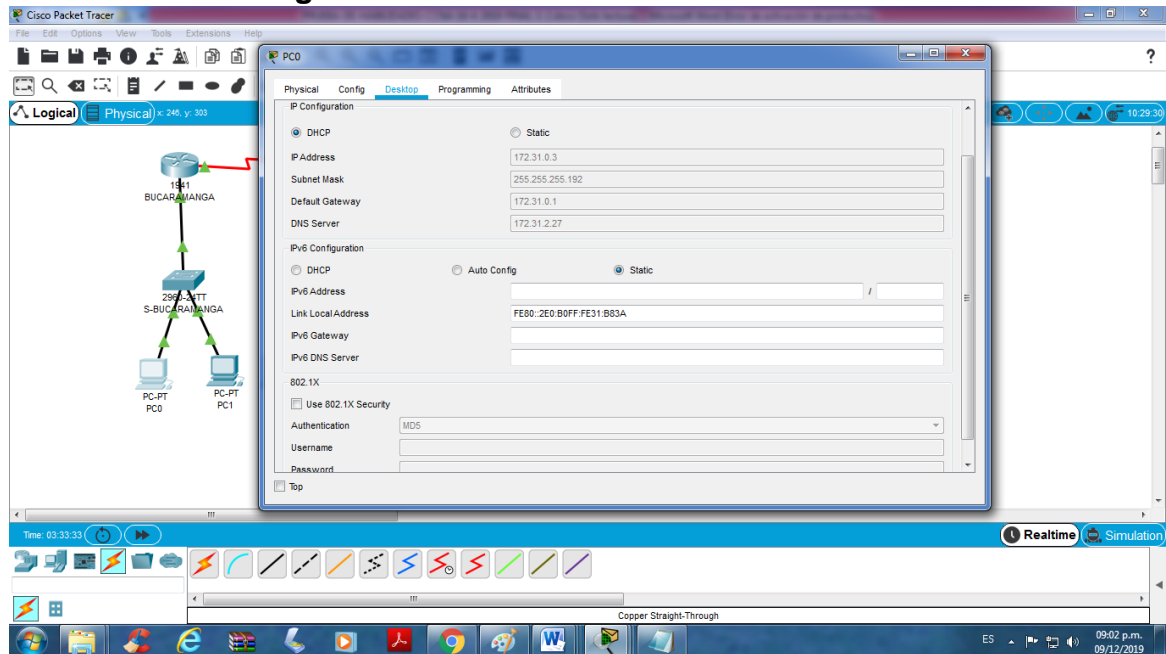
## 2. El DHCP deberá proporcionar solo direcciones a los hosts de Bucaramanga y Cundinamarca DHCP – Tunja



```
Tunja#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Tunja(config)#ip dhcp excluded-address 172.31.0.1 172.31.0.2
Tunja(config)#ip      dhcp      excluded-address      172.31.0.65
172.31.0.66
Tunja(config)#ip      dhcp      excluded-address      172.31.1.65
172.31.1.66
Tunja(config)#ip dhcp excluded-address 172.31.1.1 172.31.1.2
Tunja(config)#ip dhcp pool VLAN10BUC
Tunja(dhcp-config)#network 172.31.0.0 255.255.255.192
Tunja(dhcp-config)#default-router 172.31.0.1
Tunja(dhcp-config)#dns-server 172.31.2.27
Tunja(dhcp-config)#ip dhcp pool VLAN30BUC
Tunja(dhcp-config)#network 172.31.0.64 255.255.255.192
Tunja(dhcp-config)#default-router 172.31.0.65
Tunja(dhcp-config)#dns-server 172.31.2.27
Tunja(dhcp-config)#ip dhcp pool VLAN20CUN
Tunja(dhcp-config)#network 172.31.1.64 255.255.255.192
Tunja(dhcp-config)#default-router 172.31.1.65
Tunja(dhcp-config)#dns-server 172.31.2.27
```

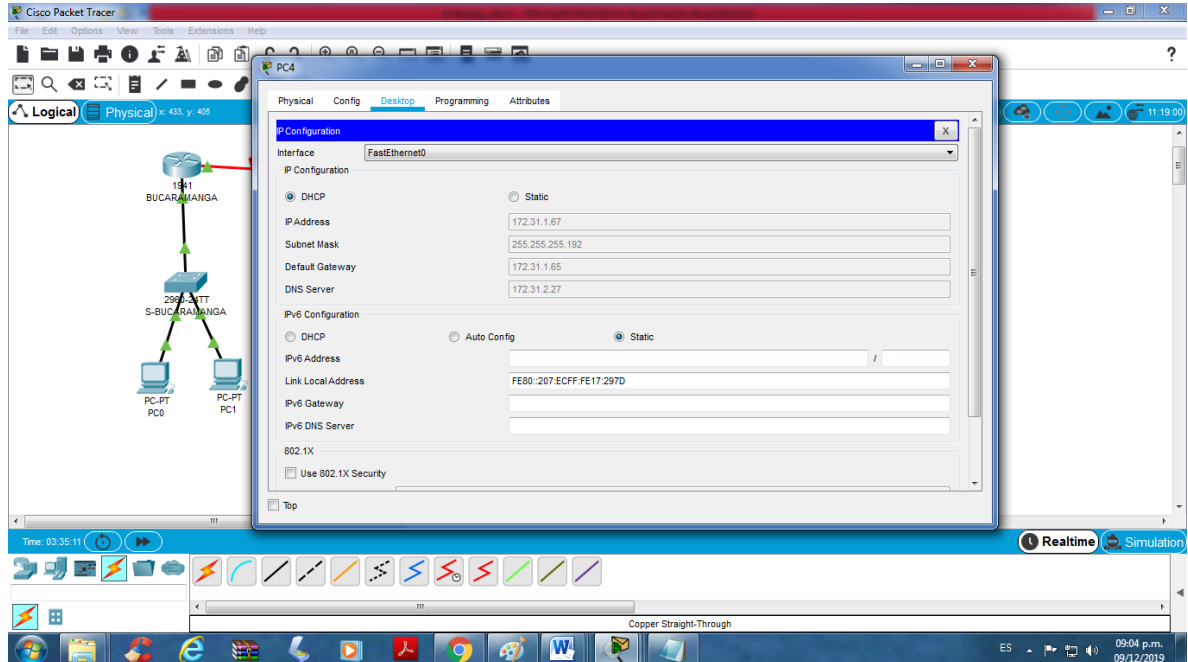
```
Tunja (dhcp-config) #ip dhcp pool VLAN30CUN
Tunja (dhcp-config) #network 172.31.1.0 255.255.255.192
Tunja (dhcp-config) #default-router 172.31.1.1
Tunja (dhcp-config) #dns-server 172.31.2.27
Tunja (dhcp-config) #
```

## DHCP- Bucaramanga



```
Bucaramanga#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Bucaramanga(config)#int g0/0.10
Bucaramanga(config-subif)#ip helper-address 172.31.2.33
Bucaramanga(config-subif)#int g0/0.30
Bucaramanga(config-subif)#ip helper-address 172.31.2.33
```

## DHCP- Cundinamarca



```
Cundinamarca#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Cundinamarca(config)#int g0/0.20
Cundinamarca(config-subif)#ip helper-address 172.31.2.37
Cundinamarca(config-subif)#int g0/0.30
Cundinamarca(config-subif)#ip helper-address 172.31.2.37
```

3. El web server deberá tener NAT estático y el resto de los equipos de la topología emplearán NAT de sobrecarga (PAT).

### Tunja

```
Tunja#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Tunja(config)#ip nat inside source static 172.31.2.27
209.165.220.3
Tunja(config)#access-list 1 permit 172.0.0.0 0.255.255.255
Tunja(config)#ip nat inside source list 1 interface g0/1
overload
Tunja(config)#int g0/1
Tunja(config-if)#ip nat outside
Tunja(config-if)#int g0/0.1
Tunja(config-subif)#ip nat inside
Tunja(config-subif)#int g0/0.20
Tunja(config-subif)#ip nat inside
Tunja(config-subif)#int g0/0.30
```

```
Tunja(config-subif)#ip nat inside
Tunja(config-subif)#int s0/0/0
Tunja(config-if)#ip nat inside
Tunja(config-if)#int s0/0/1
Tunja(config-if)#ip nat inside
Tunja(config-if)#exit
Tunja(config)#ip route 0.0.0.0 0.0.0.0 209.165.220.2
Tunja(config)#router ospf 1
Tunja(config-router)#default-information originate
Tunja(config-router)#end
Tunja#
%SYS-5-CONFIG_I: Configured from console by console

Tunja#!
Tunja#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M -
mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type
2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 209.165.220.2 to network 0.0.0.0

172.3.0.0/16 is variably subnetted, 2 subnets, 2 masks
C 172.3.2.8/29 is directly connected, GigabitEthernet0/0.1
L 172.3.2.9/32 is directly connected, GigabitEthernet0/0.1
172.31.0.0/16 is variably subnetted, 15 subnets, 4 masks
O 172.31.0.0/26 [110/65] via 172.31.2.34, 00:54:42,
Serial0/0/0
O 172.31.0.64/26 [110/65] via 172.31.2.34, 00:54:42,
Serial0/0/0
C 172.31.0.128/26 is directly connected,
GigabitEthernet0/0.20
L 172.31.0.129/32 is directly connected,
GigabitEthernet0/0.20
C 172.31.0.192/26 is directly connected,
GigabitEthernet0/0.30
L 172.31.0.193/32 is directly connected,
GigabitEthernet0/0.30
```

```
O 172.31.1.0/26 [110/65] via 172.31.2.38, 01:44:59,
Serial0/0/1
O 172.31.1.64/26 [110/65] via 172.31.2.38, 01:44:59,
Serial0/0/1
O 172.31.2.0/29 [110/65] via 172.31.2.34, 00:54:42,
Serial0/0/0
O 172.31.2.8/29 [110/65] via 172.31.2.38, 01:44:59,
Serial0/0/1
O 172.31.2.24/29 [110/65] via 172.31.2.38, 01:44:59,
Serial0/0/1
C 172.31.2.32/30 is directly connected, Serial0/0/0
L 172.31.2.33/32 is directly connected, Serial0/0/0
C 172.31.2.36/30 is directly connected, Serial0/0/1
L 172.31.2.37/32 is directly connected, Serial0/0/1
209.165.220.0/24 is variably subnetted, 2 subnets, 2 masks
C 209.165.220.0/24 is directly connected, GigabitEthernet0/1
L 209.165.220.1/32 is directly connected, GigabitEthernet0/1
S* 0.0.0.0/0 [1/0] via 209.165.220.2
```

## Bucaramanga

```
Bucaramanga#show ip route
```

```
Codes: L - local, C - connected, S - static, R - RIP, M -
mobile, B - BGP
```

```
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
area
```

```
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type
2
```

```
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
```

```
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
```

```
Gateway of last resort is 172.31.2.33 to network 0.0.0.0
```

```
172.3.0.0/29 is subnetted, 1 subnets
```

```
O 172.3.2.8/29 [110/65] via 172.31.2.33, 00:48:59,
Serial0/0/0
```

```
172.31.0.0/16 is variably subnetted, 15 subnets, 4 masks
```

```
C 172.31.0.0/26 is directly connected, GigabitEthernet0/0.10
```

```
L 172.31.0.1/32 is directly connected, GigabitEthernet0/0.10
```

```
C 172.31.0.64/26 is directly connected, GigabitEthernet0/0.30
```

```
L 172.31.0.65/32 is directly connected, GigabitEthernet0/0.30
```



```
O 172.31.0.128/26 [110/65] via 172.31.2.33, 00:48:59,
Serial0/0/0
O 172.31.0.192/26 [110/65] via 172.31.2.33, 00:48:59,
Serial0/0/0
O 172.31.1.0/26 [110/129] via 172.31.2.33, 00:56:17,
Serial0/0/0
O 172.31.1.64/26 [110/129] via 172.31.2.33, 00:56:17,
Serial0/0/0
C 172.31.2.0/29 is directly connected, GigabitEthernet0/0.1
L 172.31.2.1/32 is directly connected, GigabitEthernet0/0.1
O 172.31.2.8/29 [110/129] via 172.31.2.33, 00:56:17,
Serial0/0/0
O 172.31.2.24/29 [110/129] via 172.31.2.33, 00:56:17,
Serial0/0/0
C 172.31.2.32/30 is directly connected, Serial0/0/0
L 172.31.2.34/32 is directly connected, Serial0/0/0
O 172.31.2.36/30 [110/128] via 172.31.2.33, 00:56:17,
Serial0/0/0
O*E2 0.0.0.0/0 [110/1] via 172.31.2.33, 00:01:55, Serial0/0/0
```

## Cundinamarca

```
Cundinamarca#show ip route
```

```
Codes: L - local, C - connected, S - static, R - RIP, M -
mobile, B - BGP
```

```
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
area
```

```
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type
2
```

```
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
```

```
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
```

```
Gateway of last resort is 172.31.2.37 to network 0.0.0.0
```

```
172.3.0.0/29 is subnetted, 1 subnets
```

```
O 172.3.2.8/29 [110/65] via 172.31.2.37, 00:50:47,
Serial0/0/0
```

```
172.31.0.0/16 is variably subnetted, 16 subnets, 4 masks
```

```
O 172.31.0.0/26 [110/129] via 172.31.2.37, 00:58:00,
Serial0/0/0
```

```
O 172.31.0.64/26 [110/129] via 172.31.2.37, 00:58:00,
Serial0/0/0
```

```
O 172.31.0.128/26 [110/65] via 172.31.2.37, 00:50:37,
Serial0/0/0
O 172.31.0.192/26 [110/65] via 172.31.2.37, 00:50:37,
Serial0/0/0
C 172.31.1.0/26 is directly connected, GigabitEthernet0/0.30
L 172.31.1.1/32 is directly connected, GigabitEthernet0/0.30
C 172.31.1.64/26 is directly connected, GigabitEthernet0/0.20
L 172.31.1.65/32 is directly connected, GigabitEthernet0/0.20
O 172.31.2.0/29 [110/129] via 172.31.2.37, 00:58:00,
Serial0/0/0
C 172.31.2.8/29 is directly connected, GigabitEthernet0/0.1
L 172.31.2.9/32 is directly connected, GigabitEthernet0/0.1
C 172.31.2.24/29 is directly connected, GigabitEthernet0/0.88
L 172.31.2.25/32 is directly connected, GigabitEthernet0/0.88
O 172.31.2.32/30 [110/128] via 172.31.2.37, 00:58:10,
Serial0/0/0
C 172.31.2.36/30 is directly connected, Serial0/0/0
L 172.31.2.38/32 is directly connected, Serial0/0/0
O*E2 0.0.0.0/0 [110/1] via 172.31.2.37, 00:03:38, Serial0/0/0
```

#### 4. El enrutamiento deberá tener autenticación.

##### **Bucaramanga#configure terminal**

```
Enter configuration commands, one per line. End with CNTL/Z.
Bucaramanga(config)#int s0/0/0
Bucaramanga(config-if)#ip ospf authentication message-digest
Bucaramanga(config-if)#ip ospf message-digest-key 1 md5
cisco123
Bucaramanga(config-if)#
01:01:31: %OSPF-5-ADJCHG: Process 1, Nbr 209.165.220.1 on
Serial0/0/0 from FULL to DOWN, Neighbor Down: Dead timer
expired

01:01:31: %OSPF-5-ADJCHG: Process 1, Nbr 209.165.220.1 on
Serial0/0/0 from FULL to DOWN, Neighbor Down: Interface down
or detached
```

##### **Cundinamarca#configure terminal**

```
Enter configuration commands, one per line. End with CNTL/Z.
Cundinamarca(config)#int s0/0/0
Cundinamarca(config-if)#ip ospf authentication message-digest
Cundinamarca(config-if)#ip ospf message-digest-key 1 md5
cisco123
Cundinamarca(config-if)#
```

```
03:04:39: %OSPF-5-ADJCHG: Process 1, Nbr 209.165.220.1 on
Serial0/0/0 from FULL to DOWN, Neighbor Down: Dead timer
expired
03:04:39: %OSPF-5-ADJCHG: Process 1, Nbr 209.165.220.1 on
Serial0/0/0 from FULL to DOWN, Neighbor Down: Interface down
or detached
```

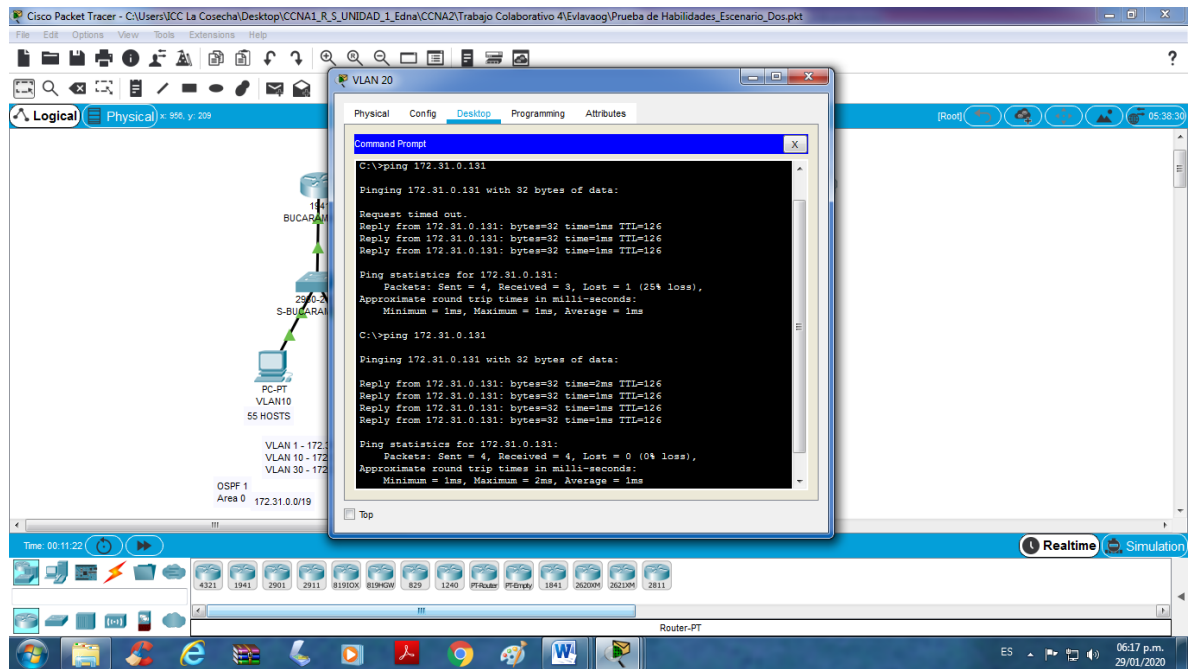
**Tunja#configure terminal**

```
Tunja(config)#int s0/0/0
Tunja(config-if)#ip ospf authentication message-digest
Tunja(config-if)#ip ospf message-digest-key 1 md5 cisco123
Tunja(config-if)#
03:26:23: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.34 on
Serial0/0/0 from LOADING to FULL, Loading Done
Tunja(config-if)#int s0/0/1
Tunja(config-if)#ip ospf authentication message-digest
Tunja(config-if)#ip ospf message-digest-key 1 md5 cisco123
Tunja(config-if)#
03:26:48: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.38 on
Serial0/0/1 from LOADING to FULL, Loading Done
```

**5. Listas de control de acceso:**

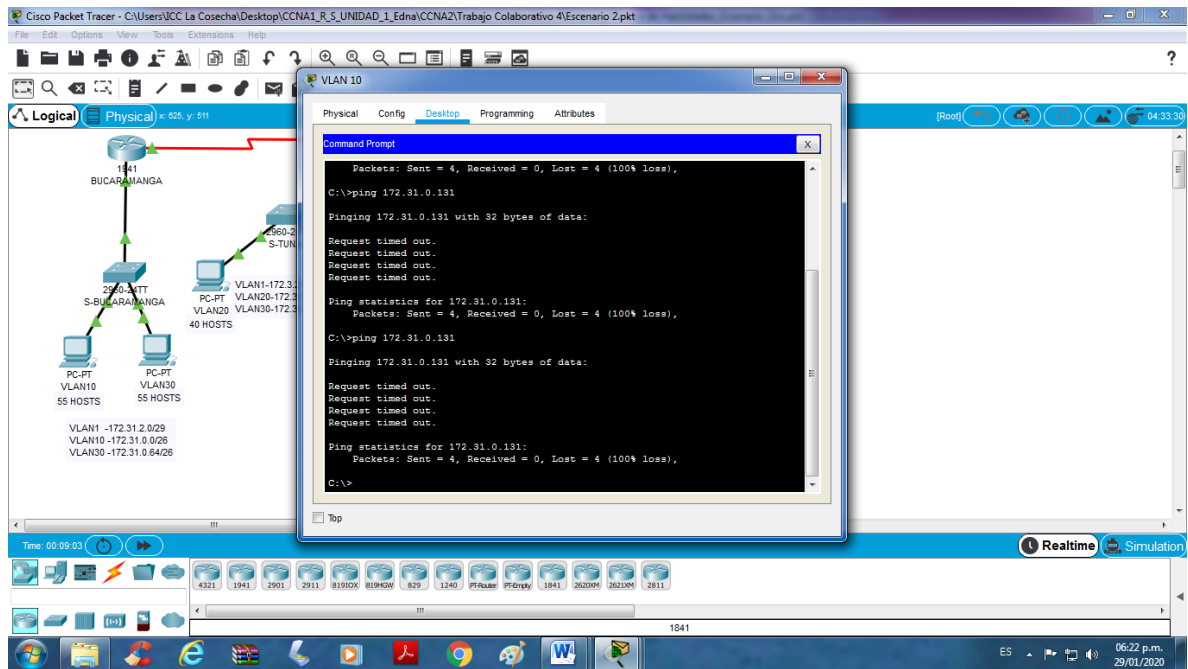
- a. Los hosts de VLAN 20 en Cundinamarca no acceden a internet, solo a la red interna de Tunja. 54-46

```
Cundinamarca(config)#access-list 101 deny ip 172.31.1.64 0.0.0.63
209.165.220.0 0.0.0.255
Cundinamarca(config)#access-list 101 permit ip any any
Cundinamarca(config)#int g0/0.20
Cundinamarca(config-subif)#ip access-group 101 in
Cundinamarca(config-subif)#
```



- b. Los hosts de VLAN 10 en Cundinamarca si acceden a internet y no a la red interna de Tunja.

```
Cundinamarca (config-subif) #exit
Cundinamarca (config) #access-list 102 permit ip 172.31.1.0
0.0.0.63 209.165.220.0 0.0.0.255
Cundinamarca (config) #access-list 102 deny ip any any
Cundinamarca (config) #int g0/0.30
Cundinamarca (config-subif) #ip access-group 102 in
Cundinamarca (config-subif) #
```

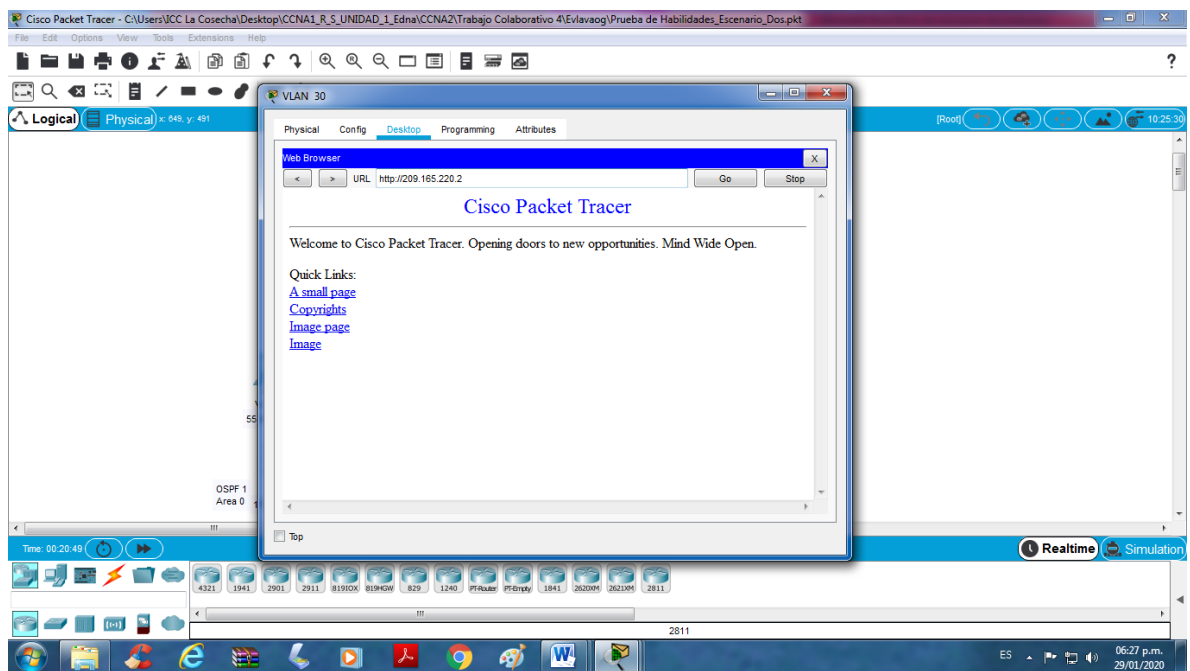
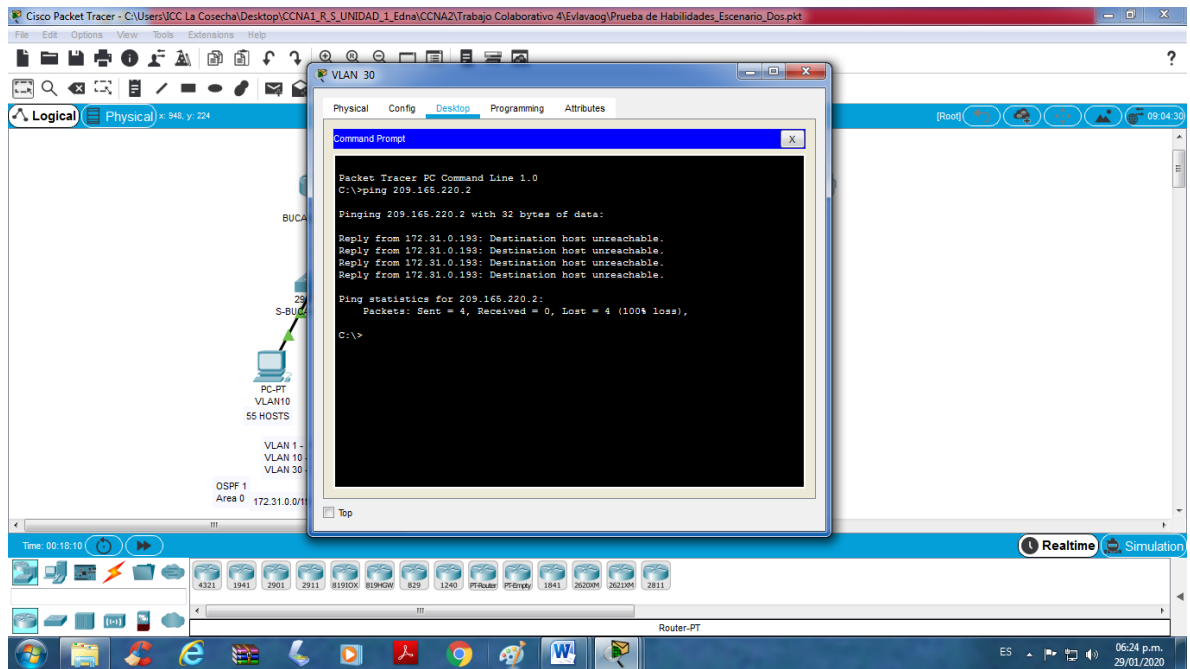


- c. Los hosts de VLAN 30 en Tunja solo acceden a servidores web y ftp de internet.

**Tunja#configure terminal**

```

Enter configuration commands, one per line. End with CNTL/Z.
Tunja(config)#access-list 101 permit tcp 172.31.0.192
0.0.0.63 209.165.220.0 0.0.0.255 eq 80
Tunja(config)#access-list 101 permit tcp 172.31.0.192
0.0.0.63 209.165.220.0 0.0.0.255 eq 21
Tunja(config)#access-list 101 permit tcp 172.31.0.192
0.0.0.63 209.165.220.0 0.0.0.255 eq 20
Tunja(config)#int g0/0.30
Tunja(config-subif)#ip access-group 101 in
Tunja(config-subif)#
  
```

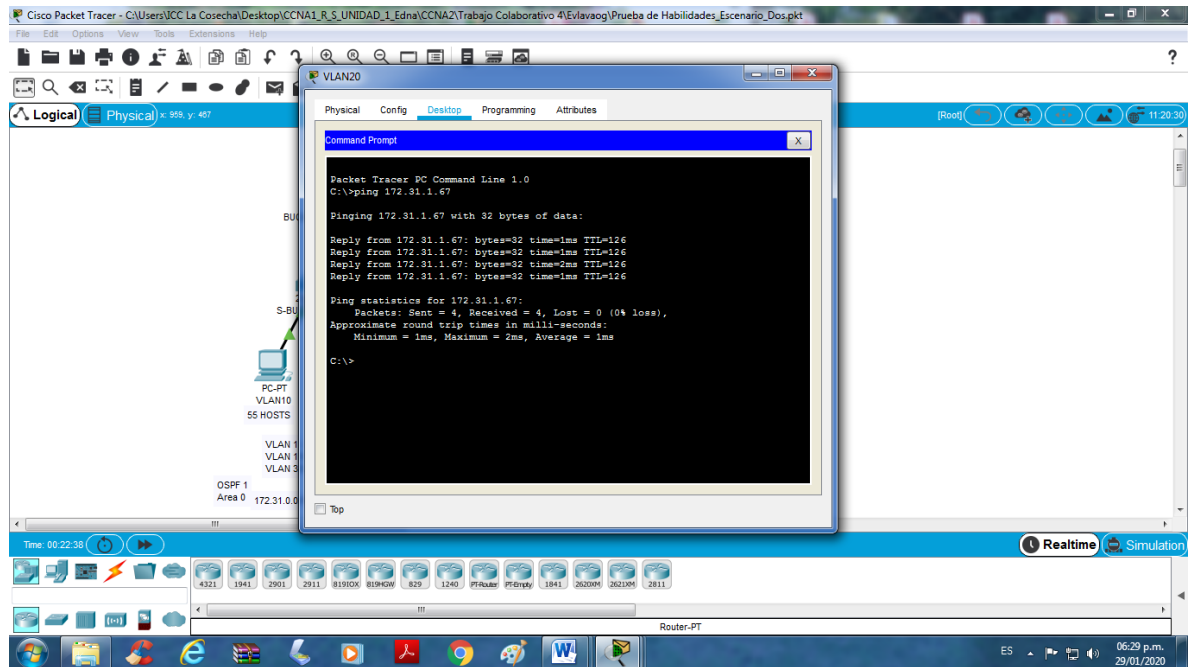


d. Los hosts de VLAN 20 en Tunja solo acceden a la VLAN 20 de Cundinamarca y VLAN 10 de Bucaramanga.

Tunja(config-subif)#exit

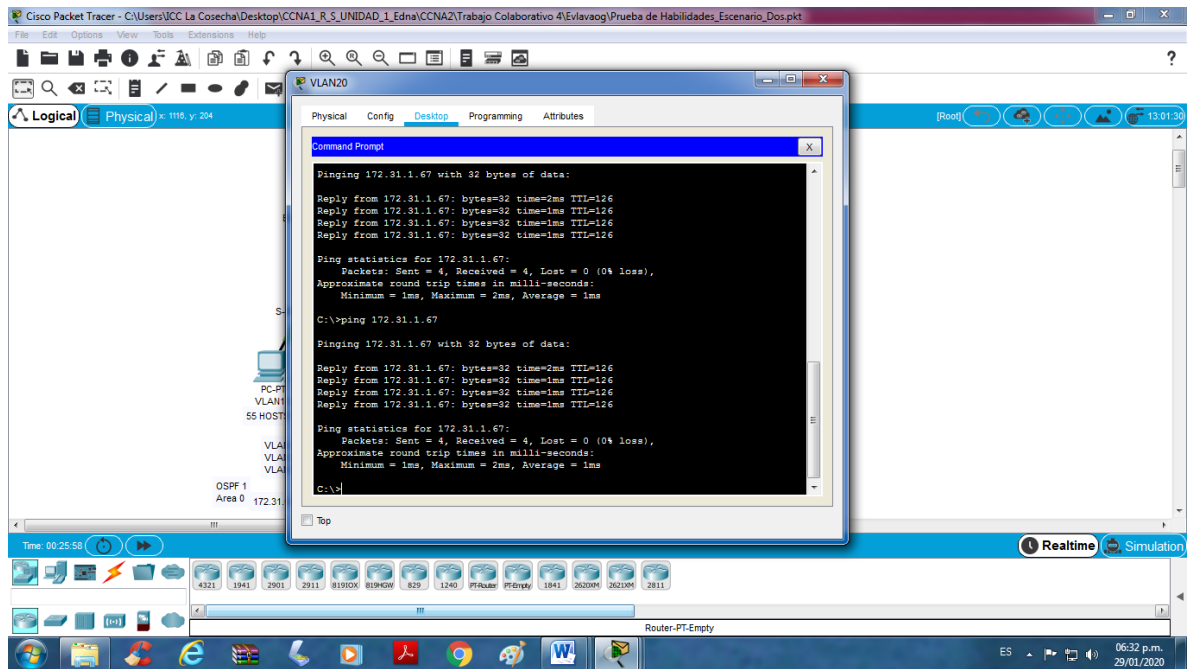
Tunja(config)#access-list 102 permit ip 172.31.0.128 0.0.0.63  
172.31.1.64 0.0.0.63

```
Tunja(config)#access-list 102 permit ip 172.31.0.128 0.0.0.63
172.31.0.0 0.0.0.63
Tunja(config)#int g0/0.20
Tunja(config-subif)#ip access-group 102 in
Tunja(config-subif)#
```



- e. Los hosts de VLAN 30 de Bucaramanga acceden a internet y a cualquier equipo de VLAN 10.

```
Bucaramanga#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Bucaramanga(config)#access-list 101 permit ip 172.31.0.64
0.0.0.63 209.165.220.0 0.0.0.255
Bucaramanga(config)#int g0/0.30
Bucaramanga(config-subif)#ip access-group 101 in
Bucaramanga(config-subif)#exit
```

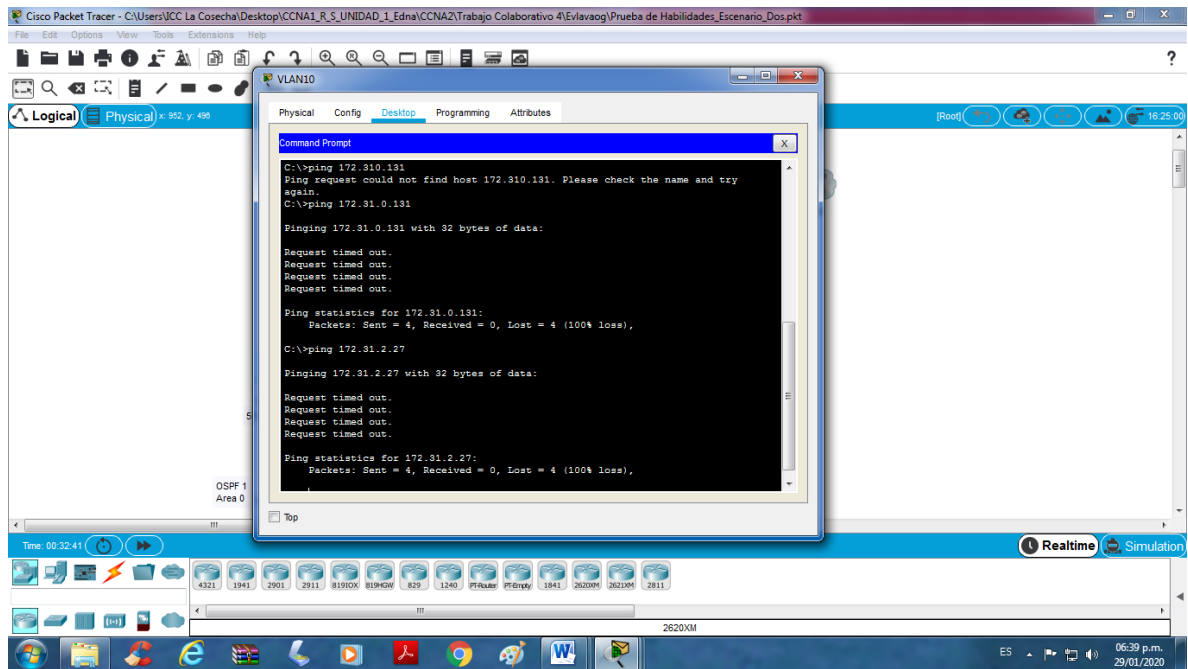


- f. Los hosts de VLAN 10 en Bucaramanga acceden a la red de Cundinamarca (VLAN 20) y Tunja (VLAN 20), no internet.

```

Bucaramanga(config-subif)#exit
Bucaramanga(config)#access-list 102 permit ip 172.31.0.0
0.0.0.63 172.31.1.64 0.0.0.63
Bucaramanga(config)#access-list 102 permit ip 172.31.0.0
0.0.0.63 172.31.0.128 0.0.0.63
Bucaramanga(config)#int g0/0.10
Bucaramanga(config-subif)#ip access-group 102 in
Bucaramanga(config-subif)#
    
```





g. Los hosts de una VLAN no pueden acceder a los de otra VLAN en una ciudad.

**Bucaramanga#configure terminal**

Enter configuration commands, one per line. End with CNTL/Z.

```
Bucaramanga(config)#access-list 103 deny ip 172.31.2.0
0.0.0.7 172.31.0.0 0.0.0.63
```

```
Bucaramanga(config)#access-list 103 deny ip 172.31.0.64
0.0.0.63 172.31.0.0 0.0.0.63
```

```
Bucaramanga(config)#access-list 103 permit ip any any
```

```
Bucaramanga(config)#int g0/0.10
```

```
Bucaramanga(config-subif)#ip access-group 103 out
```

```
Bucaramanga(config-subif)#
```

**Tunja#configure terminal**

Enter configuration commands, one per line. End with CNTL/Z.

```
Tunja(config)#access-list 103 deny ip 172.3.2.8 0.0.0.7
172.31.0.128 0.0.0.63
```

```
Tunja(config)#access-list 103 deny ip 172.3.0.192 0.0.0.63
172.31.0.128 0.0.0.63
```

```
Tunja(config)#access-list 103 permit ip any any
```

```
Tunja(config)#int g0/0.20
```

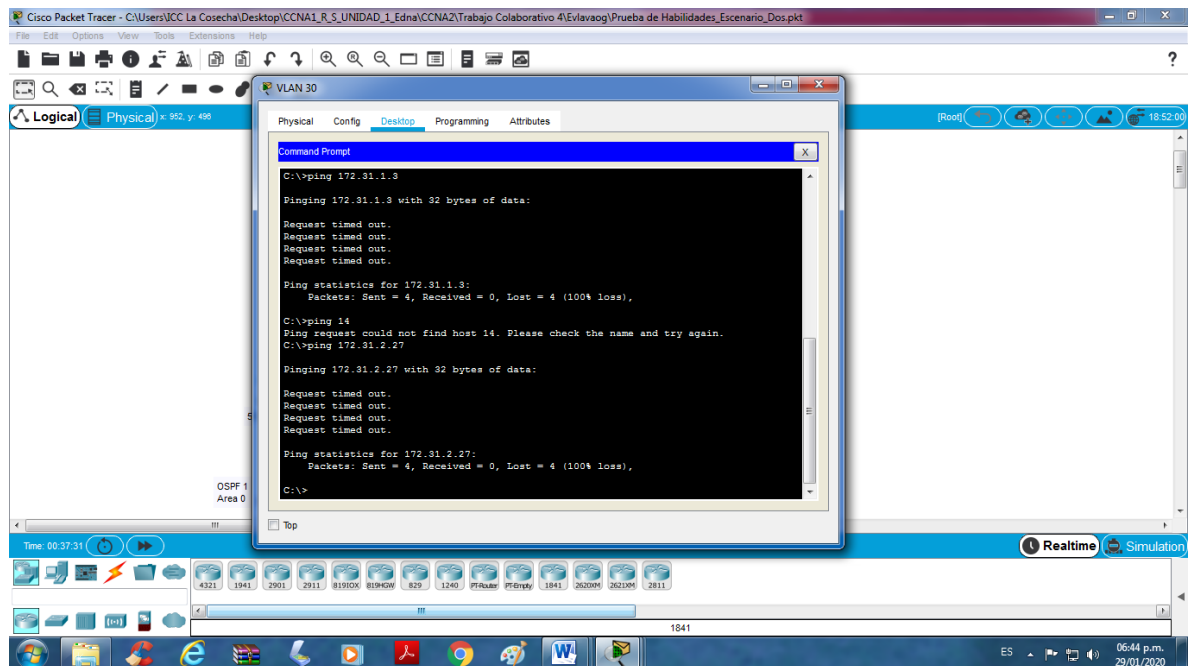
```
Tunja(config-subif)#ip access-group 103 out
```

```
Tunja(config-subif)#
```

**Cundinamarca#configure terminal**

```

Enter configuration commands, one per line. End with CNTL/Z.
Cundinamarca(config)#access-list 103 deny ip 172.31.2.8
0.0.0.7 172.31.1.64 0.0.0.63
Cundinamarca(config)#access-list 103 deny ip 172.31.1.0
0.0.0.63 172.31.1.64 0.0.0.63
Cundinamarca(config)#access-list 103 deny ip 172.31.2.24
0.0.0.7 172.31.1.64 0.0.0.63
Cundinamarca(config)#access-list 103 permit ip any any
Cundinamarca(config)#int g0/0.20
Cundinamarca(config-subif)#ip access-group 103 out
Cundinamarca(config-subif)#end
Cundinamarca#
%SYS-5-CONFIG_I: Configured from console by console
  
```



- h. Solo los hosts de las VLAN administrativas y de la VLAN de servidores tienen acceso a los routers e internet.

**Bucaramanga#configure terminal**

```

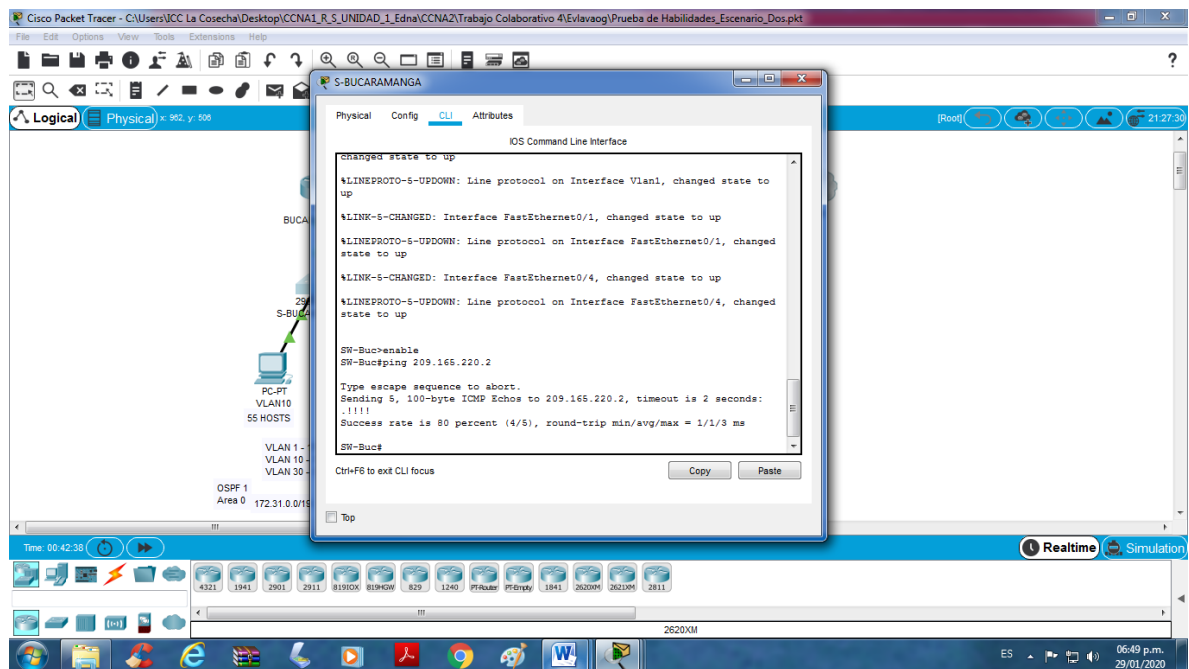
Enter configuration commands, one per line. End with CNTL/Z.
Bucaramanga(config)#access-list 2 permit 172.31.2.0 0.0.0.7
Bucaramanga(config)#access-list 2 permit 172.3.2.8 0.0.0.7
Bucaramanga(config)#access-list 2 permit 172.31.2.8 0.0.0.7
Bucaramanga(config)#line vty 0 15
Bucaramanga(config-line)#access-class 2 in
Bucaramanga(config-line)#
  
```

### Tunja#configure terminal

```
Enter configuration commands, one per line. End with CNTL/Z.
Tunja(config)#access-list 2 permit 172.31.2.0 0.0.0.7
Tunja(config)#access-list 2 permit 172.3.2.8 0.0.0.7
Tunja(config)#access-list 2 permit 172.31.2.8 0.0.0.7
Tunja(config)#line vty 0 15
Tunja(config-line)#access-class 2 in
Tunja(config-line)#
```

### Cundinamarca#configure terminal

```
Enter configuration commands, one per line. End with CNTL/Z.
Cundinamarca(config)#access-list 2 permit 172.31.2.0 0.0.0.7
Cundinamarca(config)#access-list 2 permit 172.3.2.8 0.0.0.7
Cundinamarca(config)#access-list 2 permit 172.31.2.8 0.0.0.7
Cundinamarca(config)#line vty 0 15
Cundinamarca(config-line)#access-class 2 in
Cundinamarca(config-line)#
```



6. VLSM: utilizar la dirección 172.31.0.0 /18 para el direccionamiento.

## CONCLUSIONES

Mediante la solución de cada uno de los dos escenarios, diseñados para demostrar las habilidades obtenidas, el resultado fue satisfactorio, debido a que se pudo aplicar los diferentes conceptos aprendidos de las cuatro unidades de estudio y como realizar las configuraciones de cada uno de los dispositivos, como los son routers, switch, pc y servidores, lo cual se puede comprobar su conectividad por medio de diferentes comandos.

Este diplomado es un gran complemento de la ingeniería de sistemas, puesto que nos capacita por medio de simulaciones prácticas, para poder resolver problemáticas o requerimientos que se presenten a lo largo de nuestra carrera profesional.

## REFERENCIAS BIBLIOGRÁFICAS

- [1] Vesga, J. (2014). Diseño y configuración de redes con Packet Tracer [OVA]. Recuperado de [https://1drv.ms/u/s!AmIJYei-NT1IhgCT9VCtl\\_pLtPD9](https://1drv.ms/u/s!AmIJYei-NT1IhgCT9VCtl_pLtPD9)
- [2] Vesga, J. (2014). PING y TRACER como estrategia en procesos de Networking [OVA]. Recuperado de <https://1drv.ms/u/s!AmIJYei-NT1IhgTCtKY-7F5KIRC3>
- [3] Lucas, M. (2009). Cisco Routers for the Desperate: Router and Switch Management, the Easy Way. San Francisco: No Starch Press. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1Im3L74BZ3bpMiXRx0>
- [4] Vesga, J. (2014). Configuración de Switches y Routers [OVA]. Recuperado de <https://1drv.ms/u/s!AmIJYei-NT1IhgL9QChD1m9EuGqC>
- [5] Lammle, T. (2010). CISCO Press (Ed). Cisco Certified Network Associate Study Guide. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1Im3GQVfFFrjnEGFFU>
- [6] Vesga, J. (2014). Principios de Enrutamiento [OVA]. Recuperado de [https://1drv.ms/u/s!AmIJYei-NT1IhgOyjWeh6timi\\_Tm](https://1drv.ms/u/s!AmIJYei-NT1IhgOyjWeh6timi_Tm)

## ANEXOS

1. Link PKA Escenario Uno.

<https://drive.google.com/file/d/1Eh-DdAhd2AAf1cKFvhM3QsFNymwhG1cU/view?usp=sharing>

2. Link PKA Escenario Dos.

[https://drive.google.com/file/d/1xxq1drEBufmGSaluRslDWYaZlsr\\_A5uw/view?usp=sharing](https://drive.google.com/file/d/1xxq1drEBufmGSaluRslDWYaZlsr_A5uw/view?usp=sharing)