

EVALUACIÓN – PRUEBA DE HABILIDADES PRACTICAS CCNA

EDUAR ANDRES MANDON ANGARITA

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**DIPLOMADO DE PROFUNDIZACIÓN CISCO
DISEÑO E IMPLEMENTACION DE SOLUCIONES INTEGRADAS LAN / WLAN**

**TUTOR
GIOVANNI ALBERTO BRACHO**

**UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA
ESCUELA DE CIENCIAS BASICAS Y TECNOLOGIAS
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Resumen

Este proyecto consiste en el proceso de conceptualización de los diversos temas del área de networking y seguridad los cuales se apreciaron durante el semestre educativo, a su vez la aplicación práctica de los mismos sobre diversos esquemas topológicos de red para los módulos de CCNP ROUTE y CCNA SWITCH en ambientes de simulación lógica. El objetivo principal es el enriquecimiento del estudiante en un área de profundización del área de telecomunicaciones que permita poseer una base práctica para el mejoramiento del pensamiento crítico y la capacidad de análisis proactivo sobre plataforma de red, el análisis de situaciones conflictivas que permitan al estudiante entender el funcionamiento de corta mediana y gran envergadura.

Abstract

This project consists in the process of conceptualizing the various topics of the area of networking and security which were appreciated during the educational semester, in turn the practical application of the same on various topological network schemes for the CCNP ROUTE and CCNA SWITCH modules in logical simulation environments. The main objective is the enrichment of the student in an area of deepening the area of telecommunications that allows to possess a practical base for the improvement of the critical thinking and the ability to analyze proactively on network platform, the analysis of conflicting situations that allow the student to understand the operation of medium and large short.

Índice

Introducción.....	5
Objetivos.....	6
Descripción- Topología ESCENARIO 1.....	7
Desarrollo del escenario 1	9
Descripción- Topología ESCENARIO 2.....	29
Desarrollo del escenario 2	29
Conclusiones.....	55
Referencias bibliográficas	56

Introducción

Las redes en general pueden ser repetitivo, resaltar el valor del sistema de información como aquel que sirve para coordinar las actividades empresariales, Al tratar sobre los sistemas de información resulta inevitable hacer referencia a las tecnologías de la información que sirven para dar soporte a dicho sistema de información.

A la union de las telecomunicaciones e informática, se lo conoce como telematica. El sector telemático se ha generado por la progresiva integración entre los servicios de telecomunicaciones y las técnicas de procesamiento electrónico, por esto en este trabajo vamos a resaltar cada una de estas técnicas de procesamiento e integración de los sistemas telemáticos, donde cada estudiante hará su aporte con el fin de interiorizar de manera individual y grupal los principios básicos de las TIC's, y la automatización de dicho procesos en el ambiente productivo.

Objetivos

Objetivo General

- A través de diversos ejercicios teóricos y prácticos se busca fundamentar y aplicar los conocimientos vistos en los módulos CCNP ROUTE y CCNP SWITCH vistos durante el semestre de forma que el profesional se encuentre en la capacidad de afrontar los diversos retos que se presentan en el día a día del área de telecomunicaciones.

Objetivo Especifico

- Realizar el desarrollo de la actividad practica del módulo CCNP ROUTE que permita comprobar los conocimientos adquiridos durante el semestre en temas como: protocolos de enrutamiento dinámico, enrutamiento estático, seguridad en router, IPv6, BGP, OSPF, EIGRP, administración de updates, VRF, HSRP, Sistema Autónomo entre otros.
- Realizar el desarrollo de la actividad practica del módulo CCNP SWITCH que permita comprobar los conocimientos adquiridos durante el semestre en temas como: VLAN, Routing interVLAN, Spanning-Tree, VTP, entre otros.

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.

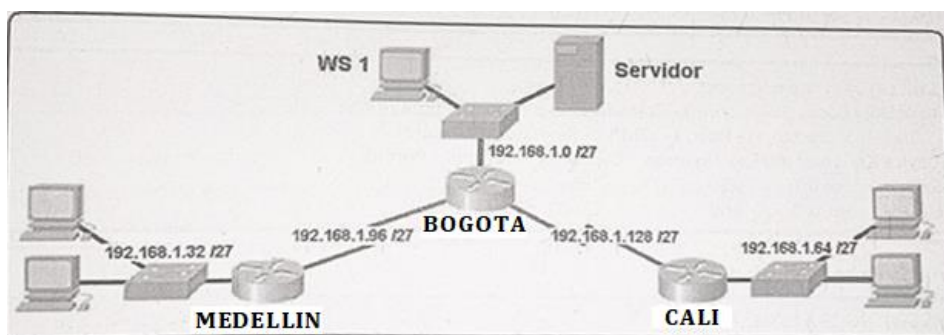
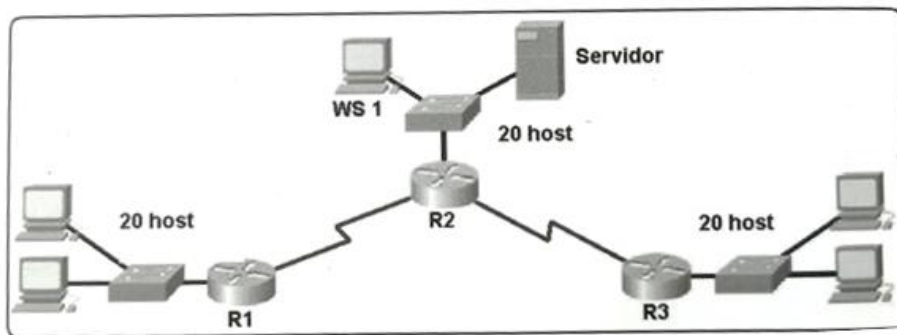
Parte 2: Considerar la asignación de los parámetros básicos y la detección de vecinos directamente conectados.

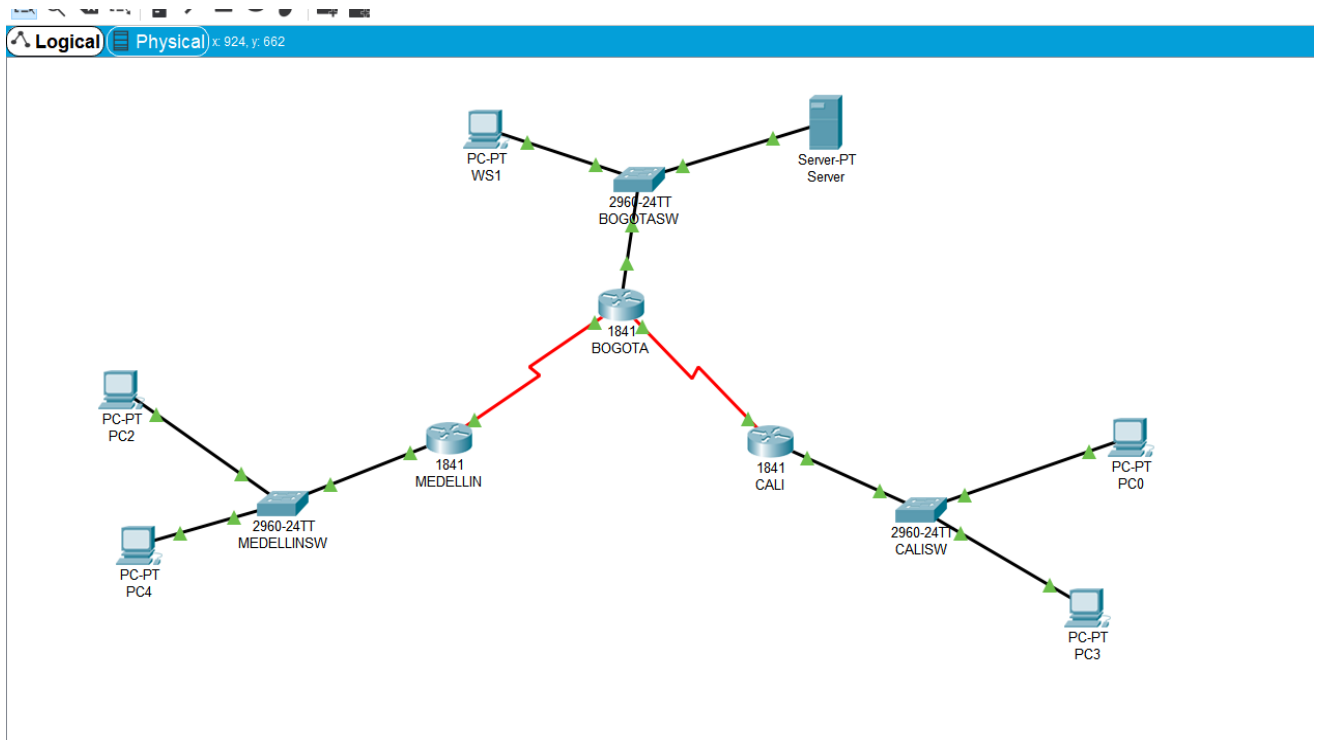
Parte 3: La red y subred establecidas deberán tener una interconexión total, todos los hosts deberán ser visibles y poder comunicarse entre ellos sin restricciones.

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 classE2
BOGOTA(config)#line console 0
BOGOTA(config-line)#password ciscoE2
BOGOTA(config-line)#login
BOGOTA(config-line)#logging synchronous
BOGOTA(config-line)#line vty 0 15
BOGOTA(config-line)#password ciscoE2
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 classE2
MEDELLIN(config)#line console 0
MEDELLIN(config-line)#password ciscoE2
MEDELLIN(config-line)#login
MEDELLIN(config-line)#logging synchronous
MEDELLIN(config-line)#line vty 0 15
MEDELLIN(config-line)#password ciscoE2
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 classE2
CALI(config)#line console 0
CALI(config-line)#password ciscoE2
CALI(config-line)#login
CALI(config-line)#logging synchronous
CALI(config-line)#line vty 0 15
CALI(config-line)#password ciscoE2
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 classE2
BOGOTASW(config)#line console 0
BOGOTASW(config-line)#password ciscoE2
BOGOTASW(config-line)#login
BOGOTASW(config-line)#logging synchronous
BOGOTASW(config-line)#line vty 0 15
BOGOTASW(config-line)#password ciscoE2
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 classE2
```

```
MEDELLINSW(config)#line console 0
```

```
MEDELLINSW(config-line)#password ciscoE2
```

```
MEDELLINSW(config-line)#login
```

```
MEDELLINSW(config-line)#logging synchronous
```

```
MEDELLINSW(config-line)#line vty 0 15
```

```
MEDELLINSW(config-line)#password ciscoE2
```

```
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 classE2
```

```
CALISW(config)#line console 0
```

```
CALISW(config-line)#password ciscoE2
```

```
CALISW(config-line)#login
```

```
CALISW(config-line)#logging synchronous
```

```
CALISW(config-line)#line vty 0 15
```

```
CALISW(config-line)#password ciscoE2
```

```
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 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 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
MEDELLIN SW 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
CALI SW 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
```

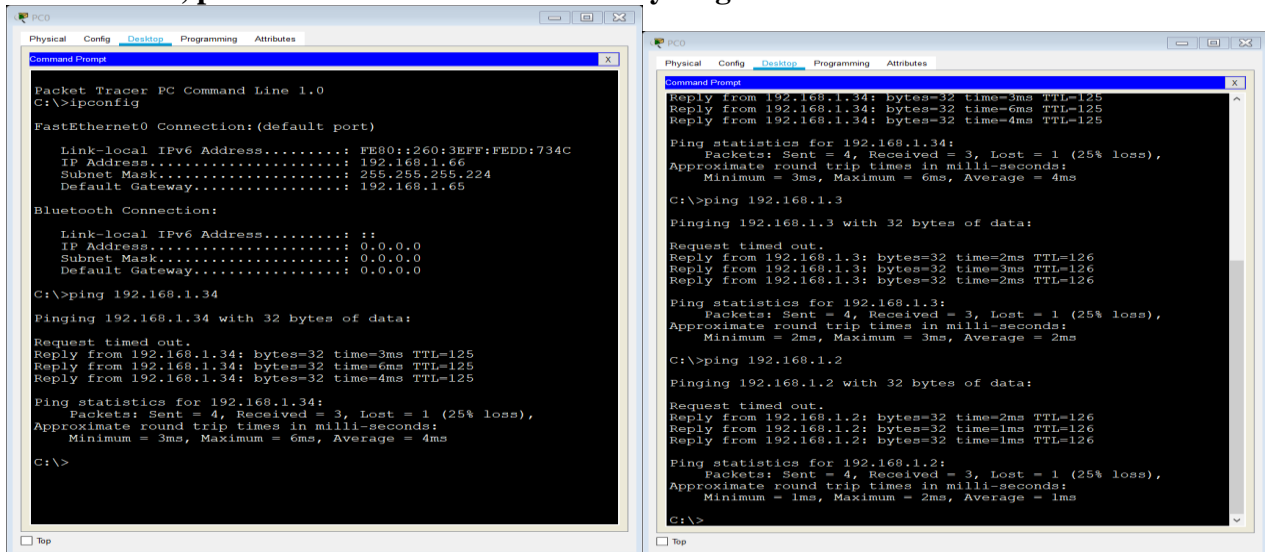
```
CALI#show ip route
```

```
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 CALL, primero a la red de MEDELLIN y luego al servidor.



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.

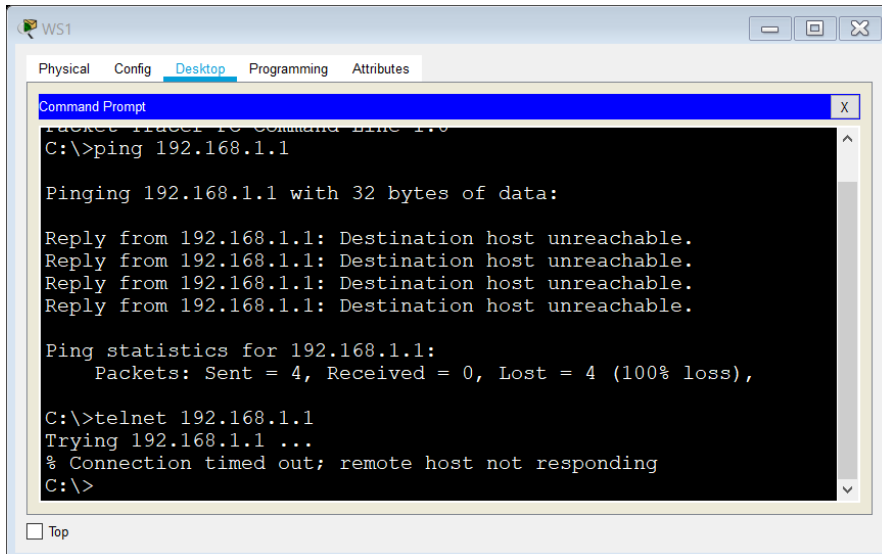
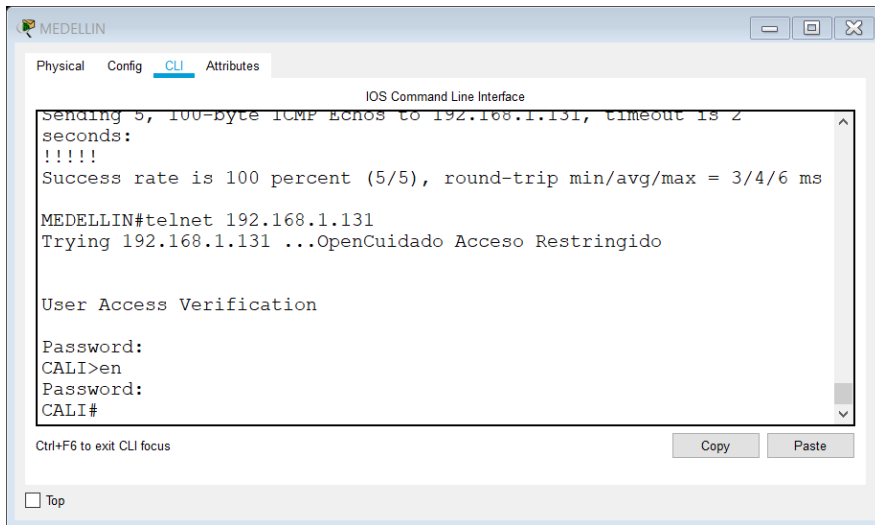
```
MEDELLIN#conf t
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN(config)#access-list 111 permit ip 192.168.1.32 0.0.0.31 host 192.168.1.30
MEDELLIN(config)#int f0/0
MEDELLIN(config-if)#ip access-group 111 in
MEDELLIN(config-if)#
```

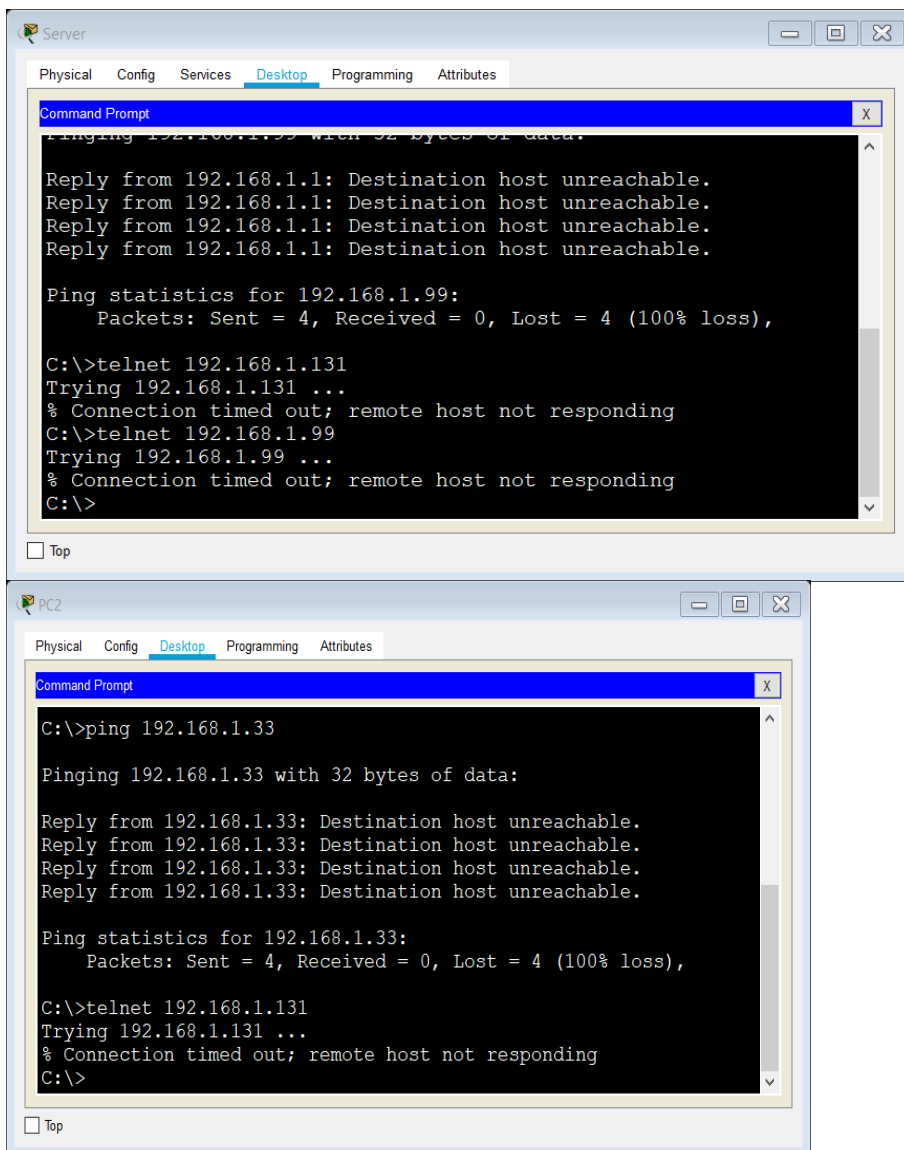
```
CALI#conf t
Enter configuration commands, one per line. End with CNTL/Z.
CALI(config)#access-list 111 permit ip 192.168.1.64 0.0.0.31 host 192.168.1.30
CALI(config)#int f0/0
CALI(config-if)#ip access-group 111 in
CALI(config-if)#
```

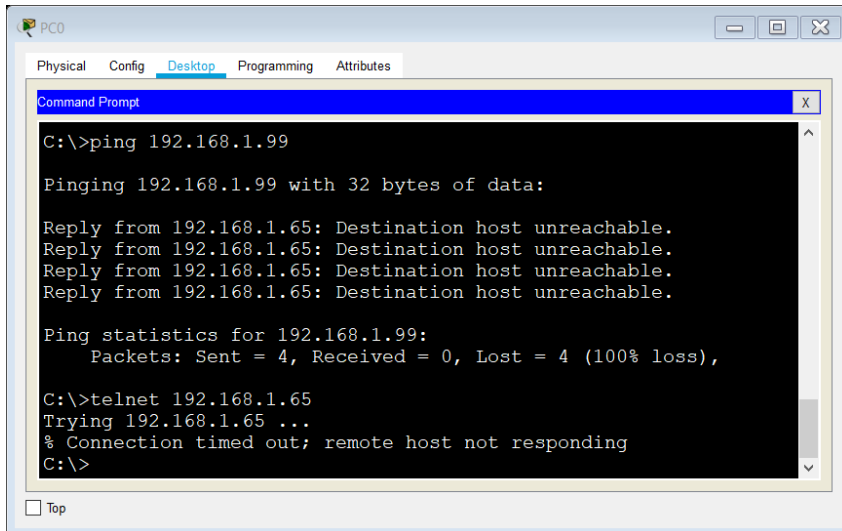
Parte 5: Comprobación de la red instalada.

- 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







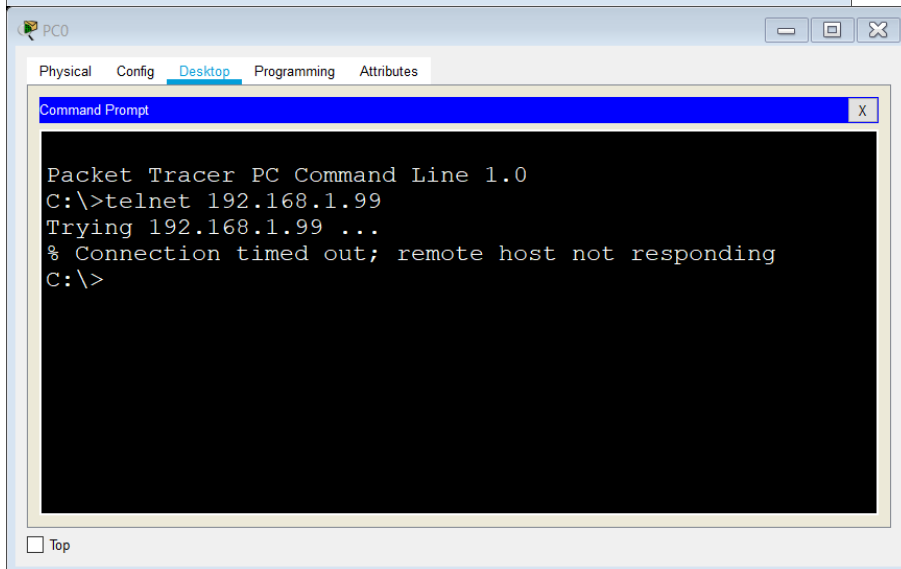
```
C:\>ping 192.168.1.99

Pinging 192.168.1.99 with 32 bytes of data:

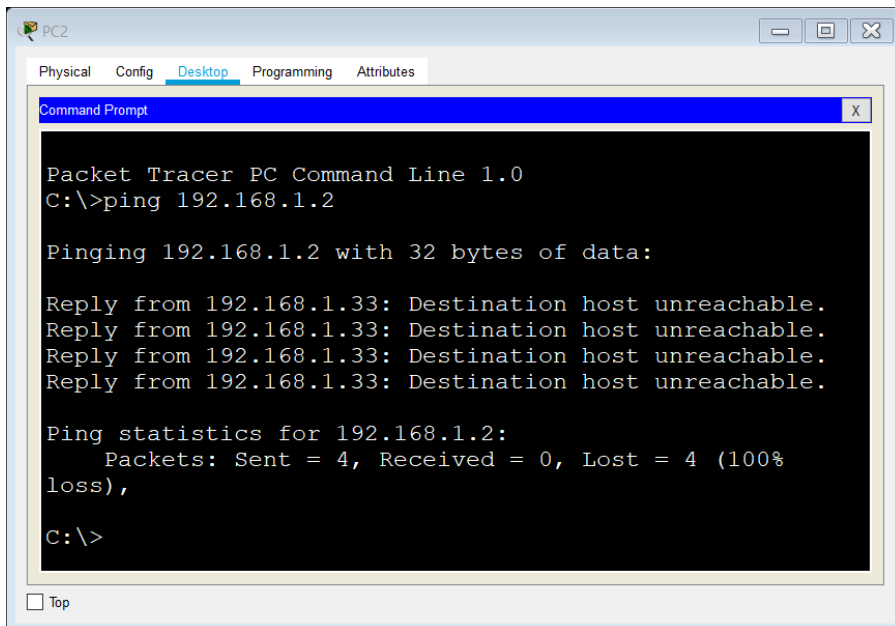
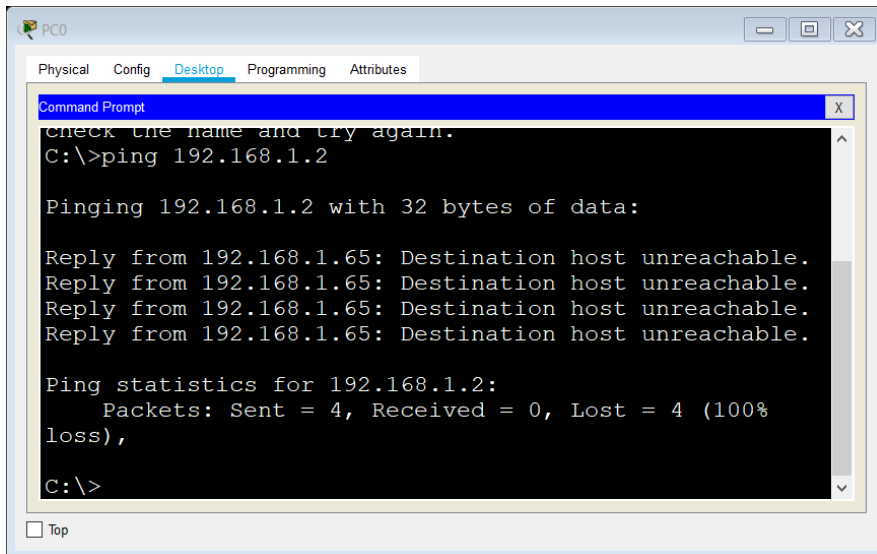
Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.

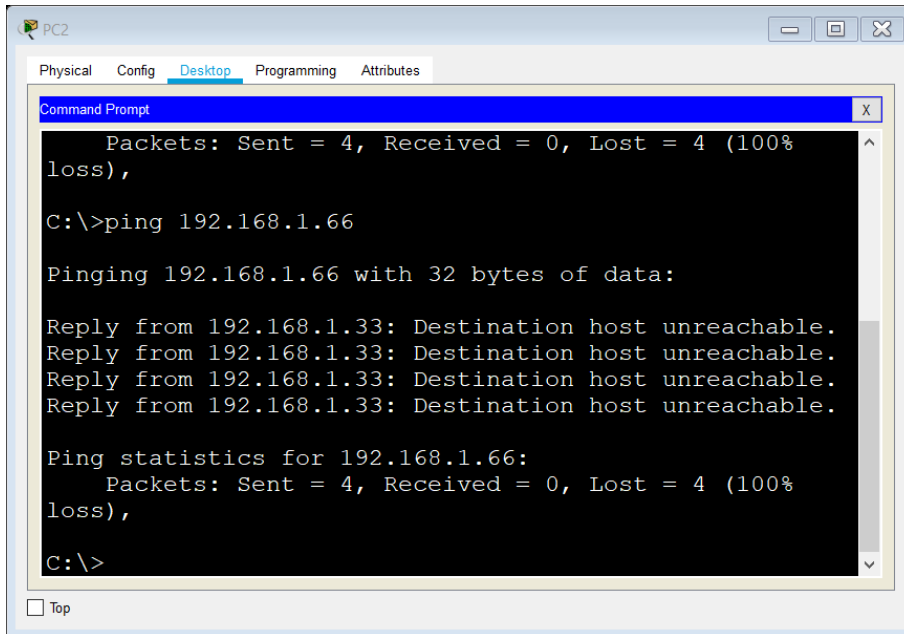
Ping statistics for 192.168.1.99:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

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



```
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:\>
```



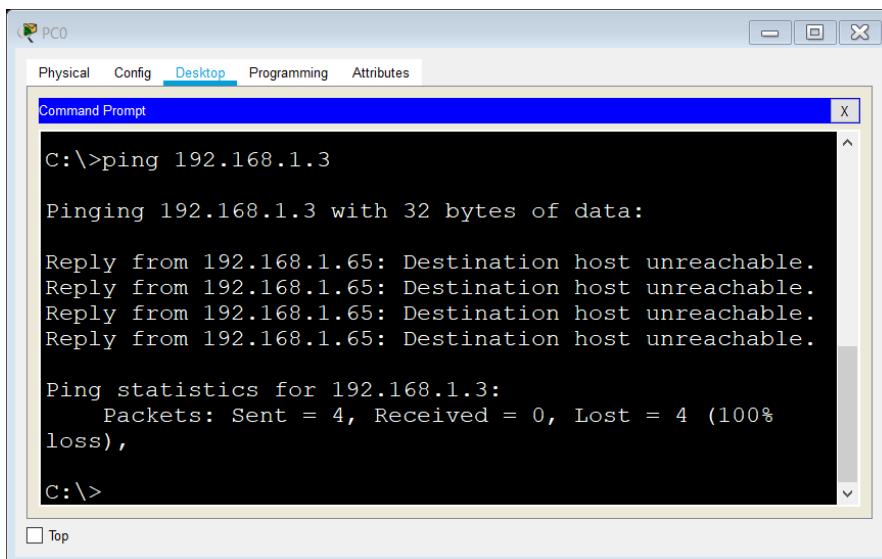


```
PC2
Physical Config Desktop Programming Attributes
Command Prompt
Packets: Sent = 4, Received = 0, Lost = 4 (100%
loss),
C:\>ping 192.168.1.66

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:\>
```

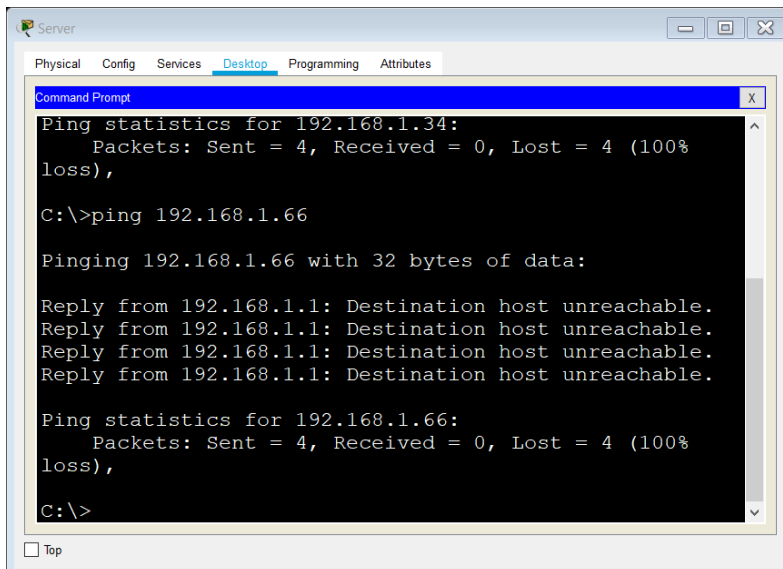
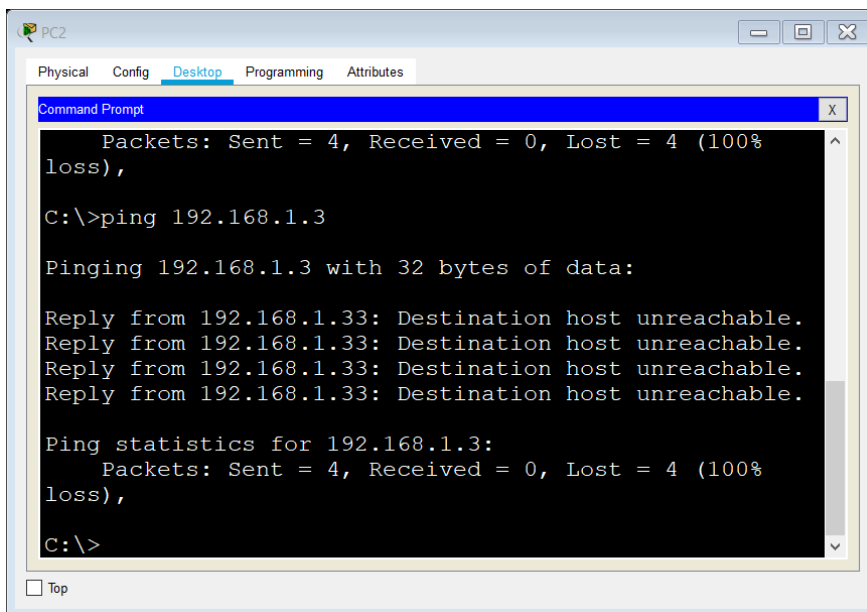


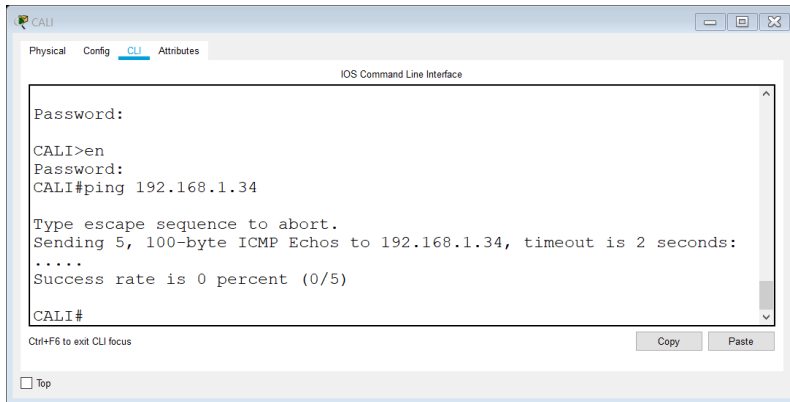
```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
C:\>ping 192.168.1.3

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:\>
```

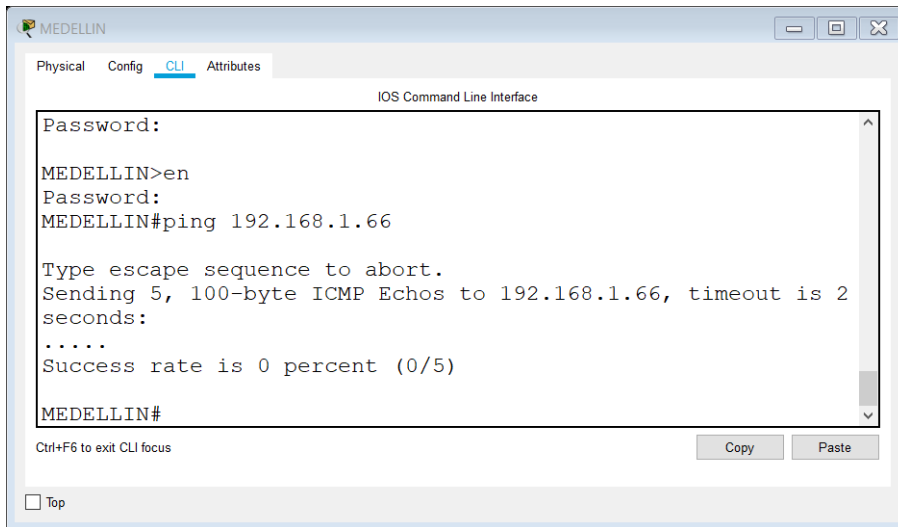




The screenshot shows a web browser window titled 'CALI' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying an 'IOS Command Line Interface'. The text in the terminal area is as follows:

```
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#
```

At the bottom of the terminal area, there is a 'Ctrl+F6 to exit CLI focus' instruction and 'Copy' and 'Paste' buttons. A 'Top' button is located at the bottom left of the window.



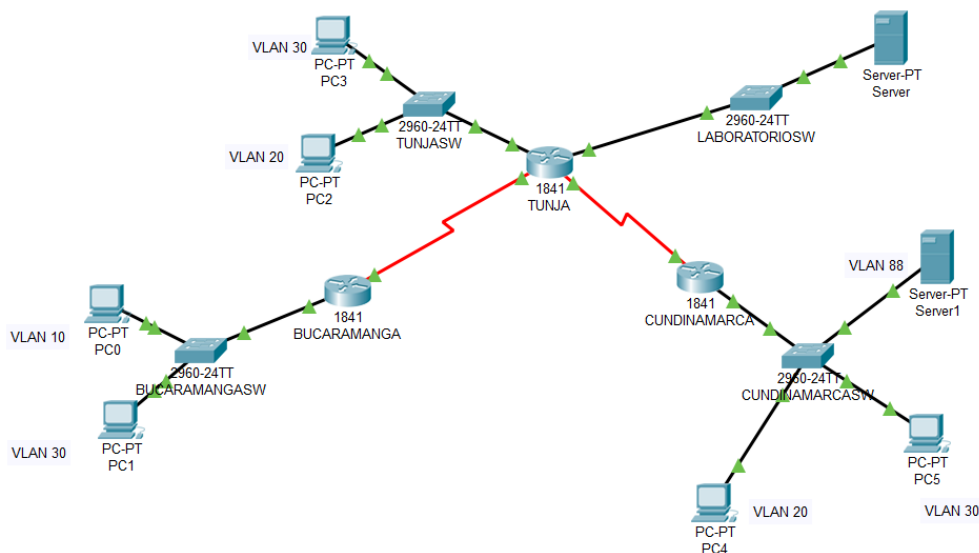
The screenshot shows a web browser window titled 'MEDELLIN' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying an 'IOS Command Line Interface'. The text in the terminal area is as follows:

```
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#
```

At the bottom of the terminal area, there is a 'Ctrl+F6 to exit CLI focus' instruction and 'Copy' and 'Paste' buttons. A 'Top' button is located at the bottom left of the window.

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.**

Usuario: administrador

BUCARAMANGA#

```
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 class16
BUCARAMANGA(config)#line console 0
BUCARAMANGA(config-line)#password cisco12345
BUCARAMANGA(config-line)#login
BUCARAMANGA(config-line)#logging synchronous
BUCARAMANGA(config-line)#line vty 0 15
BUCARAMANGA(config-line)#password cisco12345
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
```

```
TUNJA#
```

```
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 class16
TUNJA(config)#line console 0
TUNJA(config-line)#password cisco12345
TUNJA(config-line)#login
TUNJA(config-line)#logging synchronous
TUNJA(config-line)#line vty 0 15
TUNJA(config-line)#password cisco12345
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
```

CUNDINAMARCA#

```
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 class16
CUNDINAMARCA(config)#line console 0
CUNDINAMARCA(config-line)#password cisco12345
CUNDINAMARCA(config-line)#login
CUNDINAMARCA(config-line)#logging synchronous
CUNDINAMARCA(config-line)#line vty 0 15
CUNDINAMARCA(config-line)#password cisco12345
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
```

```
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

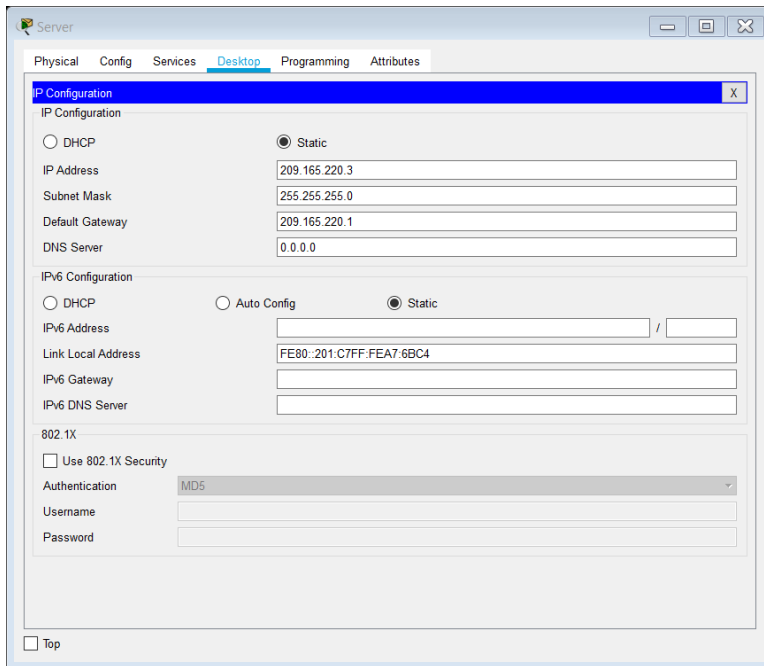
- **Máximo tiempo de acceso al detectar ataques.**

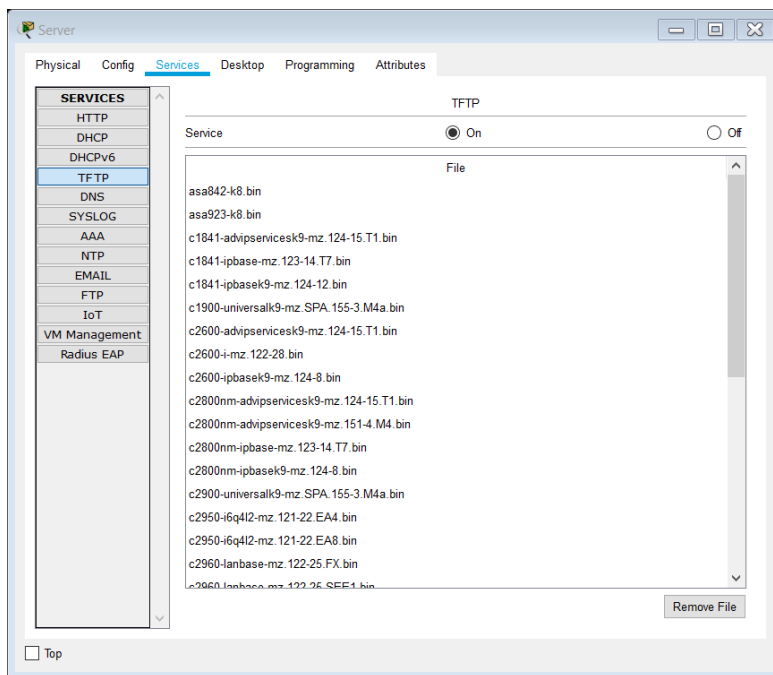
BUCARAMANGA(config-line)#login block-for 5 attempts 4 within 60

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**





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
```

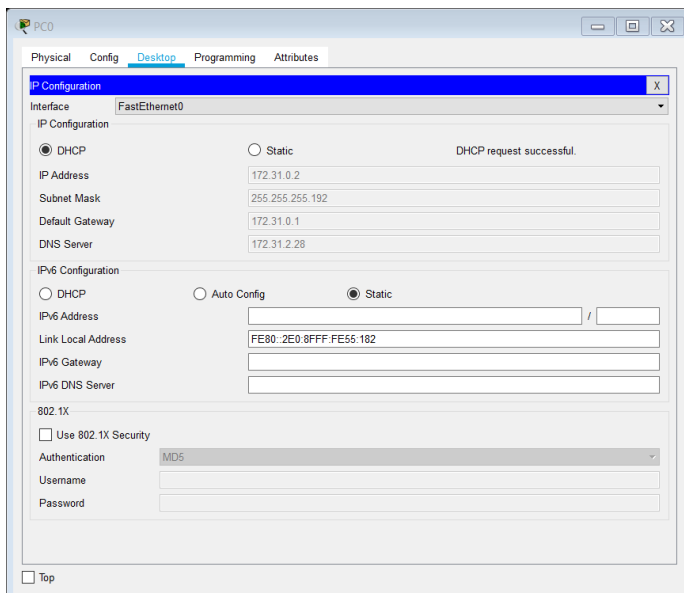
```
TUNJA(dhcp-config)#dns-server 172.31.2.28
TUNJA(dhcp-config)#ip dhcp pool V20C
TUNJA(dhcp-config)#network 172.31.1.64 255.255.255.192
TUNJA(dhcp-config)#default-router 172.31.1.65
TUNJA(dhcp-config)#dns-server 172.31.2.28
TUNJA(dhcp-config)#ip dhcp pool V30C
TUNJA(dhcp-config)#network 172.31.1.0 255.255.255.192
TUNJA(dhcp-config)#default-router 172.31.1.1
TUNJA(dhcp-config)#dns-server 172.31.2.28
TUNJA(dhcp-config)#
```

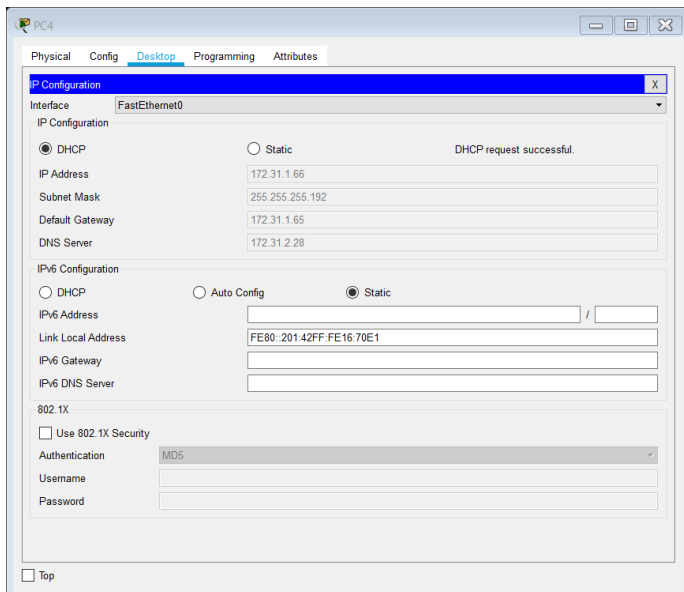
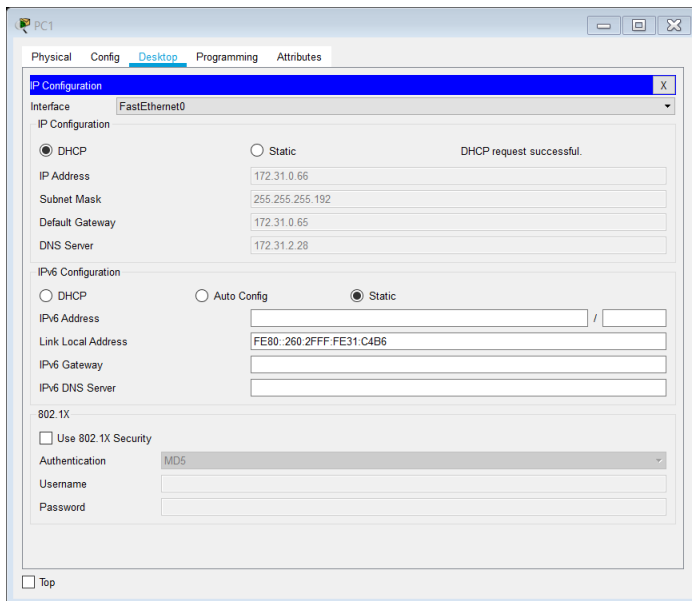
```
BUCARAMANGA(config)#int f0/0.10
BUCARAMANGA(config-subif)#ip helper-address 172.31.2.33
BUCARAMANGA(config-subif)#int f0/0.30
BUCARAMANGA(config-subif)#ip helper-address 172.31.2.33
BUCARAMANGA(config-subif)#end
BUCARAMANGA#
BUCARAMANGA#
%SYS-5-CONFIG_I: Configured from console by console
```

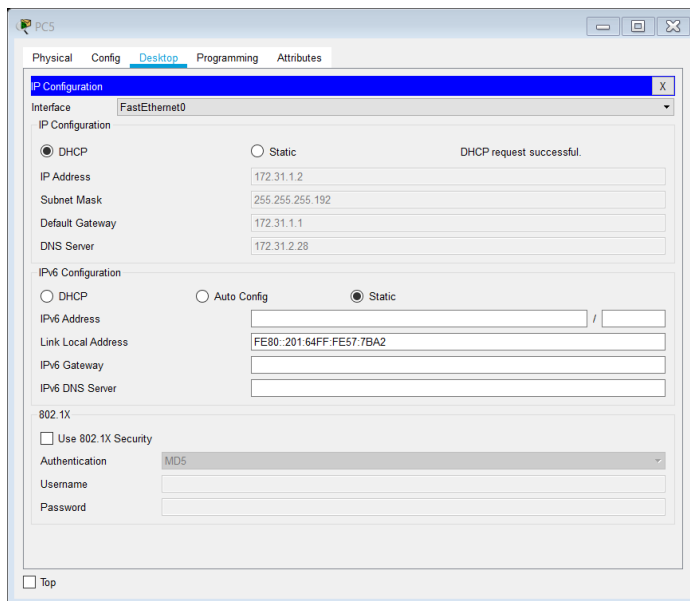
BUCARAMANGA#

```
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#







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#

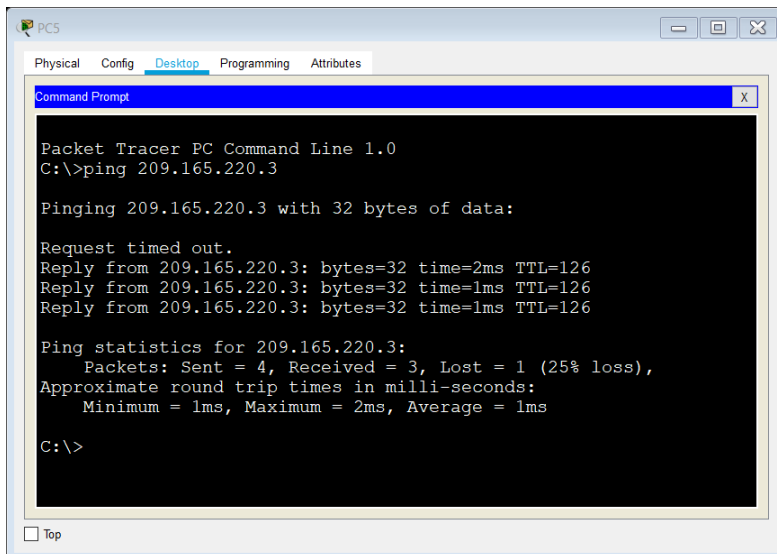
CUNDINAMARCA#show ip route

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
```

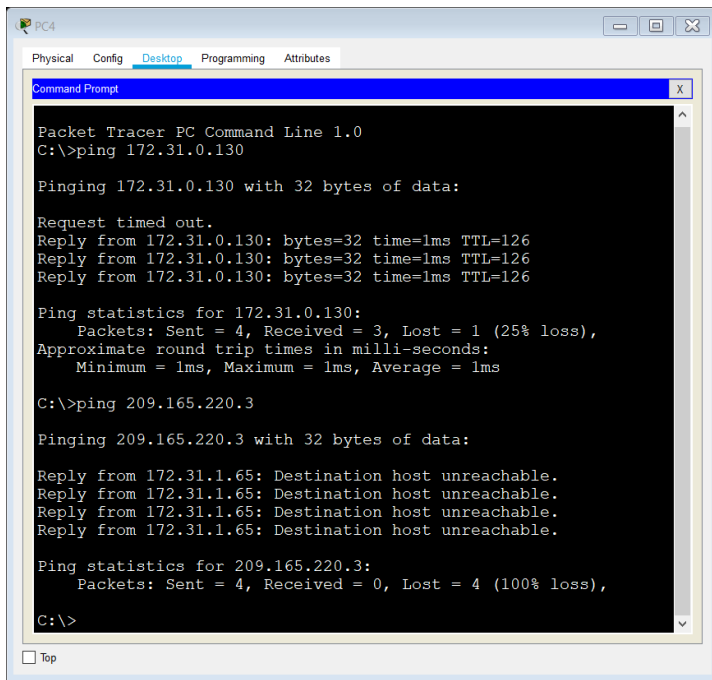
```
TUNJA(config-if)#
00:31:42: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.38 on Serial0/0/1 from LOADING to
FULL, Loading Done
```

```
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)#
```



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

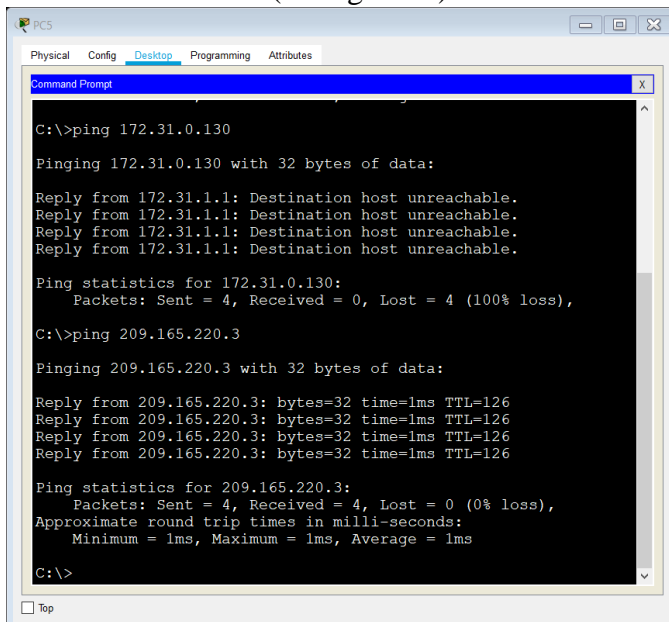
```
CUNDINAMARCA(config-subif)#access-list 112 permit ip 172.31.1.0 0.0.0.63 209.165.220.0
0.0.0.255
```

```
CUNDINAMARCA(config)#access-list 112 deny ip any any
```

```
CUNDINAMARCA(config)#int f0/0.30
```

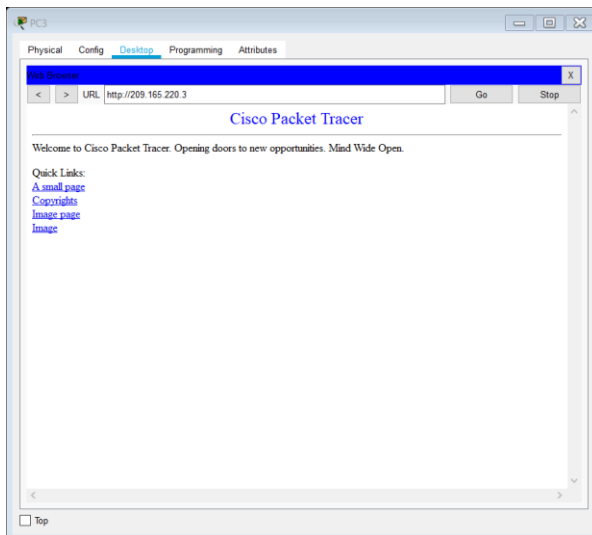
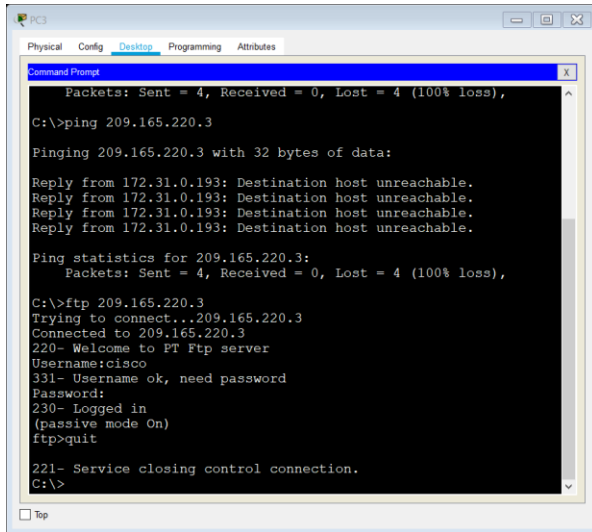
```
CUNDINAMARCA(config-subif)#ip access-group 112 in
```

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



- **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)#

```

PC2
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:\>
    
```

```

PC2
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.

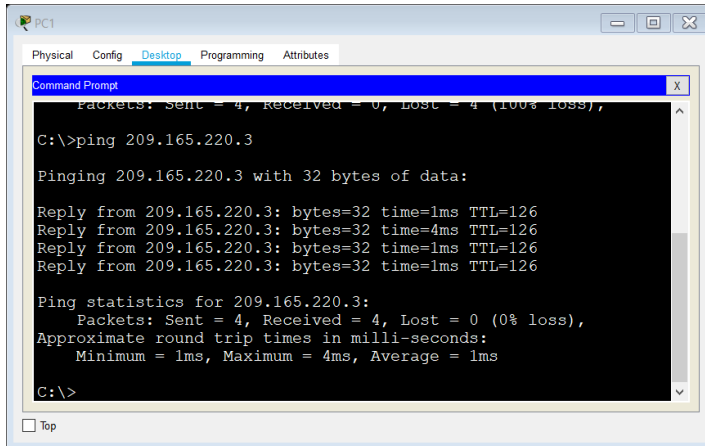
Ping statistics for 172.31.2.28:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

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)#
    
```

```

PCO
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:\>
    
```

```

PCO
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),

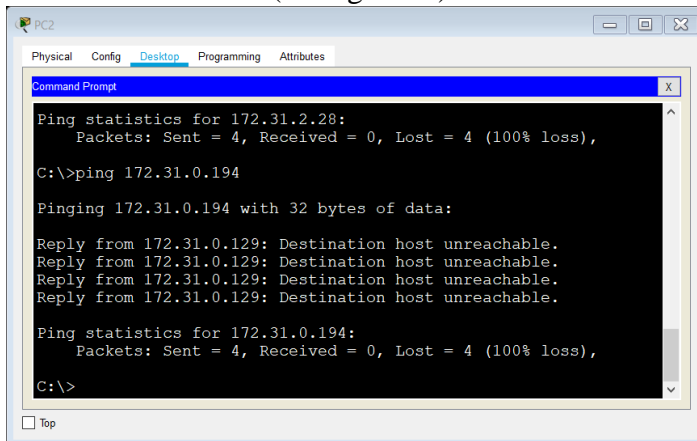
C:\>
    
```

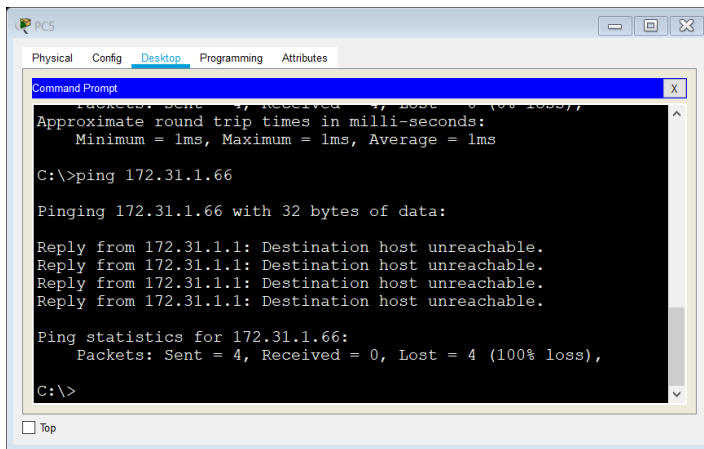
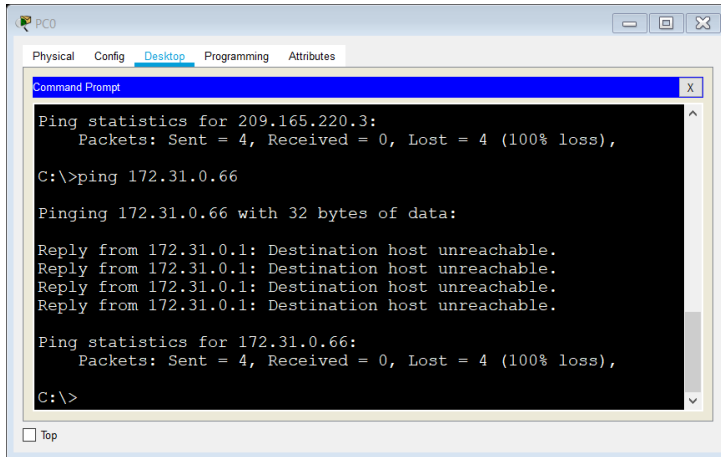
- **Los hosts de una VLAN no pueden acceder a los de otra VLAN en una ciudad.**

```
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)#
```





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

```

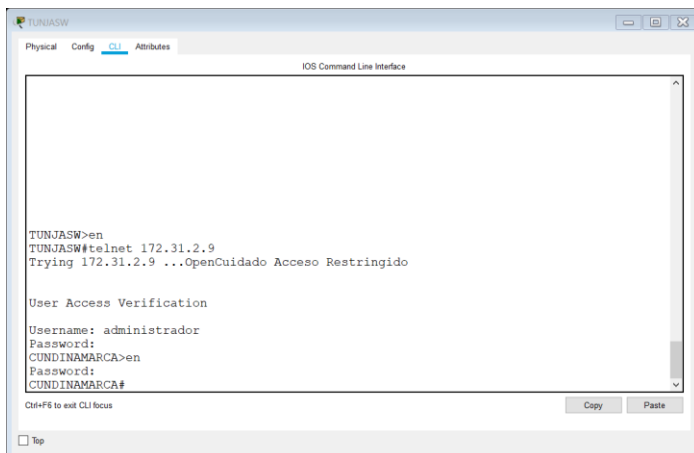
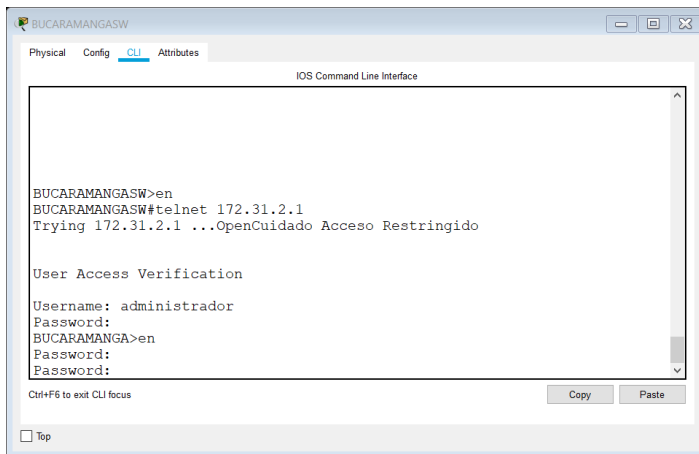
BUCARAMANGA(config-subif)#access-list 3 permit 172.31.2.0 0.0.0.7
BUCARAMANGA(config)#access-list 3 permit 172.3.2.8 0.0.0.7
BUCARAMANGA(config)#access-list 3 permit 172.31.2.8 0.0.0.7
BUCARAMANGA(config)#line vty 0 15
BUCARAMANGA(config-line)#access-class 3 in
BUCARAMANGA(config-line)#
  
```

```

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)#
```



Aspectos a tener en cuenta

- **Habilitar VLAN en cada switch y permitir su enrutamiento.**
- **Enrutamiento OSPF con autenticación en cada router.**
- **Servicio DHCP en el router Tunja, mediante el helper address, para los routers Bucaramanga y Cundinamarca.**
- **Configuración de NAT estático y de sobrecarga.**
- **Establecer una lista de control de acceso de acuerdo con los criterios señalados.**
- **Habilitar las opciones en puerto consola y terminal virtual**

Archivo .pkt – Practica Final

(click para descargar)

Escenario 1 y 2

<https://drive.google.com/drive/folders/1GqFmH8c4MkgPj6Icis5skQVHoGFhV0UA?usp=sharing>

Conclusiones

- El uso de protocolos de enrutamiento dinámico nos permite el aprendizaje rápido de la topología de red por la cual estemos pasando y la cantidad de saltos posibles para alcanzar un destino.
- Como elemento de seguridad el uso de Vlan nos permite la segmentación adecuada de una red limitando el acceso a los recursos que sean absolutamente necesarios y logrando una división basada en departamentos, servicios o localidades.
- Debemos tener cuidado al momento de implementar un esquema de red usando el protocolo VTP ya que al ser el aprendizaje de Vlan dinámico, la introducción de un nuevo Switch con un número de revisión más alto puede afectar el funcionamiento y generar indisponibilidad.
- En un ambiente empresarial de alta envergadura donde la disponibilidad de los servicios posee una alta demanda se hace necesaria la implementación de soluciones redundantes donde soluciones como HSRP para los Router y Etherchannel aparecen como alternativas eficientes para dar solución a esta necesidad.

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