

DIPLOMADO DE PROFUNDIZACIÓN CISCO CCNP
EVALUACIÓN – PRUEBA DE HABILIDADES PRÁCTICAS CCNP

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA – UNAD
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GLOSARIO

SMART LAB: es un centro especializado en difusión de conocimiento, intercambio de experiencias y espacios compartidos de trabajo vinculado a las ciudades inteligentes. El objetivo es crear un entorno compartido que estimule el intercambio de ideas y la generación de proyectos innovadores.

OSPFv2: es la versión del protocolo OSPF que actualmente utilizamos en redes IPv4.

En este caso, el formato del router ID coincide con el formato de las direcciones IP utilizadas en las interfaces por lo que es posible utilizar la dirección IP de una interfaz como router ID, de manera tal que no es obligatorio configurar un router-id y el sistema operativo puede tomar la dirección IP de una interfaz para ser utilizada en esta función.

VLAN: es un método para crear redes lógicas independientes dentro de una misma red física.¹ Varias VLAN pueden coexistir en un único conmutador físico o en una única red física.

DHCP: es un servidor que usa protocolo de red de tipo cliente/servidor en el que generalmente un servidor posee una lista de direcciones IP dinámicas y las va asignando a los clientes conforme éstas van quedando libres, sabiendo en todo momento quién ha estado en posesión de esa IP, cuánto tiempo la ha tenido y a quién se la ha asignado después.

RESUMEN

En el siguiente informe se desarrolla de acuerdo a las indicaciones para la presentación del examen de habilidades prácticas para el curso DIPLOMADO DE PROFUNDIZACIÓN CISCO CCNP, en el cual se procede abordar y conocer la importancia del curso como forma de aprendizaje acerca del proceso de enrutamiento y configuración avanzado usando Switch, para segmentar la red a través de VLAN para enviar paquetes a la red de destino a través de equipos conectados y pasando por capa 2 y capa 3 respectivamente mediante dos escenarios.

Palabras claves: BGP, CCNP, EIGRP, protocolos de red, OSPF, routing, switching.

ABSTRACT

In the following report it is developed according to the indications for the presentation of the practical skills exam for the CISCO CCNP DEPTH DEGREE course, in which it is necessary to address and know the importance of the course as a way of learning about the routing process and advanced configuration using Switch to segment the network through VLAN to send packets to the destination network through connected equipment and through layer 2 and layer 3 respectively through two scenarios.

Keywords: BGP, CCNP, EIGRP, protocolos de red, OSPF, routing, switching.

INTRODUCCIÓN

Hoy en día las redes se han convertido en una necesidad básica para el desarrollo personal y la posibilidad de realizar comunicaciones en tiempo real independientemente del sitio, lo que ha permitido la globalización de la información y el aumento del conocimiento requerido para entender el funcionamiento de estos sistemas.

En el siguiente documento se realiza una prueba práctica de configuración apoyándose en el material el cual se ha desarrollado durante el semestre educativo logrando la implementación de los conocimientos adquiridos.

Los dos escenarios que se desarrollan en este trabajo se aplican todos los protocolos de enrutamiento y los demás aspectos que se necesitan en un correcto desarrollo para una topología de redes exigidas en las empresas mencionadas.

1. EVALUACIÓN – PRUEBA DE HABILIDADES PRÁCTICAS CCNP

1.1. DESCRIPCIÓN GENERAL DE LA PRUEBA DE HABILIDADES

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

Para esta actividad, el estudiante dispone de cerca de dos semanas para realizar las tareas asignadas en cada uno de los dos (2) escenarios propuestos, acompañado de los respectivos procesos de documentación de la solución, correspondientes al registro de la configuración de cada uno de los dispositivos, la descripción detallada del paso a paso de cada una de las etapas realizadas durante su desarrollo, el registro de los procesos de verificación de conectividad mediante el uso de comandos **ping, traceroute, show ip route, entre otros**.

Teniendo en cuenta que la Prueba de habilidades está conformada por dos (2) escenarios, el estudiante deberá realizar el proceso de configuración de usando cualquiera de las siguientes herramientas: **Packet Tracer , GNS3 o SMARTLAB**.

- Es muy importante mencionar que esta actividad es de carácter **INDIVIDUAL y OBLIGATORIA**.
- Toda evidencia de **copy-paste o plagio (de la web o de otros informes)** será penalizada con severidad.

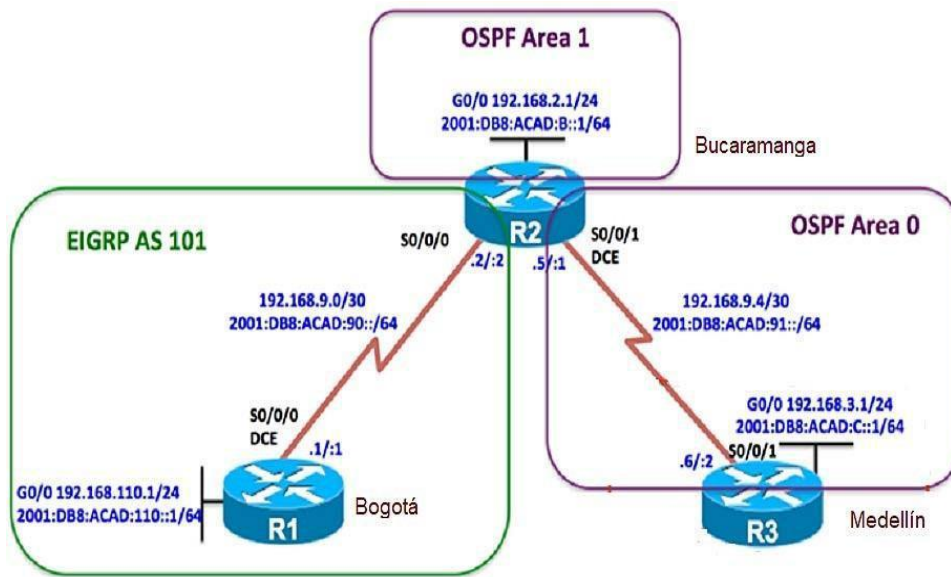
Descripción de escenarios propuestos para la prueba de habilidades

1.2. ESCENARIO 1

Una empresa de confecciones posee tres sucursales distribuidas en las ciudades de Bogotá, Medellín y Bucaramanga, 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

Figura 1. Topología de red Escenario 1



Fuente: Autor.

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

Parte 1: Configuración del escenario propuesto

1. Configurar las interfaces con las direcciones IPv4 e IPv6 que se muestran en la topología de red.

En R1.

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip domain-lookup Router(config)#hostname
R1
R1(config)#interface s0/0/0
R1(config-if)#ip address 192.168.9.1 255.255.255.252
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to
down R1(config-if)#exit
R1(config)#interface g0/0
R1(config-if)#ip address 192.168.110.1 255.255.255.0
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

R1(config-if)#ipv6 unicast-routing
R1(config)#interface s0/0/0
R1(config-if)#ipv6 address 2001:DB8:ACAD:90::1/64
R1(config-if)#ipv6 address FE80::1 link-local
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#interface g0/0
R1(config-if)#ipv6 address 2001:DB8:ACAD:110::1/64
R1(config-if)#ipv6 address FE80::1 link-local
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#
```

En R2

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip domain-lookup Router(config)#hostname
R2
R2(config)#interface s0/0/0
R2(config-if)#ip address 192.168.9.2 255.255.255.252
R2(config-if)#no shutdown
```

```

R2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

R2(config-if)#exit
R2(config)#interf
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed
state to up
ace g0/0
R2(config-if)#ip address 192.168.2.1
255.255.255.0 R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

R2(config-if)#exit
R2(config)#interface s0/0/1
R2(config-if)#ip address 192.168.9.5 255.255.255.252
R2(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to
down R2(config-if)#exit
R2(config)#ipv6 unicast-routing
R2(config)#interface s0/0/0
R2(config-if)#ipv6 address 2001:DB8:ACAD:90::2/64
R2(config-if)#ipv6 address FE80::2 link-local
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#interface g0/0
R2(config-if)#ipv6 address 2001:DB8:ACAD:8::1/64
R2(config-if)#ipv6 address FE80::2 link-local
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#interface s0/0/1
R2(config-if)#ipv6 address 2001:DB8:ACAD:91::1/64
R2(config-if)#ipv6 address FE80::2 link-local
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#

```

En R3.

```

Router>enable
Router#configure terminal

```

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

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

```
R3
```

```
R3(config)#interface s0/0/1
```

```
R3(config-if)#ip address 192.168.9.6 255.255.255.252
```

```
R3(config-if)#no shutdown
```

```
R3(config-if)#
```

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

```
R3(config-if)#exit
```

```
R3(config)#
```

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

```
R3(config)#interface g0/0
```

```
R3(config-if)#ip address 192.168.3.1 255.255.255.0
```

```
R3(config-if)#no shutdown
```

```
R3(config-if)#
```

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

```
R3(config-if)#exit
```

```
R3(config)#ipv6 unicast-routing
```

```
R3(config)#interface s0/0/1
```

```
R3(config-if)#ipv6 address 2001:DB8:ACAD:91::2/64
```

```
R3(config-if)#ipv6 address FE80::3 link-local
```

```
R3(config-if)#no shutdown
```

```
R3(config-if)#exit
```

```
R3(config)#interface g0/0
```

```
R3(config-if)#ipv6 address 2001:DB8:ACAD:C::1/64
```

```
R3(config-if)#ipv6 address FE80::3 link-local
```

```
R3(config-if)#no shutdown
```

```
R3(config-if)#exit
```

```
R3(config)#
```

2. Ajustar el ancho de banda a 128 kbps sobre cada uno de los enlaces seriales ubicados en R1, R2, y R3 y ajustar la velocidad de reloj de las conexiones de DCE según sea apropiado.

En R1.

```
R1>enable
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface s0/0/0
R1(config-if)#bandwidth 128
R1(config-if)#clock rate 128000
R1(config-if)#exit
R1(config)#
```

En R2.

```
R2(config)#interface se0/0/0
R2(config-if)#bandwidth 128
R2(config-if)#exit
R2(config)#interface se0/0/1
R2(config-if)#bandwidth 128
R2(config-if)#clock rate 128000
R2(config-if)#exit
R2(config)#
```

En R3.

```
R3(config)#interface se0/0/1
R3(config-if)#bandwidth 128
R3(config-if)#exit
R3(config)#
```

3. En R2 y R3 configurar las familias de direcciones OSPFv3 para IPv4 e IPv6. Utilice el identificador de enrutamiento 2.2.2.2 en R2 y 3.3.3.3 en R3 para ambas familias de direcciones.

En R2.

```
R2(config)#router ospf 1
R2(config-router)#router-id 2.2.2.2
R2(config-router)#exit
R2(config)#ipv6 router ospf 1
R2(config-rtr)#router-id 2.2.2.2
```

```
R2(config-rtr)#exit
R2(config)#
```

En R3.

```
R3(config)#router ospf 1
R3(config-router)#router-id 3.3.3.3
R3(config-router)#exit
R3(config)#ipv6 router ospf 1
R3(config-rtr)#router-id 3.3.3.3
R3(config-rtr)#exit
R3(config)#
```

4. En R2, configurar la interfaz F0/0 en el área 1 de OSPF y la conexión serial entre R2 y R3 en OSPF área 0.

En R2.

```
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router ospf 1
R2(config-router)#network 192.168.2.0 0.0.0.255 area 1
R2(config-router)#network 192.168.9.4 0.0.0.3 area 0
R2(config-router)#exit
R2(config)#
```

5. En R3, configurar la interfaz F0/0 y la conexión serial entre R2 y R3 en OSPF área 0.

En R3.

```
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#network 192.168.9.4 0.0.0.3 area 0
R3(config-router)#network 192.168.3.0 0.0.0.255 area 0
R3(config-router)#exit
R3(config)#
```

6. Configurar el área 1 como un área totalmente Stubby.

En R2.

```
R2(config)#router ospf 1
R2(config-router)#area 1 nssa
R2(config-router)#exit
R2(config)#
```

En R3.

```
R3(config)#router ospf 1
R3(config-router)#area 1 nssa
R3(config-router)#exit
R3(config)#
```

7. Propagar rutas por defecto de IPv4 y IPv6 en R3 al interior del dominio OSPFv3. **Nota: Es importante tener en cuenta que una ruta por defecto es diferente a la definición de rutas estáticas.**

En R3.

```
R3(config)#router ospf 1
R3(config-router)#log-adjacency-changes
R3(config-router)#exit
R3(config)#ipv6 router ospf 1
R3(config-rtr)#log-adjacency-changes
R3(config-rtr)#exit
R3(config)#
```

8. Realizar la configuración del protocolo EIGRP para IPv4 como IPv6. Configurar la interfaz F0/0 de R1 y la conexión entre R1 y R2 para EIGRP con el sistema autónomo 101. Asegúrese de que el resumen automático está desactivado.

En R1.

```
R1>enable
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router eigrp 101
R1(config-router)#passive-interface gi
R1(config-router)#passive-interface gigabitEthernet 0/0
R1(config-router)#network 192.168.110.0
R1(config-router)#network 192.168.9.0 0.0.0.3
R1(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 101: Neighbor 192.168.9.2 (Serial0/0/0) is up:
new adjacency
```

```
R1(config-router)#no auto-summary
R1(config-router)#exit
R1(config)#ipv6 router eigrp 101
R1(config-rtr)#eigrp router-id 1.1.1.1
R1(config-rtr)#no shutdown
R1(config-rtr)#passive-interfa
R1(config-rtr)#passive-interface gigabitEthernet 0/0
R1(config-rtr)#passive-interface serial 0/0/0
R1(config-rtr)#
```

En R2.

```
R2(config)#router eigrp 101
R2(config-router)#eigrp router-id 2.2.2.2
R2(config-router)#redistribute ospf 1
R2(config-router)#redistribute connected
R2(config-router)#network 192.168.9.0 0.0.0.3
R2(config-router)#no auto-summary
R2(config-router)#exit
R2(config)#ipv6 router eigrp 101
R2(config-rtr)#eigrp router-id 2.2.2.2
R2(config-rtr)#no shutdown
R2(config-rtr)#passive-interface Gigabi
R2(config-rtr)#passive-interface GigabitEthernet 0/0
R2(config-rtr)#passive-interface Ser
R2(config-rtr)#passive-interface Serial 0/0/1
R2(config-rtr)#redistribute ospf 1
R2(config-rtr)#redistribute connected
```

9. Configurar las interfaces pasivas para EIGRP según sea apropiado.

En R1.

```
R1(config)#router eigrp 101
R1(config-router)#passive
R1(config-router)#passive-interface gi
R1(config-router)#passive-interface gigabitEthernet 0/0
R1(config-router)#
```

En R2.

```
R2(config)#router eigrp 101
R2(config-router)#pass
R2(config-router)#passive-interface gi
R2(config-router)#passive-interface gigabitEthernet 0/0
R2(config-router)#exit
R2(config-rtr)#passive-interface Gigabi
R2(config-rtr)#passive-interface GigabitEthernet 0/0
R2(config-rtr)#passive-interface Ser
R2(config-rtr)#passive-interface Serial 0/0/1
R2(config-rtr)#redistribute ospf 1
R2(config-rtr)#redistribute connected
```

10. En R2, configurar la redistribución mutua entre OSPF y EIGRP para IPv4 e IPv6. Asignar métricas apropiadas cuando sea necesario.

En R2.

```
R2(config)#router ospf 1
R2(config-router)#router-id 2.2.2.2
R2(config-router)#log-adjacency-changes
R2(config-router)#area 1 stub no-summary
R2(config-router)#OSPF: Area is configured as NSSA already
```

```
R2(config-router)#redistribute eigrp 101 subnets
R2(config-router)#exit
R2(config)#ipv6 router ospf 1
R2(config-rtr)#router-id 2.2.2.2
R2(config-rtr)#log-adjacency-changes
```

```
R2(config-rtr)#area 1 stub no-summary
R2(config-rtr)#redistribute eigrp 101
R2(config-rtr)#% OSPF-4-ASBR_WITHOUT_VALID_AREA: Router is currently an
ASBR while having only one area which is a stub area
```

```
R2(config-rtr)#redistribute connected
R2(config-rtr)#% OSPF-4-ASBR_WITHOUT_VALID_AREA: Router is currently an
ASBR while having only one area which is a stub area
```

```
R2(config-rtr)#
R2(config-rtr)#exit
R2(config)#router eigrp 101
R2(config-router)#eigrp router-id 2.2.2.2
R2(config-router)#redistribute ospf 1
R2(config-router)#redistribute connected
R2(config-router)#passi
R2(config-router)#passive-interface gi
R2(config-router)#passive-interface gigabitEthernet 0/0
R2(config-router)#exit
R2(config)#ipv6 router eigrp 101
R2(config-rtr)#eigrp router-id 2.2.2.2
R2(config-rtr)#no shutdown
R2(config-rtr)#passiv
R2(config-rtr)#passive-interface gi
R2(config-rtr)#passive-interface gigabitEthernet 0/0
R2(config-rtr)#passi
R2(config-rtr)#passive-interface se
R2(config-rtr)#passive-interface serial 0/0/1
R2(config-rtr)#redistribute ospf 1
R2(config-rtr)#redistribute connected
R2(config-rtr)#exit
R2(config)#
```

11. En R2, de hacer publicidad de la ruta 192.168.3.0/24 a R1 mediante una lista de distribución y ACL.

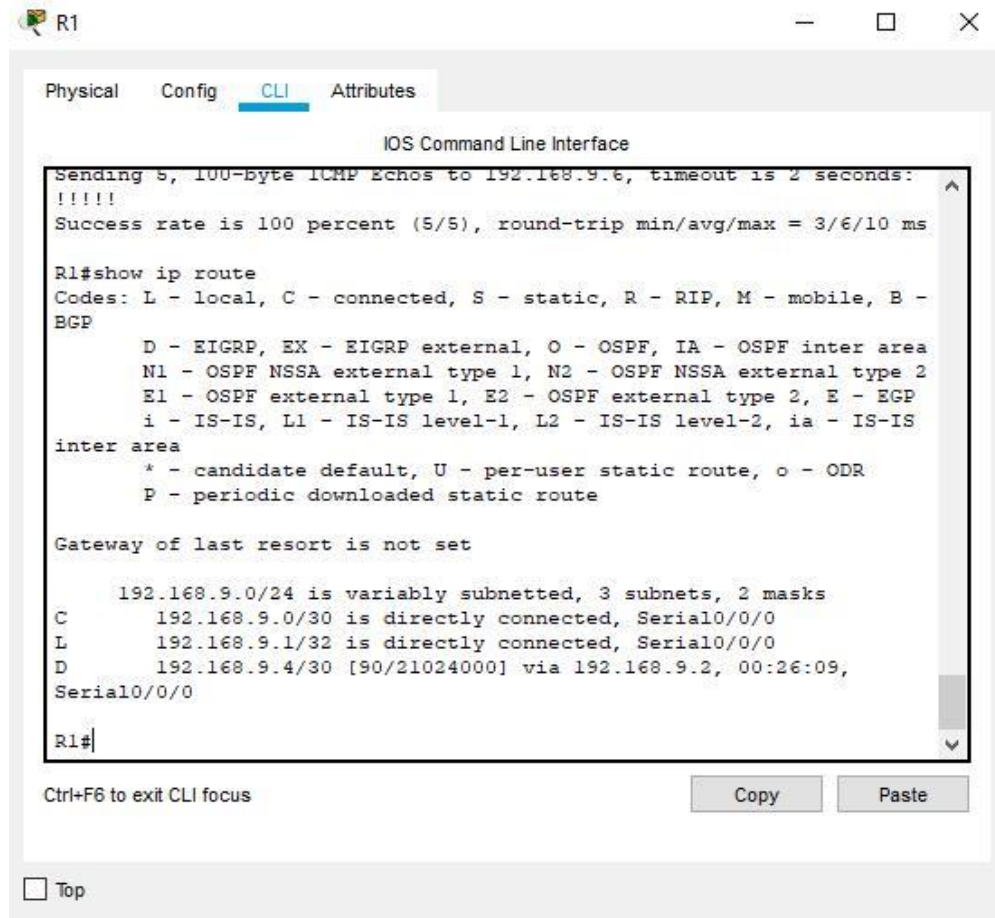
En R2.

```
R2(config)#
R2(config)#access-list 1 permit 192.168.3.0 255.255.255.0
R2(config)#
```

Parte 2: Verificar conectividad de red y control de la trayectoria.

- a. Registrar las tablas de enrutamiento en cada uno de los routers, acorde con los parámetros de configuración establecidos en el escenario propuesto.

Figura 2. Captura de pantalla 1



```
IOS Command Line Interface
Sending 5, 100-byte ICMP Echos to 192.168.9.6, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/6/10 ms

R1#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

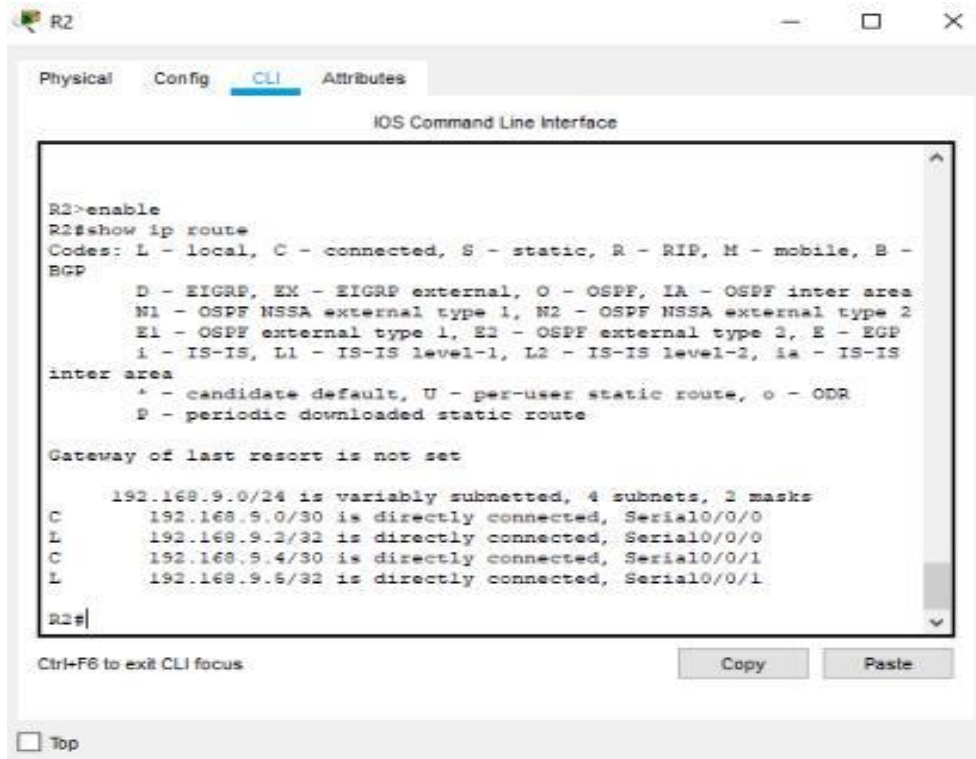
Gateway of last resort is not set

     192.168.9.0/24 is variably subnetted, 3 subnets, 2 masks
C       192.168.9.0/30 is directly connected, Serial0/0/0
L       192.168.9.1/32 is directly connected, Serial0/0/0
D       192.168.9.4/30 [90/21024000] via 192.168.9.2, 00:26:09,
Serial0/0/0

R1#
```

Fuente: Autor

Figura 3. Captura de pantalla 2



The screenshot shows a window titled 'R2' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The user has entered the command 'show ip route' and the output is as follows:

```
R2>enable
R2#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

      192.168.9.0/24 is variably subnetted, 4 subnets, 2 masks
C       192.168.9.0/30 is directly connected, Serial0/0/0
L       192.168.9.2/32 is directly connected, Serial0/0/0
C       192.168.9.4/30 is directly connected, Serial0/0/1
L       192.168.9.6/32 is directly connected, Serial0/0/1

R2#
```

At the bottom of the CLI window, there is a prompt 'Ctrl+F6 to exit CLI focus' and two buttons labeled 'Copy' and 'Paste'. Below the CLI window, there is a checkbox labeled 'Tbp' which is currently unchecked.

Fuente: Autor

Figura 4. Captura de pantalla 3

```
R3>enable
R3#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

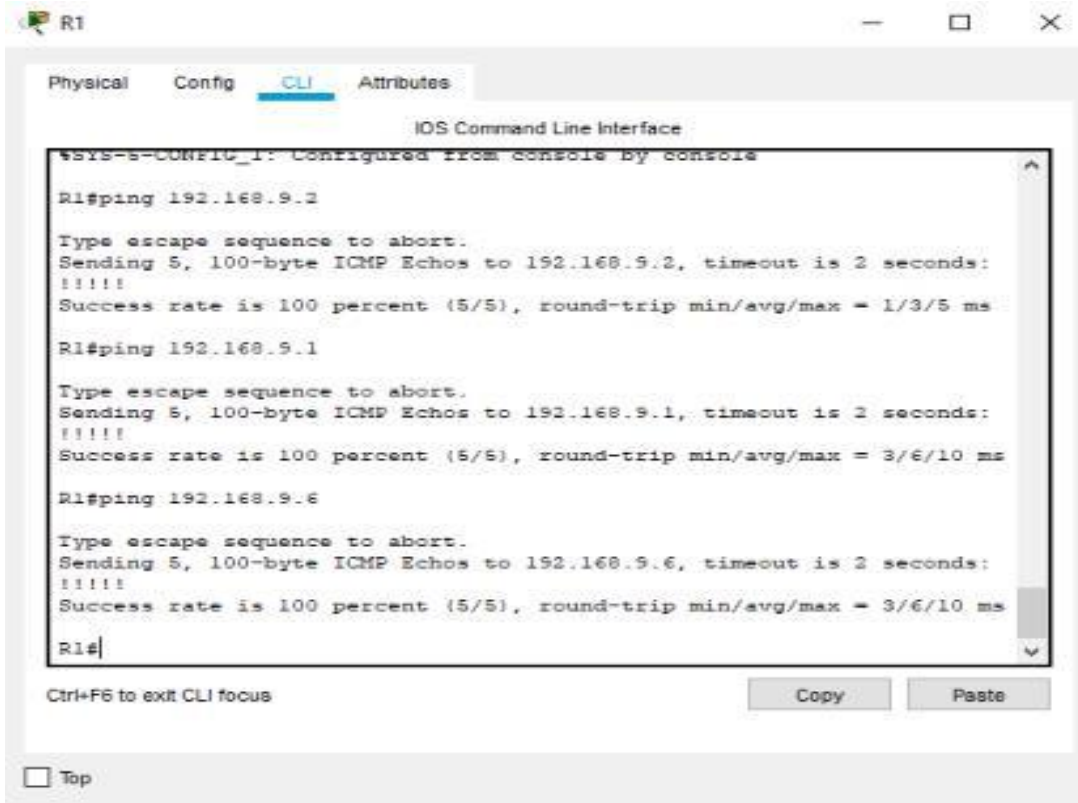
     192.168.9.0/24 is variably subnetted, 3 subnets, 2 masks
O       192.168.9.0/30 [110/1562] via 192.168.9.5, 01:58:19,
Serial0/0/1
C       192.168.9.4/30 is directly connected, Serial0/0/1
L       192.168.9.6/32 is directly connected, Serial0/0/1

R3#
```

Fuente: Autor

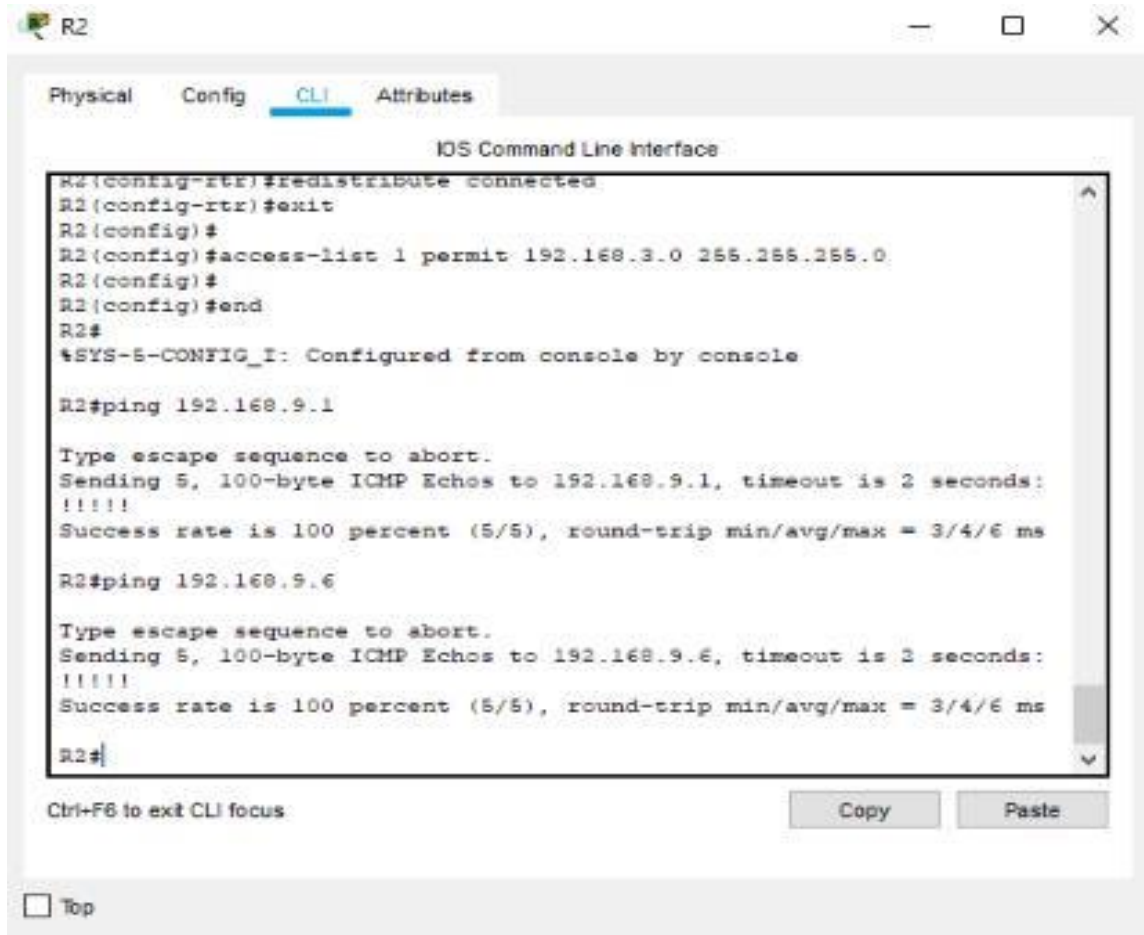
- b. Verificar comunicación entre routers mediante el comando ping y traceroute

Figura 5. Captura de pantalla 4



Fuente: Autor

Figura 6. Captura de pantalla 5



```
R2#(config-rtt)#redistribute connected
R2(config-rtt)#exit
R2(config)#
R2(config)#access-list 1 permit 192.168.3.0 255.255.255.0
R2(config)#
R2(config)#end
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#ping 192.168.9.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/4/6 ms

R2#ping 192.168.9.6

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.6, timeout is 3 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/4/6 ms

R2#
```

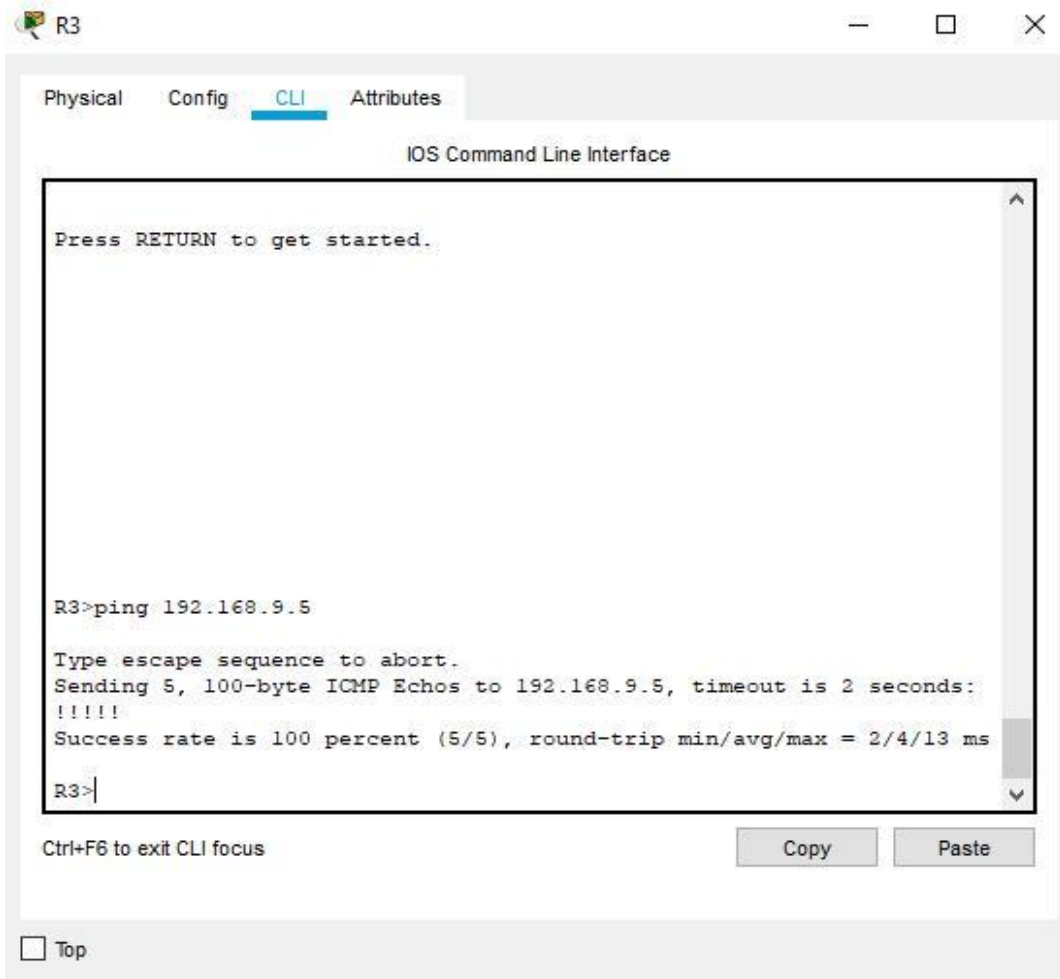
Ctrl+F6 to exit CLI focus

Copy Paste

Top

Fuente: Autor

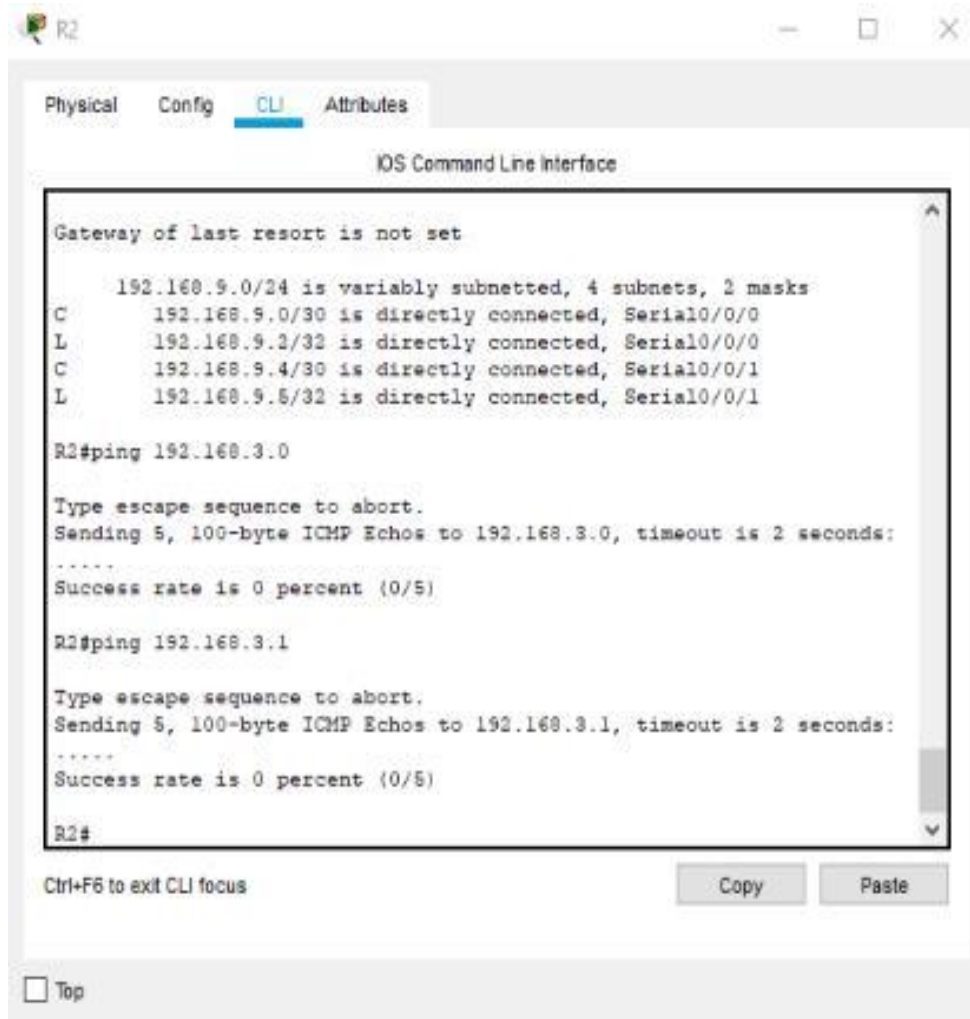
Figura 7. Captura de pantalla 6



Fuente: Autor

- c. Verificar que las rutas filtradas no están presentes en las tablas de enrutamiento de los routers correctas.

Figura 8. Captura de pantalla 7



The screenshot shows a Cisco IOS Command Line Interface window for router R2. The window has tabs for Physical, Config, CLI (selected), and Attributes. The CLI window displays the following text:

```
Gateway of last resort is not set

  192.168.9.0/24 is variably subnetted, 4 subnets, 2 masks
C   192.168.9.0/30 is directly connected, Serial0/0/0
L   192.168.9.2/32 is directly connected, Serial0/0/0
C   192.168.9.4/30 is directly connected, Serial0/0/1
L   192.168.9.5/32 is directly connected, Serial0/0/1

R2#ping 192.168.3.0

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.3.0, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

R2#ping 192.168.3.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.3.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

R2#
```

At the bottom of the CLI window, there is a prompt "Ctrl+F6 to exit CLI focus" and two buttons labeled "Copy" and "Paste". Below the CLI window, there is a checkbox labeled "Top".

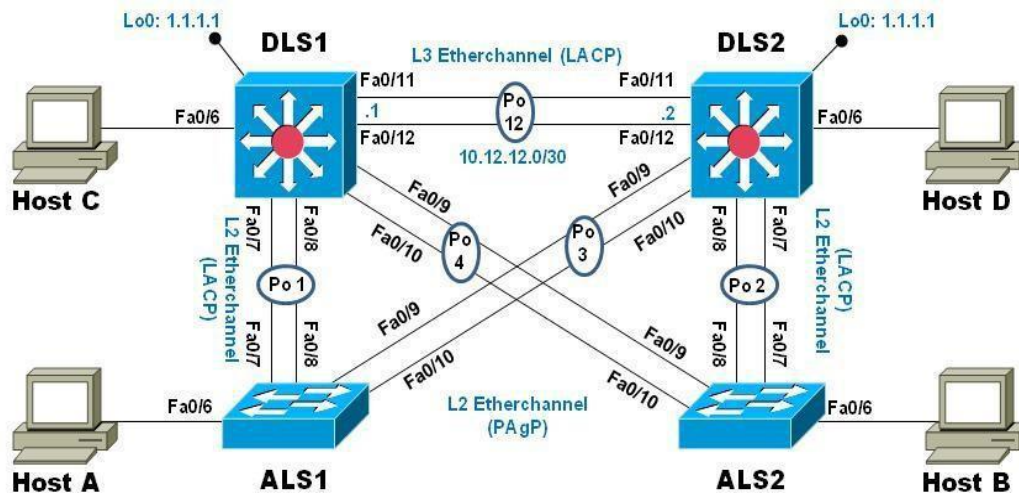
Fuente: Autor

Nota: Puede ser que Una o más direcciones no serán accesibles desde todos los routers después de la configuración final debido a la utilización de listas de distribución para filtrar rutas y el uso de IPv4 e IPv6 en la misma red.

1.3. ESCENARIO 2

Una empresa de comunicaciones presenta una estructura Core acorde a la topología de red, 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, etherchannels, VLANs y demás aspectos que forman parte del escenario propuesto.

Topología de red



Parte 1: Configurar la red de acuerdo con las especificaciones.

- a. Apagar todas las interfaces en cada switch.

En DLS1.

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface range fa0/1-24
Switch(config-if-range)#shutdown
```

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/13, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/14, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/16, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/17, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/18, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/19, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/20, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/21, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/22, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/23, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to administratively
down Switch(config-if-range)#
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to
down
%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7, changed state to
down

```
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to
down
%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/9, changed state to
down
%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/10, changed
state to down
%LINK-5-CHANGED: Interface FastEthernet0/11, changed state to administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/11, changed
state to down
%LINK-5-CHANGED: Interface FastEthernet0/12, changed state to administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/12, changed
state to down
Switch(config-if-range)#exit
Switch(config)#
```

En DLS2

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface range fa0/1-24 Switch(config-if-
range)#shutdown
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to administratively down
```

%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/11, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/12, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/13, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/14, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/16, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/17, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/18, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/19, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/20, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/21, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/22, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/23, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to administratively
down Switch(config-if-range)#

%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to administratively down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to
down

%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to administratively down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7, changed state to
down

%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to administratively down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to down

%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to administratively down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/9, changed state to down

%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to administratively down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/10, changed state to down

Switch(config-if-range)#exit
Switch(config)#

En ALS1

Switch>enable

Switch#configure terminal

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

Switch(config)#interface range fa0/1-24
Switch(config-if-range)#shutdown

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/11, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/12, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/13, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/14, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/16, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/17, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/18, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/19, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/20, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/21, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/22, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/23, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to administratively
down Switch(config-if-range)#
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to administratively down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to
down

Switch(config-if-range)#exit
Switch(config)#

En ALS2

```
Switch>enable
```

```
Switch#configure terminal
```

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

```
Switch(config)#interface range fa0/1-24 Switch(config-if-range)#shutdown
```

```
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/11, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/12, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/13, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/14, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/16, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/17, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/18, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/19, changed state to administratively down
```

```
%LINK-5-CHANGED: Interface FastEthernet0/20, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/21, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/22, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/23, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to administratively
down Switch(config-if-range)#
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to
down

Switch(config-if-range)#exit
Switch(config)#
```

- b. Asignar un nombre a cada switch acorde al escenario establecido.

En DLS1.

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname DLS1
DLS1(config)#
```

En DLS2

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname DLS2
DLS2(config)#
```

En ALS1

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname ALS1
ALS1(config)#
```

En ALS2

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname ALS2
ALS2(config)#
```

- c. Configurar los puertos troncales y Port-channels tal como se muestra en el diagrama.

- 1) La conexión entre DLS1 y DLS2 será un EtherChannel capa-3 utilizando LACP. Para DLS1 se utilizará la dirección IP 10.12.12.1/30 y para DLS2 utilizará 10.12.12.2/30.

En DLS1.

```
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface fastethernet0/11
DLS1(config-if)#channel-group 1 mode active
DLS1(config-if)#no shutdown
```

```
%LINK-5-CHANGED: Interface FastEthernet0/11, changed state to down
DLS1(config-if)#description "Conexion Sw DLS2 Port Fa0/11"
DLS1(config-if)#exit
```

```
DLS1(config)#interface fastethernet0/12
DLS1(config-if)#channel-group 1 mode active
DLS1(config-if)#no shutdown
```

%LINK-5-CHANGED: Interface FastEthernet0/12, changed state to down

```
DLS1(config-if)#description "Conexion Sw DLS2 Port Fa0/12"
DLS1(config-if)#exit
```

Creating a port-channel interface Port-channel 1

```
DLS1(config)#interface port-channel 1 DLS1(config-if)#no
switchport DLS1(config-if)#ip address 10.12.12.1
255.255.255.252 DLS1(config-if)#description "Channel
Group 1 Ports 11-12" DLS1(config-if)#no shutdown
```

```
DLS1(config-if)#exit
```

En DLS2.

```
DLS2#configure terminal
```

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

```
DLS2(config)#interface fastethernet0/11 DLS2(config-
if)#channel-group 1 mode active DLS2(config-if)#no shutdown
```

```
DLS2(config-if)#description "Conexion Sw DLS1 Port Fa0/11"
DLS2(config-if)#exit
```

```
DLS2(config)#interface fastethernet0/12
DLS2(config-if)#channel-group 1 mode active
DLS2(config-if)#no shutdown
```

```
DLS2(config-if)#description "Conexion Sw DLS1 Port Fa0/12"
DLS2(config-if)#exit
```

```
DLS2(config)#interface port-channel 1 DLS2(config-if)#no
switchport DLS2(config-if)#ip address 10.12.12.2
255.255.255.252 DLS2(config-if)#description "Channel
Group 1 Ports 11-12" DLS2(config-if)#no shutdown
```

```
DLS2(config-if)#exit
```

Creating a port-channel interface Port-channel 1

%LINK-5-CHANGED: Interface FastEthernet0/11, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/11, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/12, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/12, changed state to up

%LINK-5-CHANGED: Interface Port-channel1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel1, changed state to up

2) Los Port-channels en las interfaces Fa0/7 y Fa0/8 utilizarán LACP.

En DLS1.

```
DLS1#configure terminal
```

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

```
DLS1(config)#interface fastethernet0/7
```

```
DLS1(config-if)#channel-group 2 mode active
```

```
DLS1(config-if)#no shutdown
```

```
%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to down
```

```
DLS1(config-if)#description "Conexion Sw ALS1 Port Fe0/7"
```

```
DLS1(config-if)#exit
```

```
DLS1(config)#interface fastethernet0/8
```

```
DLS1(config-if)#channel-group 2 mode active
```

```
DLS1(config-if)#no shutdown
```

```
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to down
```

```
DLS1(config-if)#description "Conexion Sw ALS1 Port Fe0/8"
```

```
DLS1(config-if)#exit
```

```
Creating a port-channel interface Port-channel 2
```

```
DLS1(config)#
```

En DLS2

DLS2#configure terminal

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

```
DLS2(config)#interface fastethernet0/7 DLS2(config-  
if)#channel-group 2 mode active DLS2(config-if)#no shutdown
```

%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to down

```
DLS2(config-if)#description "Conexion Sw ALS2 Port Fe0/7"
```

```
DLS2(config-if)#exit
```

```
DLS2(config)#interface fastethernet0/8
```

```
DLS2(config-if)#channel-group 2 mode active
```

```
DLS2(config-if)#no shutdown
```

%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to down

```
DLS2(config-if)#description "Conexion Sw ALS2 Port Fe0/8"
```

```
DLS2(config-if)#exit
```

```
Creating a port-channel interface Port-channel 2
```

```
DLS2(config)#
```

En ALS1

ALS1#configure terminal

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

```
ALS1(config)#interface fastethernet0/7 ALS1(config-  
if)#channel-group 2 mode active ALS1(config-if)#no shutdown
```

```
ALS1(config-if)#description "Conexion Sw DLS1 Port Fe0/7"
```

```
ALS1(config-if)#exit
```

```
ALS1(config)#interface fastethernet0/8
```

```
ALS1(config-if)#channel-group 2 mode active
```

```
ALS1(config-if)#no shutdown
```

```
ALS1(config-if)#description "Conexion Sw DLS1 Port Fe0/8"
```

```
ALS1(config-if)#exit
```

```
Creating a port-channel interface Port-channel 2
```

%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to up

%LINK-5-CHANGED: Interface Port-channel2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel2, changed state to up

ALS1(config)#

En ALS2

ALS2#configure terminal

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

ALS2(config)#interface fastethernet0/7

ALS2(config-if)#channel-group 2 mode active

ALS2(config-if)#no shutdown

ALS2(config-if)#description "Conexion Sw DLS2 Port Fe0/7"

ALS2(config-if)#exit

ALS2(config)#interface fastethernet0/8

ALS2(config-if)#channel-group 2 mode active

ALS2(config-if)#no shutdown

ALS2(config-if)#description "Conexion Sw DLS2 Port Fe0/8"

ALS2(config-if)#exit

Creating a port-channel interface Port-channel 2

%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to up

%LINK-5-CHANGED: Interface Port-channel2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel2, changed state to up

ALS2(config)#

3) Los Port-channels en las interfaces F0/9 y fa0/10 utilizará PAgP.

En DLS1.

DLS1#configure terminal

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

DLS1(config)#interface fastethernet0/9

DLS1(config-if)#channel-group 3 mode desirable

DLS1(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to down

DLS1(config-if)#description "Conexion Sw ALS2 Port Fe0/9"

DLS1(config-if)#exit

DLS1(config)#interface fastethernet0/10

DLS1(config-if)#channel-group 3 mode desirable

DLS1(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to down

DLS1(config-if)#description "Conexion Sw ALS2 Port Fe0/10"

DLS1(config-if)#exit

Creating a port-channel interface Port-channel 3

DLS1(config)#

En DLS2

DLS2#configure terminal

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

```
DLS2(config)#interface fastethernet0/9 DLS2(config-  
if)#channel-group 3 mode desirable DLS2(config-if)#no  
shutdown
```

%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to down

```
DLS2(config-if)#description "Conexion Sw ALS1 Port Fe0/9"
```

```
DLS2(config-if)#exit
```

```
DLS2(config)#interface fastethernet0/10
```

```
DLS2(config-if)#channel-group 3 mode desirable
```

```
DLS2(config-if)#no shutdown
```

%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to down

```
DLS2(config-if)#description "Conexion Sw ALS1 Port Fe0/10"
```

```
DLS2(config-if)#exit
```

```
Creating a port-channel interface Port-channel 3
```

```
DLS2(config)#
```

En ALS1

ALS1#configure terminal

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

```
ALS1(config)#interface fastethernet0/9 ALS1(config-  
if)#channel-group 3 mode desirable ALS1(config-if)#no  
shutdown
```

```
ALS1(config-if)#description "Conexion Sw DLS2 Port Fe0/9"
```

```
ALS1(config-if)#exit
```

```
ALS1(config)#interface fastethernet0/10
```

```
ALS1(config-if)#channel-group 3 mode desirable
```

```
ALS1(config-if)#no shutdown
```

```
ALS1(config-if)#description "Conexion Sw DLS2 Port Fe0/10"
```

```
ALS1(config-if)#exit
```

```
Creating a port-channel interface Port-channel 3
```

%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/9, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/10, changed state to up

%LINK-5-CHANGED: Interface Port-channel3, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel3, changed state to up

ALS1(config)#

En ALS2

ALS2#configure terminal

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

ALS2(config)#interface fastethernet0/9

ALS2(config-if)#channel-group 3 mode desirable

ALS2(config-if)#no shutdown

ALS2(config-if)#description "Conexion Sw DLS1 Port Fe0/9"

ALS2(config-if)#exit

ALS2(config)#interface fastethernet0/10

ALS2(config-if)#channel-group 3 mode desirable

ALS2(config-if)#no shutdown

ALS2(config-if)#description "Conexion Sw DLS1 Port Fe0/10"

ALS2(config-if)#exit

Creating a port-channel interface Port-channel 3

%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/9, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/10, changed state to up

%LINK-5-CHANGED: Interface Port-channel3, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel3, changed state to up

ALS2(config)#

- 4) Todos los puertos troncales serán asignados a la VLAN 800 como la VLAN nativa.

En DLS1.

```
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#vlan 800
DLS1(config-vlan)#name NATIVA
DLS1(config-vlan)#exit
DLS1(config)#interface range fastethernet0/7-12
DLS1(config-if-range)#switchport trunk native vlan 800
DLS1(config-if-range)#exit
DLS1(config)#
```

En DLS2.

```
DLS2(config)#vlan 800
DLS2(config-vlan)#name NATIVA
DLS2(config-vlan)#exit
DLS2(config)#interface range fastethernet0/7-12
DLS2(config-if-range)#switchport trunk native vlan 800
DLS2(config-if-range)#exit
DLS2(config)#
```

DLS2#

En ALS1.

```
ALS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#vlan 800
ALS1(config-vlan)#name NATIVA
ALS1(config-vlan)#exit
ALS1(config)#interface range fastethernet0/7-12
ALS1(config-if-range)#switchport trunk native vlan 800
ALS1(config-if-range)#exit
ALS1(config)#
```

En ALS2.

```
ALS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#vlan 800
ALS2(config-vlan)#name NATIVA
ALS2(config-vlan)#exit
ALS2(config)#interface range fastethernet0/7-12
ALS2(config-if-range)#switchport trunk native vlan 800
ALS2(config-if-range)#exit
ALS2(config)#
```

- a. Configurar DLS1, ALS1, y ALS2 para utilizar VTP versión 3

En DLS1.

```
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
```

```
DLS1(config)#vtp version 2
```

En ALS1.

```
ALS1#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
ALS1(config)#vtp version 2
```

En ALS2.

```
ALS2#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
ALS2(config)#vtp version 2  
ALS2(config)#
```

- 1) Utilizar el nombre de dominio UNAD con la contraseña cisco123

En DLS1.

```
DLS1(config)#vtp domain UNAD  
Changing VTP domain name from NULL to UNAD  
DLS1(config)#vtp password cisco123  
Setting device VLAN database password to cisco123  
DLS1(config)#
```

En ALS1.

```
ALS1(config)#vtp domain UNAD  
Changing VTP domain name from NULL to UNAD
```

```
ALS1(config)#vtp password cisco123
Setting device VLAN database password to cisco123
ALS1(config)#
```

En ALS2.

```
ALS2(config)#vtp domain UNAD
Changing VTP domain name from NULL to UNAD
ALS2(config)#vtp password cisco123
Setting device VLAN database password to cisco123
ALS2(config)#
```

2) Configurar DLS1 como servidor principal para las VLAN.

En DLS1.

```
DLS1(config)#vtp domain server
Changing VTP domain name from UNAD to server
DLS1(config)#00:32:11 %DTP-5-DOMAINMISMATCH: Unable to perform trunk
negotiation on port Po3 because of VTP domain mismatch.
```

```
DLS1(config)#
```

3) Configurar ALS1 y ALS2 como clientes VTP.

En ALS1.

```
ALS1(config)#vtp mode client
Setting device to VTP CLIENT mode.
ALS1(config)#
```

En ALS2.

```
ALS2(config)#vtp mode client
Setting device to VTP CLIENT mode.
ALS2(config)#
```

a. Configurar en el servidor principal las siguientes VLAN:

Tabla 1. Datos de VLAN para configuración.

Número de VLAN	Nombre de VLAN	Número de VLAN	Nombre de VLAN
800	NATIVA	434	ESTACIONAMIENTO
12	EJECUTIVOS	123	MANTENIMIENTO
234	HUESPEDES	1010	VOZ
1111	VIDEONET	3456	ADMINISTRACIÓN

En DLS1.

```
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#vlan 12
DLS1(config-vlan)#name EJECUTIVOS
DLS1(config-vlan)#vlan 234
DLS1(config-vlan)#name HUESPEDES
DLS1(config-vlan)#vlan 1111
VLAN_CREATE_FAIL: Failed to create VLANs 1111 : extended VLAN(s) not allowed
in current VTP mode
DLS1(config)#name VIDEONET
^
% Invalid input detected at '^' marker.
DLS1(config)#vlan 434 DLS1(config-vlan)#name
ESTACIONAMIENTO DLS1(config-vlan)#vlan
123 DLS1(config-vlan)#name
MANTENIMIENTO DLS1(config-vlan)#vlan
1010
```

VLAN_CREATE_FAIL: Failed to create VLANs 1010 : extended VLAN(s) not allowed in current VTP mode

```
DLS1(config)#name VOZ
```

```
^
```

% Invalid input detected at '^' marker. DLS1(config)#vlan 3456

VLAN_CREATE_FAIL: Failed to create VLANs 3456 : extended VLAN(s) not allowed in current VTP mode

```
DLS1(config)#name ADMINISTRACION
```

```
^
```

% Invalid input detected at '^' marker.

- b. En DLS1, suspender la VLAN 434.

En DLS1.

```
DLS1#configure terminal
```

```
DLS1(config)#vlan 434
```

```
DLS1(config-vlan)#state suspend
```

```
^
```

% Invalid input detected at '^' marker. DLS1(config-vlan)#exit

```
DLS1(config)#
```

- c. Configurar DLS2 en modo VTP transparente VTP utilizando VTP versión 2, y configurar en DLS2 las mismas VLAN que en DLS1.

En DLS2.

```
DLS2#configure terminal
```

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

```
DLS2(config)#vtp version 2
```

```
DLS2(config)#vtp mode transparent
```

Setting device to VTP TRANSPARENT mode.

```

DLS2(config)#vlan 12
DLS2(config-vlan)#name EJECUTIVOS
DLS2(config-vlan)#vlan 234
DLS2(config-vlan)#name HUESPEDES
DLS2(config-vlan)#vlan 1111
DLS2(config-vlan)#name VIDEONET
DLS2(config-vlan)#vlan 123
DLS2(config-vlan)#name MANTENIMIENTO
DLS2(config-vlan)#vlan 1010
DLS2(config-vlan)#name VOZ
DLS2(config-vlan)#vlan 3456
DLS2(config-vlan)#name ADMINISTRACION
DLS2(config-vlan)#vlan 434
DLS2(config-vlan)#name ESTACIONAMIENTO
DLS2(config-vlan)#exit
DLS2(config)#

```

- d. Suspender VLAN 434 en DLS2.

En DLS2.

```

DLS2(config)#
DLS2(config)#vlan 434
DLS2(config-vlan)#state suspend
^
% Invalid input detected at '^'
marker. DLS2(config-vlan)#exit
DLS2(config)#

```

- e. En DLS2, crear VLAN 567 con el nombre de CONTABILIDAD. La VLAN de CONTABILIDAD no podrá estar disponible en cualquier otro Switch de la red.

En DLS2.

```
DLS2(config)#
DLS2(config)#vlan 567
DLS2(config-vlan)#name CONTABILIDAD
DLS2(config-vlan)#exit
DLS2(config)#
```

- f. Configurar DLS1 como Spanning tree root para las VLAN 1, 12, 434, 800, 1010, 1111 y 3456 y como raíz secundaria para las VLAN 123 y 234.

En DLS1.

```
DLS1#
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#
DLS1(config)#spanning-tree vlan 1 root primary
DLS1(config)#spanning-tree vlan 12 root primary
DLS1(config)#spanning-tree vlan 434 root primary
DLS1(config)#spanning-tree vlan 800 root primary
DLS1(config)#spanning-tree vlan 1010 root primary
DLS1(config)#spanning-tree vlan 1111 root primary
DLS1(config)#spanning-tree vlan 3456 root primary
DLS1(config)#spanning-tree vlan 123 root secondary
DLS1(config)#spanning-tree vlan 234 root secondary
DLS1(config)#
```

- g. Configurar DLS2 como Spanning tree root para las VLAN 123 y 234 y como una raíz secundaria para las VLAN 12, 434, 800, 1010, 1111 y 3456.

En DLS2.

```
DLS2(config)#
DLS2(config)#spanning-tree vlan 123 root primary
DLS2(config)#spanning-tree vlan 234 root primary
```

```
DLS2(config)#spanning-tree vlan 12 root secondary
DLS2(config)#spanning-tree vlan 434 root secondary
DLS2(config)#spanning-tree vlan 800 root secondary
DLS2(config)#spanning-tree vlan 1010 root secondary
DLS2(config)#spanning-tree vlan 1111 root secondary
DLS2(config)#spanning-tree vlan 3456 root secondary
DLS2(config)#
```

- h. Configurar todos los puertos como troncales de tal forma que solamente las VLAN que se han creado se les permitirá circular a través de éstos puertos.

En DLS2.

```
DLS2(config)#
DLS2(config)#interface range fas
DLS2(config)#interface range fastEthernet 0/1-24
DLS2(config-if-range)#switchport mode trunk
Command rejected: An interface whose trunk encapsulation is "Auto" can not
be configured to "trunk" mode.
Command rejected: An interface whose trunk encapsulation is "Auto" can not
be configured to "trunk" mode.
Command rejected: An interface whose trunk encapsulation is "Auto" can not
be configured to "trunk" mode.
Command rejected: An interface whose trunk encapsulation is "Auto" can not
be configured to "trunk" mode.
Command rejected: An interface whose trunk encapsulation is "Auto" can not
be configured to "trunk" mode.
Command rejected: An interface whose trunk encapsulation is "Auto" can not
be configured to "trunk" mode.
Command rejected: An interface whose trunk encapsulation is "Auto" can not
be configured to "trunk" mode.
Command rejected: An interface whose trunk encapsulation is "Auto" can not
be configured to "trunk" mode.
Command rejected: An interface whose trunk encapsulation is "Auto" can not
be configured to "trunk" mode.
Command rejected: An interface whose trunk encapsulation is "Auto" can not
be configured to "trunk" mode.
Command rejected: An interface whose trunk encapsulation is "Auto" can not
be configured to "trunk" mode.
```

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.

DLS2(config-if-range)#exit

DLS2(config)#

- i. Configurar las siguientes interfaces como puertos de acceso, asignados a las VLAN de la siguiente manera:

Tabla 2. Datos para configurar interfaces.

Interfaz	DLS1	DLS2	ALS1	ALS2
Interfaz Fa0/6	3456	12 , 1010	123, 1010	234
Interfaz Fa0/15	1111	1111	1111	1111

**Interfaces F0 /16-
18**

567

En DLS1.

```
DLS1(config)#  
DLS1(config)#interface fastethernet0/6  
DLS1(config-if)#switchport mode access  
DLS1(config-if)#switchport access vlan 3456  
% Access VLAN does not exist. Creating vlan  
3456 DLS1(config-if)#no shutdown
```

```
DLS1(config-if)#interface fastethernet0/15  
DLS1(config-if)#switchport mode access  
DLS1(config-if)#switchport access vlan 1111  
% Access VLAN does not exist. Creating vlan  
1111 DLS1(config-if)#no shutdown
```

```
%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to down
```

```
DLS1(config-if)#exit
```

```
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up
```

En DLS2.

```
DLS2#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
DLS2(config)#  
DLS2(config)#interface fastethernet0/6  
DLS2(config-if)#switchport mode access  
DLS2(config-if)#switchport access vlan 12  
DLS2(config-if)#no shutdown
```

```
DLS2(config-if)#interface fastethernet0/15  
DLS2(config-if)#switchport mode access  
DLS2(config-if)#switchport access vlan 1111  
DLS2(config-if)#no shutdown
```

%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to down
DLS2(config-if)#interface range fastethernet0/16-18 DLS2(config-if-
range)#switchport mode access DLS2(config-if-range)#switchport access
vlan 567 DLS2(config-if-range)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/16, changed state to down

%LINK-5-CHANGED: Interface FastEthernet0/17, changed state to down

%LINK-5-CHANGED: Interface FastEthernet0/18, changed state to down
DLS2(config-if-range)#exit

%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to
up

En ALS1.

ALS1#configure terminal

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

ALS1(config)#interface fastethernet0/6

ALS1(config-if)#switchport mode access

ALS1(config-if)#switchport access vlan 123

ALS1(config-if)#no shutdown

ALS1(config-if)#interface fastethernet0/15

ALS1(config-if)#switchport mode access

ALS1(config-if)#switchport access vlan 1111

ALS1(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to down

ALS1(config-if)#exit

%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to
up

ALS1(config)#

En ALS2.

```
ALS2#configure terminal
```

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

```
ALS2(config)#interface fastethernet0/6
```

```
ALS2(config-if)#switchport mode access
```

```
ALS2(config-if)#switchport access vlan 234
```

```
ALS2(config-if)#no shutdown
```

```
ALS2(config-if)#interface fastethernet0/15
```

```
ALS2(config-if)#switchport mode access
```

```
ALS2(config-if)#switchport access vlan 1111
```

```
ALS2(config-if)#no shutdown
```

```
%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to down
```

```
ALS2(config-if)#exit
```

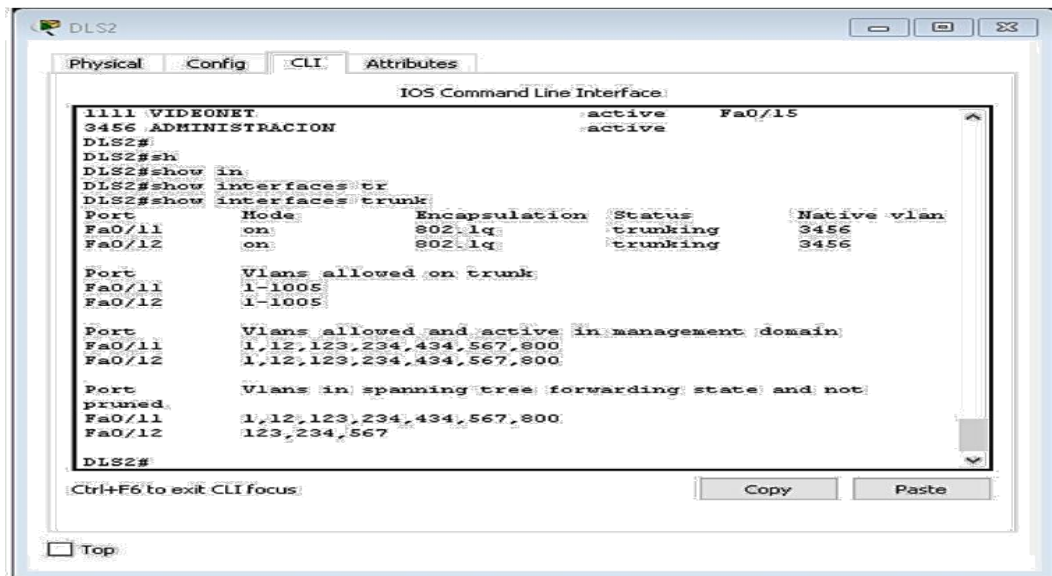
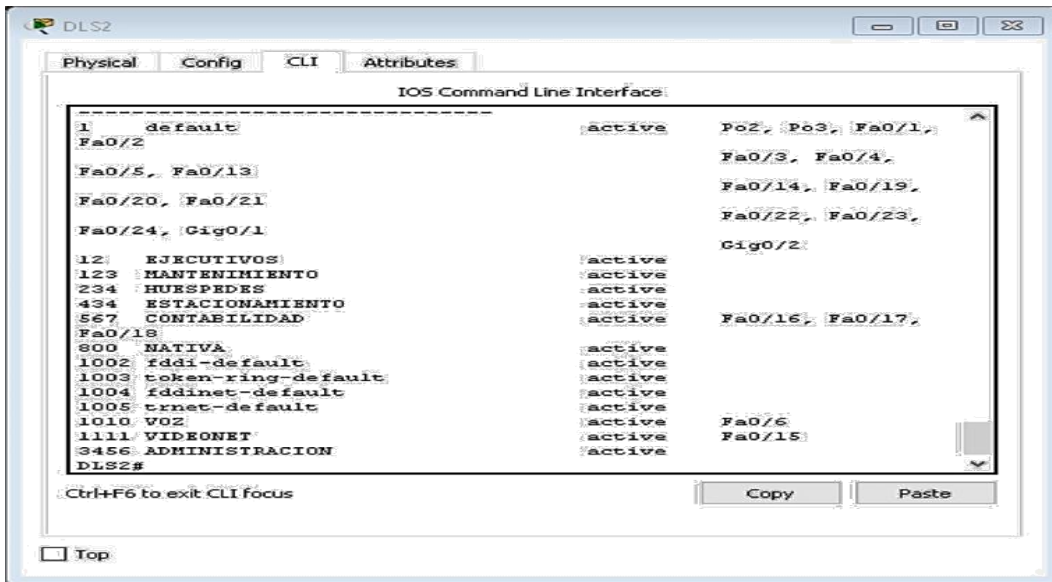
```
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up
```

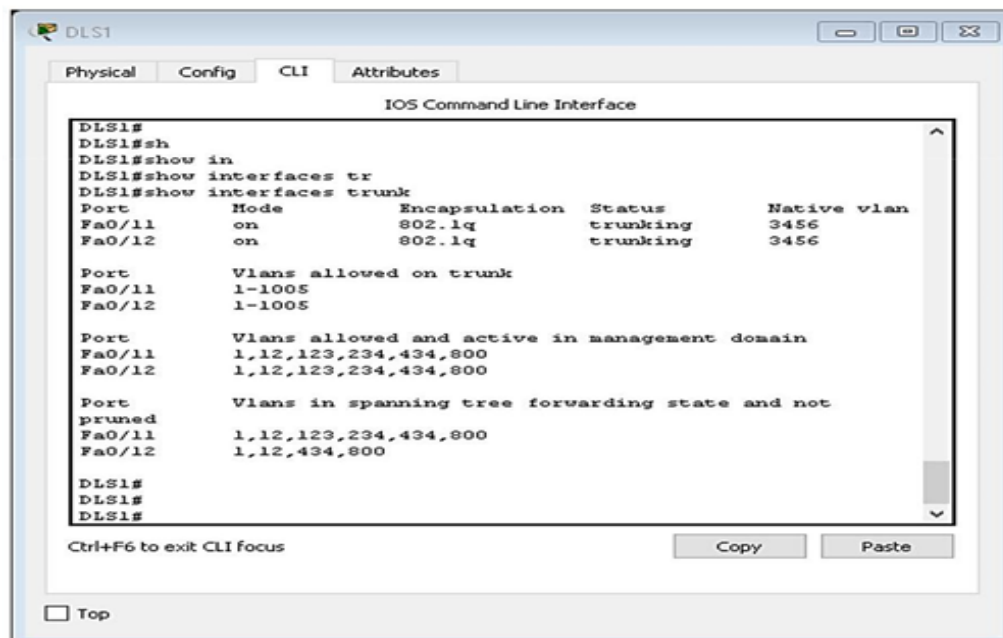
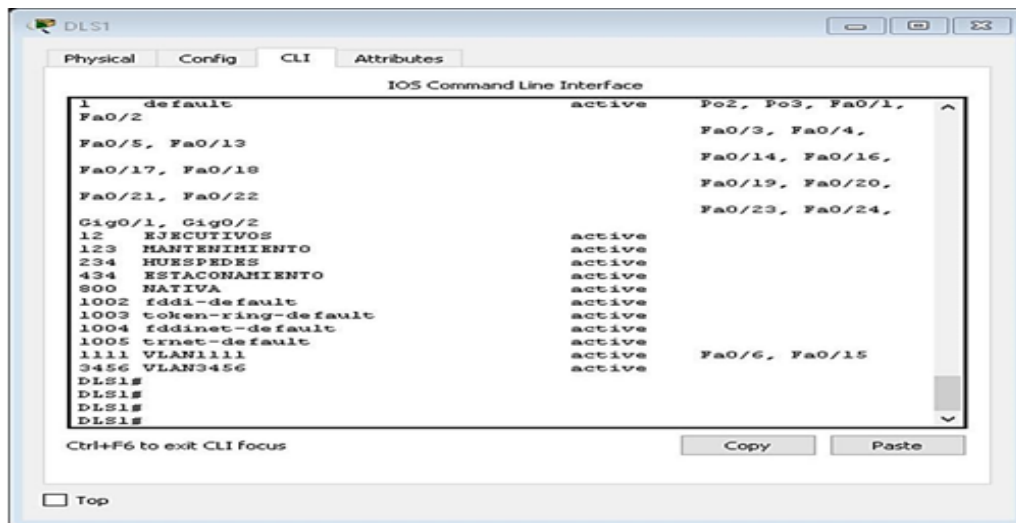
```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to up
```

```
ALS2(config)#
```

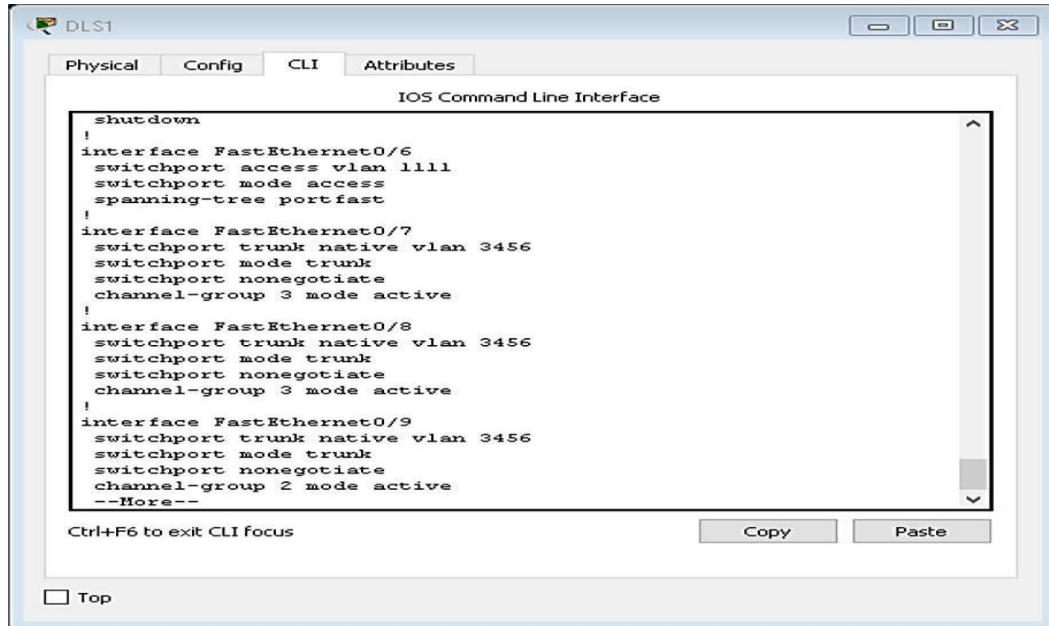
Parte 2: conectividad de red de prueba y las opciones configuradas.

- a. Verificar la existencia de las VLAN correctas en todos los switches y la asignación de puertos troncales y de acceso.

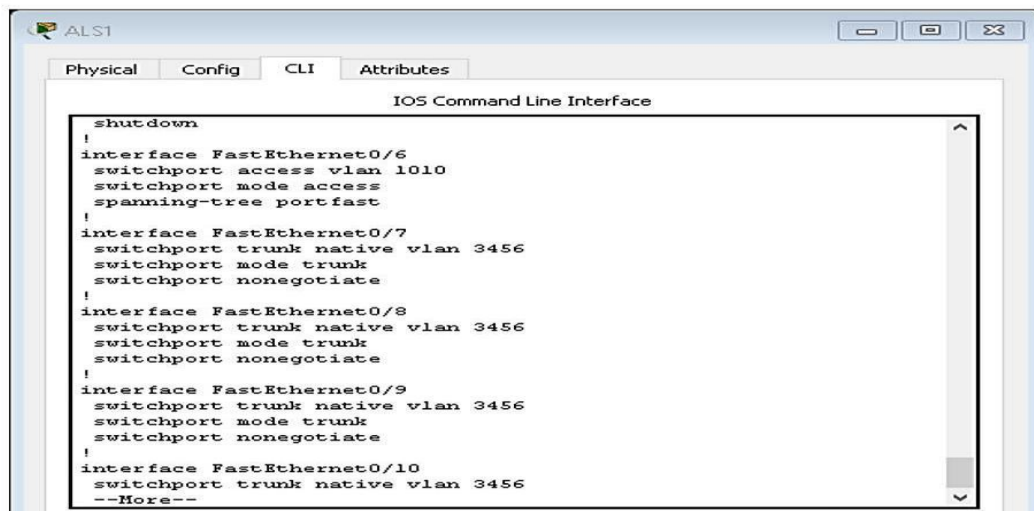




b. Verificar que el EtherChannel entre DLS1 y ALS1 está configurado correctamente

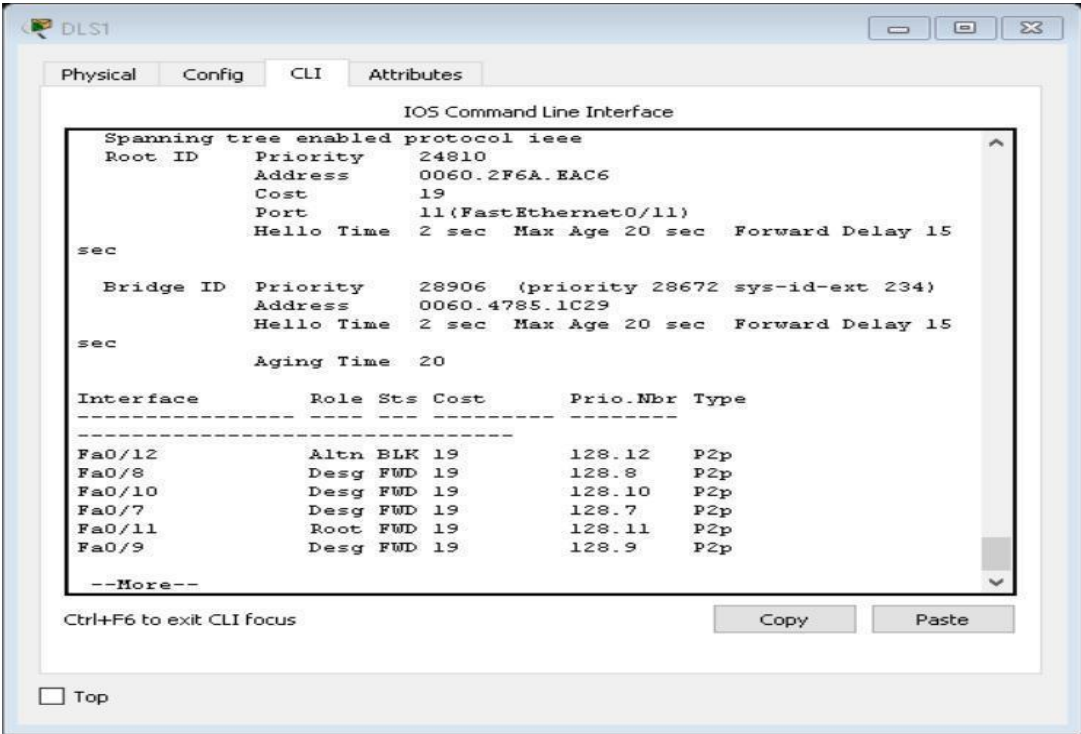


```
shut down
!
interface FastEthernet0/6
 switchport access vlan 1111
 switchport mode access
 spanning-tree portfast
!
interface FastEthernet0/7
 switchport trunk native vlan 3456
 switchport mode trunk
 switchport nonegotiate
 channel-group 3 mode active
!
interface FastEthernet0/8
 switchport trunk native vlan 3456
 switchport mode trunk
 switchport nonegotiate
 channel-group 3 mode active
!
interface FastEthernet0/9
 switchport trunk native vlan 3456
 switchport mode trunk
 switchport nonegotiate
 channel-group 2 mode active
--More--
```



```
shut down
!
interface FastEthernet0/6
 switchport access vlan 1010
 switchport mode access
 spanning-tree portfast
!
interface FastEthernet0/7
 switchport trunk native vlan 3456
 switchport mode trunk
 switchport nonegotiate
!
interface FastEthernet0/8
 switchport trunk native vlan 3456
 switchport mode trunk
 switchport nonegotiate
!
interface FastEthernet0/9
 switchport trunk native vlan 3456
 switchport mode trunk
 switchport nonegotiate
!
interface FastEthernet0/10
 switchport trunk native vlan 3456
--More--
```

c. Verificar la configuración de Spanning tree entre DLS1 o DLS2 para cada VLAN.



CONCLUSIONES

De acuerdo a lo indicado en la práctica se pudo observar y aprender cómo se configura una red a través de switching basado en protocolos avanzados de capa 2 pasando por capa 3 otorgando conectividad entre los host de la red.

Así mismo con el desarrollo de la actividad se pudieron adquirir las habilidades de gestión de redes orientadas hacia el mundo profesional y corporativo, además necesarios para planificar, implementar, asegurar, mantener y solucionar problemas de redes convergentes.

Se identificó problemas propios de conmutación y enrutamiento, esto mediante el uso adecuado de estrategias basadas en comandos del IOS y estadísticas de tráfico en las interfaces, soportado en modelos de arquitecturas de comunicación estratificadas por niveles, con el fin de resolver problemas de configuración, conectividad y enrutamiento.

REFERENCIAS BIBLIOGRÁFICAS.

Donohue, D. (2017). CISCO Press (Ed). CCNP Quick Reference. Recuperado de <https://1drv.ms/b/s!AgIGg5JUgUBthFt77ehzL5qp0OKD>

Froom, R., Frahim, E. (2015). CISCO Press (Ed). Campus Network Architecture. Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide CCNP SWITCH 300-115. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1IlnWR0hoMxgBNv1CJ>

Froom, R., Frahim, E. (2015). CISCO Press (Ed). Campus Network Security. Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide CCNP SWITCH 300-115. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1IlnWR0hoMxgBNv1CJ>

Froom, R., Frahim, E. (2015). CISCO Press (Ed). First Hop Redundancy Protocols. Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide CCNP SWITCH 300-115. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1IlnWR0hoMxgBNv1CJ>

Froom, R., Frahim, E. (2015). CISCO Press (Ed). High Availability. Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide CCNP SWITCH 300-115. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1IlnWR0hoMxgBNv1CJ>

Froom, R., Frahim, E. (2015). CISCO Press (Ed). InterVLAN Routing. Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide CCNP SWITCH 300-115. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1IlnWR0hoMxgBNv1CJ>

Froom, R., Frahim, E. (2015). CISCO Press (Ed). Network Design Fundamentals. Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide CCNP SWITCH 300-115. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1InWR0hoMxgBNv1CJ>

Froom, R., Frahim, E. (2015). CISCO Press (Ed). Network Management. Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide CCNP SWITCH 300-115. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1InWR0hoMxgBNv1CJ>

Froom, R., Frahim, E. (2015). CISCO Press (Ed). Spanning Tree Implementation. Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide CCNP SWITCH 300-115. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1InWR0hoMxgBNv1CJ>

Froom, R., Frahim, E. (2015). CISCO Press (Ed). Switch Fundamentals Review. Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide CCNP SWITCH 300-115. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1InWR0hoMxgBNv1CJ>

Froom, R., Frahim, E. (2015). CISCO Press (Ed). v. Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide CCNP SWITCH 300-115. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1InWR0hoMxgBNv1CJ>

Hucaby, D. (2015). CISCO Press (Ed). CCNP Routing and Switching SWITCH 300-115 Official Cert Guide. Recuperado de <https://1drv.ms/b/s!AqIGg5JUqUBthF16RWCSsCZnfDo2>

Macfarlane, J. (2014). Network Routing Basics : Understanding IP Routing in Cisco Systems. Recuperado de

<http://bibliotecavirtual.unad.edu.co:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=e000xww&AN=158227&lang=es&site=ehost-live>

Teare, D., Vachon B., Graziani, R. (2015). CISCO Press (Ed). Basic Network and Routing Concepts. Implementing Cisco IP Routing (ROUTE) Foundation Learning Guide CCNP ROUTE 300-101. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1InMfy2rhPZHwEoWx>

Teare, D., Vachon B., Graziani, R. (2015). CISCO Press (Ed). EIGRP Implementation. Implementing Cisco IP Routing (ROUTE) Foundation Learning Guide CCNP ROUTE 300-101. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1InMfy2rhPZHwEoWx>

Teare, D., Vachon B., Graziani, R. (2015). CISCO Press (Ed). Enterprise Internet Connectivity. Implementing Cisco IP Routing (ROUTE) Foundation Learning Guide CCNP ROUTE 300-101. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1InMfy2rhPZHwEoWx>

Teare, D., Vachon B., Graziani, R. (2015). CISCO Press (Ed). Implementing a Border Gateway Protocol (BGP). Implementing Cisco IP Routing (ROUTE) Foundation Learning Guide CCNP ROUTE 300-101. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1InMfy2rhPZHwEoWx>

Teare, D., Vachon B., Graziani, R. (2015). CISCO Press (Ed). Manipulating Routing Updates. Implementing Cisco IP Routing (ROUTE) Foundation Learning Guide CCNP ROUTE 300-101. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1InMfy2rhPZHwEoWx>

Teare, D., Vachon B., Graziani, R. (2015). CISCO Press (Ed). OSPF Implementation. Implementing Cisco IP Routing (ROUTE) Foundation Learning

Guide CCNP ROUTE 300-101. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1IlnMfy2rhPZHwEoWx>

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

Teare, D., Vachon B., Graziani, R. (2015). CISCO Press (Ed). Routers and Routing Protocol Hardening. Implementing Cisco IP Routing (ROUTE) Foundation Learning Guide CCNP ROUTE 300-101. Recuperado de <https://1drv.ms/b/s!AmIJYei-NT1IlnMfy2rhPZHwEoWx>

UNAD (2015). Introducción a la configuración de Switches y Routers [OVA]. Recuperado de <https://1drv.ms/u/s!AmIJYei-NT1IhgL9QChD1m9EuGqC>

UNAD (2015). Principios de Enrutamiento [OVA]. Recuperado de https://1drv.ms/u/s!AmIJYei-NT1IhgOyjWeh6timi_Tm

UNAD (2015). Switch CISCO - Procedimientos de instalación y configuración del IOS [OVA]. Recuperado de <https://1drv.ms/u/s!AmIJYei-NT1IlyYRohwtwPUV64dg>

UNAD (2015). Switch CISCO Security Management [OVA]. Recuperado de <https://1drv.ms/u/s!AmIJYei-NT1IlyVeVJCCezJ2QE5c>

Wallace, K. (2015). CISCO Press (Ed). CCNP Routing and Switching ROUTE 300-101 Official Cert Guide. Recuperado de <https://1drv.ms/b/s!AgIGg5JUqUBthFx8WOxiq6LPJppI>

Wallace, K. (2015). CISCO Press (Ed). CCNP Routing and Switching ROUTE
300-

101 Official Cert Guide. Recuperado de

<https://1drv.ms/b/s!AglGg5JUgUBthFx8WOxiq6LPJpp!>