PRUEBA DE HABILIDADES PRÁCTICAS CCNA

CARLOS MARIO DIAZ

UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA (UNAD)
ESCUELA DE CIENCIAS BÁSICAS TECNOLOGÍAS E INGENIERÍAS
INGENIERÍA DE SISTEMAS
BOGOTÁ
2019

PRUEBA DE HABILIDADES PRÁCTICAS CCNA

CARLOS MARIO DIAZ

Diplomado De Profundización CISCO (Diseño e implementación de soluciones integradas LAN / WAN)

Director de Curso Juan Carlos Vesga

UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA (UNAD)
ESCUELA DE CIENCIAS BÁSICAS TECNOLOGÍAS E INGENIERÍAS
INGENIERÍA DE SISTEMAS
BOGOTÁ
2019

TABLA DE CONTENIDO

INTRODUCCION 5
OBJETIVOS 6
OBJETIVO GENERAL 6
OBJETIVOS ESPECIFICOS 6
DESARROLLO DE LA ACTIVIDAD 7
Escenario 1 7
Desarrollo 8
Parte 1: Asignación de direcciones IP 11
Parte 2: Configuración Básica. 12
Parte 3: Configuración de Enrutamiento. 18
Parte 4: Configuración de las listas de Control de Acceso. 24
Parte 5: Comprobación de la red instalada. 26
ESCENARIO 2 33
Desarrollo 34
CONCLUSIONES 56
REFERENCIAS BIBLIOGRAFICAS 57

RESUMEN

En el actual trabajo se solucionan problemas referentes a redes y se desarrollan en base a la prueba de habilidades de CISCO en el diplomado de profundización correspondiente como opción de grado.

Se hace uso de la herramienta Packet Tracer y se solucionan los escenarios estipulados con la respectiva topología de red suministrada. Una vez solucionado el problema propuesto en el simulador de red, se procede a su respectiva documentación.

Palabras clave: CISCO, Redes, Simulador, Informática, Telecomunicaciones.

ABSTRACT

In the current work, problems related to networks are solved and developed based on the CISCO skills test in the corresponding deepening diploma as a degree option.

The Packet Tracer tool is used and the stipulated scenarios with the respective network topology provided are solved. Once the problem proposed in the network simulator is solved, its respective documentation is carried out.

Keywords: CISCO, Networks, Simulator, Computer science, Telecommunications.

INTRODUCCION

En la realización de la presente evaluación denominada como “Prueba de Habilidades prácticas”, se proponen dos (2) escenarios como solución a las diversas pruebas y habilidades adquiridas a lo largo del curso de Diplomado de profundización CCNA CISCO, en torno a todo lo que tiene que ver con el modelamiento de fundamentos de Networking, modelo OSI y direccionamiento IP, configuración de sistemas de red soportados en VLANs y enrutamiento en soluciones de red.

Abarcando los temas indicados, previstos con anterioridad, bajo la sustentación de prácticas de laboratorio asociados en eventos virtuales y en entornos de simulación en la mayoría a la herramienta relacionada como Packet Tracer, apoyadas en la creación, diseño y configuración de topologías adscritas a dispositivos de comunicación, con el fin de orientar hacia el buen sentido de apropiación de conocimientos prácticos para así poder influenciarlos dentro del campo y entorno tanto personal como profesional, en lo que referencia al modelamiento de redes de telecomunicaciones.

OBJETIVOS

OBJETIVO GENERAL

Se deben analizar las competencias y facultades que se aprendieron a lo largo del proceso y se ponen a prueba las mismas en la solución de los problemas planteados, enfocándonos en desarrollar lo aprendido.

OBJETIVOS ESPECIFICOS

- Desarrollar los escenarios planteados usando las herramientas propuestas.
- Desarrollar de forma detallada los pasos estipulados en las etapas de aprendizaje
- Documentar los procesos de verificar la conexión a la red propuesta usando los comandos de packet tracer.

DESARROLLO DE LA ACTIVIDAD

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.

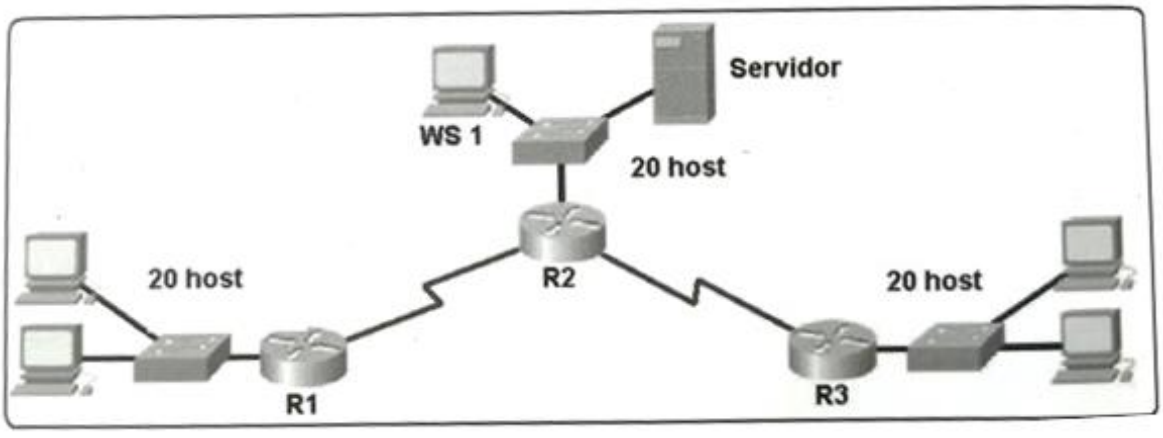
Parte 2: Considerar la asignación de los parámetros básicos y la detección de vecinos directamente conectados.

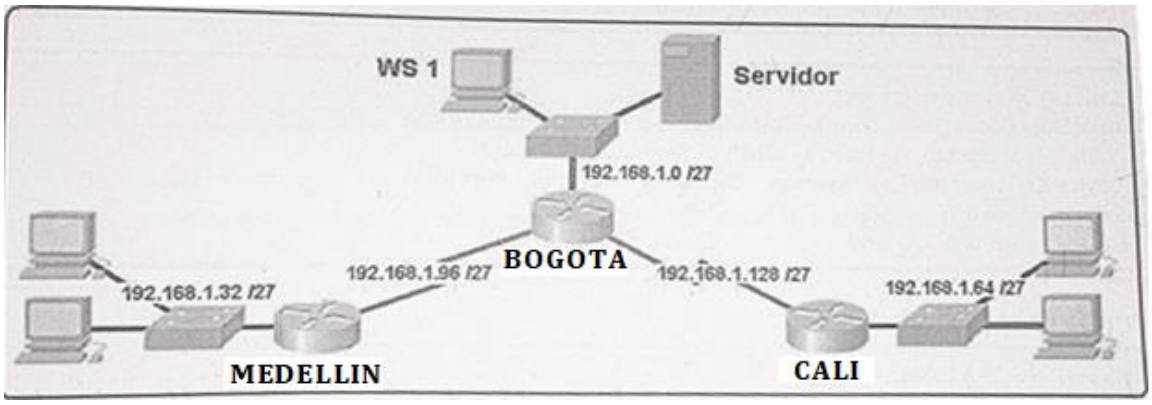
Parte 3: La red y subred establecidas deberán tener una interconexión total, todos los hosts deberán ser visibles y poder comunicarse entre ellos sin restricciones.

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.

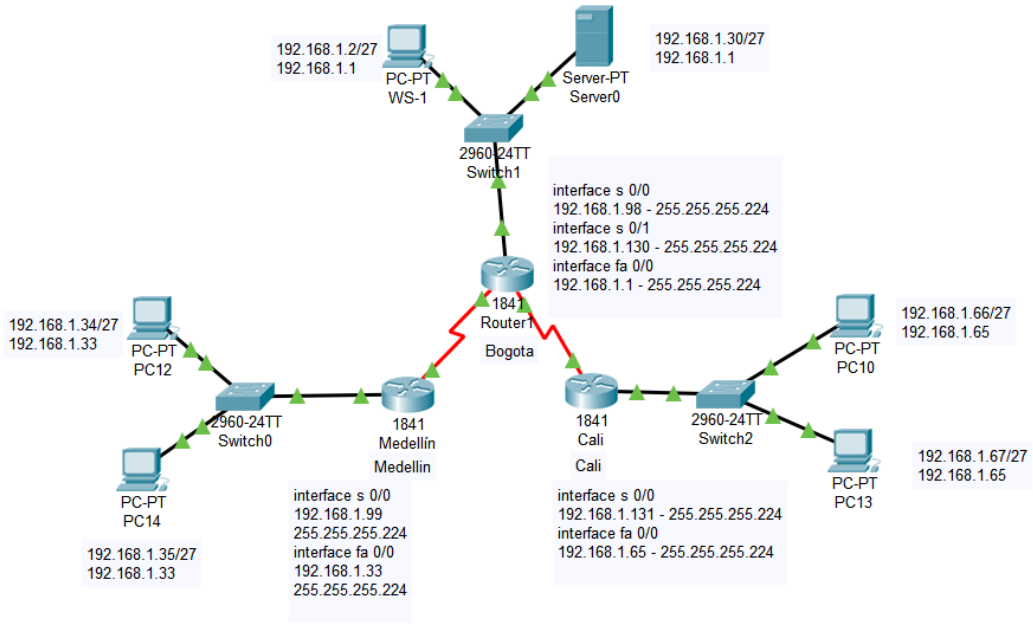
Parte 5: Comprobación total de los dispositivos y su funcionamiento en la red.

Parte 6: Configuración final.





Nuestra topología nos queda construida de la siguiente manera:



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).**

- Procederemos a configurar cada uno de los parámetros basicos de lso routres y de los swtches, entre estos, las contraseñas, los nombres, el mensaje, etc.

Router(config)#hostname bogota
bogota(config)#no ip domain-lookup

```
bogota(config)#service password-encryption
bogota(config)#banner motd $El Acceso no autorizado est prohibido$
bogota(config)#enable secret class123
bogota(config)#line console 0
bogota(config-line)#password cisco123
bogota(config-line)#login
bogota(config-line)#line vty 0 15
bogota(config-line)#password cisco123
bogota(config-line)#login
```

```
Router(config)#hostname medellin
medellin(config)#no ip domain-lookup
medellin(config)#service password-encryption
medellin(config)#banner motd $El Acceso no autorizado est prohibido$
medellin(config)#enable secret class123
medellin(config)#line console 0
medellin(config-line)#password cisco123
medellin(config-line)#login
medellin(config-line)#line vty 0 15
medellin(config-line)#password cisco123
medellin(config-line)#login
```

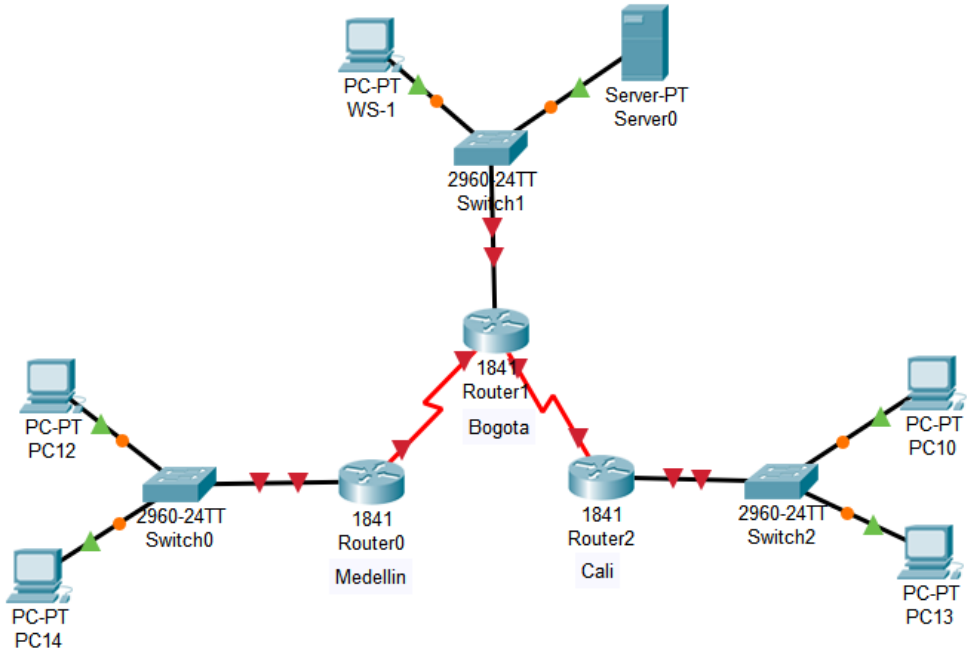
```
Router(config)#hostname cali
cali(config)#no ip domain-lookup
cali(config)#service password-encryption
cali(config)#banner motd $El Acceso no autorizado est prohibido$
cali(config)#enable secret class123
cali(config)#line console 0
cali(config-line)#password cisco123
cali(config-line)#login
cali(config-line)#line vty 0 15
cali(config-line)#password cisco123
cali(config-line)#login
```

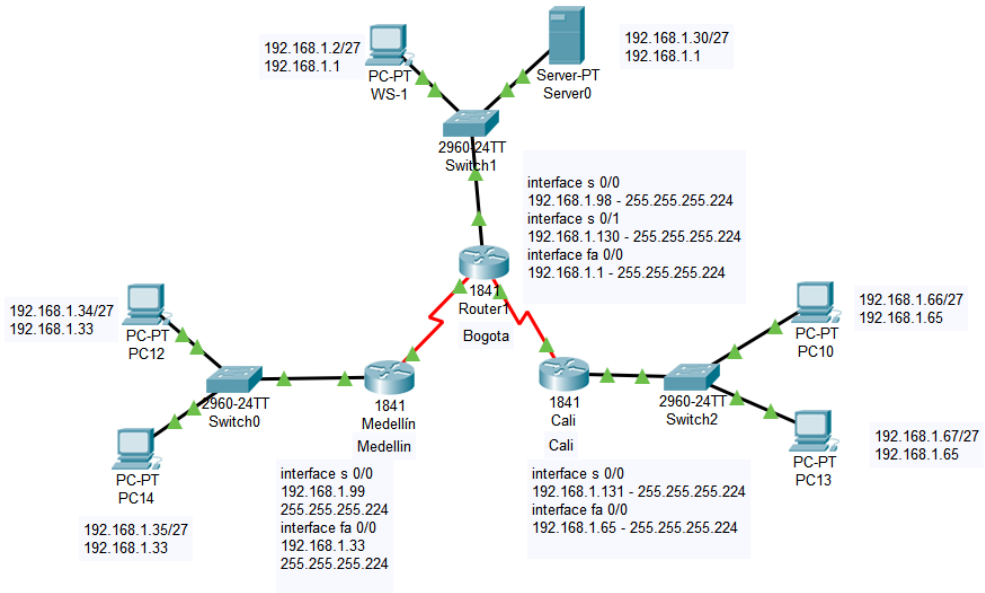
- hacemos este mismo proceso pero en este caso con los switches.

```
Switch(config)#hostname switchbogota
switchbogota(config)#no ip domain-lookup
switchbogota(config)#service password-encryption
switchbogota(config)#banner motd $El Acceso no autorizado est prohibido$
switchbogota(config)#enable secret class123
switchbogota(config)#line console 0
switchbogota(config-line)#password cisco123
switchbogota(config-line)#login
switchbogota(config-line)#line vty 0 15
switchbogota(config-line)#password cisco123
```

```
switchbogota(config-line)#login

switchmedellin(config)#hostname switchmedellin
switchmedellin(config)#no ip domain-lookup
switchmedellin(config)#service password-encryption
switchmedellin(config)#banner motd $El Acceso no autorizado est prohibido$
switchmedellin(config)#enable secret class123
switchmedellin(config)#line console 0
switchmedellin(config-line)#password cisco123
switchmedellin(config-line)#login
switchmedellin(config-line)#line vty 0 15
switchmedellin(config-line)#password cisco123
switchmedellin(config-line)#login

Switch(config)#hostname switchcali
switchcali(config)#no ip domain-lookup
switchcali(config)#service password-encryption
switchcali(config)#banner motd $El Acceso no autorizado est prohibido$
switchcali(config)#enable secret class123
switchcali(config)#line console 0
switchcali(config-line)#password cisco123
switchcali(config-line)#login
switchcali(config-line)#line vty 0 15
switchcali(config-line)#password cisco123
switchcali(config-line)#login
switchcali(config-line)#
```

- **Realizar la conexión fisica de los equipos con base en la topología de red**





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

Parte 1: Asignación de direcciones IP

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

b. Asignar una dirección IP a la red.

Bogota-LAN	192.168.1.0/27
Medellín-LAN	192.168.1.32/27
Cali-LAN	192.168.1.64/27
Bogota-Medellín	192.168.1.96/27
Bogota-Cali	192.168.1.128/27
Disponible	192.168.1.160/27
Disponible	192.168.1.192/27
Disponible	192.168.1.224/27

Parte 2: Configuración Básica.

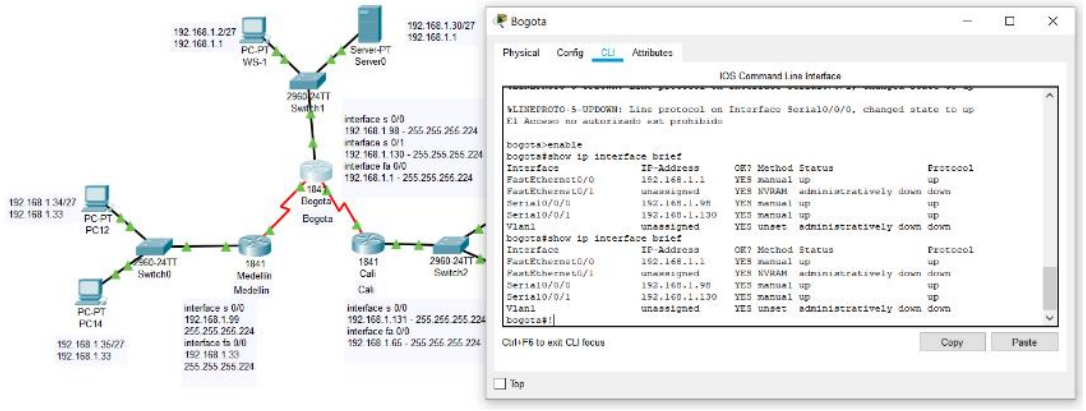
a. Completar la siguiente tabla con la configuración básica de los routers, teniendo en cuenta las subredes diseñadas.

	R1	R2	R3
Nombre de Host	MEDELLIN	BOGOTA	CALI
Dirección de Ip en interfaz Serial 0/0	192.168.1.99	192.168.1.98	192.168.1.231
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

Configuración Interfaces Router Bogotá.

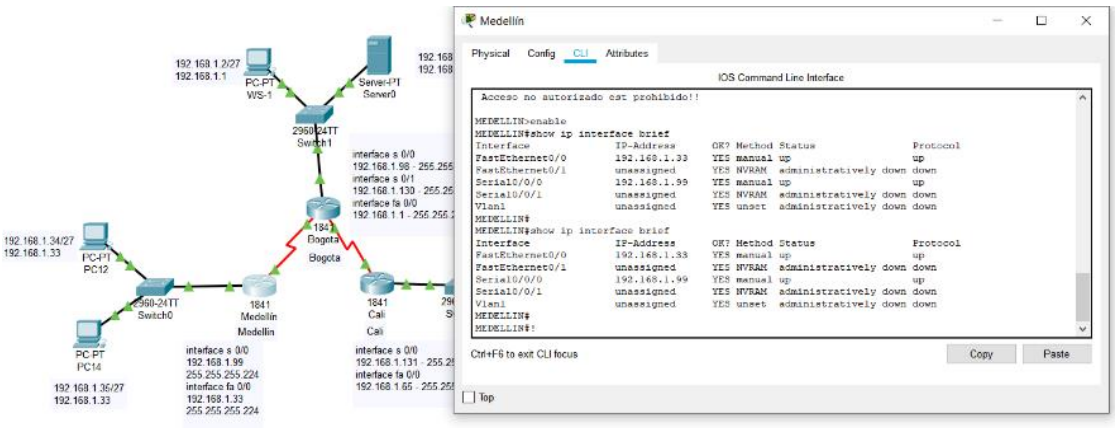
bogota(config)#int s0/0/0
bogota(config-if)#ip address 192.168.1.98 255.255.255.224
bogota(config-if)#no shutdown
bogota(config-if)#int s0/0/1
bogota(config-if)#ip address 192.168.1.130 255.255.255.224
bogota(config-if)#no shutdown
bogota(config-if)#
bogota(config-if)#int f0/0

bogota(config-if)#ip address 192.168.1.1 255.255.255.224
bogota(config-if)#no shutdown
bogota(config-if)#router eigrp 200
bogota(config-router)#no auto-summary
bogota(config-router)#network 192.168.1.0
bogota(config-router)#end
bogota#



Configuración Interfaces Router Medellín.

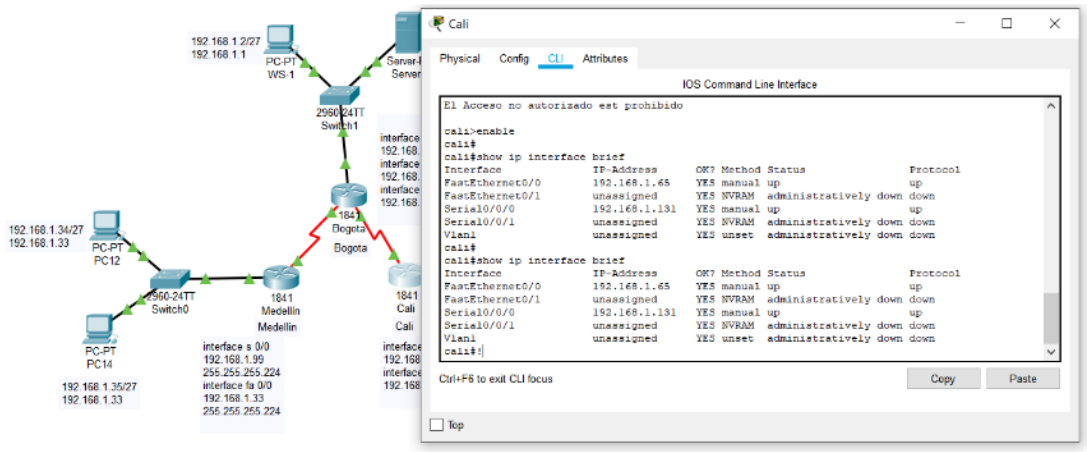
medellin(config)#int s0/0/0
medellin(config-if)#ip address 192.168.1.99 255.255.255.224
medellin(config-if)#no shutdown
medellin(config-if)#int f0/0
medellin(config-if)#ip address 192.168.1.33 255.255.255.224
medellin(config-if)#no shutdown
medellin(config-if)#
medellin(config-if)#router eigrp 200
medellin(config-router)#no auto-summary
medellin(config-router)#network 192.168.1.0
medellin(config-router)#end
medellin#



Configuración Interfaces Router Cali.

cali(config)#int s0/0/0
cali(config-if)#ip address 192.168.1.231 255.255.255.224
cali(config-if)#no shutdown

cali(config-if)#int f0/0
cali(config-if)#ip address 192.168.1.65 255.255.255.224
cali(config-if)#no shutdown
cali(config-if)#router eigrp 200
cali(config-router)#no auto-summary
cali(config-router)#network 192.168.1.0
cali(config-router)#end
cali#
cali#



b. Después de cargada la configuración en los dispositivos, verificar la tabla de enrutamiento en cada uno de los routers para comprobar las redes y sus rutas.

bogota#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

192.168.1.0/27 is subnetted, 5 subnets
C 192.168.1.0 is directly connected, FastEthernet0/0
D 192.168.1.32 [90/2172416] via 192.168.1.99, 00:04:34, Serial0/0/0

D 192.168.1.64 [90/2172416] via 192.168.1.231, 00:03:31, 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

medellin#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

192.168.1.0/27 is subnetted, 5 subnets
D 192.168.1.0 [90/2172416] via 192.168.1.98, 00:04:41, Serial0/0/0
C 192.168.1.32 is directly connected, FastEthernet0/0
D 192.168.1.64 [90/2684416] via 192.168.1.98, 00:03:38, Serial0/0/0
C 192.168.1.96 is directly connected, Serial0/0/0
D 192.168.1.128 [90/2681856] via 192.168.1.98, 00:03:44, Serial0/0/0

cali#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

192.168.1.0/27 is subnetted, 5 subnets
D 192.168.1.0 [90/2172416] via 192.168.1.130, 00:03:47, Serial0/0/0
D 192.168.1.32 [90/2684416] via 192.168.1.130, 00:03:47, 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, 00:03:47, Serial0/0/0
C 192.168.1.128 is directly connected, Serial0/0/0

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

bogota#show ip eigrp topology
IP-EIGRP Topology Table for AS 200/ID(192.168.1.130)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,

r - Reply status

P 192.168.1.0/27, 1 successors, FD is 28160
via Connected, FastEthernet0/0
P 192.168.1.32/27, 1 successors, FD is 2172416
via 192.168.1.99 (2172416/28160), Serial0/0/0
P 192.168.1.64/27, 1 successors, FD is 2172416
via 192.168.1.231 (2172416/28160), Serial0/0/1
P 192.168.1.96/27, 1 successors, FD is 2169856
via Connected, Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2169856
via Connected, Serial0/0/1

medellin#show ip eigrp topology
IP-EIGRP Topology Table for AS 200/ID(192.168.1.99)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 192.168.1.0/27, 1 successors, FD is 2172416
via 192.168.1.98 (2172416/28160), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 28160
via Connected, FastEthernet0/0
P 192.168.1.64/27, 1 successors, FD is 2684416
via 192.168.1.98 (2684416/2172416), Serial0/0/0
P 192.168.1.96/27, 1 successors, FD is 2169856
via Connected, Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2681856
via 192.168.1.98 (2681856/2169856), Serial0/0/0

cali#show ip eigrp topology
IP-EIGRP Topology Table for AS 200/ID(192.168.1.231)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 192.168.1.0/27, 1 successors, FD is 2172416
via 192.168.1.130 (2172416/28160), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 2684416
via 192.168.1.130 (2684416/2172416), Serial0/0/0
P 192.168.1.64/27, 1 successors, FD is 28160
via Connected, FastEthernet0/0
P 192.168.1.96/27, 1 successors, FD is 2681856
via 192.168.1.130 (2681856/2169856), Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2169856
via Connected, Serial0/0/0

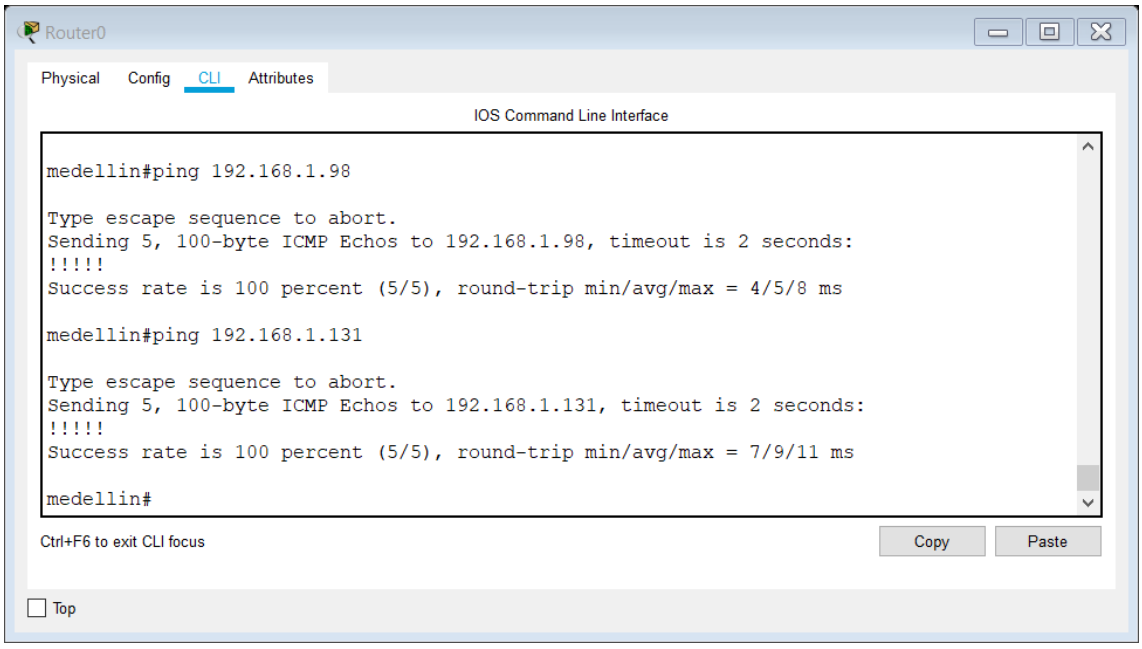
d. Realizar un diagnóstico de vecinos uando el comando cdp.

bogota#show cdp neighbor
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone
Device ID Local Intrfce Holdtme Capability Platform Port ID
switchbogota
Fas 0/0 176 S 2960 Fas 0/1
medellin Ser 0/0/0 145 R C1841 Ser 0/0/0
cali Ser 0/0/1 148 R C1841 Ser 0/0/0

medellin#show cdp neighbor
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone
Device ID Local Intrfce Holdtme Capability Platform Port ID
switchmedellin
Fas 0/0 231 S 2960 Fas 0/1
bogota Ser 0/0/0 136 R C1841 Ser 0/0/0

cali#show cdp neighbor
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone
Device ID Local Intrfce Holdtme Capability Platform Port ID
switchcali Fas 0/0 126 S 2960 Fas 0/1
bogota Ser 0/0/0 126 R C1841 Ser 0/0/1

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



Parte 3: Configuración de Enrutamiento.

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

Este paso ya estaba hecho antes, se realizó junto con la configuración de las interface de los routers, de todas maneras lo indico nuevamente:

Configuración Interfaces Router Bogotá.

```
bogota(config-if)#
bogota(config-if)#router eigrp 200
bogota(config-router)#no auto-summary
bogota(config-router)#network 192.168.1.0
bogota(config-router)#end
bogota#
```

Configuración Interfaces Router Medellín.

```
medellin(config-if)#
medellin(config-if)#router eigrp 200
medellin(config-router)#no auto-summary
medellin(config-router)#network 192.168.1.0
medellin(config-router)#end
medellin#
```

Configuración Interfaces Router Cali.

```
cali(config-if)#router eigrp 200
cali(config-router)#no auto-summary
cali(config-router)#network 192.168.1.0
cali(config-router)#end
cali#
cali#
```

Vemos claramente que se generan todas las adyacencias entre lo routers vecinos

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

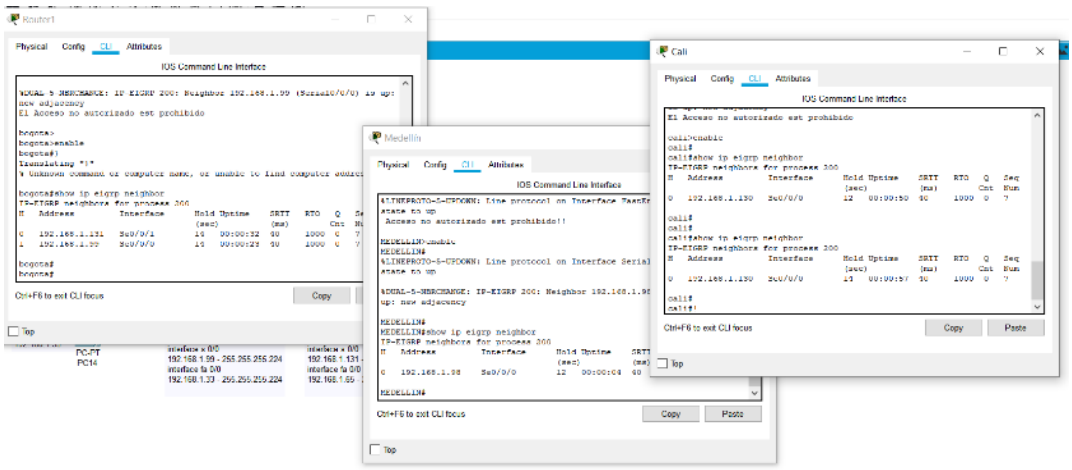
SHOW IP EIGRP NEIGHBORS

```
bogota#show ip eigrp neighbor
IP-EIGRP neighbors for process 200
```

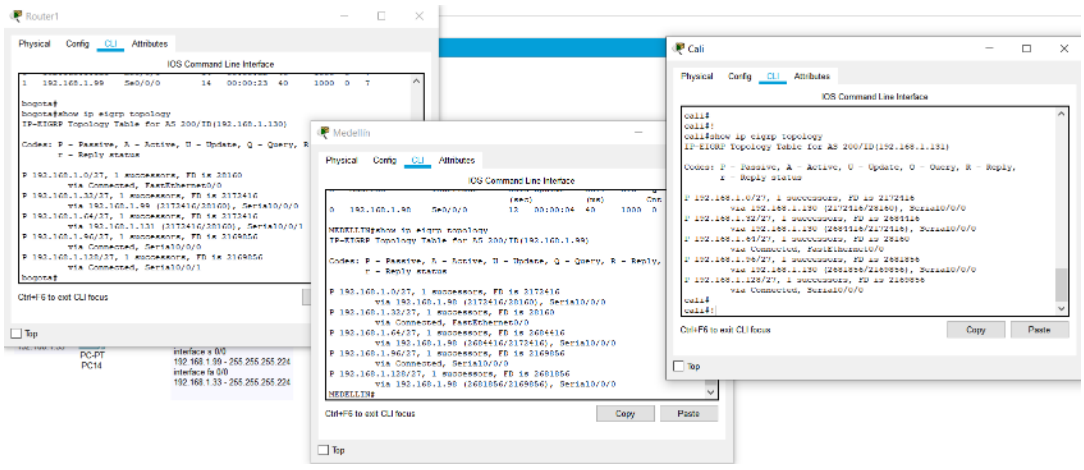
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 192.168.1.99 Se0/0/0 13 00:04:34 40 1000 0 7
1 192.168.1.231 Se0/0/1 12 00:03:31 40 1000 0 7

medellin#show ip eigrp neighbor
IP-EIGRP neighbors for process 200
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 192.168.1.98 Se0/0/0 11 00:04:40 40 1000 0 7

cali#show ip eigrp neighbor
IP-EIGRP neighbors for process 200
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 192.168.1.130 Se0/0/0 12 00:03:47 40 1000 0 8



SHOW IP EIGRP TOPOLOGY



bogota#show ip eigrp topology
IP-EIGRP Topology Table for AS 200/ID(192.168.1.130)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 192.168.1.0/27, 1 successors, FD is 28160
via Connected, FastEthernet0/0
P 192.168.1.32/27, 1 successors, FD is 2172416
via 192.168.1.99 (2172416/28160), Serial0/0/0
P 192.168.1.64/27, 1 successors, FD is 2172416
via 192.168.1.231 (2172416/28160), Serial0/0/1
P 192.168.1.96/27, 1 successors, FD is 2169856
via Connected, Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2169856
via Connected, Serial0/0/1

medellin#show ip eigrp topology
IP-EIGRP Topology Table for AS 200/ID(192.168.1.99)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 192.168.1.0/27, 1 successors, FD is 2172416
via 192.168.1.98 (2172416/28160), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 28160
via Connected, FastEthernet0/0
P 192.168.1.64/27, 1 successors, FD is 2684416
via 192.168.1.98 (2684416/2172416), Serial0/0/0
P 192.168.1.96/27, 1 successors, FD is 2169856
via Connected, Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2681856
via 192.168.1.98 (2681856/2169856), Serial0/0/0

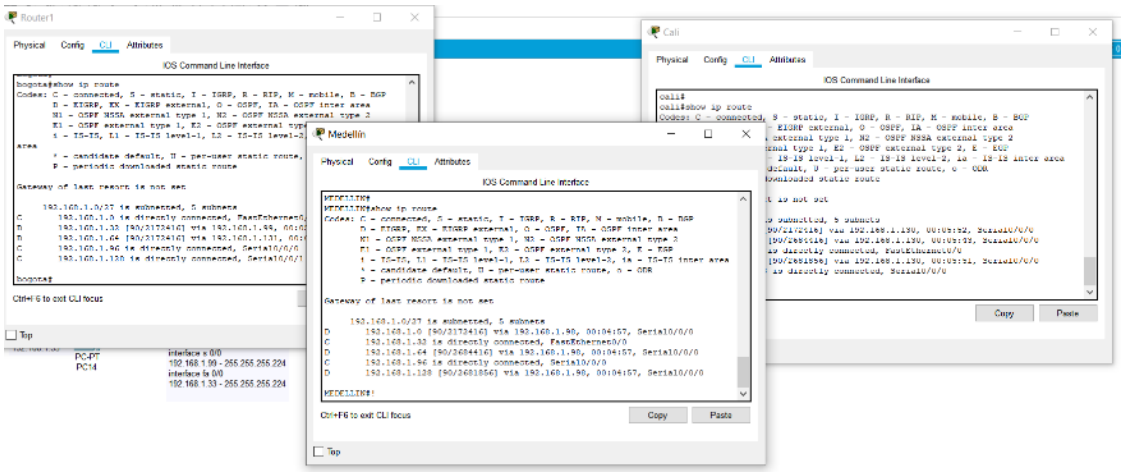
cali#show ip eigrp topology
IP-EIGRP Topology Table for AS 200/ID(192.168.1.231)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status

P 192.168.1.0/27, 1 successors, FD is 2172416
via 192.168.1.130 (2172416/28160), Serial0/0/0
P 192.168.1.32/27, 1 successors, FD is 2684416
via 192.168.1.130 (2684416/2172416), Serial0/0/0
P 192.168.1.64/27, 1 successors, FD is 28160
via Connected, FastEthernet0/0
P 192.168.1.96/27, 1 successors, FD is 2681856
via 192.168.1.130 (2681856/2169856), Serial0/0/0
P 192.168.1.128/27, 1 successors, FD is 2169856

via Connected, Serial0/0/0

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



SHOW IP ROUTE

bogota#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

192.168.1.0/27 is subnetted, 5 subnets
C 192.168.1.0 is directly connected, FastEthernet0/0
D 192.168.1.32 [90/2172416] via 192.168.1.99, 00:04:34, Serial0/0/0
D 192.168.1.64 [90/2172416] via 192.168.1.231, 00:03:31, 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

medellin#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR

P - periodic downloaded static route

Gateway of last resort is not set

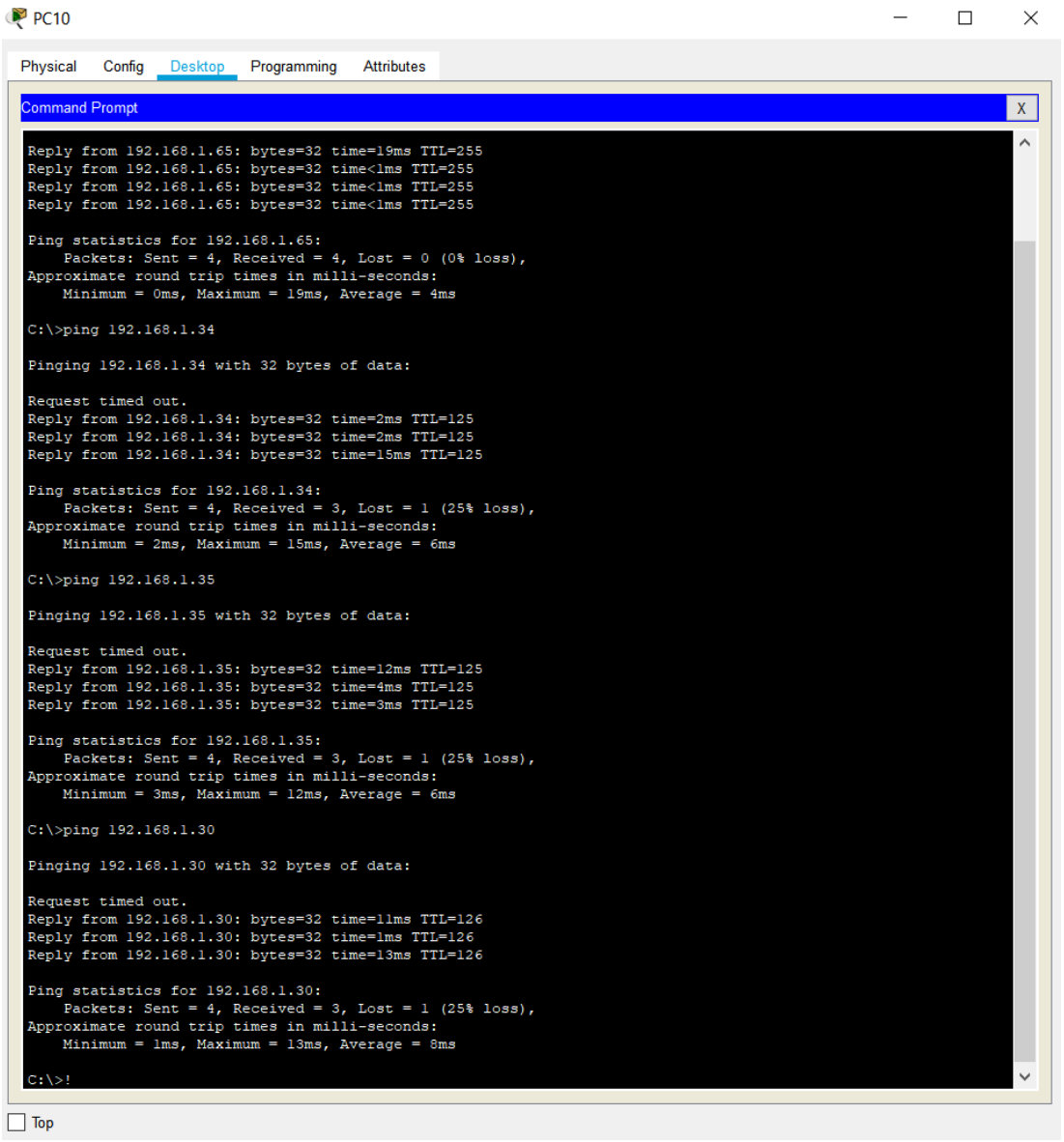
192.168.1.0/27 is subnetted, 5 subnets
D 192.168.1.0 [90/2172416] via 192.168.1.98, 00:04:41, Serial0/0/0
C 192.168.1.32 is directly connected, FastEthernet0/0
D 192.168.1.64 [90/2684416] via 192.168.1.98, 00:03:38, Serial0/0/0
C 192.168.1.96 is directly connected, Serial0/0/0
D 192.168.1.128 [90/2681856] via 192.168.1.98, 00:03:44, Serial0/0/0

cali#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

192.168.1.0/27 is subnetted, 5 subnets
D 192.168.1.0 [90/2172416] via 192.168.1.130, 00:03:47, Serial0/0/0
D 192.168.1.32 [90/2684416] via 192.168.1.130, 00:03:47, 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, 00:03:47, Serial0/0/0
C 192.168.1.128 is directly connected, Serial0/0/0

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


PC10
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Reply from 192.168.1.65: bytes=32 time=19ms TTL=255
Reply from 192.168.1.65: bytes=32 time<1ms TTL=255
Reply from 192.168.1.65: bytes=32 time<1ms TTL=255
Reply from 192.168.1.65: bytes=32 time<1ms TTL=255
Ping statistics for 192.168.1.65:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 19ms, Average = 4ms
C:\>ping 192.168.1.34
Pinging 192.168.1.34 with 32 bytes of data:
Request timed out.
Reply from 192.168.1.34: bytes=32 time=2ms TTL=125
Reply from 192.168.1.34: bytes=32 time=2ms TTL=125
Reply from 192.168.1.34: bytes=32 time=15ms TTL=125
Ping statistics for 192.168.1.34:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 2ms, Maximum = 15ms, Average = 6ms
C:\>ping 192.168.1.35
Pinging 192.168.1.35 with 32 bytes of data:
Request timed out.
Reply from 192.168.1.35: bytes=32 time=12ms TTL=125
Reply from 192.168.1.35: bytes=32 time=4ms TTL=125
Reply from 192.168.1.35: bytes=32 time=3ms TTL=125
Ping statistics for 192.168.1.35:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 3ms, Maximum = 12ms, Average = 6ms
C:\>ping 192.168.1.30
Pinging 192.168.1.30 with 32 bytes of data:
Request timed out.
Reply from 192.168.1.30: bytes=32 time=11ms TTL=126
Reply from 192.168.1.30: bytes=32 time=1ms TTL=126
Reply from 192.168.1.30: bytes=32 time=13ms TTL=126
Ping statistics for 192.168.1.30:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 13ms, Average = 8ms
C:\>!
Top

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:

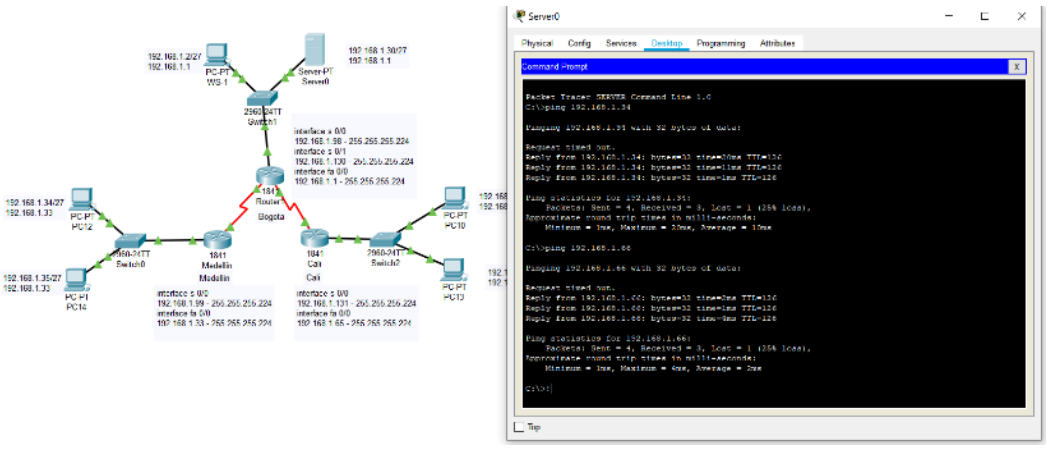
- **Cada router debe estar habilitado para establecer conexiones Telnet con los demás routers y tener acceso a cualquier dispositivo en la red.**

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.

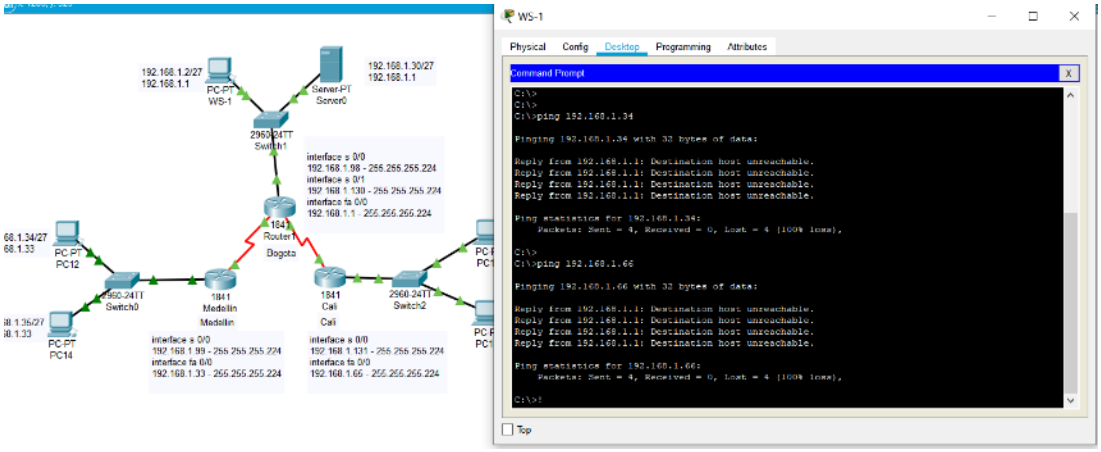
Debenos crear la ACL en el cual debenos indicar que solo el servidor debe tener acceso a cualquier otro dispositivos, este se crea de la siguiente manera:

bogota(config)#access-list 121 permit ip host 192.168.1.30 any
bogota(config)#int f0/0
bogota(config-if)#ip access-group 121 in
bogota(config-if)#

Procedemos a verificar la misma.



Vemos que desde el servidor si podemos tener acceso a los diferentes dispositivos dispositivos.

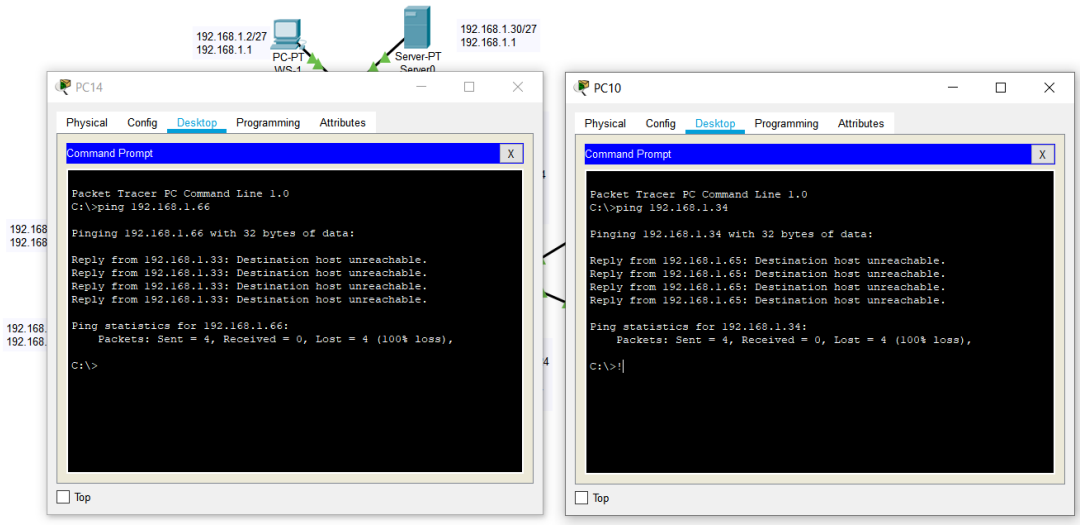


Vemos que si hacemos ping desde otro dispositivos diferente hacia los mismos puntos no tenemos acceso por las nuevas restricciones creadas.

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

medellin(config)#access-list 121 permit ip 192.168.1.32 0.0.0.31 host 192.168.1.30
medellin(config)#int f0/0
medellin(config-if)#ip access-group 121 in

cali(config)#access-list 121 permit ip 192.168.1.64 0.0.0.31 host 192.168.1.30
cali(config)#int f0/0
cali(config-if)#ip access-group 121 in



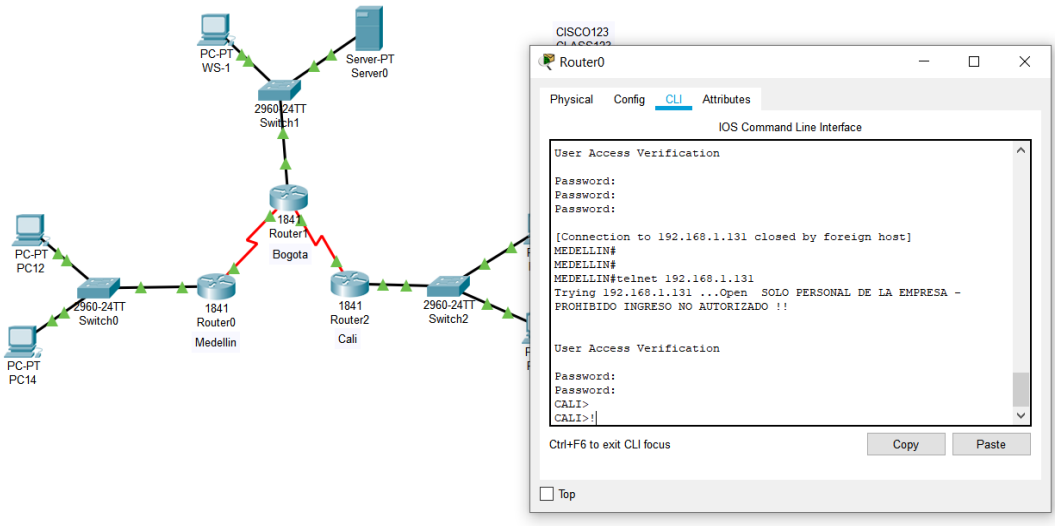
Vemos que nos tenemos ya comunicación entre las vlan con las nuevas ACL creadas.

Parte 5: Comprobación de la red instalada.

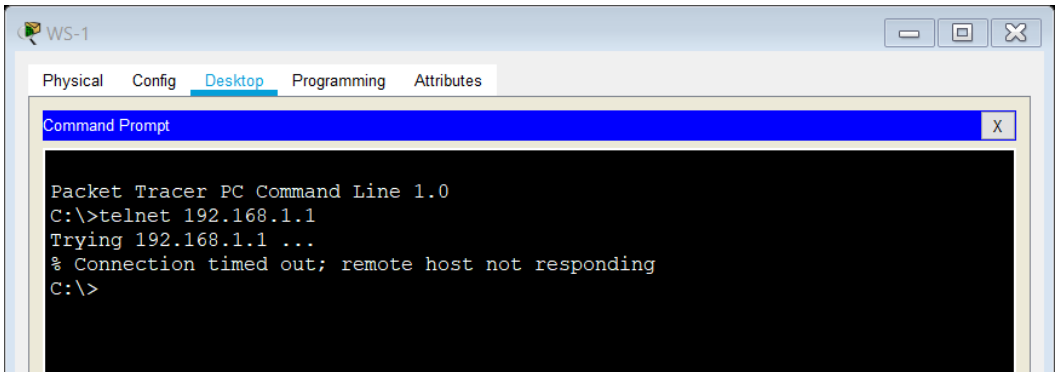
a. Se debe probar que la configuración de las listas de acceso fue exitosa.

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

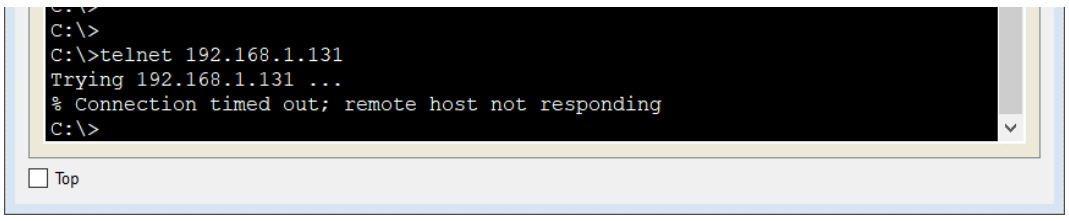
	ORIGEN	DESTINO	RESULTADO
TELNET	Router MEDELLIN	Router CALI	Éxito
	WS_1	Router BOGOTA	Falla
	Servidor	Router CALI	Éxito
	Servidor	Router MEDELLIN	Éxito
TELNET	LAN del Router MEDELLIN	Router CALI	Falla
	LAN del Router CALI	Router CALI	Falla
	LAN del Router MEDELLIN	Router MEDELLIN	Falla
	LAN del Router CALI	Router MEDELLIN	Falla
PING	LAN del Router CALI	WS_1	Falla
	LAN del Router MEDELLIN	WS_1	Falla
	LAN del Router MEDELLIN	LAN del Router CALI	Falla
PING	LAN del Router CALI	Servidor	Éxito
	LAN del Router MEDELLIN	Servidor	Éxito
	Servidor	LAN del Router MEDELLIN	Éxito
	Servidor	LAN del Router CALI	Éxito
	Router CALI	LAN del Router MEDELLIN	Falla
	Router MEDELLIN	LAN del Router CALI	Falla

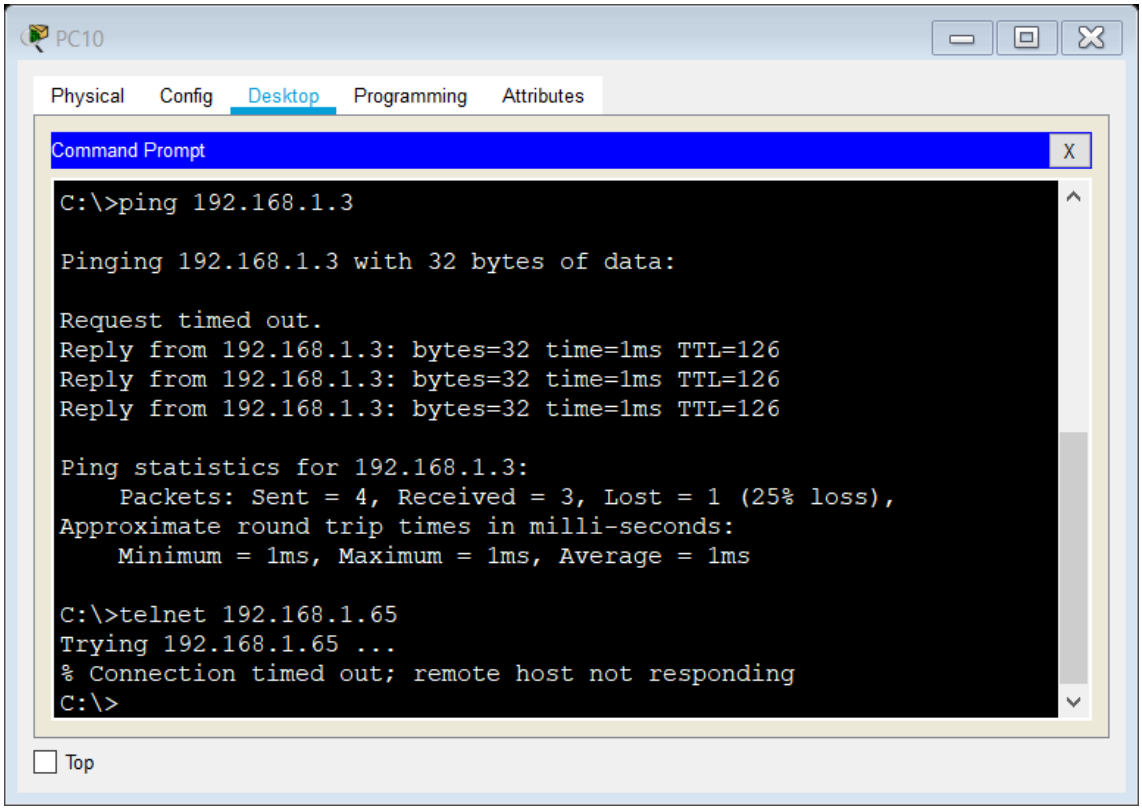


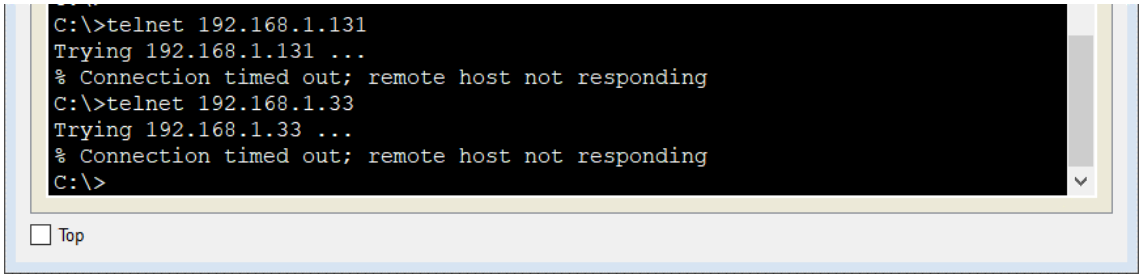
- Desde WS - hacia CALI.

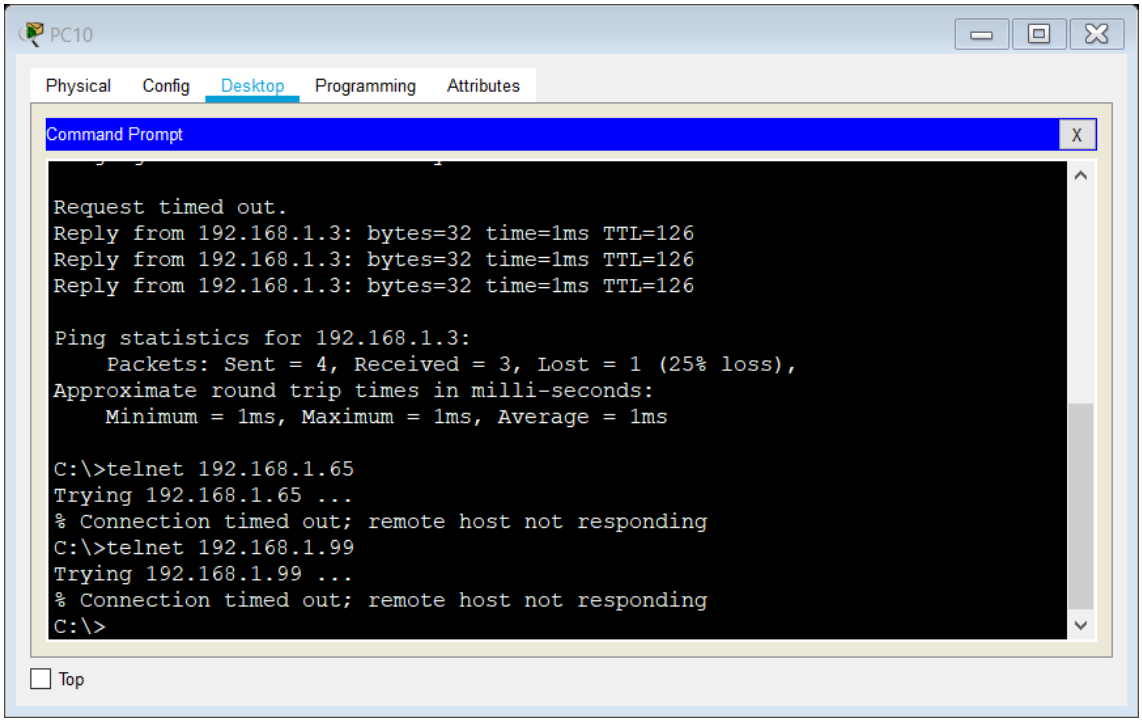


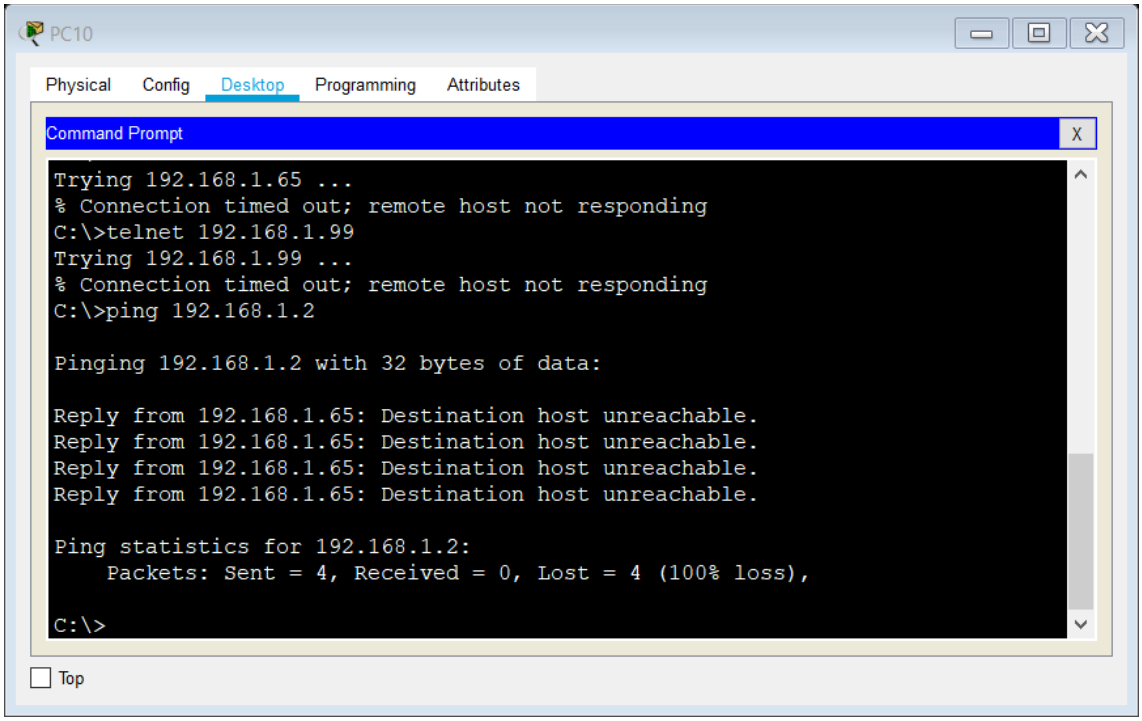
- Desde el servidor hacia CALI.

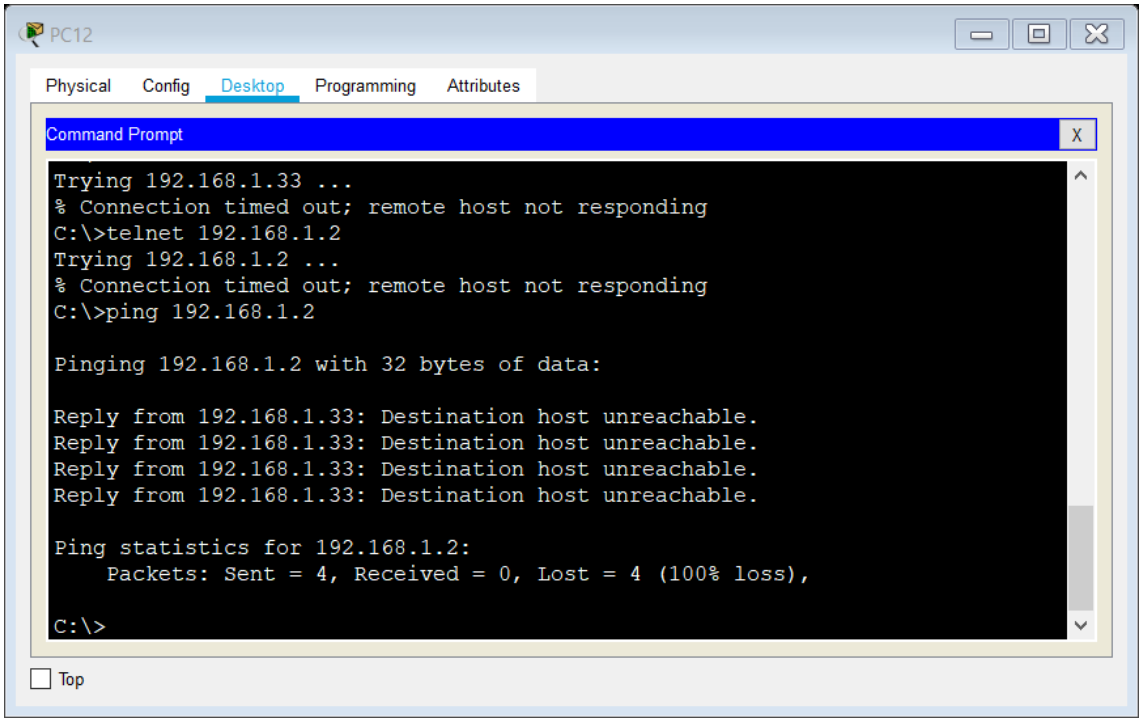


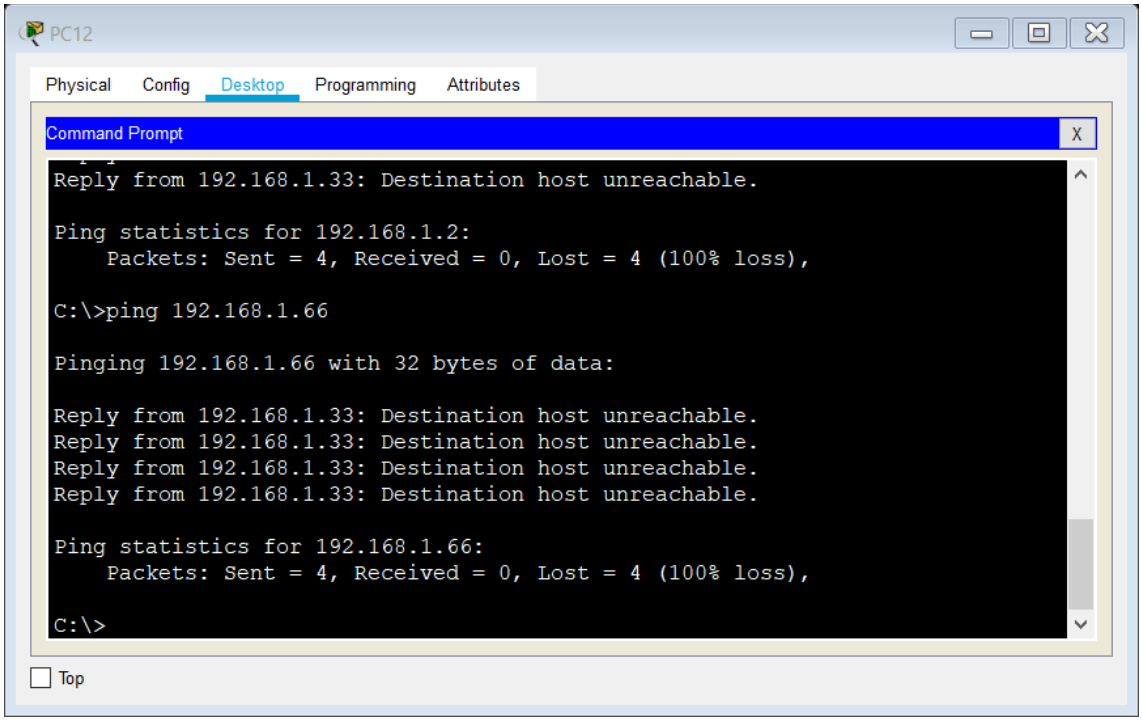

PC10
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
C:\>ping 192.168.1.3
Pinging 192.168.1.3 with 32 bytes of data:
Request timed out.
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Ping statistics for 192.168.1.3:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 1ms, Average = 1ms
C:\>telnet 192.168.1.65
Trying 192.168.1.65 ...
% Connection timed out; remote host not responding
C:\>
Top

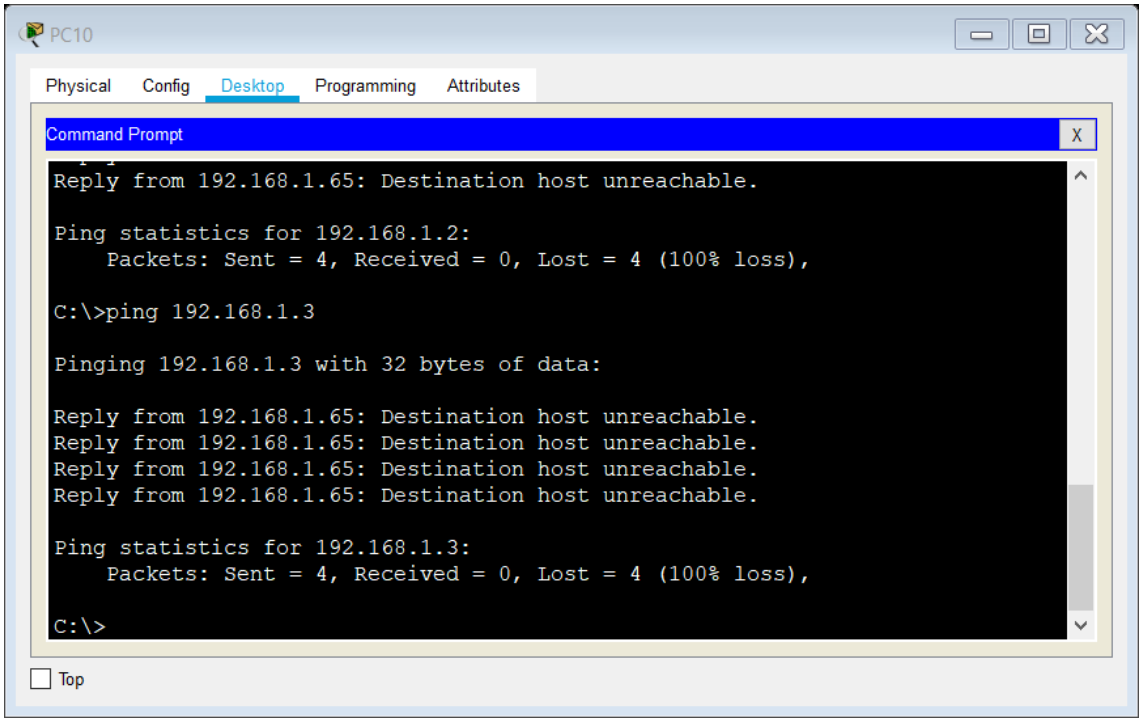

C:\>telnet 192.168.1.131
Trying 192.168.1.131 ...
% Connection timed out; remote host not responding
C:\>telnet 192.168.1.33
Trying 192.168.1.33 ...
% Connection timed out; remote host not responding
C:\>
Top

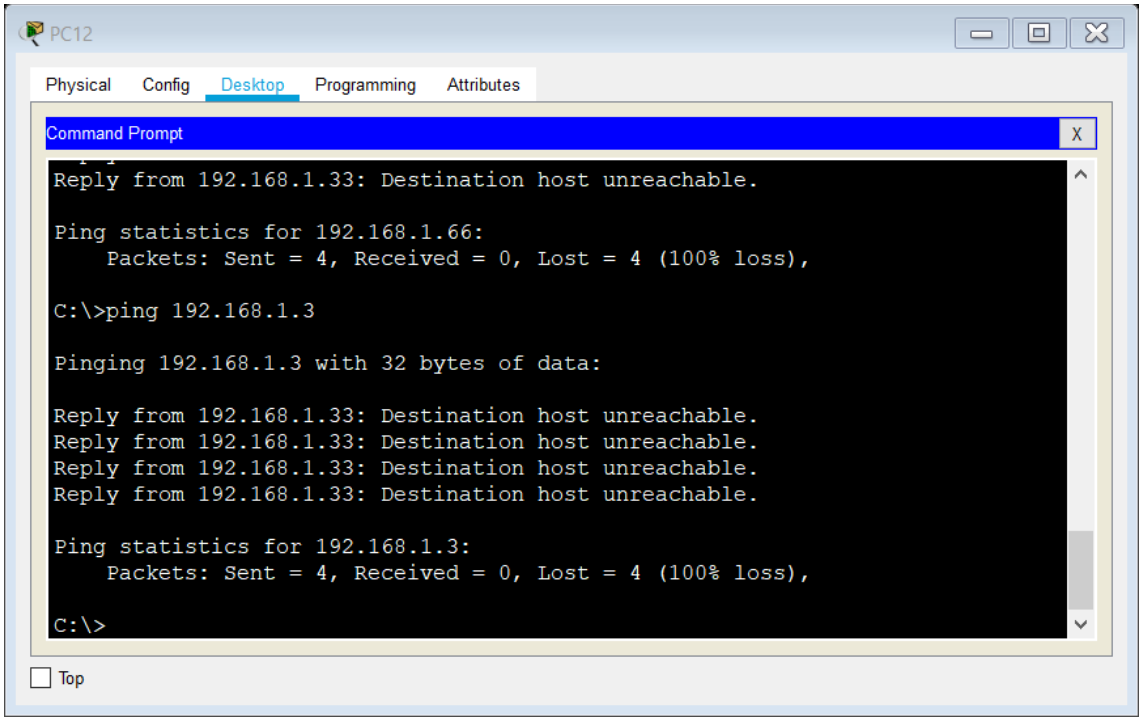

PC10
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Request timed out.
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Ping statistics for 192.168.1.3:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 1ms, Average = 1ms
C:\>telnet 192.168.1.65
Trying 192.168.1.65 ...
% Connection timed out; remote host not responding
C:\>telnet 192.168.1.99
Trying 192.168.1.99 ...
% Connection timed out; remote host not responding
C:\>
Top

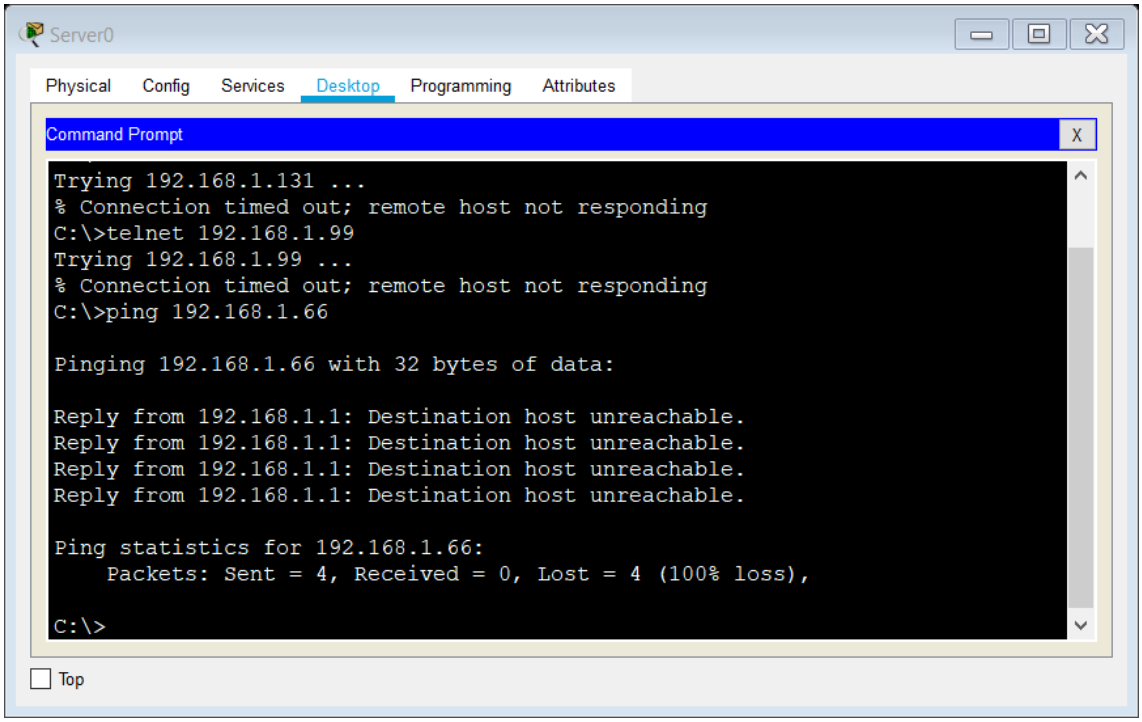

PC10
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Trying 192.168.1.65 ...
% Connection timed out; remote host not responding
C:\>telnet 192.168.1.99
Trying 192.168.1.99 ...
% Connection timed out; remote host not responding
C:\>ping 192.168.1.2
Pinging 192.168.1.2 with 32 bytes of data:
Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.
Ping statistics for 192.168.1.2:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
Top

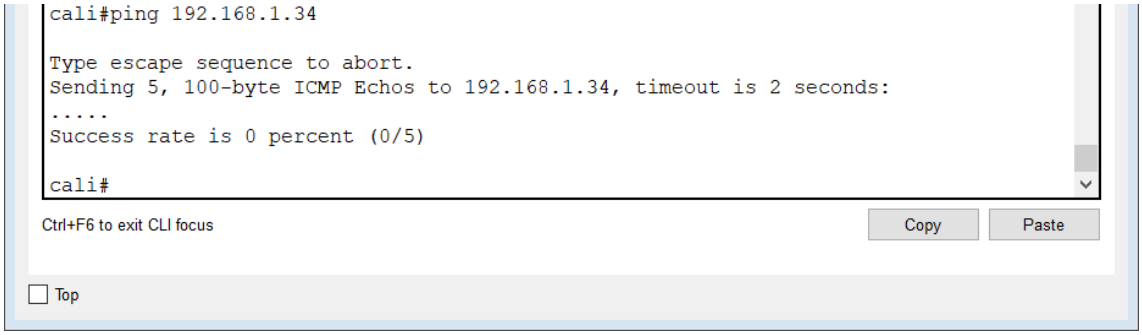

PC12
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Trying 192.168.1.33 ...
% Connection timed out; remote host not responding
C:\>telnet 192.168.1.2
Trying 192.168.1.2 ...
% Connection timed out; remote host not responding
C:\>ping 192.168.1.2
Pinging 192.168.1.2 with 32 bytes of data:
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Ping statistics for 192.168.1.2:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
Top

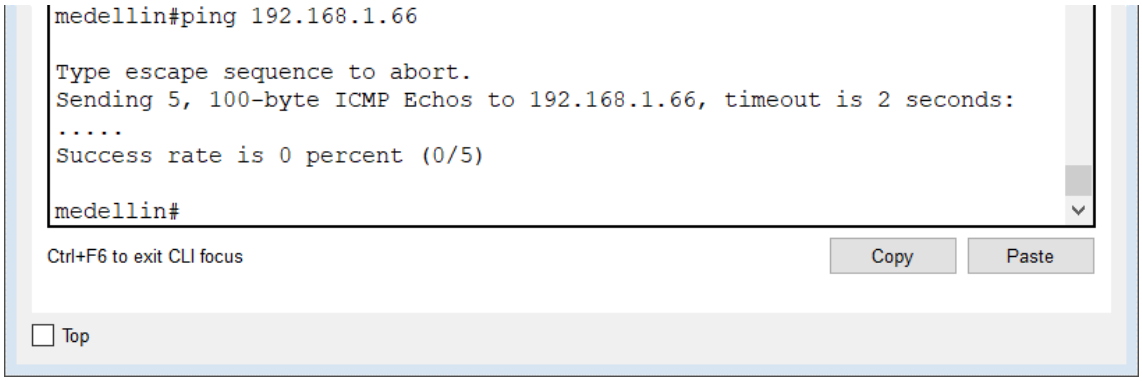

PC12
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Reply from 192.168.1.33: Destination host unreachable.
Ping statistics for 192.168.1.2:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.168.1.66
Pinging 192.168.1.66 with 32 bytes of data:
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Ping statistics for 192.168.1.66:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
Top


PC10
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Reply from 192.168.1.65: Destination host unreachable.
Ping statistics for 192.168.1.2:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.168.1.3
Pinging 192.168.1.3 with 32 bytes of data:
Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.
Reply from 192.168.1.65: Destination host unreachable.
Ping statistics for 192.168.1.3:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
Top


PC12
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Reply from 192.168.1.33: Destination host unreachable.
Ping statistics for 192.168.1.66:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.168.1.3
Pinging 192.168.1.3 with 32 bytes of data:
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Reply from 192.168.1.33: Destination host unreachable.
Ping statistics for 192.168.1.3:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
Top



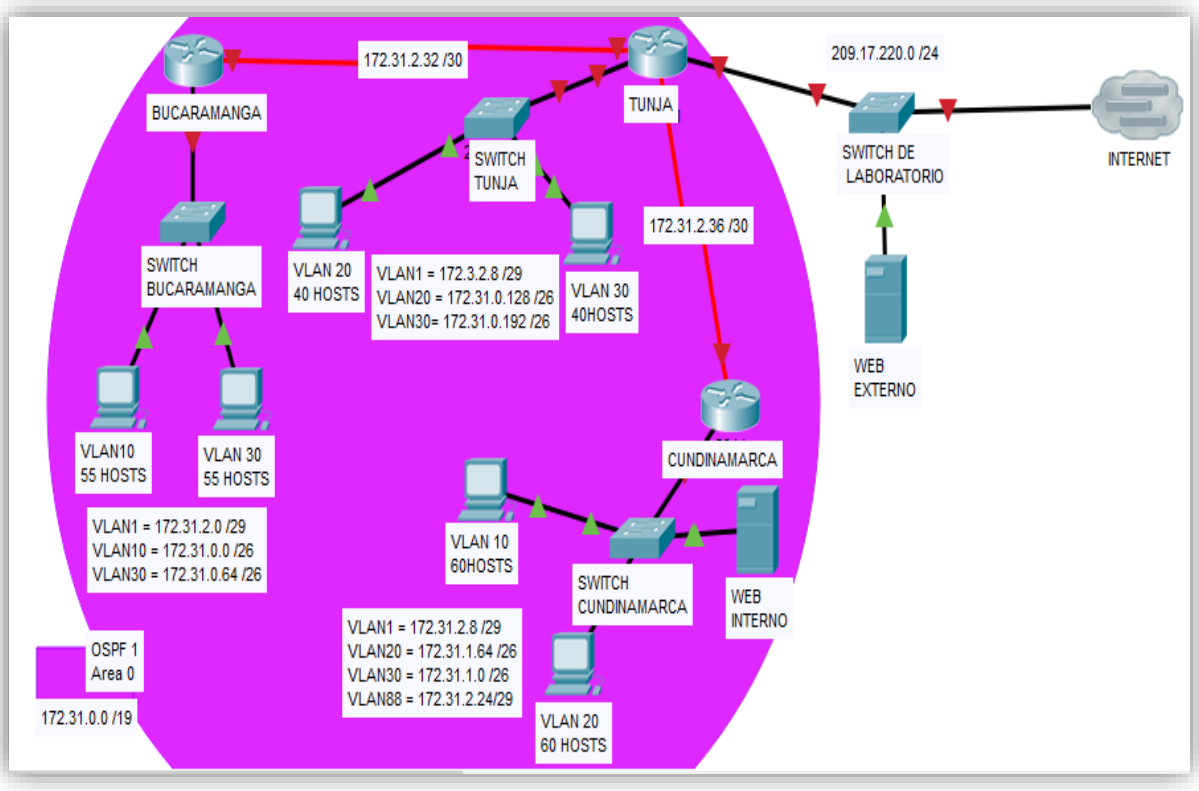


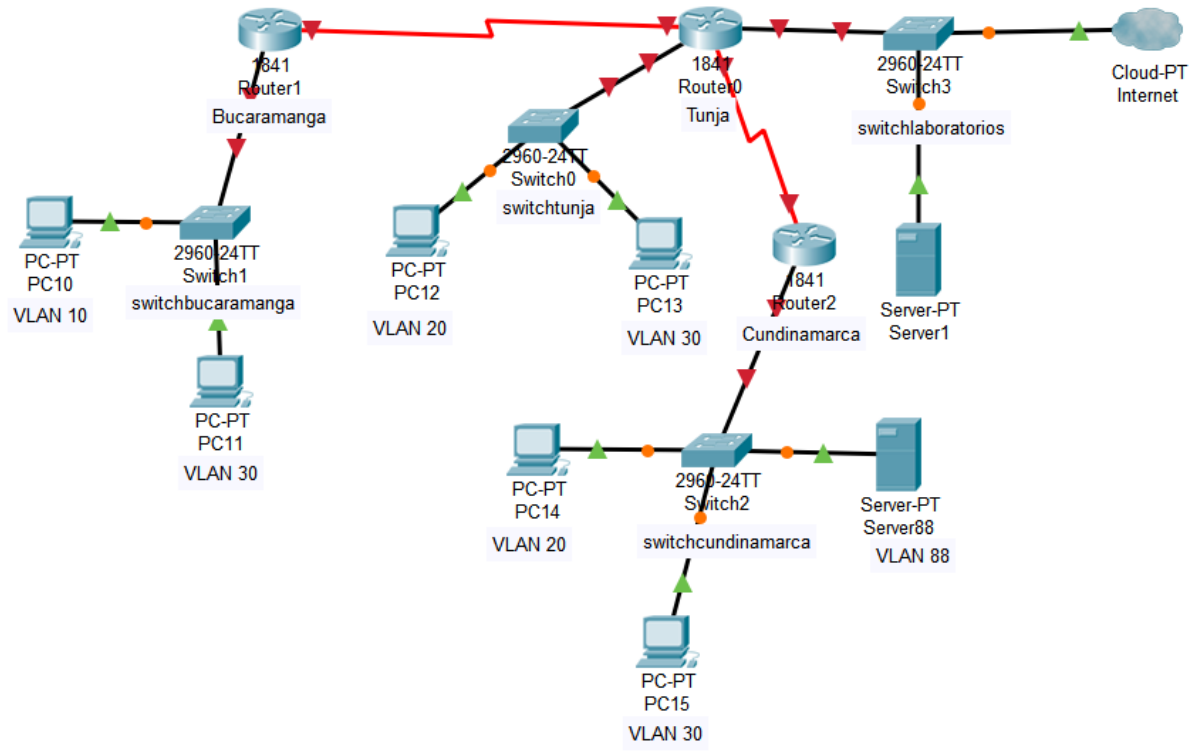


Cada uno de los resultados queda plasmado en el cuadro que se nos suministro para este fin.

ESCENARIO 2

Una empresa tiene la conexión a internet en una red Ethernet, lo cual deben adaptarlo para facilitar que sus routers y las redes que incluyen puedan, por esa vía, conectarse a internet, pero empleando las direcciones de la red LAN original.





Desarrollo

Los siguientes son los requerimientos necesarios:

1. **Todos los routers deberán tener los siguiente:**
   - **Configuración básica.**

- Procedo en esta parte a realizar la configuración de cada uno de los routers que hacen parte de nuestra red, nombres, contraseñas, mensajes, direcciones IP según tablas de direccionamiento, etc.

```
Router(config)#hostname bucaramanga
bucaramanga(config)#no ip domain-lookup
bucaramanga(config)#banner motd $El Acceso no autorizado est prohibido$
bucaramanga(config)#enable secret class123
bucaramanga(config)#line console 0
bucaramanga(config-line)#password cisco123
bucaramanga(config-line)#login
bucaramanga(config-line)#line vty 0 15
bucaramanga(config-line)#password cisco123
bucaramanga(config-line)#login
bucaramanga(config)#int f0/0.1
```

```
bucaramanga(config-subif)#encapsulation dot1q 1
bucaramanga(config-subif)#ip address 172.31.2.1 255.255.255.248
bucaramanga(config-subif)#int f0/0.10
bucaramanga(config-subif)#encapsulation dot1q 10
bucaramanga(config-subif)#ip address 172.31.0.1 255.255.255.192
bucaramanga(config-subif)#int f0/0.30
bucaramanga(config-subif)#encapsulation dot1q 30
bucaramanga(config-subif)#ip address 172.31.0.65 255.255.255.192
bucaramanga(config-subif)#int f0/0
bucaramanga(config-if)#no shutdown
bucaramanga(config-if)#int s0/0/0
bucaramanga(config-if)#ip address 172.31.2.34 255.255.255.252
bucaramanga(config-if)#no shutdown
bucaramanga(config-if)#router ospf 1
bucaramanga(config-router)#network 172.31.0.0 0.0.0.63 area 0
bucaramanga(config-router)#network 172.31.0.64 0.0.0.63 area 0
bucaramanga(config-router)#network 172.31.2.0 0.0.0.7 area 0
bucaramanga(config-router)#network 172.31.2.32 0.0.0.3 area 0
bucaramanga(config-router)#end
bucaramanga#
```

```
Router(config)#hostname tunja
tunja(config)#no ip domain-lookup
tunja(config)#banner motd $El Acceso no autorizado est prohibido$
tunja(config)#enable secret class123
tunja(config)#line console 0
tunja(config-line)#password cisco123
tunja(config-line)#login
tunja(config-line)#line vty 0 15
tunja(config-line)#password cisco123
tunja(config-line)#login
tunja(config)#int f0/0.1
tunja(config-subif)#encapsulation dot1q 1
tunja(config-subif)#ip address 172.3.2.9 255.255.255.248
tunja(config-subif)#int f0/0.20
tunja(config-subif)#encapsulation dot1q 20
tunja(config-subif)#ip address 172.31.0.129 255.255.255.192
tunja(config-subif)#int f0/0.30
tunja(config-subif)#encapsulation dot1q 30
tunja(config-subif)#ip address 172.31.0.193 255.255.255.192
tunja(config-subif)#int f0/0
tunja(config-if)#no shutdown
tunja(config-if)#int s0/0/0
tunja(config-if)#ip address 172.31.2.33 255.255.255.252
tunja(config-if)#no shutdown
tunja(config-if)#int s0/0/1
tunja(config-if)#ip address 172.31.2.37 255.255.255.252
```

```
tunja(config-if)#no shutdown
tunja(config-if)#int f0/1
tunja(config-if)#ip address 209.165.220.1 255.255.255.0
tunja(config-if)#no shutdown
tunja(config-if)#router ospf 1
tunja(config-router)#network 172.3.2.8 0.0.0.7 area 0
tunja(config-router)#network 172.31.0.128 0.0.0.63 area 0
tunja(config-router)#network 172.31.0.192 0.0.0.63 area 0
tunja(config-router)#network 172.31.2.32 0.0.0.3 area 0
tunja(config-router)#network 172.31.2.36 0.0.0.3 area 0
tunja(config-router)#end
tunja#


Router(config)#hostname cundinamarca
cundinamarca(config)#no ip domain-lookup
cundinamarca(config)#banner motd $El Acceso no autorizado est prohibido$
cundinamarca(config)#enable secret class123
cundinamarca(config)#line console 0
cundinamarca(config-line)#password cisco123
cundinamarca(config-line)#login
cundinamarca(config-line)#line vty 0 15
cundinamarca(config-line)#password cisco123
cundinamarca(config-line)#login
cundinamarca(config)#int f0/0.1
cundinamarca(config-subif)#encapsulation dot1q 1
cundinamarca(config-subif)#ip address 172.31.2.9 255.255.255.248
cundinamarca(config-subif)#int f0/0.20
cundinamarca(config-subif)#encapsulation dot1q 20
cundinamarca(config-subif)#ip address 172.31.1.65 255.255.255.192
cundinamarca(config-subif)#int f0/0.30
cundinamarca(config-subif)#encapsulation dot1q 30
cundinamarca(config-subif)#ip address 172.31.1.1 255.255.255.192
cundinamarca(config-subif)#int f0/0.88
cundinamarca(config-subif)#encapsulation dot1q 88
cundinamarca(config-subif)#ip address 172.31.2.25 255.255.255.248
cundinamarca(config-subif)#int f0/0
cundinamarca(config-if)#no shutdown
cundinamarca(config-if)#
cundinamarca(config-if)#int s0/0/0
cundinamarca(config-if)#ip address 172.31.2.38 255.255.255.252
cundinamarca(config-if)#no shutdown
cundinamarca(config-if)#router ospf 1
cundinamarca(config-router)#network 172.31.1.0 0.0.0.63 area 0
cundinamarca(config-router)#network 172.31.1.64 0.0.0.63 area 0
cundinamarca(config-router)#network 172.31.2.8 0.0.0.7 area 0
cundinamarca(config-router)#network 172.31.2.24 0.0.0.7 area 0
cundinamarca(config-router)#network 172.31.2.36 0.0.0.3 area 0
```

```
cundinamarca(config-router)#end
cundinamarca#
```

- Procedo en esta parte a realizar la configuración de cada uno de los SWITCHES que hacen parte de nuestra red, nombres, contraseñas, mensajes, direcciones IP según tablas de direccionamiento, etc.

```
Switch(config)#hostname switchbucaramanga
switchbucaramanga(config)#vlan 1
switchbucaramanga(config-vlan)#vlan 10
switchbucaramanga(config-vlan)#vlan 30
switchbucaramanga(config-vlan)#int f0/10
switchbucaramanga(config-if)#switchport mode access
switchbucaramanga(config-if)#switchport access vlan 10
switchbucaramanga(config-if)#int f0/14
switchbucaramanga(config-if)#switchport mode access
switchbucaramanga(config-if)#switchport access vlan 30
switchbucaramanga(config-if)#int f0/1
switchbucaramanga(config-if)#switchport mode trunk
switchbucaramanga(config-if)#int vlan 1
```

- configuramos ahora las direcciones IP

```
switchbucaramanga(config-if)#ip address 172.31.2.3 255.255.255.248
switchbucaramanga(config-if)#no shutdown
switchbucaramanga(config-if)#ip default-gateway 172.31.2.1
switchbucaramanga(config)#
```

```
Switch(config)#hostname swtichtunja
swtichtunja(config)#vlan 1
swtichtunja(config-vlan)#vlan 20
swtichtunja(config-vlan)#vlan 30
swtichtunja(config-vlan)#int f0/10
swtichtunja(config-if)#switchport mode access
swtichtunja(config-if)#switchport access vlan 20
swtichtunja(config-if)#int f0/14
swtichtunja(config-if)#switchport mode access
swtichtunja(config-if)#switchport access vlan 30
swtichtunja(config-if)#int f0/1
swtichtunja(config-if)#switchport mode trunk
swtichtunja(config-if)#
```

- configuramos ahora las direcciones IP

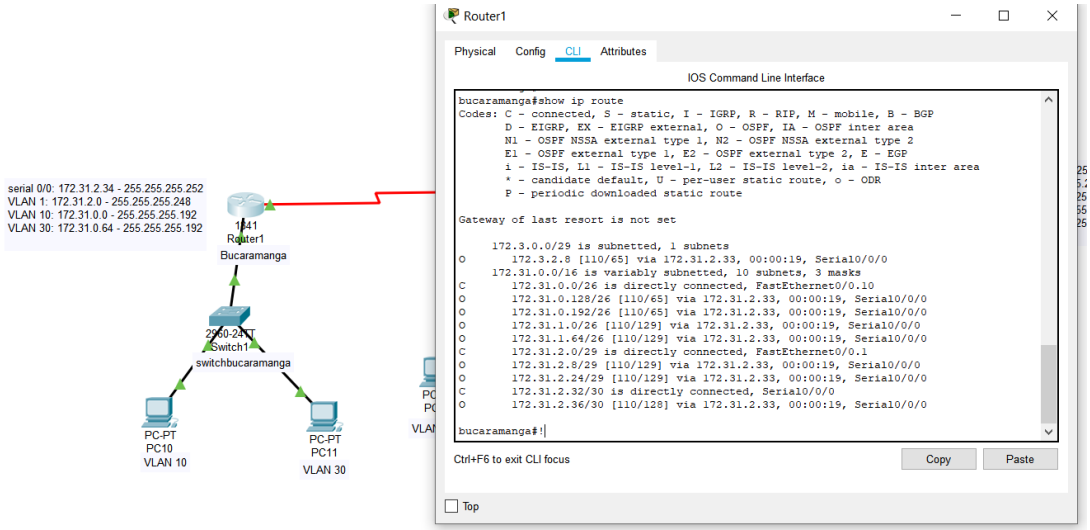
```
swtichtunja(config-if)#int vlan 1
swtichtunja(config-if)#ip address 172.3.2.11 255.255.255.248
swtichtunja(config-if)#no shutdown
swtichtunja(config-if)#
swtichtunja(config-if)#ip default-gateway 172.3.2.9
swtichtunja(config)#
swtichtunja(config)#
```

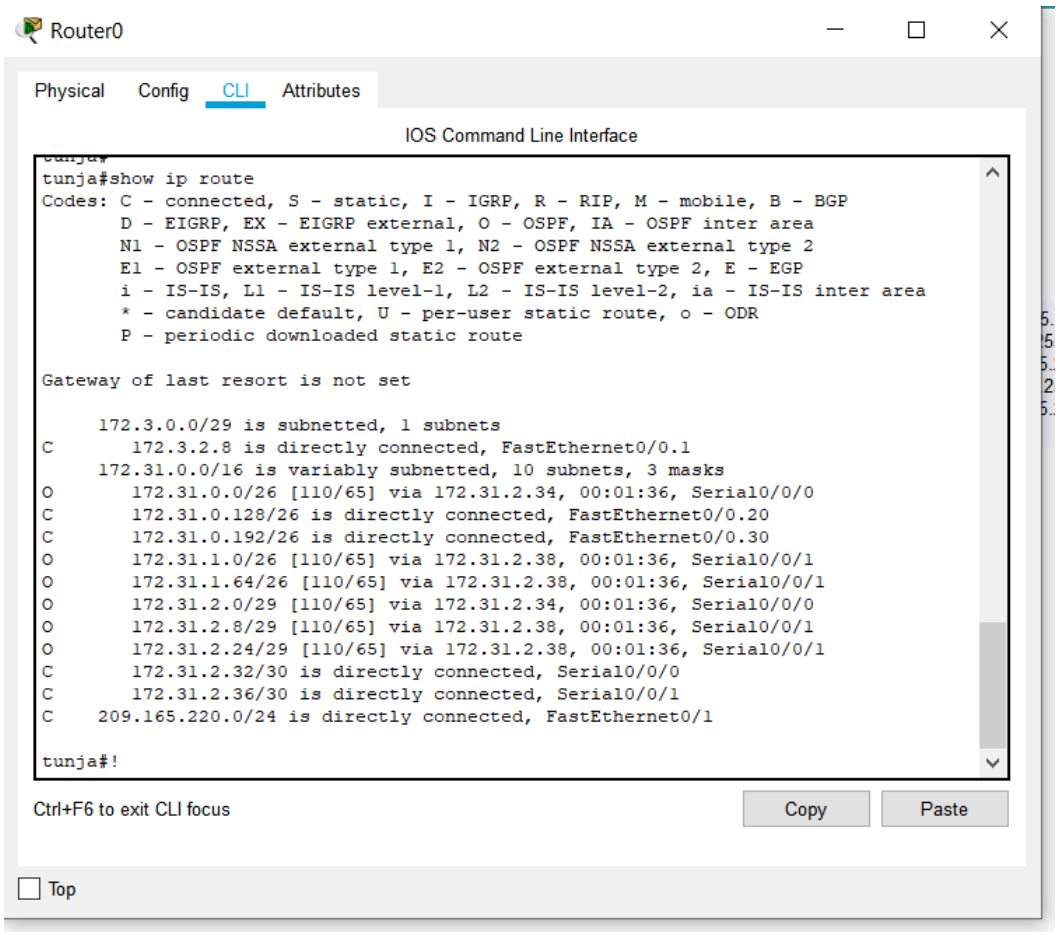
```
Switch(config)#hostname swithccundinamarca
swithccundinamarca(config)#vlan 1
swithccundinamarca(config-vlan)#vlan 20
swithccundinamarca(config-vlan)#vlan 30
swithccundinamarca(config-vlan)#vlan 88
swithccundinamarca(config-vlan)#exit
swithccundinamarca(config)#int f0/10
swithccundinamarca(config-if)#switchport mode access
swithccundinamarca(config-if)#switchport access vlan 20
swithccundinamarca(config-if)#int f0/14
swithccundinamarca(config-if)#switchport mode access
swithccundinamarca(config-if)#switchport access vlan 30
swithccundinamarca(config-if)#int f0/20
swithccundinamarca(config-if)#switchport mode access
swithccundinamarca(config-if)#switchport access vlan 88
swithccundinamarca(config-if)#int f0/1
swithccundinamarca(config-if)#switchport mode trunk
swithccundinamarca(config-if)#
```

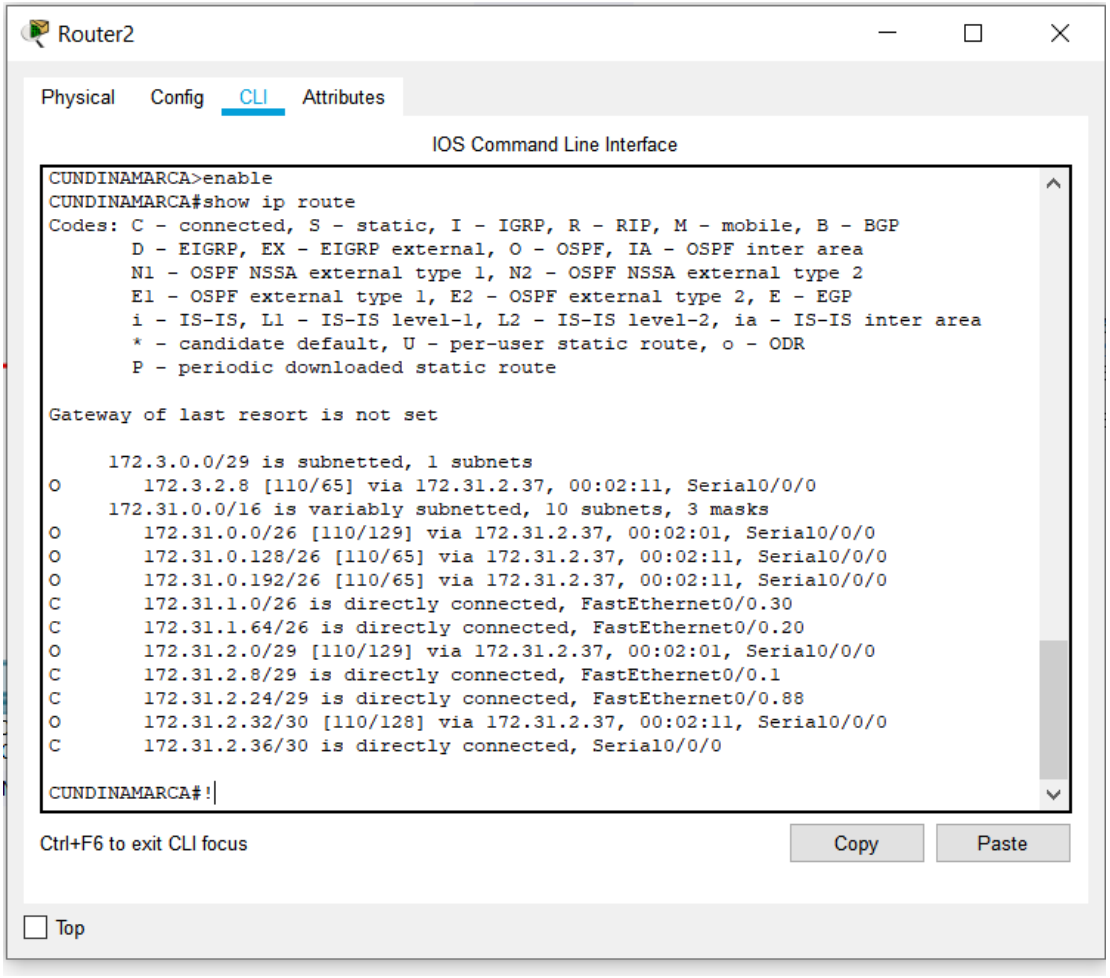
- configuramos ahora las direcciones IP

```
swithccundinamarca(config-if)#int vlan 1
swithccundinamarca(config-if)#ip address 172.31.2.11 255.255.255.248
swithccundinamarca(config-if)#no shutdown
swithccundinamarca(config-if)#
swithccundinamarca(config-if)#ip default-gateway 172.31.2.9
swithccundinamarca(config)#
```

- procedemos a verificar la configuración del protocol de enrutamiento OSPF.


serial 0/0: 172.31.2.34 - 255.255.255.252
VLAN 1: 172.31.2.0 - 255.255.255.248
VLAN 10: 172.31.0.0 - 255.255.255.192
VLAN 30: 172.31.0.64 - 255.255.255.192
1941
Router1
Bucaramanga
2960-24TT
Switch1
switchbucaramanga
PC-PT
PC10
VLAN 10
PC-PT
PC11
VLAN 30
Router1
Physical
Config
CLI
Attributes
IOS Command Line Interface
bucaramanga#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is not set
172.3.0.0/29 is subnetted, 1 subnets
O 172.3.2.8 [110/65] via 172.31.2.33, 00:00:19, Serial0/0/0
172.31.0.0/16 is variably subnetted, 10 subnets, 3 masks
C 172.31.0.0/26 is directly connected, FastEthernet0/0.10
O 172.31.0.128/26 [110/65] via 172.31.2.33, 00:00:19, Serial0/0/0
O 172.31.0.192/26 [110/65] via 172.31.2.33, 00:00:19, Serial0/0/0
O 172.31.1.0/26 [110/129] via 172.31.2.33, 00:00:19, Serial0/0/0
O 172.31.1.64/26 [110/129] via 172.31.2.33, 00:00:19, Serial0/0/0
C 172.31.2.0/29 is directly connected, FastEthernet0/0.1
O 172.31.2.8/29 [110/129] via 172.31.2.33, 00:00:19, Serial0/0/0
O 172.31.2.24/29 [110/129] via 172.31.2.33, 00:00:19, Serial0/0/0
C 172.31.2.32/30 is directly connected, Serial0/0/0
O 172.31.2.36/30 [110/128] via 172.31.2.33, 00:00:19, Serial0/0/0
bucaramanga#!
Ctrl+F6 to exit CLI focus
Copy
Paste
Top


Router0
Physical
Config
CLI
Attributes
IOS Command Line Interface
tunja#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is not set
172.3.0.0/29 is subnetted, 1 subnets
C 172.3.2.8 is directly connected, FastEthernet0/0.1
172.31.0.0/16 is variably subnetted, 10 subnets, 3 masks
O 172.31.0.0/26 [110/65] via 172.31.2.34, 00:01:36, Serial0/0/0
C 172.31.0.128/26 is directly connected, FastEthernet0/0.20
C 172.31.0.192/26 is directly connected, FastEthernet0/0.30
O 172.31.1.0/26 [110/65] via 172.31.2.38, 00:01:36, Serial0/0/1
O 172.31.1.64/26 [110/65] via 172.31.2.38, 00:01:36, Serial0/0/1
O 172.31.2.0/29 [110/65] via 172.31.2.34, 00:01:36, Serial0/0/0
O 172.31.2.8/29 [110/65] via 172.31.2.38, 00:01:36, Serial0/0/1
O 172.31.2.24/29 [110/65] via 172.31.2.38, 00:01:36, Serial0/0/1
C 172.31.2.32/30 is directly connected, Serial0/0/0
C 172.31.2.36/30 is directly connected, Serial0/0/1
C 209.165.220.0/24 is directly connected, FastEthernet0/1
tunja#!
Ctrl+F6 to exit CLI focus
Copy
Paste
Top



- **Autenticación local con AAA.**

bucaramanga(config-line)#username admin01 secret admin01pass
bucaramanga(config)#aaa new-model
bucaramanga(config)#aaa authentication login aaalocal local
bucaramanga(config)#line console 0
bucaramanga(config-line)#login authentication aaalocal
bucaramanga(config-line)#line vty 0 15
bucaramanga(config-line)#login authentication aaalocal

tunja(config-line)#username admin01 secret admin01pass
tunja(config)#aaa new-model
tunja(config)#aaa authentication login aaalocal local
tunja(config)#line console 0
tunja(config-line)#login authentication aaalocal
tunja(config-line)#line vty 0 15
tunja(config-line)#login authentication aaalocal

cundinamarca(config-line)#username admin01 secret admin01pass
cundinamarca(config)#aaa new-model
cundinamarca(config)#aaa authentication login aaalocal local
cundinamarca(config)#line console 0
cundinamarca(config-line)#login authentication aaalocal
cundinamarca(config-line)#line vty 0 15
cundinamarca(config-line)#login authentication aaalocal

- **Cifrado de contraseñas.**

bucaramanga(config)#service password-encryption
tunja(config)#service password-encryption
cundinamarca(config)#service password-encryption

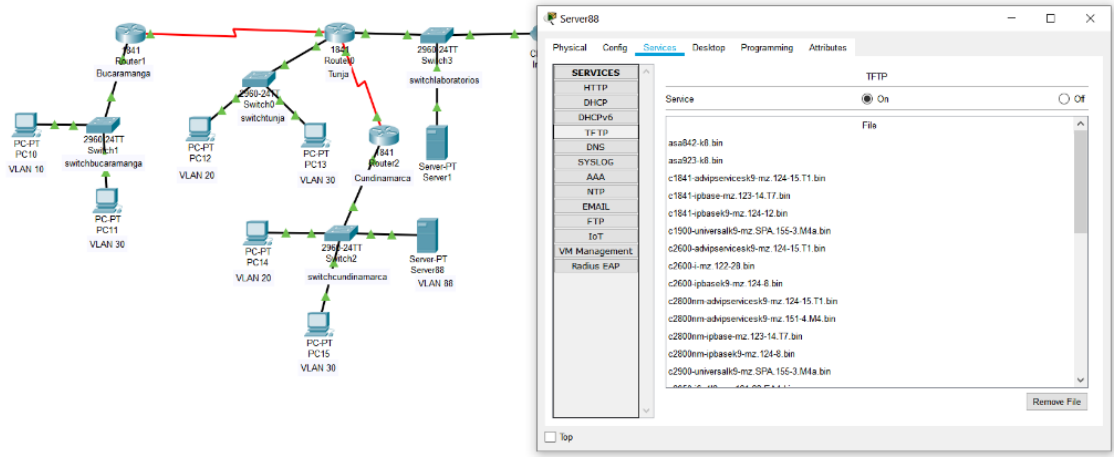
- **Un máximo de internos para acceder al router.**

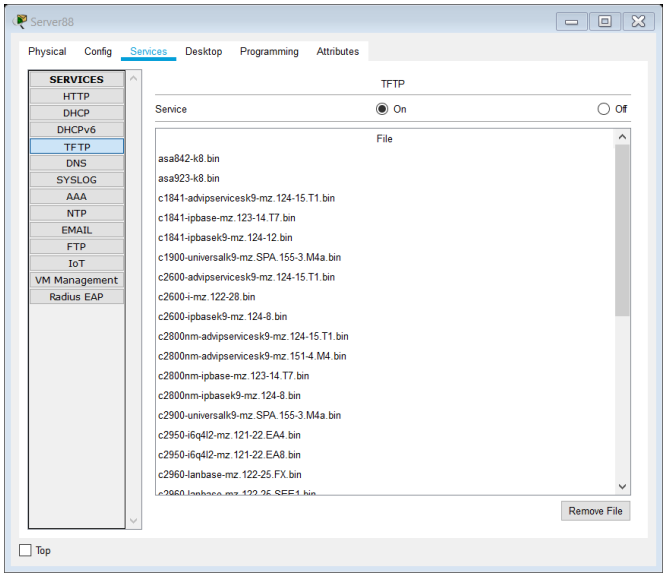
bucaramanga(config-line)#login block-for 20 attempts 10 within 60
tunja(config-line)#login block-for 20 attempts 10 within 60
cundinamarca(config-line)#login block-for 20 attempts 10 within 60

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

bucaramanga(config-line)#login block-for 20 attempts 10 within 60
tunja(config-line)#login block-for 20 attempts 10 within 60
cundinamarca(config-line)#login block-for 20 attempts 10 within 60

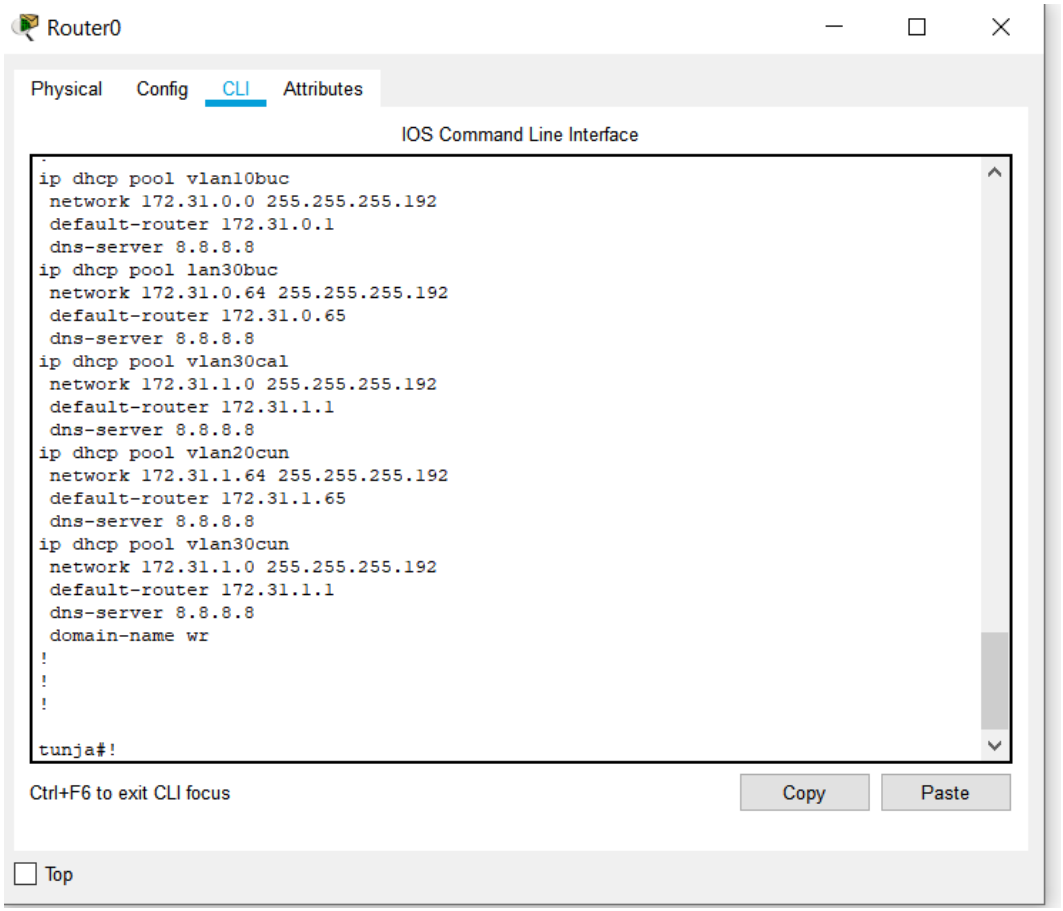
- **Establezca un servidor TFTP y almacene todos los archivos necesarios de los routers**





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

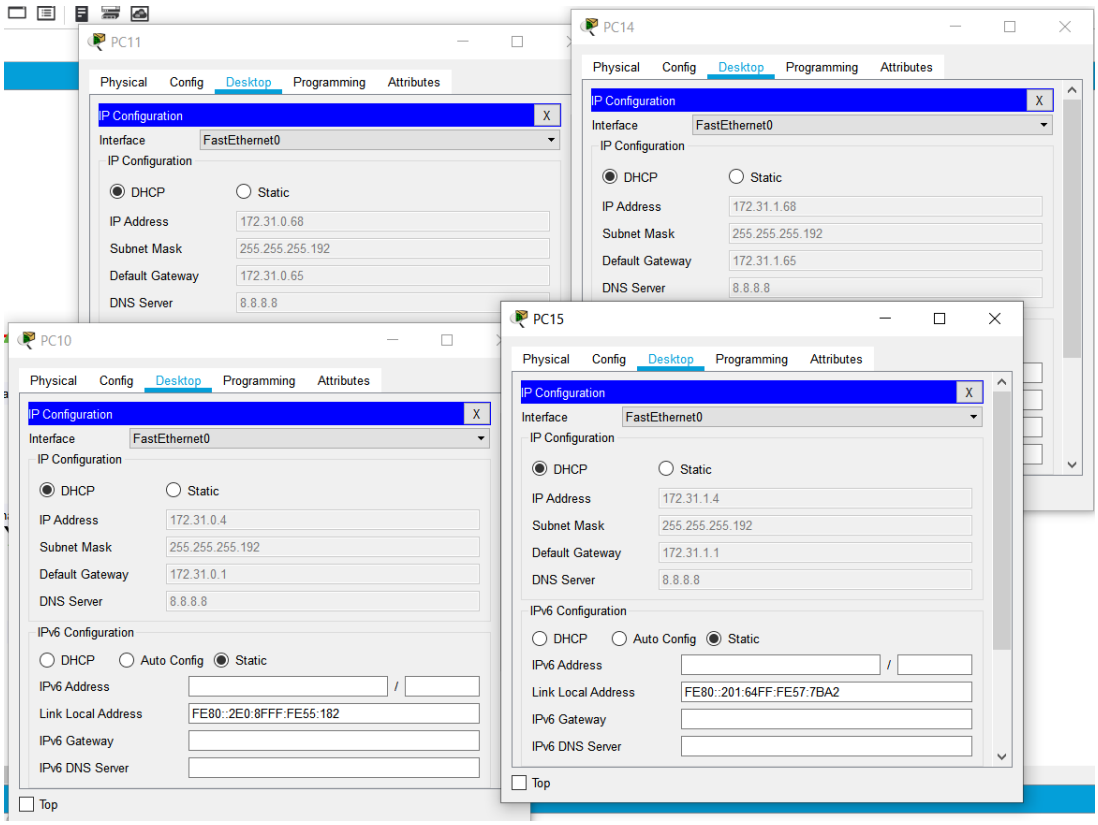
```
tunja(config)#ip dhcp excluded-address 172.31.0.1 172.31.0.3
tunja(config)#ip dhcp excluded-address 172.31.0.65 172.31.0.67
tunja(config)#ip dhcp excluded-address 172.31.1.65 172.31.1.67
tunja(config)#ip dhcp excluded-address 172.31.1.1 172.31.1.3
tunja(config)#ip dhcp pool vlan10buc
tunja(dhcp-config)#network 172.31.0.0 255.255.255.192
tunja(dhcp-config)#default-router 172.31.0.1
tunja(dhcp-config)#dns-server 8.8.8.8
tunja(dhcp-config)#ip dhcp pool lan30buc
tunja(dhcp-config)#network 172.31.0.64 255.255.255.192
tunja(dhcp-config)#default-router 172.31.0.65
tunja(dhcp-config)#dns-server 8.8.8.8
tunja(dhcp-config)#ip dhcp pool vlan20cun
tunja(dhcp-config)#network 172.31.1.64 255.255.255.192
tunja(dhcp-config)#default-router 172.31.1.65
tunja(dhcp-config)#dns-server 8.8.8.8
tunja(dhcp-config)#ip dhcp pool vlan30cun
tunja(dhcp-config)#network 172.31.1.0 255.255.255.192
tunja(dhcp-config)#default-router 172.31.1.1
tunja(dhcp-config)#dns-server 8.8.8.8
tunja(dhcp-config)#
```



bucaramanga(config)#int f0/0.10
bucaramanga(config-subif)#ip helper-address 172.31.2.33
bucaramanga(config-subif)#int f0/0.30
bucaramanga(config-subif)#ip helper-address 172.31.2.33
bucaramanga(config-subif)#end
bucaramanga#

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

- Ya tenemos nuestra configuración, solo nos queda verificar si los dispositivos de las redes de BUCARAMANGA y CUNDINAMARCA las tomas.
-



- Vemos claramente que los dispositivos PC si están tomando las IP por medio de DHCP.

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

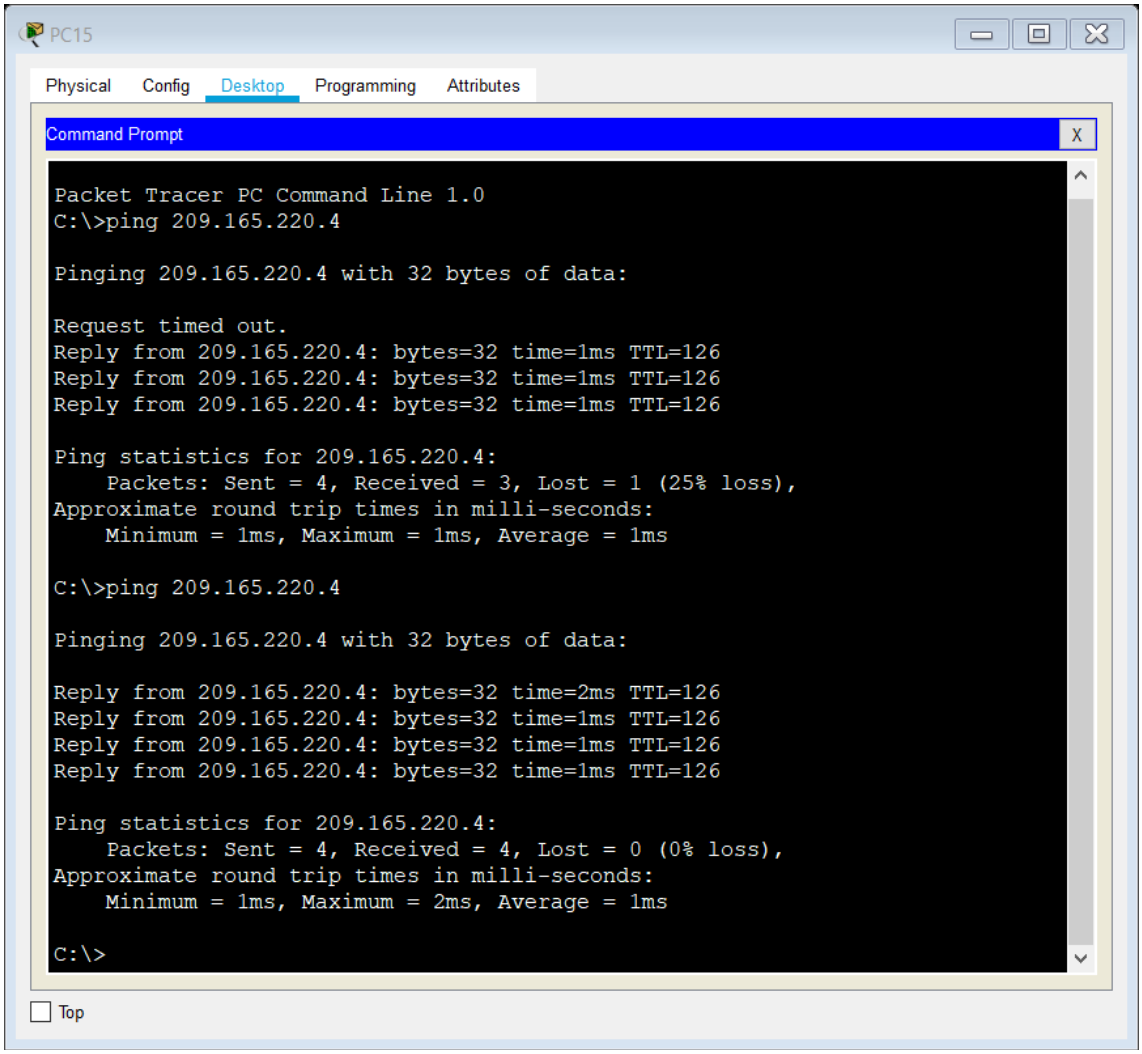
```
tunja(config)#ip nat inside source static 172.31.2.28 209.165.220.10
tunja(config)#access-list 11 permit 172.0.0.0 0.255.255.255
tunja(config)#ip nat inside source list 11 interface f0/1 overload

tunja(config)#int f0/1
tunja(config-if)#ip nat outside
tunja(config-if)#int f0/0.1
tunja(config-subif)#ip nat inside
tunja(config-subif)#int f0/0.20
tunja(config-subif)#ip nat inside
tunja(config-subif)#int f0/0.30
tunja(config-subif)#ip nat inside
tunja(config-subif)#int s0/0/0
```

```
tunja(config-if)#ip nat inside
tunja(config-if)#int s0/0/1
tunja(config-if)#ip nat inside
tunja(config-if)#exit

tunja(config)#ip route 0.0.0.0 0.0.0.0 209.165.220.4
tunja(config)#router ospf 1
tunja(config-router)#default-information originate
tunja(config-router)#end



tunja#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 209.165.220.4 to network 0.0.0.0

172.3.0.0/29 is subnetted, 1 subnets
C 172.3.2.8 is directly connected, FastEthernet0/0.1
172.31.0.0/16 is variably subnetted, 11 subnets, 3 masks
O 172.31.0.0/26 [110/65] via 172.31.2.34, 00:10:47, Serial0/0/0
O 172.31.0.64/26 [110/65] via 172.31.2.34, 00:10:47, Serial0/0/0
C 172.31.0.128/26 is directly connected, FastEthernet0/0.20
C 172.31.0.192/26 is directly connected, FastEthernet0/0.30
O 172.31.1.0/26 [110/65] via 172.31.2.38, 00:10:47, Serial0/0/1
O 172.31.1.64/26 [110/65] via 172.31.2.38, 00:10:47, Serial0/0/1
O 172.31.2.0/29 [110/65] via 172.31.2.34, 00:10:47, Serial0/0/0
O 172.31.2.8/29 [110/65] via 172.31.2.38, 00:10:47, Serial0/0/1
O 172.31.2.24/29 [110/65] via 172.31.2.38, 00:10:47, Serial0/0/1
C 172.31.2.32/30 is directly connected, Serial0/0/0
C 172.31.2.36/30 is directly connected, Serial0/0/1
C 209.165.220.0/24 is directly connected, FastEthernet0/1
S* 0.0.0.0/0 [1/0] via 209.165.220.4

tunja#

bucaramanga#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
```

```
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 172.31.2.33 to network 0.0.0.0

172.3.0.0/29 is subnetted, 1 subnets
O 172.3.2.8 [110/65] via 172.31.2.33, 00:11:18, Serial0/0/0
172.31.0.0/16 is variably subnetted, 11 subnets, 3 masks
C 172.31.0.0/26 is directly connected, FastEthernet0/0.10
C 172.31.0.64/26 is directly connected, FastEthernet0/0.30
O 172.31.0.128/26 [110/65] via 172.31.2.33, 00:11:18, Serial0/0/0
O 172.31.0.192/26 [110/65] via 172.31.2.33, 00:11:18, Serial0/0/0
O 172.31.1.0/26 [110/129] via 172.31.2.33, 00:11:18, Serial0/0/0
O 172.31.1.64/26 [110/129] via 172.31.2.33, 00:11:18, Serial0/0/0
C 172.31.2.0/29 is directly connected, FastEthernet0/0.1
O 172.31.2.8/29 [110/129] via 172.31.2.33, 00:11:18, Serial0/0/0
O 172.31.2.24/29 [110/129] via 172.31.2.33, 00:11:18, Serial0/0/0
C 172.31.2.32/30 is directly connected, Serial0/0/0
O 172.31.2.36/30 [110/128] via 172.31.2.33, 00:11:18, Serial0/0/0
O*E2 0.0.0.0/0 [110/1] via 172.31.2.33, 00:00:51, Serial0/0/0

bucaramanga#

cundinamarca#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 172.31.2.37 to network 0.0.0.0

172.3.0.0/29 is subnetted, 1 subnets
O 172.3.2.8 [110/65] via 172.31.2.37, 00:12:02, Serial0/0/0
172.31.0.0/16 is variably subnetted, 11 subnets, 3 masks
O 172.31.0.0/26 [110/129] via 172.31.2.37, 00:11:52, Serial0/0/0
O 172.31.0.64/26 [110/129] via 172.31.2.37, 00:11:52, Serial0/0/0
O 172.31.0.128/26 [110/65] via 172.31.2.37, 00:12:02, Serial0/0/0
O 172.31.0.192/26 [110/65] via 172.31.2.37, 00:12:02, Serial0/0/0
C 172.31.1.0/26 is directly connected, FastEthernet0/0.30
C 172.31.1.64/26 is directly connected, FastEthernet0/0.20
O 172.31.2.0/29 [110/129] via 172.31.2.37, 00:11:52, Serial0/0/0
C 172.31.2.8/29 is directly connected, FastEthernet0/0.1
C 172.31.2.24/29 is directly connected, FastEthernet0/0.88
O 172.31.2.32/30 [110/128] via 172.31.2.37, 00:12:02, Serial0/0/0
C 172.31.2.36/30 is directly connected, Serial0/0/0
```

O*E2 0.0.0.0/0 [110/1] via 172.31.2.37, 00:01:34, Serial0/0/0

cundinamarca#



```
tunja#show ip nat translations
Pro  Inside global     Inside local       Outside local      Outside
global
icmp 209.165.220.1:1   172.31.1.4:1       209.165.220.4:1
209.165.220.4:1
icmp 209.165.220.1:2   172.31.1.4:2       209.165.220.4:2
209.165.220.4:2
icmp 209.165.220.1:3   172.31.1.4:3       209.165.220.4:3
209.165.220.4:3
icmp 209.165.220.1:4   172.31.1.4:4       209.165.220.4:4
209.165.220.4:4
icmp 209.165.220.1:5   172.31.1.4:5       209.165.220.4:5
209.165.220.4:5
icmp 209.165.220.1:6   172.31.1.4:6       209.165.220.4:6
209.165.220.4:6
icmp 209.165.220.1:7   172.31.1.4:7       209.165.220.4:7
209.165.220.4:7
icmp 209.165.220.1:8   172.31.1.4:8       209.165.220.4:8
209.165.220.4:8
---  209.165.220.10    172.31.2.28        ---                ---

tunja#
```

4. El enrutamiento deberá tener autenticación.

bucaramanga#conf t
Enter configuration commands, one per line. End with CNTL/Z.
bucaramanga(config)#int s0/0/0
bucaramanga(config-if)#ip ospf authentication message-digest
bucaramanga(config-if)#ip ospf message-digest-key 1 md5 ospfpass
bucaramanga(config-if)#

tunja(config)#int s0/0/0
tunja(config-if)#ip ospf authentication message-digest
tunja(config-if)#ip ospf message-digest-key 1 md5 ospfpass
tunja(config-if)#int s0/0/1
tunja(config-if)#ip ospf authentication message-digest
tunja(config-if)#ip ospf message-digest-key 1 md5 ospfpass
tunja(config-if)#

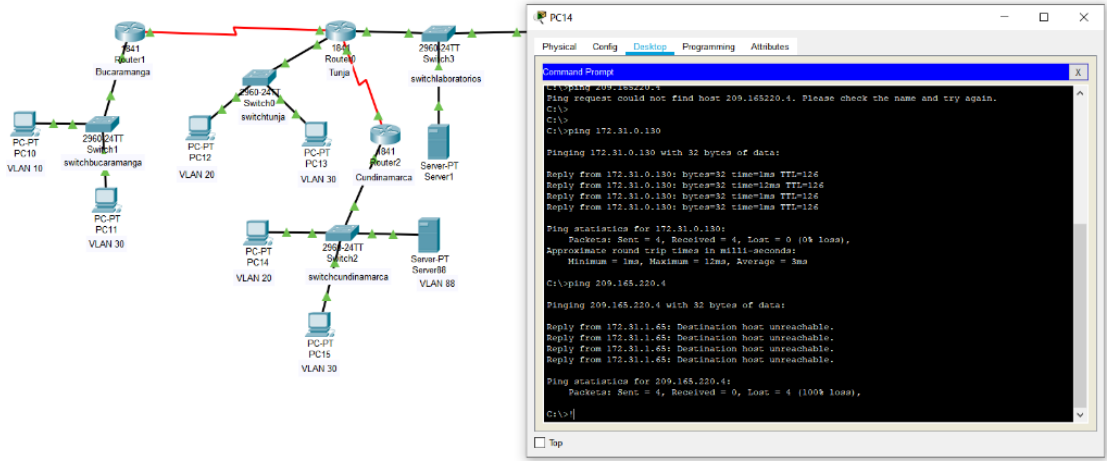
cundinamarca(config)#int s0/0/0
cundinamarca(config-if)#ip ospf authentication message-digest
cundinamarca(config-if)#ip ospf message-digest-key 1 md5 ospfpass
cundinamarca(config-if)#

5. **Listas de control de acceso**

6. **VLSM: utilizar la dirección 172.31.0.0 /18 para el direccionamiento.**

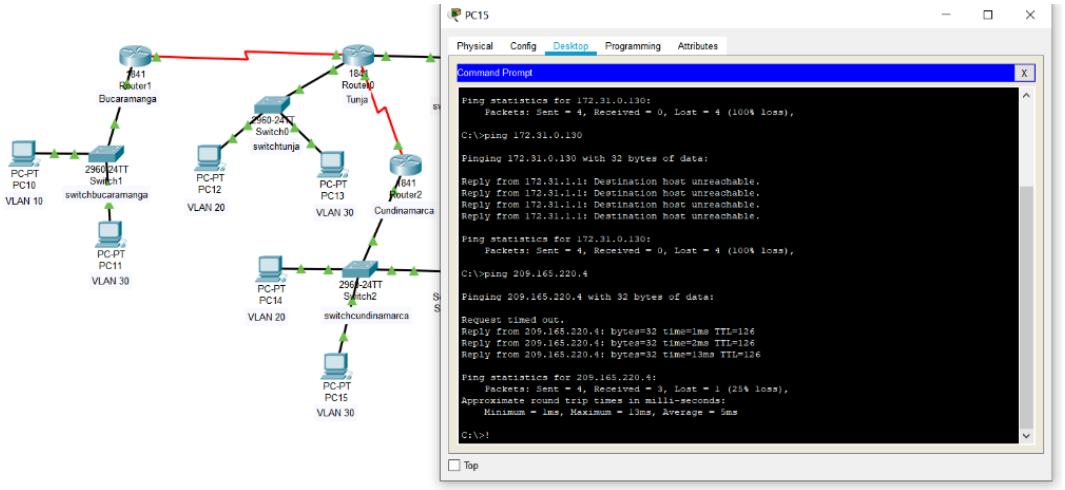
- **Los hosts de VLAN 20 en Cundinamarca no acceden a internet, solo a la red interna de Tunja.**

cundinamarca(config-if)#access-list 121 deny ip 172.31.1.64 0.0.0.63 209.165.220.0 0.0.0.255
cundinamarca(config)#access-list 121 permit ip any any
cundinamarca(config)#int f0/0.20
cundinamarca(config-subif)#ip access-group 121 in
cundinamarca(config-subif)#



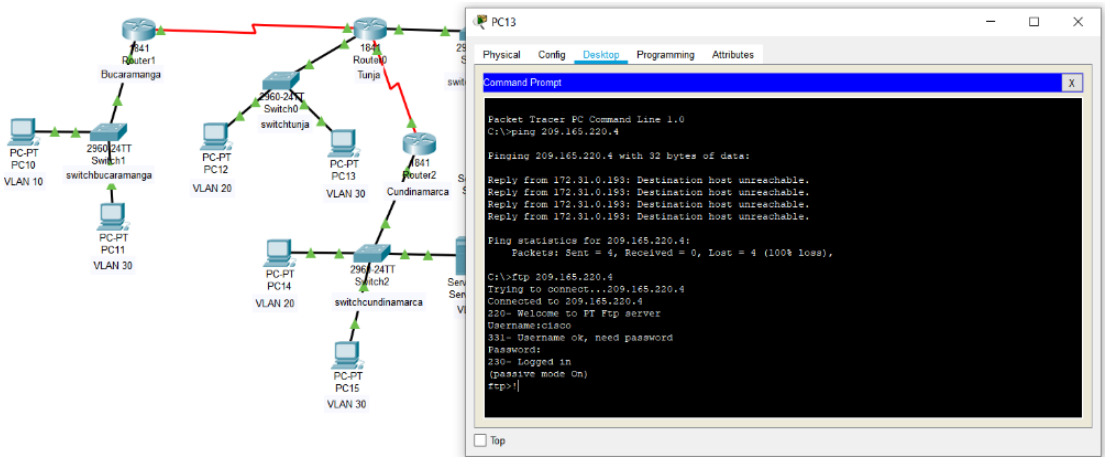
- **Los hosts de VLAN 10 en Cundinamarca si acceden a internet y no a la red interna de Tunja.**

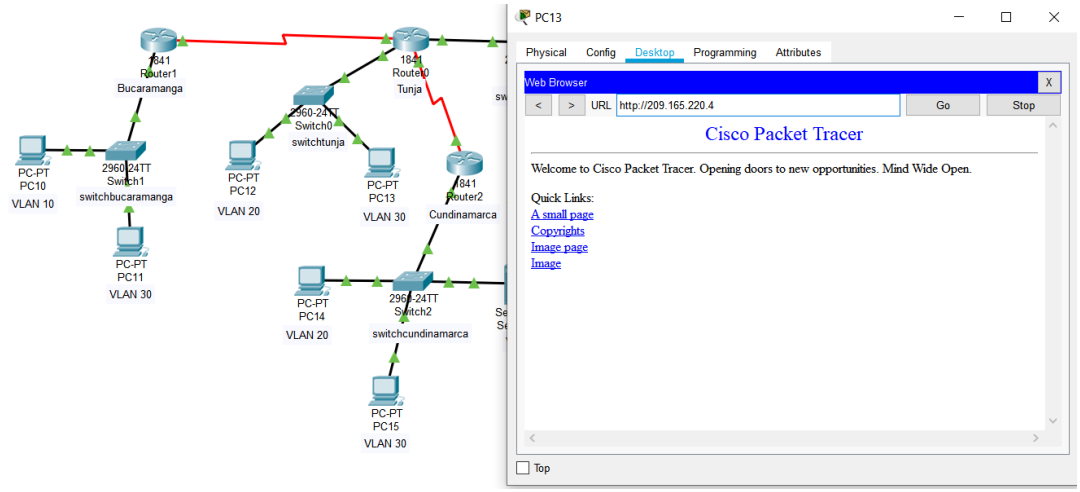
cundinamarca(config-subif)#access-list 122 permit ip 172.31.1.0 0.0.0.63 209.165.220.0 0.0.0.255
cundinamarca(config)#access-list 122 deny ip any any
cundinamarca(config)#int f0/0.30
cundinamarca(config-subif)#ip access-group 122 in
cundinamarca(config-subif)#



- **Los hosts de VLAN 30 en Tunja solo acceden a servidores web y ftp de internet.**

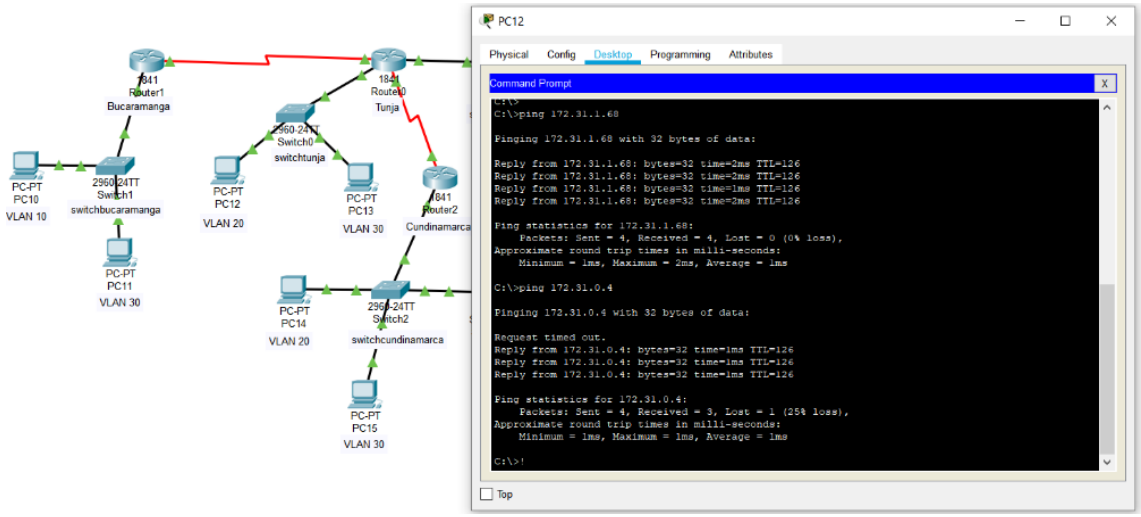
tunja(config)#access-list **121** permit tcp 172.31.0.192 0.0.0.63 209.165.220.0 0.0.0.255 eq www
tunja(config)#access-list **121** permit tcp 172.31.0.192 0.0.0.63 209.165.220.0 0.0.0.255 eq ftp
tunja(config)#int f0/0.30
tunja(config-subif)#ip access-group **121** in
tunja(config-subif)#





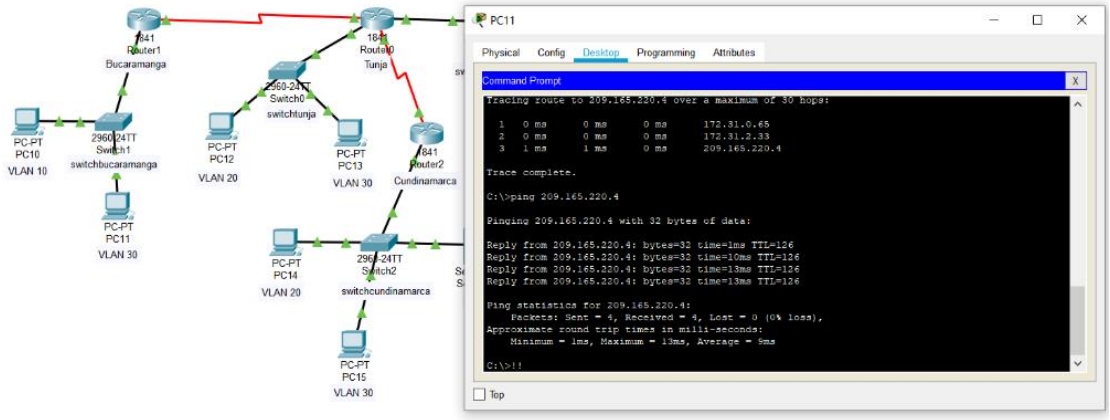
- **Los hosts de VLAN 20 en Tunja solo acceden a la VLAN 20 de Cundinamarca y VLAN 10 de Bucaramanga.**

```
tunja(config-subif)#access-list 122 permit ip 172.31.0.128 0.0.0.63 172.31.1.64
0.0.0.63
tunja(config)#access-list 122 permit ip 172.31.0.128 0.0.0.63 172.31.0.0
0.0.0.63
tunja(config)#int f0/0.20
tunja(config-subif)#ip access-group 122 in
tunja(config-subif)#
```



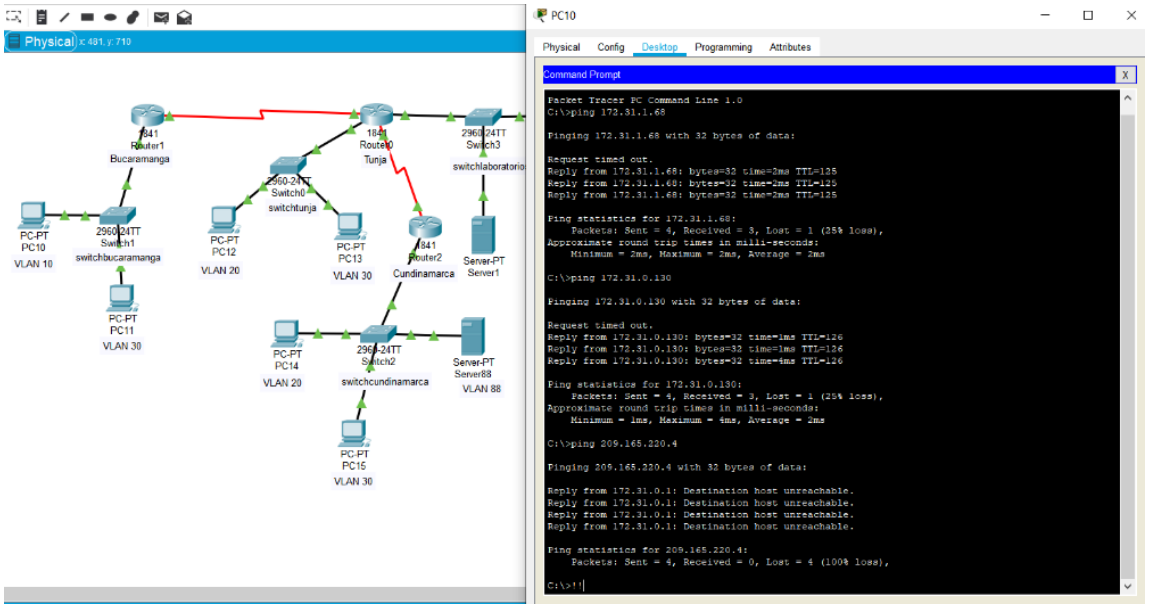
- **Los hosts de VLAN 30 de Bucaramanga acceden a internet y a cualquier equipo de VLAN 10.**

bucaramanga(config)#access-list 121 permit ip 172.31.0.64 0.0.0.63 209.165.220.0 0.0.0.255
bucaramanga(config)#int f0/0.30
bucaramanga(config-subif)#ip access-group 121 in
bucaramanga(config-subif)#



- **Los hosts de VLAN 10 en Bucaramanga acceden a la red de Cundinamarca (VLAN 20) y Tunja (VLAN 20), no internet.**

bucaramanga(config-subif)#access-list 122 permit ip 172.31.0.0 0.0.0.63 172.31.1.64 0.0.0.63
bucaramanga(config)#access-list 122 permit ip 172.31.0.0 0.0.0.63 172.31.0.128 0.0.0.63
bucaramanga(config)#int f0/0.10
bucaramanga(config-subif)#ip access-group 122 in
bucaramanga(config-subif)#



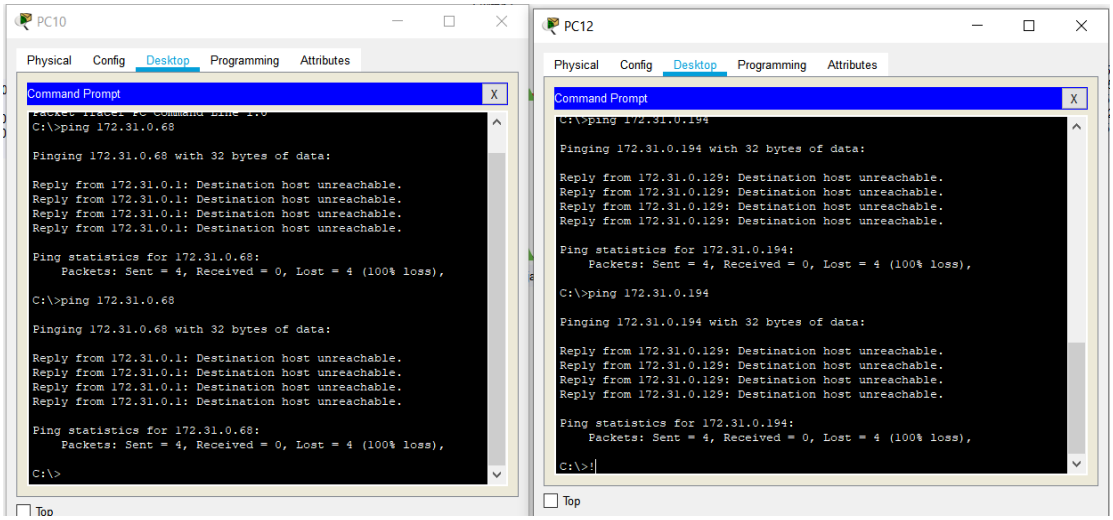
- **Los hosts de una VLAN no pueden acceder a los de otra VLAN en una ciudad.**

bucaramanga(config-subif)#access-list 123 deny ip 172.31.2.0 0.0.0.7 172.31.0.0 0.0.0.63
bucaramanga(config)#access-list 123 deny ip 172.31.0.64 0.0.0.63 172.31.0.0 0.0.0.63
bucaramanga(config)#access-list 123 permit ip any any
bucaramanga(config)#int f0/0.10
bucaramanga(config-subif)#ip access-group 123 out
bucaramanga(config-subif)#

tunja(config)#access-list 123 deny ip 172.3.2.8 0.0.0.7 172.31.0.128 0.0.0.63
tunja(config)#access-list 123 deny ip 172.3.0.192 0.0.0.63 172.31.0.128 0.0.0.63
tunja(config)#access-list 123 permit ip any any
tunja(config)#int f0/0.20
tunja(config-subif)#ip access-group 123 out
tunja(config-subif)#

cundinamarca(config)#access-list 123 deny ip 172.31.2.8 0.0.0.7 172.31.1.64 0.0.0.63
cundinamarca(config)#access-list 123 deny ip 172.31.1.0 0.0.0.63 172.31.1.64 0.0.0.63
cundinamarca(config)#access-list 123 deny ip 172.31.2.24 0.0.0.7 172.31.1.64 0.0.0.63
cundinamarca(config)#access-list 123 permit ip any any

cundinamarca(config)#int f0/0.20
cundinamarca(config-subif)#ip access-group 123 out
cundinamarca(config-subif)#

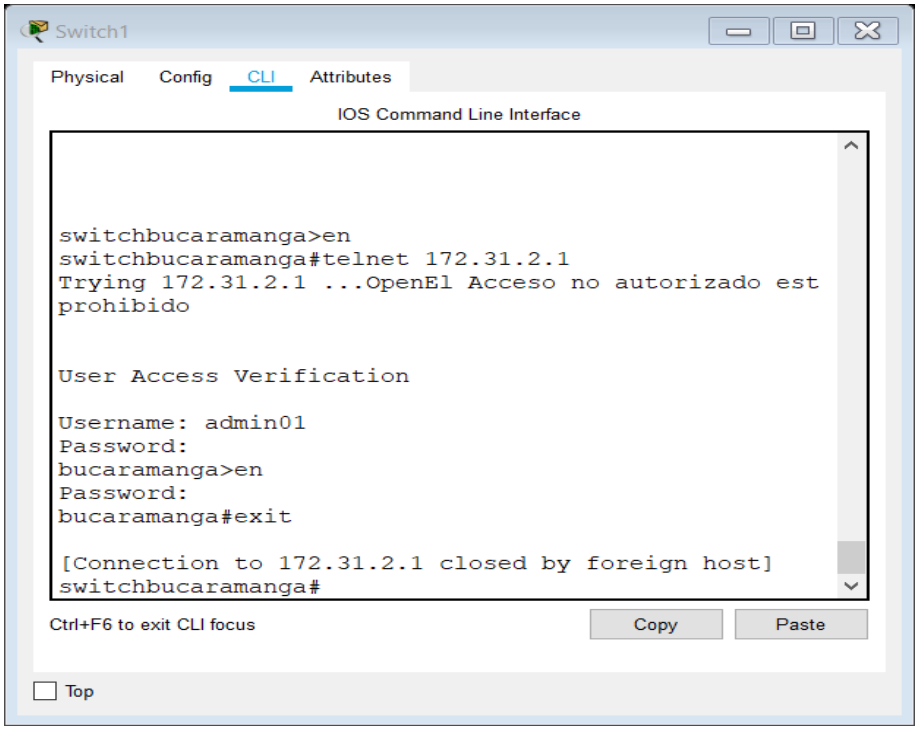


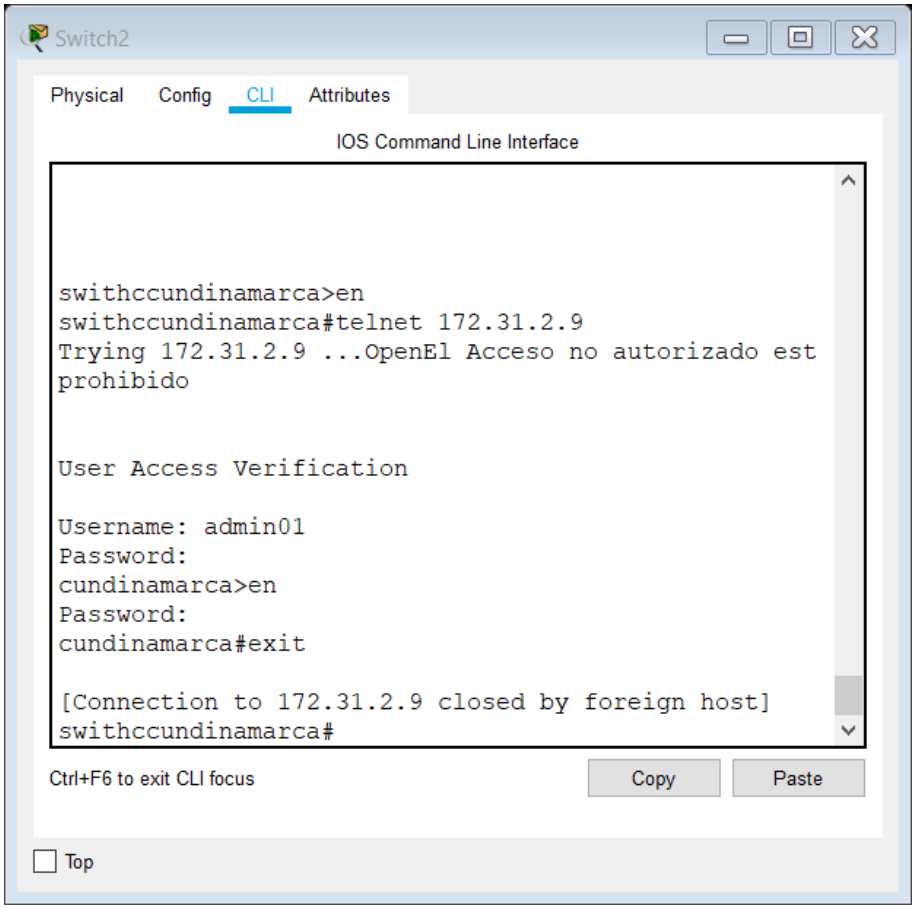
- **Solo los hosts de las VLAN administrativas y de la VLAN de servidores tienen accedo a los routers e internet.**

bucaramanga(config-subif)#access-list 10 permit 172.31.2.0 0.0.0.7
bucaramanga(config)#access-list 10 permit 172.3.2.8 0.0.0.7
bucaramanga(config)#access-list 10 permit 172.31.2.8 0.0.0.7
bucaramanga(config)#line vty 0 15
bucaramanga(config-line)#access-class 10 in
bucaramanga(config-line)#

tunja(config-subif)#access-list 10 permit 172.31.2.0 0.0.0.7
tunja(config)#access-list 10 permit 172.3.2.8 0.0.0.7
tunja(config)#access-list 10 permit 172.31.2.8 0.0.0.7
tunja(config)#line vty 0 15
tunja(config-line)#access-class 10 in
tunja(config-line)#

cundinamarca(config-subif)#access-list 10 permit 172.31.2.0 0.0.0.7
cundinamarca(config)#access-list 10 permit 172.3.2.8 0.0.0.7
cundinamarca(config)#access-list 10 permit 172.31.2.8 0.0.0.7
cundinamarca(config)#line vty 0 15
cundinamarca(config-line)#access-class 10 in
cundinamarca(config-line)#


Switch1
Physical
Config
CLI
Attributes
IOS Command Line Interface
switchbucaramanga>en
switchbucaramanga#telnet 172.31.2.1
Trying 172.31.2.1 ...OpenEl Acceso no autorizado est
prohibido
User Access Verification
Username: admin01
Password:
bucaramanga>en
Password:
bucaramanga#exit
[Connection to 172.31.2.1 closed by foreign host]
switchbucaramanga#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top


Switch2
Physical
Config
CLI
Attributes
IOS Command Line Interface
swithccundinamarca>en
swithccundinamarca#telnet 172.31.2.9
Trying 172.31.2.9 ...OpenEl Acceso no autorizado est
prohibido
User Access Verification
Username: admin01
Password:
cundinamarca>en
Password:
cundinamarca#exit
[Connection to 172.31.2.9 closed by foreign host]
swithccundinamarca#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

CONCLUSIONES

A partir de lo anteriormente desarrollado se puede poner en evidencia la ayuda que nos facilita el software CISCO en la puesta en practica en la prueba de habilidades. Se aplicaron los conocimientos adquiridos y se nos permitió hacer una experimentación en primera mano de cada escenario.

Después del anterior orden de ideas se puede verificar que los conocimientos adquiridos en este diplomados nos sirven como una base para desenvolvernos en el mundo de las redes futuramente como profesionales de la materia.

REFERENCIAS BIBLIOGRAFICAS

- CISCO. (2014). VLANs. Principios de Enrutamiento y Conmutación. Disponible en: https://static-course-assets.s3.amazonaws.com/RSE50ES/module3/index.html#3.0.1.1

- UNAD (2014). PING y TRACER como estrategia en procesos de Networking [OVA]. {En línea}. Disponible en: https://1drv.ms/u/s!AmIJYei-NT1IhgTCtKY-7F5KIRC3

- UNAD (2014). Configuración de Switches y Routers [OVA].{En línea}. Disponible en: https://1drv.ms/u/s!AmIJYei-NT1IhgL9QChD1m9EuGqC

- UNAD (2014). Principios de Enrutamiento [OVA]. {En línea}. Disponible en: https://1drv.ms/u/s!AmIJYei-NT1IhgOyjWeh6timi_Tm

- Collado, Eduardo (2019) Cambiar la Métrica por Defecto Utilizando el Comando cost. {20 de Noviembre de 2019}. Disponible en: https://www.eduangi.org/node186.html