EVALUACIÓN – PRUEBA DE HABILIDADES PRÁCTICAS CCNA
DIPLOMADO DE PROFUNDIZACIÓN

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Contenido

RESUMEN

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

Para el desarrollo de esta actividad, se dará solución a la problemática planteada en dos escenarios, dentro de este documento se dejaran evidencias correspondientes al registro de la configuración de cada uno de los dispositivos, la descripción detallada del paso a paso de cada una de las etapas realizadas durante su desarrollo, el registro de los procesos de verificación de conectividad mediante el uso de comandos ping, traceroute, show ip route, entre otros.

ABSTRAC

The practical skills test is part of the evaluation activities of the CCNA Deepening Diploma, and seeks to identify the degree of development of skills and abilities that were acquired throughout the diploma. The essential thing is to test the levels of understanding and solution of problems related to various aspects of Networking.

For the development of this activity, a solution will be given to the problem posed in two scenarios, within this document there will be evidence corresponding to the registration of the configuration of each of the devices, the detailed description of the step by step of each of the stages carried out during its development, the registration of connectivity verification processes through the use of ping, traceroute, show ip route commands, among others.

INTRODUCCIÓN

Esta actividad permitirá validar los conocimientos adquiridos durante el desarrollo del curso Diplomado de Profundización CCNA, y busca dar solución a dos escenarios planteados dejando evidencia del procedimiento para solucionar las problemáticas planteadas.

OBJETIVOS

OBJETIVO GENERAL

Dar solución a los dos scenarios planteados aplicando todas las competencias adquiridas dentro del desarrollo del curso.

OBJETIVO ESPECIFICO

Diseñar un sistema de direccionamiento que de solución a los dos escenarios planteados, describir el paso a paso para la configuración de equipos y evidenciar su funcionamiento.

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.

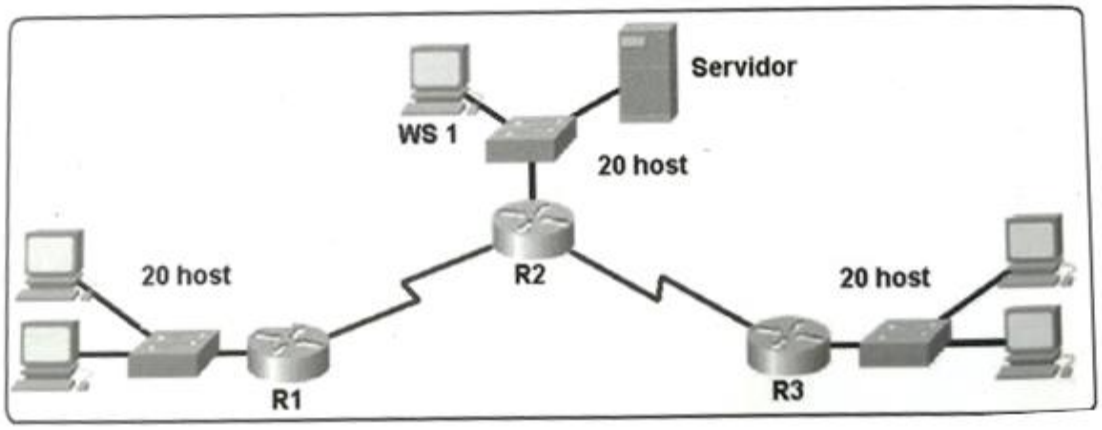
Parte 3: La red y subred establecidas deberán tener una interconexión total, todos los hosts deberán ser visibles y poder comunicarse entre ellos sin restricciones.

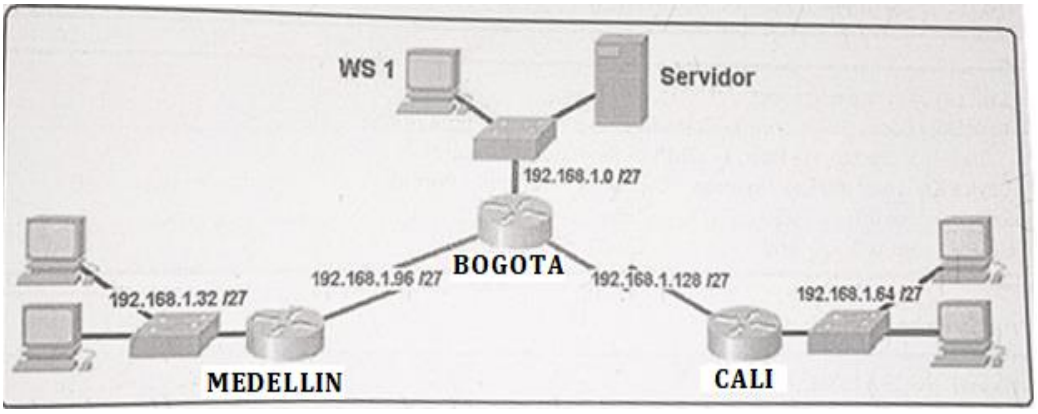
Parte 4: Implementar la seguridad en la red, se debe restringir el acceso y comunicación entre hosts de acuerdo con los requerimientos del administrador de red.

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

Parte 6: Configuración final.

Topología de red





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).

RUOTER BOGOTA:

```
Router>en
Router#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R_BOGOTA
R_BOGOTA(config)#no ip domain-lookup
R_BOGOTA(config)#service password-encryption
R_BOGOTA(config)#banner motd $advertecia:acceso no autorizado$
R_BOGOTA(config)#enable secret classclass
R_BOGOTA(config)#line console 0
R_BOGOTA(config-line)#password cisco
R_BOGOTA(config-line)#login
R_BOGOTA(config-line)#line vty 0 4
R_BOGOTA(config-line)#line vty 0 4
R_BOGOTA(config-line)#password cisco
R_BOGOTA(config-line)#login
R_BOGOTA(config-line)#
```

```
R_BOGOTA(config)#int s0/1/0
R_BOGOTA(config-if)#ip address 192.168.1.98 255.255.255.224
R_BOGOTA(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
R_BOGOTA(config-if)#int s0/1/1
R_BOGOTA(config-if)#ip address 192.168.1.130 255.255.255.224
R_BOGOTA(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
R_BOGOTA(config-if)#int g0/0
R_BOGOTA(config-if)#ip address 192.168.1.1 255.255.255.224
R_BOGOTA(config-if)#no shutdown

R_BOGOTA(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_BOGOTA(config-if)#router eigrp 200
R_BOGOTA(config-router)#no auto-summary
R_BOGOTA(config-router)#network 192.168.1.0
R_BOGOTA(config-router)#end
R_BOGOTA#
%SYS-5-CONFIG_I: Configured from console by console
```

SWITCH BOGOTA

```
Switch>en
Switch#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#no ip domain lookup
Switch(config)#service password-encryption
Switch(config)#banner motd $advertencia:acceso no autorizado$
Switch(config)#enable secret classclass
Switch(config)#line console 0
Switch(config-line)#password cisco
Switch(config-line)#login
Switch(config-line)#line vty 0 4
Switch(config-line)#password cisco
Switch(config-line)#login
Switch(config-line)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console
```

ROUTER MEDELLIN

```
Router>en
Router#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R_MEDELLIN
R_MEDELLIN(config)#no ip domain-lookup
R_MEDELLIN(config)#service password-encryption
R_MEDELLIN(config)#banner motd $advertencia:acceso no autorizado$
R_MEDELLIN(config)#enable secret classclass
R_MEDELLIN(config)#line console 0
R_MEDELLIN(config-line)#password cisco
R_MEDELLIN(config-line)#login
R_MEDELLIN(config-line)#line vty 0 4
R_MEDELLIN(config-line)#password cisco
R_MEDELLIN(config-line)#login
R_MEDELLIN(config-line)#int s0/1/0
R_MEDELLIN(config-if)#ip address 192.168.1.99 255.255.255.224
R_MEDELLIN(config-if)#no shutdown

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

R_MEDELLIN(config-if)#int g
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state t
R_MEDELLIN(config-if)#int g0/0
R_MEDELLIN(config-if)#ip address 192.168.1.33 255.255.255.224
R_MEDELLIN(config-if)#no shutdown

R_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

R_MEDELLIN(config-if)#router eigrp 200
R_MEDELLIN(config-router)#no auto-summary
R_MEDELLIN(config-router)#network 192.168.1.0
R_MEDELLIN(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 200: Neighbor 192.168.1.98 (Serial0/1/0) is up: new adjacency
```

SWITCH MEDELLIN

```
Switch>en
Switch#hostname S_MEDELLIN
                ^
% Invalid input detected at '^' marker.

Switch#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname S_MEDELLIN
S_MEDELLIN(config)#no ip domain-lookup
S_MEDELLIN(config)#service password-encryption
S_MEDELLIN(config)#banner motd $advertencia:acceso no autorizado$
S_MEDELLIN(config)#enable secret classclass
S_MEDELLIN(config)#line console 0
S_MEDELLIN(config-line)#password cisco
S_MEDELLIN(config-line)#login
S_MEDELLIN(config-line)#line vty 0 4
S_MEDELLIN(config-line)#password cisco
S_MEDELLIN(config-line)#login
S MEDELLIN(config-line)#
```

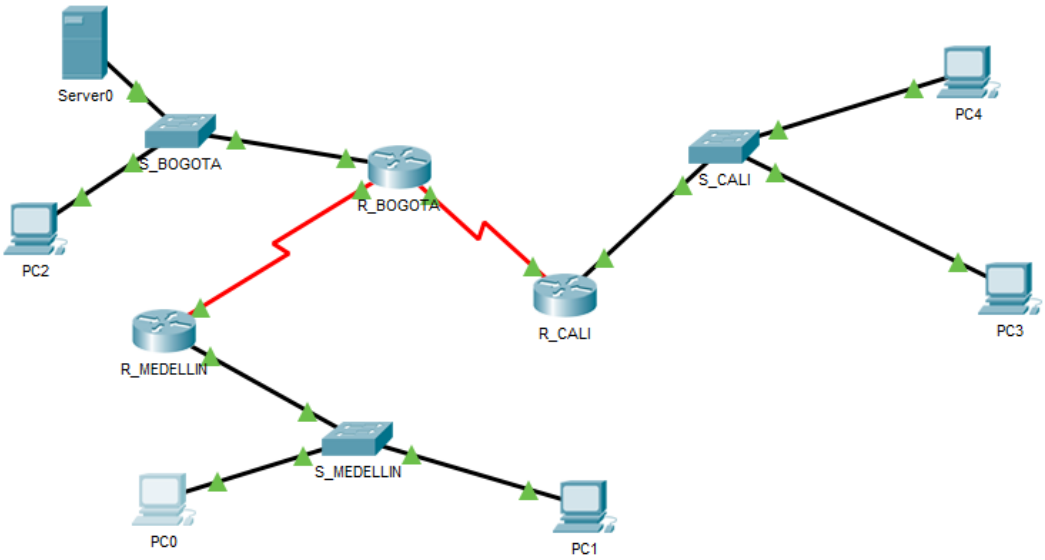
ROUTER CALI

```
Router>EN
Router#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R_CALI
R_CALI(config)#no ip domain-lookup
R_CALI(config)#service password-encryption
R_CALI(config)#banner motd $advertencia:acceso no autorizado$
R_CALI(config)#enable secret classclass
R_CALI(config)#line console 0
R_CALI(config-line)#password cisco
R_CALI(config-line)#login
R_CALI(config-line)#line vty 0 4
R_CALI(config-line)#password cisco
R_CALI(config-line)#login
R_CALI(config-line)#int s0/1/0
R_CALI(config-if)#ip address 192.168.1.131 255.255.255.224
R_CALI(config-if)#no shutdown

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

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

R_CALI(config-if)#int g0/0
R_CALI(config-if)#ip address 192.168.1.65 255.255.255.224
R_CALI(config-if)#no shutdown

R_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

R_CALI(config-if)#router eigrp 200
R_CALI(config-router)#no auto-summary
R_CALI(config-router)#network 192.168.1.0
R_CALI(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 200: Neighbor 192.168.1.130 (Serial0/1/0) is up: new adjacency

R_CALI(config-router)#end
```

SWITCH CALI

```
Switch>EN
Switch#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname S_CALI
S_CALI(config)#no ip domain lookup
S_CALI(config)#service password encryption
                                ^
% Invalid input detected at '^' marker.

S_CALI(config)#service password-encryption
S_CALI(config)#banner motd $advertencia:acceso no autorizado$
S_CALI(config)#enable secret classclass
S_CALI(config)#console 0
                ^
% Invalid input detected at '^' marker.

S_CALI(config)#line console 0
S_CALI(config-line)#password cisco
S_CALI(config-line)#login
S_CALI(config-line)#line vty 0 4
S_CALI(config-line)#password cisco
S_CALI(config-line)#login
S_CALI(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. ***192.168.1.0/27***

Subnet	Network	Broadcast
LAN BOG	192.168.1.0	192.168.1.31
LAN MED	192.168.1.32	192.168.1.63
LAN CALI	192.168.1.64	192.168.1.95
BOG-MED	192.168.1.96	192.168.1.127
BOG-CAL	192.168.1.128	192.168.1.159
1	192.168.1.160	192.168.1.191
2	192.168.1.192	192.168.1.223
3	192.168.1.224	192.168.1.255

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

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

```
R_BOGOTA#show 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, 8 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
D       192.168.1.32/27 [90/2170112] via 192.168.1.99, 01:22:23, Serial0/1/0
D       192.168.1.64/27 [90/2170112] via 192.168.1.131, 00:41:54, Serial0/1/1
C       192.168.1.96/27 is directly connected, Serial0/1/0
L       192.168.1.98/32 is directly connected, Serial0/1/0
C       192.168.1.128/27 is directly connected, Serial0/1/1
L       192.168.1.130/32 is directly connected, Serial0/1/1

R_BOGOTA#
```

MEDELLIN

```
R_MEDELLIN#show 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, 7 subnets, 2 masks
D       192.168.1.0/27 [90/2170112] via 192.168.1.98, 01:17:26, Serial0/1/0
C       192.168.1.32/27 is directly connected, GigabitEthernet0/0
L       192.168.1.33/32 is directly connected, GigabitEthernet0/0
D       192.168.1.64/27 [90/2682112] via 192.168.1.98, 00:36:57, Serial0/1/0
C       192.168.1.96/27 is directly connected, Serial0/1/0
L       192.168.1.99/32 is directly connected, Serial0/1/0
D       192.168.1.128/27 [90/2681856] via 192.168.1.98, 00:38:08, Serial0/1/0

R_MEDELLIN#
```

CALI

```
R_CALI#show 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, 7 subnets, 2 masks
D       192.168.1.0/27 [90/2170112] via 192.168.1.130, 00:34:49, Serial0/1/0
D       192.168.1.32/27 [90/2682112] via 192.168.1.130, 00:34:49, Serial0/1/0
C       192.168.1.64/27 is directly connected, GigabitEthernet0/0
L       192.168.1.65/32 is directly connected, GigabitEthernet0/0
D       192.168.1.96/27 [90/2681856] via 192.168.1.130, 00:34:49, Serial0/1/0
C       192.168.1.128/27 is directly connected, Serial0/1/0
L       192.168.1.131/32 is directly connected, Serial0/1/0

R_CALI#
```

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

BOGOTA

```
R_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 2816
         via Connected, GigabitEthernet0/0
P 192.168.1.32/27, 1 successors, FD is 2170112
         via 192.168.1.99 (2170112/2816), Serial0/1/0
P 192.168.1.64/27, 1 successors, FD is 2170112
         via 192.168.1.131 (2170112/2816), Serial0/1/1
P 192.168.1.96/27, 1 successors, FD is 2169856
         via Connected, Serial0/1/0
P 192.168.1.128/27, 1 successors, FD is 2169856
         via Connected, Serial0/1/1
R_BOGOTA#
```

MEDELLIN

```
R_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 2170112
         via 192.168.1.98 (2170112/2816), Serial0/1/0
P 192.168.1.32/27, 1 successors, FD is 2816
         via Connected, GigabitEthernet0/0
P 192.168.1.64/27, 1 successors, FD is 2682112
         via 192.168.1.98 (2682112/2170112), Serial0/1/0
P 192.168.1.96/27, 1 successors, FD is 2169856
         via Connected, Serial0/1/0
P 192.168.1.128/27, 1 successors, FD is 2681856
         via 192.168.1.98 (2681856/2169856), Serial0/1/0
R_MEDELLIN#
```

CALI

```
R_CALI#show ip eigrp topology
IP-EIGRP Topology Table for AS 200/ID(192.168.1.131)

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

P 192.168.1.0/27, 1 successors, FD is 2170112
         via 192.168.1.130 (2170112/2816), Serial0/1/0
P 192.168.1.32/27, 1 successors, FD is 2682112
         via 192.168.1.130 (2682112/2170112), Serial0/1/0
P 192.168.1.64/27, 1 successors, FD is 2816
         via Connected, GigabitEthernet0/0
P 192.168.1.96/27, 1 successors, FD is 2681856
         via 192.168.1.130 (2681856/2169856), Serial0/1/0
P 192.168.1.128/27, 1 successors, FD is 2169856
         via Connected, Serial0/1/0
R_CALI#
```

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

BOGOTA

```
R_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
R_CALI       Ser 0/1/1        125           R       C1900       Ser 0/1/0
R_MEDELLIN   Ser 0/1/0        136           R       C1900       Ser 0/1/0
S_BOGOTA     Gig 0/0          141           S       2960        Gig 0/1
R_BOGOTA#
```

MEDELLIN

```
R_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
S_MEDELLIN   Gig 0/0          174           S       2960        Gig 0/1
R_BOGOTA     Ser 0/1/0        175           R       C1900       Ser 0/1/0
R_MEDELLIN#
```

CALI

```
R_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
S_CALI       Gig 0/0          139           S       2960        Gig 0/1
R_BOGOTA     Ser 0/1/0        156           R       C1900       Ser 0/1/1
R_CALI#
```

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

```
R_BOGOTA#pin 192.168.1.99

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.99, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/4/15 ms

R_BOGOTA#ping 192.168.1.131

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.131, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/3/11 ms

R_BOGOTA#ping 192.168.1.30

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.30, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
```

Parte 3: Configuración de Enrutamiento.

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

BOGOTA

```
R_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 2816
         via Connected, GigabitEthernet0/0
P 192.168.1.32/27, 1 successors, FD is 2170112
         via 192.168.1.99 (2170112/2816), Serial0/1/0
P 192.168.1.64/27, 1 successors, FD is 2170112
         via 192.168.1.131 (2170112/2816), Serial0/1/1
P 192.168.1.96/27, 1 successors, FD is 2169856
         via Connected, Serial0/1/0
P 192.168.1.128/27, 1 successors, FD is 2169856
         via Connected, Serial0/1/1
R_BOGOTA#
```

MEDELLIN

```
R_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 2170112
         via 192.168.1.98 (2170112/2816), Serial0/1/0
P 192.168.1.32/27, 1 successors, FD is 2816
         via Connected, GigabitEthernet0/0
P 192.168.1.64/27, 1 successors, FD is 2682112
         via 192.168.1.98 (2682112/2170112), Serial0/1/0
P 192.168.1.96/27, 1 successors, FD is 2169856
         via Connected, Serial0/1/0
P 192.168.1.128/27, 1 successors, FD is 2681856
         via 192.168.1.98 (2681856/2169856), Serial0/1/0
R_MEDELLIN#
```

CALI

```
R_CALI#show ip eigrp topology
IP-EIGRP Topology Table for AS 200/ID(192.168.1.131)

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

P 192.168.1.0/27, 1 successors, FD is 2170112
         via 192.168.1.130 (2170112/2816), Serial0/1/0
P 192.168.1.32/27, 1 successors, FD is 2682112
         via 192.168.1.130 (2682112/2170112), Serial0/1/0
P 192.168.1.64/27, 1 successors, FD is 2816
         via Connected, GigabitEthernet0/0
P 192.168.1.96/27, 1 successors, FD is 2681856
         via 192.168.1.130 (2681856/2169856), Serial0/1/0
P 192.168.1.128/27, 1 successors, FD is 2169856
         via Connected, Serial0/1/0
R_CALI#
```

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

BOGOTA

```
R_BOGOTA#SHOW IP EIGRP NEIGHBORS
IP-EIGRP neighbors for process 200
H   Address         Interface       Hold Uptime    SRTT   RTO   Q   Seq
                                    (sec)          (ms)       Cnt Num
0   192.168.1.99    Se0/1/0         11   02:06:21  40     1000  0   7
1   192.168.1.131   Se0/1/1         13   01:25:52  40     1000  0   7
```

MEDELLIN

```
R_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    Se0/1/0         14   02:09:09  40     1000  0   7
```

CALI

```
R_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   Se0/1/0         10   01:29:21  40     1000  0   8
```

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

BOGOTA

```
R_BOGOTA#show 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, 8 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
D       192.168.1.32/27 [90/2170112] via 192.168.1.99, 02:12:06, Serial0/1/0
D       192.168.1.64/27 [90/2170112] via 192.168.1.131, 01:31:37, Serial0/1/1
C       192.168.1.96/27 is directly connected, Serial0/1/0
L       192.168.1.98/32 is directly connected, Serial0/1/0
C       192.168.1.128/27 is directly connected, Serial0/1/1
L       192.168.1.130/32 is directly connected, Serial0/1/1
```

MEDELLIN

```
R_MEDELLIN#show 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, 7 subnets, 2 masks
D       192.168.1.0/27 [90/2170112] via 192.168.1.98, 02:11:39, Serial0/1/0
C       192.168.1.32/27 is directly connected, GigabitEthernet0/0
L       192.168.1.33/32 is directly connected, GigabitEthernet0/0
D       192.168.1.64/27 [90/2682112] via 192.168.1.98, 01:31:10, Serial0/1/0
C       192.168.1.96/27 is directly connected, Serial0/1/0
L       192.168.1.99/32 is directly connected, Serial0/1/0
D       192.168.1.128/27 [90/2681856] via 192.168.1.98, 01:32:21, Serial0/1/0
```

CALI

```
R_CALI#show 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, 7 subnets, 2 masks
D       192.168.1.0/27 [90/2170112] via 192.168.1.130, 01:30:21, Serial0/1/0
D       192.168.1.32/27 [90/2682112] via 192.168.1.130, 01:30:21, Serial0/1/0
C       192.168.1.64/27 is directly connected, GigabitEthernet0/0
L       192.168.1.65/32 is directly connected, GigabitEthernet0/0
D       192.168.1.96/27 [90/2681856] via 192.168.1.130, 01:30:21, Serial0/1/0
C       192.168.1.128/27 is directly connected, Serial0/1/0
L       192.168.1.131/32 is directly connected, Serial0/1/0
```

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.

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

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

Las condiciones para crear las ACL son las siguientes:

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

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

```
R_BOGOTA#CONF TERM
Enter configuration commands, one per line.  End with CNTL/Z.
R_BOGOTA(config)#access-list 151 permit ip host 192.168.1.30 any
R_BOGOTA(config)#int g0/0
R_BOGOTA(config-if)#ip access-group 151 in
R_BOGOTA(config-if)#
R_BOGOTA(config-if)#end
```

```
R_MEDELLIN#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
R_MEDELLIN(config)#access-list 151 permit ip 192.168.1.32 0.0.0.31 host 192.168.1.30
R_MEDELLIN(config)#int g0/0
R_MEDELLIN(config-if)#ip access-group 151 in
R_MEDELLIN(config-if)#end
```

```
R_CALI#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
R_CALI(config)#access-list 151 permit ip 192.168.1.64 0.0.0.31 host 192.168.1.30
R_CALI(config)#int g0/0
R_CALI(config-if)#ip access-group 151 in
```

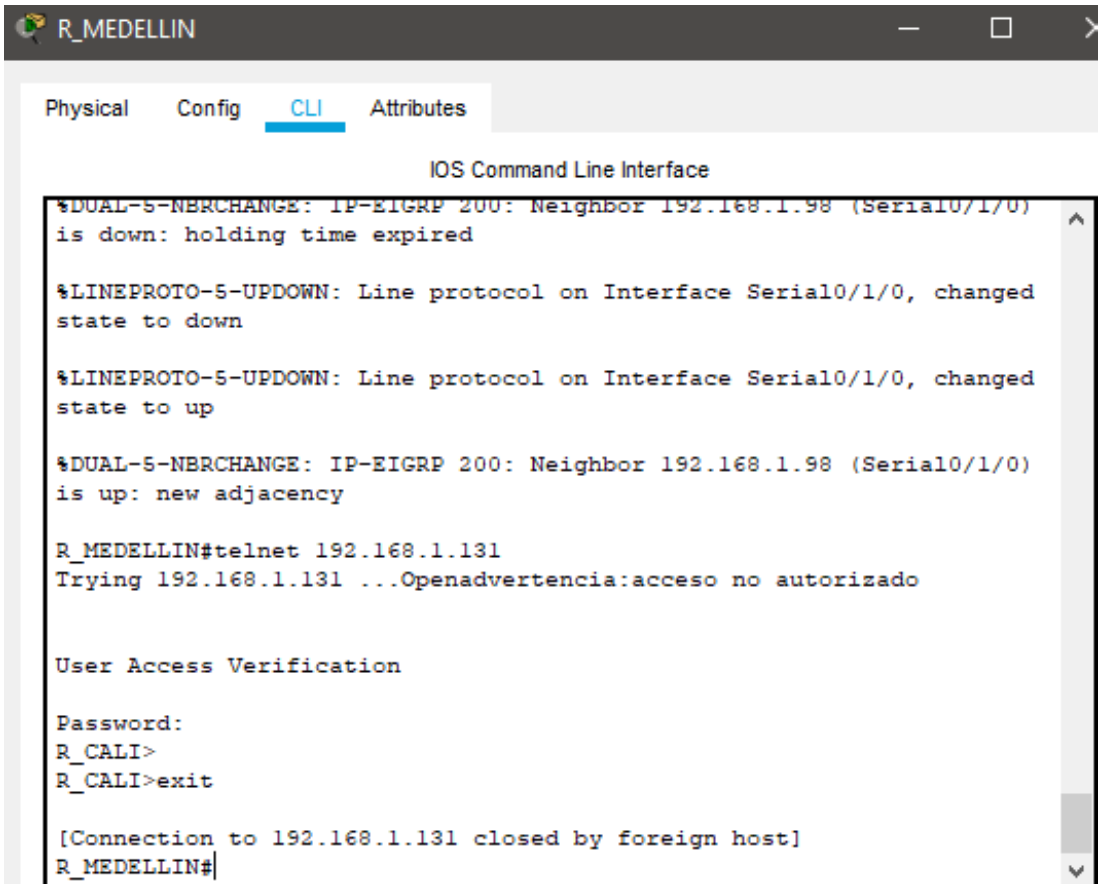
c. Las estaciones de trabajo en las LAN de MEDELLIN y CALI no deben tener acceso a ningún dispositivo fuera de su subred, excepto para interconectar con el servidor.

Parte 5: Comprobación de la red instalada.

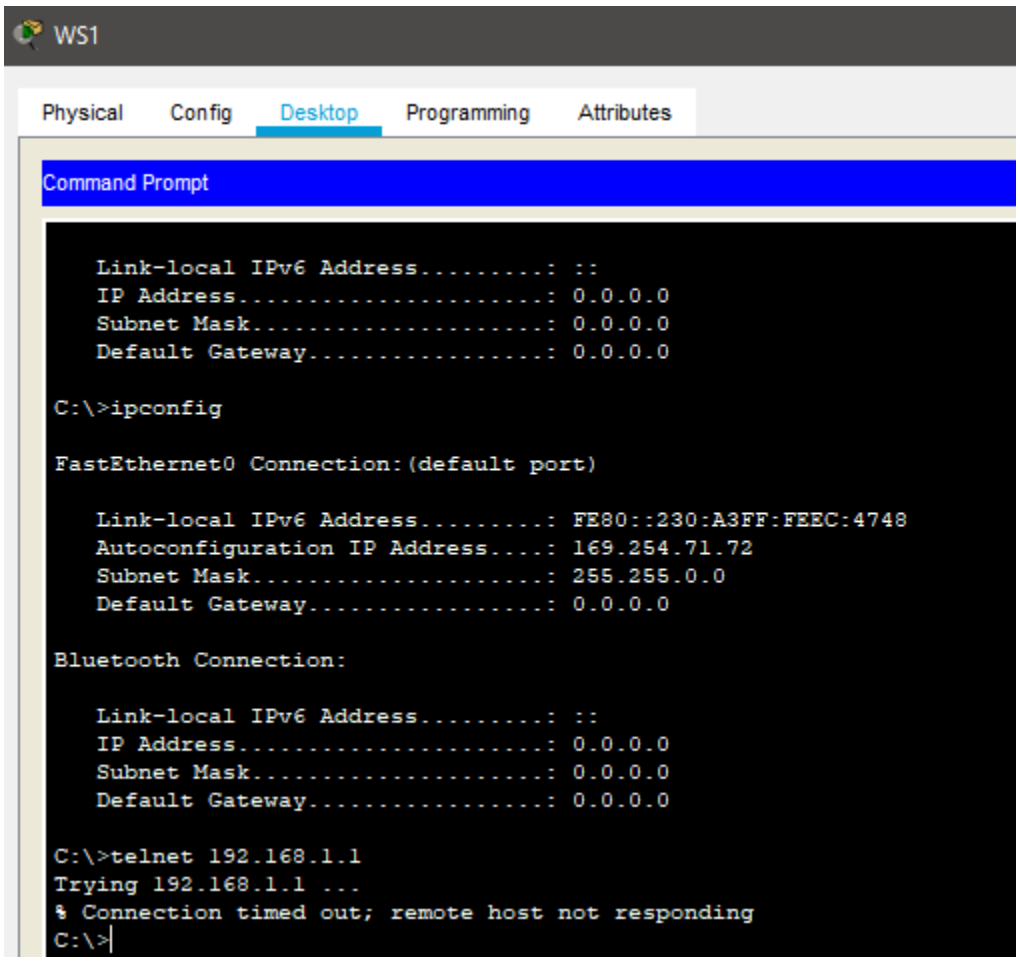
a. Se debe probar que la configuración de las listas de acceso fue exitosa.
b. Comprobar y Completar la siguiente tabla de condiciones de prueba para confirmar el óptimo funcionamiento de la red e.

	ORIGEN	DESTINO	RESULTADO
TELNET	Router MEDELLIN	Router CALI	OK
	WS_1	Router BOGOTA	OK
	Servidor	Router CALI	FALLA
	Servidor	Router MEDELLIN	OK
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	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	FALLA
	Router MEDELLIN	LAN del Router CALI	FALLA

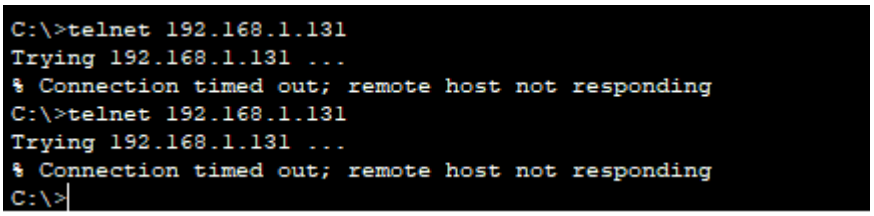
TELNET R_MED/R_CALI



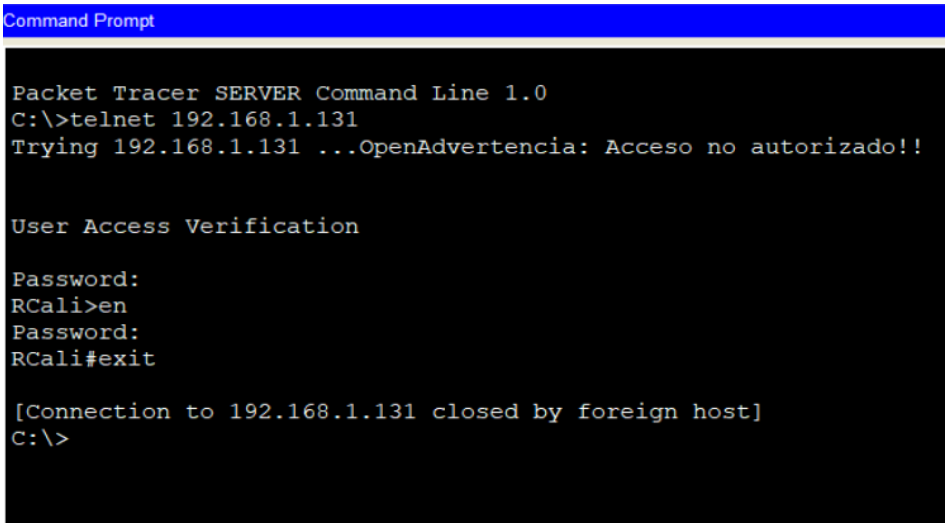
TELNET WS1 R_BOG



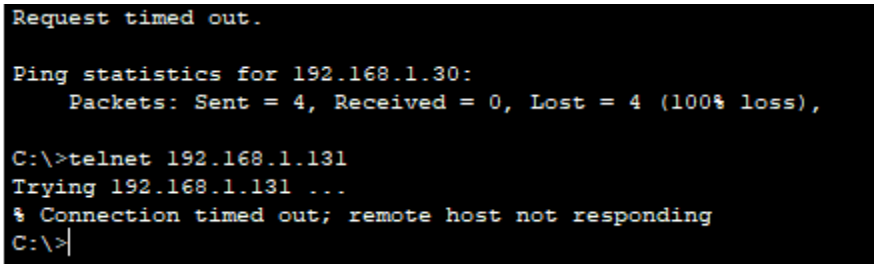
TELNET SERVER/R_CALI



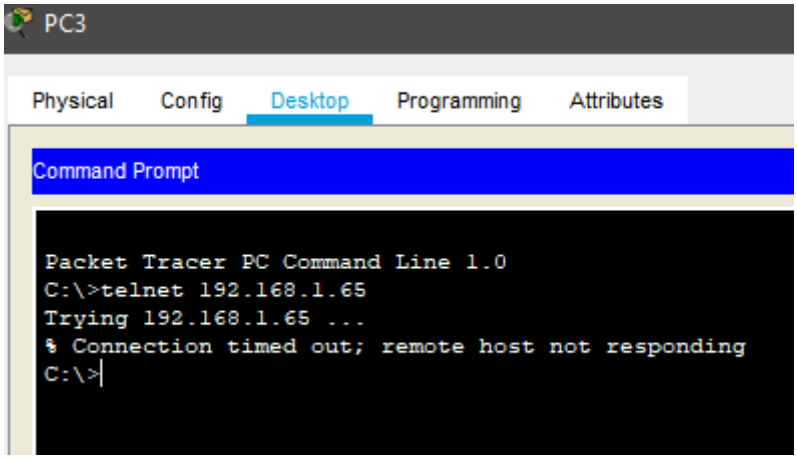
TELNET SERVER/R_MED



TELNET LAN R_MED/R_CALI



TELNET LAN CALI/ R_CALI



TELNET LAN MED/R_MED

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

TELNET LAN CALI/R_CALI

```
C:\>telnet 192.168.1.99
Trying 192.168.1.99 ...
% Connection timed out; remote host not responding
C:\>
```

PING LAN CALI/WS1

```
Pinging 192.168.1.10 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.1.10:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

PING LAN MEDELLIN/WS1

```
Pinging 192.168.1.10 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.1.10:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

PING LAN MEDELLIN/LAN CALI

```
C:\>ping 192.168.1.68

Pinging 192.168.1.68 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.1.68:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

PIN LAN CALI/SERVER

```
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=15ms TTL=126
Reply from 192.168.1.30: bytes=32 time=16ms 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 = 11ms, Maximum = 16ms, Average = 14ms
```

PING LAN MEDELLIN/SERVER

```
C:\>ping 192.168.1.30

Pinging 192.168.1.30 with 32 bytes of data:

Reply from 192.168.1.30: bytes=32 time=2ms TTL=126
Reply from 192.168.1.30: bytes=32 time=11ms TTL=126
Reply from 192.168.1.30: bytes=32 time=12ms 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 = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 13ms, Average = 9ms
```

PING SERVER/LAN MEDELLIN

```
C:\>ping 192.168.1.42

Pinging 192.168.1.42 with 32 bytes of data:

Reply from 192.168.1.42: bytes=32 time=1ms TTL=126
Reply from 192.168.1.42: bytes=32 time=10ms TTL=126
Reply from 192.168.1.42: bytes=32 time=11ms TTL=126
Reply from 192.168.1.42: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.1.42:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 11ms, Average = 5ms
```

PING SERVER/ LAN CALI

```
C:\>ping 192.168.1.74

Pinging 192.168.1.74 with 32 bytes of data:

Reply from 192.168.1.74: bytes=32 time=1ms TTL=126
Reply from 192.168.1.74: bytes=32 time=11ms TTL=126
Reply from 192.168.1.74: bytes=32 time=2ms TTL=126
Reply from 192.168.1.74: bytes=32 time=11ms TTL=126

Ping statistics for 192.168.1.74:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 11ms, Average = 6ms
```

PIN R_CALI/LAN MEDELLIN

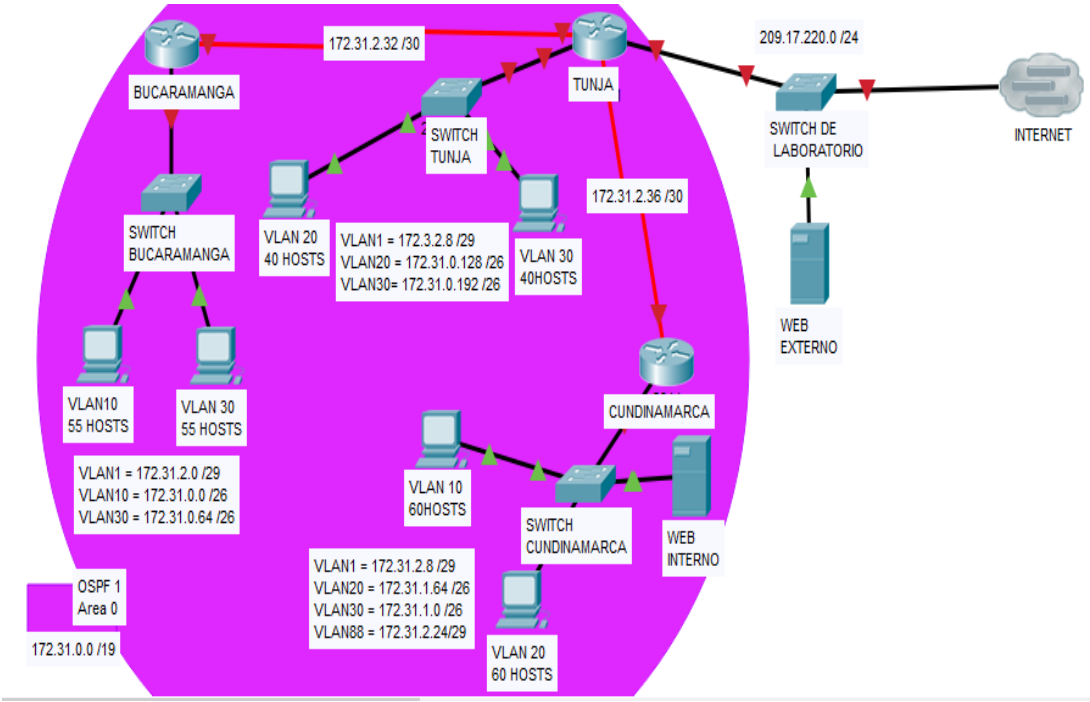
```
R_CALI#ping 192.168.1.42

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.42, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

R_CALI#
```

PING R_MEDELLIN/ LAN CALI

```
R_MEDELLIN#ping 192.168.1.74

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.74, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

R_MEDELLIN#
```

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.

ROUTER BUCARAMANGA

```
Router>en
Router#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname RBUC
RBUC(config)#no ip domain-lookup
RBUC(config)#service password-encryption
RBUC(config)#banner motd $Advertencia: Acceso no autorizado!!$
RBUC(config)#enable secret classclass
RBUC(config)#line console 0
RBUC(config-line)#password cisco
RBUC(config-line)#login
RBUC(config-line)#line vty 04
RBUC(config-line)#password cisco
RBUC(config-line)#login
RBUC(config-line)#end
RBUC#
%SYS-5-CONFIG_I: Configured from console by console

RBUC#en
RBUC#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
RBUC(config)#int g0/0.1
RBUC(config-subif)#encapsulation dot1ql
                                     ^
% Invalid input detected at '^' marker.

RBUC(config-subif)#encapsulation dot1q 1
RBUC(config-subif)#ip address 172.31.2.1 255.255.248
                                         ^
% Invalid input detected at '^' marker.

RBUC(config-subif)#ip address 172.31.2.1 255.255.255.248
RBUC(config-subif)#int g0/0.10
RBUC(config-subif)#encapsulation dot1q 10
RBUC(config-subif)#ip address 172.31.0.1 255.255.255.192
RBUC(config-subif)#int g0/0.30
RBUC(config-subif)#encapsulation dot1q 30
RBUC(config-subif)#ip address 172.31.0.65 255.255.255.192
RBUC(config-subif)#int g0/0
RBUC(config-if)#no shutdown
```

```
RBUC(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

%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

%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

%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

RBUC(config-if)#router ospf 1
RBUC(config-router)#network 172.31.0.0 0.0.0.63 area 0
RBUC(config-router)#network 172.31.0.64 0.0.0.63 area 0
RBUC(config-router)#network 172.31.2.0 0.0.0.7 area 0
RBUC(config-router)#network 172.31.2.32 0.0.0.3 area 0
RBUC(config-router)#end
RBUC#
%SYS-5-CONFIG_I: Configured from console by console
```

ROUTER TUNJA

```
Router>EN
Router#CONF TERM
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname RTUNJA
RTUNJA(config)#no ip domain-lookup
RTUNJA(config)#service password-encryption
RTUNJA(config)#banner motd $Advertencia: Acceso no autorizado!!$
RTUNJA(config)#enable secret classclass
RTUNJA(config)#line console 0
RTUNJA(config-line)#password cisco
RTUNJA(config-line)#login
RTUNJA(config-line)#line vty 0 4
RTUNJA(config-line)#password cisco
RTUNJA(config-line)#login
RTUNJA(config-line)#end
RTUNJA#
%SYS-5-CONFIG_I: Configured from console by console

RTUNJA#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
RTUNJA(config)#int g0/0.1
RTUNJA(config-subif)#encapsulation dotlq 1
RTUNJA(config-subif)#ip address 172.3.2.9 255.255.255.248
RTUNJA(config-subif)#int g0/0.20
RTUNJA(config-subif)#encapsulation dotlq 20
RTUNJA(config-subif)#ip address 172.31.0.129 255.255.255.192
RTUNJA(config-subif)#int g0/0.30
RTUNJA(config-subif)#encapsulation dotlq 30
RTUNJA(config-subif)#ip address 172.31.0.193 255.255.255.192
RTUNJA(config-subif)#int g0/0
RTUNJA(config-if)#no shutdown

RTUNJA(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

%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
```

```
%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

%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

RTUNJA(config-if)#int s0/0/0
RTUNJA(config-if)#ip address 172.31.2.33 255.255.255.252
RTUNJA(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
RTUNJA(config-if)#int s0/0/1
RTUNJA(config-if)#ip address 172.31.2.37 255.255.255.252
RTUNJA(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
RTUNJA(config-if)#int g0/1
RTUNJA(config-if)#ip address 209.165.220.1 255.255.255.0
RTUNJA(config-if)#no shutdown

RTUNJA(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

RTUNJA(config-if)#router ospf 1
RTUNJA(config-router)#network 172.3.2.8 0.0.0.7 area 0
RTUNJA(config-router)#network 172.31.0.128 0.0.0.63 area 0
RTUNJA(config-router)#network 172.31.0.192 0.0.0.63 area 0
RTUNJA(config-router)#network 172.31.2.32 0.0.0.3 area 0
RTUNJA(config-router)#network 172.31.2.36 0.0.0.3 area 0
RTUNJA(config-router)#end
RTUNJA#
%SYS-5-CONFIG_I: Configured from console by console

RTUNJA#
```

ROUTER CUNDINAMARCA

```
Router>en
Router#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname RCUND
RCUND(config)#no ip domain-lookup
RCUND(config)#service password-encryption
RCUND(config)#banner motd $Advertencia: Acceso no autorizado!!$
RCUND(config)#enable secret classclass
RCUND(config)#line console 0
RCUND(config-line)#password cisco
RCUND(config-line)#login
RCUND(config-line)#line vty 0 4
RCUND(config-line)#password cisco
RCUND(config-line)#login
RCUND(config-line)#end
RCUND#
%SYS-5-CONFIG_I: Configured from console by console

RCUND#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
RCUND(config)#int g0/0.1
RCUND(config-subif)#encapsulation dot1q 1
RCUND(config-subif)#ip address 172.31.2.9 255.255.255.248
RCUND(config-subif)#int g0/0.10
RCUND(config-subif)#encapsulation dot1q 10
RCUND(config-subif)#ip address 172.31.1.65 255.255.255.192
RCUND(config-subif)#int g0/0.20
RCUND(config-subif)#encapsulation dot1q 20
RCUND(config-subif)#ip address 172.31.1.1 255.255.255.192
RCUND(config-subif)#int g0/0.88
RCUND(config-subif)#encapsulation dot1q 88
RCUND(config-subif)#ip address 172.31.2.25 255.255.255.248
RCUND(config-subif)#int g0/0
RCUND(config-if)#no shutdown

RCUND(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
```

```
%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

%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

%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

%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

RCUND(config-if)#int s0/0/0
RCUND(config-if)#ip address 172.31.2.38 255.255.255.252
RCUND(config-if)#no shutdown

RCUND(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

RCUND(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

RCUND(config-if)#router ospf 1
RCUND(config-router)#network 172.31.1.0 0.0.0.63 area 0
RCUND(config-router)#network 172.31.1.64 0.0.0.63 area 0
RCUND(config-router)#network 172.31.2.8 0.0.0.7 area 0
RCUND(config-router)#network 172.31.2.24 0.0.0.7 area 0
RCUND(config-router)#network 172.31.2.36 0.0.0.3 area 0
RCUND(config-router)#end
RCUND#
%SYS-5-CONFIG_I: Configured from console by console

00:43:48: %OSPF-5-ADJCHG: Process 1, Nbr 209.165.220.1 on Serial0/0/0 from LOADING to FULL, Loading Done
```

SWITCH BUCARAMANGA

```
Switch>EN
Switch#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname SBUC
SBUC(config)#vlan 1
SBUC(config-vlan)#vlan 10
SBUC(config-vlan)#vlan 30
SBUC(config-vlan)#int f0/10
SBUC(config-if)#switchport mode access
SBUC(config-if)#switchport access vlan 10
SBUC(config-if)#int f0/14
SBUC(config-if)#switchport mode access
SBUC(config-if)#switchport access vlan 30
SBUC(config-if)#int g0/1
SBUC(config-if)#switchport mode trunk

SBUC(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

SBUC(config-if)#int vlan 1
SBUC(config-if)#ip address 172.31.2.3 255.255.255.248
SBUC(config-if)#no shutdown

SBUC(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

SBUC(config-if)#ip default-gateway 172.31.2.1
SBUC(config)#
SBUC(config)#end
SBUC#
%SYS-5-CONFIG_I: Configured from console by console
```

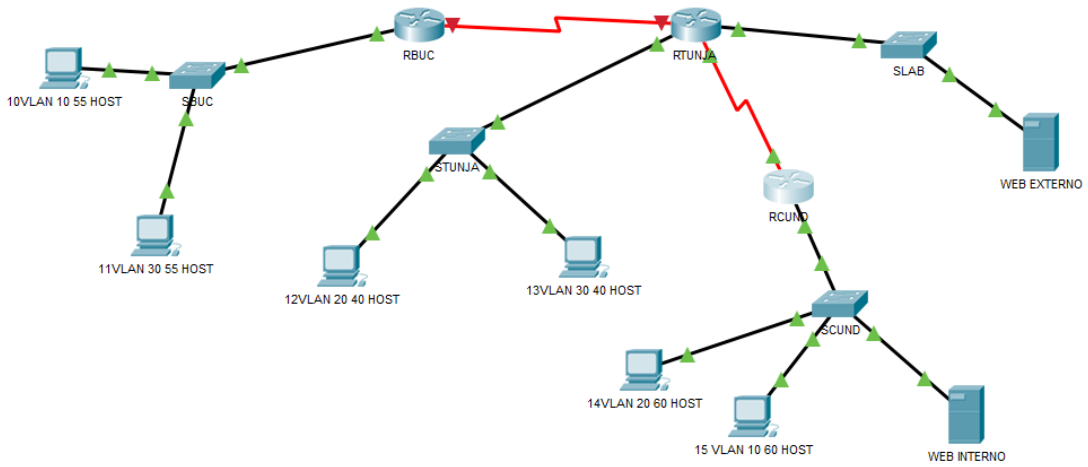
SWITCH TUNJA

```
Switch>en
Switch#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 1
Switch(config-vlan)#vlan 20
Switch(config-vlan)#vlan 30
Switch(config-vlan)#int f0/10
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#int f0/14
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#int g0/1
Switch(config-if)#switchport mode trunk

Switch(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

Switch(config-if)#int vlan 1
Switch(config-if)#ip address 172.3.2.11 255.255.255.248
Switch(config-if)#no shutdown

Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

Switch(config-if)#ip default-gateway 172.3.2.9
Switch(config)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console
```

SWITCH CUNDINAMARCA

```
Switch>en
Switch#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname SCUND
SCUND(config)#vlan 1
SCUND(config-vlan)#vlan 10
SCUND(config-vlan)#vlan 20
SCUND(config-vlan)#vlan 88
SCUND(config-vlan)#int f0/10
SCUND(config-if)#switchport mode access
SCUND(config-if)#switchport access vlan 10
SCUND(config-if)#int f0/14
SCUND(config-if)#switchport mode access
SCUND(config-if)#switchport access vlan 20
SCUND(config-if)#int f0/20
SCUND(config-if)#switchport mode access
SCUND(config-if)#switchport access vlan 88
SCUND(config-if)#int  g0/1
SCUND(config-if)#switchport mode trunk

SCUND(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

SCUND(config-if)#int vlan 1
SCUND(config-if)#ip address 172.31.2.11 255.255.255.248
SCUND(config-if)#no shutdown

SCUND(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

SCUND(config-if)#ip default-gateway 172.31.2.9
SCUND(config)#end
SCUND#
%SYS-5-CONFIG_I: Configured from console by console
```

CONEXIÓN EQUIPOS



- Autenticación local con AAA.

R BUC

```
RBUC#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
RBUC(config)#username adminadmin secret passpass
RBUC(config)#aaa new-model
RBUC(config)#aaa authentication login AAA-LOGIN local
RBUC(config)#line console 0
RBUC(config-line)#login authentication AAA-LOGIN
RBUC(config-line)#line vty 0 4
RBUC(config-line)#login authentication AAA-LOGIN
RBUC(config-line)#
```

R TUNJA

```
RTUNJA(config)#username adminadmin secret passpass
RTUNJA(config)#aaa new-model
RTUNJA(config)#aaa authentication login AAA-LOGIN local
RTUNJA(config)#line console 0
RTUNJA(config-line)#login authentication AAA-LOGIN
RTUNJA(config-line)#line vty 0 4
RTUNJA(config-line)#login authentication AAA-LOGIN
RTUNJA(config-line)#
```

R CUNDINAMARCA

```
RCUND(config)#username adminadmin secret passpass
RCUND(config)#aaa new-model
RCUND(config)#aaa authentication login AAA-LOGIN local
RCUND(config)#line console 0
RCUND(config-line)#login authentication AAA-LOGIN
RCUND(config-line)#line vty 0 4
RCUND(config-line)#login authentication AAA-LOGIN
RCUND(config-line)#
```

- Cifrado de contraseñas.

ROUTER BUCARAMANGA

```
RBUC(config)#service password-encryption
RBUC(config)#END
RBUC#
%SYS-5-CONFIG_I: Configured from console by console
```

ROUTER TUNJA

```
RTUNJA#CONF TERM
Enter configuration commands, one per line.  End with CNTL/Z.
RTUNJA(config)#service password-encryption
RTUNJA(config)#END
RTUNJA#
%SYS-5-CONFIG_I: Configured from console by console
```

ROUTER CUNDINAMARCA

```
RCUND#CONF TERM
Enter configuration commands, one per line.  End with CNTL/Z.
RCUND(config)#service password-encryption
RCUND(config)#END
RCUND#
%SYS-5-CONFIG_I: Configured from console by console
```

- Un máximo de internos para acceder al router.
- Máximo tiempo de acceso al detectar ataques.

Configuramos un bloquee 10 segundos el acceso por ssh, telnet y http cuando ocurran 5 intentos fallidos en un minuto.

R BUC

```
RBUC#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
RBUC(config)#login block-for 10 attempts 5 within 60
RBUC(config)#end
RBUC#
%SYS-5-CONFIG_I: Configured from console by console
```

R TUNJA

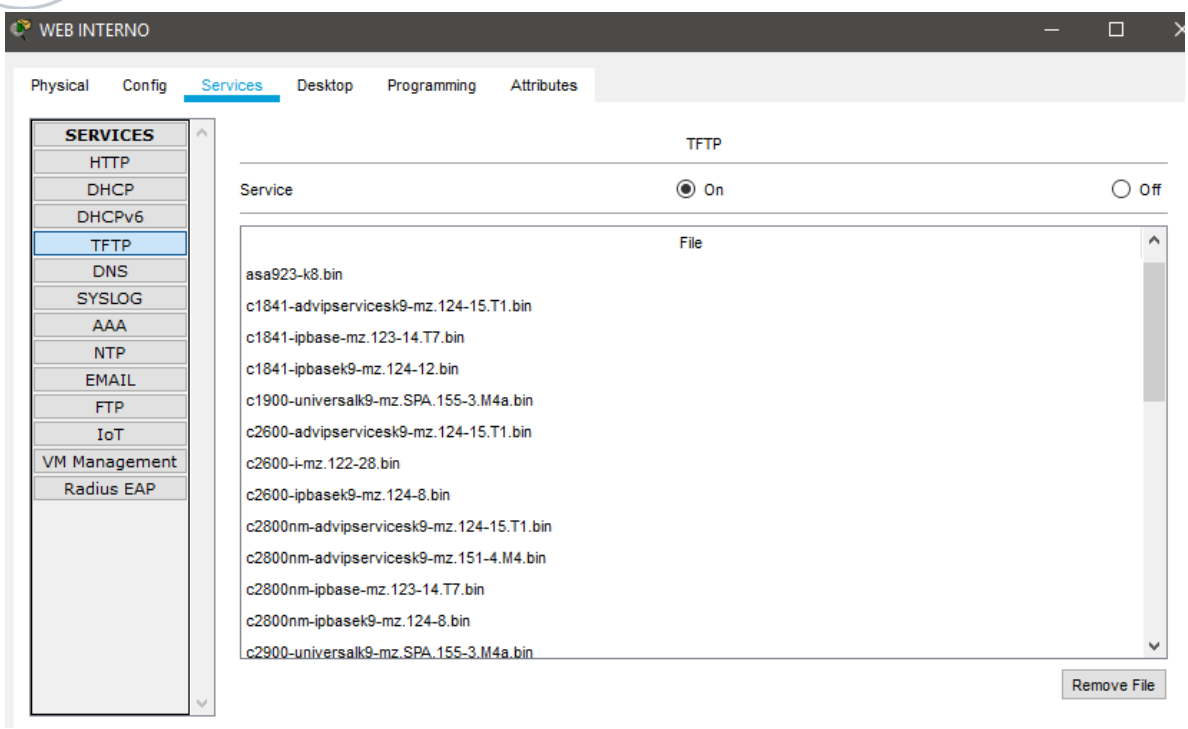
```
RTUNJA#CONF TERM
Enter configuration commands, one per line.  End with CNTL/Z.
RTUNJA(config)#login block-for 10 attempts 5 within 60
RTUNJA(config)#END
RTUNJA#
%SYS-5-CONFIG_I: Configured from console by console
```

R CUND

```
RCUND#CONF TERM
Enter configuration commands, one per line.  End with CNTL/Z.
RCUND(config)#login block-for 10 attempts 5 within 60
RCUND(config)#END
RCUND#
%SYS-5-CONFIG_I: Configured from console by console
```

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

Para esto vamos a usar el servidor interno



Se crean las copias de seguridad de los archivos necesarios de cada uno de los router y se guardan en el servidor TFPT 172.31.2.27 utilizando el comando COPY RUNNING-CONFIG TFTP, luego usamos el comando SHOW FLASH para ver el nombre del IOS, y con el comando COPY FLASH: TFTP para guardar el IOS del router.

VERIFICACION

RBUC

```
RBUC#copy running-config tftp
Address or name of remote host []? 172.31.2.27
Destination filename [RBUC-confg]? backup_RBUC

Writing running-config........
```

RTUNJA

```
RTUNJA#copy running-config tftp
Address or name of remote host []? 172.31.2.27
Destination filename [RTUNJA-confg]? Backup_RTunja

Writing running-config........
```

RCUND

```
RCUND#copy running-config tftp
Address or name of remote host []? 172.31.2.27
Destination filename [RCUND-confg]? Backup_RCundinamarca

Writing running-config........
```

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

RTUNJA

```
RTUNJA#CONF TERM
Enter configuration commands, one per line.  End with CNTL/Z.
RTUNJA(config)#ip dhcp excluded-address 172.31.0.1 172.31.0.4
RTUNJA(config)#ip dhcp excluded-address 172.31.0.65 172.31.0.68
RTUNJA(config)#ip dhcp excluded-address 172.31.1.65 172.31.1.68
RTUNJA(config)#ip dhcp excluded-address 172.31.1.1 172.31.1.4
RTUNJA(config)#ip dhcp pool vlan10B
RTUNJA(dhcp-config)#network 172.31.0.0 255.255.255.192
RTUNJA(dhcp-config)#default-router 172.31.0.1
RTUNJA(dhcp-config)#dns-server 172.31.2.27
RTUNJA(dhcp-config)#ip dhcp pool vlan30B
RTUNJA(dhcp-config)#network 172.31.0.64 255.255.255.192
RTUNJA(dhcp-config)#default-router 172.31.0.65
RTUNJA(dhcp-config)#dns-server 172.31.2.27
RTUNJA(dhcp-config)#ip dhcp pool vlan20C
RTUNJA(dhcp-config)#network 172.31.1.64 255.255.255.192
RTUNJA(dhcp-config)#default-router 172.31.1.65
RTUNJA(dhcp-config)#dns-server 172.31.2.27
RTUNJA(dhcp-config)#ip dhcp pool vlan30C
RTUNJA(dhcp-config)#network 172.31.1.0 255.255.255.192
RTUNJA(dhcp-config)#default-router 172.31.1.1
RTUNJA(dhcp-config)#dns-server 172.31.2.27
RTUNJA(dhcp-config)#
```

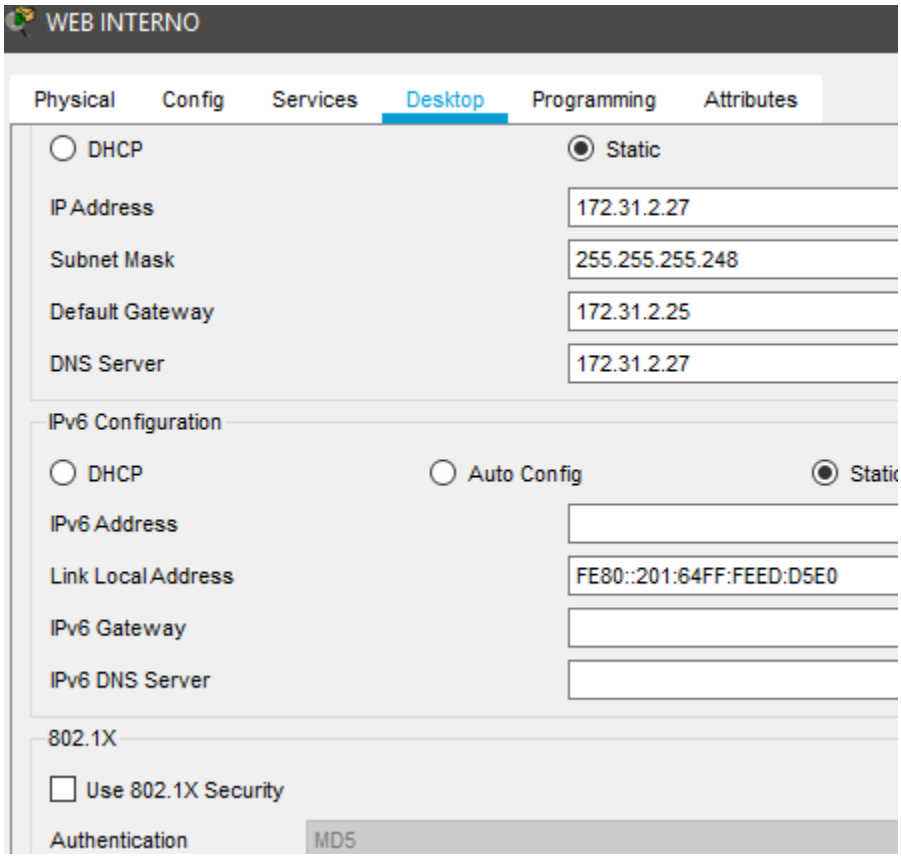
RCUND

```
RCUND(config)#int g0/0.10
RCUND(config-subif)#ip helper-address 172.31.2.37
RCUND(config-subif)#int g0/0.20
RCUND(config-subif)#ip helper-address 172.31.2.37
RCUND(config-subif)#end
RCUND#
%SYS-5-CONFIG_I: Configured from console by console
```

RBUC

```
RBUC(config)#int g0/0.10
RBUC(config-subif)#ip helper-address 172.31.2.33
RBUC(config-subif)#int g0/0.30
RBUC(config-subif)#ip helper-address 172.31.2.33
RBUC(config-subif)#end
RBUC#
%SYS-5-CONFIG_I: Configured from console by console
```

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



RTUNJA

```
RTUNJA(config)#ip nat inside source static 172.31.2.27 209.165.220.10
RTUNJA(config)#ip access-list standard NAT-ACL
RTUNJA(config-std-nacl)#permit 172.31.0.0 0.0.255.255
RTUNJA(config-std-nacl)#ip nat inside source list NAT-ACL interface g0/1 overload
RTUNJA(config)#int g0/1
RTUNJA(config-if)#ip nat outside
RTUNJA(config-if)#int g0/0.1
RTUNJA(config-subif)#ip nat inside
RTUNJA(config-subif)#int g0/0.20
RTUNJA(config-subif)#ip nat inside
RTUNJA(config-subif)#int g0/0.30
RTUNJA(config-subif)#ip nat inside
RTUNJA(config-subif)#int s0/0/0
RTUNJA(config-if)#ip nat inside
RTUNJA(config-if)#int s0/0/1
RTUNJA(config-if)#ip nat inside
RTUNJA(config-if)#EXIT
RTUNJA(config)#ip route 0.0.0.0 0.0.0.0 209.165.220.5
RTUNJA(config)#router ospf 1
RTUNJA(config-router)#default-information originate
RTUNJA(config-router)#END
RTUNJA#
%SYS-5-CONFIG_I: Configured from console by console
```

```
RTUNJA#show 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 209.165.220.5 to network 0.0.0.0

     172.3.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.3.2.8/29 is directly connected, GigabitEthernet0/0.1
L       172.3.2.9/32 is directly connected, GigabitEthernet0/0.1
     172.31.0.0/16 is variably subnetted, 10 subnets, 4 masks
C       172.31.0.128/26 is directly connected, GigabitEthernet0/0.20
L       172.31.0.129/32 is directly connected, GigabitEthernet0/0.20
C       172.31.0.192/26 is directly connected, GigabitEthernet0/0.30
L       172.31.0.193/32 is directly connected, GigabitEthernet0/0.30
O       172.31.1.0/26 [110/65] via 172.31.2.38, 02:55:44, Serial0/0/1
O       172.31.1.64/26 [110/65] via 172.31.2.38, 02:55:44, Serial0/0/1
O       172.31.2.8/29 [110/65] via 172.31.2.38, 02:55:44, Serial0/0/1
O       172.31.2.24/29 [110/65] via 172.31.2.38, 02:55:44, Serial0/0/1
C       172.31.2.36/30 is directly connected, Serial0/0/1
L       172.31.2.37/32 is directly connected, Serial0/0/1
     209.165.220.0/24 is variably subnetted, 2 subnets, 2 masks
C       209.165.220.0/24 is directly connected, GigabitEthernet0/1
L       209.165.220.1/32 is directly connected, GigabitEthernet0/1
S*   0.0.0.0/0 [1/0] via 209.165.220.5

RTUNJA#
```

RCUND

```
RCUND#show 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 172.31.2.37 to network 0.0.0.0

     172.3.0.0/29 is subnetted, 1 subnets
O       172.3.2.8/29 [110/65] via 172.31.2.37, 03:03:47, Serial0/0/0
     172.31.0.0/16 is variably subnetted, 12 subnets, 4 masks
O       172.31.0.128/26 [110/65] via 172.31.2.37, 03:03:47, Serial0/0/0
O       172.31.0.192/26 [110/65] via 172.31.2.37, 03:03:47, Serial0/0/0
C       172.31.1.0/26 is directly connected, GigabitEthernet0/0.20
L       172.31.1.1/32 is directly connected, GigabitEthernet0/0.20
C       172.31.1.64/26 is directly connected, GigabitEthernet0/0.10
L       172.31.1.65/32 is directly connected, GigabitEthernet0/0.10
C       172.31.2.8/29 is directly connected, GigabitEthernet0/0.1
L       172.31.2.9/32 is directly connected, GigabitEthernet0/0.1
C       172.31.2.24/29 is directly connected, GigabitEthernet0/0.88
L       172.31.2.25/32 is directly connected, GigabitEthernet0/0.88
C       172.31.2.36/30 is directly connected, Serial0/0/0
L       172.31.2.38/32 is directly connected, Serial0/0/0
O*E2 0.0.0.0/0 [110/1] via 172.31.2.37, 00:08:50, Serial0/0/0
```

RBUC

```
RBUC#show 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

     172.31.0.0/16 is variably subnetted, 6 subnets, 3 masks
C       172.31.0.0/26 is directly connected, GigabitEthernet0/0.10
L       172.31.0.1/32 is directly connected, GigabitEthernet0/0.10
C       172.31.0.64/26 is directly connected, GigabitEthernet0/0.30
L       172.31.0.65/32 is directly connected, GigabitEthernet0/0.30
C       172.31.2.0/29 is directly connected, GigabitEthernet0/0.1
L       172.31.2.1/32 is directly connected, GigabitEthernet0/0.1

RBUC#
```

4. El enrutamiento deberá tener autenticación.

RBUC

```
RBUC#CONF TERM
Enter configuration commands, one per line.  End with CNTL/Z.
RBUC(config)#int s0/0/0
RBUC(config-if)#ip ospf authentication message-digest
RBUC(config-if)#ip ospf message-digest-key 1 md5 ospfospf
RBUC(config-if)#end
RBUC#
%SYS-5-CONFIG_I: Configured from console by console
```

RTUNJA

```
RTUNJA#
RTUNJA#CONF TERM
Enter configuration commands, one per line.  End with CNTL/Z.
RTUNJA(config)#int s0/0/0
RTUNJA(config-if)#ip ospf authentication message-digest
RTUNJA(config-if)#ip ospf message-digest-key 1 md5 ospfospf
RTUNJA(config-if)#int s0/0/1
RTUNJA(config-if)#ip ospf authentication message-digest
RTUNJA(config-if)#ip ospf message-digest-key 1 md5 ospfospf
RTUNJA(config-if)#
```

RCUND

```
RCUND#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
RCUND(config)#int s0/0/0
RCUND(config-if)#ip ospf authentication message-digest
RCUND(config-if)#ip ospf message-digest-key 1 md5 ospfospf
RCUND(config-if)#end
RCUND#
%SYS-5-CONFIG_I: Configured from console by console

03:59:53: %OSPF-5-ADJCHG: Process 1, Nbr 209.165.220.1 on Serial0/0/0
from LOADING to FULL, Loading Done
```

5. Listas de control de acceso:

- Los hosts de VLAN 20 en Cundinamarca no acceden a internet, solo a la red interna de Tunja.
- Los hosts de VLAN 10 en Cundinamarca si acceden a internet y no a la red interna de Tunja.

- Los hosts de VLAN 30 en Tunja solo acceden a servidores web y ftp de internet.
- Los hosts de VLAN 20 en Tunja solo acceden a la VLAN 20 de Cundinamarca y VLAN 10 de Bucaramanga.
- Los hosts de VLAN 30 de Bucaramanga acceden a internet y a cualquier equipo de VLAN 10.
- Los hosts de VLAN 10 en Bucaramanga acceden a la red de Cundinamarca (VLAN 20) y Tunja (VLAN 20), no internet.
- Los hosts de una VLAN no pueden acceder a los de otra VLAN en una ciudad.
- Solo los hosts de las VLAN administrativas y de la VLAN de servidores tienen accedo a los routers e internet.

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

Aspectos a tener en cuenta

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

Conclusiones

- La implementación de NAT es un mecanismo utilizado en la red creado para solucionar la escasez de direcciones IPV4 publicas su función es conectar una o más redes LAN internas a internet mediante una sola IP publica o conjunto de estas. en el caso de la NAT estática se mapea la dirección IP privada con una dirección IP publica de forma tal que cada equipo en la red privada tiene asignado una IP publica para acceder a internet. Para la NAT dinámica se utiliza un pool de IP’s privadas que son mapeadas de forma dinámica y a demanda.