

Trabajo De Grado – Diplomado Profundización Cisco (Diseño e
implementación de soluciones Integradas LAN/WAN)

Prueba De Habilidades Prácticas

Presentado por

Diana Constanza Barrera Vargas

Universidad Nacional Abierta y a Distancia - UNAD

Ingeniería Sistemas

(Opción de Grado)

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Trabajo Final Evaluación Prueba Habilidades Practicas

Presentado Por

Diana Constanza Barrera Vargas

Trabajo De Grado Para Optar Al Titulo Ingeniería de Sistemas

Diego Edinson Ramírez

Tutor

Universidad Nacional Abierta y a Distancia - UNAD

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NOTA DE ACEPTACIÓN

Firma Del Presidente de Jurado

Firma Del Jurado

Firma Del Jurado

Sogamoso 17 de febrero de 2020

Dedicatoria

A mi hija porque me has enseñado la felicidad y quien es mi motor y mi más grande motivación para concluir esta nueva etapa.

A mi familia en general quienes siempre han sido un gran apoyo tanto motivacional como económico.

A la universidad y los tutores porque gracias a ellos puedo concluir una etapa más en mi vida

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Abstrac

For the realization of this work, two exercises will be solved as part of a skill practice with which it seeks to identify the degree of development, competencies and skills that were achieved throughout the course and through which the problem related to various aspects

One of the configurations is carried out for a Technology company that has three branches located in the cities of Bogotá, Medellín and Cali where the student will be the network administrator, who must configure and interconnect each of the devices that are part of the scenario, in accordance with the guidelines established for IP addressing, routing protocols and other aspects that are part of the network topology.

Introducción

En el presente trabajo se aborda la construcción de una red de comunicación, cada una de las prácticas debe solucionarse, para su desarrollo se deberá realizar el proceso de configuración usando la herramienta: *Packet*, cumpliendo las indicaciones establecidas en cada una de las tareas (Prácticas de Laboratorio) y con la topología propuesta en la guía para el desarrollo de la actividad.

Objetivos

Objetivo General

Desarrollar la actividad denominado prueba de habilidades prácticas CCNA, poniendo a prueba los niveles de comprensión y solución de problemas relacionados con diversos aspectos de Networking.

Objetivos Específicos

- Realizar las tareas asignadas en cada uno de los escenarios propuestos.
- Cumplir con las normas Icontec para la presentación del trabajo escrito
- Plasmar el informe con las respectivas evidencias de configuración de los dispositivos
- Efectuar las rutinas de diagnóstico y dejar los equipos listos para su configuración (asignar nombres de equipos, asignar claves de seguridad, etc).
- Cumplir la conexión física de los equipos con base en la topología de red

Desarrollo De Los Escenarios

Escenario 1

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

Topología de red

Los requerimientos solicitados son los siguientes:

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

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

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

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

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

Parte 6: Configuración final.

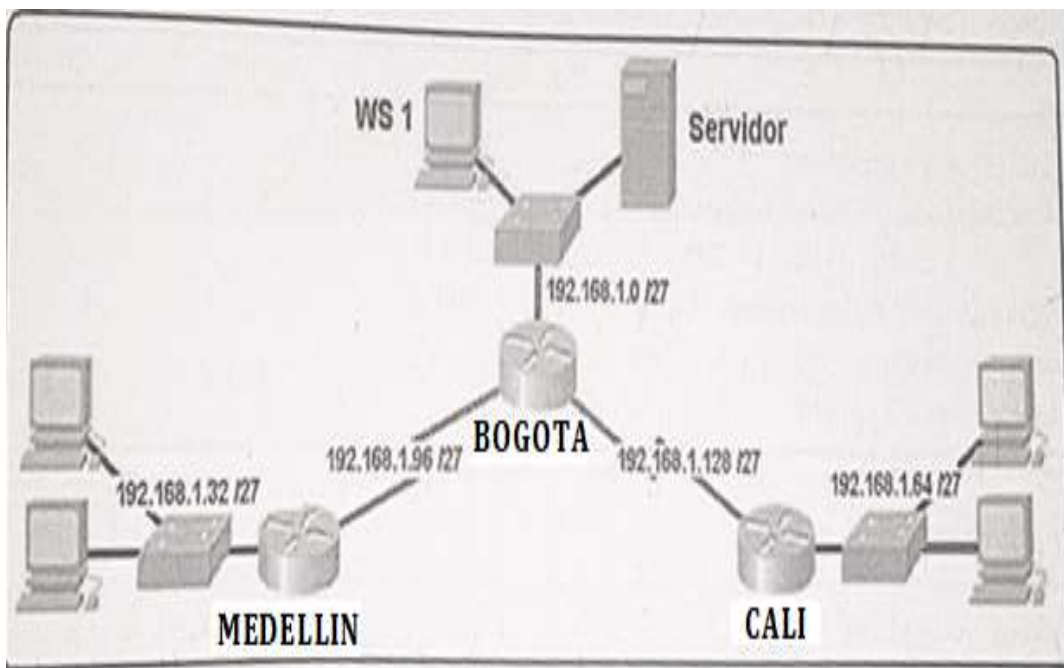
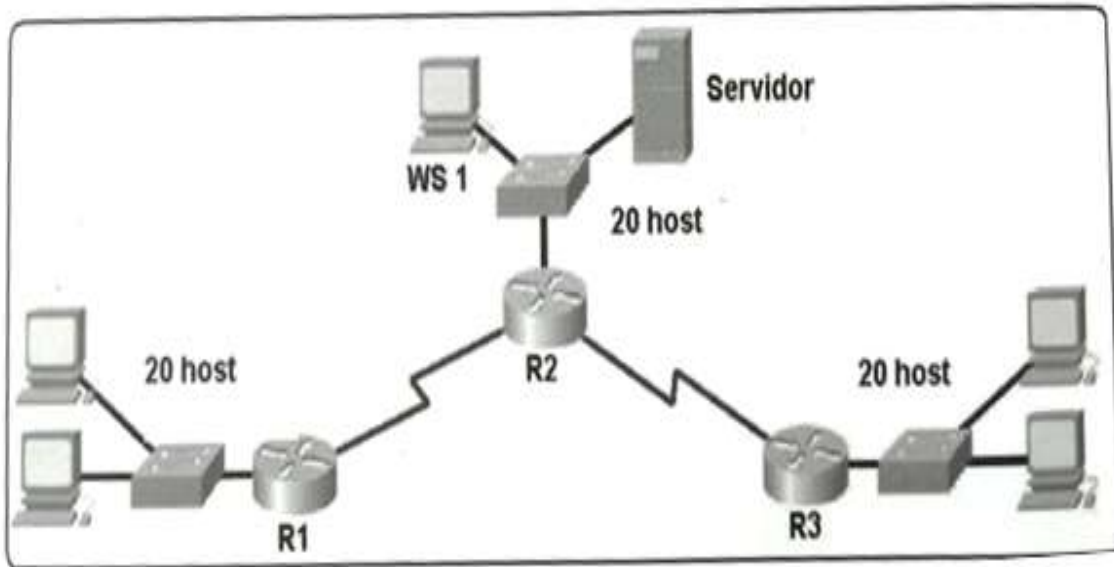


Figura 1. topologia de la red

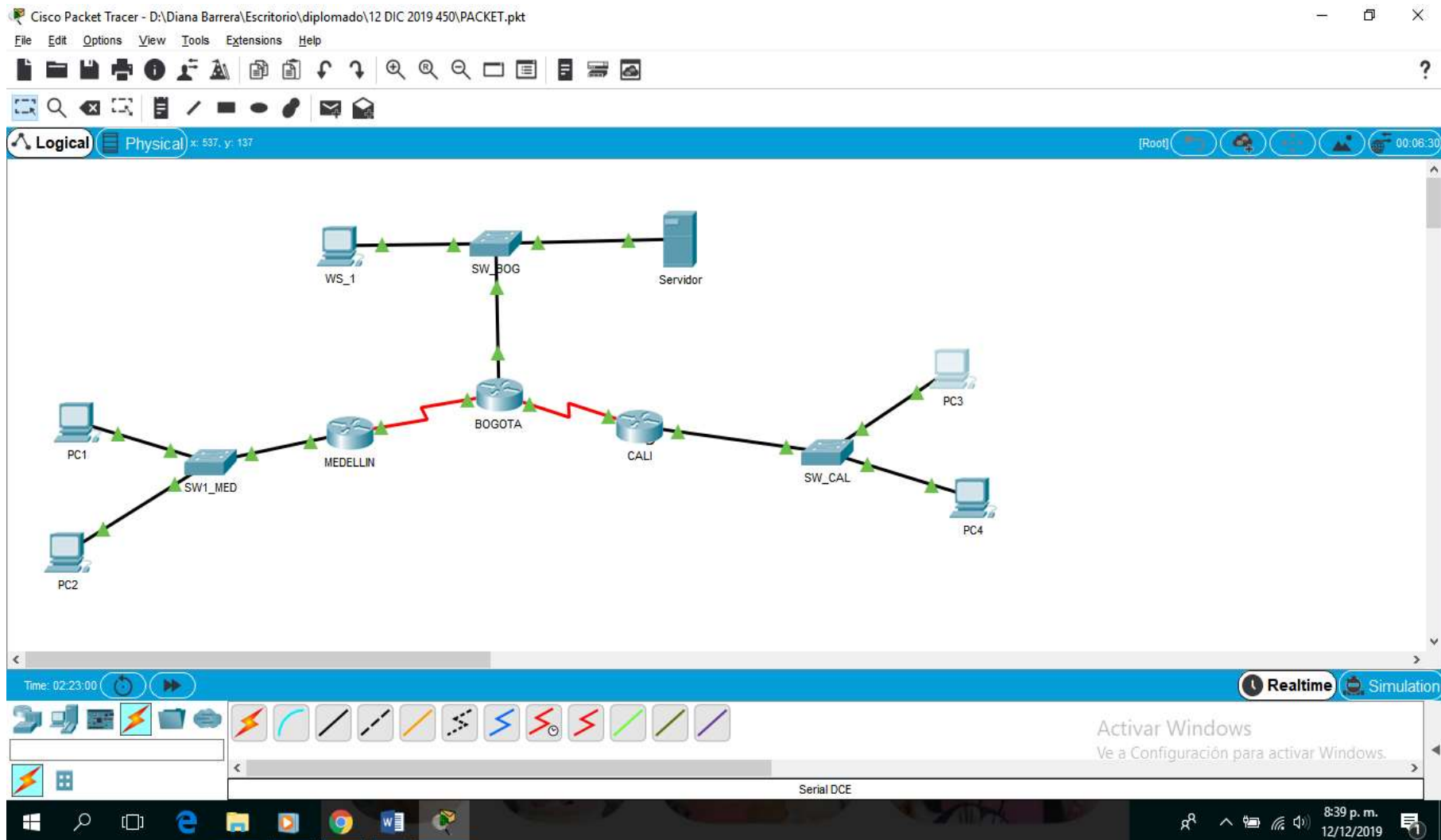


Figura 2. Diseño de red en packet tracer

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).

Asignar Nombres

Clave de Ingreso cisco

Configuraciones

Configuro Router1 Medellin Nombre, Clave consola y Vty

```
Router>EN
```

```
Router#conf t
```

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

```
Router(config)#hostname MEDELLIN
```

```
MEDELLIN(config)#no ip domain-lookup
```

```
MEDELLIN(config)#service password-encryption
```

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

```
MEDELLIN(config-line)#password cisco
```

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

```
MEDELLIN(config-line)#line vty 0 4
```

```
MEDELLIN(config-line)#password cisco
```

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

```
MEDELLIN(config-line)#exit
```

```
MEDELLIN(config)#enable secret cisco
```

```
MEDELLIN(config)#do write
```

```
Building configuration...
```

```
[OK]
```

```
MEDELLIN(config)#!
```

```
MEDELLIN#
```

```
%SYS-5-CONFIG_I: Configured from console by console Switch Medellin Nombre,  
Clave Consola, Vty y Hora
```

Configuración Switch Medellin Nombre, Clave Consola, Vty y Hora

```
Switch>en
```

```
Switch#conf ter
```

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

```
Switch(config)#hostname SW1-Med
```

```
SW1-Med(config)#hostname SW1_Med
```

```
SW1_Med(config)#no ip domain-lookup
```

```
SW1_Med(config)#line console 0
```

```
SW1_Med(config-line)#password cisco
```

```
SW1_Med(config-line)#login
```

```
SW1_Med(config-line)#line vty 0 4
```

```
SW1_Med(config-line)#password cisco
```

```
SW1_Med(config-line)#login
```

```
SW1_Med(config-line)#exit
SW1_Med(config)#service password-encryption
SW1_Med(config)#
SW1_Med(config)#enable secret cisco
SW1_Med(config)#do write
Building configuration...
[OK]
SW1_Med(config)#!
```

```
Configuro Switch Bogota Nombre, Clave consola, Vty y Hora
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)#service pass
Bogota(config)#service password-encryption
Bogota(config)#line console 0
Bogota(config-line)#password cisco
Bogota(config-line)#login
Bogota(config-line)#line vty 0 4
Bogota(config-line)#password cisco
Bogota(config-line)#login
Bogota(config-line)#exit
Bogota(config)#enable secret cisco
Bogota(config)#do write
Building configuration...
[OK]
```

```
Configuro Router Bogota Nombre, Clave consola, Vty y Hora
Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname SW_BOG
SW_BOG(config)#no ip domain-lookup
SW_BOG(config)#line console 0
SW_BOG(config-line)#password cisco
SW_BOG(config-line)#login
SW_BOG(config-line)#line vty 0 4
SW_BOG(config-line)#password cisco
SW_BOG(config-line)#login
SW_BOG(config-line)#exit
SW_BOG(config)#service password-encryption
```

```
SW_BOG(config)#enable secret cisco
SW_BOG(config)#do write
Building configuration...
[OK]
SW_BOG(config)#
```

```
Configuro Router Cali Nombre, Clave consola, Vty y Hora
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)#line console 0
CALI(config-line)#password cisco
CALI(config-line)#login
CALI(config-line)#line vty 0 4
CALI(config-line)#password cisco
CALI(config-line)#
CALI(config-line)#login
CALI(config-line)#exit
CALI(config)#enable secret cisco
CALI(config)#service password-encryption
CALI(config)#do wr
Building configuration...
[OK]
CALI(config)#
```

```
Configuro Switch Cali Nombre, Clave consola, Vty y Hora
Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console
Switch#en
Switch#SW_Cali
Translating "SW_Cali"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address
Switch#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname SW_Cali
SW_Cali(config)#line vty 0 4
SW_Cali(config-line)#password cisco
```

```

SW_Cali(config-line)#login
SW_Cali(config-line)#line console 0
SW_Cali(config-line)#password cisco
SW_Cali(config-line)#login
SW_Cali(config-line)#exit
SW_Cali(config)#enable secret cisco
SW_Cali(config)#service pass
SW_Cali(config)#service password-encryption
SW_Cali(config)#do write
Building configuration...
[OK]
SW_Cali(config)#! Realizar la conexión física de los equipos con base en la
topología de red.

```

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

Parte 1: Asignación de direcciones IP:

a. Se debe dividir (subnetear) la red creando una segmentación en ocho partes, para permitir crecimiento futuro de la red corporativa.

RTA:

Red Clase C: 192.168.1.0

Crear una segmentación en ocho partes

Mascara Por default	255	255	255	0
Mascara Por default Binario	11111111	11111111	11111111	00000000

Mascara Adaptada - Binario	11111111	11111111	11111111	11100000
Mascara Adaptada	255	255	255	224 o /27

Host Útiles: 30

Uso fórmula

$$2^n - 2$$

$$2^5 - 2 = 32 - 2 = 30$$

b. Asignar una dirección IP a la red.
192.168.1.0

Parte 2: Configuración Básica.

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

	R1	R2	R3
Nombre de Host	MEDELLIN	BOGOTA	CALI
Dirección de Ip en interfaz Serial 0/0	192.168.1.99	192.168.1.98	192.168.1.131
Dirección de Ip en interfaz Serial 0/1		192.168.1.130	
Dirección de Ip en interfaz FA 0/0	192.168.1.33	192.168.1.1	192.168.1.65
Protocolo de enrutamiento	Eigrp	Eigrp	Eigrp
Sistema Autónomo	200	200	200
Afirmaciones de red	192.168.1.0	192.168.1.0	192.168.1.0
Nombre de Host	IP	Masca	Puerta
WS_1	192.168.1.4	255.255.255.224	192.168.1.31
Servidor	192.168.1.2	255.255.255.224	192.168.1.31
Pc1	192.168.1.36	255.255.255.224	192.168.1.63
Pc2	192.168.1.37	255.255.255.224	192.168.1.63
Pc3	192.168.1.68	255.255.255.224	192.168.1.95
Pc4	192.168.1.69	255.255.255.224	192.168.1.95

Interface Router Medellin

```
MEDELLIN>en
```

```
Password:
```

```
MEDELLIN#conf ter
```

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

```
MEDELLIN(config)#inter s0/0/0
```

```
%Invalid interface type and number
```

```
MEDELLIN(config)#inter s0
```

```
MEDELLIN(config)#inter
```

```
MEDELLIN(config)#interface s0/1/0
```

```
MEDELLIN(config-if)#ip add 192.168.1.99 255.255.255.224
```

```
MEDELLIN(config-if)#no shut
```

```
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
```

```
MEDELLIN(config-if)#exit
```

```
MEDELLIN(config)#exit
```

```
MEDELLIN#conf ter
```

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

```
MEDELLIN(config)#inter GIGA0/0
```

```
MEDELLIN(config-if)#ip add 192.168.1.33 255.255.255.224
```

```
MEDELLIN(config-if)#no shut
MEDELLIN(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0,
changed state to up
MEDELLIN#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
MEDELLIN#
```

```
Interface Router Bogota
Bogota#config ter
Enter configuration commands, one per line. End with CNTL/Z.
Bogota(config)#inter s0/1/0
Bogota(config-if)#ip add 192.168.1.98 255.255.255.224
Bogota(config-if)#no shut
Bogota(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
Bogota(config-if)#exit
Bogota(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state
to up
Bogota(config)#inter s0/1/1
Bogota(config-if)#ip add 192.168.1.130 255.255.255.224
Bogota(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
Bogota(config-if)#exit
Bogota(config)#inter giga0/0
Bogota(config-if)#ip add 192.168.1.1 255.255.255.224
Bogota(config-if)#no shut
Bogota(config-if)#
```

```
Interface Router Cali
CALI>en
Password:
CALI#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
CALI(config)#inter s0/1/0
CALI(config-if)#ip add 192.168.1.131 255.255.255.224
CALI(config-if)#no shut
CALI(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
CALI(config-if)#ext
```

```

^
% Invalid input detected at '^' marker.
CALI(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state
to up

CALI(config-if)#exit
CALI(config)#inter G0/0
CALI(config-if)#ip add 192.168.1.55 255.255.255.224
CALI(config-if)#no shut
CALI(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0,
changed state to up
CALI(config-if)#
CALI#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]

```

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.

```

MEDELLIN
MEDELLIN>en
MEDELLIN#sh ip route
Codes: L - local, C - connected, S - static, 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
192.168.1.0/24 is variably subnetted, 4 subnets, 2 masks
C 192.168.1.32/27 is directly connected, GigabitEthernet0/0
L 192.168.1.33/32 is directly connected, GigabitEthernet0/0
C 192.168.1.96/27 is directly connected, Serial0/0/1
L 192.168.1.99/32 is directly connected, Serial0/0/1
MEDELLIN#
BOGOTA
Bogota#sh ip route

```

Codes: L - local, C - connected, S - static, 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
192.168.1.0/24 is variably subnetted, 6 subnets, 2 masks
C 192.168.1.0/27 is directly connected, GigabitEthernet0/0
L 192.168.1.1/32 is directly connected, GigabitEthernet0/0
C 192.168.1.96/27 is directly connected, Serial0/0/1
L 192.168.1.98/32 is directly connected, Serial0/0/1
C 192.168.1.128/27 is directly connected, Serial0/0/0
L 192.168.1.130/32 is directly connected, Serial0/0/0

CALI

CALI>sh ip route

Codes: L - local, C - connected, S - static, 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
192.168.1.0/24 is variably subnetted, 4 subnets, 2 masks
C 192.168.1.32/27 is directly connected, GigabitEthernet0/0
L 192.168.1.55/32 is directly connected, GigabitEthernet0/0
C 192.168.1.128/27 is directly connected, Serial0/0/1
L 192.168.1.131/32 is directly connected, Serial0/0/1

d. Realizar un diagnóstico de vecinos usando el comando cdp.Bogota

Bogota>sh cdp neighbors

Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone
Device ID Local Intrfce Holdtme Capability Platform Port ID
SW_BOG Gig 0/0 176 S 2960 Fas 0/1
MEDELLIN Ser 0/0/0 164 R C1900 Ser 0/0/1
CALI Ser 0/0/1 160 R C1900 Ser 0/0/1

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

Se realiza ping desde el PC1 Al Servidor

```
:>ping 192.168.1.33
Pinging 192.168.1.33 with 32 bytes of data:
Reply from 192.168.1.33: bytes=32 time=1ms TTL=255
Reply from 192.168.1.33: bytes=32 time=1ms TTL=255
Reply from 192.168.1.33: bytes=32 time<1ms TTL=255
Reply from 192.168.1.33: bytes=32 time<1ms TTL=255
```

```
Ping statistics for 192.168.1.33:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 1ms, Average = 0ms
C:>C:>
```

```
Se realiza ping desde el PC 2 Al PC1 de la lan 2
:>ping 192.168.1.33
```

```
Pinging 192.168.1.33 with 32 bytes of data:
Reply from 192.168.1.33: bytes=32 time=1ms TTL=255
Reply from 192.168.1.33: bytes=32 time=1ms TTL=255
Reply from 192.168.1.33: bytes=32 time<1ms TTL=255
Reply from 192.168.1.33: bytes=32 time<1ms TTL=255
```

```
Ping statistics for 192.168.1.33:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

```
C:>C:>
Se realiza ping desde el PC3 al PC4
Pinging 192.168.1.69 with 32 bytes of data:
Reply from 192.168.1.69: bytes=32 time<1ms TTL=128
Reply from 192.168.1.69: bytes=32 time<1ms TTL=128
Reply from 192.168.1.69: bytes=32 time<1ms TTL=128
Reply from 192.168.1.69: bytes=32 time<1ms TTL=128
Ping statistics for 192.168.1.69:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

```
C:>
```

Parte 3: Configuración de Enrutamiento.

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

```
MEDELLIN
MEDELLIN>en
Password:
MEDELLIN#router eigrp 8
^
% Invalid input detected at '^' marker.
MEDELLIN#conf t
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN(config)#router eigrp 8
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)#no auto-summary
MEDELLIN(config-router)#exit
MEDELLIN(config)#do write
Building configuration...
[OK]
MEDELLIN(config)#
```

```
BOGOTA
Bogota>en
Password:
Bogota#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota(config)#router eigrp 8
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)#no auto-summary
Bogota(config-router)#exit
Bogota(config)#do write
Building configuration...
[OK]
```

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

```
CALI>en
Password:
```

```

CALI#router eigrp 8
^
% Invalid input detected at '^' marker.
CALI#conf t
Enter configuration commands, one per line. End with CNTL/Z.
CALI(config)#router eigrp 8
CALI(config-router)#network 192.168.1.32 0.0.0.31
CALI(config-router)#network 192.168.1.128 0.0.0.31
CALI(config-router)#no auto-summary
CALI(config-router)#exit
CALI(config)#do write
Building configuration...
[OK]
CALI(config)#

```

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

```

MEDELLIN
MEDELLIN>en
Password:
MEDELLIN#sh ip eigrp neig
IP-EIGRP neighbors for process 8
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 192.168.1.98 Se0/0/1 14 00:01:46 40 1000 0 4
BOGOTA
Bogota# sh ip eigrp neig
IP-EIGRP neighbors for process 8
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 192.168.1.99 Se0/0/1 13 00:01:03 40 1000 0 5
1 192.168.1.131 Se0/0/0 13 00:00:51 40 1000 0 5

Bogota#!
Cali
CALI#sh ip eigrp neighbors
IP-EIGRP neighbors for process 8
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 192.168.1.130 Se0/0/1 10 00:10:15 40 1000 0 6
CALI#

```

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

Medellin:

```
MEDELLIN#sh ip route eigrp
```

```
192.168.1.0/24 is variably subnetted, 6 subnets, 2 masks
```

```
D 192.168.1.0/27 [90/2172416] via 192.168.1.98, 00:10:58, Serial0/0/1
```

```
D 192.168.1.128/27 [90/2681856] via 192.168.1.98, 00:10:52, Serial0/0/1
```

```
MEDELLIN#
```

Bogotá:

```
Bogota#sh ip route eigrp
```

```
192.168.1.0/24 is variably subnetted, 7 subnets, 2 masks
```

```
D 192.168.1.32/27 [90/2172416] via 192.168.1.99, 00:11:23, Serial0/0/1
```

```
[90/2172416] via 192.168.1.131, 00:11:11, Serial0/0/0
```

Cali

```
CALI#sh ip route eigrp
```

```
192.168.1.0/24 is variably subnetted, 6 subnets, 2 masks
```

```
D 192.168.1.0/27 [90/2172416] via 192.168.1.130, 00:11:28, Serial0/0/1
```

```
D 192.168.1.96/27 [90/2681856] via 192.168.1.130, 00:11:28, Serial0/0/1
```

```
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 MEDELLIN y luego al servidor.

Ping de la LAN Cali (PC4) A LAN Medellin (PC1)

```
C:\>ping 192.168.1.35
```

Pinging 192.168.1.35 with 32 bytes of data:

```
Reply from 192.168.1.35: bytes=32 time=10ms TTL=125
```

```
Reply from 192.168.1.35: bytes=32 time=11ms TTL=125
```

```
Reply from 192.168.1.35: bytes=32 time=15ms TTL=125
```

```
Reply from 192.168.1.35: bytes=32 time=19ms TTL=125
```

```
Ping statistics for 192.168.1.35:
```

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

```
Approximate round trip times in milli-seconds:
```

```
Minimum = 10ms, Maximum = 19ms, Average = 13ms
```

```
C:\>
```

Ping de la LAN Cali (PC4) A LAN Bogotá (Servidor)

```
C:\>ping 192.168.1.12
```

Pinging 192.168.1.12 with 32 bytes of data:


```
Reply from 192.168.1.12: bytes=32 time=2ms TTL=126
Reply from 192.168.1.12: bytes=32 time=14ms TTL=126
Reply from 192.168.1.12: bytes=32 time=1ms TTL=126
Reply from 192.168.1.12: bytes=32 time=1ms TTL=126
```

```
Ping statistics for 192.168.1.12:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 14ms, Average = 4ms
```

```
C:\>
```

Parte 4: Configuración de las listas de Control de Acceso.

En este momento cualquier usuario de la red tiene acceso a todos sus dispositivos y estaciones de trabajo. El jefe de redes le solicita implementar seguridad en la red. Para esta labor se decide configurar listas de control de acceso (ACL) a los routers. Las condiciones para crear las ACL son las siguientes:

a. Cada router debe estar habilitado para establecer conexiones Telnet con los demás routers y tener acceso a cualquier dispositivo en la red.

```
MEDELLIN
Password:
MEDELLIN>en
Password:
MEDELLIN#config ter
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN(config)#no ip domain-lookup
MEDELLIN(config)#line vty 0 4
MEDELLIN(config-line)#password cisco
MEDELLIN(config-line)#login
MEDELLIN(config-line)#exit
MEDELLIN(config)#enable secret cisco
MEDELLIN(config)#service password-encryption
MEDELLIN(config)#do wr
Building configuration...
[OK]
MEDELLIN(config)#!
MEDELLIN#
%SYS-5-CONFIG_I: Configured from console by console
BOGOTA
Bogota>en
Password:
Bogota#config ter
Enter configuration commands, one per line. End with CNTL/Z.
```

```
Bogota(config)#no ip domain-lookup
Bogota(config)#line vty 0 4
Bogota(config-line)#password cisco
Bogota(config-line)#login
Bogota(config-line)#exit
Bogota(config)#enable secret cisco
Bogota(config)#service password-encryption
Bogota(config)#do wr
Building configuration...
[OK]
Bogota(config)#
CALI
```

Password:

```
CALI>en
Password:
CALI#config ter
Enter configuration commands, one per line. End with CNTL/Z.
CALI(config)#no ip domain-lookup
CALI(config)#line vty 0 4
CALI(config-line)#password cisco
CALI(config-line)#login
CALI(config-line)#exit
CALI(config)#enable secret cisco
CALI(config)#service password-encryption
CALI(config)#do wr
Building configuration...
[OK]
CALI(config)#
```

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 MEDELLIN y CALI no deben tener acceso a ningún dispositivo fuera de su subred, excepto para interconectar con el servidor.

```
LAN Medellin
MEDELLIN>en
Password:
MEDELLIN#conf terminal
```

```
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN(config)#acc
MEDELLIN(config)#access-list 2 deny 192.168.1.64 0.0.0.31
MEDELLIN(config)#access-list 2 permit any
MEDELLIN(config)#
MEDELLIN#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
MEDELLIN(config)#inter G0/0
MEDELLIN(config-if)#ip acc
MEDELLIN(config-if)#ip access-group 2 out
MEDELLIN(config-if)#
MEDELLIN #
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
MEDELLIN#sh run
Building configuration...
[OK]
MEDELLIN#
```

```
LAN Cali
CALI>en
Password:
CALI#conf terminal
Enter configuration commands, one per line. End with CNTL/Z.
CALI(config)#acc
CALI(config)#access-list 2 deny 192.168.1.32 0.0.0.31
CALI(config)#access-list 2 permit any
CALI(config)#
CALI#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
CALI(config)#inter G0/0
CALI(config-if)#ip acc
CALI(config-if)#ip access-group 2 out
CALI(config-if)#
CALI#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
CALI#sh run
Building configuration...
[OK]
```

CALI#

Parte 5: Comprobación de la red instalada.

a. Se debe probar que la configuración de las listas de acceso fue exitosa.

Ping de Router CALI a router WS_1

Password:

```
CALI>ping 192.168.1.4
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.1.4, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/3/10 ms

```
CALI>
```

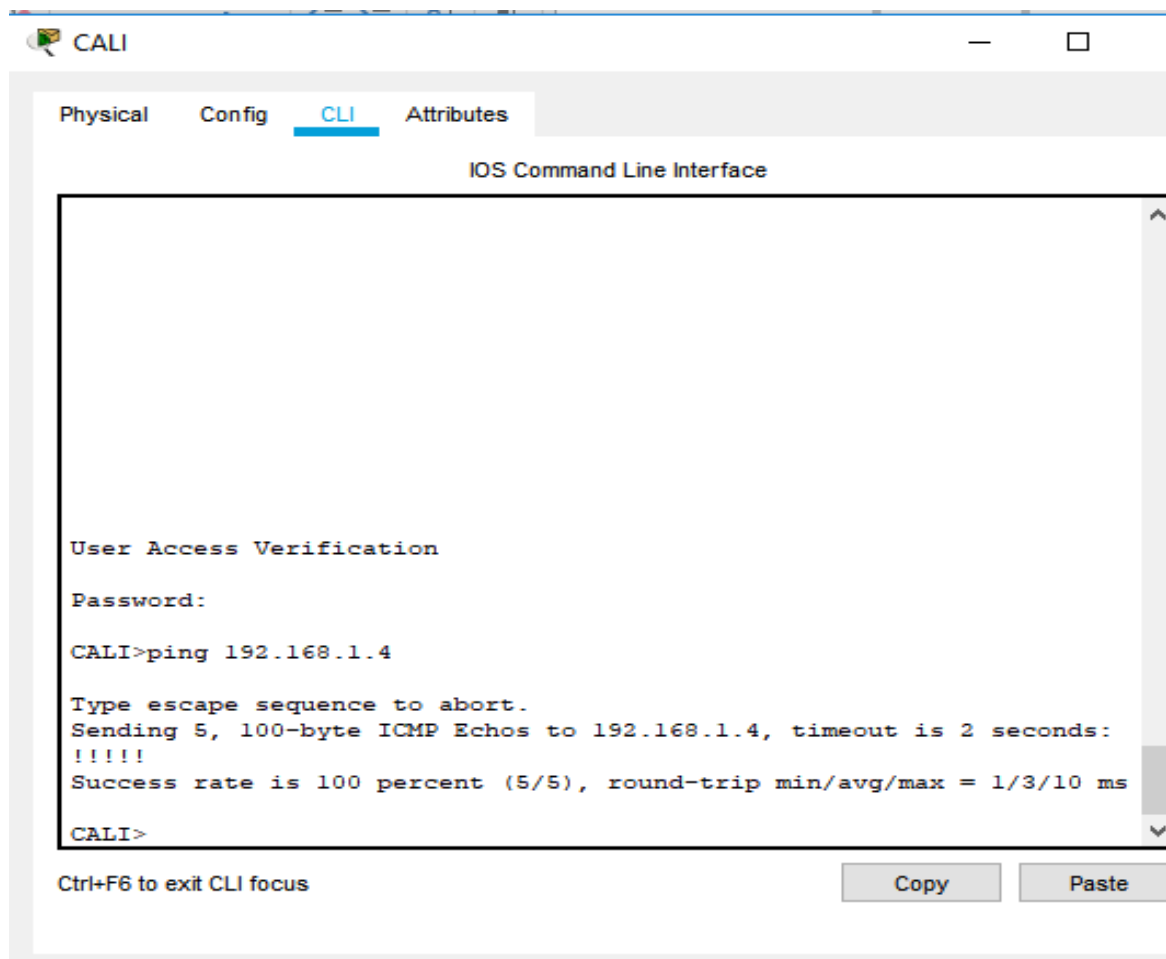


Figura 3. Ping Medellin

```
Ping de router de medellin a router de cali
MEDELLIN>en
Password:
MEDELLIN#ping 192.168.1.131
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.131, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/3/5 ms
MEDELLIN#!
MEDELLIN#
```

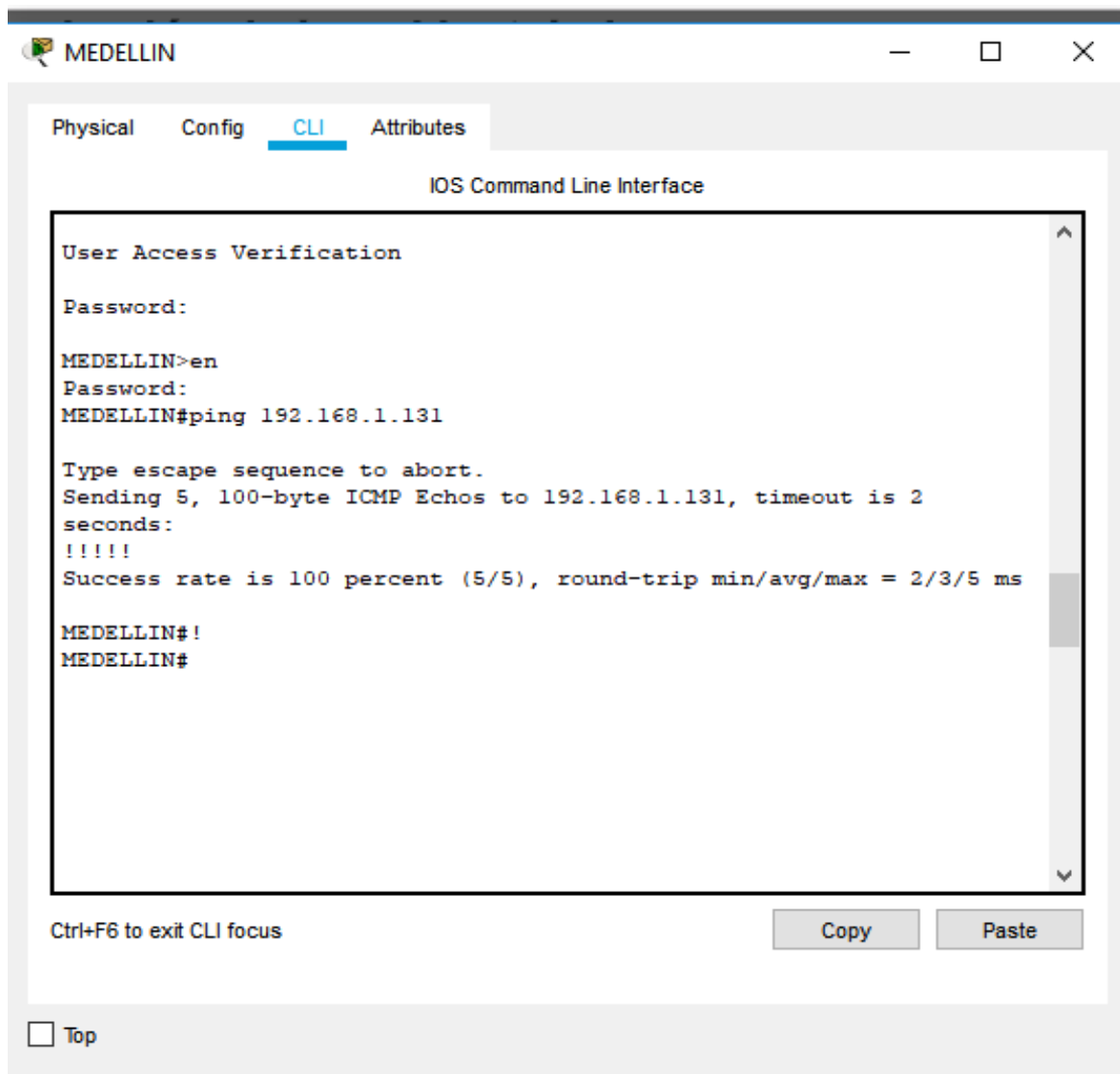


Figura 4. ping router cali

Ping y telnet de WS_1 a Router Bogota

```
C:\>ping 192.168.1.99
```

Pinging 192.168.1.99 with 32 bytes of data:

```
Reply from 192.168.1.99: bytes=32 time=1ms TTL=254
```

```
Reply from 192.168.1.99: bytes=32 time=1ms TTL=254
```

```
Reply from 192.168.1.99: bytes=32 time=1ms TTL=254
```

```
Reply from 192.168.1.99: bytes=32 time=1ms TTL=254
```

Ping statistics for 192.168.1.99:

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

Approximate round trip times in milli-seconds:

Minimum = 1ms, Maximum = 1ms, Average = 1ms

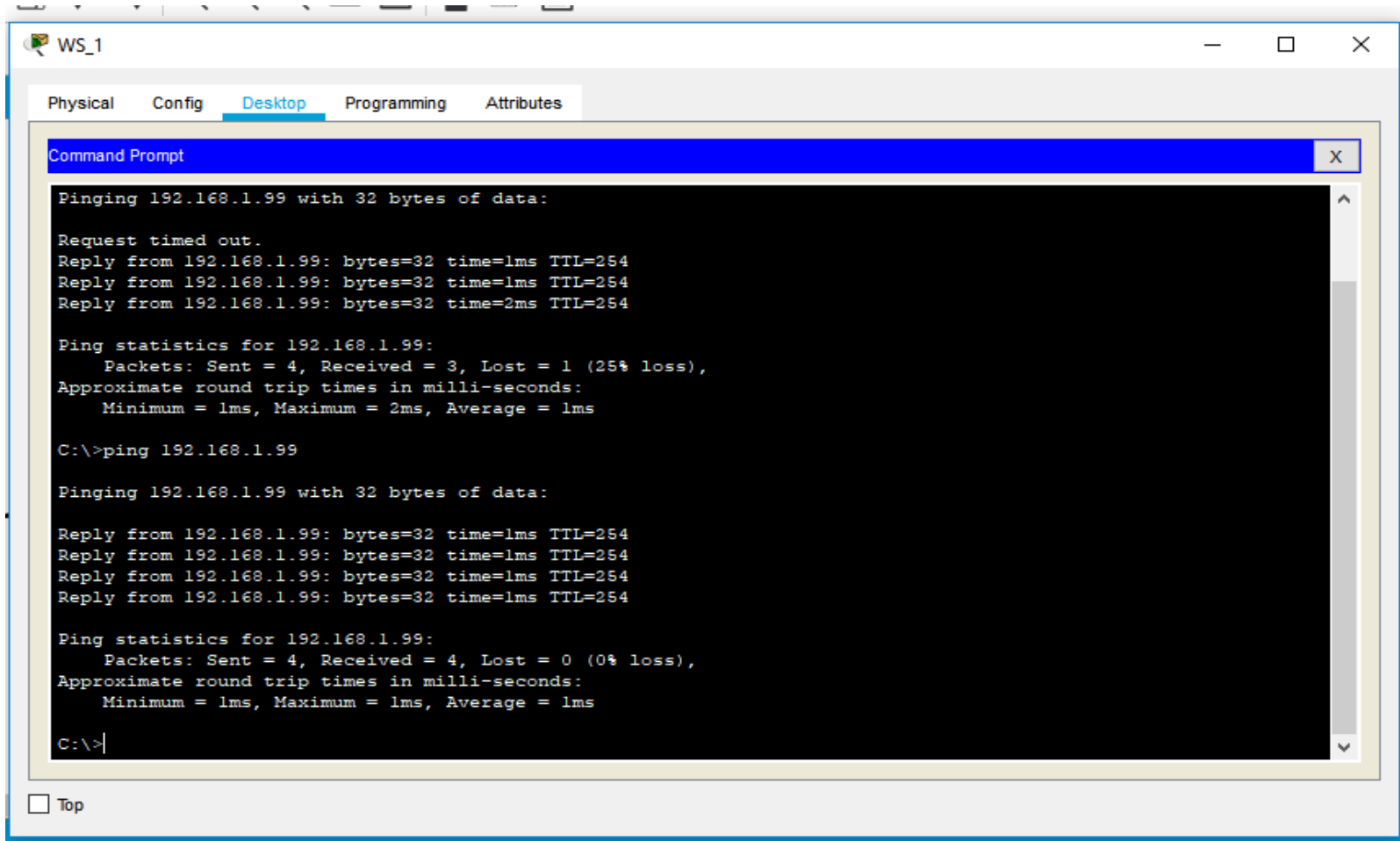


Figura 5. Ping router Medellin

```
Ping y telnet de servidor a router cali
Packet Tracer SERVER Command Line 1.0
C:\>ping 192.168.1.131
```

```
Pinging 192.168.1.131 with 32 bytes of data:
```

```
Reply from 192.168.1.131: bytes=32 time=2ms TTL=254
Reply from 192.168.1.131: bytes=32 time=1ms TTL=254
Reply from 192.168.1.131: bytes=32 time=2ms TTL=254
Reply from 192.168.1.131: bytes=32 time=1ms TTL=254
```

```
Ping statistics for 192.168.1.131:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 2ms, Average = 1ms
```

```
C:\>telnet 192.168.1.131
Trying 192.168.1.131 ...Open
User Access Verification
Password:
Password:
CALI>en
Password
```

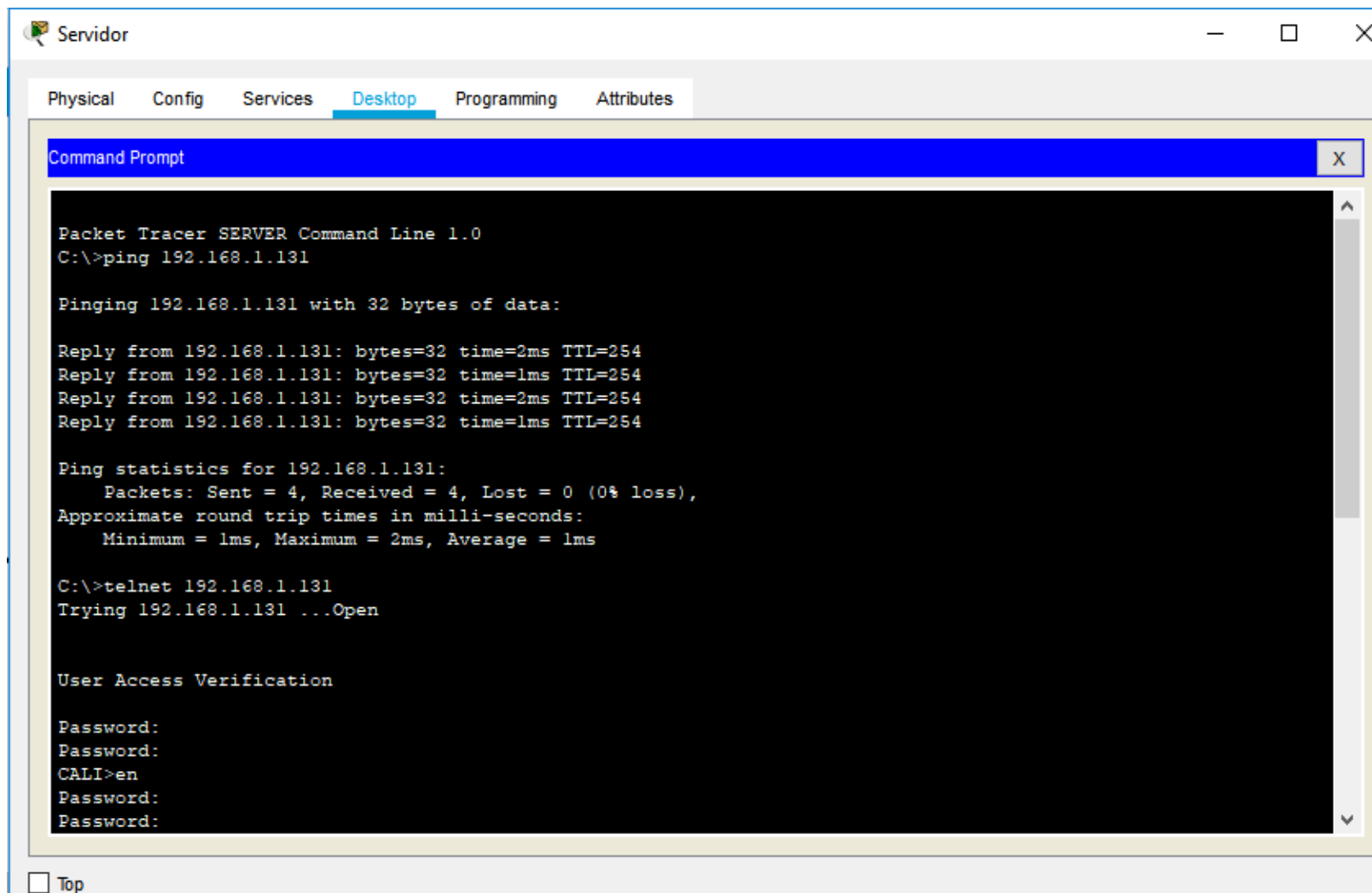



Figura 6. ping de servidor a router Cali

Ping y telnet de servidor a router medellin

```
C:\>ping 192.168.1.99
```

Pinging 192.168.1.99 with 32 bytes of data:

```
Reply from 192.168.1.99: bytes=32 time=1ms TTL=254
```

```
Reply from 192.168.1.99: bytes=32 time=2ms TTL=254
```

```
Reply from 192.168.1.99: bytes=32 time=2ms TTL=254
```

```
Reply from 192.168.1.99: bytes=32 time=1ms TTL=254
```

Ping statistics for 192.168.1.99:

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

Approximate round trip times in milli-seconds:

Minimum = 1ms, Maximum = 2ms, Average = 1ms

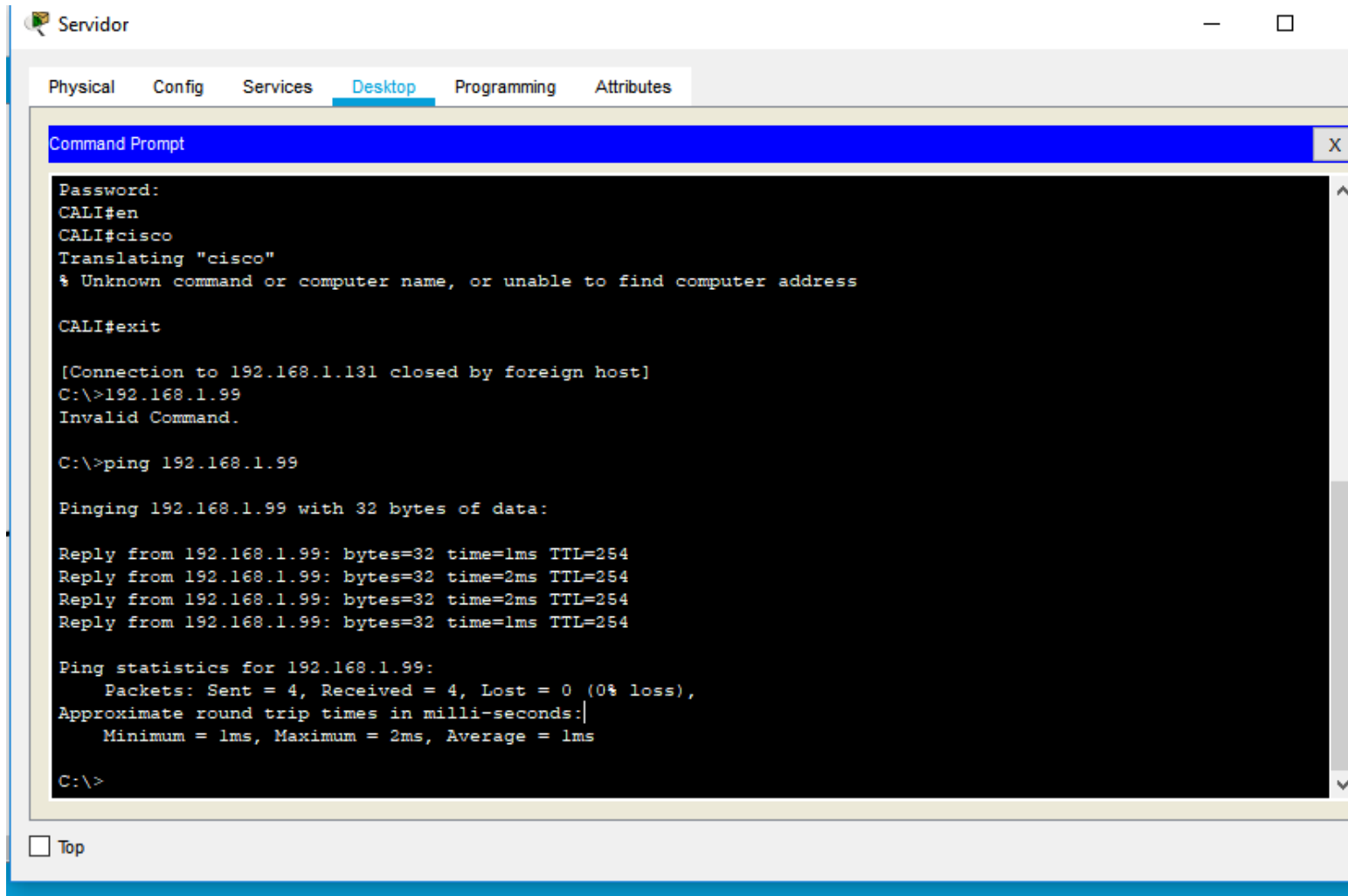


Figura 7. ping LAN Medellin a router Medellin

Ping y telnet de LAN Medellin A router medellin
 [Connection to 192.168.1.131 closed by foreign host]
 C:\>192.168.1.99
 Invalid Command.
 C:\>ping 192.168.1.99
 Pinging 192.168.1.99 with 32 bytes of data:
 Reply from 192.168.1.99: bytes=32 time=1ms TTL=254
 Reply from 192.168.1.99: bytes=32 time=2ms TTL=254
 Reply from 192.168.1.99: bytes=32 time=2ms TTL=254
 Reply from 192.168.1.99: bytes=32 time=1ms TTL=254
 Ping statistics for 192.168.1.99:
 Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
 Approximate round trip times in milli-seconds:
 Minimum = 1ms, Maximum = 2ms, Average = 1ms

b. Comprobar y Completar la siguiente tabla de condiciones de prueba para confirmar el óptimo funcionamiento de la red e.

	ORIGEN	DESTINO	RESULTADO
TELNET	Router MEDELLIN	Router CALI	Ok
	WS_1	Router BOGOTA	Ok
	Servidor	Router CALI	Ok
	Servidor	Router MEDELLIN	Ok
TELNET	LAN del Router MEDELLIN	Router CALI	No
	LAN del Router CALI	Router CALI	No
	LAN del Router MEDELLIN	Router MEDELLIN	Ok
	LAN del Router CALI	Router MEDELLIN	Ok

PING	LAN del Router CALI	WS_1	Ok
	LAN del Router MEDELLIN	WS_1	Ok
	LAN del Router MEDELLIN	LAN del Router CALI	Ok
PING	LAN del Router CALI	Servidor	Ok
	LAN del Router MEDELLIN	Servidor	Ok
	Servidor	LAN del Router MEDELLIN	Ok
	Servidor	LAN del Router CALI	Ok
	Router CALI	LAN del Router MEDELLIN	Ok
	Router MEDELLIN	LAN del Router CALI	Ok

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.

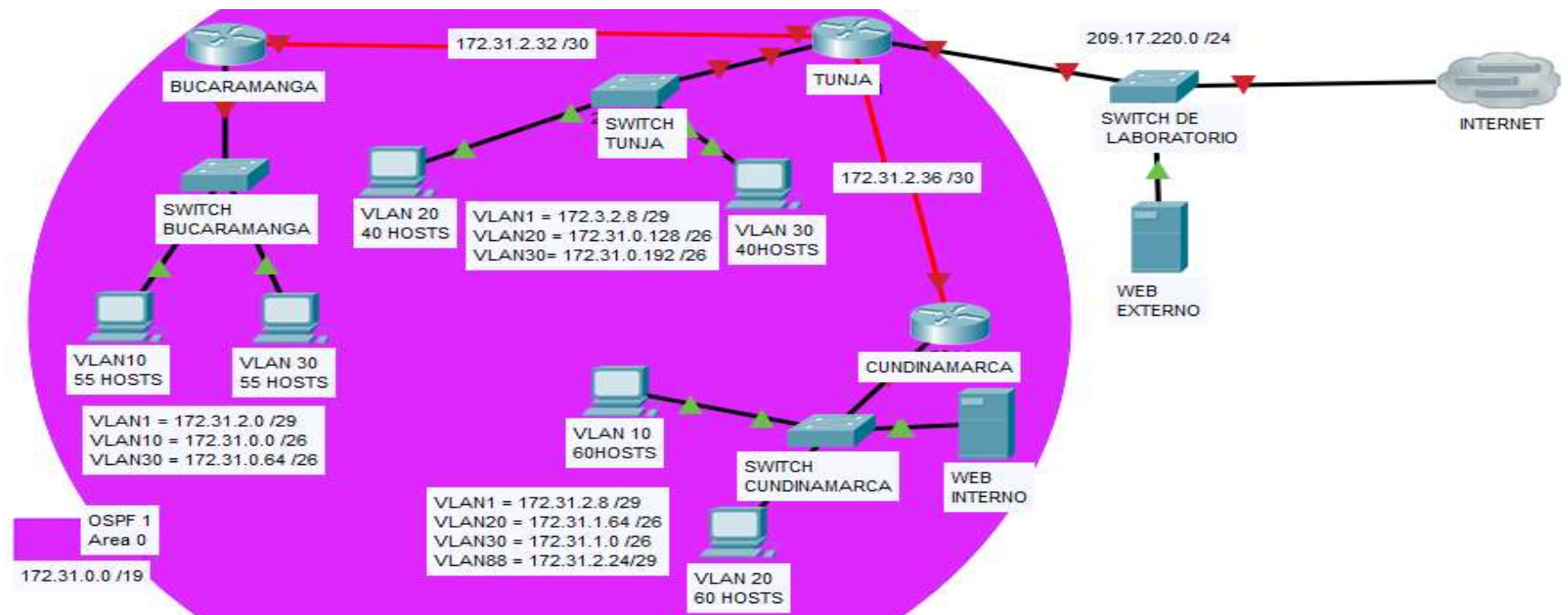


Figura 8. topologia de red ecenario

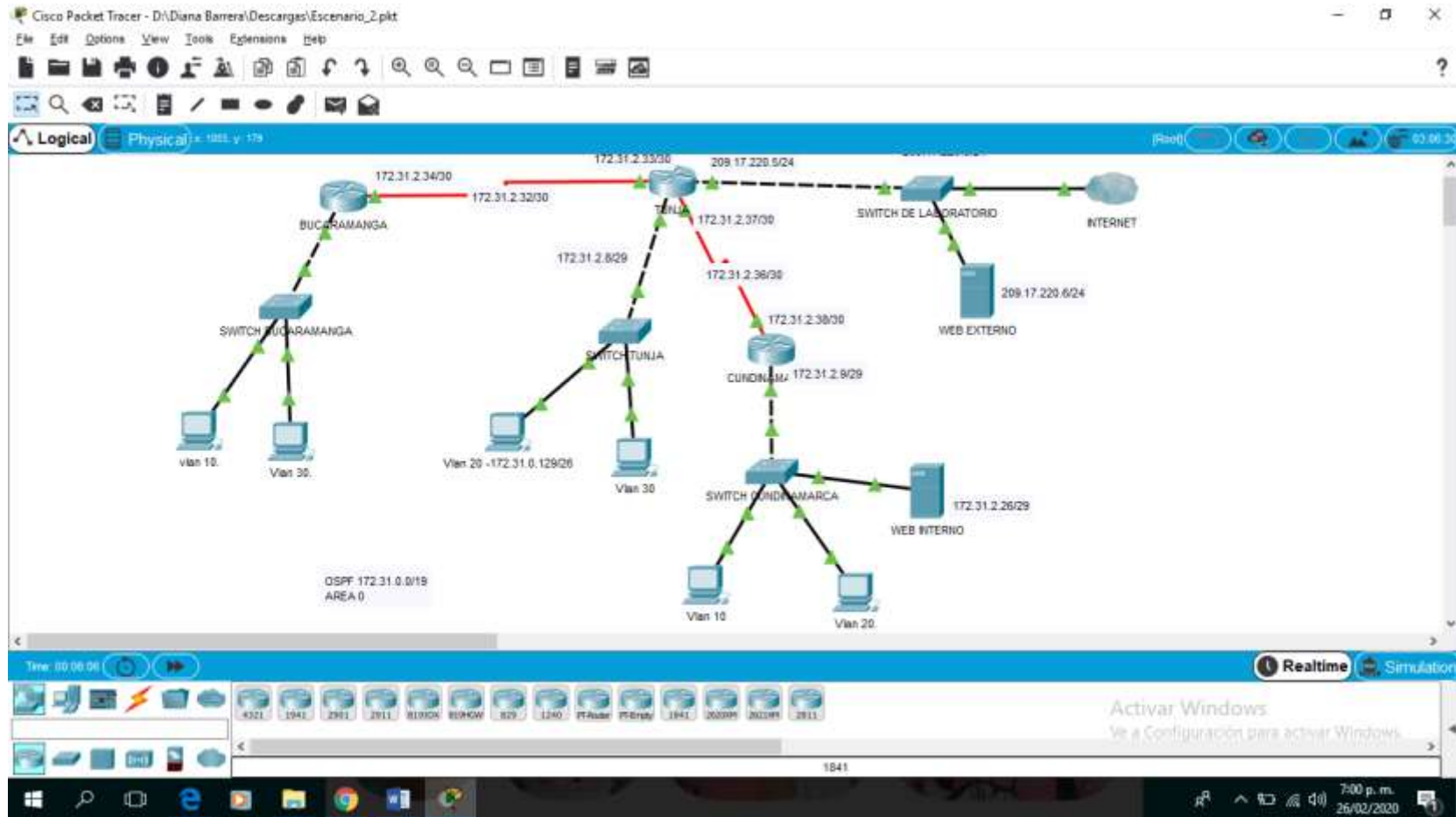


Figura 9. topología de red ecenario 2 en packet tracer

Desarrollo

Los siguientes son los requerimientos necesarios:

Parte 1: Todos los routers deberán tener lo siguiente:

Configuración básica.

Configuro ip y hostname router Bucaramanga

```
Router>EN
```

```
Router#configure terminal
```

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

```
Router(config)#hostname BUCARA
```

```
BUCARA(config)#inter s0/1/0
```

```
BUCARA(config-if)#ip add 172.31.2.34 255.255.255.252
```

```
BUCARA(config-if)#no shut
```

```
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
```

```
BUCARA(config-if)#exit
```

```
BUCARA(config)#inter g0/0
```

```
BUCARA(config-if)#no shu
```

```
BUCARA(config-if)#
```

```
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0,  
changed state to up
```

```
BUCARA(config-if)#exit
```

```
BUCARA(config)#end
```

```
BUCARA#
```

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

```
BUCARA#wr
```

```
Building configuration...
```

```
[OK]
```

```
BUCARA#
```

- Configuración Hostname y IPs Router TUNJA

```
Router>en
```

```
Router#configure terminal
```

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

```
Router(config)#hostname R_TUNJA
```

```
R_TUNJA(config)#inter s0/1/0
```

```
R_TUNJA(config-if)#ip add 172.31.2.33 255.255.255.252
```



```
R_TUNJA(config-if)#no shut
```

```
R_TUNJA(config-if)#
```

```
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
```

```
R_TUNJA(config-if)#exit
```

```
R_TUNJA(config)#inter s0/1/1
```

```
R_TUNJA(config-if)#ip add 172.31.2.37 255.255.255.252
```

```
% 172.31.2.36 overlaps with Serial0/1/0
```

```
R_TUNJA(config-if)#clock rate 128000
```

```
R_TUNJA(config-if)#no shut
```

```
R_TUNJA(config-if)#
```

```
R_TUNJA#
```

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

```
wr
```

```
Building configuration...
```

```
[OK]
```

```
R_TUNJA#
```

```
R_TUNJA>EN
```

```
R_TUNJA#CONF TER
```

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

```
R_TUNJA(config)#inter g0/0
```

```
R_TUNJA(config-if)#ip add 209.17.220.5 255.255.255.0
```

```
R_TUNJA(config-if)#no shut
```

```
R_TUNJA(config-if)#
```

```
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0,  
changed state to up
```

```
R_TUNJA(config-if)#exit
```

```
R_TUNJA(config)#inter g0/1
```

```
R_TUNJA(config-if)#no shu
```

```
R_TUNJA(config-if)#
```

```
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1,  
changed state to up
```

```
R_TUNJA(config-if)#
```

```
R_TUNJA#
```

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

```
wr
Building configuration...
[OK]
R_TUNJA#
```

- **Configuro Hostname y IPs Router CUNDINAMARCA**

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#Hostname R_Cund
R_Cund(config)#inter s0/1/0
R_Cund(config-if)#ip add 172.31.2.38 255.255.255.252
R_Cund(config-if)#no shut
```

```
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
R_Cund(config-if)#
R_Cund#
```

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

```
Building configuration...
[OK]
R_Cund#
```

```
R_Cund(config)#inter G0/0
R_Cund(config-if)#no shut
```

```
R_Cund(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0,
changed state to up
```

```
R_Cund(config-if)#
R_Cund#
%SYS-5-CONFIG_I: Configured from console by console
```

```
wr
Building configuration...
[OK]
R_Cund#
```

Activo SSH

Primero Activo SSH y consola Router Tunja

```
R_TUNJA>enable
R_TUNJA#configure terminal
```

```
Enter configuration commands, one per line. End with CNTL/Z.
R_TUNJA(config)#ip domain name escenario.org
R_TUNJA(config)#ip ssh version 2
Please create RSA keys (of at least 768 bits size) to enable SSH v2.
R_TUNJA(config)#crypto key generate rsa
The name for the keys will be: R_TUNJA.escenario.org
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.
How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]
R_TUNJA(config)#do write
*mar. 1 0:16:59.835: %SSH-5-ENABLED: SSH 2 has been enabled
Building configuration...
[OK]
R_TUNJA(config)#line console 0
R_TUNJA(config-line)#password cisco
R_TUNJA(config-line)#exit
R_TUNJA(config)#service password-encryption
R_TUNJA(config)#enable secret cisco
R_TUNJA(config)#
R_TUNJA#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration.
[OK]
R_TUNJA#
```

Tercero Activo SSH Router Bucaramanga

```
BUCARA>enable
BUCARA#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
BUCARA(config)#ip domain name escenario.org
BUCARA(config)#ip ssh version 2
Please create RSA keys (of at least 768 bits size) to enable SSH v2.
BUCARA(config)#crypto key generate rsa
The name for the keys will be: BUCARA.escenario.org
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

BUCARA(config)#do wr
```

*mar. 1 0:27:53.40: %SSH-5-ENABLED: SSH 2 has been enabled
Building configuration...

[OK]

BUCARA(config)#

- **Configuro Vlan en Switch y Router**

- **Router Cundinamarca vlan 20, 30 y 1**

R_Cund>enable

Password:

R_Cund#configure terminal

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

R_Cund(config)#inter g0/0

R_Cund(config-if)#exit

R_Cund(config)#inter g0/0.20

R_Cund(config-subif)#

%LINK-5-CHANGED: Interface GigabitEthernet0/0.20, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.20,
changed state to up

R_Cund(config-subif)#encapsulation dot1Q 20

R_Cund(config-subif)#ip add 172.31.1.65 255.255.255.192

R_Cund(config-subif)#exit

R_Cund(config)#inter g0/0.30

R_Cund(config-subif)#

%LINK-5-CHANGED: Interface GigabitEthernet0/0.30, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.30,
changed state to up

R_Cund(config-subif)#encapsulation dot1Q 30

R_Cund(config-subif)#ip add 172.31.1.1 255.255.255.192

R_Cund(config-subif)#exit

R_Cund(config)#inter g0/0.88

R_Cund(config-subif)#

%LINK-5-CHANGED: Interface GigabitEthernet0/0.88, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.88,
changed state to up

R_Cund(config-subif)#encapsulation dot1Q 88

R_Cund(config-subif)#ip add 172.31.2.25 255.255.255.248

R_Cund(config-subif)#exit

R_Cund(config)#inter g0/0.1

```
R_Cund(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.1,
changed state to up

R_Cund(config-subif)#encapsulation dot1Q 1
R_Cund(config-subif)#ip add 172.31.2.9 255.255.255.248
R_Cund(config-subif)#exit
R_Cund(config)#
R_Cund#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
R_Cund#
```

- **Router Tunja vlan 20, 30 y 1**

```
R_TUNJA>enable
Password:
R_TUNJA#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R_TUNJA(config)#inter g0/1.20
R_TUNJA(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1.20, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1.20,
changed state to up

R_TUNJA(config-subif)#encapsulation dot1Q 20
R_TUNJA(config-subif)#ip add 172.31.0.129 255.255.255.192
R_TUNJA(config-subif)#exit
R_TUNJA(config)#inter g0/1.30
R_TUNJA(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1.30, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1.30,
changed state to up

R_TUNJA(config-subif)#encapsulation dot1Q 30
R_TUNJA(config-subif)#ip add 172.31.0.193 255.255.255.192
R_TUNJA(config-subif)#exit
```

```
R_TUNJA(config)#inter g0/1.1
R_TUNJA(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1.1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1.1,
changed state to up
```

```
R_TUNJA(config-subif)#encapsulation dot1Q 1
R_TUNJA(config-subif)#ip add 172.31.2.9 255.255.255.248
R_TUNJA(config-subif)#exit
R_TUNJA(config)#
R_TUNJA#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
R_TUNJA#
```

```
R_TUNJA#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
R_TUNJA(config)#inter g0/1
R_TUNJA(config-if)#ip add 172.3.2.9 255.255.255.248
R_TUNJA(config-if)#no shut
R_TUNJA(config-if)#exit
R_TUNJA(config)#
R_TUNJA#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
```

- Router Bucaramanga vlan 10, 30 y 1

```
BUCARA>enable
Password:
BUCARA#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
BUCARA(config)#inter g0/0
BUCARA(config-if)#no shut
BUCARA(config-if)#exit
BUCARA(config)#inter g0/0.10
BUCARA(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.10, changed state to up
```

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.10, changed state to up

```
BUCARA(config-subif)#enca
BUCARA(config-subif)#encapsulation dot1Q 10
BUCARA(config-subif)#ip add 172.31.0.1 255.255.255.192
BUCARA(config-subif)#exit
BUCARA(config)#inter g0/0.30
BUCARA(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.30, changed state to up
```

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.30, changed state to up

```
BUCARA(config-subif)#encapsulation dot1Q 30
BUCARA(config-subif)#ip add 172.31.0.65 255.255.255.192
BUCARA(config-subif)#exit
BUCARA(config)#inter g0/0.1
BUCARA(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.1, changed state to up
```

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.1, changed state to up

```
BUCARA(config-subif)#encapsulation dot1Q 1
BUCARA(config-subif)#ip add 172.31.2.1 255.255.255.248
BUCARA(config-subif)#exit
BUCARA(config)#
BUCARA#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
BUCARA#
```

- **SWITCH CUNDINAMARCA Activo VLAN's y asigno puertos Vlan 10, 20 y 88**

```
SW-Cund#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-Cund(config)#vlan 88
SW-Cund(config-vlan)#name vlan88
SW-Cund(config-vlan)#exit
```

```

SW-Cund(config)#inter f0/1
SW-Cund(config-if)#switchport mode access
SW-Cund(config-if)#switchport access vlan 88
SW-Cund(config-if)#exit
SW-Cund(config)#vlan 10
SW-Cund(config-vlan)#name vlan10
SW-Cund(config-vlan)#exit
SW-Cund(config)#vlan 20
SW-Cund (config-vlan)#name vlan20
SW-Cund(config-vlan)#exit
SW-Cund(config)#interface range f0/2 - 15
SW-Cund(config-if-range)#switchport mode access
SW-Cund(config-if-range)#switchport access vlan 10
SW-Cund(config-if-range)#no shutdown
SW-Cund(config-if-range)#exit
SW-Cund(config)#interface range f0/16 - 22
SW-Cund(config-if-range)#switchport mode access
SW-Cund(config-if-range)#switchport access vlan 20
SW-Cund(config-if-range)#no shutdown
SW-Cund(config-if-range)#exit
SW-Cund(config)#inter g0/1
SW-Cund(config-if)#switchport mode trunk
SW-Cund(config-if)#no shutdown
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1,
changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1,
changed state to up
SW-Cund(config-if)#exit
SW-Cund(config)#
SW-Cund#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
Switch#

```

- SWITCH TUNJA Activo VLAN's y asigno puertos Vlan 20, 30

```

SW-Tunja>enable
Password:
SW-Tunja#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-Tunja(config)#vlan 20
SW-Tunja(config-vlan)#name vlan20

```



```

SW-Tunja(config-vlan)#exit
SW-Tunja(config)#vlan 30
SW-Tunja(config-vlan)#name vlan30
SW-Tunja(config-vlan)#exit
SW-Tunja(config)#inter range f0/1 -12
SW-Tunja(config-if-range)#switchport mode access
SW-Tunja(config-if-range)#switchport access vlan 20
SW-Tunja(config-if-range)#no shutdown
SW-Tunja(config-if-range)#exit
SW-Tunja(config)#inter range f0/13 - 24
SW-Tunja(config-if-range)#switchport mode access
SW-Tunja(config-if-range)#switchport access vlan 30
SW-Tunja(config-if-range)#no shutdown
SW-Tunja(config-if-range)#exit
SW-Tunja(config)#inter g0/1
SW-Tunja(config-if)#switchport mode trunk
SW-Tunja(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1,
changed state to down

```

```

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1,
changed state to up

```

```

SW-Tunja(config-if)#exit
SW-Tunja(config)#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
SW-Tunja#

```

- **SWITCH Bucaramanga Activo VLAN's y asigno puertos Vlan 10, 30**

```

Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname SW_Buca
SW_Buca(config)#vlan 10
SW_Buca(config-vlan)#name vlan10
SW_Buca(config-vlan)#exit
SW_Buca(config)#vlan 30
SW_Buca(config-vlan)#name vlan30
SW_Buca(config-vlan)#exit
SW_Buca(config)#inter range f0/1 - 12
SW_Buca(config-if-range)#switchport mode access
SW_Buca(config-if-range)#switchport access vlan 10

```

```

SW_Buca(config-if-range)#no shutdown
SW_Buca(config-if-range)#exit
SW_Buca(config)#inter range f0/13 - 24
SW_Buca(config-if-range)#switchport mode access
SW_Buca(config-if-range)#switchport access vlan 30
SW_Buca(config-if-range)#no shutdown
SW_Buca(config-if-range)#exit
SW_Buca(config)#inter g0/1
SW_Buca(config-if)#switchport mode trunk
SW_Buca(config-if)#exit
SW_Buca#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
SW_Buca#

```

Autenticación local con AAA.

Logear usuarios

Usuario	Clave
cisco	Cisco
Cisco1	Cisco1

- Configuro Router Cundinamarca

```

R_Cund>enable
R_Cund#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R_Cund(config)#ip domain name escenario.org
R_Cund(config)#ip ssh version 2
Please create RSA keys (of at least 768 bits size) to enable SSH v2.
R_Cund(config)#crypto key generate rsa
The name for the keys will be: R_Cund.escenario.org
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

```

```

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

```

```

R_Cund(config)#do write

```

```

*mar. 1 0:23:36.211: %SSH-5-ENABLED: SSH 2 has been enabled
Building configuration...
[OK]
R_Cund(config)#aaa new-model
R_Cund(config)#aaa authentication login Cisco group radius local enable
R_Cund(config)# radius-server host 172.31.2.2 key 0123456789
R_Cund(config)#line vty 0 4
R_Cund(config-line)#transport input ssh
R_Cund(config-line)#login authentication cisco
R_Cund(config)#username cisco secret cisco
R_Cund(config)#username cisco1 secret cisco1
R_Cund(config)#line console 0
R_Cund(config-line)#password cisco
R_Cund(config-line)#exit
R_Cund(config)#service password-encryption
R_Cund(config)#enable secret cisco
R_Cund(config)#do write
R_Cund(config)#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration.
[OK]
R_Cund#
  - Configuro Router TUNJA

```

Router TUNJA

```

R_TUNJA#CONFIGURE TERMINAL
Enter configuration commands, one per line. End with CNTL/Z.
R_TUNJA(config)#ip domain name escenario.org
R_TUNJA(config)#ip ssh version 2
R_TUNJA(config)#crypto key generate rsa
% You already have RSA keys defined named R_TUNJA.escenario.org .
% Do you really want to replace them? [yes/no]: y
The name for the keys will be: R_TUNJA.escenario.org
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

R_TUNJA(config)#
*mar. 1 0:28:57.336: %SSH-5-ENABLED: SSH 2 has been enabled
R_TUNJA(config)#aaa new-model

```

```
R_TUNJA(config)#aaa authentication login Cisco group radius local enable
R_TUNJA(config)#radius-server host 172.31.2.26 key 0123456789
R_TUNJA(config)#line vty 0 4
R_TUNJA(config-line)#transport input ssh
R_TUNJA(config-line)#login authentication Cisco
R_TUNJA(config-line)#exit
R_TUNJA(config)#username Cisco1 secret Cisco1
R_TUNJA(config)#username cisco secret cisco
R_TUNJA(config)#do write
Building configuration...
[OK]
R_TUNJA(config)#
- Configuro Router Bucaramanga
```

```
BUCARA>enable
Password:
BUCARA#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
BUCARA(config)#ip domain name escenario.org
BUCARA(config)#ip ssh version 2
BUCARA(config)#crypto key generate rsa
% You already have RSA keys defined named BUCARA.escenario.org .
% Do you really want to replace them? [yes/no]: y
The name for the keys will be: BUCARA.escenario.org
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.
```

```
How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]
```

```
BUCARA(config)#aaa new-model
*mar. 1 0:47:17.507: %SSH-5-ENABLED: SSH 2 has been enabled
BUCARA(config)#aaa authentication login Cisco group radius local enable
BUCARA(config)#radius-server host 172.31.2.26 key 0123456789
BUCARA(config)#line vty 0 4
BUCARA(config-line)#transport input ssh
BUCARA(config-line)#login authentication Cisco
BUCARA(config-line)#exit
BUCARA(config)#username Cisco1 secret Cisco1
BUCARA(config)#username cisco secret cisco
BUCARA(config)#do write
Building configuration...
[OK]
BUCARA(config)#
```

- **Configuro servidor AAA**

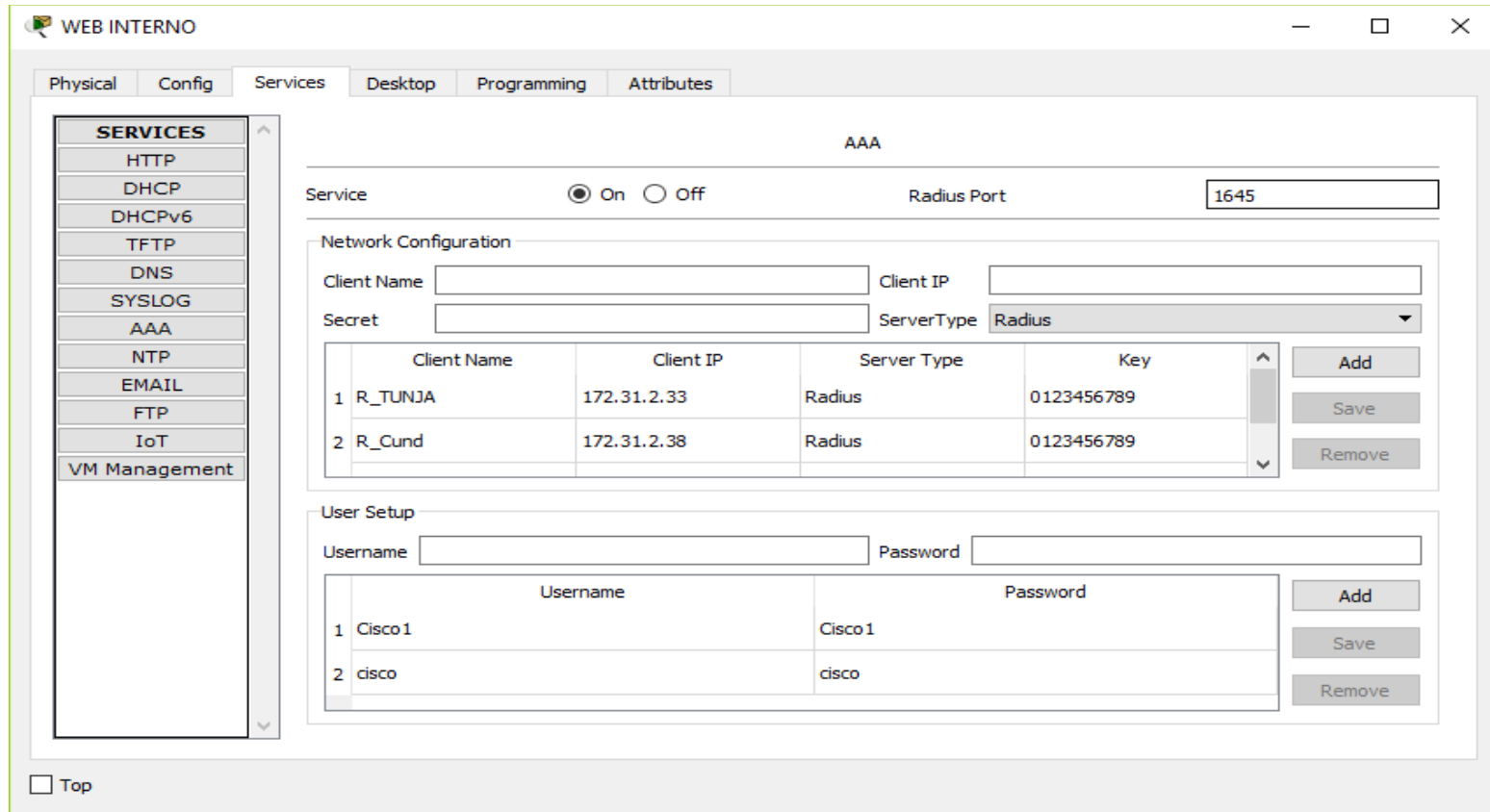


Figura 10. web interno servidor AAA

Cifrado de contraseñas.

Configuro todos los dispositivos

- Router de Cundinamarca

```
R_Cund#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R_Cund(config)#service password-encryption
R_Cund(config)#enable secret cisco
R_Cund(config)#exit
R_Cund#
```

- Router de TUNJA

```
R_TUNJA#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R_TUNJA(config)#service password-encryption
R_TUNJA(config)#enable secret cisco
R_TUNJA(config)#exit
R_TUNJA#
```

- Router de BUCARAMANGA

```
BUCARA#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
BUCARA(config)#service password-encryption
BUCARA(config)#enable secret cisco
BUCARA(config)#exit
BUCARA#
```

- Switch de Cundinamarca

```
SW_Cund (config)#line console 0
SW_Cund(config-line)#password cisco
SW_Cund(config-line)#exit
SW_Cund(config)#service password-encryption
SW_Cund(config)#enable secret cisco
SW_Cund (config)#
SW_Cund#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
SW_Cund#
```

- Switch de Tunja

```
SW-Tunja(config)#line console 0
SW-Tunja(config-line)#password cisco
```

```
SW-Tunja(config-line)#exit
SW-Tunja(config)#service password-encryption
SW-Tunja(config)#enable secret cisco
SW-Tunja(config)#
SW-Tunja#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
SW-Tunja#
```

- **Switch de Cundinamarca**

```
SW_Buca(config)#line console 0
SW_Buca(config-line)#password cisco
SW_Buca(config-line)#login
SW_Buca(config-line)#exit
SW_Buca(config)#service password-encryption
SW_Buca(config)#enable secret cisco
SW_Buca(config)#
SW_Buca#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
```

- **Router Cundinamarca**

```
R_Cund(config)#ip ssh authentication-retries 3
R_Cund(config)#ip ssh time-out 60
R_Cund(config)#
R_Cund#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
R_Cund#
```

- **Router Tunja**

```
R_TUNJA(config)#ip ssh authentication-retries 3
R_TUNJA(config)#ip ssh time-out 60
R_TUNJA(config)#
R_TUNJA#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
```

R_TUNJA#

- **Router Bucaramanga**

```
BUCARA(config)#ip ssh authentication-retries 3
BUCARA(config)#ip ssh time-out 60
BUCARA(config)#
BUCARA#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
BUCARA#
```

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

```
R_Cund>enable
Password:
R_Cund#copy running-config tftp
Address or name of remote host []? 172.31.2.26
Destination filename [R_Cund-config]? Backup_R_Cund
```

Writing running-config.....

```
R_Cund#copy flas tftp
Source filename []? c1900-universalk9-mz.SPA.151-1.M4.bin
Address or name of remote host []? 172.31.2.26
Destination filename [c1900-universalk9-mz.SPA.151-1.M4.bin]? Backup_c1900-
universalk9-mz.SPA.151-1.M4.bin
```

R_Cund#

- **Configuro router de TUNJA**

```
R_TUNJA#copy running-config tftp
Address or name of remote host []? 172.31.2.26
Destination filename [R_TUNJA-config]? Backup_R_Tunja
```

Writing running-config.....

```
R_TUNJA#copy flas tftp
Source filename []? c1900-universalk9-mz.SPA
```


Address or name of remote host []? 172.31.2.26
Destination filename [c1900-universalk9-mz.SPA]? Backup_c1900-universalk9-
mz.SPA

- **Configuro router de BUCARAMANGA**

BUCARA#copy running-config tftp
Address or name of remote host []? 172.31.2.26
Destination filename [BUCARA-config]? Backup_R_Bucar

Writing running-config....

R_TUNJA#copy flas tftp
Source filename []? c1900-universalk9-mz.SPA
Address or name of remote host []? 172.31.2.26
Destination filename [c1900-universalk9-mz.SPA]? Backup_c1900-universalk9-
mz.SPA

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

- **Configuro router de Cundinamarca para DHCP**

R_Cund#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R_Cund(config)#ip dhcp pool vlan20
R_Cund(dhcp-config)#network 172.31.1.64 255.255.255.192
R_Cund(dhcp-config)#dns-server 8.8.8.8
R_Cund(dhcp-config)#default-router 172.31.1.65
R_Cund(dhcp-config)#exit
R_Cund(config)#ip dhcp excluded-address 172.31.1.65
R_Cund(config)#ip dhcp pool vlan30
R_Cund(dhcp-config)#network 172.31.0.192 255.255.255.192
R_Cund(dhcp-config)#dns-server 172.31.0.193
R_Cund(dhcp-config)#exit
R_Cund(config)#ip dhcp excluded-address 172.31.0.193
R_Cund(config)#ip dhcp pool vlan30
R_Cund(dhcp-config)#network 172.31.1.0 255.255.255.192
R_Cund(dhcp-config)#dns-server 8.8.8.8
R_Cund(dhcp-config)#default-router 172.31.1.1
R_Cund(dhcp-config)#exit
R_Cund(config)#ip dhcp excluded-address 172.31.1.1
R_Cund(config)#

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

```
R_Cund#wr  
Building configuration...  
[OK]
```

```
R_Cund#%DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged  
172.31.1.65.
```

```
%DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 172.31.1.65.
```

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

- **Configuro router de Bucaranamaga para DHCP**

```
BUCARA#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
BUCARA(config)#ip dhcp pool vlan10  
BUCARA(dhcp-config)#network 172.31.0.0 255.255.255.192  
BUCARA(dhcp-config)#dns-server 8.8.8.8  
BUCARA(dhcp-config)#default-router 172.31.0.1  
BUCARA(dhcp-config)#exit  
BUCARA(config)#ip dhcp excluded-address 172.31.0.1  
BUCARA(config)#ip dhcp pool vlan30  
BUCARA(dhcp-config)#network 172.31.0.64 255.255.255.192  
BUCARA(dhcp-config)#dns-server 8.8.8.8  
BUCARA(dhcp-config)#default-router 172.31.0.65  
BUCARA(dhcp-config)#exit  
BUCARA(config)#ip dhcp excluded-address 172.31.0.65  
BUCARA(config)#  
BUCARA#  
%SYS-5-CONFIG_I: Configured from console by console  
wr  
Building configuration...  
[OK]  
BUCARA#
```

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

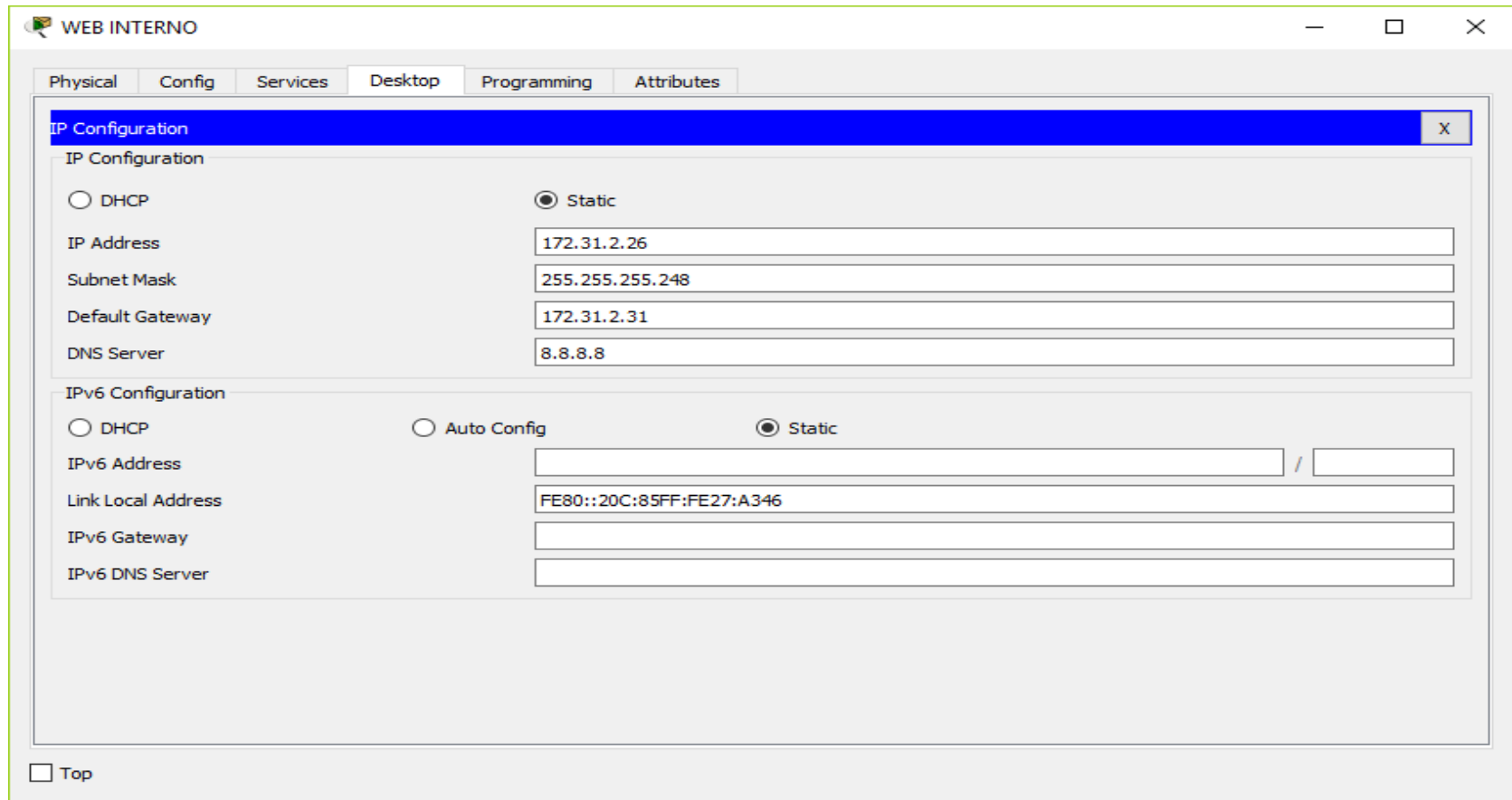


Figura 11. Web interno

Parte 4: El enrutamiento deberá tener autenticación.

- Configuro OSPF de Cundinamarca

```
R_Cund#conf ter
```

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

```
R_Cund(config)#router ospf 1
```

```
R_Cund(config-router)#network 172.31.2.36 0.0.0.3 area 0
```

```
R_Cund(config-router)#network 172.31.2.0 0.0.0.3 area 0
```

```
R_Cund(config-router)#network 172.31.2.24 0.0.0.7 area 0
```

```
R_Cund(config-router)#network 172.31.1.0 0.0.0.63 area 0
```

```
R_Cund(config-router)#network 172.31.1.64 0.0.0.63 area 0
```

```
R_Cund(config-router)#network 172.3.2.8 0.0.0.7 area 0
```

```
R_Cund(config-router)#
```

```
03:38:00: %OSPF-5-ADJCHG: Process 1, Nbr 209.17.220.5 on Serial0/1/0 from  
LOADING to FULL, Loading Done
```

```
R_Cund(config-router)#network 172.31.2.8 0.0.0.3 area 0
```

```
R_Cund(config-router)#exit
```

```
R_Cund(config)#inter s0/1/0
```

```
R_Cund(config-if)#ip ospf message-digest-key 1 md5 cisco
```

```
R_Cund(config-if)#ip ospf authentication message-digest
```

```
R_Cund(config-if)#exit
```

```
R_Cund(config)#exit
```

```
R_Cund#wr
```

```
R_Cund#
```

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

```
wr
```

```
Building configuration...
```

```
[OK]
```

```
R_Cund#
```

Configuro OSPF de TUNJA

```
R_TUNJA#conf ter
```

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

```
R_TUNJA(config)#router ospf 1
```

```
R_TUNJA(config-router)#network 172.31.0.0 0.0.0.3 area 0
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state  
to down
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state  
to down
```

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface router ospf 1

R_TUNJA(config-router)#network 172.31.2.0 0.0.0.3 area 0

R_TUNJA(config-router)#network 172.31.2.32 0.0.0.3 area 0

R_TUNJA(config-router)#network 172.31.2.36 0.0.0.3 area 0

R_TUNJA(config-router)#network 209.17.220.5 0.0.0.255 area 0

R_TUNJA(config-router)#network 172.31.0.128 0.0.0.63 area 0

R_TUNJA(config-router)#network 172.31.0.192 0.0.0.63 area 0

R_TUNJA(config-router)#network 172.3.2.8 0.0.0.7 area 0

R_TUNJA(config-router)#

03:36:36: %OSPF-5-ADJCHG: Process 1, Nbr 172.31.2.34 on Serial0/1/0 from LOADING to FULL, Loading Done

R_TUNJA(config-router)#exit

R_TUNJA(config)#inter s0/1/0

R_TUNJA(config-if)#ip ospf message-digest-key 1 md5 cisco

R_TUNJA(config-if)#ip ospf authentication message-digest

R_TUNJA(config-if)#exit

R_TUNJA(config)#inter s0/1/1

R_TUNJA(config-if)#ip ospf message-digest-key 1 md5 cisco

R_TUNJA(config-if)#ip ospf authentication message-digest

R_TUNJA(config-if)#do write

R_TUNJA#wr

Building configuration...

[OK]

- **Configuro OSPF de Bucaramanga**

BUCARA#conf ter

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

BUCARA(config)#router ospf 1

BUCARA(config-router)#network 172.31.0.0 0.0.0.3 area 0

BUCARA(config-router)#network 172.31.2.0 0.0.0.3 area 0

BUCARA(config-router)#network 172.31.2.32 0.0.0.3 area 0

BUCARA(config-router)#network 172.31.2.0 0.0.0.7 area 0

BUCARA(config-router)#network 172.31.0.0 0.0.0.63 area 0

BUCARA(config-router)#network 172.31.0.64 0.0.0.63 area 0

BUCARA(config-router)#exit

BUCARA(config)#inter s0/1/0

BUCARA(config-if)#ip ospf message-digest-key 1 md5 cisco

BUCARA(config-if)#ip ospf authentication message-digest

BUCARA(config-if)#exit

```
BUCARA(config)#
BUCARA#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
BUCARA#
```

Parte 5: Listas de control de acceso:

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

- Configuro Router Cundinamarca

```
R_Cund(config)#access-list 100 deny ip 172.31.1.64 0.0.0.63 172.31.2.24 0.0.0.7
R_Cund(config)#access-list 100 permit ip any 172.31.2.8 0.0.0.7
R_Cund(config)#
R_Cund#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
R_Cund(config)#inter g0/0.20
R_Cund(config-subif)#
% Unknown command or computer name, or unable to find computer address

R_Cund(config-subif)#ip access-group 100 in
R_Cund(config-subif)#
```

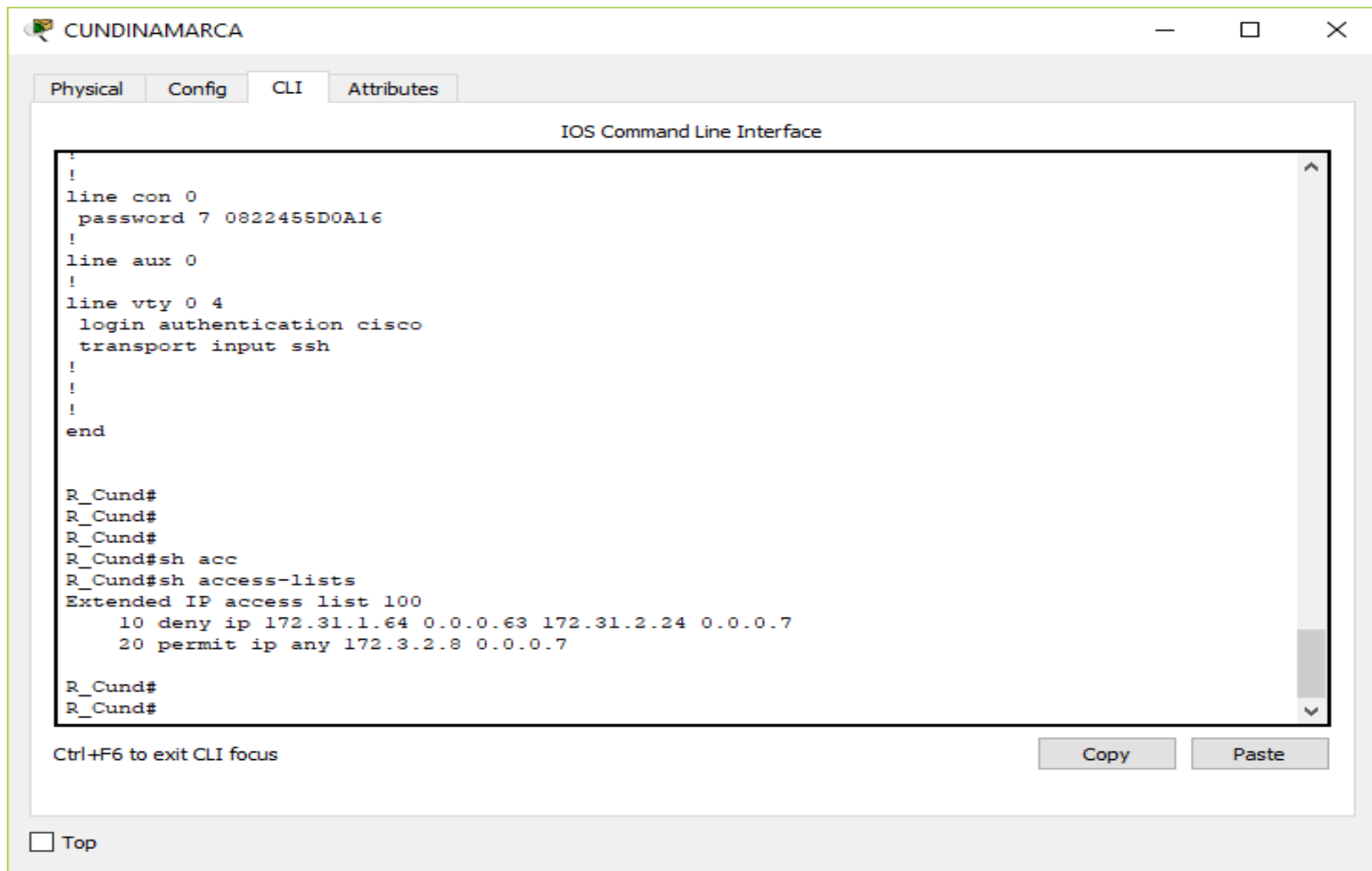


Figura 12. configuro router Cundinamarca

Los hosts de VLAN 30 en Cundinamarca si acceden a internet y no a la red interna de Tunja.

- Configuro Router Cundinamarca

```
R_Cund(config)#access-list 101 deny ip 172.31.1.0 0.0.0.63 172.31.2.8 0.0.0.7
R_Cund(config)#access-list 101 permit ip any 172.31.2.24 0.0.0.7
R_Cund(config)#inter g0/0.30
R_Cund(config-subif)#ip access-group 101 in
R_Cund(config-subif)#
access-list 101 deny ip 172.31.1.0 0.0.0.63 172.31.2.8 0.0.0.7
access-list 101 permit ip any 172.31.2.24 0.0.0.7
access-list 100 deny ip 172.31.1.64 0.0.0.63 172.31.2.24 0.0.0.7
access-list 100 permit ip 172.31.2.24 0.0.0.7 any
```

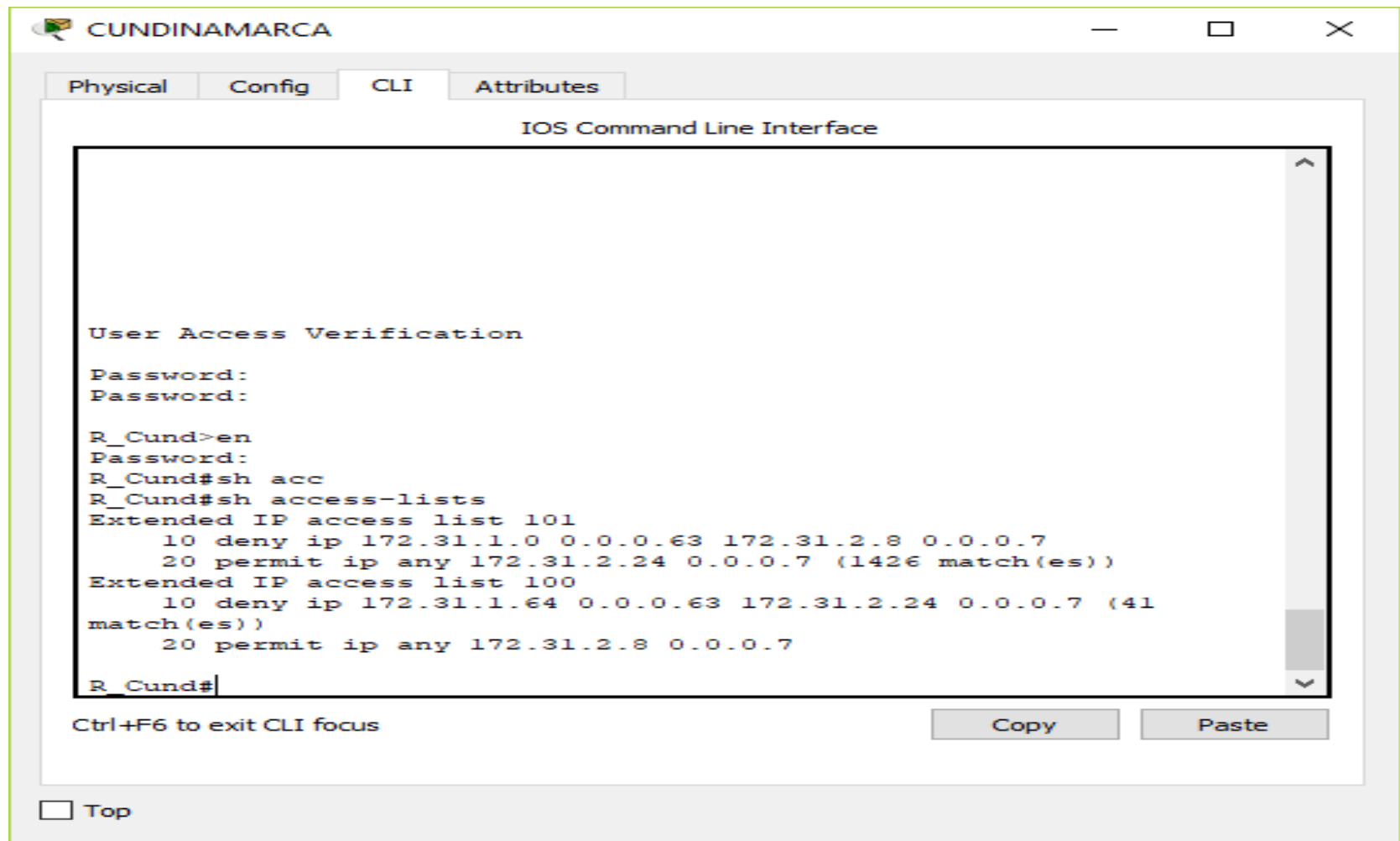



Figura 13. configure router Cundinamarca

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