

PRUEBA DE HABILIDADES PRÁCTICAS CISCO CCNA

JORGE AUGUSTO TÉLLEZ GÜIZA

**UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA – UNAD
ESCUELA: CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA
PROGRAMA INGENIERÍA DE SISTEMAS
DIPLOMADO DE PROFUNDIZACIÓN CISCO
COLOMBIA
2019**

Actividad Final

Jorge Augusto Téllez Güiza

Tutor:
Ing. Juan Carlos Vesga

Actividad Final: Prueba de habilidades prácticas CCNA.

Universidad Nacional Abierta y a Distancia – UNAD
Escuela: Ciencias básicas, tecnología e ingeniería
Programa Ingeniería de Sistemas
Diplomado de Profundización CISCO
Colombia
2019

Tabla de Contenido

1. Objetivos.....	9
1.1 General	9
1.2 Específicos	9
2. Escenario Uno.....	10
2.1 Topología de Red	10
2.2 Parte 1.....	11
2.3 Parte 2 Configuración Básica.....	12
2.3.1 Configuración Bogotá.....	12
2.3.2 Configuración Cali.....	13
2.3.3 Configuración Medellín.....	14
2.4 Diagnóstico Configuración de Enrutamiento.....	15
2.5 Configuración de las listas de Control de Acceso.....	15
2.5.1 Medellin ACL	16
2.5.2 Cali ACL.....	17
2.5.3 Bogotá ACL.....	18
2.6 Parte 5 Comprobación de la Red Instalada.	19
3. Escenario 2.....	21

3.1	Bucaramanga.....	21
3.1.1	Router.....	21
3.1.2	Switch	22
3.1.3	Conectividad Bga-PC01 - Bga-PC66.....	23
3.1.4	Configuración de Seguridad y Acceso.....	24
3.2	Tunja.....	24
3.2.1	Router.....	24
3.2.2	Switch	25
3.2.3	Tunja-Pc01 - Tunja-Pc93.....	26
3.2.4	Configuración de Seguridad y Acceso.....	26
3.3	Cundinamarca.....	27
3.3.1	Router.....	27
3.3.2	Switch	28
3.3.3	Cund-PC1, Cund-PC70, WEB interno.....	29
3.3.4	Configuración de Seguridad y Acceso.....	30
3.3.5	Configuración del Servidor TFTP	31
3.3.6	Verificación DHCP.....	32
3.3.7	NAT estático WEB Server.....	33
3.3.8	Listas de Control de Acceso Cundinamarca	34
3.3.9	Listas de Control de Acceso Tunja	36

3.3.10	Listas de Control de Acceso Bucaramanga.....	37
4.	Conclusiones.....	38
5.	Referencias.....	39

Resumen

Este documento muestra la solución a dos escenarios de red planteados como prueba fina del diplomado opción de grado, Cisco CCNA1 y CCNA2, que serán desarrollados usando Packet Tracer.

En el transcurso del programa conocimos y practicamos sobre los diferentes equipos de networking Cisco y las soluciones ofrecidas para conectividad LAN y WAN todo el tiempo tuvimos apoyo directo de la empresa Cisco y recorrimos conceptos básicos, direccionamiento y enrutamiento en este documento hacemos el desarrollo de dos ejercicios en dos escenarios diferentes.

Abstract

This document shows the solution to two network scenarios posed as a final test of the diploma grade option, Cisco CCNA1 and CCNA2, which will be developed using Packet Tracer.

Over the course of the program we learned and practiced on the different Cisco networking equipment and solutions offered for LAN and WAN connectivity all the time we had direct support from the Cisco enterprise and we went through basic concepts, addressing and routing in this document we do the development of two exercises in two different scenarios.

Introducción

La evaluación denominada “Prueba de habilidades prácticas”, forma parte de las actividades evaluativas del Diplomado de Profundización CCNA, y busca identificar el grado de desarrollo de competencias y habilidades que fueron adquiridas a lo largo del diplomado. Lo esencial es poner a prueba los niveles de comprensión y solución de problemas relacionados con diversos aspectos de Networking.

Para esta actividad, el estudiante dispone de cerca de dos semanas para realizar las tareas asignadas en cada uno de los dos (2) escenarios propuestos, acompañado de los respectivos procesos de documentación de la solución, correspondientes al registro de la configuración de cada uno de los dispositivos, 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. Objetivos

1.1 General

Aplicar los conocimientos adquiridos durante el curso para resolver los dos Casos de Estudio propuestos.

1.2 Específicos

- Plantear un esquema de red que resuelva el primer escenario propuesto
- Plantear un esquema de red que resuelva el segundo escenario propuesto

2. Escenario Uno

Una empresa posee sucursales distribuidas en las ciudades de Bogotá, Medellín y Cali en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los lineamientos establecidos para el direccionamiento IP, protocolos de enrutamiento y demás aspectos que forman parte de la topología de red.

2.1 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.

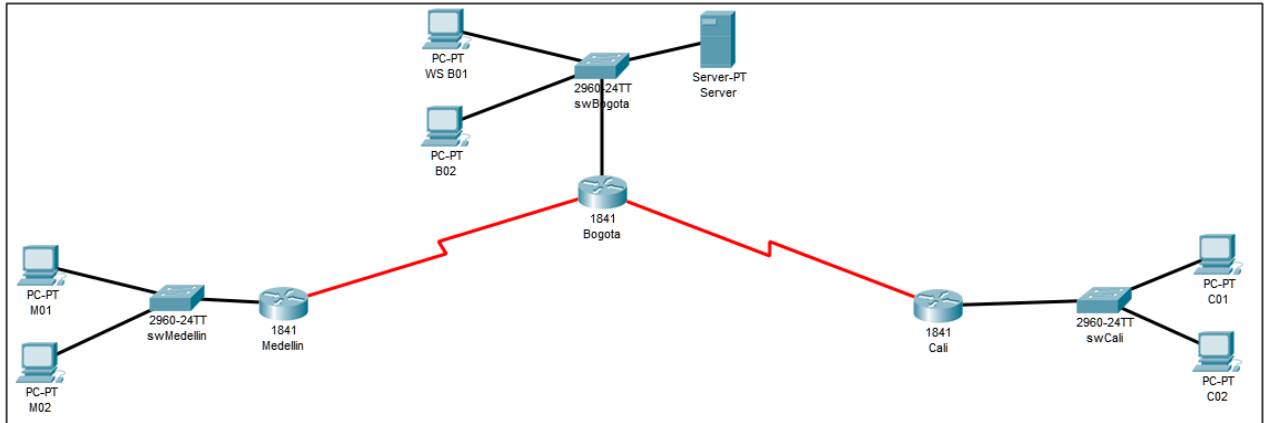
Parte 2: Considerar la asignación de los parámetros básicos y la detección de vecinos directamente conectados.

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.



2.2 Parte 1

La red asignada es 192.168.1.0/24 para todas las sedes, usamos subredes para asignar un grupo de direcciones a cada ciudad.

Usamos la máscara /27 que nos permite asignar 30 direcciones a cada ciudad, así:

Nodo	Medellín	Bogotá	Cali
Rango de direcciones	198.168.1.32/27	198.168.1.0/27	198.168.1.64/27
Router puerto serial0/0	192.168.1.99	192.168.1.98	192.168.1.31
Router puerto serial0/1		192.168.1.30	
Router puerto fa0/0	192.168.1.33	192.168.1.1	192.168.1.65
Switch Vlan1	192.168.1.62	192.168.1.30	192.168.1.95
PC0	192.168.1.34	192.168.1.3	192.168.1.66
Servidor		192.168.1.2	

2.3 Parte 2 Configuración Básica

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

Nodo	Medellín	Bogotá	Cali
Router puerto serial0/0	192.168.1.99	192.168.1.98	192.168.1.31
Router puerto serial0/1		192.168.1.30	
Router puerto fa0/0	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

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.

2.3.1 Configuración Bogotá

2.3.1.1 Router

```
en
conf term
hostname Bogota
router eigrp 200
no auto-summary
network 192.168.1.0 255.255.255.224
network 192.168.1.96 255.255.255.252
network 192.168.1.128 255.255.255.252
exit
int fa0/0
ip addr 192.168.1.1 255.255.255.224
no shutdown
exit
int s0/0/0
```

```
ip addr 192.168.1.98 255.255.255.252
no shutdown
exit
int s0/0/1
ip addr 192.168.1.130 255.255.255.252
no shutdown
exit
cdp run
exit
show ip route
show ip eigrp neighbors
```

2.3.1.2 *Switch*

```
enable
conf term
hostname swBogota
int vlan 1
ip addr 192.168.1.30 255.255.255.224
no shutdown
exit
exit
copy run startup-configcopy run startup-config
```

2.3.2 **Configuración Cali**

2.3.2.1 *Router*

```
en
conf term
hostname Cali
router eigrp 200
no auto-summary
network 192.168.1.64 255.255.255.224
network 192.168.1.128 255.255.255.252
exit
int fa0/0
ip addr 192.168.1.65 255.255.255.224
no shutdown
exit
int s0/0/0
ip addr 192.168.1.129 255.255.255.252
no shutdown
exit
exit
show ip route
show ip eigrp neighbors
```

2.3.2.2 *Switch*

```
enable
conf term
hostname swCali
int vlan 1
ip addr 192.168.1.94 255.255.255.224
no shutdown
exit
exit
copy run startup-config
```

2.3.3 Configuración Medellín

2.3.3.1 *Router*

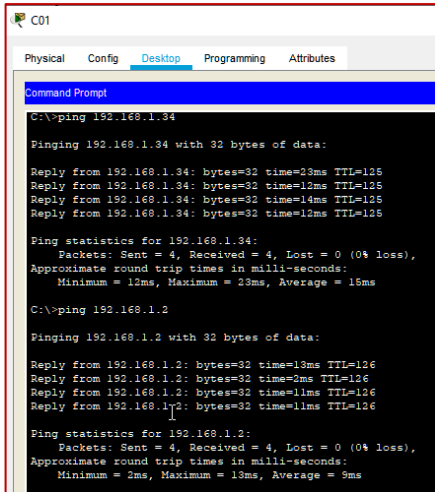
```
en
conf term
hostname Medellin
router eigrp 200
no auto-summary
network 192.168.1.32 255.255.255.224
network 192.168.1.96 255.255.255.252
exit
int s0/0/0
ip address 192.168.1.97 255.255.255.252
exit
int fa0/0
ip address 192.168.1.33 255.255.255.224
no shutdown
exit
exit
show ip route
show ip eigrp neighbors
```

2.3.3.2 *Switch*

```
enable
conf term
hostname swMedellin
int vlan 1
ip addr 192.168.1.62 255.255.255.224
no shutdown
exit
exit
copy run startup-config
```

2.4 Diagnóstico Configuración de Enrutamiento

Realizar esta prueba desde un host de la red LAN del router CALI, primero a la red de Medellín y luego al servidor.



```
C:\>ping 192.168.1.34

Pinging 192.168.1.34 with 32 bytes of data:

Reply from 192.168.1.34: bytes=32 time=23ms TTL=125
Reply from 192.168.1.34: bytes=32 time=12ms TTL=125
Reply from 192.168.1.34: bytes=32 time=14ms TTL=125
Reply from 192.168.1.34: bytes=32 time=12ms TTL=125

Ping statistics for 192.168.1.34:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 12ms, Maximum = 23ms, Average = 15ms

C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=13ms TTL=126
Reply from 192.168.1.2: bytes=32 time=2ms TTL=126
Reply from 192.168.1.2: bytes=32 time=11ms TTL=126
Reply from 192.168.1.2: bytes=32 time=11ms TTL=126

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 13ms, Average = 9ms
```

2.5 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.

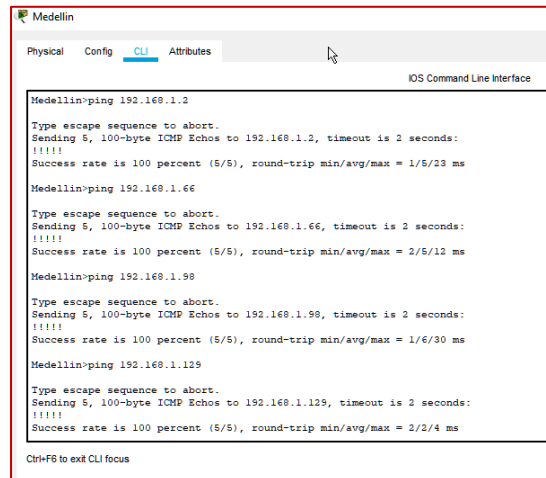
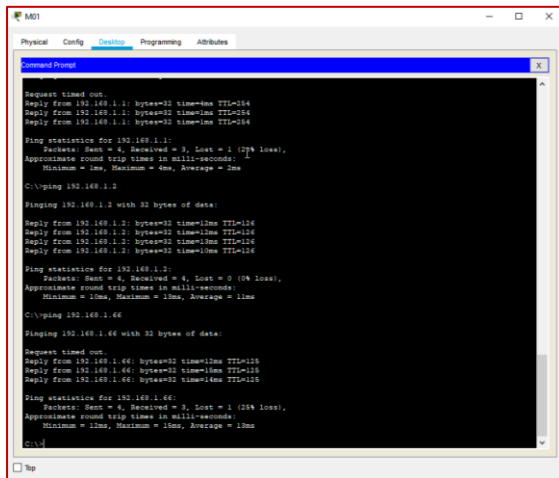
b. El equipo WS1 y el servidor se encuentran en la subred de administración. Solo el servidor de la subred de administración debe tener acceso a cualquier otro dispositivo en cualquier parte de la red.

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

2.5.1 Medellín ACL

```
en
conf term
access-list 1 permit 192.168.1.2
access-list 1 deny any
int fa0/0
ip access-group 1 out
exit
```

2.5.1.1 PC M01 Antes de aplicar ACL



2.5.1.2 PC M01 Después de aplicar ACL

```
Medellin
Physical Config CLI Attributes
IOS Command Line Interface

Medellin#ping 192.168.1.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.2, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (6/6), round-trip min/avg/max = 1/6/21 ms

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 100 percent (6/6), round-trip min/avg/max = 2/14/38 ms

Medellin#ping 192.168.1.90
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.90, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (6/6), round-trip min/avg/max = 1/8/35 ms

Medellin#ping 192.168.1.129
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.129, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (6/6), round-trip min/avg/max = 2/2/3 ms
```

```
M01
Physical Config Desktop Programming Attributes
Command Prompt

C:\>ping 192.168.1.1
Pinging 192.168.1.1 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

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

```

2.5.2 Cali ACL

```
en
conf term
access-list 1 permit 192.168.1.2
access-list 1 deny any
int fa0/0
ip access-group 1 out
exit
```

2.5.2.1 PC C01 Antes de aplicar ACL

```
C01
Physical Config Desktop Programming Attributes
Command Prompt

C:\>ping 192.168.1.9
Pinging 192.168.1.9 with 32 bytes of data:
Reply from 192.168.1.9: bytes=32 time=17ms TTL=124
Reply from 192.168.1.9: bytes=32 time=14ms TTL=124
Reply from 192.168.1.9: bytes=32 time=14ms TTL=124
Reply from 192.168.1.9: bytes=32 time=14ms TTL=124

Ping statistics for 192.168.1.9:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 14ms, Maximum = 17ms, Average = 14ms

C:\>ping 192.168.1.2
Pinging 192.168.1.2 with 32 bytes of data:
Reply from 192.168.1.2: bytes=32 time=14ms TTL=124
Reply from 192.168.1.2: bytes=32 time=14ms TTL=124
Reply from 192.168.1.2: bytes=32 time=14ms TTL=124
Reply from 192.168.1.2: bytes=32 time=14ms TTL=124

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 12ms, Average = 8ms

C:\>ping 192.168.1.33
Pinging 192.168.1.33 with 32 bytes of data:
Reply from 192.168.1.33: bytes=32 time=14ms TTL=124
Reply from 192.168.1.33: bytes=32 time=14ms TTL=124
Reply from 192.168.1.33: bytes=32 time=14ms TTL=124
Reply from 192.168.1.33: bytes=32 time=14ms TTL=124

Ping statistics for 192.168.1.33:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 17ms, Average = 8ms

C:\>
```

```
Cali
Physical Config CLI Attributes
IOS Command Line Interface

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 (6/6), round-trip min/avg/max = 1/8/39 ms

Cali#ping 192.168.1.97
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.97, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (6/6), round-trip min/avg/max = 2/2/4 ms

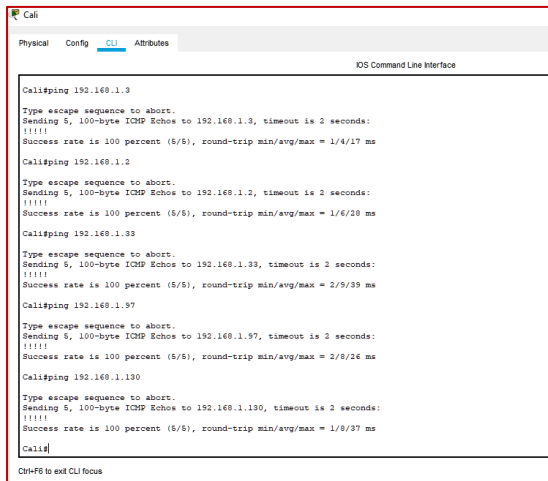
Cali#ping 192.168.1.33
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.33, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (6/6), round-trip min/avg/max = 2/8/30 ms

Cali#ping 192.168.1.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.2, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (6/6), round-trip min/avg/max = 1/2/5 ms

Cali#ping 192.168.1.3
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.3, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (6/6), round-trip min/avg/max = 1/1/3 ms

Cali#>
```

2.5.2.2 PC C01 Después de aplicar ACL



```
IOS Command Line Interface

Calipling 192.168.1.3
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 192.168.1.3, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/4/17 ms

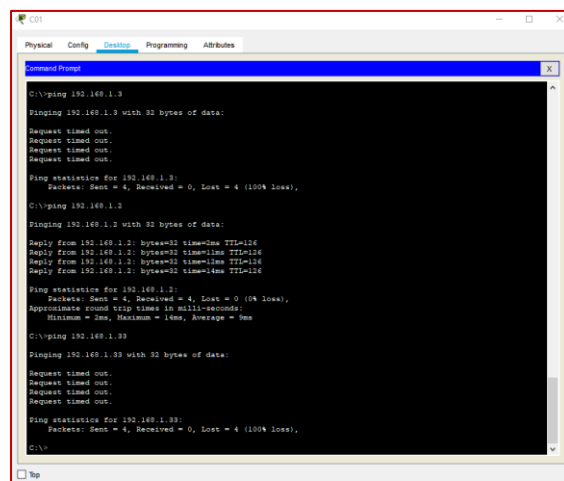
Calipling 192.168.1.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 192.168.1.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/6/28 ms

Calipling 192.168.1.33
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 192.168.1.33, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/9/35 ms

Calipling 192.168.1.97
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 192.168.1.97, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/8/26 ms

Calipling 192.168.1.130
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 192.168.1.130, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/8/37 ms

Cali
```



```
Command Prompt

C:\>ping 192.168.1.9
Pinging 192.168.1.9 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.168.1.9:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.1.2
Pinging 192.168.1.2 with 32 bytes of data:
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
Reply from 192.168.1.2: bytes=32 time=1ms TTL=126
Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 1ms, Average = 8ms

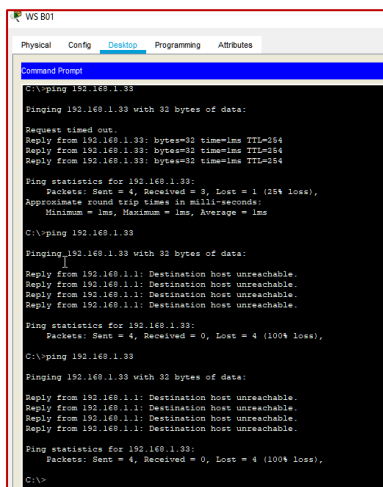
C:\>ping 192.168.1.33
Pinging 192.168.1.33 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.168.1.33:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

2.5.3 Bogotá ACL

```
en
conf term
access-list 2 permit host 192.168.1.2
int fa0/0
ip access-group 2 in
exit
exit
```

2.5.3.1 Pruebas en Server y WS1.



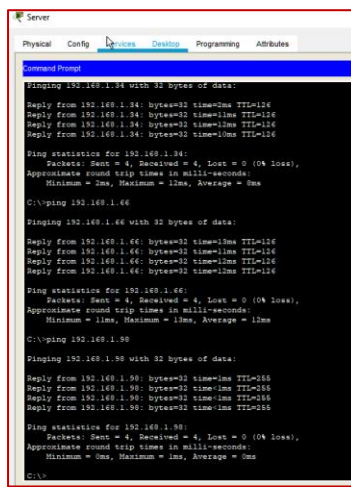
```
Command Prompt

C:\>ping 192.168.1.33
Pinging 192.168.1.33 with 32 bytes of data:
Request timed out.
Reply from 192.168.1.33: bytes=32 time=1ms TTL=254
Reply from 192.168.1.33: bytes=32 time=1ms TTL=254
Reply from 192.168.1.33: bytes=32 time=1ms TTL=254
Ping statistics for 192.168.1.33:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\>ping 192.168.1.97
Pinging 192.168.1.97 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 192.168.1.97:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.1.130
Pinging 192.168.1.130 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 192.168.1.130:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```



```
Command Prompt

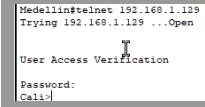
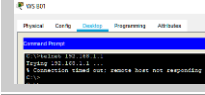
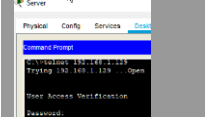
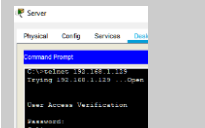
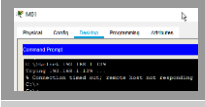
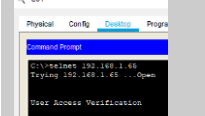
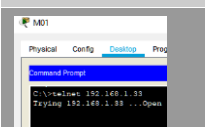
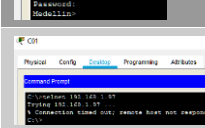
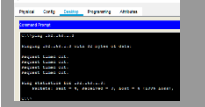
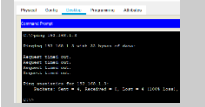
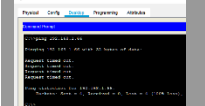
Pinging 192.168.1.34 with 32 bytes of data:
Reply from 192.168.1.34: bytes=32 time=2ms TTL=126
Reply from 192.168.1.34: bytes=32 time=1ms TTL=126
Reply from 192.168.1.34: bytes=32 time=1ms TTL=126
Reply from 192.168.1.34: bytes=32 time=1ms TTL=126
Ping statistics for 192.168.1.34:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 1ms, Average = 8ms

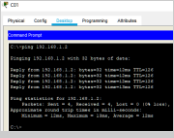
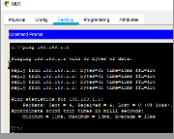
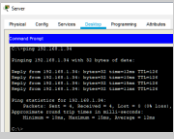
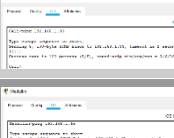
C:\>ping 192.168.1.66
Pinging 192.168.1.66 with 32 bytes of data:
Reply from 192.168.1.66: bytes=32 time=2ms TTL=126
Reply from 192.168.1.66: bytes=32 time=1ms TTL=126
Reply from 192.168.1.66: bytes=32 time=1ms TTL=126
Reply from 192.168.1.66: bytes=32 time=1ms TTL=126
Ping statistics for 192.168.1.66:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\>ping 192.168.1.90
Pinging 192.168.1.90 with 32 bytes of data:
Reply from 192.168.1.90: bytes=32 time=1ms TTL=126
Reply from 192.168.1.90: bytes=32 time=1ms TTL=126
Reply from 192.168.1.90: bytes=32 time=1ms TTL=126
Reply from 192.168.1.90: bytes=32 time=1ms TTL=126
Ping statistics for 192.168.1.90:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

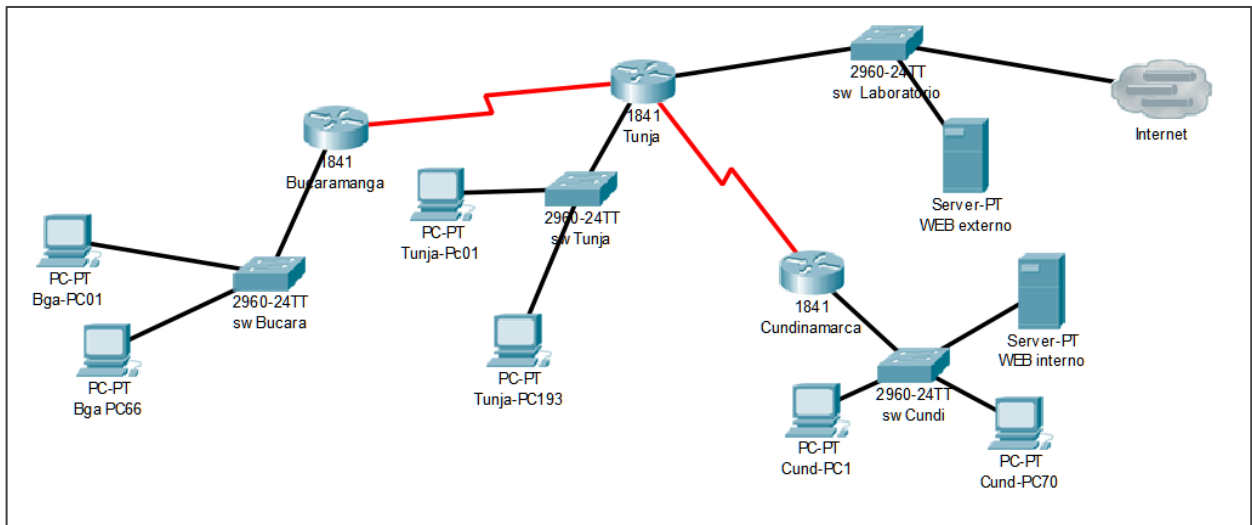
2.6 Parte 5 Comprobación de la Red Instalada.

	Origen	Destino	Resultado
telnet	Router Medellín	Router Cali	
	WS_1	Router Bogotá	
	Servidor	Router Cali	
	Servidor	Router Medellín	
telnet	LAN del Router Medellín	Router Cali	
	LAN del Router Cali	Router Cali	
	LAN del Router Medellín	Router Medellín	
	LAN del Router Cali	Router Medellín	
ping	LAN del Router Cali	WS_1	
	LAN del Router Medellín	WS_1	
	LAN del Router Medellín	LAN del Router Cali	

ping	LAN del Router Cali	Servidor	
	LAN del Router Medellín	Servidor	
	Servidor	LAN del Router Medellín	
	Servidor	LAN del Router Cali	
	Router Cali	LAN del Router Medellín	
	Router Medellín	LAN del Router Cali	

3. 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.



3.1 Bucaramanga

La configuración de los equipos de Bucaramanga será.

3.1.1 Router

```
ena
conf term
hostname Bucaramanga
int se0/0/0
ip ospf authentication-key cisco
ip addr 172.31.2.34 255.255.255.252
ip nat outside
no shutdown
exit
```

```

! ip route 0.0.0.0 0.0.0.0 s0/0/0
int fa0/0
ip addr 172.31.2.1 255.255.255.248
ip nat inside
no shutdown
exit
int fa0/0.1
encapsulation dot1Q 10
ip addr 172.31.0.1 255.255.255.192
ip nat inside
no shutdown
exit
int fa0/0.3
encapsulation dot1Q 30
ip addr 172.31.0.65 255.255.255.192
ip nat inside
no shutdown
exit
router ospf 100
area 0 authentication
exit
access-list 1 permit 172.31.0.0 255.255.255.192
access-list 3 permit 172.31.0.65 255.255.255.192
ip nat inside source list 1 int se0/0/0 overload
ip nat inside source list 3 int se0/0/0 overload
ip dhcp pool dhcpVlan10
network 172.31.0.0 255.255.255.192
default-router 172.31.0.1
dns-server 8.8.8.8
exit
ip dhcp excluded-address 172.31.0.1 172.31.0.2
ip dhcp pool dhcpVlan30
network 172.31.0.65 255.255.255.192
default-router 172.31.0.65
dns-server 8.8.8.8
exit
ip dhcp excluded-address 172.31.0.65 172.31.0.66
exit
exit

```

3.1.2 Switch

```

ena
conf term
hostname swBucara
int vlan1
ip addr 172.31.2.2 255.255.255.248
no shutdown
exit
int fa0/1
switchport mode trunk
switchport trunk native vlan 1
no shut
int fa0/2
switchport mode access
switchport access vlan 10

```

```

no shut
int fa0/3
switchport mode access
switchport access vlan 30
no shut
int vlan10
ip addr 172.31.0.2 255.255.255.192
no shutdown
int vlan30
ip addr 172.31.0.66 255.255.255.192
no shutdown
exit
exit

```

3.1.3 Conectividad Bga-PC01 - Bga-PC66

Pruebas de conectividad realizadas en la sede Bucaramanga como se observa en las gráficas muestran el estado de la conectividad dentro de la sede.

```

Bga-PC01
Physical Config Desktop Programming Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection: (default port)

    Link-local IPv6 Address . . . . . : FE80::201:63FF:FEEA:A247
    IP Address . . . . . : 172.31.0.3
    Subnet Mask . . . . . : 255.255.255.192
    Default Gateway . . . . . : 172.31.0.1

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 172.31.0.1

Pinging 172.31.0.1 with 32 bytes of data:

Reply from 172.31.0.1: bytes=32 time=1ms TTL=255
Reply from 172.31.0.1: bytes=32 time<1ms TTL=255
Reply from 172.31.0.1: bytes=32 time<1ms TTL=255
Reply from 172.31.0.1: bytes=32 time=3ms TTL=255

Ping statistics for 172.31.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 1ms

C:\>ping 172.31.0.1

Pinging 172.31.0.1 with 32 bytes of data:

Reply from 172.31.0.1: bytes=32 time=1ms TTL=255
Reply from 172.31.0.1: bytes=32 time<1ms TTL=255
Reply from 172.31.0.1: bytes=32 time<1ms TTL=255
Reply from 172.31.0.1: bytes=32 time<1ms TTL=255

Ping statistics for 172.31.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>|

```

```

Bga-PC66
Physical Config Desktop Programming Attributes
Command Prompt
C:\>ipconfig

FastEthernet0 Connection: (default port)

    Link-local IPv6 Address . . . . . : FE80::260:47FF:FEEB:B91C
    IP Address . . . . . : 172.31.0.67
    Subnet Mask . . . . . : 255.255.255.192
    Default Gateway . . . . . : 172.31.0.65

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 172.31.0.65

Pinging 172.31.0.65 with 32 bytes of data:

Reply from 172.31.0.65: bytes=32 time=1ms TTL=255
Reply from 172.31.0.65: bytes=32 time<1ms TTL=255
Reply from 172.31.0.65: bytes=32 time<1ms TTL=255
Reply from 172.31.0.65: bytes=32 time<1ms TTL=255

Ping statistics for 172.31.0.65:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 172.31.0.66

Pinging 172.31.0.66 with 32 bytes of data:

Reply from 172.31.0.66: bytes=32 time=2ms TTL=255
Reply from 172.31.0.66: bytes=32 time<1ms TTL=255
Reply from 172.31.0.66: bytes=32 time<1ms TTL=255
Reply from 172.31.0.66: bytes=32 time<1ms TTL=255

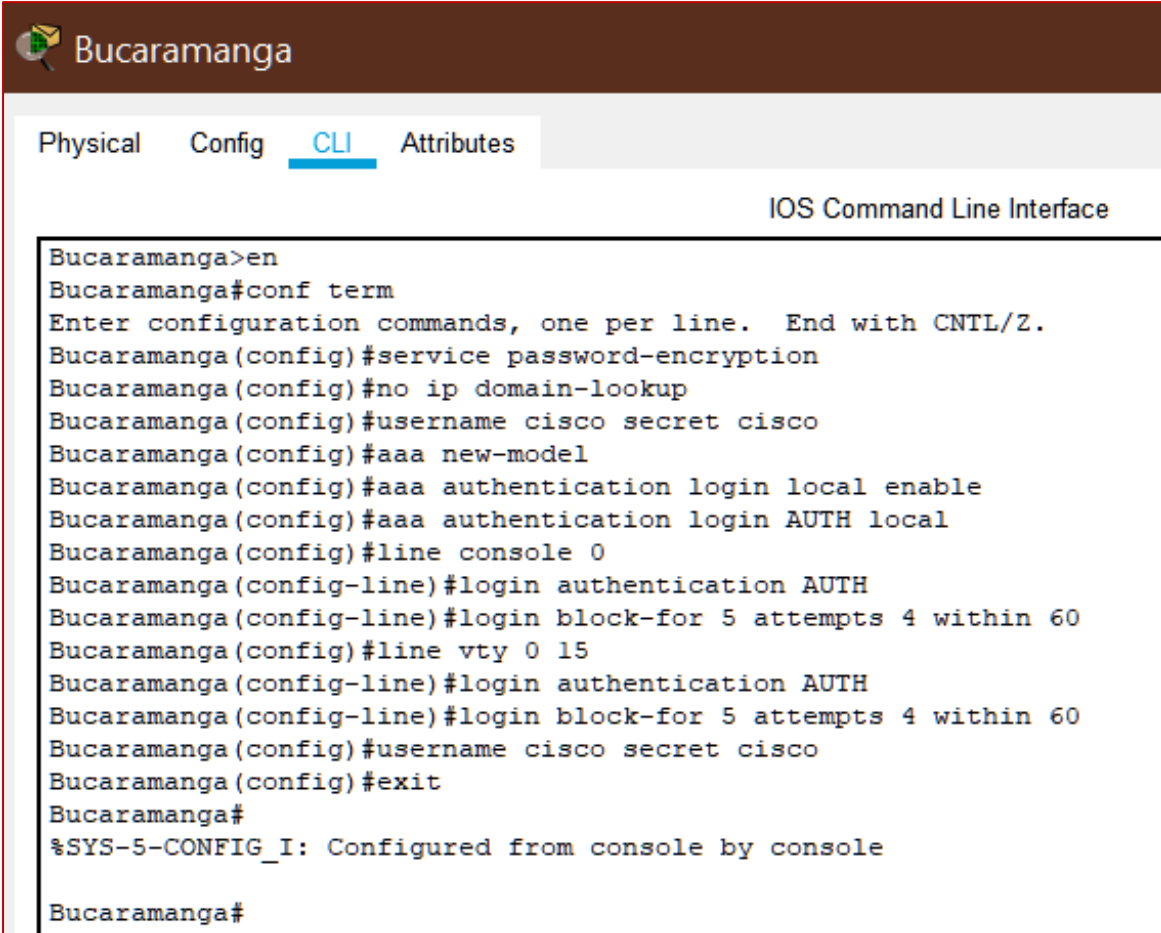
Ping statistics for 172.31.0.66:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\>

```

3.1.4 Configuración de Seguridad y Acceso

Establecemos seguridad con autenticación local AAA, encriptación, cifrado de contraseñas, máximo número de intentos de acceso al router, tiempo máximo de acceso al detectar ataques. ..



```
Bucaramanga>en
Bucaramanga#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Bucaramanga(config)#service password-encryption
Bucaramanga(config)#no ip domain-lookup
Bucaramanga(config)#username cisco secret cisco
Bucaramanga(config)#aaa new-model
Bucaramanga(config)#aaa authentication login local enable
Bucaramanga(config)#aaa authentication login AUTH local
Bucaramanga(config)#line console 0
Bucaramanga(config-line)#login authentication AUTH
Bucaramanga(config-line)#login block-for 5 attempts 4 within 60
Bucaramanga(config)#line vty 0 15
Bucaramanga(config-line)#login authentication AUTH
Bucaramanga(config-line)#login block-for 5 attempts 4 within 60
Bucaramanga(config)#username cisco secret cisco
Bucaramanga(config)#exit
Bucaramanga#
%SYS-5-CONFIG_I: Configured from console by console
Bucaramanga#
```

3.2 Tunja

3.2.1 Router

```
enable
conf term
hostname Tunja
int fa0/0
ip addr 209.17.220.1 255.255.255.0
```



```

ip nat outside
no shutdown
exit
int s0/0/0
ip ospf authentication-key cisco
ip addr 172.31.2.33 255.255.255.252
ip nat inside
no shutdown
exit
int s0/0/1
ip ospf authentication-key cisco
ip addr 172.31.2.37 255.255.255.252
ip nat inside
no shutdown
exit
int fa0/1
ip addr 172.3.2.9 255.255.255.248
no shutdown
exit
int fa0/1.2
encapsulation dot1Q 20
ip addr 172.31.0.129 255.255.255.192
no shutdown
exit
int fa0/1.3
encapsulation dot1Q 30
ip addr 172.31.0.193 255.255.255.192
no shutdown
exit
router ospf 100
area 10 authentication
exit
exit

```

3.2.2 Switch

```

enable
conf term
hostname swTunja
int vlan1
ip addr 172.3.2.10 255.255.255.248
no shutdown
exit
int fa0/1
switchport mode trunk
switchport trunk native vlan 1
no shut
int fa0/2
switchport mode access
switchport access vlan 20
no shut
int fa0/3
switchport mode access
switchport access vlan 30
no shut
int vlan20
ip addr 172.31.0.130 255.255.255.192
no shutdown
int vlan30
ip addr 172.31.0.194 255.255.255.192

```

```
no shutdown
exit
exit
```

3.2.3 Tunja-Pc01 - Tunja-Pc93

Pruebas de conectividad realizadas en la sede Tunja como se observa en las gráficas muestran el estado de la conectividad dentro de la sede.

```
Tunja-PC01
Physical Config Desktop Programming Attributes
Command Prompt
C:\>ipconfig

FastEthernet0 Connection: (default port)

Link-local IPv6 Address . . . . . FE80::2E0:B0FF:FE64:A3D
IP Address . . . . . 172.31.0.131
Subnet Mask . . . . . 255.255.255.192
Default Gateway . . . . . 172.31.0.129

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 172.31.0.129

Pinging 172.31.0.129 with 32 bytes of data:

Reply from 172.31.0.129: bytes=32 time<1ms TTL=255
Reply from 172.31.0.129: bytes=32 time<1ms TTL=255
Reply from 172.31.0.129: bytes=32 time<1ms TTL=255
Reply from 172.31.0.129: bytes=32 time<1ms TTL=255

Ping statistics for 172.31.0.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 172.31.0.130

Pinging 172.31.0.130 with 32 bytes of data:

Request timed out.
Reply from 172.31.0.130: bytes=32 time<1ms TTL=255
Reply from 172.31.0.130: bytes=32 time<1ms TTL=255
Reply from 172.31.0.130: bytes=32 time<1ms TTL=255

Ping statistics for 172.31.0.130:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>

Tunja-PC193
Physical Config Desktop Programming Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection: (default port)

Link-local IPv6 Address . . . . . FE80::2D0:58FF:FEC3:3792
IP Address . . . . . 172.31.0.195
Subnet Mask . . . . . 255.255.255.192
Default Gateway . . . . . 172.31.0.193

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 172.31.0.193

Pinging 172.31.0.193 with 32 bytes of data:

Reply from 172.31.0.193: bytes=32 time<2ms TTL=255
Reply from 172.31.0.193: bytes=32 time<1ms TTL=255
Reply from 172.31.0.193: bytes=32 time<1ms TTL=255
Reply from 172.31.0.193: bytes=32 time<1ms TTL=255

Ping statistics for 172.31.0.193:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\>ping 172.31.0.194

Pinging 172.31.0.194 with 32 bytes of data:

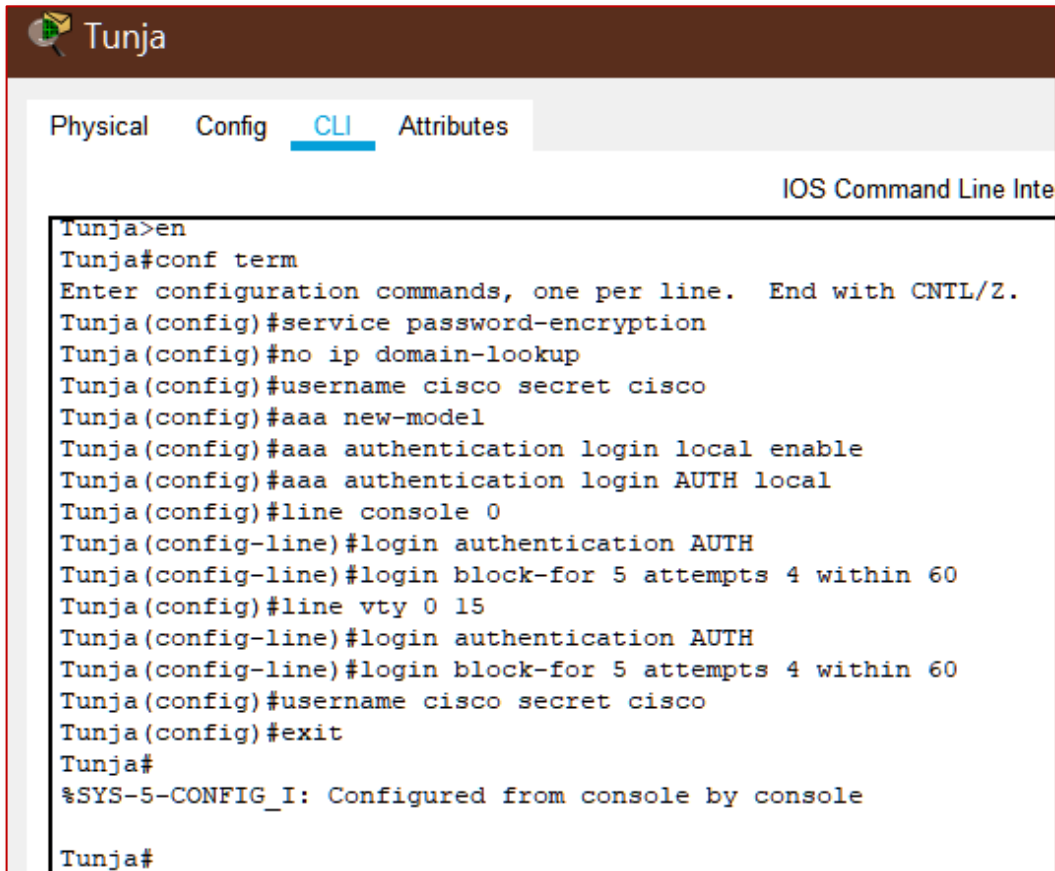
Request timed out.
Reply from 172.31.0.194: bytes=32 time<1ms TTL=255
Reply from 172.31.0.194: bytes=32 time<1ms TTL=255
Reply from 172.31.0.194: bytes=32 time<1ms TTL=255

Ping statistics for 172.31.0.194:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

3.2.4 Configuración de Seguridad y Acceso

Establecemos seguridad con autenticación local AAA, encriptación, cifrado de contraseñas, máximo número de internos de acceso al router, tiempo máximo de acceso al detectar ataques. ..



The screenshot shows the Tunja network management interface. At the top, there is a navigation bar with tabs for 'Physical', 'Config', 'CLI' (which is selected and underlined), and 'Attributes'. Below the navigation bar, the text 'IOS Command Line Inte' is visible. The main content area displays a terminal window with the following text:

```
Tunja>en
Tunja#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Tunja(config)#service password-encryption
Tunja(config)#no ip domain-lookup
Tunja(config)#username cisco secret cisco
Tunja(config)#aaa new-model
Tunja(config)#aaa authentication login local enable
Tunja(config)#aaa authentication login AUTH local
Tunja(config)#line console 0
Tunja(config-line)#login authentication AUTH
Tunja(config-line)#login block-for 5 attempts 4 within 60
Tunja(config)#line vty 0 15
Tunja(config-line)#login authentication AUTH
Tunja(config-line)#login block-for 5 attempts 4 within 60
Tunja(config)#username cisco secret cisco
Tunja(config)#exit
Tunja#
%SYS-5-CONFIG_I: Configured from console by console
Tunja#
```

3.3 Cundinamarca

3.3.1 Router

```
ena
conf term
hostname Cundinamarca
int s0/0/0
ip ospf authentication-key cisco
ip addr 172.31.2.38 255.255.255.252
ip nat outside
no shutdown
exit
int fa0/0
ip addr 172.3.2.11 255.255.255.248
ip nat inside
no shutdown
exit
int fa0/0.2
encapsulation dot1q 20
ip addr 172.31.1.65 255.255.255.192
```

```

ip nat inside
no shutdown
exit
int fa0/0.3
encapsulation dot1Q 30
ip addr 172.31.1.1 255.255.255.192
ip nat inside (Community, 2019)
no shutdown
exit
int fa0/0.8
encapsulation dot1Q 88
ip addr 172.31.2.25 255.255.255.248
ip nat inside
no shutdown
exit
ip dhcp pool dhcpVlan20
network 172.31.1.64 255.255.255.192
default-router 172.31.1.65
dns-server 8.8.8.8
exit
ip dhcp excluded-address 172.31.1.65 172.31.1.66
ip dhcp pool dhcpVlan30
network 172.31.1.0 255.255.255.192
default-router 172.31.1.1
dns-server 8.8.8.8
exit
ip dhcp excluded-address 172.31.1.1 172.31.1.2
router ospf 100
area 20 authentication
exit
exit

```

3.3.2 Switch

```

enable
conf term
hostname swCundi
int vlan1
ip addr 172.3.2.12 255.255.255.248
no shutdown
exit
int fa0/1
switchport mode trunk
switchport trunk native vlan 1
no shut
int fa0/2
switchport mode access
switchport access vlan 20
no shut
int fa0/3
switchport mode access
switchport access vlan 30
no shut
int gi0/1
switchport mode access (OmniSecu.com, 2019)
switchport access vlan 88
no shut
int vlan20
ip addr 172.31.1.66 255.255.255.192

```

```

no shutdown
int vlan30
ip addr 172.31.1.2 255.255.255.192
no shutdown
int vlan88
ip addr 172.31.2.26 255.255.255.192 (Jodies, 2011)
no shutdown
exit
exit

```

3.3.3 Cund-PC1, Cund-PC70, WEB interno.

Pruebas de conectividad realizadas en la sede Cundinamarca como se observa en las gráficas muestran el estado de la conectividad dentro de la sede.

```

Cund-PC1
Physical Config Desktop Programming Attributes
Command Prompt
FastEthernet0 Connection: (default port)
Link-local IPv6 Address.....: FE80::2D0:D3FF:FE17:43E1
IP Address.....: 172.31.1.67
Subnet Mask.....: 255.255.255.192
Default Gateway.....: 172.31.1.65

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 172.31.1.65

Pinging 172.31.1.65 with 32 bytes of data:

Reply from 172.31.1.65: bytes=32 time<1ms TTL=255
Reply from 172.31.1.65: bytes=32 time=3ms TTL=255
Reply from 172.31.1.65: bytes=32 time<1ms TTL=255
Reply from 172.31.1.65: bytes=32 time<1ms TTL=255

Ping statistics for 172.31.1.65:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 1ms

C:\>ping 172.31.1.66

Pinging 172.31.1.66 with 32 bytes of data:

Request timed out.
Reply from 172.31.1.66: bytes=32 time<1ms TTL=255
Reply from 172.31.1.66: bytes=32 time<1ms TTL=255
Reply from 172.31.1.66: bytes=32 time<1ms TTL=255

Ping statistics for 172.31.1.66:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>

```

```

Cund-PC70
Physical Config Desktop Programming Attributes
Command Prompt
C:\>ipconfig

FastEthernet0 Connection: (default port)
Link-local IPv6 Address.....: FE80::209:7CFF:FED1:1502
IP Address.....: 172.31.1.3
Subnet Mask.....: 255.255.255.192
Default Gateway.....: 172.31.1.1

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 192.168.1.1

Pinging 192.168.1.1 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 192.168.1.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 172.31.1.1

Pinging 172.31.1.1 with 32 bytes of data:

Reply from 172.31.1.1: bytes=32 time<1ms TTL=255
Reply from 172.31.1.1: bytes=32 time<1ms TTL=255
Reply from 172.31.1.1: bytes=32 time=3ms TTL=255
Reply from 172.31.1.1: bytes=32 time<1ms TTL=255

Ping statistics for 172.31.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 1ms

C:\>ping 172.31.1.2

Pinging 172.31.1.2 with 32 bytes of data:

Request timed out.
Reply from 172.31.1.2: bytes=32 time<1ms TTL=255
Reply from 172.31.1.2: bytes=32 time<1ms TTL=255
Reply from 172.31.1.2: bytes=32 time<1ms TTL=255

Ping statistics for 172.31.1.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>

```

```
WEB interno
Physical  Config  Services  Desktop  Programming  Attributes
Command Prompt
C:\>
C:\>ipconfig

FastEthernet0 Connection: (default port)

    Link-local IPv6 Address . . . . . : FE80::210:11FF:FEC6:B2A9
    IP Address. . . . . : 0.0.0.0
    Subnet Mask . . . . . : 0.0.0.0
    Default Gateway . . . . . : 0.0.0.0

GigabitEthernet1 Connection:

    Link-local IPv6 Address . . . . . : FE80::209:7CFF:FE58:16BA
    IP Address . . . . . : 172.31.2.27
    Subnet Mask . . . . . : 255.255.255.192
    Default Gateway . . . . . : 172.31.2.25

C:\>ping 172.31.2.25

Pinging 172.31.2.25 with 32 bytes of data:

Reply from 172.31.2.25: bytes=32 time<1ms TTL=255
Reply from 172.31.2.25: bytes=32 time=7ms TTL=255
Reply from 172.31.2.25: bytes=32 time<1ms TTL=255
Reply from 172.31.2.25: bytes=32 time<1ms TTL=255

Ping statistics for 172.31.2.25:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 7ms, Average = 2ms

C:\>ping 172.31.2.26

Pinging 172.31.2.26 with 32 bytes of data:

Request timed out.
Reply from 172.31.2.26: bytes=32 time<1ms TTL=255
Reply from 172.31.2.26: bytes=32 time=3ms TTL=255
Reply from 172.31.2.26: bytes=32 time<1ms TTL=255

Ping statistics for 172.31.2.26:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 1ms

C:\>|
```

3.3.4 Configuración de Seguridad y Acceso

Establecemos seguridad con autenticación local AAA, encriptación, cifrado de contraseñas, máximo número de internos de acceso al router, tiempo máximo de acceso al detectar ataques. ..

```

Cundinamarca>en
Cundinamarca#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Cundinamarca(config)#service password-encryption
Cundinamarca(config)#no ip domain-lookup
Cundinamarca(config)#username cisco secret cisco
Cundinamarca(config)#aaa new-model
Cundinamarca(config)#aaa authentication login local enable
Cundinamarca(config)#aaa authentication login AUTH local
Cundinamarca(config)#line console 0
Cundinamarca(config-line)#login authentication AUTH
Cundinamarca(config-line)#login block-for 5 attempts 4 within 60
Cundinamarca(config)#line vty 0 15
Cundinamarca(config-line)#login authentication AUTH
Cundinamarca(config-line)#login block-for 5 attempts 4 within 60
Cundinamarca(config)#username cisco secret cisco
Cundinamarca(config)#exit
Cundinamarca#
%SYS-5-CONFIG_I: Configured from console by console
Cundinamarca#

```

3.3.5 Configuración del Servidor TFTP

```

C:\>
C:\>ping 209.17.220.1

Pinging 209.17.220.1 with 32 bytes of data:

Reply from 209.17.220.1: bytes=32 time<1ms TTL=355
Reply from 209.17.220.1: bytes=32 time<1ms TTL=355
Reply from 209.17.220.1: bytes=32 time<1ms TTL=355
Reply from 209.17.220.1: bytes=32 time<1ms TTL=355

Ping statistics for 209.17.220.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 209.17.220.2

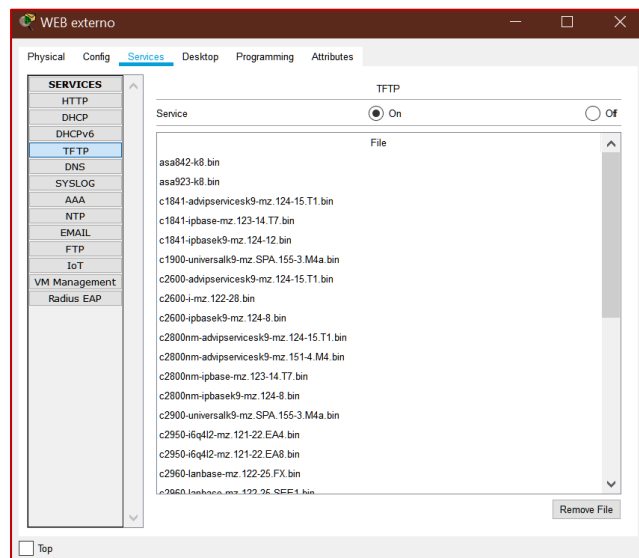
Pinging 209.17.220.2 with 32 bytes of data:

Request timed out.
Reply from 209.17.220.2: bytes=32 time<1ms TTL=355
Reply from 209.17.220.2: bytes=32 time<1ms TTL=355
Reply from 209.17.220.2: bytes=32 time<1ms TTL=355

Ping statistics for 209.17.220.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>

```



3.3.6 Verificación DHCP

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

```
Bucaramanga
Physical Config CLI Attributes
IOS Command Line Interface
Bucaramanga#sho ip dhcp pool
Pool dhcpVlan10 :
Utilization mark (high/low) : 100 / 0
Subnet size (first/next) : 0 / 0
Total addresses : 62
Leased addresses : 0
Excluded addresses : 2
Pending event : none

1 subnet is currently in the pool
Current index IP address range Leased/Excluded/Total
172.31.0.1 172.31.0.1 - 172.31.0.62 0 / 2 / 62

Pool dhcpVlan30 :
Utilization mark (high/low) : 100 / 0
Subnet size (first/next) : 0 / 0
Total addresses : 62
Leased addresses : 0
Excluded addresses : 2
Pending event : none

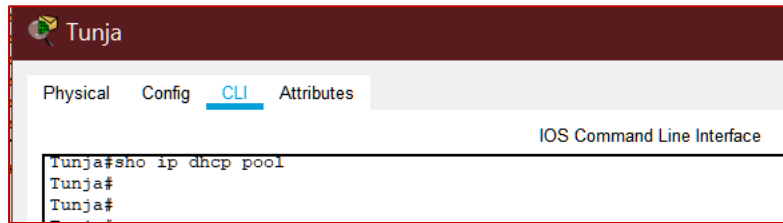
1 subnet is currently in the pool
Current index IP address range Leased/Excluded/Total
172.31.0.65 172.31.0.65 - 172.31.0.126 0 / 2 / 62
Bucaramanga#
```

```
Cundinamarca
Physical Config CLI Attributes
IOS Command Line Interface
Username: cisco
Password:
Cundinamarca>en
Cundinamarca#sho ip dhcp pool
Pool dhcpVlan20 :
Utilization mark (high/low) : 100 / 0
Subnet size (first/next) : 0 / 0
Total addresses : 62
Leased addresses : 0
Excluded addresses : 2
Pending event : none

1 subnet is currently in the pool
Current index IP address range Leased/Excluded/Total
172.31.1.65 172.31.1.65 - 172.31.1.126 0 / 2 / 62

Pool dhcpVlan30 :
Utilization mark (high/low) : 100 / 0
Subnet size (first/next) : 0 / 0
Total addresses : 62
Leased addresses : 0
Excluded addresses : 2
Pending event : none

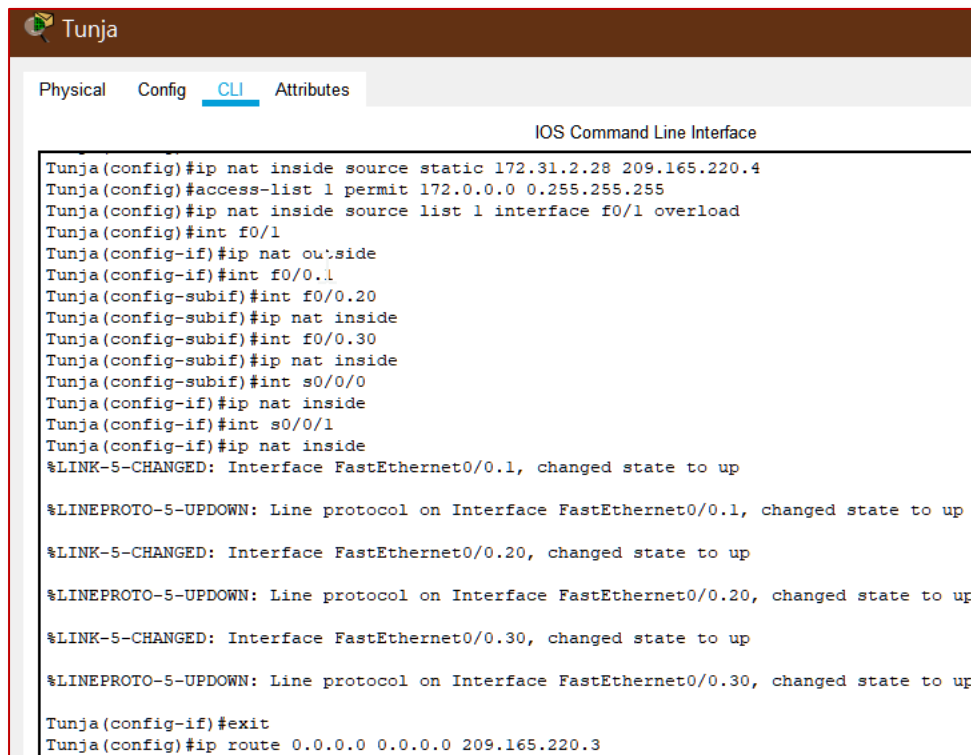
1 subnet is currently in the pool
Current index IP address range Leased/Excluded/Total
172.31.1.1 172.31.1.1 - 172.31.1.62 0 / 2 / 62
Cundinamarca#
```

```
Tunja
Physical Config CLI Attributes
IOS Command Line Interface
Tunja#sho ip dhcp pool
Tunja#
Tunja#
```

3.3.7 NAT estático WEB Server

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



```
Tunja
Physical Config CLI Attributes
IOS Command Line Interface
Tunja(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 inside
Tunja(config-if)#int f0/0.1
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
%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
Tunja(config-if)#exit
Tunja(config)#ip route 0.0.0.0 0.0.0.0 209.165.220.3
```

```
Tunja
Physical Config CLI Attributes
IOS Command Line Interface
Tunja(config)#router ospf 1
Tunja(config-router)#default-information originate
Tunja(config-router)#exit
Tunja(config)#exit
Tunja#
%SYS-5-CONFIG_I: Configured from console by console
Tunja#
```

```
Tunja
Physical Config CLI Attributes
IOS Command Line Interface
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 not set

 172.3.0.0/29 is subnetted, 1 subnets
C    172.3.2.8 is directly connected, FastEthernet0/1
 172.31.0.0/16 is variably subnetted, 4 subnets, 2 masks
C    172.31.0.128/26 is directly connected, FastEthernet0/1.2
C    172.31.0.192/26 is directly connected, FastEthernet0/1.3
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    209.17.220.0/24 is directly connected, FastEthernet0/0
Tunja#
```

3.3.8 Listas de Control de Acceso Cundinamarca

En Cundinamarca los hosts de VLAN 20 no tienen acceso a internet, solo acceden a la red interna de Tunja, los hosts de VLAN 10 solo acceden a internet.

```
Cundinamarca
Physical Config CLI Attributes
IOS Command Line Interface
Cundinamarca#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Cundinamarca(config)#access-list 123 deny ip 172.31.1.64 0.0.0.63 209.165.220.0 0.0.0.255
Cundinamarca(config)#access-list 123 permit ip any any
Cundinamarca(config)#int f0/0.20
Cundinamarca(config-subif)#ip access-group 123 in
Cundinamarca(config-subif)#
%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
Cundinamarca(config-subif)#
```

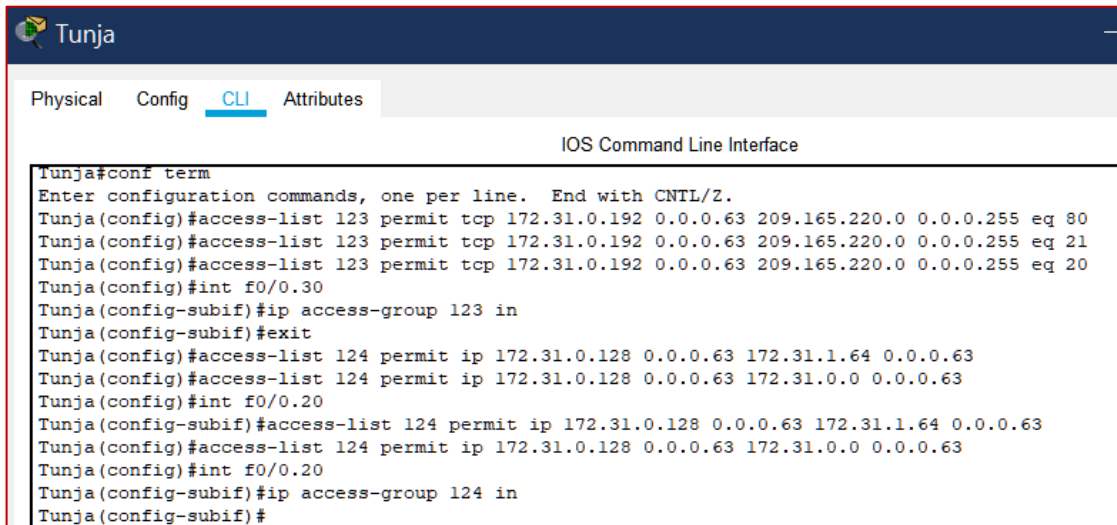
```
Cundinamarca
Physical Config CLI Attributes
IOS Command Line Interface
Cundinamarca(config)#access-list 124 deny ip any any
Cundinamarca(config)#int f0/0.30
Cundinamarca(config-subif)#access-list 124 permit ip 172.31.1.0 0.0.0.63 209.165.220.0 0.0.0.255
Cundinamarca(config)#access-list 124 deny ip any any
Cundinamarca(config)#int f0/0.30
Cundinamarca(config-subif)#ip access-group 124 in
%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
Cundinamarca(config-subif)#
```

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

```
Cundinamarca
Physical Config CLI Attributes
IOS Command Line Interface
Cundinamarca>ena
Cundinamarca#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Cundinamarca(config)#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)#
```

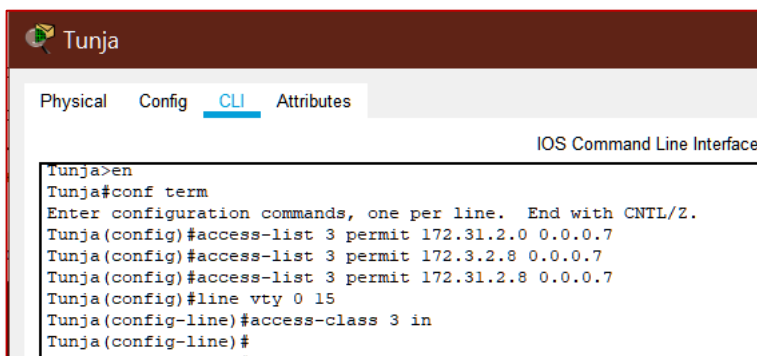
3.3.9 Listas de Control de Acceso Tunja

Los hosts de VLAN 30 en Tunja solo acceden a servidores web y ftp de internet; Los hosts de VLAN 20 en Tunja solo acceden a la VLAN 20 de Cundinamarca y VLAN 10 de Bucaramanga.



```
Tunja
Physical Config CLI Attributes
IOS Command Line Interface
Tunja#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Tunja(config)#access-list 123 permit tcp 172.31.0.192 0.0.0.63 209.165.220.0 0.0.0.255 eq 80
Tunja(config)#access-list 123 permit tcp 172.31.0.192 0.0.0.63 209.165.220.0 0.0.0.255 eq 21
Tunja(config)#access-list 123 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 123 in
Tunja(config-subif)#exit
Tunja(config)#access-list 124 permit ip 172.31.0.128 0.0.0.63 172.31.1.64 0.0.0.63
Tunja(config)#access-list 124 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)#access-list 124 permit ip 172.31.0.128 0.0.0.63 172.31.1.64 0.0.0.63
Tunja(config)#access-list 124 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 124 in
Tunja(config-subif)#
```

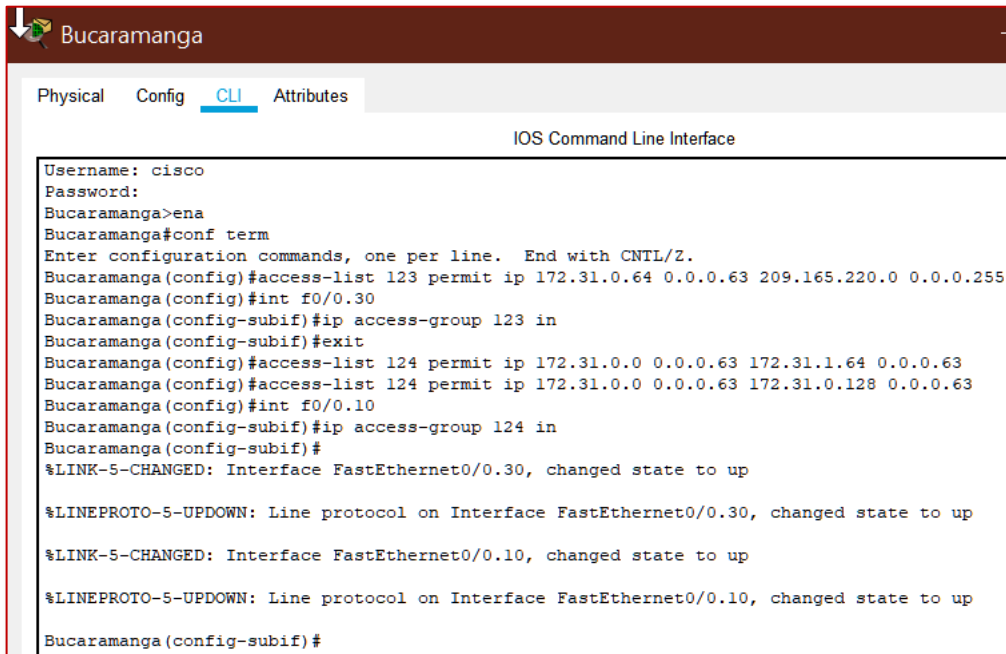
Solo los hosts de las VLAN administrativas y de la VLAN de servidores tienen acceso a los routers e internet.



```
Tunja
Physical Config CLI Attributes
IOS Command Line Interface
Tunja>en
Tunja#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Tunja(config)#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
Tunja(config-line)#
```

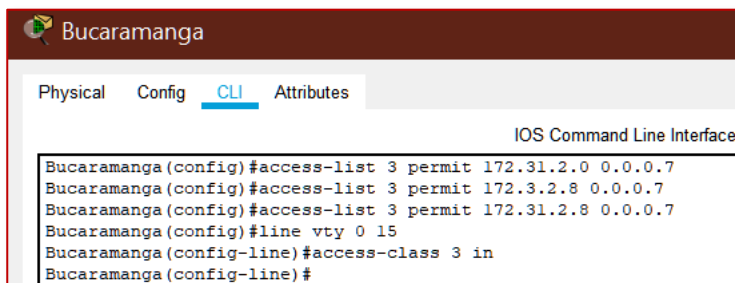
3.3.10 Listas de Control de Acceso Bucaramanga

Los hosts de VLAN 30 de Bucaramanga acceden a internet y a cualquier equipo de VLAN 10; Los hosts de VLAN 10 en Bucaramanga acceden a la red de Cundinamarca (VLAN 20) y Tunja (VLAN 20), no internet.



```
Bucaramanga
Physical Config CLI Attributes
IOS Command Line Interface
Username: cisco
Password:
Bucaramanga>ena
Bucaramanga#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Bucaramanga(config)#access-list 123 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 123 in
Bucaramanga(config-subif)#exit
Bucaramanga(config)#access-list 124 permit ip 172.31.0.0 0.0.0.63 172.31.1.64 0.0.0.63
Bucaramanga(config)#access-list 124 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 124 in
Bucaramanga(config-subif)#
%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 FastEthernet0/0.10, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.10, changed state to up
Bucaramanga(config-subif)#
```

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



```
Bucaramanga
Physical Config CLI Attributes
IOS Command Line Interface
Bucaramanga(config)#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)#
```

4. Conclusiones

Los conocimientos adquiridos en el diplomado se pusieron a prueba, con el desarrollo de los casos planteados que requieren habilidades tanto de CCNA1 como de CCNA2.

La prueba de habilidades se presenta como un gran reto, mostrando como podrá ser mi actividad durante el ejercicio profesional como Ingeniero de Sistemas.

5. Referencias

alfonsocutro. (10 de 03 de 2010). *Bases de Datos Relacional*. Obtenido de

<http://www.dataprix.com/263-bases-datos-relacional>

Community, C. (2019). *How to configure NAT with VLAN* . Obtenido de

<https://community.cisco.com/t5/switching/how-to-configure-nat-with-vlan/td-p/1031641>

Firewall.cx. (2018). *How To Configure DHCP Server On A Cisco Router*. Obtenido de

<http://www.firewall.cx/cisco-technical-knowledgebase/cisco-routers/812-cisco-router-dhcp-config.html>

Jodies, K. (2011). *Jodies IP Calc*. Obtenido de

<http://jodies.de/ipcalc?host=172.16.31.64&mask1=26&mask2=>

OmniSecu.com. (2019). *How to configure and assign a Cisco switch access port to a VLAN*.

Obtenido de <http://www.omnisequ.com/cisco-certified-network-associate-ccna/how-to-configure-and-assign-a-switch-access-port-to-a-vlan.php>

CISCO Packet Tracer (2018). Descargado en agosto de 2019, de

http://www.cisco.com/web/learning/netacad/course_catalog/PacketTracer.html