PRUEBA DE HABILIDADES CCNA 16-4 2019 - FINAL

PRESENTADO POR:

JOSE SULEIMAR MUÑOZ BURBANO

UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA UNAD

ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA -ECBTI

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CONTENIDO

RESUMEN

Con los conocimientos previos adquiridos, aplicando conocimientos, experiencia, comprensión y resolución de actividades propuestas concernientes a temáticas propias de Networking.

En este orden de ideas, en la presente experiencia se nos proponen dos (2) escenarios que corresponden:

El primero: a una empresa que 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.

En el segundo: a 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.

Con base a lo anterior, se proyecta adelantar la planificación, planteamiento y debidos registros de la configuración de cada uno de los dispositivos, así como la descripción detallada del paso a paso de cada una de las etapas realizadas durante su desarrollo, el registro de los procesos de verificación de conectividad mediante el uso de comandos ping, traceroute, show ip route, entre otros.

1. INTRODUCCION

Mediante la presente actividad, se pretende profundizar en temáticas importantes, tales como, desarrollo, el registro de los procesos de verificación de conectividad mediante el uso de comandos ping, traceroute, show ip route, entre otros; las cuales que se implementarán como complemento y fortalecimiento de nuestras competencias cognitivas, para aplicarlas en la cotidianidad en nuestro rol a desempeñar, puntualmente en este caso, usando tecnologías y herramientas afines como CISCO.

Actualmente está en auge una serie de nuevas tecnologías que hacen la vida del hombre más fácil en muchos aspectos, dichas tecnologías son Internet de las cosas, Sistemas Ciber físicos, Cloud Computing, Machine to Machine, entre otros.

Estas tecnologías están fundamentadas en redes informáticas por esto es fundamental como profesionales conocer la historia y evolución de las redes distinguir los estándares y las organizaciones que se encargan de su desarrollo y cuáles de estos tienen vigencia en las redes actuales.

La mejor forma de poder comprender cuál es el funcionamiento de una red informática es a través de la practica creando modelos que se ajusten a la realidad, para tal fin este curso nos provee de una poderosa herramienta como lo es cisco packet tracert la cual nos da la oportunidad de experimentar con los diferentes tipos de dispositivos, medios de transmisión tipos de redes, protocolos, etc.

2. OBJETIVOS

2.1. OBJETIVO GENERAL.

Comprender los pasos necesarios para planificar e implementar una solución técnica para una determinada empresa, registrando los procesos de verificación de conectividad mediante el uso de comandos ping, traceroute, show ip route, entre otros.

2.2. OBJETIVOS ESPECIFICOS.

- Recabar información relevante para plantear una solución técnica a un problema.
- Diseñar una solución técnica para un entorno de oficina pequeña.
- Crear el prototipo de una solución técnica propuesta con Packet Tracer.
- Planificar la instalación de una solución técnica para el entorno solicitado.

3. DESARROLLO DE LOS DOS ESCENARIOS

3.1. 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.

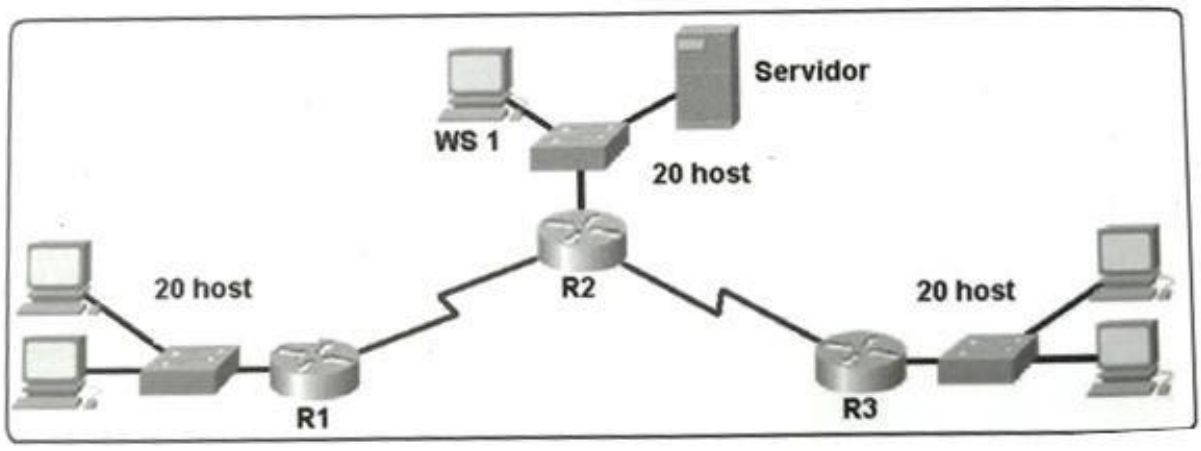
Parte 2: Considerar la asignación de los parámetros básicos y la detección de vecinos directamente conectados.

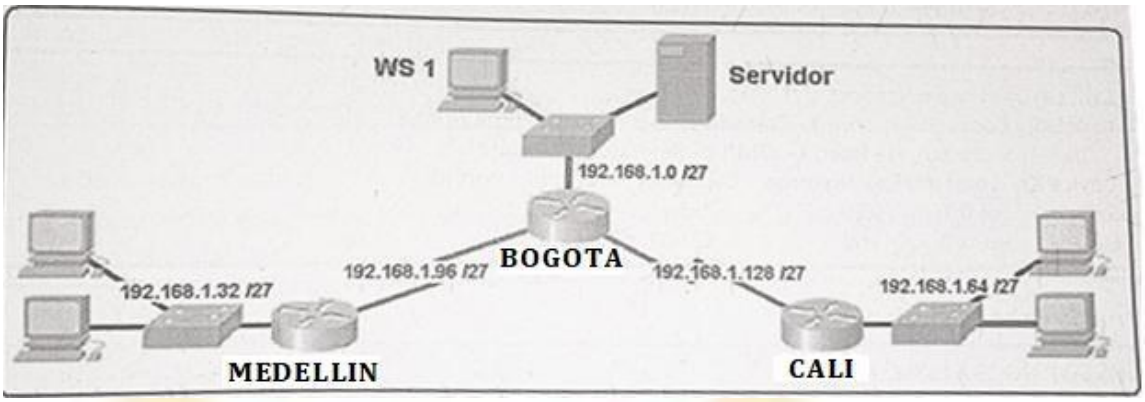
Parte 3: La red y subred establecidas deberán tener una interconexión total, todos los hosts deberán ser visibles y poder comunicarse entre ellos sin restricciones.

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.

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

```
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 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 Bogotá	192.168.1.0/27
LAN Medellín	192.168.1.32/27
LAN Cali	192.168.1.64/27
Bogotá - Medellín	192.168.1.96/27
Bogotá - 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 Intrfce 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 Intrfce 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 Intrfce 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.

SHOW IP ROUTE

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.

```
Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection:(default port)

   Link-local IPv6 Address.....: FE80::260:3EFF:FEDD:734C
   IP Address.....: 192.168.1.66
   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 192.168.1.34

Pinging 192.168.1.34 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.34: bytes=32 time=3ms TTL=125
Reply from 192.168.1.34: bytes=32 time=6ms TTL=125
Reply from 192.168.1.34: bytes=32 time=4ms TTL=125

Ping statistics for 192.168.1.34:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 6ms, Average = 4ms

C:\>
```

```
Reply from 192.168.1.34: bytes=32 time=3ms TTL=125
Reply from 192.168.1.34: bytes=32 time=6ms TTL=125
Reply from 192.168.1.34: bytes=32 time=4ms TTL=125

Ping statistics for 192.168.1.34:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 6ms, Average = 4ms

C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.3: bytes=32 time=2ms TTL=126
Reply from 192.168.1.3: bytes=32 time=3ms TTL=126
Reply from 192.168.1.3: bytes=32 time=2ms TTL=126

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 3ms, Average = 2ms

C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.2: bytes=32 time=2ms TTL=126
Reply from 192.168.1.2: bytes=32 time=1ms TTL=126
Reply from 192.168.1.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 2ms, Average = 1ms

C:\>
```

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	Éxito
	Router CALI	LAN del Router MEDELLIN	Falla

	Router MEDELLIN	LAN del Router CALI	Falla

```
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 = 3/4/6 ms

MEDELLIN#telnet 192.168.1.131
Trying 192.168.1.131 ...OpenCuidado Acceso Restringido


User Access Verification

Password:
CALI>en
Password:
CALI#
```

```
C:\>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>telnet 192.168.1.1
Trying 192.168.1.1 ...
% Connection timed out; remote host not responding
C:\>
```

```
Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.

Ping statistics for 192.168.1.99:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>telnet 192.168.1.131
Trying 192.168.1.131 ...
% Connection timed out; remote host not responding
C:\>telnet 192.168.1.99
Trying 192.168.1.99 ...
% Connection timed out; remote host not responding
C:\>
```

```
C:\>ping 192.168.1.33

Pinging 192.168.1.33 with 32 bytes of data:

Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.

Ping statistics for 192.168.1.33:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>telnet 192.168.1.131
Trying 192.168.1.131 ...
% Connection timed out; remote host not responding
C:\>
```

```
C:\>ping 192.168.1.99

Pinging 192.168.1.99 with 32 bytes of data:

Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.

Ping statistics for 192.168.1.99:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>telnet 192.168.1.65
Trying 192.168.1.65 ...
% Connection timed out; remote host not responding
C:\>
```

```
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.

Ping statistics for 192.168.1.33:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>telnet 192.168.1.131
Trying 192.168.1.131 ...
% Connection timed out; remote host not responding
C:\>telnet 192.168.1.33
Trying 192.168.1.33 ...
% Connection timed out; remote host not responding
C:\>
```

```
Packet Tracer PC Command Line 1.0
C:\>telnet 192.168.1.99
Trying 192.168.1.99 ...
% Connection timed out; remote host not responding
C:\>
```

```
Check the name and try again.
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100%
loss),

C:\>
```

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100%
loss),

C:\>
```

```
    Packets: Sent = 4, Received = 0, Lost = 4 (100%
loss),

C:\>ping 192.168.1.66

Pinging 192.168.1.66 with 32 bytes of data:

Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.

Ping statistics for 192.168.1.66:
    Packets: Sent = 4, Received = 0, Lost = 4 (100%
loss),

C:\>
```

```
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100%
loss),

C:\>
```

```
    Packets: Sent = 4, Received = 0, Lost = 4 (100%
loss),

C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100%
loss),

C:\>
```

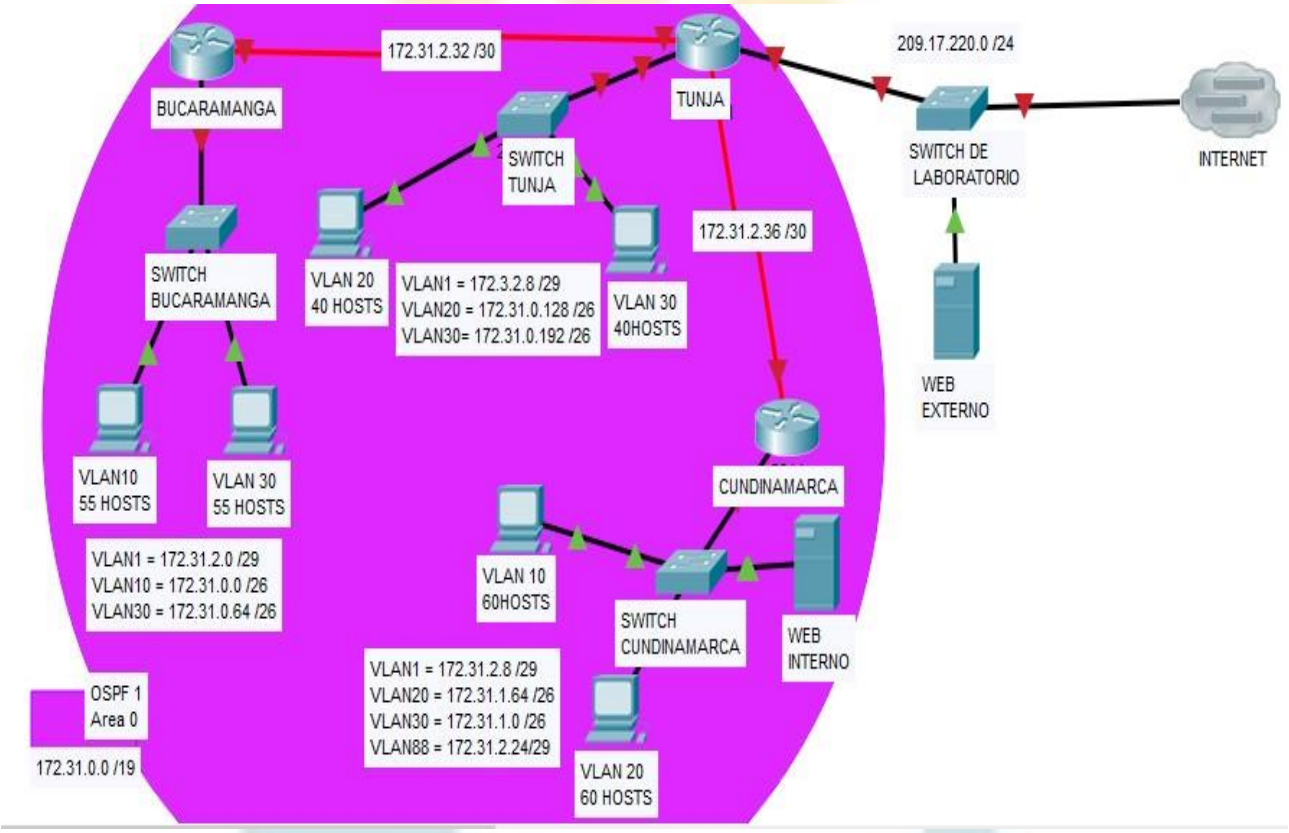
```
Ping statistics for 192.168.1.34:
    Packets: Sent = 4, Received = 0, Lost = 4 (100%
loss),

C:\>ping 192.168.1.66

Pinging 192.168.1.66 with 32 bytes of data:

Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.

Ping statistics for 192.168.1.66:
    Packets: Sent = 4, Received = 0, Lost = 4 (100%
loss),

C:\>
```

```
Password:

CALI>en
Password:
CALI#ping 192.168.1.34

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.34, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

CALI#
```

```
Password:

MEDELLIN>en
Password:
MEDELLIN#ping 192.168.1.66

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.66, timeout is 2
seconds:
.....
Success rate is 0 percent (0/5)

MEDELLIN#
```

3.2. 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

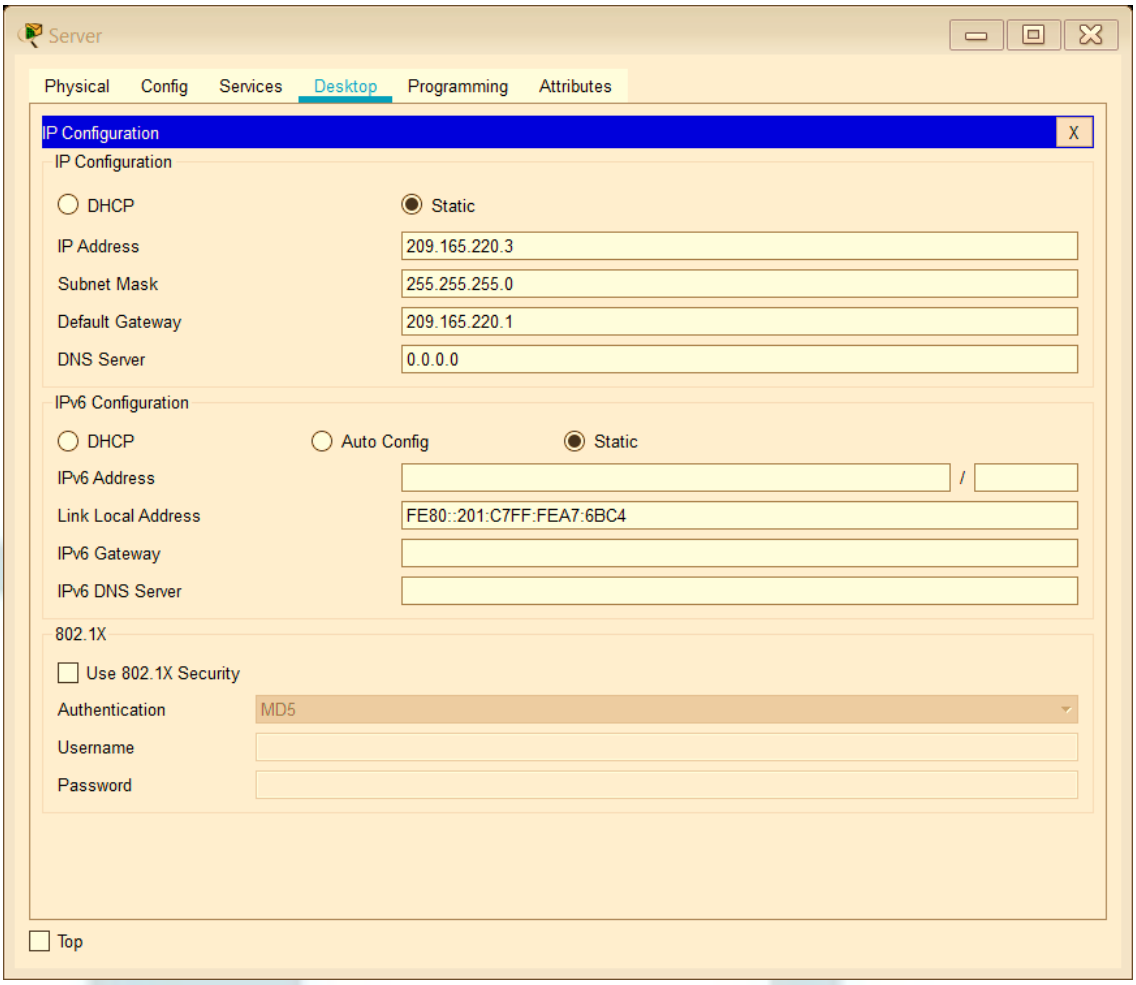
- **Máximo tiempo de acceso al detectar ataques.**

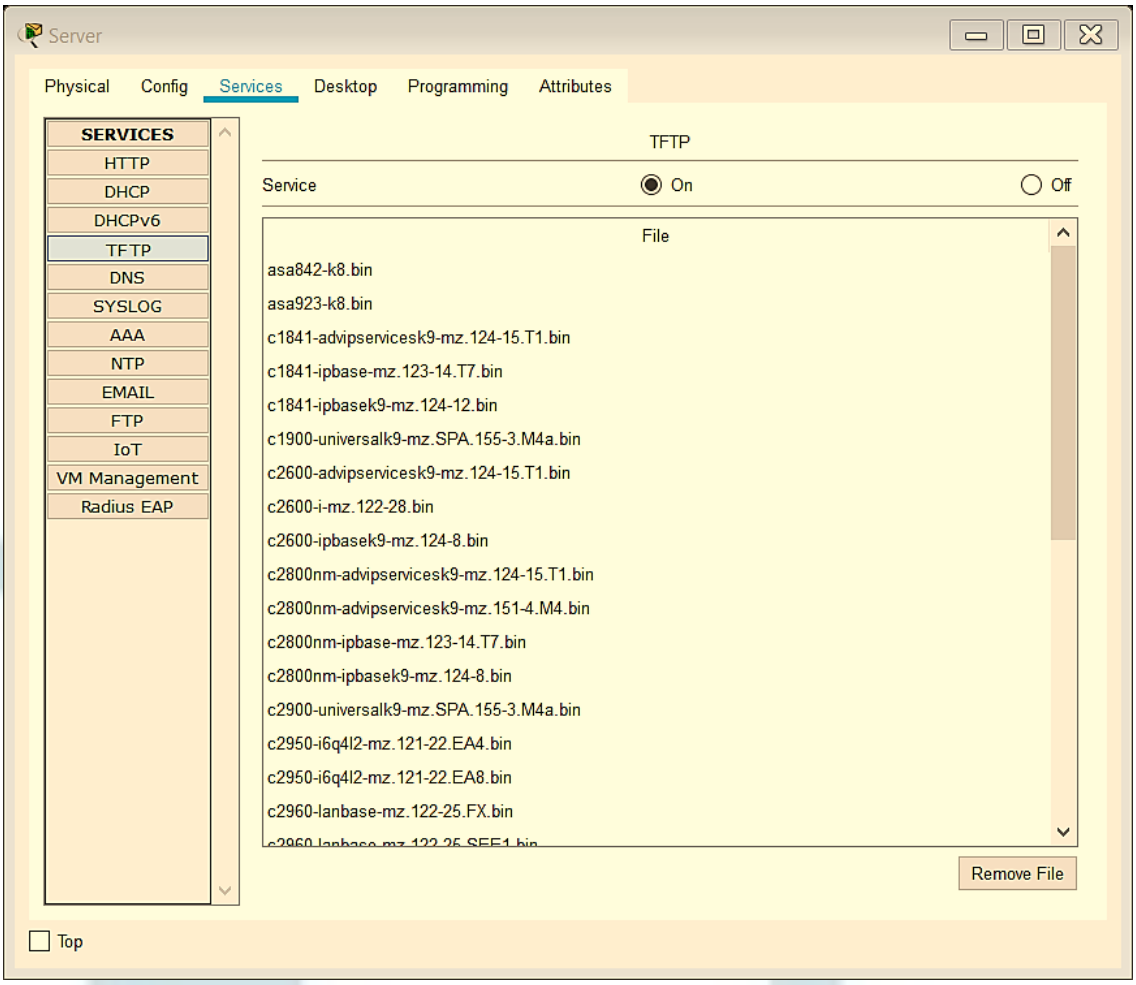
BUCARAMANGA(config-line)#login block-for 5 attempts 4 within 60

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**


Server
Physical
Config
Services
Desktop
Programming
Attributes
IP Configuration
X
IP Configuration
DHCP
Static
IP Address
209.165.220.3
Subnet Mask
255.255.255.0
Default Gateway
209.165.220.1
DNS Server
0.0.0.0
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
/
Link Local Address
FE80::201:C7FF:FEA7:6BC4
IPv6 Gateway
IPv6 DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top



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)#
```

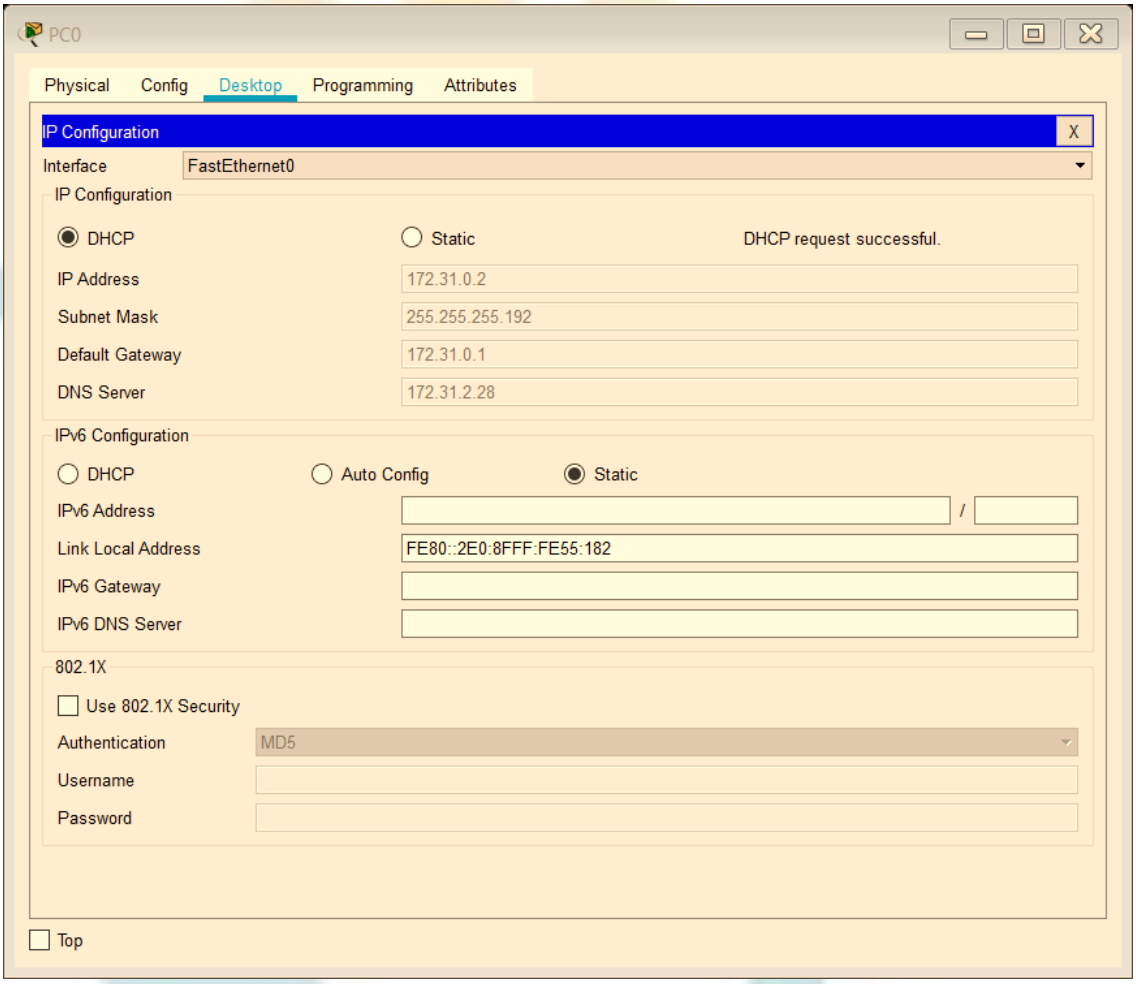
```
BUCARAMANGA(config)#int f0/0.10
BUCARAMANGA(config-subif)#ip helper-address 172.31.2.33
BUCARAMANGA(config-subif)#int f0/0.30
BUCARAMANGA(config-subif)#ip helper-address 172.31.2.33
BUCARAMANGA(config-subif)#end
BUCARAMANGA#
BUCARAMANGA#
%SYS-5-CONFIG_I: Configured from console by console

BUCARAMANGA#
```

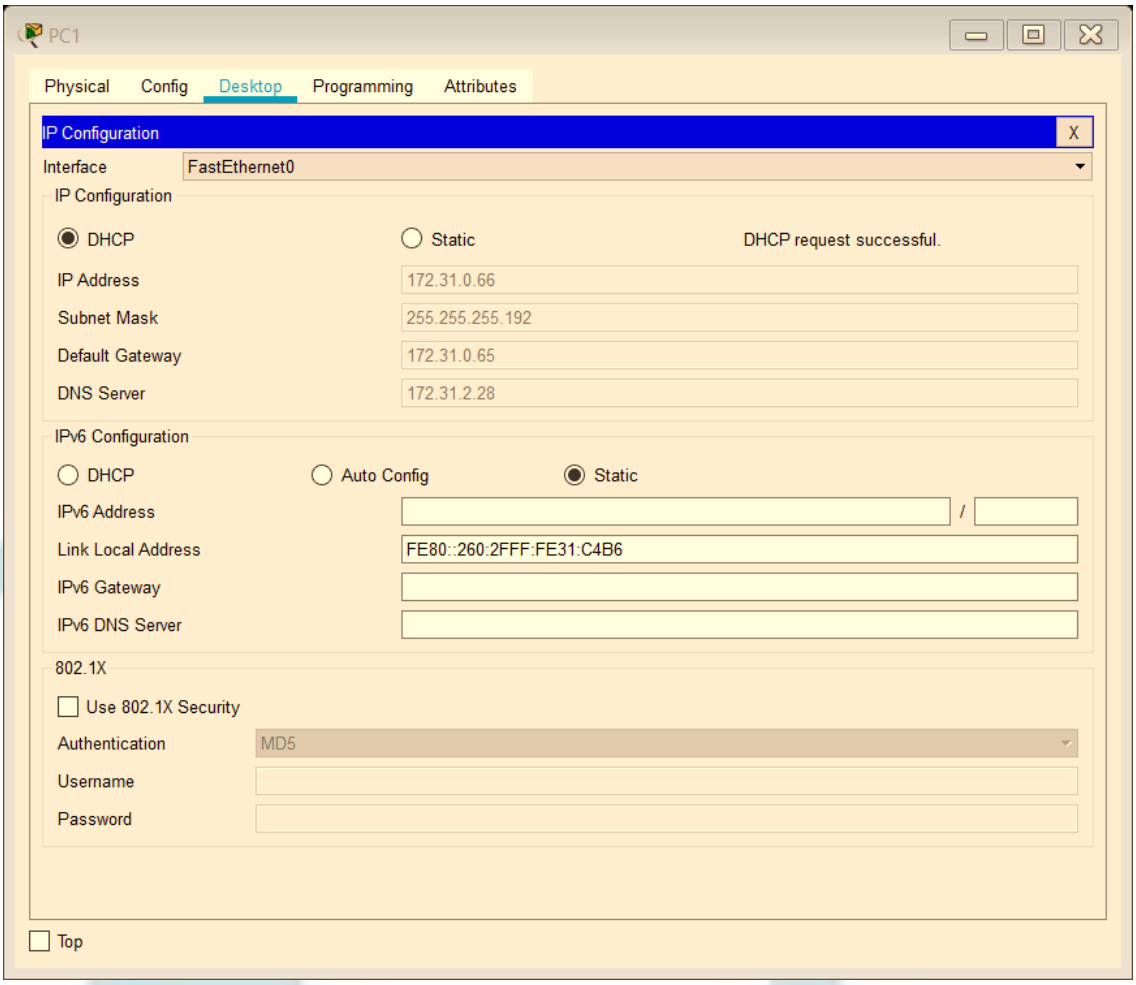
```
CUNDINAMARCA(config)#int f0/0.20
CUNDINAMARCA(config-subif)#ip helper-address 172.31.2.37
CUNDINAMARCA(config-subif)#int f0/0.30
CUNDINAMARCA(config-subif)#ip helper-address 172.31.2.37
CUNDINAMARCA(config-subif)#end
```

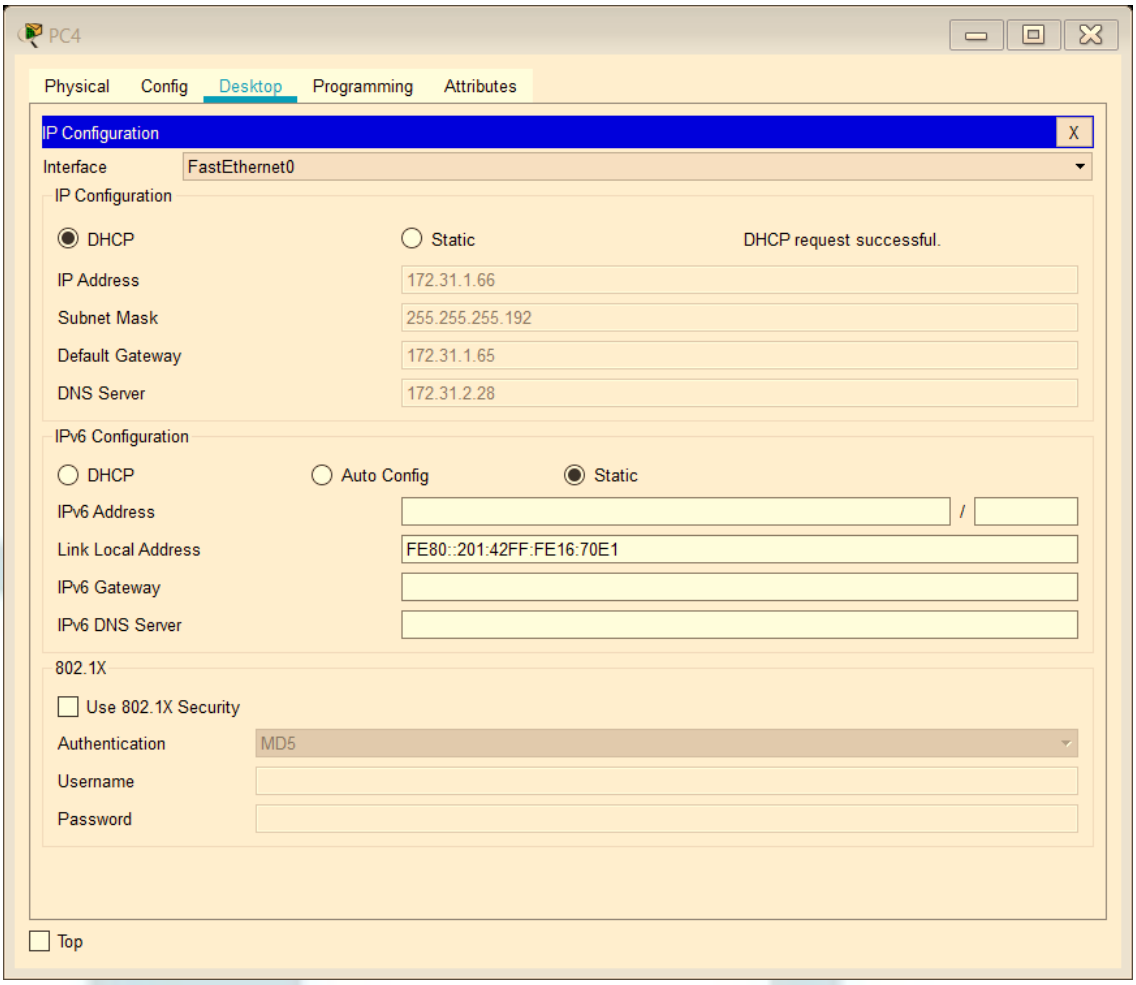
CUNDINAMARCA#

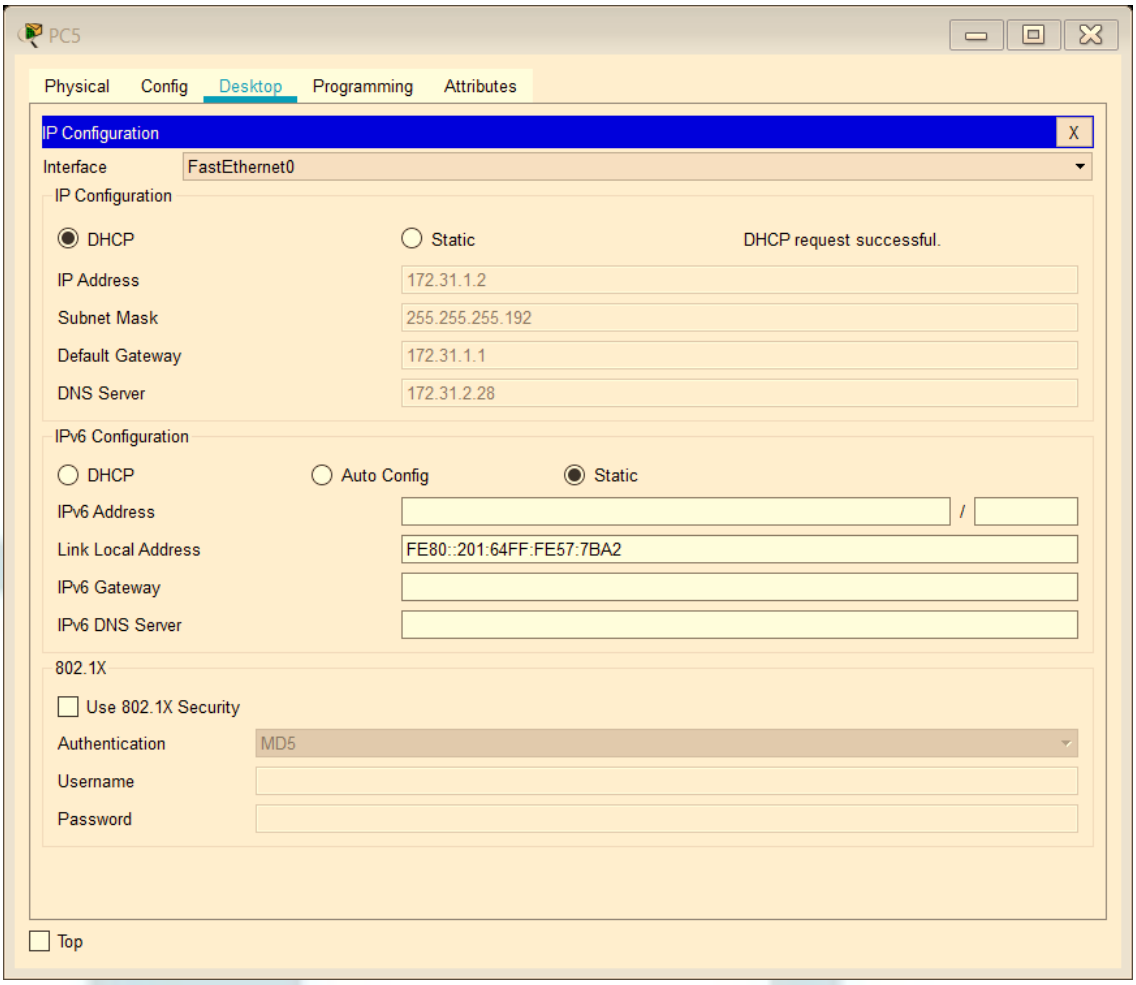
%SYS-5-CONFIG_I: Configured from console by console

CUNDINAMARCA#




PC1
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
DHCP request successful.
IP Address
172.31.0.66
Subnet Mask
255.255.255.192
Default Gateway
172.31.0.65
DNS Server
172.31.2.28
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
/
Link Local Address
FE80::260:2FFF:FE31:C4B6
IPv6 Gateway
IPv6 DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top


PC4
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
DHCP request successful.
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
DHCP
Auto Config
Static
IPv6 Address
/
Link Local Address
FE80::201:42FF:FE16:70E1
IPv6 Gateway
IPv6 DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top



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#

```
Packet Tracer PC Command Line 1.0
C:\>ping 209.165.220.3

Pinging 209.165.220.3 with 32 bytes of data:

Request timed out.
Reply from 209.165.220.3: bytes=32 time=2ms 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 = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 2ms, Average = 1ms

C:\>
```

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.**

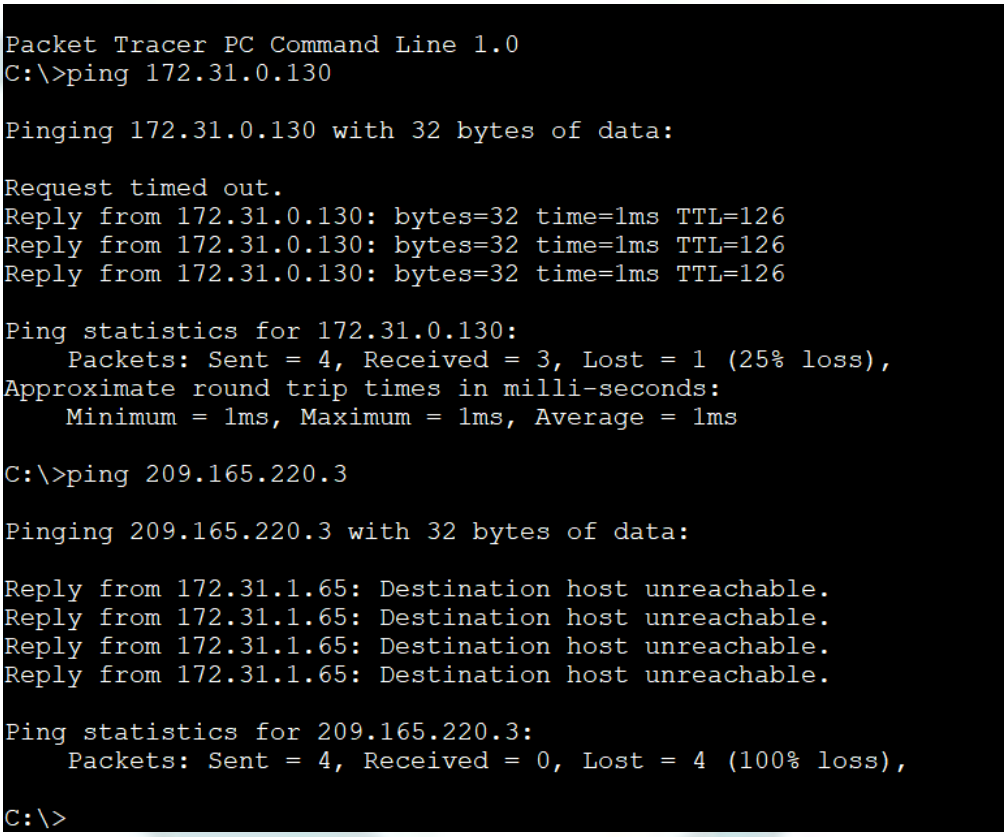
CUNDINAMARCA(config-if)#access-list 111 deny ip 172.31.1.64 0.0.0.63 209.165.220.0 0.0.0.255

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)#



   - **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)#

```
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

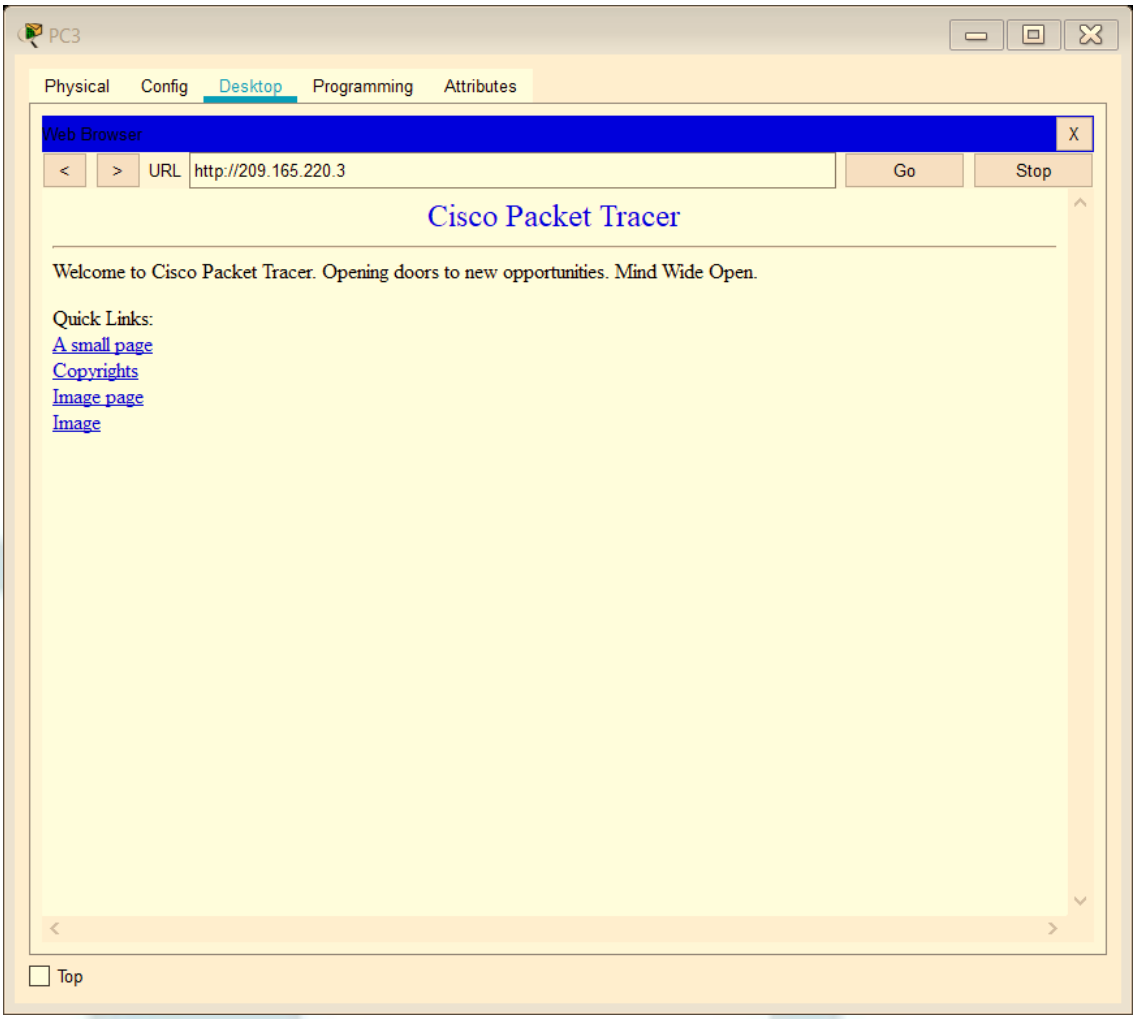
TUNJA(config)#access-list 111 permit tcp 172.31.0.192 0.0.0.63 209.165.220.0 0.0.0.255 eq 20

TUNJA(config)#int f0/0.30

TUNJA(config-subif)#ip access-group 111 in

TUNJA(config-subif)#

```
    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 172.31.0.193: Destination host unreachable.
Reply from 172.31.0.193: Destination host unreachable.
Reply from 172.31.0.193: Destination host unreachable.
Reply from 172.31.0.193: Destination host unreachable.

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

C:\>ftp 209.165.220.3
Trying to connect...209.165.220.3
Connected to 209.165.220.3
220- Welcome to PT Ftp server
Username:cisco
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
ftp>quit

221- Service closing control connection.
C:\>
```



- **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)#

```
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:\>
```

```
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)#

```
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=4ms 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 = 4ms, Average = 1ms

C:\>
```

- **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)#

```
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:\>
```

```
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)#

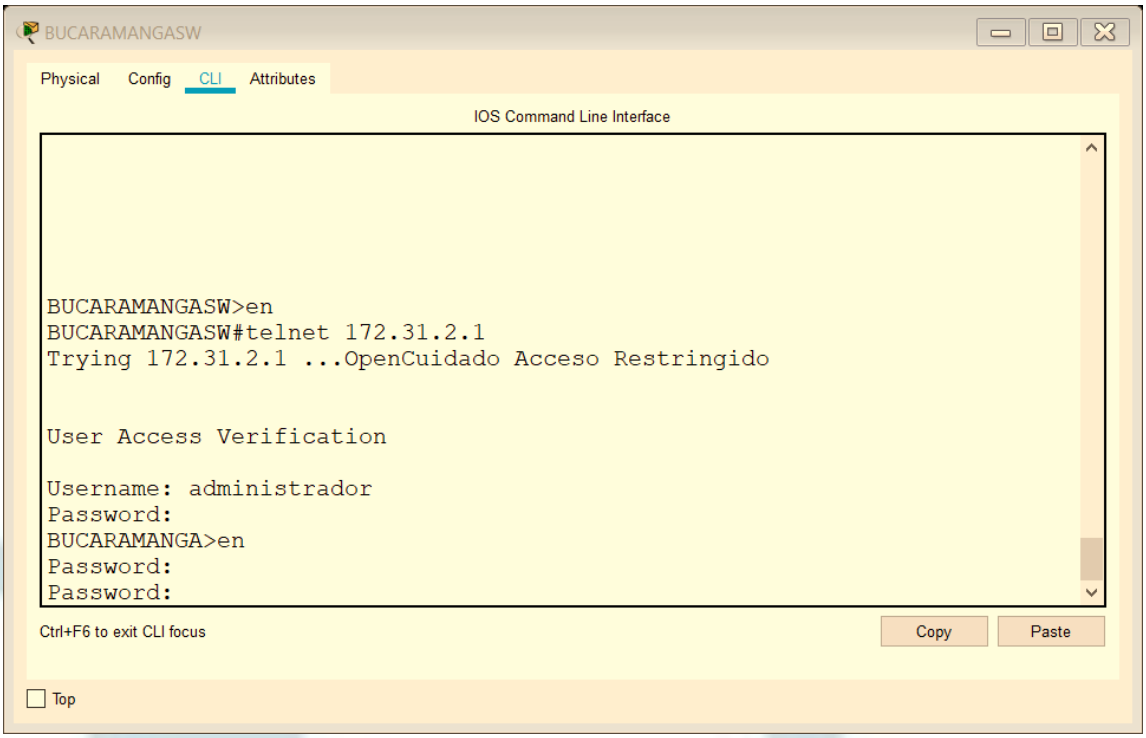
```
Ping statistics for 172.31.2.28:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

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:\>
```

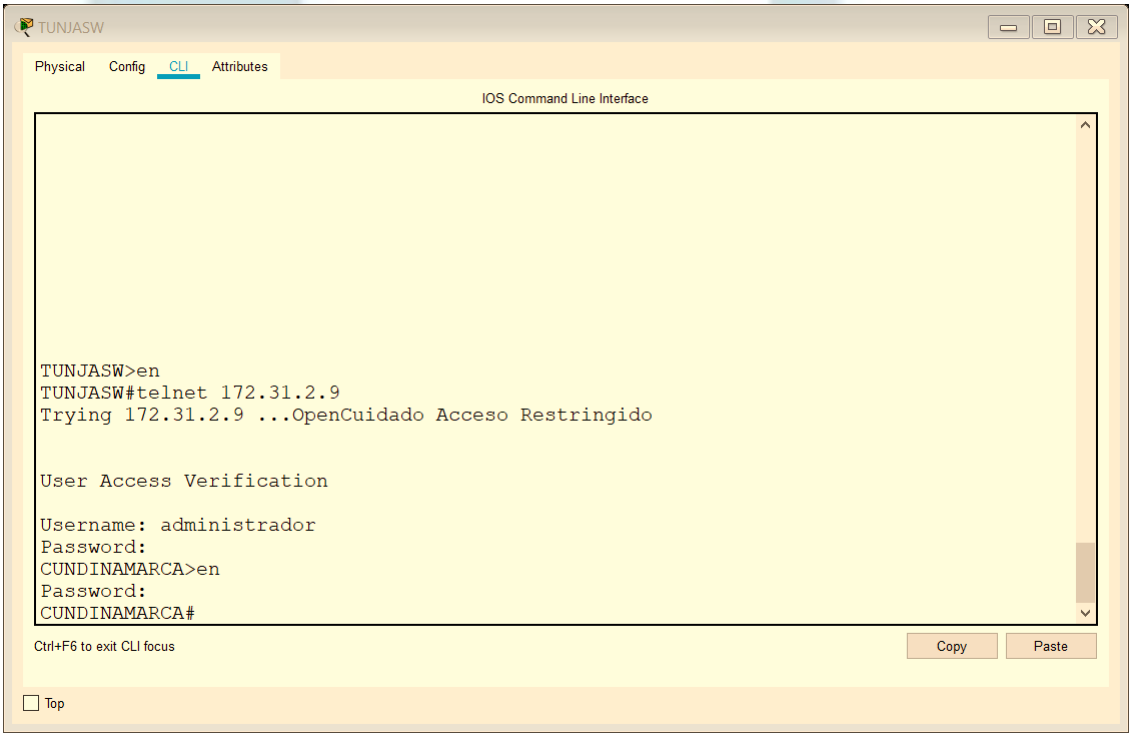
```
Ping statistics for 209.165.220.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

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:\>
```

```
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 accedo 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)#
```


BUCARAMANGASW
Physical
Config
CLI
Attributes
IOS Command Line Interface
BUCARAMANGASW>en
BUCARAMANGASW#telnet 172.31.2.1
Trying 172.31.2.1 ...OpenCuidado Acceso Restringido
User Access Verification
Username: administrador
Password:
BUCARAMANGA>en
Password:
Password:
Ctrl+F6 to exit CLI focus
Copy
Paste
Top


TUNJASW
Physical
Config
CLI
Attributes
IOS Command Line Interface
TUNJASW>en
TUNJASW#telnet 172.31.2.9
Trying 172.31.2.9 ...OpenCuidado Acceso Restringido
User Access Verification
Username: administrador
Password:
CUNDINAMARCA>en
Password:
CUNDINAMARCA#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

4. CONCLUSIONES

- Se desarrolló, registró e identificó la configuración de cada uno de los dispositivos, así como la descripción detallada del paso a paso de cada una de las etapas realizadas durante su desarrollo, el registro de los procesos de verificación de conectividad mediante el uso de comandos ping, traceroute, show ip route, entre otros.

- Se obtuvo información relevante para plantear una solución técnica al problema planteado.

- Se diseñó la solución técnica, para un entorno de oficina pequeña.

- Se creó el prototipo de la solución técnica propuesta con Packet Tracer.

- Se logró planificar la instalación de una solución técnica para el entorno solicitado.

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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