



Diplomado De Profundización Cisco (Diseño E Implementación De Soluciones

Integradas LAN / WAN)

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Resumen

La administración de las redes LAN y WAN en la actualidad ha permitido a las empresas e instituciones optimizar el uso de los recursos mediante una red centralizada permitiendo disponer la información de forma segura y rápida. Entender la importancia que juegan las telecomunicaciones en nuestras vidas, como parte del diario vivir, en cualquier entorno, para el uso práctico, y entender el funcionamiento de cómo se mueven los datos a través de las redes de información, son algunos de los alcances obtenidos más importantes, logrados en el desarrollo del curso, y será mostrado a lo largo de este trabajo.

Este trabajo muestra la construcción de una red de comunicaciones sobre la plataforma de aprendizaje de CISCO y con la ayuda del software Packet Tracer se pudo simular la red y su funcionamiento basados en el problema enviado en la guía de actividades del presente diplomado.

Para la construcción de la red utilicé switches, routers, terminales y se realizó la configuración de cada uno de estos componentes, VLAN y los protocolos de enrutamientos necesarios para emular y construir la red y así poder realizar y desarrollar cada uno de los puntos solicitados en la guía lo que me permitió apropiarme conocimientos sobre tipologías de redes de comunicaciones y la configuración de cada uno de los componentes.

Palabras clave: Switch, Router, Cisco, LAN, WAN, VLAN.

Abstract

The administration of the LAN and WAN networks has now allowed companies and institutions to optimize the use of resources through a centralized network allowing the information to be arranged safely and quickly. Understanding the importance that telecommunications play in our lives, as part of the daily life, in any environment, for practical use, and understanding the operation of how data moves through information networks, are some of the scope obtained most important, achieved in the development of the course, and will be shown throughout this work.

This work shows the construction of a communications network on the CISCO learning platform and with the help of the Packet Tracer software it was possible to simulate the network and its operation based on the problem sent in the activity guide of this diploma.

For the construction of the network I used switches, routers, terminals and the configuration of each of these components, VLANs and the routing protocols necessary to emulate and build the network was carried out and thus be able to perform and develop each of the points requested in the guide which allowed me to appropriate knowledge about types of communication networks and the configuration of each of the components.

Keywords: Switch, Router, Cisco, LAN, WAN, VLAN.

Introducción

En la actualidad la gran mayoría de compañías, utilizan las redes de computadoras para poder comunicarse entre sí por medio de conexiones ya sean físicas o inalámbricas. Dependiendo de las necesidades de las empresas, se implementa arquitectura que permiten la transmisión de datos en un área geográficamente pequeña, es decir conectan estaciones de trabajos, terminales y otros dispositivos en un solo edificio, o puede necesitar la implementación de comunicaciones entre áreas geográficamente separadas.

Las telecomunicaciones han avanzado de forma rigurosa y han permitido la comunicación entre distancias cortas y largas a través de las redes LAN y WAN estos avances han logrado acercamiento entre países, ciudades, culturas, idiomas permitiendo que la información fluya y esté disponible en cualquier parte del mundo y en cualquier momento brindando al hombre una facilidad de comunicación entre las personas, la infraestructura técnica y la información.

En este trabajo se diseñaron tipologías de red que con las cuales se pone en práctica los conocimientos adquiridos durante el desarrollo del diplomado y demostrar las competencias en la solución de problemas en la vida real para cubrir las necesidades de telecomunicación en una situación dada.

Objetivos

- ❖ Implementar habilidades obtenidas en las prácticas de laboratorio a lo largo del curso, teorías para identificar y aplicar una solución a un caso o situación estudio de problema de Networking basados en la solución de una problemática real.
- ❖ Reconocer los equipos requeridos para establecer la topología de red.
- ❖ Configurar los equipos y conectarlos de acuerdo a los requerimientos establecidos en la guía de actividades.
- ❖ Poner en práctica las habilidades y conocimientos adquiridos sobre OSPFv2, enrutamiento, VLAN, NAT, Access Lists entre otros.
- ❖ Configurar dispositivos de comunicación como Routers, Switch, Servidores.

Desarrollo de los escenarios

Escenario 1

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.

Topología de red

Los requerimientos solicitados son los siguientes:

Parte 1: Para el direccionamiento IP debe definirse una dirección de acuerdo con el número de hosts requeridos.

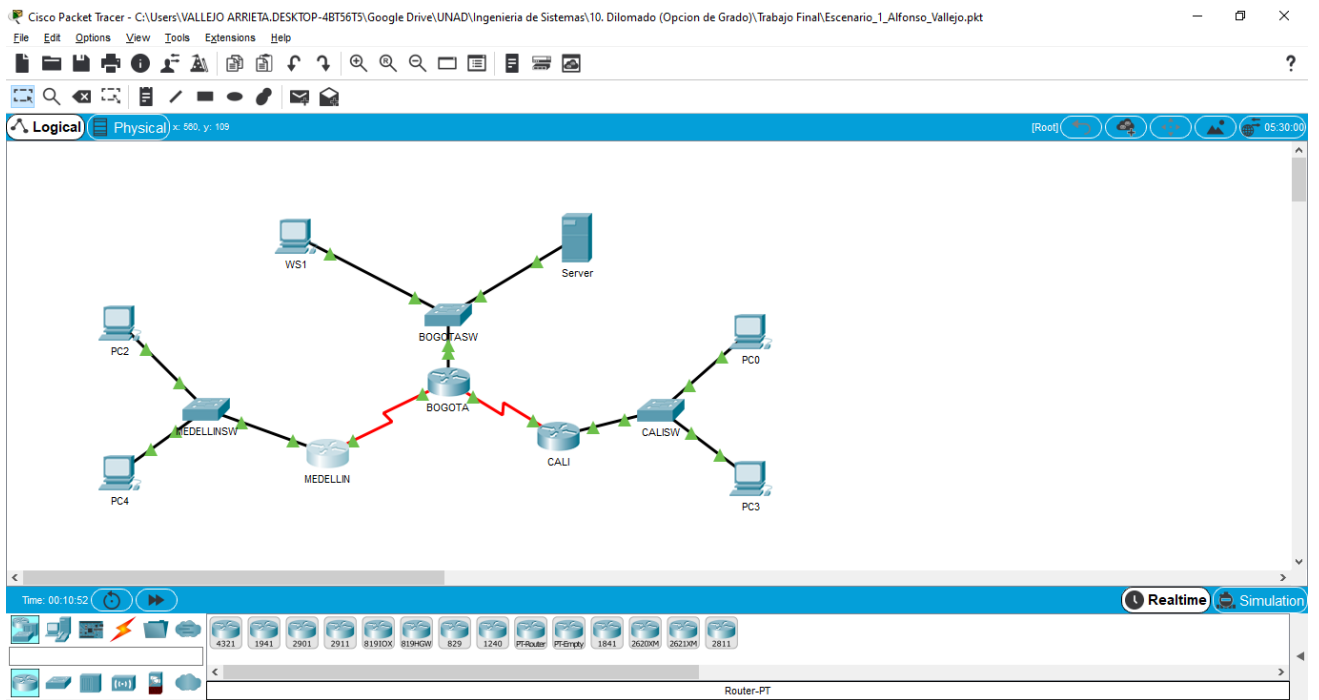
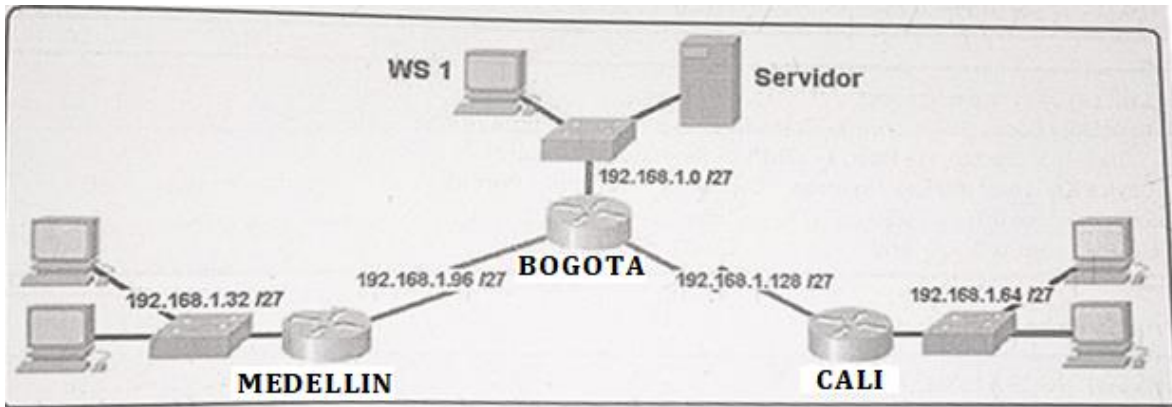
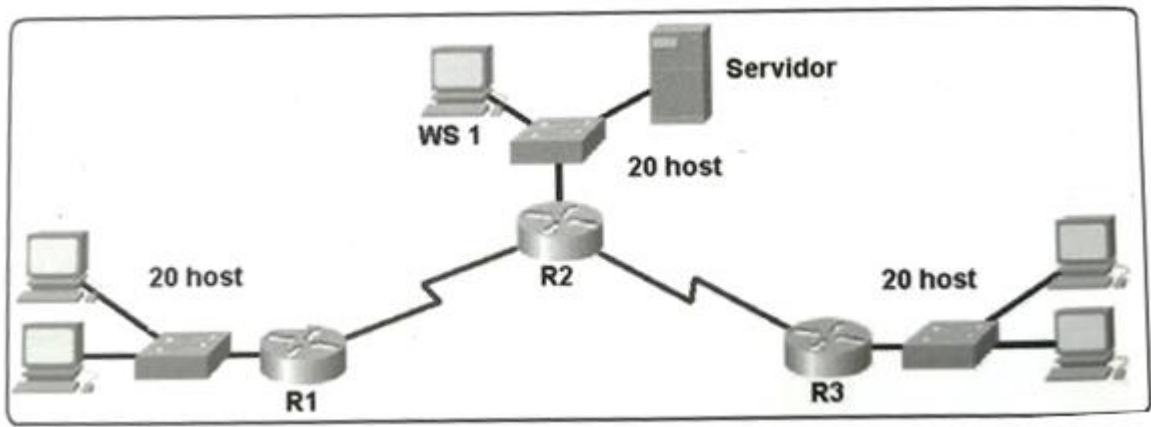
Parte 2: Considerar la asignación de los parámetros básicos y la detección de vecinos directamente conectados.

Parte 3: La red y subred establecidas deberán tener una interconexión total, todos los hosts deberán ser visibles y poder comunicarse entre ellos sin restricciones.

Parte 4: Implementar la seguridad en la red, se debe restringir el acceso y comunicación entre hosts de acuerdo con los requerimientos del administrador de red.

Parte 5: Comprobación total de los dispositivos y su funcionamiento en la red.

Parte 6: Configuración final.



Desarrollo

- Como trabajo inicial se debe realizar lo siguiente.

```
Router>en
Router#conf term
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)#banner motd #Cuidado Acceso Restringido#
BOGOTA(config)#enable secret class123
BOGOTA(config)#line console 0
BOGOTA(config-line)#password cisco123
BOGOTA(config-line)#login
BOGOTA(config-line)#logging synchronous
BOGOTA(config-line)#line vty 0 15
BOGOTA(config-line)#password cisco123
BOGOTA(config-line)#login
BOGOTA(config-line)#logging synchronous
BOGOTA(config-line)#
BOGOTA(config-line)#
```

```
Router>en
Router#conf term
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)#banner motd #Cuidado Acceso Restringido#
MEDELLIN(config)#enable secret class123
MEDELLIN(config)#line console 0
MEDELLIN(config-line)#password cisco123
MEDELLIN(config-line)#login
MEDELLIN(config-line)#logging synchronous
MEDELLIN(config-line)#line vty 0 15
MEDELLIN(config-line)#password cisco123
MEDELLIN(config-line)#login
MEDELLIN(config-line)#logging synchronous
MEDELLIN(config-line)#
```

```
Router>en
Router#conf term
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)#banner motd #Cuidado Acceso Restringido#
CALI(config)#enable secret class123
CALI(config)#line console 0
CALI(config-line)#password cisco123
CALI(config-line)#login
CALI(config-line)#logging synchronous
CALI(config-line)#line vty 0 15
CALI(config-line)#password cisco123
CALI(config-line)#login
CALI(config-line)#logging synchronous
CALI(config-line)#
```

```
Switch>en
Switch#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname BOGOTASW
BOGOTASW(config)#no ip domain-lookup
BOGOTASW(config)#service password-encryption
BOGOTASW(config)#banner motd #Cuidado Acceso Restringido#
BOGOTASW(config)#enable secret class123
BOGOTASW(config)#line console 0
BOGOTASW(config-line)#password cisco123
BOGOTASW(config-line)#login
BOGOTASW(config-line)#logging synchronous
BOGOTASW(config-line)#line vty 0 15
BOGOTASW(config-line)#password cisco123
BOGOTASW(config-line)#login
BOGOTASW(config-line)#logging synchronous
BOGOTASW(config-line)#
BOGOTASW(config-line)#
```

```
Switch>en
Switch>en
Switch#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname MEDELLINSW
MEDELLINSW(config)#no ip domain-lookup
MEDELLINSW(config)#service password-encryption
MEDELLINSW(config)#banner motd #Cuidado Acceso Restringido#
MEDELLINSW(config)#enable secret class123
MEDELLINSW(config)#line console 0
```

```
MEDELLINSW(config-line)#password cisco123
MEDELLINSW(config-line)#login
MEDELLINSW(config-line)#logging synchronous
MEDELLINSW(config-line)#line vty 0 15
MEDELLINSW(config-line)#password cisco123
MEDELLINSW(config-line)#login
MEDELLINSW(config-line)#logging synchronous
MEDELLINSW(config-line)#
MEDELLINSW(config-line)#
```

```
Switch>en
Switch#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname CALISW
CALISW(config)#no ip domain-lookup
CALISW(config)#service password-encryption
CALISW(config)#banner motd #Cuidado Acceso Restringido#
CALISW(config)#enable secret class123
CALISW(config)#line console 0
CALISW(config-line)#password cisco123
CALISW(config-line)#login
CALISW(config-line)#logging synchronous
CALISW(config-line)#line vty 0 15
CALISW(config-line)#password cisco123
CALISW(config-line)#login
CALISW(config-line)#logging synchronous
CALISW(config-line)#
```

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

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

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

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.**

LAN Bogota	192.168.1.0/27
LAN Medellín	192.168.1.32/27
LAN Cali	192.168.1.64/27
Bogota - Medellín	192.168.1.96/27
Bogota - Cali	192.168.1.128/27
Red Futura	192.168.1.160/27
Red Futura	192.168.1.192/27
Red Futura	192.168.1.224/27

Parte 2: Configuración Básica.

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

	R1	R2	R3
Nombre de Host	MEDELLIN	BOGOTA	CALI
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
Protocolo de enrutamiento	Eigrp	Eigrp	Eigrp
Sistema Autónomo	200	200	200
Afirmaciones de red	192.168.1.0	192.168.1.0	192.168.1.0

```
BOGOTA(config-line)#int 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)#
BOGOTA(config-if)#int 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)#
BOGOTA(config-if)#int f0/0
BOGOTA(config-if)#ip address 192.168.1.1 255.255.255.224
BOGOTA(config-if)#no shutdown
```

```
BOGOTA(config-if)#
BOGOTA(config-if)#router eigrp 200
BOGOTA(config-router)#no auto-summary
BOGOTA(config-router)#network 192.168.1.0 0.0.0.31
BOGOTA(config-router)#network 192.168.1.96 0.0.0.31
```

```
BOGOTA(config-router)#network 192.168.1.128 0.0.0.31
BOGOTA(config-router)#
BOGOTA(config-router)#end
BOGOTA#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%SYS-5-CONFIG_I: Configured from console by console

BOGOTA#

MEDELLIN(config-line)#int s0/0/0
MEDELLIN(config-if)#ip address 192.168.1.99 255.255.255.224
MEDELLIN(config-if)#no shutdown

MEDELLIN(config-if)#
MEDELLIN(config-if)#int f0/0
MEDELLIN(config-if)#ip address 192.168.1.33 255.255.255.224
MEDELLIN(config-if)#no shutdown

MEDELLIN(config-if)#
MEDELLIN(config-if)#router eigrp 200
MEDELLIN(config-router)#no auto-summary
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)#end
MEDELLIN#
MEDELLIN#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

%SYS-5-CONFIG_I: Configured from console by console

MEDELLIN#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
%DUAL-5-NBRCHANGE: IP-EIGRP 200: Neighbor 192.168.1.98 (Serial0/0/0) is up: new
adjacency

MEDELLIN#

CALI(config-line)#int s0/0/0
CALI(config-if)#ip address 192.168.1.131 255.255.255.224
CALI(config-if)#no shutdown
```

```
CALI(config-if)#int f0/0
CALI(config-if)#ip address 192.168.1.65 255.255.255.224
CALI(config-if)#no shutdown
```

```
CALI(config-if)#
CALI(config-if)#router eigrp 200
CALI(config-router)#no auto-summary
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)#end
CALI#
CALI#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
```

```
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
```

```
%SYS-5-CONFIG_I: Configured from console by console
```

```
CALI#
```

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

```
%DUAL-5-NBRCHANGE: IP-EIGRP 200: Neighbor 192.168.1.130 (Serial0/0/0) is up: new adjacency
```

```
CALI#
```

- 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: C - connected, S - static, I - IGRP, 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
```

```
192.168.1.0/27 is subnetted, 5 subnets
C 192.168.1.0 is directly connected, FastEthernet0/0
```

D 192.168.1.32 [90/2172416] via 192.168.1.99, 00:02:57, Serial0/0/0
D 192.168.1.64 [90/2172416] via 192.168.1.131, 00:02:10, Serial0/0/1
C 192.168.1.96 is directly connected, Serial0/0/0
C 192.168.1.128 is directly connected, Serial0/0/1

BOGOTA#

MEDELLIN#show ip route

Codes: C - connected, S - static, I - IGRP, 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

192.168.1.0/27 is subnetted, 5 subnets
D 192.168.1.0 [90/2172416] via 192.168.1.98, 00:04:09, Serial0/0/0
C 192.168.1.32 is directly connected, FastEthernet0/0
D 192.168.1.64 [90/2684416] via 192.168.1.98, 00:03:22, Serial0/0/0
C 192.168.1.96 is directly connected, Serial0/0/0
D 192.168.1.128 [90/2681856] via 192.168.1.98, 00:03:29, Serial0/0/0

CALI#show ip route

Codes: C - connected, S - static, I - IGRP, 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

192.168.1.0/27 is subnetted, 5 subnets
D 192.168.1.0 [90/2172416] via 192.168.1.130, 00:04:10, Serial0/0/0
D 192.168.1.32 [90/2684416] via 192.168.1.130, 00:04:10, Serial0/0/0
C 192.168.1.64 is directly connected, FastEthernet0/0
D 192.168.1.96 [90/2681856] via 192.168.1.130, 00:04:10, Serial0/0/0
C 192.168.1.128 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 28160
via Connected, FastEthernet0/0
P 192.168.1.32/27, 1 successors, FD is 2172416
via 192.168.1.99 (2172416/28160), Serial0/0/0
P 192.168.1.64/27, 1 successors, FD is 2172416
via 192.168.1.131 (2172416/28160), 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 2172416
via 192.168.1.98 (2172416/28160), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 28160
via Connected, FastEthernet0/0
P 192.168.1.64/27, 1 successors, FD is 2684416
via 192.168.1.98 (2684416/2172416), 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 2172416
via 192.168.1.130 (2172416/28160), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 2684416
via 192.168.1.130 (2684416/2172416), Serial0/0/0

P 192.168.1.64/27, 1 successors, FD is 28160
via Connected, FastEthernet0/0
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 Intfcae Holdtme Capability Platform Port ID
BOGOTASW Fas 0/0 124 S 2960 Fas 0/1
MEDELLIN Ser 0/0/0 123 R C1841 Ser 0/0/0
CALI Ser 0/0/1 170 R C1841 Ser 0/0/0
BOGOTA#
```

```
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 Intfcae Holdtme Capability Platform Port ID
MEDELLINSW Fas 0/0 166 S 2960 Fas 0/1
BOGOTA Ser 0/0/0 151 R C1841 Ser 0/0/0
MEDELLIN#
```

```
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 Intfcae Holdtme Capability Platform Port ID
CALISW Fas 0/0 162 S 2960 Fas 0/1
BOGOTA Ser 0/0/0 163 R C1841 Ser 0/0/1
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 00:04:10 40 1000 0 8
```

```
CALI#
```

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

CALI#ping 192.168.1.130

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.1.130, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 2/4/9 ms

CALI#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 = 3/4/6 ms

CALI#

BOGOTA#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 = 1/3/6 ms

BOGOTA#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 = 2/3/7 ms

BOGOTA#

Parte 3: Configuración 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.

SHOW IP EIGRP NEIGHBORS

```
BOGOTA#show ip eigrp neighbor
IP-EIGRP neighbors for process 200
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 192.168.1.99 Se0/0/0 12 00:02:56 40 1000 0 7
1 192.168.1.131 Se0/0/1 14 00:02:09 40 1000 0 7
```

BOGOTA#

```
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 12 00:10:34 40 1000 0 7
```

MEDELLIN#

```
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 10 00:10:07 40 1000 0 8
```

CALI#

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 28160
via Connected, FastEthernet0/0
P 192.168.1.32/27, 1 successors, FD is 2172416
via 192.168.1.99 (2172416/28160), Serial0/0/0
P 192.168.1.64/27, 1 successors, FD is 2172416
via 192.168.1.131 (2172416/28160), 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 2172416
via 192.168.1.98 (2172416/28160), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 28160
via Connected, FastEthernet0/0
P 192.168.1.64/27, 1 successors, FD is 2684416
via 192.168.1.98 (2684416/2172416), 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 2172416
via 192.168.1.130 (2172416/28160), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 2684416
via 192.168.1.130 (2684416/2172416), Serial0/0/0
P 192.168.1.64/27, 1 successors, FD is 28160
via Connected, FastEthernet0/0
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: C - connected, S - static, I - IGRP, 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

192.168.1.0/27 is subnetted, 5 subnets

C 192.168.1.0 is directly connected, FastEthernet0/0

D 192.168.1.32 [90/2172416] via 192.168.1.99, 00:02:57, Serial0/0/0

D 192.168.1.64 [90/2172416] via 192.168.1.131, 00:02:10, Serial0/0/1

C 192.168.1.96 is directly connected, Serial0/0/0

C 192.168.1.128 is directly connected, Serial0/0/1

BOGOTA#

MEDELLIN#show ip route

Codes: C - connected, S - static, I - IGRP, 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

192.168.1.0/27 is subnetted, 5 subnets

D 192.168.1.0 [90/2172416] via 192.168.1.98, 00:04:09, Serial0/0/0

C 192.168.1.32 is directly connected, FastEthernet0/0

D 192.168.1.64 [90/2684416] via 192.168.1.98, 00:03:22, Serial0/0/0

C 192.168.1.96 is directly connected, Serial0/0/0

D 192.168.1.128 [90/2681856] via 192.168.1.98, 00:03:29, Serial0/0/0

CALI#show ip route

Codes: C - connected, S - static, I - IGRP, 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

192.168.1.0/27 is subnetted, 5 subnets

D 192.168.1.0 [90/2172416] via 192.168.1.130, 00:04:10, Serial0/0/0

D 192.168.1.32 [90/2684416] via 192.168.1.130, 00:04:10, Serial0/0/0

C 192.168.1.64 is directly connected, FastEthernet0/0

D 192.168.1.96 [90/2681856] via 192.168.1.130, 00:04:10, Serial0/0/0

C 192.168.1.128 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.

The screenshot shows a network topology in Cisco Packet Tracer. The network consists of several devices: WS1, Server, BOGOTASW, BOGOTA, CALISW, CALI, MEDELLIN, MEDELLINSW, PC2, PC4, and PC3. The devices are interconnected, with BOGOTASW and BOGOTA acting as central hubs. The network is divided into three main sections: BOGOTA (top), MEDELLIN (left), and CALI (right). The devices are connected via Ethernet links, and the network is running IPv6.

The Command Prompt window for PC3 shows the following output:

```

C:\>ipconfig

FastEthernet0 Connection: (default port)
Link-local IPv6 Address . . . . . : FE80::204:9AFF:FE05:69E7
IP Address. . . . . : 192.168.1.67
Subnet Mask . . . . . : 255.255.255.224
Default Gateway . . . . . : 192.168.1.65

Bluetooth Connection:

Link-local IPv6 Address . . . . . : ::
IP Address . . . . . : 0.0.0.0
Subnet Mask . . . . . : 0.0.0.0
Default Gateway . . . . . : 0.0.0.0

C:\>ping 192.168.1.66

Pinging 192.168.1.66 with 32 bytes of data:

Reply from 192.168.1.66: bytes=32 time<1ms TTL=128
Reply from 192.168.1.66: bytes=32 time<1ms TTL=128
Reply from 192.168.1.66: bytes=32 time<1ms TTL=128
Reply from 192.168.1.66: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.66:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
  
```

The screenshot shows the same network topology as the previous image. The devices are interconnected, with BOGOTASW and BOGOTA acting as central hubs. The network is divided into three main sections: BOGOTA (top), MEDELLIN (left), and CALI (right). The devices are connected via Ethernet links, and the network is running IPv6.

The Command Prompt window for PC4 shows the following output:

```

Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection: (default port)
Link-local IPv6 Address . . . . . : FE80::201:96FF:FE06:81B4
IP Address . . . . . : 192.168.1.35
Subnet Mask . . . . . : 255.255.255.224
Default Gateway . . . . . : 192.168.1.33

Bluetooth Connection:

Link-local IPv6 Address . . . . . : ::
IP Address . . . . . : 0.0.0.0
Subnet Mask . . . . . : 0.0.0.0
Default Gateway . . . . . : 0.0.0.0

C:\>ping 192.168.1.34

Pinging 192.168.1.34 with 32 bytes of data:

Reply from 192.168.1.34: bytes=32 time<1ms TTL=128
Reply from 192.168.1.34: bytes=32 time=3ms TTL=128
Reply from 192.168.1.34: bytes=32 time<1ms TTL=128
Reply from 192.168.1.34: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.34:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 1ms
  
```

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.**
- 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#conf term
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA(config)#access-list 111 permit ip host 192.168.1.30 any
BOGOTA(config)#int f0/0
BOGOTA(config-if)#ip access-group 111 in
BOGOTA(config-if)#
```

- 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#conf t
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN(config)#access-list 111 permit ip 192.168.1.32 0.0.0.31 host 192.168.1.30
MEDELLIN(config)#int f0/0
MEDELLIN(config-if)#ip access-group 111 in
MEDELLIN(config-if)#
```

```
CALI#conf t
Enter configuration commands, one per line. End with CNTL/Z.
```

```

CALI(config)#access-list 111 permit ip 192.168.1.64 0.0.0.31 host 192.168.1.30
CALI(config)#int f0/0
CALI(config-if)#ip access-group 111 in
CALI(config-if)#

```

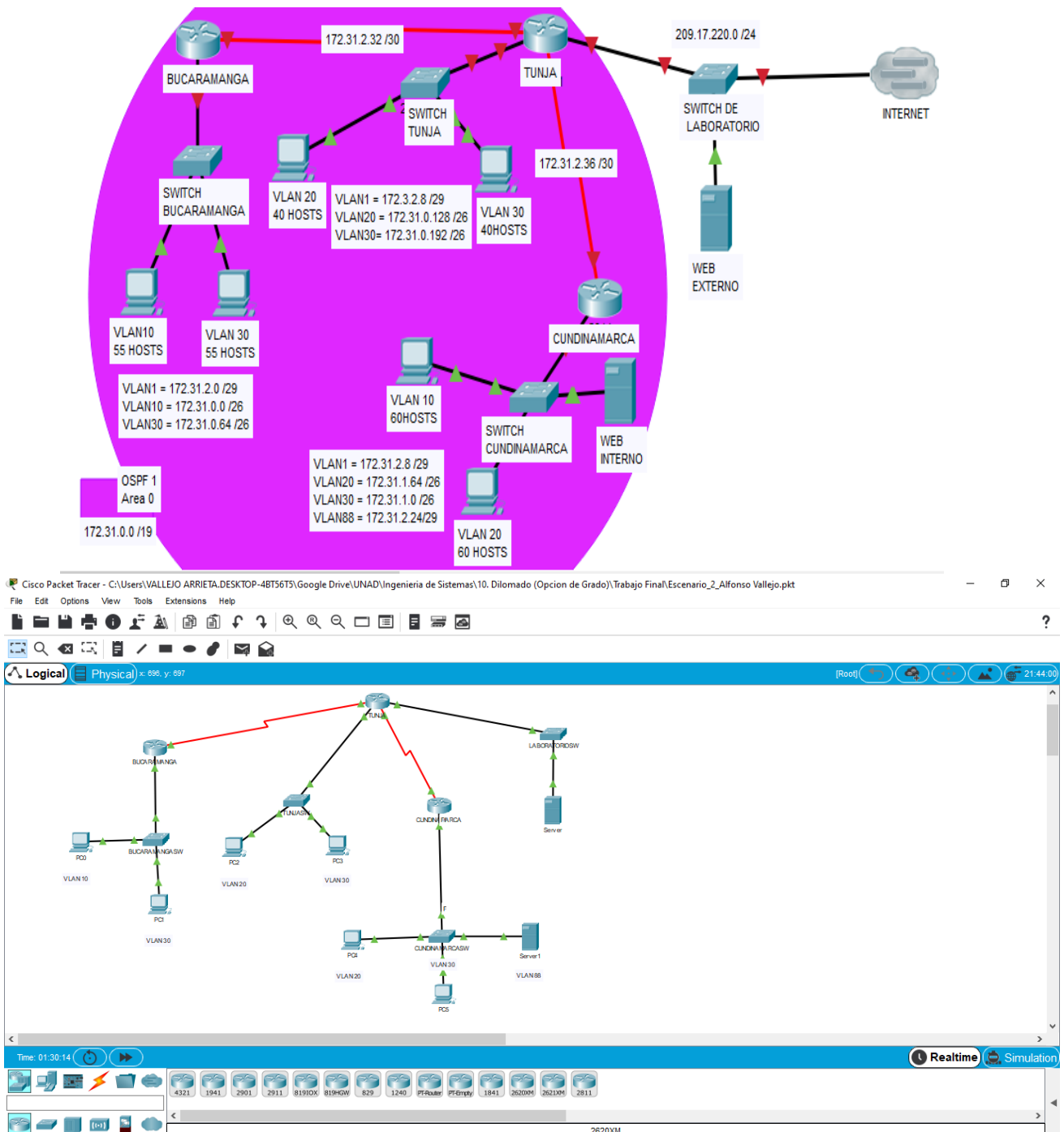
Parte 5: Comprobación de la red instalada.

- 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 E.

	ORIGEN	DESTINO	RESULTADO
TELNET	Router MEDELLIN	Router CALI	Éxito
	WS_1	Router BOGOTA	Falla
	Servidor	Router CALI	Éxito
	Servidor	Router MEDELLIN	Éxito
TELNET	LAN del Router MEDELLIN	Router CALI	Falla
	LAN del Router CALI	Router CALI	Falla
	LAN del Router MEDELLIN	Router MEDELLIN	Falla
	LAN del Router CALI	Router MEDELLIN	Falla
PING	LAN del Router CALI	WS_1	Falla
	LAN del Router MEDELLIN	WS_1	Falla
	LAN del Router MEDELLIN	LAN del Router CALI	Falla
PING	LAN del Router CALI	Servidor	Éxito
	LAN del Router MEDELLIN	Servidor	Éxito
	Servidor	LAN del Router MEDELLIN	Éxito
	Servidor	LAN del Router CALI	Falla
	Router CALI	LAN del Router MEDELLIN	Falla
	Router MEDELLIN	LAN del Router CALI	Falla

Escenario 2

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.



Desarrollo

Los siguientes son los requerimientos necesarios:

1. Todos los routers deberán tener los siguiente:

- **Configuración básica.**

```
Router>en
Router#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname BUCARAMANGA
BUCARAMANGA(config)#no ip domain-lookup
BUCARAMANGA(config)#banner motd #Cuidado Acceso Restringido#
BUCARAMANGA(config)#enable secret class123
BUCARAMANGA(config)#line console 0
BUCARAMANGA(config-line)#password cisco123
BUCARAMANGA(config-line)#login
BUCARAMANGA(config-line)#logging synchronous
BUCARAMANGA(config-line)#line vty 0 15
BUCARAMANGA(config-line)#password cisco123
BUCARAMANGA(config-line)#login
BUCARAMANGA(config-line)#logging synchronous
BUCARAMANGA(config)#int f0/0.1
BUCARAMANGA(config-subif)#encapsulation dot1q 1
BUCARAMANGA(config-subif)#ip address 172.31.2.1 255.255.255.248
BUCARAMANGA(config-subif)#int f0/0.10
BUCARAMANGA(config-subif)#encapsulation dot1q 10
BUCARAMANGA(config-subif)#ip address 172.31.0.1 255.255.255.192
BUCARAMANGA(config-subif)#int f0/0.30
BUCARAMANGA(config-subif)#encapsulation dot1q 30
BUCARAMANGA(config-subif)#ip address 172.31.0.65 255.255.255.192
BUCARAMANGA(config-subif)#int f0/0
BUCARAMANGA(config-if)#no shutdown
BUCARAMANGA(config-if)#
BUCARAMANGA(config-if)#
BUCARAMANGA(config-if)#int 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)#
BUCARAMANGA(config-if)#router ospf 1
BUCARAMANGA(config-router)#network 172.31.0.0 0.0.0.63 area 0
BUCARAMANGA(config-router)#network 172.31.0.64 0.0.0.63 area 0
```

```
BUCARAMANGA(config-router)#network 172.31.2.0 0.0.0.7 area 0
BUCARAMANGA(config-router)#network 172.31.2.32 0.0.0.3 area 0
BUCARAMANGA(config-router)#end
BUCARAMANGA#
```

```
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0.1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0.10, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.10, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0.30, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.30, changed state to up
%SYS-5-CONFIG_I: Configured from console by console
BUCARAMANGA#
```

```
Router>en
Router#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname TUNJA
TUNJA(config)#no ip domain-lookup
TUNJA(config)#banner motd #Cuidado Acceso Restringido#
TUNJA(config)#enable secret class123
TUNJA(config)#line console 0
TUNJA(config-line)#password cisco123
TUNJA(config-line)#login
TUNJA(config-line)#logging synchronous
TUNJA(config-line)#line vty 0 15
TUNJA(config-line)#password cisco123
TUNJA(config-line)#login
TUNJA(config-line)#logging synchronous
TUNJA(config)#int f0/0.1
TUNJA(config-subif)#encapsulation dot1q 1
TUNJA(config-subif)#ip address 172.3.2.9 255.255.255.248
TUNJA(config-subif)#int f0/0.20
TUNJA(config-subif)#encapsulation dot1q 20
TUNJA(config-subif)#ip address 172.31.0.129 255.255.255.192
TUNJA(config-subif)#int f0/0.30
TUNJA(config-subif)#encapsulation dot1q 30
TUNJA(config-subif)#ip address 172.31.0.193 255.255.255.192
TUNJA(config-subif)#int f0/0
TUNJA(config-if)#no shutdown
TUNJA(config-if)#
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)#
```

```
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 f0/1
TUNJA(config-if)#ip address 209.165.220.1 255.255.255.0
TUNJA(config-if)#no shutdown
TUNJA(config-if)#
TUNJA(config-if)#router ospf 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)#network 172.31.2.36 0.0.0.3 area 0
TUNJA(config-router)#end
TUNJA#
```

```
TUNJA#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0.1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0.20, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.20, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0.30, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.30, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%SYS-5-CONFIG_I: Configured from console by console
TUNJA#
```

```
Router>en
Router#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname CUNDINAMARCA
CUNDINAMARCA(config)#no ip domain-lookup
CUNDINAMARCA(config)#banner motd #Cuidado Acceso Restringido#
CUNDINAMARCA(config)#enable secret class123
CUNDINAMARCA(config)#line console 0
CUNDINAMARCA(config-line)#password cisco123
CUNDINAMARCA(config-line)#login
CUNDINAMARCA(config-line)#logging synchronous
CUNDINAMARCA(config-line)#line vty 0 15
CUNDINAMARCA(config-line)#password cisco123
CUNDINAMARCA(config-line)#login
```

```

CUNDINAMARCA(config-line)#logging synchronous
CUNDINAMARCA(config)#int f0/0.1
CUNDINAMARCA(config-subif)#encapsulation dot1q 1
CUNDINAMARCA(config-subif)#ip address 172.31.2.9 255.255.255.248
CUNDINAMARCA(config-subif)#int f0/0.20
CUNDINAMARCA(config-subif)#encapsulation dot1q 20
CUNDINAMARCA(config-subif)#ip address 172.31.1.65 255.255.255.192
CUNDINAMARCA(config-subif)#int f0/0.30
CUNDINAMARCA(config-subif)#encapsulation dot1q 30
CUNDINAMARCA(config-subif)#ip address 172.31.1.1 255.255.255.192
CUNDINAMARCA(config-subif)#int f0/0.88
CUNDINAMARCA(config-subif)#encapsulation dot1q 88
CUNDINAMARCA(config-subif)#ip address 172.31.2.25 255.255.255.248
CUNDINAMARCA(config-subif)#int f0/0
CUNDINAMARCA(config-if)#no shutdown
CUNDINAMARCA(config-if)#
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)#router ospf 1
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)#end
CUNDINAMARCA#

```

```

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0.1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0.20, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.20, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0.30, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.30, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0.88, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.88, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%SYS-5-CONFIG_I: Configured from console by console
CUNDINAMARCA#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
CUNDINAMARCA#
00:14:55: %OSPF-5-ADJCHG: Process 1, Nbr 209.165.220.1 on Serial0/0/0 from LOADING to
FULL, Loading Done
CUNDINAMARCA#
Switch>en

```

Switch#conf term

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

```
Switch(config)#hostname BUCARAMANGASW
BUCARAMANGASW(config)#vlan 1
BUCARAMANGASW(config-vlan)#vlan 10
BUCARAMANGASW(config-vlan)#vlan 30
BUCARAMANGASW(config-vlan)#int f0/20
BUCARAMANGASW(config-if)#switchport mode access
BUCARAMANGASW(config-if)#switchport access vlan 10
BUCARAMANGASW(config-if)#int f0/24
BUCARAMANGASW(config-if)#switchport mode access
BUCARAMANGASW(config-if)#switchport access vlan 30
BUCARAMANGASW(config-if)#int f0/1
BUCARAMANGASW(config-if)#switchport mode trunk
BUCARAMANGASW(config-if)#int vlan 1
BUCARAMANGASW(config-if)#ip address 172.31.2.3 255.255.255.248
BUCARAMANGASW(config-if)#no shutdown
BUCARAMANGASW(config-if)#ip default-gateway 172.31.2.1
BUCARAMANGASW(config)#
BUCARAMANGASW(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
```

Switch>en

Switch#conf term

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

```
Switch(config)#hostname TUNJASW
TUNJASW(config)#vlan 1
TUNJASW(config-vlan)#vlan 20
TUNJASW(config-vlan)#vlan 30
TUNJASW(config-vlan)#int f0/20
TUNJASW(config-if)#switchport mode access
TUNJASW(config-if)#switchport access vlan 20
TUNJASW(config-if)#int f0/24
TUNJASW(config-if)#switchport mode access
TUNJASW(config-if)#switchport access vlan 30
TUNJASW(config-if)#int f0/1
TUNJASW(config-if)#switchport mode trunk
TUNJASW(config-if)#
TUNJASW(config-if)#int vlan 1
TUNJASW(config-if)#ip address 172.3.2.11 255.255.255.248
TUNJASW(config-if)#no shutdown
TUNJASW(config-if)#
TUNJASW(config-if)#ip default-gateway 172.3.2.9
```

```

TUNJASW(config)#
TUNJASW(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
TUNJASW(config)#
Switch>en
Switch#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname CUNDINAMARCASW
CUNDINAMARCASW(config)#vlan 1
CUNDINAMARCASW(config-vlan)#vlan 20
CUNDINAMARCASW(config-vlan)#vlan 30
CUNDINAMARCASW(config-vlan)#vlan 88
CUNDINAMARCASW(config-vlan)#exit
CUNDINAMARCASW(config)#int f0/20
CUNDINAMARCASW(config-if)#switchport mode access
CUNDINAMARCASW(config-if)#switchport access vlan 20
CUNDINAMARCASW(config-if)#int f0/24
CUNDINAMARCASW(config-if)#switchport mode access
CUNDINAMARCASW(config-if)#switchport access vlan 30
CUNDINAMARCASW(config-if)#int f0/10
CUNDINAMARCASW(config-if)#switchport mode access
CUNDINAMARCASW(config-if)#switchport access vlan 88
CUNDINAMARCASW(config-if)#int f0/1
CUNDINAMARCASW(config-if)#switchport mode trunk
CUNDINAMARCASW(config-if)#
CUNDINAMARCASW(config-if)#int vlan 1
CUNDINAMARCASW(config-if)#ip address 172.31.2.11 255.255.255.248
CUNDINAMARCASW(config-if)#no shutdown
CUNDINAMARCASW(config-if)#
CUNDINAMARCASW(config-if)#ip default-gateway 172.31.2.9
CUNDINAMARCASW(config)#
CUNDINAMARCASW(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
CUNDINAMARCASW(config)#

```

- **Autenticación local con AAA.**

```
BUCARAMANGA(config-line)#username administrador secret cisco12345
BUCARAMANGA(config)#aaa new-model
BUCARAMANGA(config)#aaa authentication login AUTH local
BUCARAMANGA(config)#line console 0
BUCARAMANGA(config-line)#login authentication AUTH
BUCARAMANGA(config-line)#line vty 0 15
BUCARAMANGA(config-line)#login authentication AUTH
```

```
TUNJA(config-line)#username administrador secret cisco12345
TUNJA(config)#aaa new-model
TUNJA(config)#aaa authentication login AUTH local
TUNJA(config)#line console 0
TUNJA(config-line)#login authentication AUTH
TUNJA(config-line)#line vty 0 15
TUNJA(config-line)#login authentication AUTH
```

```
CUNDINAMARCA(config-line)#username administrador secret cisco12345
CUNDINAMARCA(config)#aaa new-model
CUNDINAMARCA(config)#aaa authentication login AUTH local
CUNDINAMARCA(config)#line console 0
CUNDINAMARCA(config-line)#login authentication AUTH
CUNDINAMARCA(config-line)#line vty 0 15
CUNDINAMARCA(config-line)#login authentication AUTH
```

- **Cifrado de contraseñas.**

```
BUCARAMANGA(config)#service password-encryption
TUNJA(config)#service password-encryption
CUNDINAMARCA(config)#service password-encryption
```

- **Un máximo de internos para acceder al router.**

```
BUCARAMANGA(config-line)#login block-for 5 attempts 4 within 60
TUNJA(config-line)#login block-for 5 attempts 4 within 60
CUNDINAMARCA(config-line)#login block-for 5 attempts 4 within 60
```

- **Máximo tiempo de acceso al detectar ataques.**

BUCARAMANGA(config-line)#login block-for 5 attempts 4 within 60

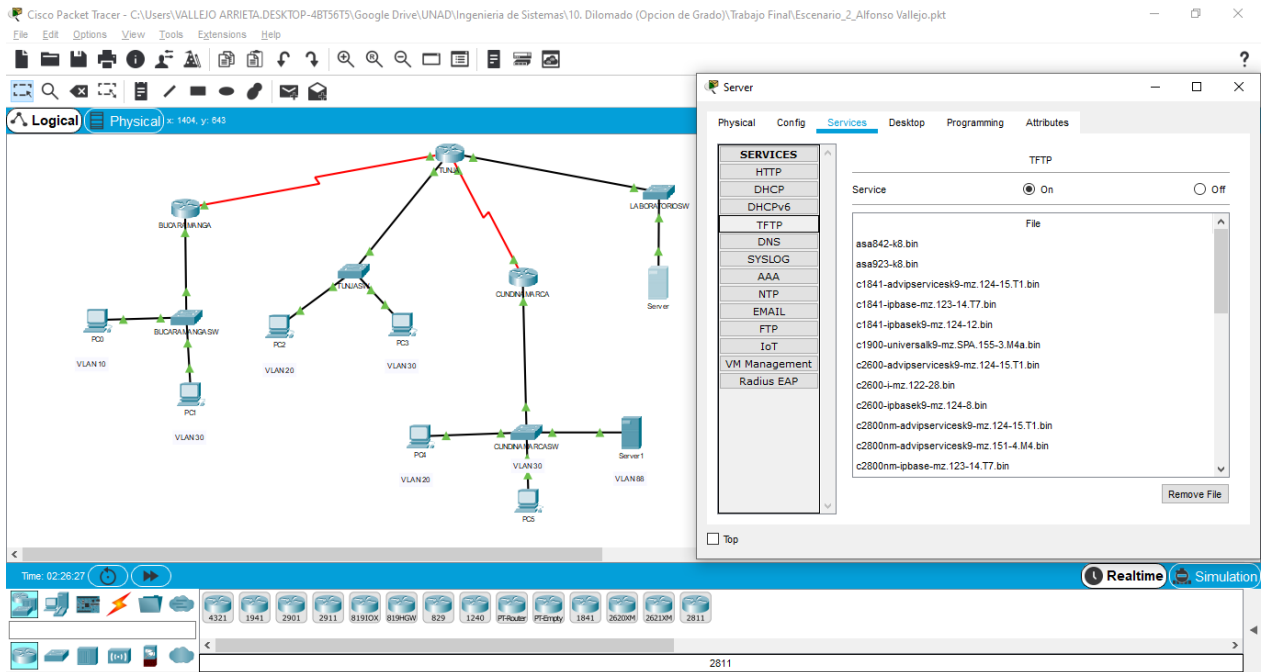
TUNJA(config-line)#login block-for 5 attempts 4 within 60

CUNDINAMARCA(config-line)#login block-for 5 attempts 4 within 60

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

The screenshot displays the Cisco Packet Tracer interface. The main window shows a network topology with three central routers: BUCARAMANGA, TUNJA, and CUNDINAMARCA. BUCARAMANGA is connected to TUNJA, and TUNJA is connected to CUNDINAMARCA. A central router labeled 'LABORATORIOSW' is also connected to the other three. Below each router are several switches and PCs, each associated with a specific VLAN (VLAN 10, 20, 30, and 88). A server icon is visible on the right side of the network.

On the right side, a 'Server' configuration window is open, showing the 'Desktop' tab. The 'IP Configuration' section is active, with 'Static' selected. The IP Address is set to 209.165.220.3, Subnet Mask to 255.255.255.0, and Default Gateway to 209.165.220.1. The DNS Server is set to 0.0.0.0. The 'IPv6 Configuration' section is also visible, with 'Static' selected and the Link Local Address set to FE80::201:C7FF:FEA7:6BC4.



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

```

TUNJA(config)#ip dhcp excluded-address 172.31.0.1
TUNJA(config)#ip dhcp excluded-address 172.31.0.65
TUNJA(config)#ip dhcp excluded-address 172.31.1.65
TUNJA(config)#ip dhcp excluded-address 172.31.1.1
TUNJA(config)#ip dhcp pool V10B
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 172.31.2.28
TUNJA(dhcp-config)#ip dhcp pool V30B
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 172.31.2.28
TUNJA(dhcp-config)#ip dhcp pool V20C
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 172.31.2.28
TUNJA(dhcp-config)#ip dhcp pool V30C
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 172.31.2.28
TUNJA(dhcp-config)#

```

```

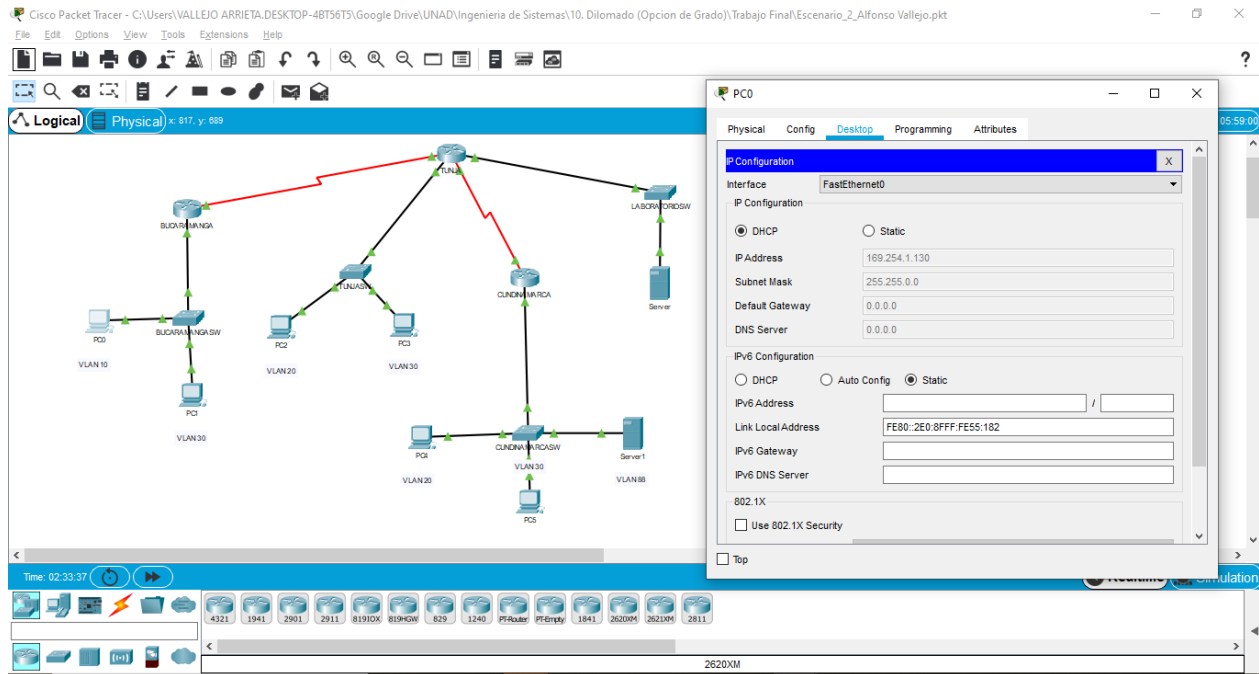
BUCARAMANGA(config)#int f0/0.10
BUCARAMANGA(config-subif)#ip helper-address 172.31.2.33
BUCARAMANGA(config-subif)#int f0/0.30
BUCARAMANGA(config-subif)#ip helper-address 172.31.2.33
BUCARAMANGA(config-subif)#end
BUCARAMANGA#
BUCARAMANGA#
%SYS-5-CONFIG_I: Configured from console by console
BUCARAMANGA#

```

```

CUNDINAMARCA(config)#int f0/0.20
CUNDINAMARCA(config-subif)#ip helper-address 172.31.2.37
CUNDINAMARCA(config-subif)#int f0/0.30
CUNDINAMARCA(config-subif)#ip helper-address 172.31.2.37
CUNDINAMARCA(config-subif)#end
CUNDINAMARCA#
%SYS-5-CONFIG_I: Configured from console by console
CUNDINAMARCA#

```



Cisco Packet Tracer - C:\Users\VALLEJO ARRIETA.DESKTOP-48T56T5\Google Drive\UNAD\Ingenieria de Sistemas\10. Dilomado (Opcion de Grado)\Trabajo Final\Escenario_2_Alfonso Vallejo.pkt

File Edit Options View Tools Extensions Help

Logical Physical x: 1033, y: 714

PC1 Configuration:

- Physical: DHCP
- IP Address: 169.254.196.182
- Subnet Mask: 255.255.0.0
- Default Gateway: 0.0.0.0
- DNS Server: 0.0.0.0
- IPv6 Configuration:
 - Static
 - IPv6 Address: [] / []
 - Link Local Address: FE80::260:2FFF:FE31:C496
 - IPv6 Gateway: []
 - IPv6 DNS Server: []
- 802.1X:
 - Use 802.1X Security:
 - Authentication: MD5
 - Username: []
 - Password: []

Time: 02:35:55

4321 1941 2901 2911 81910X 819HGW 829 1240 PTEduw PTEduw 1841 26200M 26210M 2811

2811

Cisco Packet Tracer - C:\Users\VALLEJO ARRIETA.DESKTOP-48T56T5\Google Drive\UNAD\Ingenieria de Sistemas\10. Dilomado (Opcion de Grado)\Trabajo Final\Escenario_2_Alfonso Vallejo.pkt

File Edit Options View Tools Extensions Help

Logical Physical x: 413, y: 373

PC2 Configuration:

- Physical: Static
- IP Address: 172.31.0.130
- Subnet Mask: 255.255.255.192
- Default Gateway: 172.31.0.129
- DNS Server: 172.31.2.28
- IPv6 Configuration:
 - Static
 - IPv6 Address: [] / []
 - Link Local Address: FE80::2E0:A3FF:FEA1:C25B
 - IPv6 Gateway: []
 - IPv6 DNS Server: []
- 802.1X:
 - Use 802.1X Security:
 - Authentication: MD5
 - Username: []
 - Password: []

Time: 02:38:05

4321 1941 2901 2911 81910X 819HGW 829 1240 PTEduw PTEduw 1841 26200M 26210M 2811

2811

Cisco Packet Tracer - C:\Users\VALLEJO_ARIETA.DESKTOP-48T56T5\Google Drive\UNAD\Ingenieria de Sistemas\10. Diplomado (Opcion de Grado)\Trabajo Final\Escenario_2_Alfonso Vallejo.pkt

File Edit Options View Tools Extensions Help

Logical Physical x: 813, y: 371

PC3 Configuration:

- Physical: Config Desktop Programming Attributes
- Static: DHCP:
- IP Address: 172.31.0.194
- Subnet Mask: 255.255.255.192
- Default Gateway: 172.31.0.193
- DNS Server: 172.31.2.28
- IPv6 Configuration:
 - Static: DHCP: Auto Config:
 - IPv6 Address: /
 - Link Local Address: FE80:200:BAFF:FE0B:4C9A
 - IPv6 Gateway: /
 - IPv6 DNS Server: /
- 802.1X:
 - Use 802.1X Security:
 - Authentication: MDS
 - Username: /
 - Password: /

Time: 02:39:41

4321 1941 2901 2911 81910X 819K0W 829 1240 P2R0uW P2E0rW 1841 26200M 26210M 2811

2811

Cisco Packet Tracer - C:\Users\VALLEJO_ARIETA.DESKTOP-48T56T5\Google Drive\UNAD\Ingenieria de Sistemas\10. Diplomado (Opcion de Grado)\Trabajo Final\Escenario_2_Alfonso Vallejo.pkt

File Edit Options View Tools Extensions Help

Logical Physical x: 817, y: 710

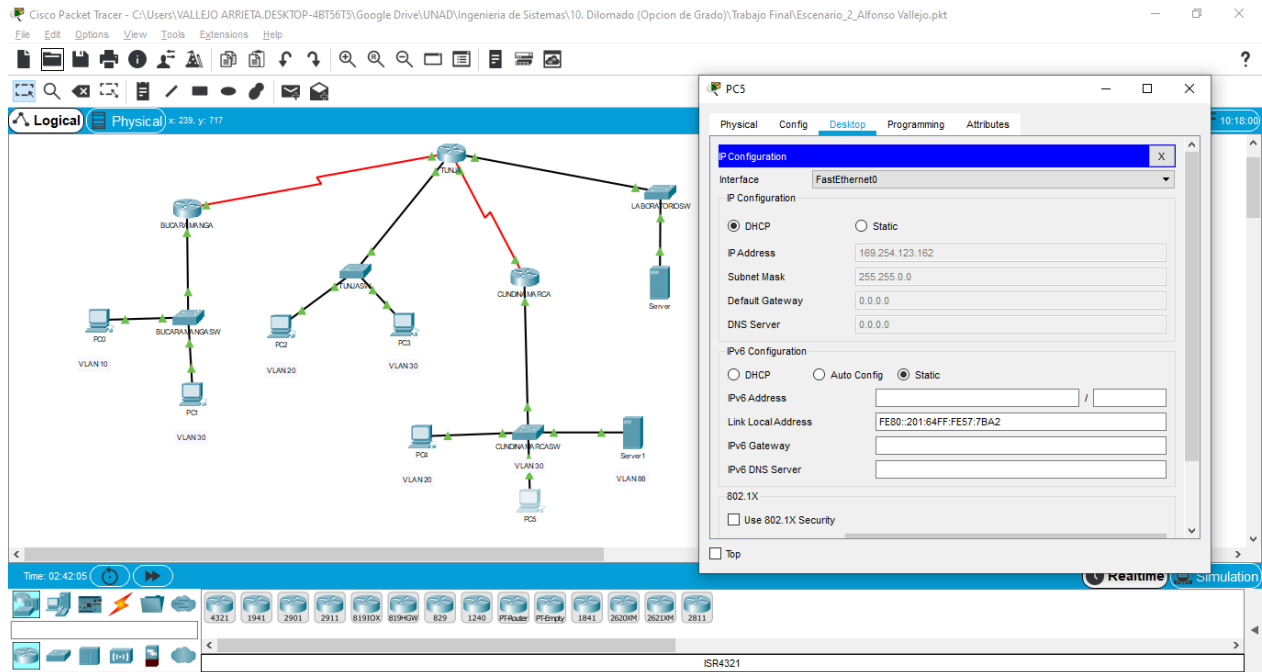
PC4 Configuration:

- Physical: Config Desktop Programming Attributes
- Static: DHCP:
- IP Address: 172.31.1.66
- Subnet Mask: 255.255.255.192
- Default Gateway: 172.31.1.65
- DNS Server: 172.31.2.28
- IPv6 Configuration:
 - Static: DHCP: Auto Config:
 - IPv6 Address: /
 - Link Local Address: FE80:201:42FF:FE16:70E1
 - IPv6 Gateway: /
 - IPv6 DNS Server: /
- 802.1X:
 - Use 802.1X Security:
 - Authentication: MDS
 - Username: /
 - Password: /

Time: 02:40:37

4321 1941 2901 2911 81910X 819K0W 829 1240 P2R0uW P2E0rW 1841 26200M 26210M 2811

1841



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

```

TUNJA(dhcp-config)#ip nat inside source static 172.31.2.28 209.165.220.4
TUNJA(config)#access-list 1 permit 172.0.0.0 0.255.255.255
TUNJA(config)#ip nat inside source list 1 interface f0/1 overload
TUNJA(config)#int f0/1
TUNJA(config-if)#ip nat outside
TUNJA(config-if)#int f0/0.1
TUNJA(config-subif)#ip nat inside
TUNJA(config-subif)#int f0/0.20
TUNJA(config-subif)#ip nat inside
TUNJA(config-subif)#int f0/0.30
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 0.0.0.0 209.165.220.3
TUNJA(config)#router ospf 1
TUNJA(config-router)#default-information originate
TUNJA(config-router)#
TUNJA#show ip route

```

Codes: C - connected, S - static, I - IGRP, 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 209.165.220.3 to network 0.0.0.0
172.3.0.0/29 is subnetted, 1 subnets

C 172.3.2.8 is directly connected, FastEthernet0/0.1
172.31.0.0/16 is variably subnetted, 11 subnets, 3 masks
O 172.31.0.0/26 [110/65] via 172.31.2.34, 00:24:49, Serial0/0/0
O 172.31.0.64/26 [110/65] via 172.31.2.34, 00:24:49, Serial0/0/0
C 172.31.0.128/26 is directly connected, FastEthernet0/0.20
C 172.31.0.192/26 is directly connected, FastEthernet0/0.30
O 172.31.1.0/26 [110/65] via 172.31.2.38, 00:23:33, Serial0/0/1
O 172.31.1.64/26 [110/65] via 172.31.2.38, 00:23:33, Serial0/0/1
O 172.31.2.0/29 [110/65] via 172.31.2.34, 00:24:49, Serial0/0/0
O 172.31.2.8/29 [110/65] via 172.31.2.38, 00:23:33, Serial0/0/1
O 172.31.2.24/29 [110/65] via 172.31.2.38, 00:23:33, Serial0/0/1
C 172.31.2.32/30 is directly connected, Serial0/0/0
C 172.31.2.36/30 is directly connected, Serial0/0/1
C 209.165.220.0/24 is directly connected, FastEthernet0/1
S* 0.0.0.0/0 [1/0] via 209.165.220.3
TUNJA#

BUCARAMANGA#show ip route

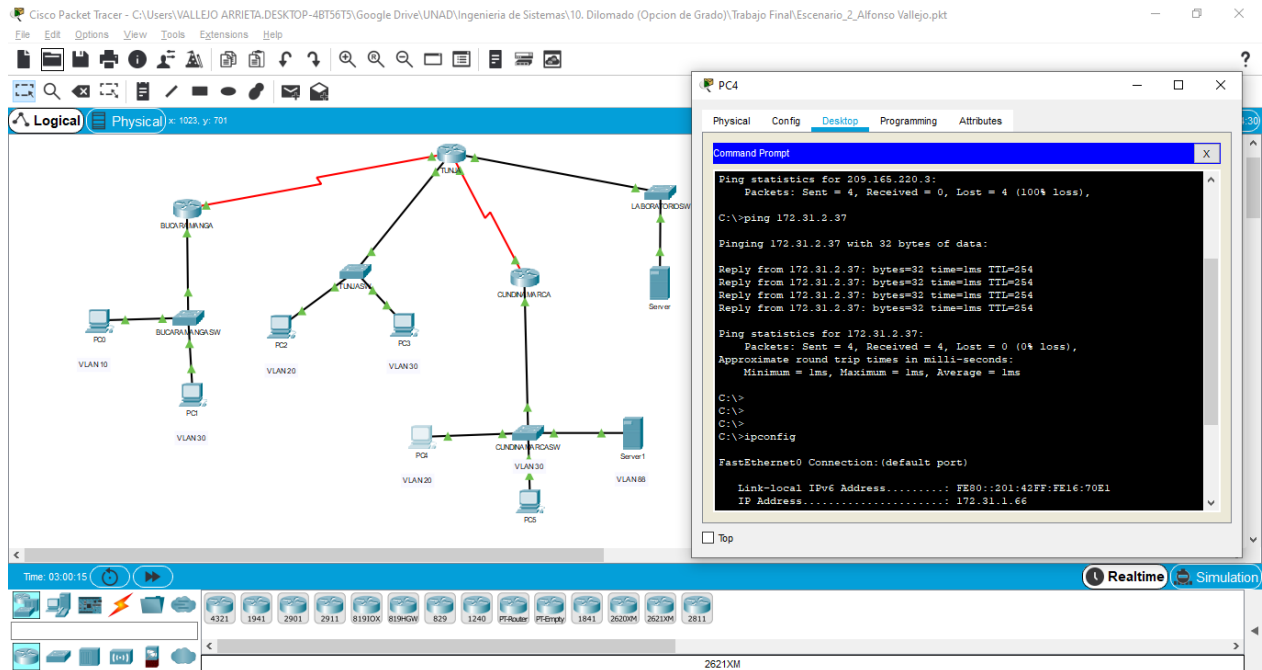
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS 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 [110/65] via 172.31.2.33, 00:25:08, Serial0/0/0
172.31.0.0/16 is variably subnetted, 11 subnets, 3 masks
C 172.31.0.0/26 is directly connected, FastEthernet0/0.10
C 172.31.0.64/26 is directly connected, FastEthernet0/0.30
O 172.31.0.128/26 [110/65] via 172.31.2.33, 00:25:08, Serial0/0/0
O 172.31.0.192/26 [110/65] via 172.31.2.33, 00:25:08, Serial0/0/0
O 172.31.1.0/26 [110/129] via 172.31.2.33, 00:23:42, Serial0/0/0
O 172.31.1.64/26 [110/129] via 172.31.2.33, 00:23:42, Serial0/0/0
C 172.31.2.0/29 is directly connected, FastEthernet0/0.1
O 172.31.2.8/29 [110/129] via 172.31.2.33, 00:23:42, Serial0/0/0

```
O 172.31.2.24/29 [110/129] via 172.31.2.33, 00:23:42, Serial0/0/0
C 172.31.2.32/30 is directly connected, Serial0/0/0
O 172.31.2.36/30 [110/128] via 172.31.2.33, 00:24:02, Serial0/0/0
O*E2 0.0.0.0/0 [110/1] via 172.31.2.33, 00:02:01, Serial0/0/0
BUCARAMANGA#
```

```
CUNDINAMARCA#show ip route
```

```
Codes: C - connected, S - static, I - IGRP, 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 [110/65] via 172.31.2.37, 00:24:15, Serial0/0/0
172.31.0.0/16 is variably subnetted, 11 subnets, 3 masks
O 172.31.0.0/26 [110/129] via 172.31.2.37, 00:24:15, Serial0/0/0
O 172.31.0.64/26 [110/129] via 172.31.2.37, 00:24:15, Serial0/0/0
O 172.31.0.128/26 [110/65] via 172.31.2.37, 00:24:15, Serial0/0/0
O 172.31.0.192/26 [110/65] via 172.31.2.37, 00:24:15, Serial0/0/0
C 172.31.1.0/26 is directly connected, FastEthernet0/0.30
C 172.31.1.64/26 is directly connected, FastEthernet0/0.20
O 172.31.2.0/29 [110/129] via 172.31.2.37, 00:24:15, Serial0/0/0
C 172.31.2.8/29 is directly connected, FastEthernet0/0.1
C 172.31.2.24/29 is directly connected, FastEthernet0/0.88
O 172.31.2.32/30 [110/128] via 172.31.2.37, 00:24:15, Serial0/0/0
C 172.31.2.36/30 is directly connected, Serial0/0/0
O*E2 0.0.0.0/0 [110/1] via 172.31.2.37, 00:02:24, Serial0/0/0
CUNDINAMARCA#
```



```
TUNJA#show ip nat translation
Pro Inside global Inside local Outside local Outside global
icmp 209.165.220.1:1 172.31.1.2:1 209.165.220.3:1 209.165.220.3:1
icmp 209.165.220.1:2 172.31.1.2:2 209.165.220.3:2 209.165.220.3:2
icmp 209.165.220.1:3 172.31.1.2:3 209.165.220.3:3 209.165.220.3:3
icmp 209.165.220.1:4 172.31.1.2:4 209.165.220.3:4 209.165.220.3:4
--- 209.165.220.4 172.31.2.28 --- ---
TUNJA#
```

4. El enrutamiento deberá tener autenticación.

```
BUCARAMANGA#conf t
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)#

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)#
```

TUNJA#

00:30:20: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.34 on Serial0/0/0 from FULL to DOWN, Neighbor Down: Dead timer expired

00:30:20: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.34 on Serial0/0/0 from FULL to DOWN, Neighbor Down: Interface down or detached

TUNJA#

00:31:32: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.38 on Serial0/0/1 from FULL to DOWN, Neighbor Down: Dead timer expired

00:31:32: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.38 on Serial0/0/1 from FULL to DOWN, Neighbor Down: Interface down or detached

TUNJA#conf t

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

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)#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)#

00:31:40: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.34 on Serial0/0/0 from LOADING to FULL, Loading Done

TUNJA(config-if)#

00:31:42: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.38 on Serial0/0/1 from LOADING to FULL, Loading Done

TUNJA(config-if)#

5. Listas de control de acceso:

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

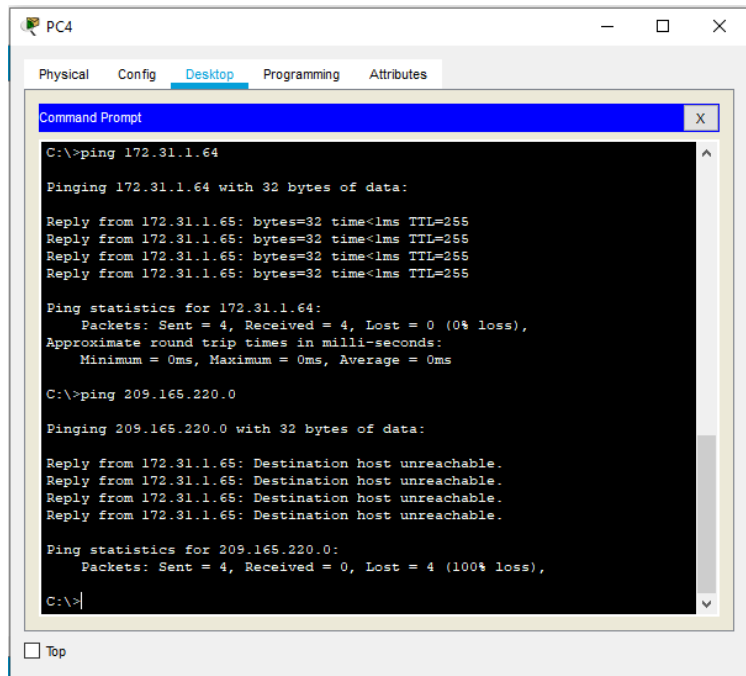
```
CUNDINAMARCA(config-if)#access-list 111 deny ip 172.31.1.64 0.0.0.63 209.165.220.0 0.0.0.255
```

```
CUNDINAMARCA(config)#access-list 111 permit ip any any
```

```
CUNDINAMARCA(config)#int f0/0.20
```

```
CUNDINAMARCA(config-subif)#ip access-group 111 in
```

```
CUNDINAMARCA(config-subif)#
```



The screenshot shows a Windows Command Prompt window titled "PC4" with tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is active. The Command Prompt displays the following output:

```
C:\>ping 172.31.1.64

Pinging 172.31.1.64 with 32 bytes of data:

Reply from 172.31.1.65: bytes=32 time<1ms TTL=255
Reply from 172.31.1.65: bytes=32 time<1ms TTL=255
Reply from 172.31.1.65: bytes=32 time<1ms TTL=255
Reply from 172.31.1.65: bytes=32 time<1ms TTL=255

Ping statistics for 172.31.1.64:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 209.165.220.0

Pinging 209.165.220.0 with 32 bytes of data:

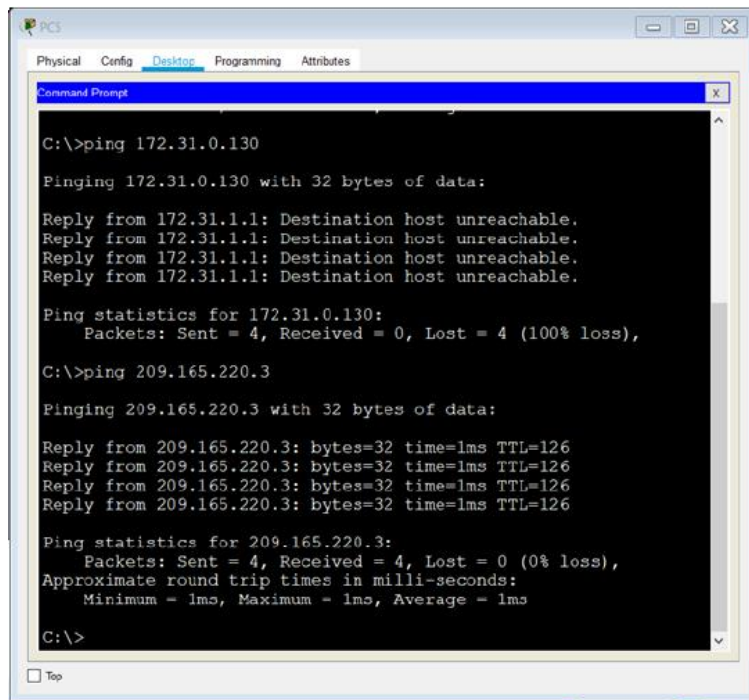
Reply from 172.31.1.65: Destination host unreachable.
Reply from 172.31.1.65: Destination host unreachable.
Reply from 172.31.1.65: Destination host unreachable.
Reply from 172.31.1.65: Destination host unreachable.

Ping statistics for 209.165.220.0:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>|
```

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

```
CUNDINAMARCA(config-subif)#access-list 112 permit ip 172.31.1.0 0.0.0.63 209.165.220.0
0.0.0.255
CUNDINAMARCA(config)#access-list 112 deny ip any any
CUNDINAMARCA(config)#int f0/0.30
CUNDINAMARCA(config-subif)#ip access-group 112 in
CUNDINAMARCA(config-subif)#
```



```
Physical  Config  Desktop  Programming  Attributes
Command Prompt
C:\>ping 172.31.0.130

Pinging 172.31.0.130 with 32 bytes of data:

Reply from 172.31.1.1: Destination host unreachable.
Reply from 172.31.1.1: Destination host unreachable.
Reply from 172.31.1.1: Destination host unreachable.
Reply from 172.31.1.1: Destination host unreachable.

Ping statistics for 172.31.0.130:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 209.165.220.3

Pinging 209.165.220.3 with 32 bytes of data:

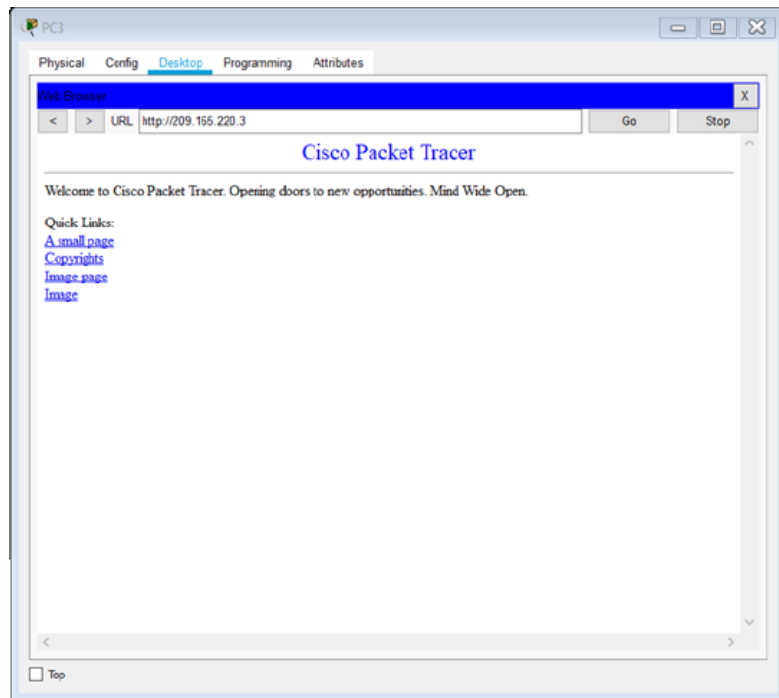
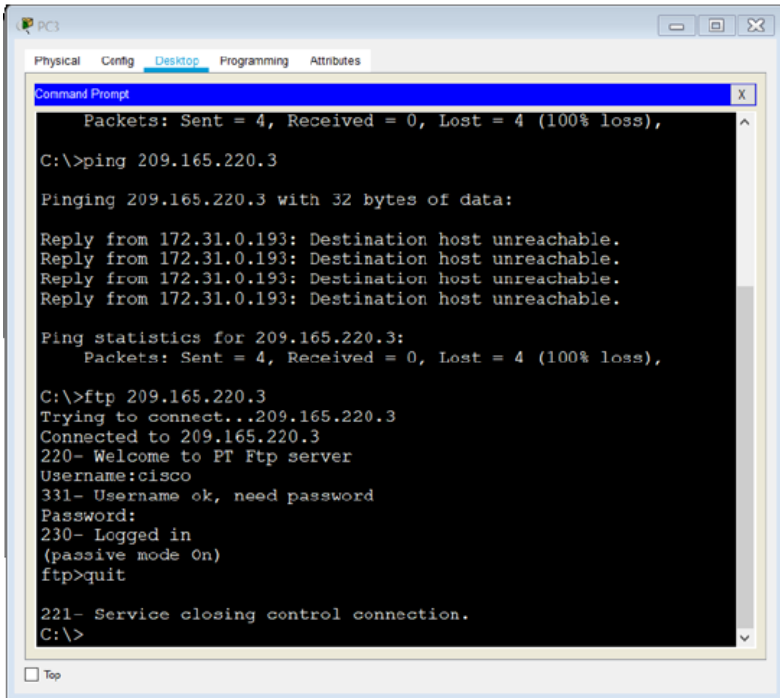
Reply from 209.165.220.3: bytes=32 time=1ms TTL=126
Reply from 209.165.220.3: bytes=32 time=1ms TTL=126
Reply from 209.165.220.3: bytes=32 time=1ms TTL=126
Reply from 209.165.220.3: bytes=32 time=1ms TTL=126

Ping statistics for 209.165.220.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\>
```

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

```
TUNJA(config)#access-list 111 permit tcp 172.31.0.192 0.0.0.63 209.165.220.0 0.0.0.255 eq 80
TUNJA(config)#access-list 111 permit tcp 172.31.0.192 0.0.0.63 209.165.220.0 0.0.0.255 eq 21
TUNJA(config)#access-list 111 permit tcp 172.31.0.192 0.0.0.63 209.165.220.0 0.0.0.255 eq 20
TUNJA(config)#int f0/0.30
TUNJA(config-subif)#ip access-group 111 in
TUNJA(config-subif)#
```



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

```
TUNJA(config-subif)#access-list 112 permit ip 172.31.0.128 0.0.0.63 172.31.1.64 0.0.0.63
TUNJA(config)#access-list 112 permit ip 172.31.0.128 0.0.0.63 172.31.0.0 0.0.0.63
TUNJA(config)#int f0/0.20
TUNJA(config-subif)#ip access-group 112 in
TUNJA(config-subif)#
```

```

Physical  Config  Desktop  Programming  Attributes
Command Prompt
Reply from 172.31.1.66: bytes=32 time=3ms TTL=126
Reply from 172.31.1.66: bytes=32 time=1ms TTL=126
Reply from 172.31.1.66: bytes=32 time=2ms TTL=126
Reply from 172.31.1.66: bytes=32 time=1ms TTL=126

Ping statistics for 172.31.1.66:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 3ms, Average = 1ms

C:\>ping 172.31.0.2

Pinging 172.31.0.2 with 32 bytes of data:

Request timed out.
Reply from 172.31.0.2: bytes=32 time=1ms TTL=126
Reply from 172.31.0.2: bytes=32 time=1ms TTL=126
Reply from 172.31.0.2: bytes=32 time=4ms TTL=126

Ping statistics for 172.31.0.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 4ms, Average = 2ms

C:\>

```

```

Physical  Config  Desktop  Programming  Attributes
Command Prompt
C:\>ping 172.31.0.66

Pinging 172.31.0.66 with 32 bytes of data:

Reply from 172.31.0.129: Destination host unreachable.
Reply from 172.31.0.129: Destination host unreachable.
Reply from 172.31.0.129: Destination host unreachable.
Reply from 172.31.0.129: Destination host unreachable.

Ping statistics for 172.31.0.66:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 172.31.2.28

Pinging 172.31.2.28 with 32 bytes of data:

Reply from 172.31.0.129: Destination host unreachable.
Reply from 172.31.0.129: Destination host unreachable.
Reply from 172.31.0.129: Destination host unreachable.
Reply from 172.31.0.129: Destination host unreachable.

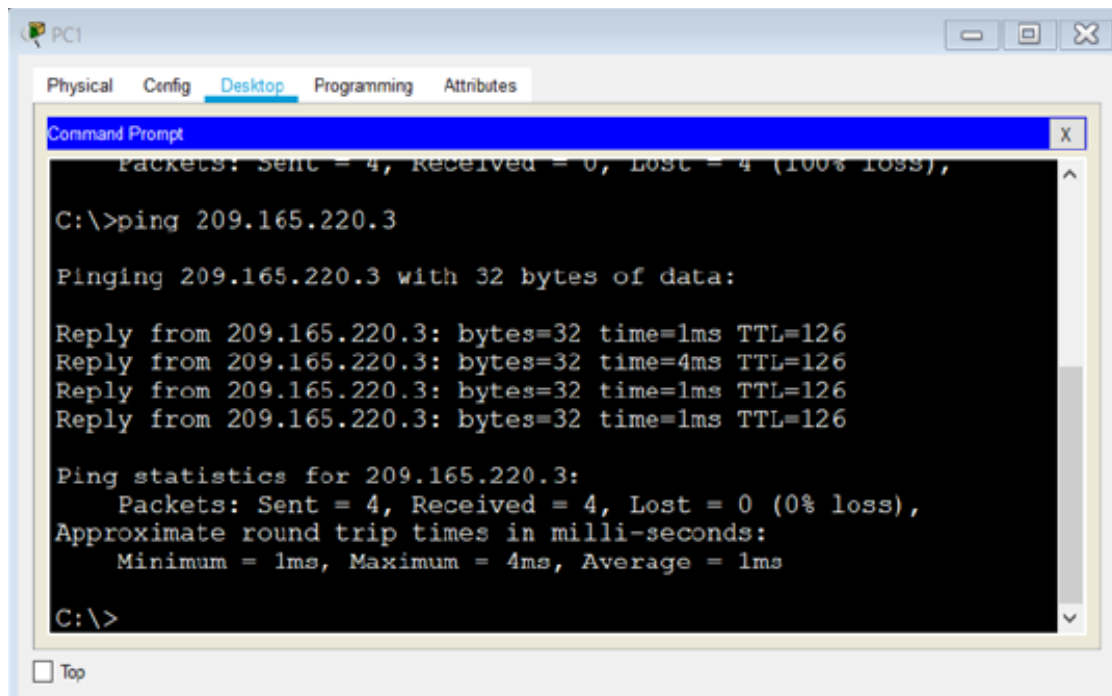
Ping statistics for 172.31.2.28:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>

```

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

```
BUCARAMANGA(config)#access-list 111 permit ip 172.31.0.64 0.0.0.63 209.165.220.0
0.0.0.255
BUCARAMANGA(config)#int f0/0.30
BUCARAMANGA(config-subif)#ip access-group 111 in
BUCARAMANGA(config-subif)#
```



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

```
BUCARAMANGA(config-subif)#access-list 112 permit ip 172.31.0.0 0.0.0.63 172.31.1.64
0.0.0.63
BUCARAMANGA(config)#access-list 112 permit ip 172.31.0.0 0.0.0.63 172.31.0.128 0.0.0.63
BUCARAMANGA(config)#int f0/0.10
BUCARAMANGA(config-subif)#ip access-group 112 in
BUCARAMANGA(config-subif)#
```

```

PC0
Physical Config Desktop Programming Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>ping 172.31.1.66

Pinging 172.31.1.66 with 32 bytes of data:

Reply from 172.31.1.66: bytes=32 time=4ms TTL=125
Reply from 172.31.1.66: bytes=32 time=2ms TTL=125
Reply from 172.31.1.66: bytes=32 time=2ms TTL=125
Reply from 172.31.1.66: bytes=32 time=2ms TTL=125

Ping statistics for 172.31.1.66:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 4ms, Average = 2ms

C:\>ping 172.31.0.130

Pinging 172.31.0.130 with 32 bytes of data:

Reply from 172.31.0.130: bytes=32 time=4ms TTL=126
Reply from 172.31.0.130: bytes=32 time=1ms TTL=126
Reply from 172.31.0.130: bytes=32 time=1ms TTL=126
Reply from 172.31.0.130: bytes=32 time=1ms TTL=126

Ping statistics for 172.31.0.130:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 4ms, Average = 1ms

C:\>

```

```

PC0
Physical Config Desktop Programming Attributes
Command Prompt
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 4ms, Average = 1ms

C:\>ping 209.165.220.3

Pinging 209.165.220.3 with 32 bytes of data:

Reply from 172.31.0.1: Destination host unreachable.
Reply from 172.31.0.1: Destination host unreachable.
Reply from 172.31.0.1: Destination host unreachable.
Reply from 172.31.0.1: Destination host unreachable.

Ping statistics for 209.165.220.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>

```

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

```

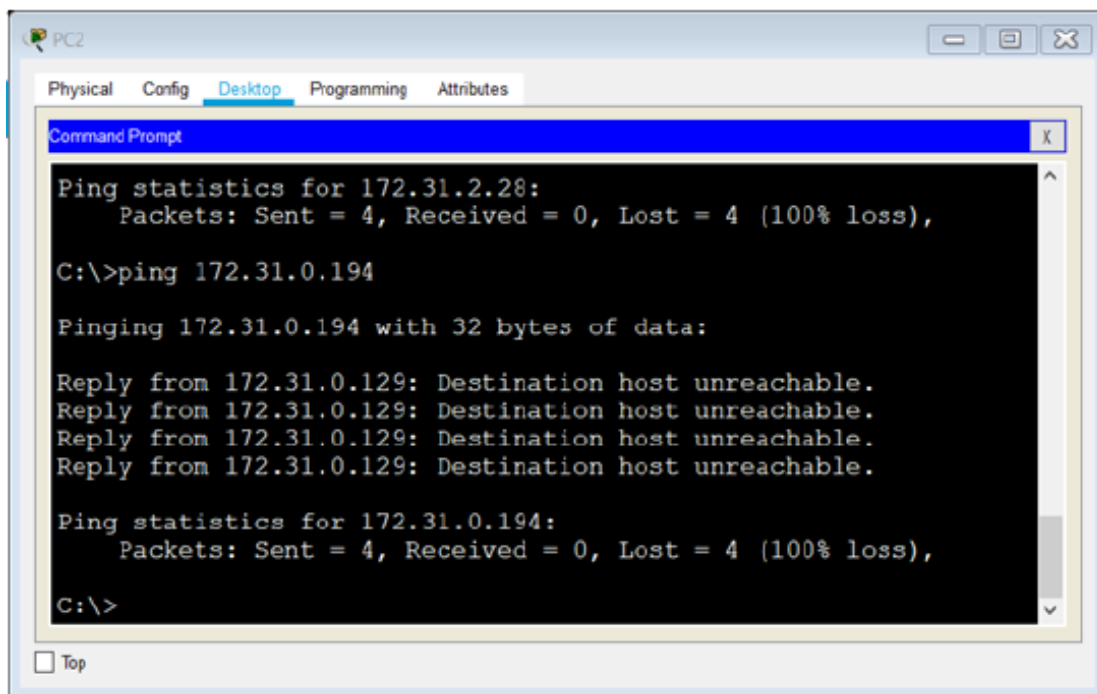
BUCARAMANGA(config-subif)#access-list 113 deny ip 172.31.2.0 0.0.0.7 172.31.0.0 0.0.0.63
BUCARAMANGA(config)#access-list 113 deny ip 172.31.0.64 0.0.0.63 172.31.0.0 0.0.0.63
BUCARAMANGA(config)#access-list 113 permit ip any any
BUCARAMANGA(config)#int f0/0.10
BUCARAMANGA(config-subif)#ip access-group 113 out

```

```
BUCARAMANGA(config-subif)#
```

```
TUNJA(config)#access-list 113 deny ip 172.3.2.8 0.0.0.7 172.31.0.128 0.0.0.63  
TUNJA(config)#access-list 113 deny ip 172.3.0.192 0.0.0.63 172.31.0.128 0.0.0.63  
TUNJA(config)#access-list 113 permit ip any any  
TUNJA(config)#int f0/0.20  
TUNJA(config-subif)#ip access-group 113 out  
TUNJA(config-subif)#
```

```
CUNDINAMARCA(config)#access-list 113 deny ip 172.31.2.8 0.0.0.7 172.31.1.64 0.0.0.63  
CUNDINAMARCA(config)#access-list 113 deny ip 172.31.1.0 0.0.0.63 172.31.1.64 0.0.0.63  
CUNDINAMARCA(config)#access-list 113 deny ip 172.31.2.24 0.0.0.7 172.31.1.64 0.0.0.63  
CUNDINAMARCA(config)#access-list 113 permit ip any any  
CUNDINAMARCA(config)#int f0/0.20  
CUNDINAMARCA(config-subif)#ip access-group 113 out  
CUNDINAMARCA(config-subif)#
```



The image shows a screenshot of a Windows PC2 window titled "PC2". The window has tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes", with "Desktop" selected. Inside the window is a "Command Prompt" window. The text in the Command Prompt is as follows:

```
Ping statistics for 172.31.2.28:  
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),  
  
C:\>ping 172.31.0.194  
  
Pinging 172.31.0.194 with 32 bytes of data:  
  
Reply from 172.31.0.129: Destination host unreachable.  
Reply from 172.31.0.129: Destination host unreachable.  
Reply from 172.31.0.129: Destination host unreachable.  
Reply from 172.31.0.129: Destination host unreachable.  
  
Ping statistics for 172.31.0.194:  
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),  
  
C:\>
```

At the bottom left of the Command Prompt window, there is a checkbox labeled "Top" which is currently unchecked.

```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
Ping statistics for 209.165.220.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 172.31.0.66

Pinging 172.31.0.66 with 32 bytes of data:

Reply from 172.31.0.1: Destination host unreachable.
Reply from 172.31.0.1: Destination host unreachable.
Reply from 172.31.0.1: Destination host unreachable.
Reply from 172.31.0.1: Destination host unreachable.

Ping statistics for 172.31.0.66:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

```
PC5
Physical Config Desktop Programming Attributes
Command Prompt
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\>ping 172.31.1.66

Pinging 172.31.1.66 with 32 bytes of data:

Reply from 172.31.1.1: Destination host unreachable.
Reply from 172.31.1.1: Destination host unreachable.
Reply from 172.31.1.1: Destination host unreachable.
Reply from 172.31.1.1: Destination host unreachable.

Ping statistics for 172.31.1.66:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

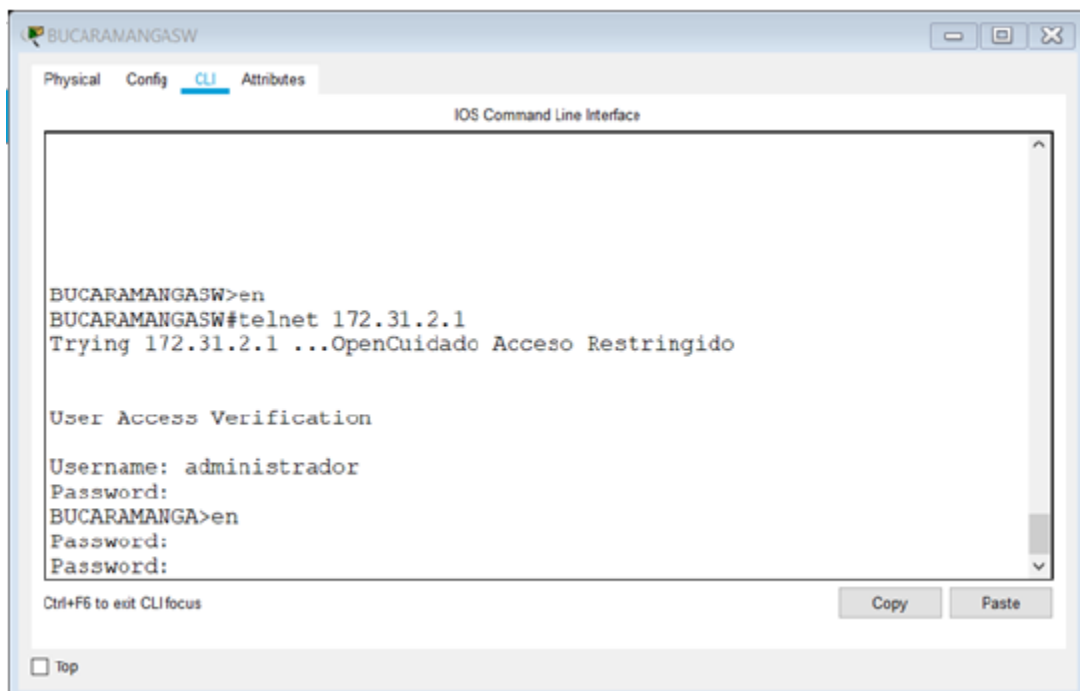
C:\>
```

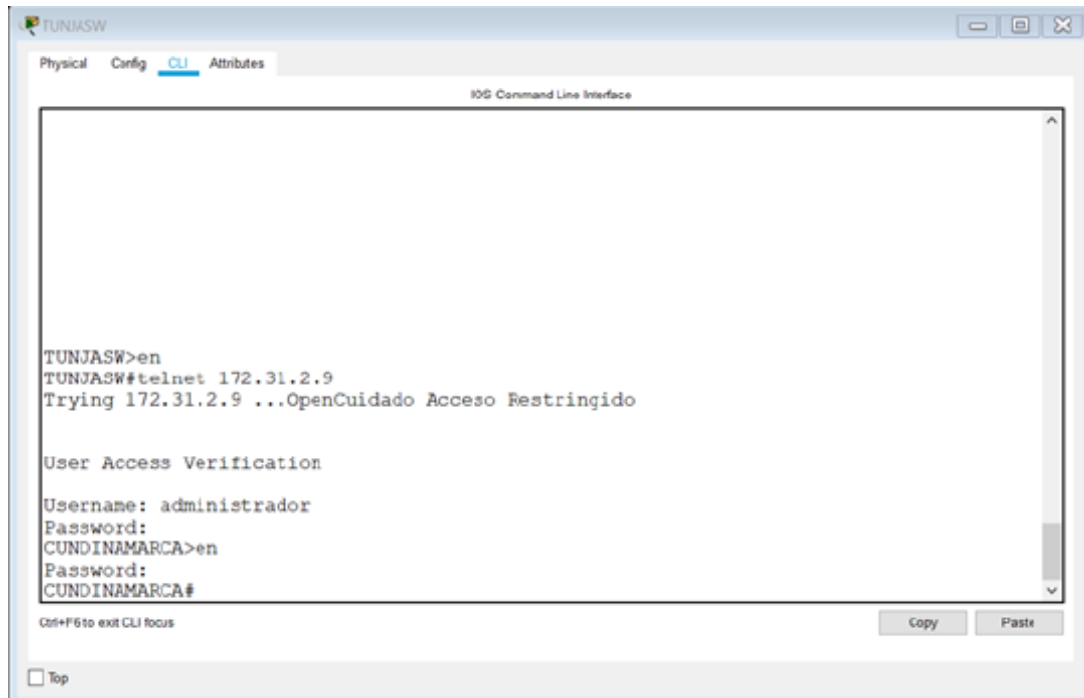
- Solo los hosts de las VLAN administrativas y de la VLAN de servidores tienen acceso a los routers e internet.

```
BUCARAMANGA(config-subif)#access-list 3 permit 172.31.2.0 0.0.0.7
BUCARAMANGA(config)#access-list 3 permit 172.3.2.8 0.0.0.7
BUCARAMANGA(config)#access-list 3 permit 172.31.2.8 0.0.0.7
BUCARAMANGA(config)#line vty 0 15
BUCARAMANGA(config-line)#access-class 3 in
BUCARAMANGA(config-line)#
```

```
TUNJA(config-subif)#access-list 3 permit 172.31.2.0 0.0.0.7
TUNJA(config)#access-list 3 permit 172.3.2.8 0.0.0.7
TUNJA(config)#access-list 3 permit 172.31.2.8 0.0.0.7
TUNJA(config)#line vty 0 15
TUNJA(config-line)#access-class 3 in
```

```
CUNDINAMARCA(config-subif)#access-list 3 permit 172.31.2.0 0.0.0.7
CUNDINAMARCA(config)#access-list 3 permit 172.3.2.8 0.0.0.7
CUNDINAMARCA(config)#access-list 3 permit 172.31.2.8 0.0.0.7
CUNDINAMARCA(config)#line vty 0 15
CUNDINAMARCA(config-line)#access-class 3 in
CUNDINAMARCA(config-line)#
```





Conclusiones

- ❖ Se realizó la configuración de dispositivos en un entorno virtual gracias al software Packet Tracer, configuraciones como direccionamientos, enrutamiento, creación de protocolos, creación de rutas, configuración de Vlan's entre otras configuraciones, garantizando la conectividad y el correcto funcionamiento de la red implementada en los ejercicios planteados.
- ❖ Los resultados nos muestran que en la construcción de redes WAN y LAN se puede construir enrutamientos estáticos y dinámicos que nos permitirán mayor eficiencia en el diseño de las redes, así mismo otorgar los permisos necesarios para que los enlaces y puertos puedan ser administrados adecuadamente para accesos prohibidos.
- ❖ Resolví de manera práctica ejercicios que me ayudaron a desarrollar las habilidades necesarias para el curso de profundización de diseño e implementación de soluciones integrales LAN/WAN de acuerdo a lo solicitado y a la topología de red, entregando la mejor solución para la conectividad de red en los dispositivos propuestos.
- ❖ Desarrollé la destreza en el manejo de herramientas de simulación resulta fundamental en el futuro ejercicio de la profesional en ingeniería de sistemas pues estos entornos nos brindan la posibilidad de analizar diversas variables que puedan afectar diferentes diseños de redes.
- ❖ Se adquirieron conocimientos fundamentales para la consolidación y verificación de conceptos como NAT, PAT, OSPF, DHCP ha sido bastante provechosa en el desarrollo de estas habilidades prácticas, pues son conceptos fundamentales en el diseño de redes.

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