

DIPLOMADO DE PROFUNDIZACIÓN CISCO CCNA

JOSÉ WIGBERTO TIQUE TAPIERO

UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA UNAD
ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA
INGENIERÍA DE SISTEMAS
GIRARDOT
2019

DIPLOMADO DE PROFUNDIZACIÓN CISCO CCNA

JOSÉ WIGBERTO TIQUE TAPIERO

DIPLOMADO EN CISCO COMO OPCIÓN DE GRADO

GIOVANNI ALBERTO BRACHO

TUTOR

UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA UNAD
ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA
INGENIERÍA DE SISTEMAS

GIRARDOT

2019

2019

Nota de Aceptación

Presidente del Jurado

Jurado

Jurado

AGRADECIMIENTO Y DEDICATORIA

Le doy gracias al
Señor Jesús por
darme la vida, la
sabiduría y el
entendimiento para
realizar mi meta
académica.

A la universidad por
darme la oportunidad
de adquirir
conocimientos para el
mejoramiento de
calidad de vida y
servicio a la
comunidad.

Dedico este trabajo
con amor y cariño a mi
esposa LIDIA y a mi
hija SARA por el
apoyo incondicional
que me brindaron en
todo momento.

CONTENIDO

RESUMEN	8
ABSTRACT	9
INTRODUCCION	10
1. OBJETIVOS.....	11
1.1. GENERAL	11
1.2. ESPECIFICOS.....	11
2. DESARROLLO DE LOS ESCENARIOS.....	12
2.1. ESCENARIO 1	12
2.1.1. TOPOLOGÍA DE RED	12
2.1.2. DESARROLLO.....	13
2.1.3. CONFIGURACIÓN BÁSICA.....	15
2.2. ESCENARIO 2	50
2.2.1. DESARROLLO.....	51
2.2.2. CONFIGURACIÓN.....	53
3. CONCLUSIONES	68
4. BIBLIOGRAFÍA.....	69

LISTA DE TABLAS

Tabla 1 CONVERSIÓN A BINARIO 192.168.1.32 - 255.255.255.224	18
Tabla 2 RED 192.168.1.32/27	18
Tabla 3 BROADCAST 192.168.1.63	18
Tabla 4 RANGO HOSTS 192.168.1.33 - 192.168.1.62	19
Tabla 5 CONVERSIÓN A BINARIO 192.168.1.64 - 255.255.255.224	19
Tabla 6 RED 192.168.1.64/27	19
Tabla 7 BROADCAST 192.168.1.95	19
Tabla 8 RANGO HOSTS 192.168.1.65 - 192.168.1.94	19
Tabla 9 CONVERSIÓN A BINARIO 192.168.1.0 - 255.255.255.224	20
Tabla 10 RED 192.168.1.0/27	20
Tabla 11 BROADCAST 192.168.1.31	20
Tabla 12 RANGO HOSTS 192.168.1.1 - 192.168.1.30	20
Tabla 13 Configuración básica de los routers	24
Tabla 14 Tabla de condiciones de prueba	41

LISTA DE ILUSTRACIONES

Ilustración 1 TOPOLOGÍA DE RED:	14
Ilustración 2 PC0 – PC1	27
Ilustración 3 PC2 – PC3.....	27
Ilustración 4 SERVIDOR – WS 1	28
Ilustración 5 PC3.....	37
Ilustración 6 PC3 CONEXIÓN.....	37
Ilustración 7 Router MEDELLÍN - Router CALI	43
Ilustración 8 WS_1 - Router BOGOTÁ.....	43
Ilustración 9 Servidor - Router CALI	44
Ilustración 10 Servidor - Router MEDELLÍN.....	44
Ilustración 11 LAN del Router MEDELLÍN- Router CALI.....	45
Ilustración 12 LAN del Router CALI - Router CALI	45
Ilustración 13 LAN del Router MEDELLÍN - Router MEDELLÍN.....	46
Ilustración 14 LAN del Router CALI - Router MEDELLÍN.....	46
Ilustración 15 LAN del Router CALI- WS_1	47
Ilustración 16 LAN del Router MEDELLÍN - WS_1	47
Ilustración 17 LAN del Router MEDELLÍN - LAN del Router CALI.....	48
Ilustración 18 LAN del Router CALI – Servidor	48
Ilustración 19 LAN del Router MEDELLÍN – Servidor	49
Ilustración 20 Servidor - LAN del Router MEDELLÍN.....	49
Ilustración 21 Servidor - LAN del Router CALI.....	50
Ilustración 22 Router CALI..... LAN - del Router MEDELLÍN	
50	
Ilustración 23 ESCENARIO 2.....	51
Ilustración 24 DESARROLLO ESCENARIO 2	53

RESUMEN

Los escenarios propuestos para la prueba de habilidades muestran las diferentes configuraciones donde se evidencia el código utilizado para lograr completar dichos escenarios, paso a paso se detalla y se cumple con lo solicitado en las actividades; éste es el producto del esfuerzo de la adquisición de conocimiento obtenido durante el curso del diplomado.

ABSTRACT

The scenarios proposed for the skills test show the different configurations where the code used to complete these scenarios is evidenced, step by step it is detailed and complied with what is requested in the activities, this is the product of the knowledge acquisition effort obtained during the course of the diploma.

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.

A continuación, se elaboran dos escenarios correspondientes a la temática de implementación de soluciones soportadas en enrutamiento avanzado como etapa final del curso Diplomado de Profundización CCNA.

1. OBJETIVOS

1.1. *GENERAL*

Realizar el proceso de configuración de 2 escenarios propuestos usando las herramientas GNS3 o Packet Tracer.

1.2. *ESPECÍFICOS*

- Describir el paso a paso de cada punto realizado
- Digitar el código de configuración aplicado
- Hacer uso de listas de acceso
- Aplicar el conocimiento adquirido durante el curso del diplomado

2. DESARROLLO DE LOS ESCENARIOS

2.1. ESCENARIO 1

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

2.1.1. 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.

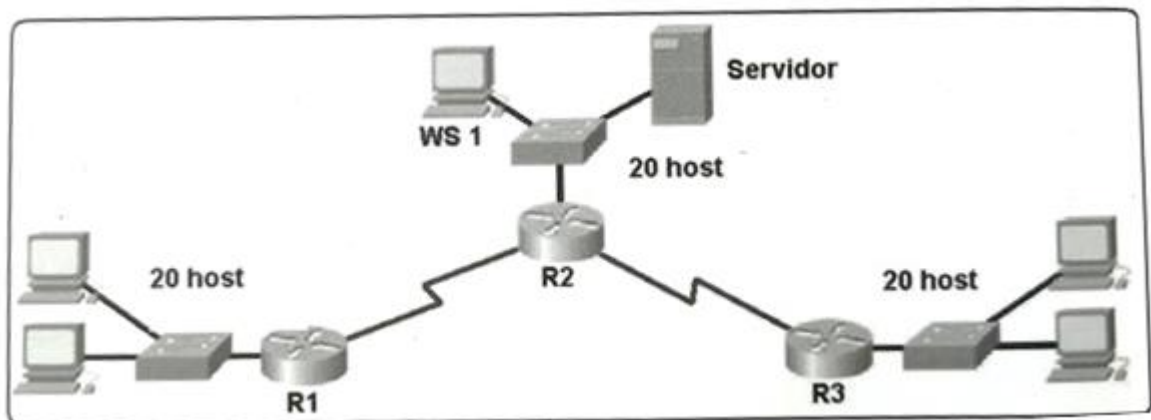
Parte 2: Considerar la asignación de los parámetros básicos y la detección de vecinos directamente conectados.

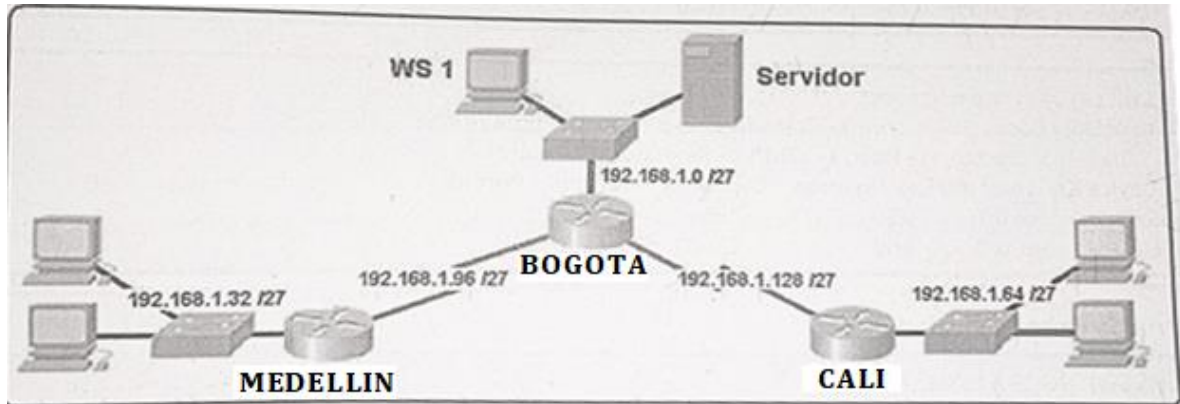
Parte 3: La red y subred establecidas deberán tener una interconexión total, todos los hosts deberán ser visibles y poder comunicarse entre ellos sin restricciones.

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.



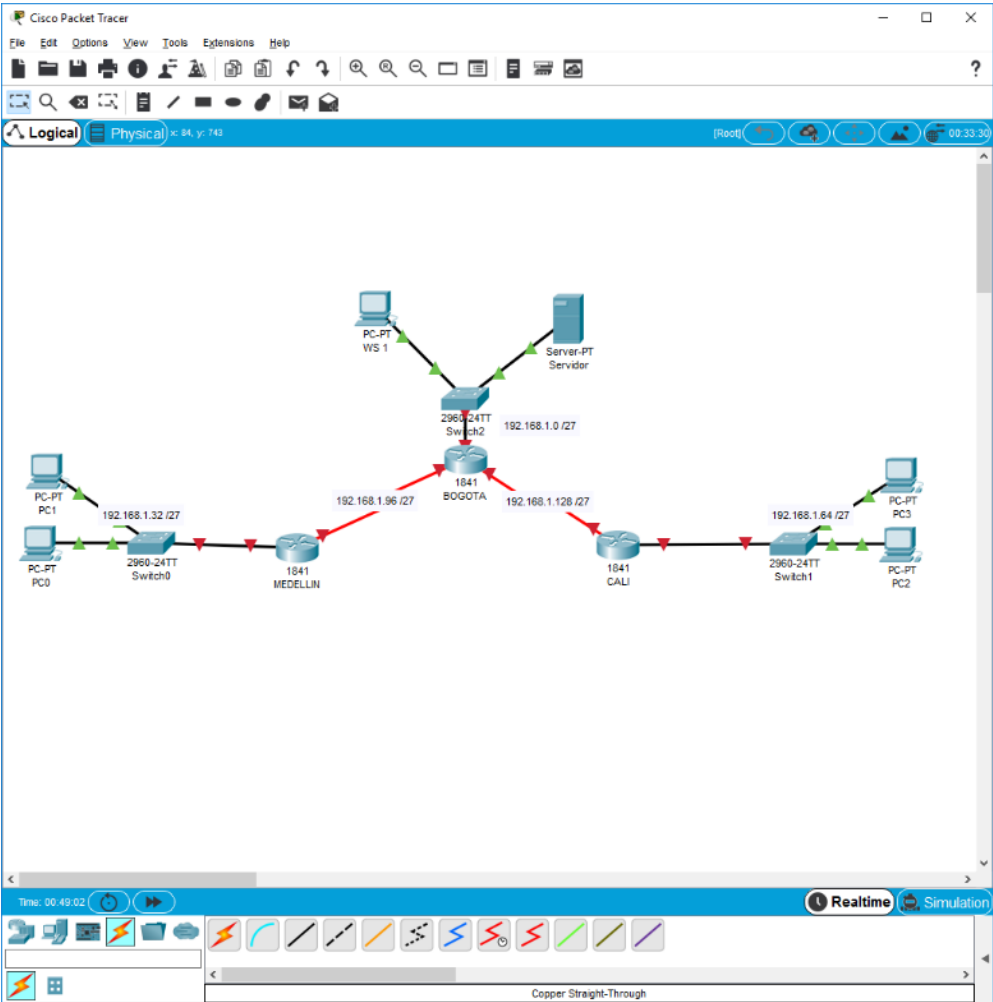


2.1.2. DESARROLLO

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

Ilustración 1 TOPOLOGÍA DE RED:



2.1.3. CONFIGURACIÓN BÁSICA

ROUTER BOGOTÁ

Router>en

Router#conf t

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

Router(config)#hostname BOGOTA

BOGOTA(config)# no ip domain-lookup

BOGOTA(config)#enable secret class

BOGOTA(config)#line console 0

BOGOTA(config-line)#password cisco

BOGOTA(config-line)#login

BOGOTA(config-line)#logging synchronous

BOGOTA(config-line)#line vty 0 15

BOGOTA(config-line)#password cisco

BOGOTA(config-line)#login

BOGOTA(config-line)#logging synchronous

BOGOTA(config)#banner motd #

Enter TEXT message. End with the character '#'.

Prohibido el acceso a personal no autorizado!!!

#

BOGOTA(config)#service password-encryption

BOGOTA(config)#exit

BOGOTA#

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

BOGOTA#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

BOGOTA#

ROUTER MEDELLÍN

Router>en

Router#conf t

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

Router(config)#hostname MEDELLÍN

MEDELLIN(config)#no ip domain-lookup

MEDELLIN(config)#enable secret class

MEDELLIN(config)#line console 0

MEDELLIN(config-line)#password cisco

MEDELLIN(config-line)#login

MEDELLIN(config-line)#logging synchronous

MEDELLIN(config-line)#line vty 0 15

MEDELLIN(config-line)#password cisco

MEDELLIN(config-line)#login

MEDELLIN(config-line)#logging synchronous

MEDELLIN(config-line)#banner motd #

Enter TEXT message. End with the character '#'.

Prohibido el acceso a personal no autorizado!!!

#

MEDELLIN(config)#service password-encryption

MEDELLIN(config)#exit

MEDELLIN#

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

MEDELLIN#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

MEDELLIN#

ROUTER CALI

Router>en

Router#conf t

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

Router(config)#hostname CALI

CALI(config)#no ip domain-lookup

CALI(config)#enable secret class

CALI(config)#line console 0

CALI(config-line)#password cisco

CALI(config-line)#login

CALI(config-line)#logging synchronous

CALI(config-line)#line vty 0 15

CALI(config-line)#password cisco

CALI(config-line)#login

CALI(config-line)#logging synchronous

CALI(config-line)#banner motd #

Enter TEXT message. End with the character '#'.

Prohibido el acceso a personal no autorizado

#

CALI(config)#service password-encryption

CALI(config)#exit

CALI#

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

CALI#copy running-config startup-config

Destination filename [startup-config]?

Building configuration...

[OK]

CALI#

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.

192.168.1.32 /27 192.168.1.33 – 192.168.1.62

Tabla 1 CONVERSIÓN A BINARIO 192.168.1.32 - 255.255.255.224

192.168.1.32	>	1	1	0	0	0	0	0	0	.	1	0	1	0	1	0	0	0	.	0	0	0	0	0	0	1	.	0	0	1	0	0	0	0	0
255.255.255.22	>	1	1	1	1	1	1	1	1	.	1	1	1	1	1	1	1	1	1	.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	>																																		

La red se obtiene poniendo a cero todos los bits de host. En este caso la red se corresponde con:

Tabla 2 RED 192.168.1.32/27

192.168.1.32/27	>	1	1	0	0	0	0	0	0	.	1	0	1	0	1	0	0	0	.	0	0	0	0	0	0	1	.	0	0	1	0	0	0	0	0
-----------------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

La dirección broadcast se obtiene poniendo a uno todos los bits de host. En este caso la dirección broadcast se corresponde con:

Tabla 3 BROADCAST 192.168.1.63

192.168.1.63	>	1	1	0	0	0	0	0	0	.	1	0	1	0	1	0	0	0	.	0	0	0	0	0	0	1	.	0	0	1	1	1	1	1	1
--------------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

El rango de hosts son todos los valores que existen entre la red y la dirección broadcast.

Tabla 4 RANGO HOSTS 192.168.1.33 - 192.168.1.62

192.168.1.33	>	1 1 0 0 0 0 0 0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 0 1 0 0 0 0 1
192.168.1.62	>	1 1 0 0 0 0 0 0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 0 1 1 1 1 1 0

192.168.1.64 /27 192.168.1.65 – 192.168.1.95

Tabla 5 CONVERSIÓN A BINARIO 192.168.1.64 - 255.255.255.224

192.168.1.64	>	1 1 0 0 0 0 0 0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 1 0 0 0 0 0 0
255.255.255.224	>	1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 1 0 0 0 0 0

La red se obtiene poniendo a cero todos los bits de host. En este caso la red se corresponde con:

Tabla 6 RED 192.168.1.64/27

192.168.1.64/27	>	1 1 0 0 0 0 0 0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 1 0 0 0 0 0 0
-----------------	---	---

La dirección broadcast se obtiene poniendo a uno todos los bits de host. En este caso la dirección broadcast se corresponde con:

Tabla 7 BROADCAST 192.168.1.95

192.168.1.95	>	1 1 0 0 0 0 0 0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 1 0 1 1 1 1 1
--------------	---	---

El rango de hosts son todos los valores que existen entre la red y la dirección broadcast.

Tabla 8 RANGO HOSTS 192.168.1.65 - 192.168.1.94

192.168.1.65 > 1 1 0 0 0 0 0 0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 1 0 0 0 0 0 1
 >

192.168.1.94 >> 1 1 0 0 0 0 0 0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 1 0 1 1 1 1 0

192.168.1.0 /27 192.168.1.2 – 192.168.1.30

Tabla 9 CONVERSIÓN A BINARIO 192.168.1.0 - 255.255.255.224

192.168.1.0 > 1 1 0 0 0 0 0 0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 0 0 0 0 0 0 0
 >
 255.255.255.22 > 1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 1 0 0 0 0 0
 4 >

La red se obtiene poniendo a cero todos los bits de host. En este caso la red se corresponde con:

Tabla 10 RED 192.168.1.0/27

192.168.1.0/27 > 1 1 0 0 0 0 0 0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 0 0 0 0 0 0 0
 >

La dirección broadcast se obtiene poniendo a uno todos los bits de host. En este caso la dirección broadcast se corresponde con:

Tabla 11 BROADCAST 192.168.1.31

192.168.1.31 > 1 1 0 0 0 0 0 0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 0 0 1 1 1 1 1
 >

El rango de hosts son todos los valores que existen entre la red y la dirección broadcast.

Tabla 12 RANGO HOSTS 192.168.1.1 - 192.168.1.30

192.168.1.1 > 1 1 0 0 0 0 0 0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 0 0 0 0 0 0 1
 >

```
192.168.1.30 > 1 1 0 0 0 0 0 0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 0 0 1 1 1 1 0
```

Asignar una dirección IP a la red.

IP BOGOTÁ

```
BOGOTA(config)#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)#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)#int fa0/0
```

```
BOGOTA(config-if)#ip address 192.168.1.1 255.255.255.224
```

```
BOGOTA(config-if)#no shutdown
```

```
BOGOTA(config-if)#
```

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

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

```
BOGOTA(config-if)#
```

IP MEDELLÍN

MEDELLIN(config)#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)#

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

MEDELLIN(config-if)#int fa

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

MEDELLIN(config-if)#int fa0/0

MEDELLIN(config-if)#ip address 192.168.1.33 255.255.255.224

MEDELLIN(config-if)#no shutdown

MEDELLIN(config-if)#

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

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

MEDELLIN(config-if)#

IP CALI

CALI(config)#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)#

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

CALI(config-if)#int fa

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

CALI(config-if)#int fa0/0

CALI(config-if)#ip address 192.168.1.65 255.255.255.224

CALI(config-if)#no shutdown

CALI(config-if)#

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

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

CALI(config-if)#

PC0
Ip address 192.168.1.39
Subnet Mask 255.255.255.224

PC1
Ip address 192.168.1.40
Subnet Mask 255.255.255.224

PC2
Ip address 192.168.1.67
Subnet Mask 255.255.255.224

PC3
Ip address 192.168.1.68
Subnet Mask 255.255.255.224

WS1
Ip address 192.168.1.4
Subnet Mask 255.255.255.224

Servidor
Ip address 192.168.1.3
Subnet Mask 255.255.255.224

Parte 2: Configuración básica.

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

Tabla 13 Configuración básica de los routers

	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

- 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.

BOGOTÁ

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, 3 subnets

C 192.168.1.0 is directly connected, FastEthernet0/0

C 192.168.1.96 is directly connected, Serial0/0/0

C 192.168.1.128 is directly connected, Serial0/0/1

BOGOTA#

MEDELLÍN

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, 2 subnets

C 192.168.1.32 is directly connected, FastEthernet0/0

C 192.168.1.96 is directly connected, Serial0/0/0

MEDELLIN#

CALI

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, 2 subnets

C 192.168.1.64 is directly connected, FastEthernet0/0

C 192.168.1.128 is directly connected, Serial0/0/0

CALI#

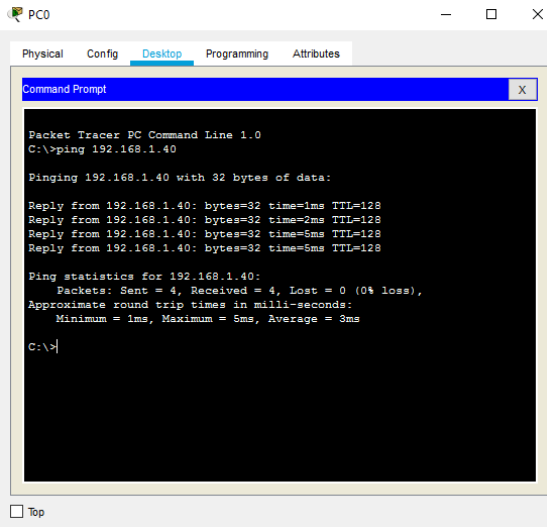
c. Verificar el balanceo de carga que presentan los routers.

Actualmente no es posible verificar el balanceo puesto que se lleva una configuración básica, por tanto se verificará al final.

d. Realizar un diagnóstico de vecinos usando el comando cdp.
Actualmente no es posible verificar el balanceo puesto que se lleva una configuración básica, por tanto se verificará al final.

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

Ilustración 2 PC0 – PC1



```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.40

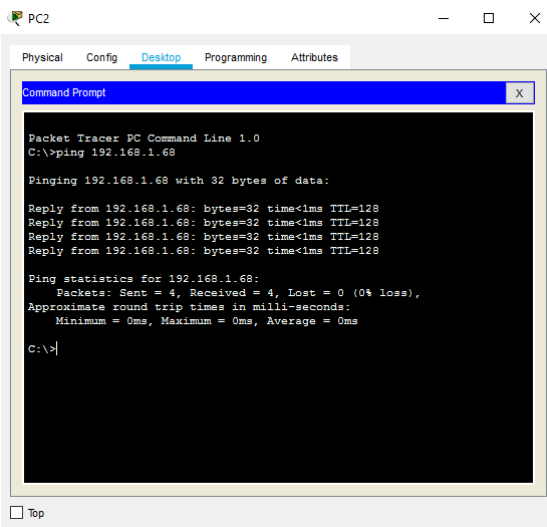
Pinging 192.168.1.40 with 32 bytes of data:

Reply from 192.168.1.40: bytes=32 time=1ms TTL=128
Reply from 192.168.1.40: bytes=32 time=2ms TTL=128
Reply from 192.168.1.40: bytes=32 time=5ms TTL=128
Reply from 192.168.1.40: bytes=32 time=5ms TTL=128

Ping statistics for 192.168.1.40:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 5ms, Average = 3ms

C:\>
```

Ilustración 3 PC2 – PC3



```
PC2
Physical Config Desktop Programming Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.68

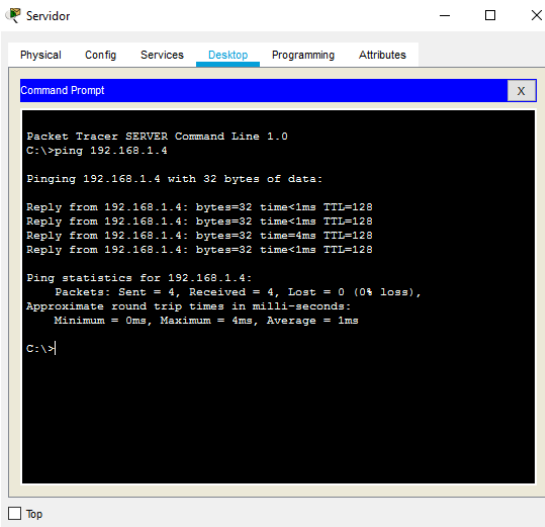
Pinging 192.168.1.68 with 32 bytes of data:

Reply from 192.168.1.68: bytes=32 time<1ms TTL=128
Reply from 192.168.1.68: bytes=32 time<1ms TTL=128
Reply from 192.168.1.68: bytes=32 time<1ms TTL=128
Reply from 192.168.1.68: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.68:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Ilustración 4 SERVIDOR – WS 1



The image shows a Packet Tracer interface with a 'Servidor' window open. The 'Desktop' tab is selected, and a 'Command Prompt' window is active. The command prompt displays the output of a 'ping 192.168.1.4' command, showing four successful replies with 32 bytes of data and a TTL of 128. The statistics indicate that 4 packets were sent, 4 were received, and there was 0% loss. The round trip times are: Minimum = 0ms, Maximum = 4ms, Average = 1ms.

```
Packet Tracer SERVER Command Line 1.0
C:\>ping 192.168.1.4

Pinging 192.168.1.4 with 32 bytes of data:

Reply from 192.168.1.4: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time=4ms TTL=128
Reply from 192.168.1.4: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 4ms, Average = 1ms

C:\>
```

Parte 3: Configuración de Enrutamiento.

- a. Asignar el protocolo de enrutamiento EIGRP a los routers considerando el direccionamiento diseñado.

BOGOTÁ

```
BOGOTA#conf t
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA(config)#router eigrp 1
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)#
```

MEDELLÍN

```
MEDELLIN(config)#router eigrp 1
MEDELLIN(config-router)#network 192.168.1.32 0.0.0.31
MEDELLIN(config-router)#network 192.168.1.96 0.0.0.31
MEDELLIN(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.1.98 (Serial0/0/0)
is up: new adjacency

MEDELLIN(config-router)#passive-interface fa0/0
MEDELLIN(config-router)#no auto-summary
MEDELLIN(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.1.98 (Serial0/0/0)
resync: summary configured

MEDELLIN(config-router)#
```

CALI

```
CALI(config)#router eigrp 1
CALI(config-router)#network 192.168.1.64 0.0.0.31
CALI(config-router)#network 192.168.1.128 0.0.0.31
CALI(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.1.130 (Serial0/0/0)
is up: new adjacency
```

```
CALI(config-router)#passive-interface fa0/0
CALI(config-router)#no auto-summary
CALI(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.1.130 (Serial0/0/0)
resync: summary configured
```

```
CALI(config-router)#
```

- b. Verificar si existe vecindad con los routers configurados con EIGRP.

BOGOTÁ

```
BOGOTA#show cdp neighbors detail
```

```
Device ID: Switch
Entry address(es):
Platform: cisco 2960, Capabilities: Switch
Interface: FastEthernet0/0, Port ID (outgoing port): FastEthernet0/1
Holdtime: 159
```

```
Version:
Cisco IOS Software, C2960 Software (C2960-LANBASE-M), Version
12.2(25)FX, RELEASE SOFTWARE (fc1)
Copyright (c) 1986-2005 by Cisco Systems, Inc.
Compiled Wed 12-Oct-05 22:05 by pt_team
```

advertisement version: 2

Duplex: full

Device ID: MEDELLN

Entry address(es):

IP address : 192.168.1.99

Platform: cisco C1841, Capabilities: Router

Interface: Serial0/0/0, Port ID (outgoing port): Serial0/0/0

Holdtime: 172

Versión:

*Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M),
Version 12.4(15)T1, RELEASE SOFTWARE (fc2)*

Technical Support: <http://www.cisco.com/techsupport>

Copyright (c) 1986-2007 by Cisco Systems, Inc.

Compiled Wed 18-Jul-07 04:52 by pt_team

advertisement version: 2

Duplex: full

Device ID: CALI

Entry address(es):

IP address : 192.168.1.131

Platform: cisco C1841, Capabilities: Router

Interface: Serial0/0/1, Port ID (outgoing port): Serial0/0/0

Holdtime: 130

Versión:

*Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M),
Version 12.4(15)T1, RELEASE SOFTWARE (fc2)*

Technical Support: <http://www.cisco.com/techsupport>

*Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team*

*advertisement version: 2
Duplex: full*

BOGOTA#

MEDELLÍN

MEDELLIN#show cdp neighbors detail

*Device ID: Switch
Entry address(es):
Platform: cisco 2960, Capabilities: Switch
Interface: FastEthernet0/0, Port ID (outgoing port): FastEthernet0/1
Holdtime: 149*

*Versión:
Cisco IOS Software, C2960 Software (C2960-LANBASE-M), Version
12.2(25)FX, RELEASE SOFTWARE (fc1)
Copyright (c) 1986-2005 by Cisco Systems, Inc.
Compiled Wed 12-Oct-05 22:05 by pt_team*

*advertisement version: 2
Duplex: full*

*Device ID: BOGOTA
Entry address(es):
IP address : 192.168.1.98
Platform: cisco C1841, Capabilities: Router
Interface: Serial0/0/0, Port ID (outgoing port): Serial0/0/0*

Holdtime: 136

Versión:

*Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M),
Version 12.4(15)T1, RELEASE SOFTWARE (fc2)*

Technical Support: <http://www.cisco.com/techsupport>

Copyright (c) 1986-2007 by Cisco Systems, Inc.

Compiled Wed 18-Jul-07 04:52 by pt_team

advertisement version: 2

Duplex: full

MEDELLIN#

CALI

CALI#show cdp neighbors detail

Device ID: Switch

Entry address(es):

Platform: cisco 2960, Capabilities: Switch

Interface: FastEthernet0/0, Port ID (outgoing port): FastEthernet0/1

Holdtime: 167

Versión:

*Cisco IOS Software, C2960 Software (C2960-LANBASE-M), Version
12.2(25)FX, RELEASE SOFTWARE (fc1)*

Copyright (c) 1986-2005 by Cisco Systems, Inc.

Compiled Wed 12-Oct-05 22:05 by pt_team

advertisement version: 2

Duplex: full

Device ID: BOGOTA

Entry address(es):

IP address : 192.168.1.130

Platform: cisco C1841, Capabilities: Router

Interface: Serial0/0/0, Port ID (outgoing port): Serial0/0/1

Holdtime: 136

Versión:

*Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M),
Version 12.4(15)T1, RELEASE SOFTWARE (fc2)*

Technical Support: <http://www.cisco.com/techsupport>

Copyright (c) 1986-2007 by Cisco Systems, Inc.

Compiled Wed 18-Jul-07 04:52 by pt_team

advertisement version: 2

Duplex: full

CALI#

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

BOGOTÁ

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, 00:04:35, Serial0/0/0
D 192.168.1.64 [90/2172416] via 192.168.1.131, 00:02:52, 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#

MEDELLÍN

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, 00:03:45, 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, 00:04:14, 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, 00:05:57, Serial0/0/0

MEDELLIN#

*%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.1.98 (Serial0/0/0)
is down: holding time expired*

MEDELLIN#

*%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.1.98 (Serial0/0/0)
is up: new adjacency*

MEDELLIN#

*%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 192.168.1.98 (Serial0/0/0)
is resync: graceful restart*

MEDELLIN#

CALI

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, 00:04:55, Serial0/0/0
D 192.168.1.32 [90/2684416] via 192.168.1.130, 00:05:24, 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, 00:05:24, Serial0/0/0*

C 192.168.1.128 is directly connected, Serial0/0/0

CALI#

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

Ilustración 5 PC3

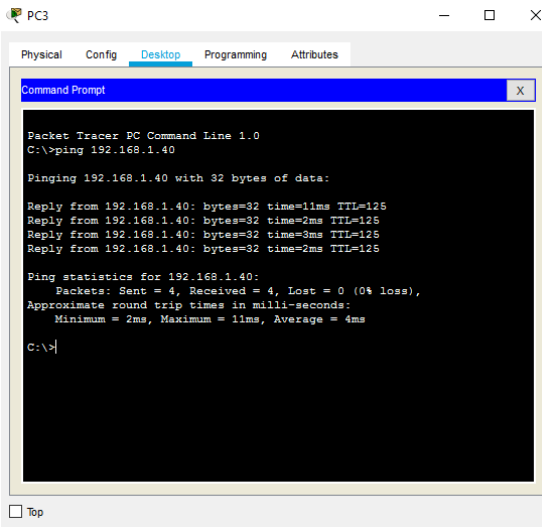
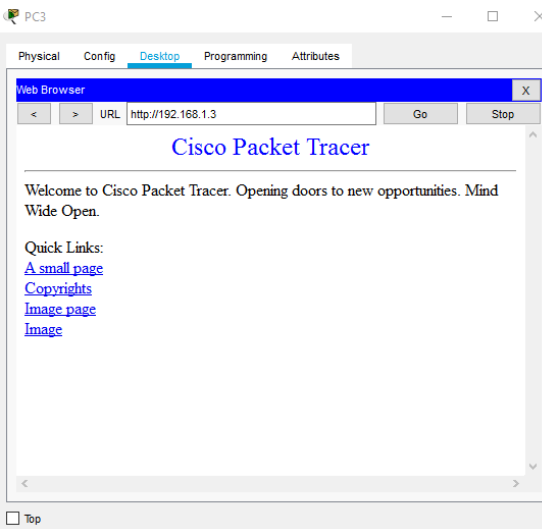


Ilustración 6 PC3 CONEXIÓN



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.

BOGOTÁ

```
BOGOTA#telnet 192.168.1.33
Trying 192.168.1.33 ... Open
```

```
-----
-----
Prohibido el acceso a personal no autorizado!!!
-----
-----
```

User Access Verification

```
Password:
MEDELLIN>exit
```

```
[Connection to 192.168.1.33 closed by foreign host]
BOGOTA#telnet 192.168.1.65
Trying 192.168.1.65 ... Open
```

```
-----
-----
Prohibido el acceso a personal no autorizado
-----
-----
```

User Access Verification

```
Password:
CALI>
```

MEDELLÍN

MEDELLIN#telnet 192.168.1.65
Trying 192.168.1.65 ...Open

Prohibido el acceso a personal no autorizado

User Access Verification

Password:
CALI>exit

[Connection to 192.168.1.65 closed by foreign host]
MEDELLIN#telnet 192.168.1.1
Trying 192.168.1.1 ...Open

Prohibido el acceso a personal no autorizado!!!

User Access Verification

Password:
BOGOTA>

CALI

CALI#telnet 192.168.1.33
Trying 192.168.1.33 ...Open

Prohibido el acceso a personal no autorizado!!!

User Access Verification

Password:
MEDELLIN>exit

[Connection to 192.168.1.33 closed by foreign host]
CALI#telnet 192.168.1.1
Trying 192.168.1.1 ... Open

Prohibido el acceso a personal no autorizado!!!

User Access Verification

Password:
BOGOTA>

- a. 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.

BOGOTÁ

BOGOTA(config)#access-list 1 deny 192.168.1.4
BOGOTA(config)#access-list 1 permit 192.168.1.3
BOGOTA(config)#exit
BOGOTA#
%SYS-5-CONFIG_1: Configured from console by console

BOGOTA#show access-list
Standard IP access list 1
10 deny host 192.168.1.4
20 permit host 192.168.1.3

BOGOTA#conf t
Enter configuration commands, one per line. End with CNTL/Z.
BOGOTA(config)#int fa0/0
BOGOTA(config-if)#ip access-group 1 in
BOGOTA(config-if)#

- b. 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.

MEDELLÍN

```
MEDELLIN(config)#access-list 104 permit ip host 192.168.1.40 192.168.1.3
0.0.0.31
MEDELLIN(config)#access-list 104 permit ip host 192.168.1.41 192.168.1.3
0.0.0.31
MEDELLIN(config-if)#ip access-group 104 in
MEDELLIN(config)#
```

CALI

```
CALI(config)#access-list 105 permit ip host 192.168.1.67 192.168.1.3 0.0.0.31
CALI(config)#access-list 105 permit ip host 192.168.1.68 192.168.1.3 0.0.0.31
CALI(config)#int fa0/0
CALI(config-if)#ip access-group 105 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.

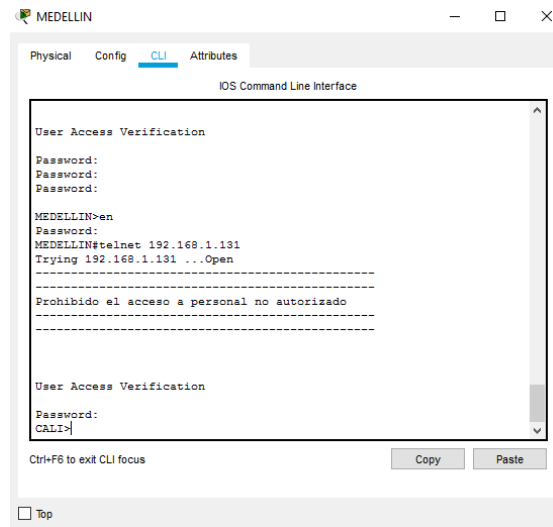
Tabla 14 Tabla de condiciones de prueba

	ORIGEN	DESTINO	RESULTADO
TELNET	Router MEDELLIN	Router CALI	CONEXIÓN
	WS_1	Router BOGOTA	DESCONEXIÓN
	Servidor	Router CALI	CONEXIÓN
	Servidor	Router MEDELLIN	CONEXIÓN
TELNET	LAN del Router MEDELLIN	Router CALI	DESCONEXIÓN
	LAN del Router CALI	Router CALI	DESCONEXIÓN
	LAN del Router MEDELLIN	Router MEDELLIN	DESCONEXIÓN

	LAN del Router CALI	Router MEDELLIN	DESCONEXIÓN
PING	LAN del Router CALI	WS_1	DESCONEXIÓN
	LAN del Router MEDELLIN	WS_1	DESCONEXIÓN
	LAN del Router MEDELLIN	LAN del Router CALI	DESCONEXIÓN
PING	LAN del Router CALI	Servidor	CONEXIÓN
	LAN del Router MEDELLIN	Servidor	CONEXIÓN
	Servidor	LAN del Router MEDELLIN	CONEXIÓN
	Servidor	LAN del Router CALI	CONEXIÓN
	Router CALI	LAN del Router MEDELLIN	DESCONEXION

TELNET

Ilustración 7 Router MEDELLIN - Router CALI

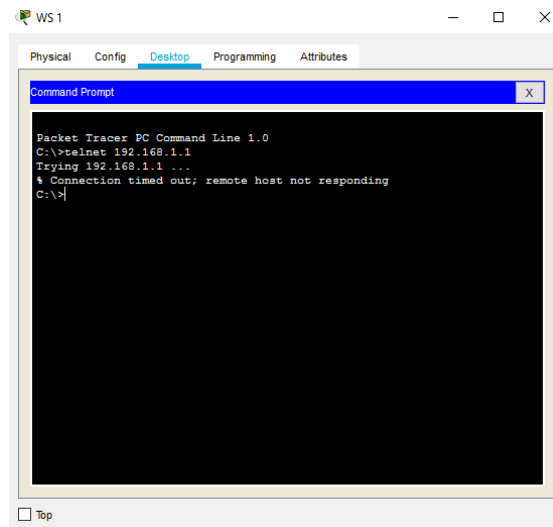


The screenshot shows a window titled "MEDELLIN" with tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is active, displaying the "IOS Command Line Interface". The terminal output is as follows:

```
User Access Verification
Password:
Password:
Password:
MEDELLIN>en
Password:
MEDELLIN#telnet 192.168.1.131
Trying 192.168.1.131 ...Open
-----
Prohibido el acceso a personal no autorizado
-----
User Access Verification
Password:
CALI>
```

At the bottom of the window, there are "Copy" and "Paste" buttons, and a "Top" button with a checkbox.

Ilustración 8 WS_1 - Router BOGOTA

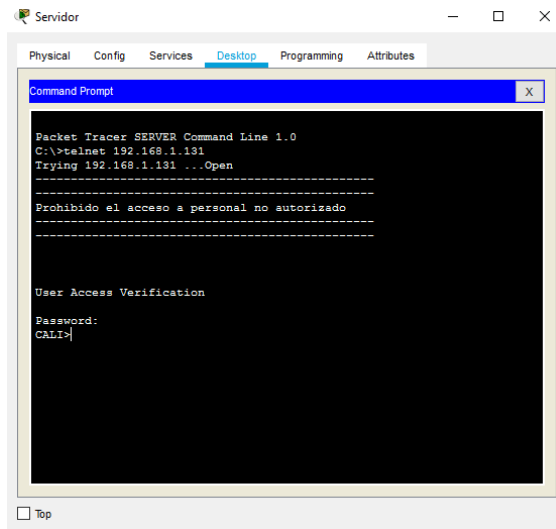


The screenshot shows a window titled "WS 1" with tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is active, displaying a "Command Prompt" window. The terminal output is as follows:

```
Packet Tracer PC Command Line 1.0
C:\>telnet 192.168.1.1
Trying 192.168.1.1 ...
% Connection timed out; remote host not responding
C:\>
```

At the bottom of the window, there is a "Top" button with a checkbox.

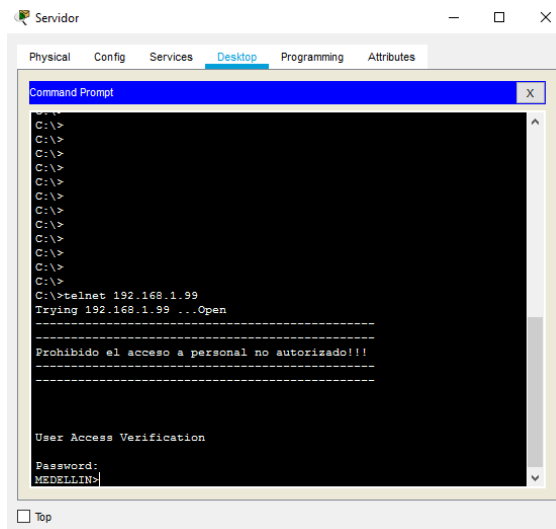
Ilustración 9 Servidor - Router CALI



```
Packet Tracer SERVER Command Line 1.0
C:\>telnet 192.168.1.131
Trying 192.168.1.131 ...Open
-----
Prohibido el acceso a personal no autorizado
-----

User Access Verification
Password:
CALI>
```

Ilustración 10 Servidor - Router MEDELLIN



```
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>telnet 192.168.1.99
Trying 192.168.1.99 ...Open
-----
Prohibido el acceso a personal no autorizado!!
-----

User Access Verification
Password:
MEDELLIN>
```

Ilustración 11 LAN del Router MEDELLIN- Router CALI

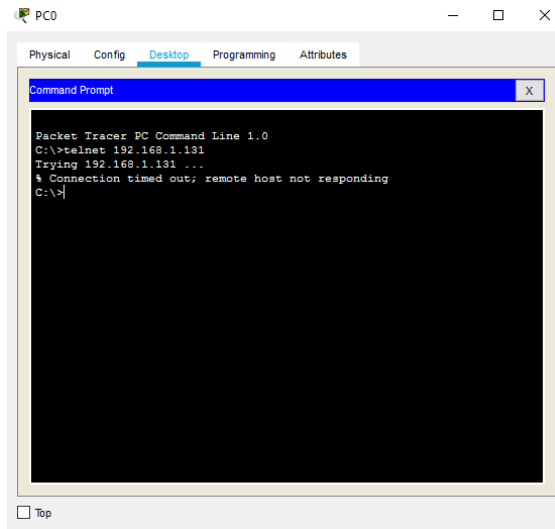
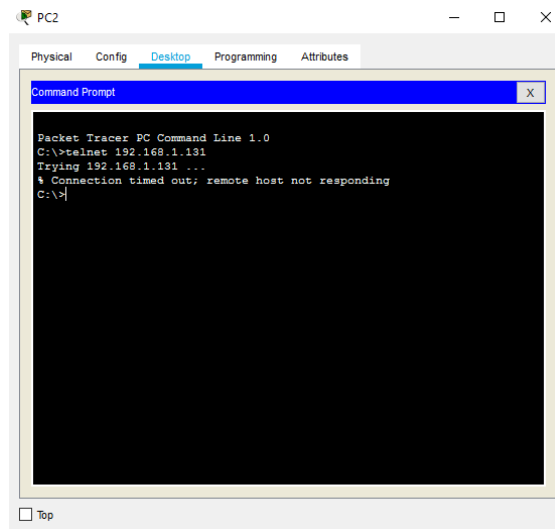


Ilustración 12 LAN del Router CALI - Router CALI



PING

Ilustración 15 LAN del Router CALI- WS_1

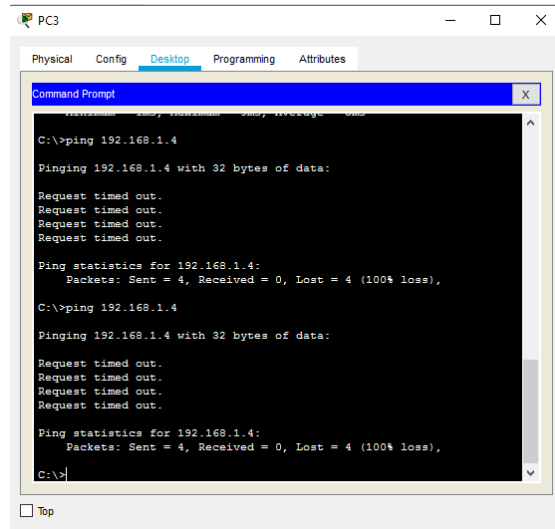


Ilustración 16 LAN del Router MEDELLIN - WS_1

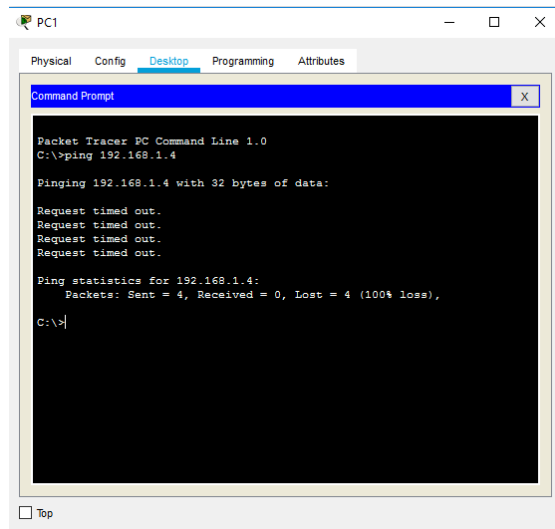
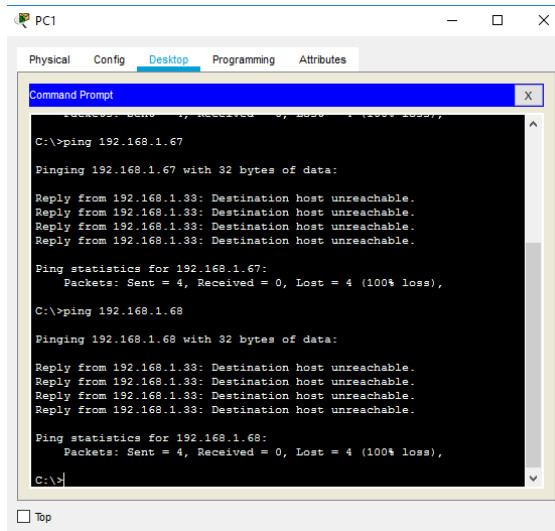
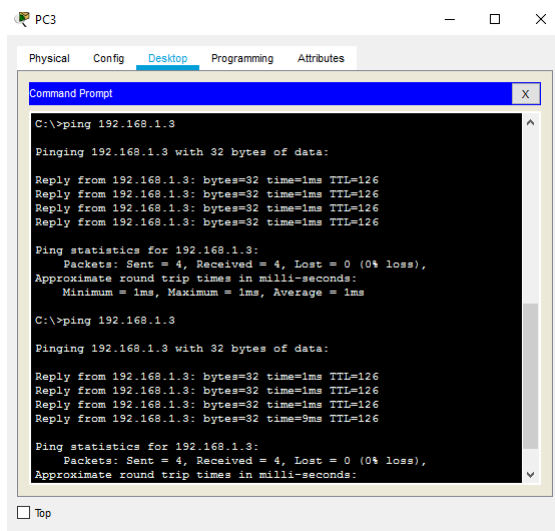


Ilustración 17 LAN del Router MEDELLIN - LAN del Router CALI



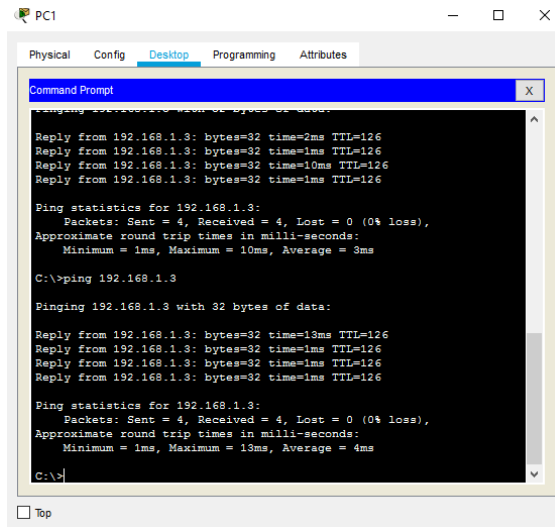
```
PC1
Physical Config Desktop Programming Attributes
Command Prompt
C:\>ping 192.168.1.67
Pinging 192.168.1.67 with 32 bytes of data:
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Ping statistics for 192.168.1.67:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.168.1.68
Pinging 192.168.1.68 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 192.168.1.68:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

Ilustración 18 LAN del Router CALI – Servidor



```
PC3
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 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms
C:\>ping 192.168.1.3
Pinging 192.168.1.3 with 32 bytes of data:
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=3ms TTL=126
Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
```


Ilustración 19 LAN del Router MEDELLIN – Servidor



The screenshot shows a Windows Command Prompt window titled 'Command Prompt' with a blue header bar. The window is open on a desktop environment with tabs for 'Physical', 'Config', 'Desktop', 'Programming', and 'Attributes'. The command prompt displays the following text:

```
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time=2ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=10ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 10ms, Average = 3ms

C:\>ping 192.168.1.3

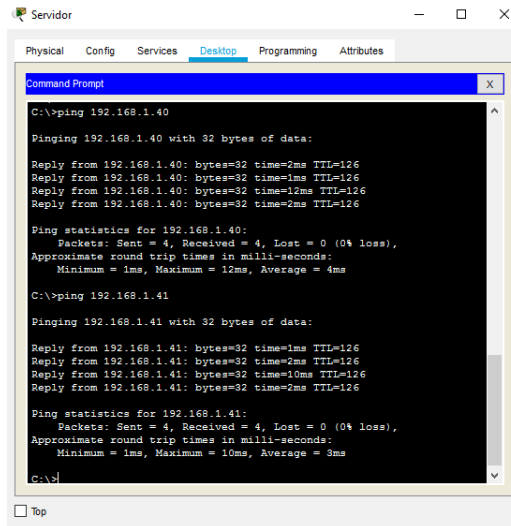
Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time=13ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 13ms, Average = 4ms

C:\>
```

Ilustración 20 Servidor - LAN del Router MEDELLIN



The screenshot shows a Windows Command Prompt window titled 'Servidor' with a blue header bar. The window is open on a desktop environment with tabs for 'Physical', 'Config', 'Services', 'Desktop', 'Programming', and 'Attributes'. The command prompt displays the following text:

```
C:\>ping 192.168.1.40

Pinging 192.168.1.40 with 32 bytes of data:

Reply from 192.168.1.40: bytes=32 time=2ms TTL=126
Reply from 192.168.1.40: bytes=32 time=1ms TTL=126
Reply from 192.168.1.40: bytes=32 time=12ms TTL=126
Reply from 192.168.1.40: bytes=32 time=2ms TTL=126

Ping statistics for 192.168.1.40:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 12ms, Average = 4ms

C:\>ping 192.168.1.41

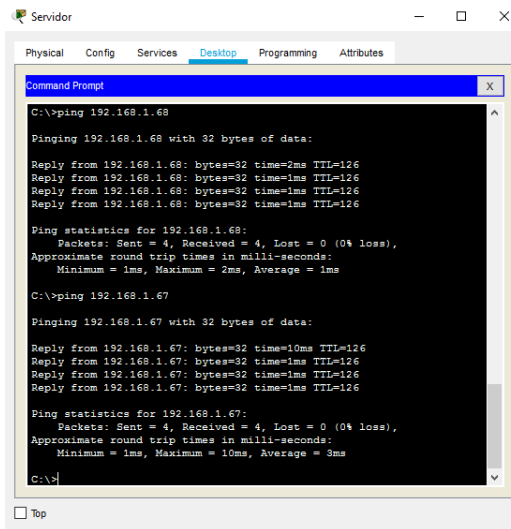
Pinging 192.168.1.41 with 32 bytes of data:

Reply from 192.168.1.41: bytes=32 time=1ms TTL=126
Reply from 192.168.1.41: bytes=32 time=2ms TTL=126
Reply from 192.168.1.41: bytes=32 time=10ms TTL=126
Reply from 192.168.1.41: bytes=32 time=2ms TTL=126

Ping statistics for 192.168.1.41:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 10ms, Average = 3ms

C:\>
```

Ilustración 21 Servidor - LAN del Router CALI



```
C:\>ping 192.168.1.68

Pinging 192.168.1.68 with 32 bytes of data:

Reply from 192.168.1.68: bytes=32 time=2ms TTL=126
Reply from 192.168.1.68: bytes=32 time=1ms TTL=126
Reply from 192.168.1.68: bytes=32 time=1ms TTL=126
Reply from 192.168.1.68: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.1.68:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 2ms, Average = 1ms

C:\>ping 192.168.1.67

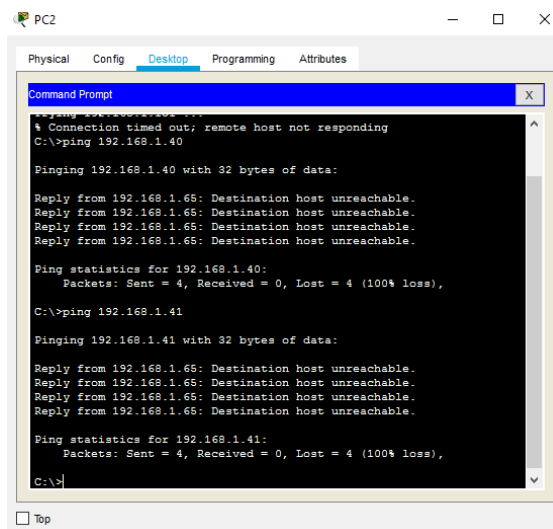
Pinging 192.168.1.67 with 32 bytes of data:

Reply from 192.168.1.67: bytes=32 time=10ms TTL=126
Reply from 192.168.1.67: bytes=32 time=1ms TTL=126
Reply from 192.168.1.67: bytes=32 time=1ms TTL=126
Reply from 192.168.1.67: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.1.67:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 10ms, Average = 3ms

C:\>
```

Ilustración 22 Router CALILAN - del Router MEDELLIN



```
C:\>ping 192.168.1.40
^
Connection timed out; remote host not responding
C:\>ping 192.168.1.40

Pinging 192.168.1.40 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 192.168.1.40:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.1.41

Pinging 192.168.1.41 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 192.168.1.41:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

2.2. ESCENARIO 2

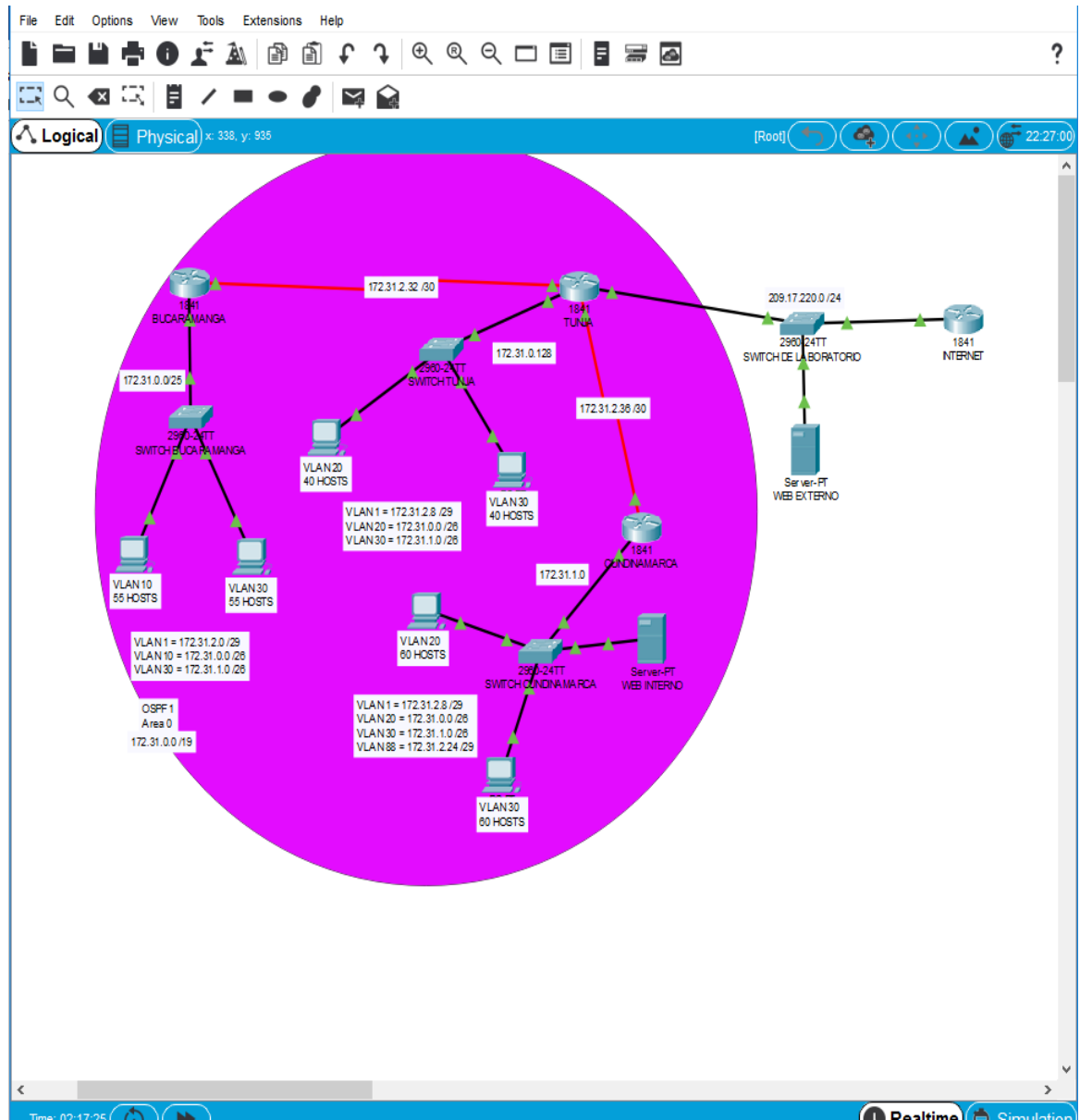
3. El web server deberá tener NAT estático y el resto de los equipos de la topología emplearan NAT de sobrecarga (PAT).
4. El enrutamiento deberá tener autenticación.
5. Listas de control de acceso:
 - Los hosts de VLAN 20 en Cundinamarca no acceden a internet, solo a la red interna de Tunja.
 - Los hosts de VLAN 20 en Cundinamarca si acceden a internet y no a la red interna de 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.
 - 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.
 - Los hosts de una VLAN no pueden acceder a los de otra VLAN en una ciudad.
 - Solo los hosts de las VLAN administrativas y de la VLAN de servidores tienen acceso a los routers e internet.
6. VLSM: utilizar la dirección 172.31.0.0 /18 para el direccionamiento.

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

2.2.2. CONFIGURACIÓN

Ilustración 24 DESARROLLO ESCENARIO 2



TUNJA

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname TUNJA
TUNJA(config)#no ip domain-lookup
TUNJA(config)#enable secret class
TUNJA(config)#username CISCO password CLASS
TUNJA(config)#aaa new-model
TUNJA(config)#aaa authentication login LOCAL local
TUNJA(config)#line console 0
TUNJA(config-line)#password cisco
TUNJA(config-line)#login authentication LOCAL
TUNJA(config-line)#line vty 0 15
TUNJA(config-line)#login authentication LOCAL
TUNJA(config-line)#password cisco
TUNJA(config-line)#exit
TUNJA(config)#banner motd #
Enter TEXT message. End with the character '#'.
-----
-----
Prohibido el acceso a personal no autorizado!!!
-----
-----
#
TUNJA(config)#service password-encryption
TUNJA(config)#line console 0
TUNJA(config-line)#exec-timeout 5 0
TUNJA(config-line)#line vty 0 15
TUNJA(config-line)#exec-timeout 5 0
TUNJA(config-line)#exit
TUNJA(config)#login block-for 300 attempt 3 within 60
TUNJA(config)#exit
TUNJA#
%SYS-5-CONFIG_1: Configured from console by console

TUNJA#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
```

[OK]

```
TUNJA(config)#int fa0/0
TUNJA(config-if)#no ip address 209.17.220.3 255.255.255.0
TUNJA(config-if)#ip address 209.17.220.1 255.255.255.0
TUNJA(config-if)#exit
TUNJA(config)#int fa0/0
TUNJA(config-if)#ip address 172.31.0.129 255.255.255.128
TUNJA(config-if)#no shutdown
```

CUNDINAMARCA

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname CUNDINAMARCA
CUNDINAMARCA(config)#no ip domain-lookup
CUNDINAMARCA(config)#enable secret class
CUNDINAMARCA(config)#username CISCO password CLASS
CUNDINAMARCA(config)#aaa new-model
CUNDINAMARCA(config)#aaa authentication login LOCAL local
CUNDINAMARCA(config)#line console 0
CUNDINAMARCA(config-line)#password cisco
CUNDINAMARCA(config-line)#login authentication LOCAL
CUNDINAMARCA(config-line)#exec-timeout 5 0
CUNDINAMARCA(config-line)#line vty 0 15
CUNDINAMARCA(config-line)#login authentication LOCAL
CUNDINAMARCA(config-line)#password cisco
CUNDINAMARCA(config-line)#exec-timeout 5 0
CUNDINAMARCA(config-line)#exit
CUNDINAMARCA(config)#banner motd #
Enter TEXT message. End with the character '#'.
-----
-----
Prohibido el acceso a personal no autorizado!!!
-----
-----
#

CUNDINAMARCA(config)#service password-encryption
CUNDINAMARCA(config)#login block-for 300 attempt 3 within 60
CUNDINAMARCA(config)#exit
```

```
CUNDINAMARCA#  
%SYS-5-CONFIG_1: Configured from console by console
```

```
CUNDINAMARCA#copy running-config startup-config  
Destination filename [startup-config]?  
Building configuration...  
[OK]  
CUNDINAMARCA(config)#int s0/0/0  
CUNDINAMARCA(config-if)#ip address 172.31.2.38 255.255.255.252  
CUNDINAMARCA(config-if)#no shutdown  
TUNJA(config)#int fa0/0  
TUNJA(config-if)#ip address 209.17.220.4 255.255.255.0  
TUNJA(config-if)#no shutdown  
CUNDINAMARCA(config)#int fa0/1  
CUNDINAMARCA(config-if)#ip address 172.31.1.1 255.255.255.128  
CUNDINAMARCA(config-if)#no shutdown
```

BUCARAMANGA

```
Router>en  
Router#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#hostname BUCARAMANGA  
BUCARAMANGA(config)#no ip domain-lookup  
BUCARAMANGA(config)#enable secret class  
BUCARAMANGA(config)#username CISCO password CLASS  
BUCARAMANGA(config)#aaa new-model  
BUCARAMANGA(config)#aaa authentication login LOCAL local  
BUCARAMANGA(config)#line console 0  
BUCARAMANGA(config-line)#password cisco  
BUCARAMANGA(config-line)#login authentication LOCAL  
BUCARAMANGA(config-line)#exec-timeout 5 0  
BUCARAMANGA(config-line)#line vty 0 15  
BUCARAMANGA(config-line)#password cisco  
BUCARAMANGA(config-line)#login authentication LOCAL  
BUCARAMANGA(config-line)#exec-timeout 5 0  
BUCARAMANGA(config-line)#exit  
BUCARAMANGA(config)#banner motd #  
Enter TEXT message. End with the character '#'.  
-----
```

Prohibido el acceso a personal no autorizado!!!

#

*BUCARAMANGA(config)#service password-encryption
BUCARAMANGA(config)#login block-for 300 attempt 3 within 60
BUCARAMANGA(config)#exit
BUCARAMANGA#
%SYS-5-CONFIG_I: Configured from console by console*

*BUCARAMANGA#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
BUCARAMANGA(config)#int s0/0/0
BUCARAMANGA(config-if)#ip address 172.31.2.34 255.255.255.252
BUCARAMANGA(config-if)#no shutdown
BUCARAMANGA(config)#int fa0/0
BUCARAMANGA(config-if)#ip address 172.31.0.129 255.255.255.128
BUCARAMANGA(config-if)#no shutdown*

TUNJA

TUNJA#show flash

System flash directory:

File Length Name/status

3 33591768 c1841-advipservicesk9-mz.124-15.T1.bin

2 28282 sigdef-category.xml

1 227537 sigdef-default.xml

[33847587 bytes used, 30168797 available, 64016384 total]

63488K bytes of processor board System flash (Read/Write)

TUNJA#copy flash tftp

Source filename []? c1841-advipservicesk9-mz.124-15.T1.bin

Address or name of remote host []? 209.17.220.4

Destination filename [c1841-advipservicesk9-mz.124-15.T1.bin]?

backup_TUNJA

TUNJA

```
TUNJA(config)#ip nat inside source static 209.17.220.4 172.31.2.33
TUNJA(config)#int fa0/0
TUNJA(config-if)#ip nat inside
TUNJA(config-if)#int s0/0/0
TUNJA(config-if)#ip nat outside
TUNJA(config-if)#
TUNJA(config)#ip nat pool NATPOOL 172.31.2.33 172.31.2.34 netmask
255.255.255.252
TUNJA(config)#access-list 1 permit 172.31.0.0 0.0.0.63
TUNJA(config)#access-list 2 permit 172.31.1.0 0.0.0.63
TUNJA(config)#ip nat inside source list 1 pool NATPOOL overload
TUNJA(config)#ip nat inside source list 2 pool NATPOOL overload
TUNJA(config)#int fa0/1
TUNJA(config-if)#ip nat inside
TUNJA(config-if)#int s0/0/0
TUNJA(config-if)#ip nat outside
TUNJA(config-if)#
```

CUNDINAMARCA

```
CUNDINAMARCA(config)#ip nat pool NATCUND 172.31.2.37 172.31.2.38
netmask 255.255.255.252
CUNDINAMARCA(config)#access-list 1 permit 172.31.1.0 0.0.0.63
CUNDINAMARCA(config)#ip nat inside source list 1 pool NATCUND overload
CUNDINAMARCA(config)#access-list 2 permit 172.31.0.0 0.0.0.63
CUNDINAMARCA(config)#ip nat inside source list 2 pool NATCUND overload
CUNDINAMARCA(config)#int fa0/0
CUNDINAMARCA(config-if)#ip nat inside
CUNDINAMARCA(config-if)#int s0/0/0
CUNDINAMARCA(config-if)#ip nat outside
CUNDINAMARCA(config-if)#
```

BUCARAMANGA

```
BUCARAMANGA(config)#ip nat pool NATBUC 172.31.2.33 172.31.2.34
netmask 255.255.255.252
BUCARAMANGA(config)#access-list 1 permit 172.31.0.0 0.0.0.63
BUCARAMANGA(config)#access-list 2 permit 172.31.1.0 0.0.0.63
```

```
BUCARAMANGA(config)#ip nat inside source list 1 pool NATBUC overload
BUCARAMANGA(config)#ip nat inside source list 2 pool NATBUC overload
BUCARAMANGA(config)#int fa0/0
BUCARAMANGA(config-if)#ip nat inside
BUCARAMANGA(config-if)#int s0/0/0
BUCARAMANGA(config-if)#ip nat outside
```

```
CUNDINAMARCA(config)#access-list 100 deny ip host 172.31.0.1
200.17.220.2 0.0.0.255
CUNDINAMARCA(config)#access-list 100 permit ip host 172.31.0.1
172.31.0.20 0.0.0.63
CUNDINAMARCA(config)#access-list 100 permit ip host 172.31.0.1
172.31.1.15 0.0.0.63
CUNDINAMARCA(config)#int fa0/0
CUNDINAMARCA(config-if)#ip access-group 100 out
CUNDINAMARCA(config-if)#no shutdown
CUNDINAMARCA(config-if)#
CUNDINAMARCA(config)#access-list 102 permit ip host 172.31.0.2
200.17.220.2 0.0.0.255
CUNDINAMARCA(config)#access-list 102 deny ip host 172.31.0.2
172.31.0.20 0.0.0.63
CUNDINAMARCA(config)#access-list 102 deny ip host 172.31.0.2
172.31.1.15 0.0.0.63
CUNDINAMARCA(config)#int fa0/0
CUNDINAMARCA(config-if)#ip access-group 102 out
CUNDINAMARCA(config-if)#no shutdown
CUNDINAMARCA(config-if)#
TUNJA(config)#access-list 100 permit ip host 172.31.1.15 200.17.220.4
0.0.0.255
TUNJA(config)#access-list 100 permit tcp host 172.31.1.15 200.17.220.2
0.0.0.255
TUNJA(config)#int fa0/1
TUNJA(config-if)#ip access-group 100 out
TUNJA(config-if)#no shutdown
TUNJA(config-if)#
TUNJA(config)#access-list 101 permit ip host 172.31.0.20 172.31.0.2
0.0.0.63
TUNJA(config)#access-list 101 permit ip host 172.31.0.20 172.31.0.5
0.0.0.63
TUNJA(config)#int fa0/1
TUNJA(config-if)#ip access-group 101 out
```

```

TUNJA(config-if)#no shutdown
TUNJA(config-if)#
BUCARAMANGA(config)#access-list 100 permit ip host 172.31.1.5
200.17.220.2 0.0.0.255
BUCARAMANGA(config)#access-list 100 permit ip host 172.31.1.5
172.31.0.0 0.0.0.63
BUCARAMANGA(config)#int fa0/0
BUCARAMANGA(config-if)#ip access-group 100 out
BUCARAMANGA(config-if)#no shutdown
BUCARAMANGA(config-if)#
BUCARAMANGA(config)#access-list 101 deny ip host 172.31.0.5
200.17.220.2 0.0.0.255
BUCARAMANGA(config)#access-list 101 permit ip host 172.31.0.5
172.31.0.20 0.0.0.63
BUCARAMANGA(config)#access-list 101 permit ip host 172.31.0.5
172.31.0.2 0.0.0.63
BUCARAMANGA(config)#int fa0/0
BUCARAMANGA(config-if)#ip access-group 101 out
BUCARAMANGA(config-if)#no shutdown
BUCARAMANGA(config-if)#

```

CUNDINAMARCA

$120 \text{ hosts} = 2^7 = 128 - 2 = 126$
 $172.31.0.1/25 - 172.31.0.126/25$

BUCARAMANGA

$110 \text{ hosts} = 2^7 = 128 - 2 = 126$
 $172.31.0.129/25 - 172.31.0.254/25$

TUNJA

$80 \text{ hosts} = 2^7 = 128 - 2 = 126$
 $172.31.1.1/25 - 172.31.1.26/25$

TUNJA

```
Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 20
Switch(config-vlan)#exit
Switch(config)#vlan 30
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#int range fa0/5-10
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 20
Switch(config-if-range)#exit
Switch(config)#int range fa0/15-20
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 30
Switch(config-if-range)#do wr
Building configuration...
[OK]
Switch(config-if-range)#
```

```
TUNJA(config)#int fa0/1.20
TUNJA(config-subif)#encapsulation dot1Q 20
TUNJA(config-subif)#ip address 172.31.0.1 255.255.255.192
TUNJA(config-subif)#no shutdown
TUNJA(config-subif)#int fa0/1.30
TUNJA(config-subif)#encapsulation dot1Q 30
TUNJA(config-subif)#ip address 172.31.1.1 255.255.255.192
TUNJA(config-subif)#no shutdown
TUNJA(config-subif)#
```

CUNDINAMARCA

```
Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#exit
```

```
Switch(config)#vlan 30
Switch(config-vlan)#exit
Switch(config)#vlan 88
Switch(config-vlan)#exit
Switch(config)#int range fa0/15-19
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 20
Switch(config-if-range)#exit
Switch(config)#int range fa0/20-24
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 10
Switch(config-if-range)#exit
Switch(config)#do wr
Building configuration...
[OK]
Switch(config)#
```

```
CUNDINAMARCA(config-if)#int fa0/0.20
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)#encapsulation dot1Q 20
CUNDINAMARCA(config-subif)#ip address 172.31.0.1 255.255.255.192
CUNDINAMARCA(config-subif)#no shutdown
CUNDINAMARCA(config-subif)#int fa0/0.30
CUNDINAMARCA(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
```

```
CUNDINAMARCA(config-subif)#encapsulation dot1Q 30
CUNDINAMARCA(config-subif)#ip address 172.31.1.1 255.255.255.192
CUNDINAMARCA(config-subif)#no shutdown
CUNDINAMARCA(config-subif)#
```


BUCARAMANGA

Switch>en

Switch#conf t

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

Switch(config)#vlan 10

Switch(config-vlan)#exit

Switch(config)#vlan 30

Switch(config-vlan)#exit

Switch(config)#int range f

%LINK-3-UPDOWN: Interface FastEthernet0/3, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to down

%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to up

% Incomplete command.

Switch(config)#int range fa0/2-5

Switch(config-if-range)#switchport access vlan 10

Switch(config-if-range)#do write

Building configuration...

[OK]

Switch(config-if-range)#exit

Switch(config)#int range fa0/20-24

Switch(config-if-range)#switchport access vlan 30

Switch(config-if-range)#switchport mode access

Switch(config-if-range)#switchport access vlan 30

Switch(config-if-range)#exit

Switch(config)#int range fa0/2-4

Switch(config-if-range)#switchport mode access

Switch(config-if-range)#switchport access vlan 10

Switch(config-if-range)#exit

Switch(config)#

BUCARAMANGA#conf t

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

BUCARAMANGA(config)#int fa0/0.10

```
BUCARAMANGA(config-subif)#encapsulation dot1Q 10
BUCARAMANGA(config-subif)#ip address 172.31.0.1 255.255.255.192
BUCARAMANGA(config-subif)#no shutdown
BUCARAMANGA(config-subif)#int fa0/0.30
BUCARAMANGA(config-subif)#encapsulation dot1Q 30
BUCARAMANGA(config-subif)#ip address 172.31.1.1 255.255.255.192
BUCARAMANGA(config-subif)#no shutdown
BUCARAMANGA(config-subif)#
```

TUNJA

```
TUNJA(config)#router ospf 1
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)#network 209.17.220.0 0.0.0.255 area 0
TUNJA(config-router)#exit
TUNJA(config)#int s0/0/0
TUNJA(config-if)#ip ospf authentication-key cisco
TUNJA(config-if)#ip ospf authentication
03:45:03: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.34 on Serial0/0/0
from LOADING to FULL, Loading Done
TUNJA(config-if)#int s0/0/1
TUNJA(config-if)#ip ospf authentication-key cisco
TUNJA(config-if)#ip ospf authentication
03:45:36: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.38 on Serial0/0/1
from LOADING to FULL, Loading Done
TUNJA(config-if)#exit
TUNJA(config)#
```

CUNDINAMARCA

```
CUNDINAMARCA(config)#router ospf 1
CUNDINAMARCA(config-router)#network 172.31.2.36 0.0.0.3 area 0
CUNDINAMARCA(config-router)#network 172.31.1.0 0.0.0.127 area 0
CUNDINAMARCA(config-router)#exit
CUNDINAMARCA(config)#int s0/0/0
CUNDINAMARCA(config-if)#ip ospf authentication-key cisco
CUNDINAMARCA(config-if)#ip ospf authentication
CUNDINAMARCA(config-if)#
```

BUCARAMANGA

```
BUCARAMANGA(config)#router ospf 1
BUCARAMANGA(config-router)#network 172.31.2.32 0.0.0.3 area 0
BUCARAMANGA(config-router)#network 172.31.0.0 0.0.0.127 area 0
BUCARAMANGA(config-router)#exit
BUCARAMANGA(config)#int s0/0/0
BUCARAMANGA(config-if)#ip ospf authentication-key cisco
BUCARAMANGA(config-if)#ip ospf authentication
BUCARAMANGA(config-if)#
```

3. CONCLUSIONES

De acuerdo con los contenidos vistos dentro del curso Diplomado de Profundización Cisco CCNA, se logra conceptualizar con claridad el término red, que es un conjunto de dispositivos conectados por medio de cables, ondas, señales, y demás métodos de transporte de datos para compartir información y servicios.

El uso de listas permite limitar el acceso o recibir paquetes desde otras redes.

4. BIBLIOGRAFÍA

Shaughnessy, T., Velte, T., & Sánchez García, J. I. (2000). Manual de CISCO.

Ariganello, E., & Sevilla, B. (2011). Redes CISCO - guía de estudio para la certificación CCNP (No. 004.6 A73).

Benchimol, D. (2010). Redes Cisco-Instalacion y administracion de hardware y software.

CISCO. (s.f.). Principios básicos de routing y switching: Listas de Control de

Acceso. (2017), Tomado de:

<https://staticcourseassets.s3.amazonaws.com/RSE503/es/index.html#9.0.1>

Principios básicos de routing y switching: Traducción de direcciones de red para IPv4. (2017), Tomado de:

<https://staticcourseassets.s3.amazonaws.com/RSE503/es/index.html#11.0>

DHCP. Principios de Enrutamiento y Conmutación. (2014) Recuperado de:

<https://static->

[courseassets.s3.amazonaws.com/RSE50ES/module10/index.html#10.0.1.1](https://static-courseassets.s3.amazonaws.com/RSE50ES/module10/index.html#10.0.1.1)

Teare, D., Vachon B., Graziani, R. (2015). CISCO Press (Ed). Implementing IPv4 in the Enterprise Network. Implementing Cisco IP Routing (ROUTE) Foundation Learning Guide CCNP ROUTE 300-101. Recuperado de <https://1drv.ms/b/s!AmlJYei-NT1IlnMfy2rhPZHwEoWx>

Seguí, F. B. (2015). Configuración DHCP en routers CISCO.

Chamorro Serna, L., Montaña Torres, O., Guzmán Pérez, E. H., Daza Navia, M.

Y., & Castillo Ortiz, O. F. (2018). Diplomado de Profundización Cisco-Enrutamiento en soluciones de red.

Es.wikipedia.org. (2018). Open Shortest Path First. [online] disponible en:

https://es.wikipedia.org/wiki/Open_Shortest_Path_First