Prueba de Habilidades Practicas CCNP

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Bogotá, junio 13 de 2018

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Trabajo de grado presentado como requisito para optar al título de Ingeniero de Telecomunicaciones

Director: Gerardo Granados Acuña
Magíster en Telemática

Universidad Nacional Abierta y a Distancia
Bogotá, junio 13 de 2018

Dedicatoria

Este trabajo de grado se lo dedico a Dios quien día a día me permite vivir y me da sabiduría para afrontar cada situación de la vida, a mi madre quien sin tener muchos recursos me formó con grandes valores que me permiten hoy en día conseguir cada una de mis metas.

También se la dedico a mi familia, quienes siempre me han acompañado y apoyado en todos los proyectos.

Agradecimientos

El desarrollo de este trabajo de grado a significado mucho esfuerzo por parte de quienes tenemos el compromiso y el requisito para optar por el título de Ingeniero.

Sin embargo, el resultado no hubiese sido posible sin contar con la colaboración de varias personas que apoyaron este proceso.

Primeramente, a Dios que me da la salud, la inteligencia, el valor para afrontar cada reto en mi vida, a mi esposa y mis hijos que sin importar el tiempo que tuve que sacrificar siempre estuvieron ahí dándome fuerzas para continuar, a la Universidad por el apoyo en la formación que estamos recibiendo que nos cualifica cada vez más para asumir los retos de una Institución con un alto grado de conocimiento.

A nuestro tutor el Ingeniero Gerardo Granados Acuña quien nos acompañó con diligencia y compromiso en este trabajo.

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1. Introducción

El presente trabajo sustenta de manera escrita y gráfica el proceso que se ha realizado para implementar cada uno de los temas vistos durante el desarrollo del curso CCNP de Cisco, en equipos Router y Switches. El caso propuesto para Routing fue desarrollado en la plataforma GNS3 2.1.4 y el caso para Switching fue desarrollado en la plataforma PacketTracert 7.1. En la guía estipulada se indicaba realizar algún caso de estudio en la plataforma Online Smartlab, pero al tratar de realizar cada una de las configuraciones necesarias, no se logra cumplir con cada uno de los objetivos, por lo cual se toma la decisión de no usarla, teniendo en cuenta que la idea es aprender al máximo la implementación de cada uno de los protocolos y parámetros que podemos configurar en cada uno de los equipos que podemos encontrar en un ambiente laboral.

A continuación, se relacionan los temas que se abordaran durante la resolución de cada caso de estudio de acuerdo al problema planteado:

Routing:

- Configuración de enlaces seriales.
- Configuración del protocolo OSPFv3 para IPV4 e IPV6.
- Áreas Stubby.
- Propagación de rutas por defecto.
- Configuración del protocolo EIGRP para IPV4 e IPV6.
- Redistribución de protocolos.
- Listas de distribución y ACL.

Switching:

- Configuración de puertos troncales y de Acceso.
- Configuración de interfaces Port-channel capa 2 y capa 3.
- Implementación de VTP para propagación de vlan.
- Creación de vlan.
- Implementación de STP (Spanning Tree Protocol).
- Configuración de SVI (Switch Virtual Interface) y enrutamiento entre vlan.
- Configuración de interfaces Loopback.
- Configuración de HSRP (Hot Standby Router Protocol).
- Configuración de un servidor DHCP.

2. Objetivos

2.1 Objetivo general

Dar solución a cada uno de los casos de estudio planteados indicando y aplicando los comandos necesarios para realizar cada una de las configuraciones requeridas de acuerdo a lo aprendido durante el desarrollo del curso.

2.2 Objetivos específicos

- Investigar y analizar cada uno de los temas requeridos para dar solución al problema planteado.
- Configurar cada uno de los equipos necesarios para la implementación de cada caso de estudio propuesto.
- Conocer y aplicar los comandos necesarios para establecer los parámetros que cada protocolo requiere para su funcionamiento.
- Realizar pruebas tanto de conectividad como de funcionalidad de cada uno de los equipos de la topología

3. Evaluación – prueba de habilidades practicas CCNP

Descripción de escenarios propuestos para la prueba de habilidades

3.1 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

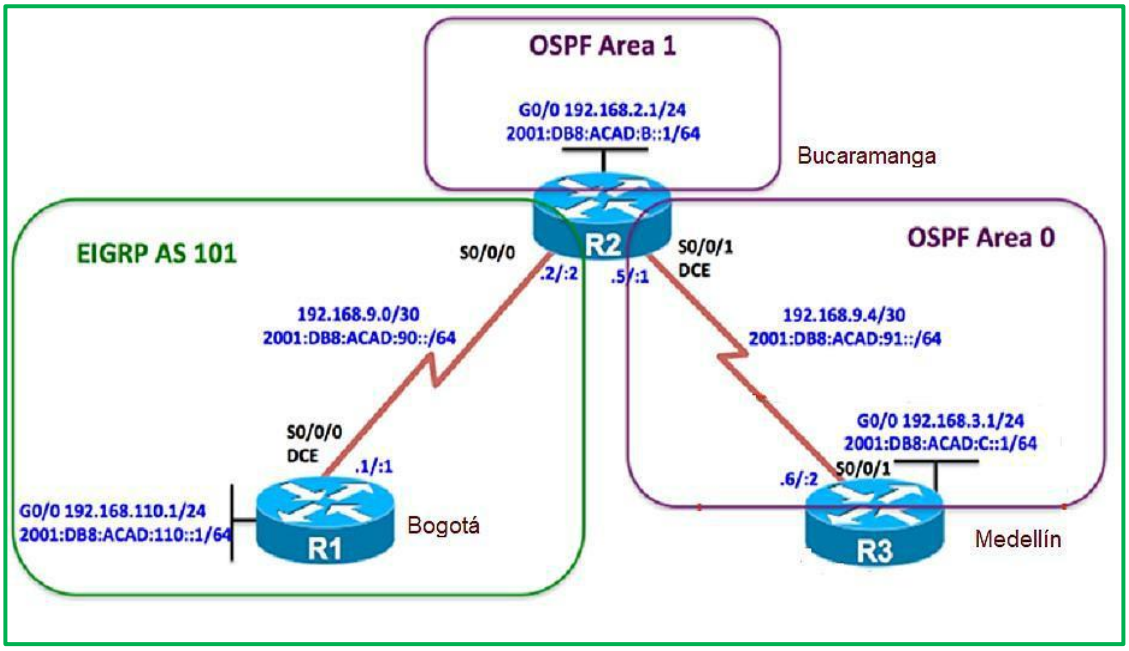


Ilustración 1: Topología Escenario 1

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.**
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.**

Para esto usamos los siguientes comandos en R1, R2 y en R3:

Router#
Router#configure terminal
Router(config)#hostname R1
R1(config)#ipv6 unicast-routing
R1(config)#interface FastEthernet0/0
R1(config-if)#ip address 192.168.110.1 255.255.255.0
R1(config-if)#ipv6 address 2001:db8:acad:110::1/64
R1(config-if)#no shutdown
R1(config-if)#
*May 22 23:07:08.471: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to down
R1(config-if)#interface serial1/0
R1(config-if)#ip address 192.168.9.1 255.255.255.0
R1(config-if)#ipv6 address 2001:db8:acad:90::1/64
R1(config-if)#clock rate 128000
R1(config-if)#bandwidth 128
R1(config-if)#no shutdown
R1(config-if)#
*May 22 23:07:37.859: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
R1(config-if)#
*May 22 23:07:38.871: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
R1(config-if)#
*May 22 23:08:02.067: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to down
R1(config-if)#

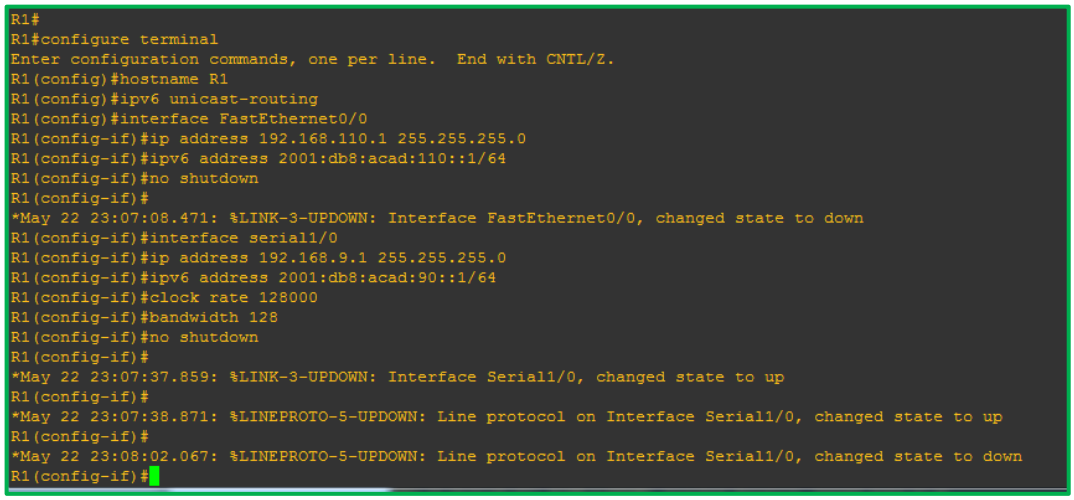


Ilustración 2: Configuración Interfaces R1

Configuración parámetros R2:

```
Router(config)#hostname R2
R2(config)#ipv6 unicast-routing
R2(config)#interface FastEthernet0/0
R2(config-if)#ip address 192.168.2.1 255.255.255.0
R2(config-if)#ipv6 address 2001:db8:acad:b::1/64
R2(config-if)#no shutdown
R2(config-if)#
*May 22 23:09:32.095: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to down
R2(config-if)#interface serial1/0
R2(config-if)#ip address 192.168.9.2 255.255.255.0
R2(config-if)#ipv6 address 2001:db8:acad:90::2/64
R2(config-if)#bandwidth 128
R2(config-if)#no shutdown
R2(config-if)#
*May 22 23:09:56.595: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
R2(config-if)#interface serial1/1
*May 22 23:09:57.607: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
R2(config-if)#interface serial1/1
R2(config-if)#ip address 192.168.9.5 255.255.255.0
R2(config-if)#ipv6 address 2001:db8:acad:91::1/64
R2(config-if)#clock rate 128000
R2(config-if)#bandwidth 128
R2(config-if)#no shutdown
R2(config-if)#
*May 22 23:10:28.303: %LINK-3-UPDOWN: Interface Serial1/1, changed state to up
R2(config-if)#
*May 22 23:10:29.315: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/1, changed state to up
R2(config-if)#
*May 22 23:10:52.135: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/1, changed state to down
R2(config-if)#
```

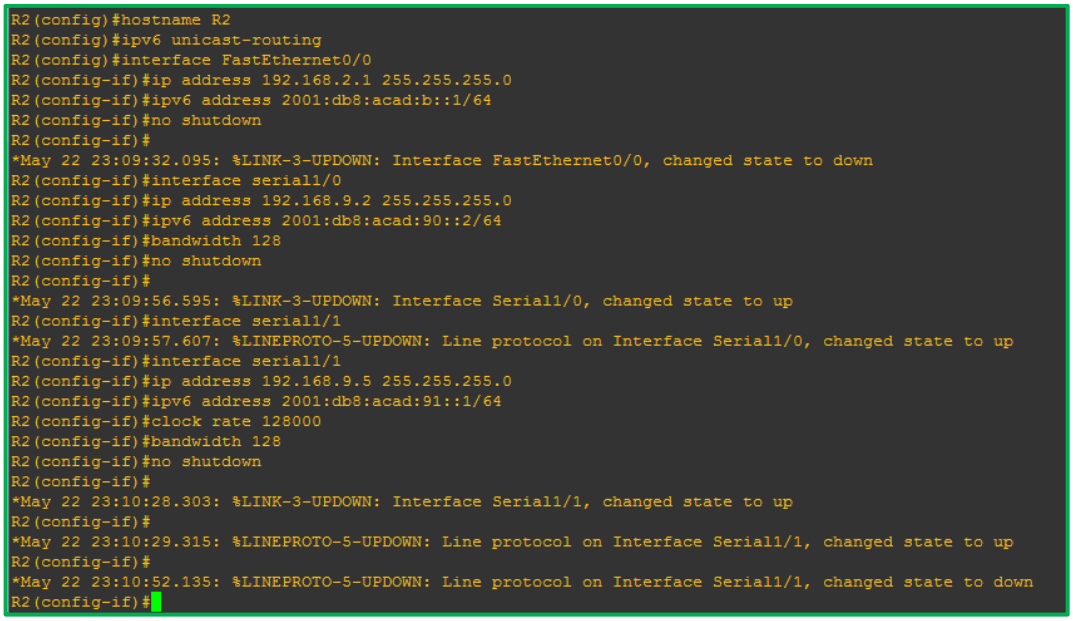


Ilustración 3: Configuración Interfaces R2

Configuración parámetros R3

Router#configure terminal
Router(config)#hostname R3
R3(config)#ipv6 unicast-routing
R3(config)#interface FastEthernet0/0
R3(config-if)#ip address 192.168.3.1 255.255.255.0
R3(config-if)#ipv6 address 2001:db8:acad:c::1/64
R3(config-if)#no shutdown
R3(config-if)#
*May 22 23:12:16.963: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to down
R3(config-if)#interface serial1/0
R3(config-if)#ip address 192.168.9.6 255.255.255.0
R3(config-if)#ipv6 address 2001:db8:acad:91::2/64
R3(config-if)#bandwidth 128
R3(config-if)#no shutdown
R3(config-if)#
*May 22 23:12:55.587: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
R3(config-if)#
*May 22 23:12:56.599: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
R3(config-if)#

```
R3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#hostname R3
R3(config)#ipv6 unicast-routing
R3(config)#interface FastEthernet0/0
R3(config-if)#ip address 192.168.3.1 255.255.255.0
R3(config-if)#ipv6 address 2001:db8:acad:c::1/64
R3(config-if)#no shutdown
R3(config-if)#
*May 22 23:12:16.963: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to down
R3(config-if)#interface serial1/0
R3(config-if)#ip address 192.168.9.6 255.255.255.0
R3(config-if)#ipv6 address 2001:db8:acad:91::2/64
R3(config-if)#bandwidth 128
R3(config-if)#no shutdown
R3(config-if)#
*May 22 23:12:55.587: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
R3(config-if)#
*May 22 23:12:56.599: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
R3(config-if)#
```

Ilustración 4: Configuración Interfaces R3

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.**

Procedemos a configurar el protocolo aplicando los siguientes comandos:

R2(config-if)#router ospfv3 1
R2(config-router)#address-family ipv4 unicast
R2(config-router-af)#router-id 2.2.2.2
R2(config-router-af)#exit-address-family
R2(config-router)#address-family ipv6 unicast
R2(config-router-af)#router-id 2.2.2.2
R2(config-router-af)#exit-address-family
R2(config-router)#

```
R2(config-if)#router ospfv3 1
R2(config-router)#address-family ipv4 unicast
R2(config-router-af)#router-id 2.2.2.2
R2(config-router-af)#exit-address-family
R2(config-router)#address-family ipv6 unicast
R2(config-router-af)#router-id 2.2.2.2
R2(config-router-af)#exit-address-family
R2(config-router)#
```

Ilustración 5: Configuración OSPFV3 R2

R3(config-if)#router ospfv3 1
R3(config-router)#address-family ipv4 unicast
R3(config-router-af)#router-id 3.3.3.3
R3(config-router-af)#passive-interface FastEthernet0/0
R3(config-router-af)#exit-address-family
R3(config-router)#address-family ipv6 unicast
R3(config-router-af)#router-id 3.3.3.3
R3(config-router-af)#passive-interface FastEthernet0/0

R3(config-router-af)#exit-address-family
R3(config-router)#

```
R3#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#router ospfv3 1
R3(config-router)#address-family ipv4 unicast
R3(config-router-af)#router-id 3.3.3.3
R3(config-router-af)#passive-interface FastEthernet0/0
R3(config-router-af)#exit-address-family
R3(config-router)#address-family ipv6 unicast
R3(config-router-af)#router-id 3.3.3.3
R3(config-router-af)#passive-interface FastEthernet0/0
R3(config-router-af)#exit-address-family
R3(config-router)#exit
```

Ilustración 6: Configuración OSPFV3 R3

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.**

Configuramos OSPF en la interface indicada.

R2(config)#interface FastEthernet0/0
R2(config-if)#ospfv3 1 ipv4 area 1
R2(config-if)#ospfv3 1 ipv6 area 1
R2(config-if)#interface serial1/1
R2(config-if)#ospfv3 1 ipv4 area 0
R2(config-if)#ospfv3 1 ipv6 area 0
R2(config-if)#
*May 22 23:17:16.215: %OSPFv3-5-ADJCHG: Process 1, IPv4, Nbr 3.3.3.3 on Serial1/1 from LOADING to FULL, Loading Done
R2(config-if)#
*May 22 23:17:18.095: %OSPFv3-5-ADJCHG: Process 1, IPv6, Nbr 3.3.3.3 on Serial1/1 from LOADING to FULL, Loading Done
R2(config-if)#

```
R2(config)#interface FastEthernet0/0
R2(config-if)#ospfv3 1 ipv4 area 1
R2(config-if)#ospfv3 1 ipv6 area 1
R2(config-if)#interface serial1/1
R2(config-if)#ospfv3 1 ipv4 area 0
R2(config-if)#ospfv3 1 ipv6 area 0
R2(config-if)#
*May 22 23:17:16.215: %OSPFv3-5-ADJCHG: Process 1, IPv4, Nbr 3.3.3.3 on Serial1/1 from LOADING to FULL, Loadin
g Done
R2(config-if)#
*May 22 23:17:18.095: %OSPFv3-5-ADJCHG: Process 1, IPv6, Nbr 3.3.3.3 on Serial1/1 from LOADING to FULL, Loadin
g Done
R2(config-if)#
```

Ilustración 7: Configuración OSPF en las Interfaces en R2

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

```
R3(config)#interface FastEthernet0/0
R3(config-if)#ospfv3 1 ipv4 area 0
R3(config-if)#ospfv3 1 ipv6 area 0
R3(config-if)#interface serial1/0
R3(config-if)#ospfv3 1 ipv4 area 0
R3(config-if)#ospfv3 1 ipv6 area 0
*May 22 23:17:15.883: %OSPFv3-5-ADJCHG: Process 1, IPv4, Nbr 2.2.2.2
on Serial1/0 from LOADING to FULL, Loading Done
R3(config-if)#ospfv3 1 ipv6 area 0
R3(config-if)#
*May 22 23:17:17.755: %OSPFv3-5-ADJCHG: Process 1, IPv6, Nbr 2.2.2.2
on Serial1/0 from LOADING to FULL, Loading Done
R3(config-if)#
```

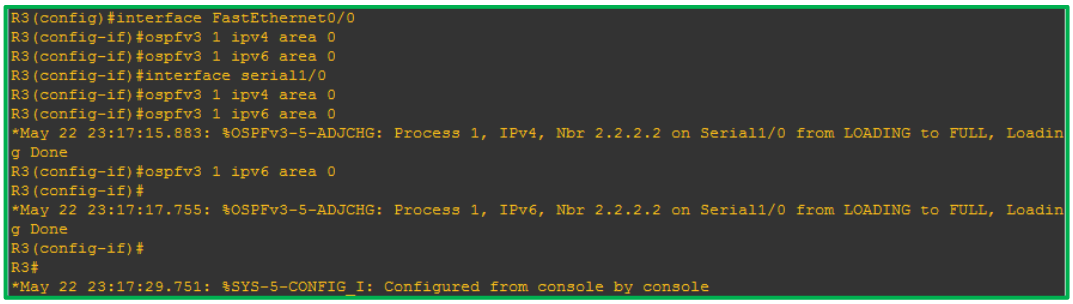


Ilustración 8: Configuración OSPF en las Interfaces en R3

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

Procedemos a configurar un área Stubby.

```
R2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#router ospfv3 1
R2(config-router)#address-family ipv4 unicast
R2(config-router-af)#area 1 stub no-summary
R2(config-router-af)#exit-address-family
R2(config-router)#address-family ipv6 unicast
R2(config-router-af)#area 1 stub no-summary
R2(config-router-af)#exit-address-family
R2(config-router)#
```

```
R2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#router ospfv3 1
R2(config-router)#address-family ipv4 unicast
R2(config-router-af)#area 1 stub no-summary
R2(config-router-af)#exit-address-family
R2(config-router)#address-family ipv6 unicast
R2(config-router-af)#area 1 stub no-summary
R2(config-router-af)#exit-address-family
R2(config-router)#
```

Ilustración 9: Configuración área 1 como totalmente Stubby en R2

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.

```
R3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#router ospfv3 1
R3(config-router)#address-family ipv4 unicast
R3(config-router-af)#default-information originate always
R3(config-router-af)#exit-address-family
R3(config-router)#address-family ipv6 unicast
R3(config-router-af)#default-information originate always
R3(config-router-af)#exit-address-family
R3(config-router)#
```

```
R3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#router ospfv3 1
R3(config-router)#address-family ipv4 unicast
R3(config-router-af)#default-information originate always
R3(config-router-af)#exit-address-family
R3(config-router)#address-family ipv6 unicast
R3(config-router-af)#default-information originate always
R3(config-router-af)#exit-address-family
R3(config-router)#
```

Ilustración 10: Propagación rutas por defecto de IPv4 y IPv6 en R3

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.

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

Procedemos a configurar el protocolo EIGRP, para eso usamos los siguientes comandos:

```
R1#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#router eigrp DUAL-STACK
R1(config-router)#address-family ipv4 unicast autonomous-system 4
R1(config-router-af)#af-interface FastEthernet0/0
R1(config-router-af-interface)#passive-interface
R1(config-router-af-interface)#exit-af-interface
R1(config-router-af)#topology base
R1(config-router-af-topology)#exit-af-topology
R1(config-router-af)#network 192.168.9.0 0.0.0.3
R1(config-router-af)#network 192.168.110.0 0.0.0.3
R1(config-router-af)#eigrp router-id 1.1.1.1
R1(config-router-af)#exit-address-family
R1(config-router)#address-family ipv6 unicast autonomous-system 6
R1(config-router-af)#af-interface FastEthernet0/0
R1(config-router-af-interface)#passive-interface
R1(config-router-af-interface)#exit-af-interface
R1(config-router-af)#topology base
R1(config-router-af-topology)#exit-af-topology
R1(config-router-af)#eigrp router-id 1.1.1.1
R1(config-router-af)#exit-address-family
```

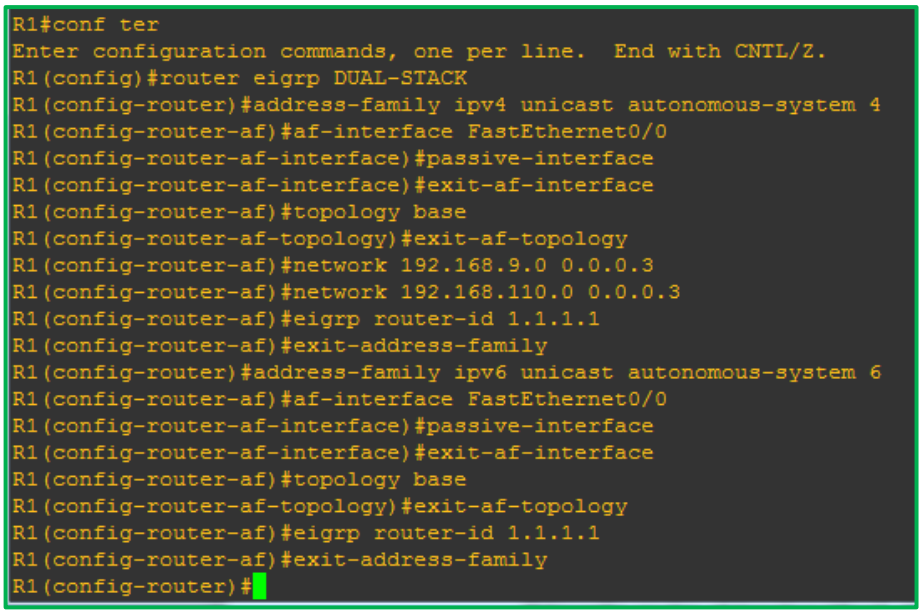


Ilustración 11: Configuración interfaces pasivas para EIGRP en R1

```
R2(config)#router eigrp DUAL-STACK
R2(config-router)#address-family ipv4 unicast autonomous-system 4
R2(config-router-af)#network 192.168.9.0 0.0.0.3
```

R2(config-router-af)#
*May 22 23:43:35.639: %DUAL-5-NBRCHANGE: EIGRP-IPv4 4: Neighbor 192.168.9.1 (Serial1/0) is up: new adjacency
R2(config-router-af)#eigrp router-id 2.2.2.2
R2(config-router-af)#exit-address-family
*May 22 23:44:07.087: %DUAL-5-NBRCHANGE: EIGRP-IPv4 4: Neighbor 192.168.9.1 (Serial1/0) is down: route configuration changed
*May 22 23:44:08.043: %DUAL-5-NBRCHANGE: EIGRP-IPv4 4: Neighbor 192.168.9.1 (Serial1/0) is up: new adjacency
R2(config-router-af)#exit-address-family
R2(config-router)#address-family ipv6 unicast autonomous-system 6
R2(config-router-af)#
*May 22 23:44:22.819: %DUAL-5-NBRCHANGE: EIGRP-IPv6 6: Neighbor FE80::C801:1DFF:FE84:0 (Serial1/0) is up: new adjacency
R2(config-router-af)#af-interface FastEthernet0/0
R2(config-router-af-interface)#shutdown
R2(config-router-af-interface)#exit-af-interface
R2(config-router-af)#af-interface serial1/0
R2(config-router-af-interface)#shutdown
R2(config-router-af-interface)#exit-af-interface
*May 22 23:45:16.807: %DUAL-5-NBRCHANGE: EIGRP-IPv6 6: Neighbor FE80::C801:1DFF:FE84:0 (Serial1/0) is down: interface down
R2(config-router-af-interface)#exit-af-interface
R2(config-router-af)#eigrp router-id 2.2.2.2
R2(config-router-af)#exit-address-family
R2(config-router)#

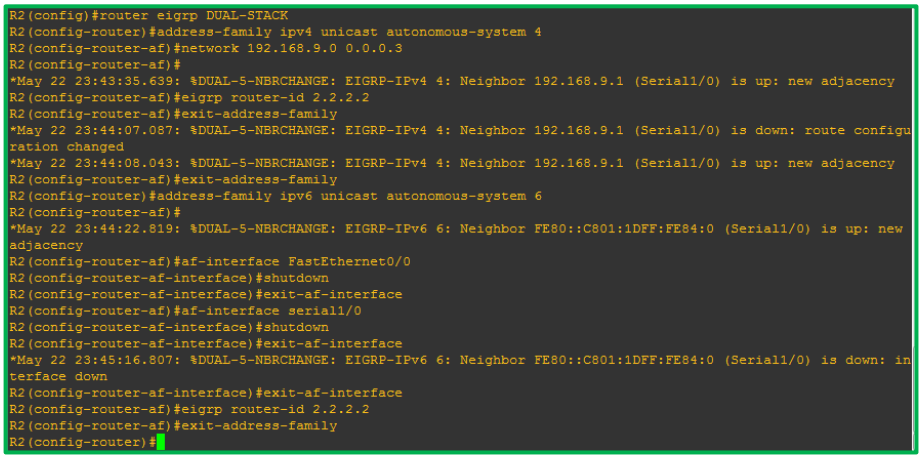


Ilustración 12: Configuración del protocolo EIGRP en R2

R2#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router eigrp DUAL-STACK
R2(config-router)#

R2(config-router)#address-family ipv4 unicast autonomous-system 4
R2(config-router-af)#topology base
R2(config-router-af-topology)#distribute-list R3-to-R1 out
R2(config-router-af-topology)#
*May 17 23:15:41.471: %DUAL-5-NBRCHANGE: EIGRP-IPv4 4: Neighbor 192.168.9.1 (Serial2/0) is resync: route configuration changed
R2(config-router-af-topology)#redistribute ospfv3 1 metric 10000 100 255 1 1500
R2(config-router-af-topology)#exit-af-topology
R2(config-router-af)#

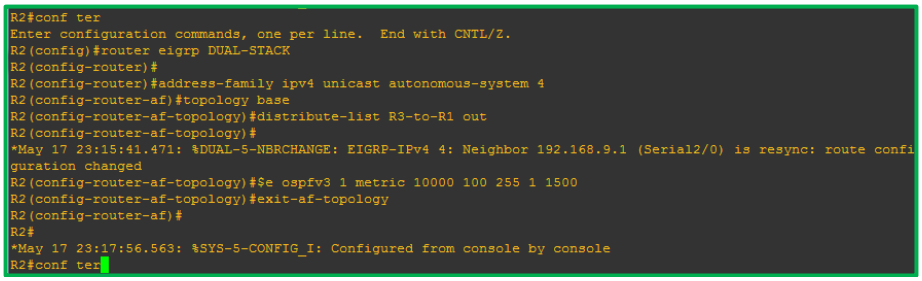


Ilustración 13: Configuración sistema autónomo R2

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

Realizamos redistribución en los protocolos OSPF y EIGRP.

R2#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router eigrp DUAL-STACK
R2(config-router)#address-family ipv4 unicast autonomous-system 4
R2(config-router-af)#topology base
R2(config)#distribute-list R3-to-R1 out
R2(config-router-af-topology)#redistribute ospfv3 1 metric 10000 100 255 1 1500
R2(config-router-af-topology)#exit-af-topology
R2(config-router)#address-family ipv6 unicast autonomous-system 6
R2(config-router-af)#topology base
R2(config-router-af-topology)#redistribute ospf 1 metric 10000 100 255 1 1500
R2(config-router-af-topology)#exit-af-topology
R2(config-router-af)#exit

```
R2#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#router eigrp DUAL-STACK
R2(config-router)#address-family ipv4 unicast autonomous-system 4
R2(config-router-af)#topology base
R2(config-router-af-topology)#distribute-list R3-to-R1 out
R2(config-router-af-topology)#$e ospfv3 1 metric 10000 100 255 1 1500
R2(config-router-af-topology)#
*May 23 00:00:34.663: %DUAL-5-NBRCHANGE: EIGRP-IPv4 4: Neighbor 192.168.9.1 (Serial1/0) is resync: route confi
guration changed
R2(config-router-af-topology)#exit-af-topology
R2(config-router-af)#address-family ipv6 unicast autonomous-system 6
R2(config-router-af)#topology base
```

```
R2(config-router-af-topology)#$e ospf 1 metric 10000 100 255 1 1500
R2(config-router-af-topology)#exit-af-topology
R2(config-router-af)#
```

Ilustración 14: Configuración Métricas y redistribución de Protocolo en R2

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

Configuramos la lista de acceso.

R2(config-router)#ip access-list standard R3-to-R1
R2(config-std-nacl)#remark ACL to filter 192.168.3.0/24
R2(config-std-nacl)#
*May 23 00:05:20.751: %DUAL-5-NBRCHANGE: EIGRP-IPv4 4: Neighbor 192.168.9.1 (Serial1/0) is resync: route configuration changed
R2(config-std-nacl)#deny 192.168.3.0 0.0.0.255
R2(config-std-nacl)#permit any
R2(config-std-nacl)#
*May 23 00:05:48.531: %DUAL-5-NBRCHANGE: EIGRP-IPv4 4: Neighbor 192.168.9.1 (Serial1/0) is resync: route configuration changed
R2(config-std-nacl)#

```
R2(config-router)#ip access-list standard R3-to-R1
R2(config-std-nacl)#remark ACL to filter 192.168.3.0/24
R2(config-std-nacl)#
*May 23 00:05:20.751: %DUAL-5-NBRCHANGE: EIGRP-IPv4 4: Neighbor 192.168.9.1 (Serial1/0) is resync: route confi
guration changed
R2(config-std-nacl)#deny 192.168.3.0 0.0.0.255
R2(config-std-nacl)#permit any
R2(config-std-nacl)#
```

Ilustración 15: Creación de ACL en R2

R2#conf term
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router ospfv3 1
R2(config-router)#address-family ipv4 unicast
R2(config-router-af)#redistribute eigrp 4
R2(config-router-af)#address-family ipv6 unicast
R2(config-router-af)#redistribute eigrp 6
R2(config-router-af)#exit-address-family
R2(config-router)#

```
R2#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#router ospfv3 1
R2(config-router)#address-family ipv4 unicast
R2(config-router-af)#redistribute eigrp 4
R2(config-router-af)#address-family ipv6 unicast
R2(config-router-af)#redistribute eigrp 6
R2(config-router-af)#exit-address-family
R2(config-router)#
```

Ilustración 16: Redistribución R2

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.

En las imágenes siguientes podemos observar las tablas de enrutamiento a nivel de IPV4 e IPV6.

```
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
       i - IS-IS, su - IS-IS summary, 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, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is 192.168.9.2 to network 0.0.0.0

D*EX  0.0.0.0/0 [170/50752000] via 192.168.9.2, 00:16:18, Serial1/0
      192.168.9.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.9.0/24 is directly connected, Serial1/0
L        192.168.9.1/32 is directly connected, Serial1/0
R1#
```

```
R1#show ipv6 route
IPv6 Routing Table - default - 3 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, HA - Home Agent, MR - Mobile Router, R - RIP
       H - NHRP, I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea
       IS - ISIS summary, D - EIGRP, EX - EIGRP external, NM - NEMO
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, l - LISP
C   2001:DB8:ACAD:90::/64 [0/0]
     via Serial1/0, directly connected
L   2001:DB8:ACAD:90::1/128 [0/0]
     via Serial1/0, receive
L   FF00::/8 [0/0]
     via Null0, receive
R1#
```

```
R1#show ip eigrp neighbors
EIGRP-IPv4 VR(DUAL-STACK) Address-Family Neighbors for AS(4)
H   Address                 Interface              Hold Uptime   SRTT   RTO  Q  Seq
                                                   (sec)         (ms)       Cnt Num
0   192.168.9.2             Se1/0                    13 00:36:08   16  1170  0  8
R1#
```

```
R1#show ipv6 eigrp neighbors
EIGRP-IPv6 VR(DUAL-STACK) Address-Family Neighbors for AS(6)
```

Ilustración 17: Tabla enrutamiento R1

```
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
       i - IS-IS, su - IS-IS summary, 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, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is 192.168.9.6 to network 0.0.0.0

O*E2  0.0.0.0/0 [110/1] via 192.168.9.6, 00:14:15, Serial1/1
      192.168.9.0/24 is variably subnetted, 3 subnets, 2 masks
C        192.168.9.0/24 is directly connected, Serial1/1
                        is directly connected, Serial1/0
L        192.168.9.2/32 is directly connected, Serial1/0
L        192.168.9.5/32 is directly connected, Serial1/1
R2#
```

```
R2#show ipv6 route
IPv6 Routing Table - default - 6 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, HA - Home Agent, MR - Mobile Router, R - RIP
       H - NHRP, I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea
       IS - ISIS summary, D - EIGRP, EX - EIGRP external, NM - NEMO
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, l - LISP
OE2 ::/0 [110/1], tag 1
     via FE80::C803:22FF:FE30:0, Serial1/1
C   2001:DB8:ACAD:90::/64 [0/0]
     via Serial1/0, directly connected
L   2001:DB8:ACAD:90::2/128 [0/0]
     via Serial1/0, receive
C   2001:DB8:ACAD:91::/64 [0/0]
     via Serial1/1, directly connected
L   2001:DB8:ACAD:91::1/128 [0/0]
     via Serial1/1, receive
L   FF00::/8 [0/0]
     via Null0, receive
R2#
```

```
R2#show ip eigrp neighbors
EIGRP-IPv4 VR(DUAL-STACK) Address-Family Neighbors for AS(4)
H   Address                 Interface              Hold Uptime   SRTT   RTO  Q  Seq
                                                   (sec)         (ms)       Cnt Num
0   192.168.9.1             Se1/0                    12 00:43:09   21  1170  0  8
R2#show ipv6 eigrp neighbors
EIGRP-IPv6 VR(DUAL-STACK) Address-Family Neighbors for AS(6)
R2#
```

Ilustración 18: Tabla enrutamiento R2

```
R2#show ipv6 ospf
 Routing Process "ospfv3 1" with ID 2.2.2.2
 Event-log enabled, Maximum number of events: 1000, Mode: cyclic
 It is an autonomous system boundary router
 Redistributing External Routes from,
    eigrp 6
 Router is not originating router-LSAs with maximum metric
 Initial SPF schedule delay 5000 msecs
 Minimum hold time between two consecutive SPFs 10000 msecs
 Maximum wait time between two consecutive SPFs 10000 msecs
 Minimum LSA interval 5 secs
 Minimum LSA arrival 1000 msecs
 LSA group pacing timer 240 secs
 Interface flood pacing timer 33 msecs
 Retransmission pacing timer 66 msecs
 Number of external LSA 1. Checksum Sum 0x00788C
 Number of areas in this router is 2. 1 normal 1 stub 0 nssa
 Graceful restart helper support enabled
 Reference bandwidth unit is 100 mbps
 RFC1583 compatibility enabled
    Area BACKBONE(0)
        Number of interfaces in this area is 1
        SPF algorithm executed 5 times
        Number of LSA 6. Checksum Sum 0x034A51
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
        Flood list length 0
    Area 1
        Number of interfaces in this area is 1
        It is a stub area
        SPF algorithm executed 3 times
        Number of LSA 1. Checksum Sum 0x00A267
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
        Flood list length 0
```

```
R2#show ipv6 ospf database

            OSPFv3 Router with ID (2.2.2.2) (Process ID 1)

                Router Link States (Area 0)

ADV Router       Age         Seq#        Fragment ID  Link count  Bits
 2.2.2.2         1262        0x80000004  0            1           E
 3.3.3.3         1622        0x80000004  0            1           E

                Link (Type-8) Link States (Area 0)

ADV Router       Age         Seq#        Link ID    Interface
 2.2.2.2         718         0x80000003  5          Se1/1
 3.3.3.3         654         0x80000003  4          Se1/1

                Intra Area Prefix Link States (Area 0)

ADV Router       Age         Seq#        Link ID    Ref-lstype  Ref-LSID
 2.2.2.2         718         0x80000003  0          0x2001      0
 3.3.3.3         654         0x80000003  0          0x2001      0

                Router Link States (Area 1)

ADV Router       Age         Seq#        Fragment ID  Link count  Bits
 2.2.2.2         718         0x80000003  0            0           None

                Type-5 AS External Link States

ADV Router       Age         Seq#        Prefix
 3.3.3.3         1622        0x80000002  ::/0
```

Ilustración 19: Tabla enrutamiento IPV6 R2

```
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
       i - IS-IS, su - IS-IS summary, 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, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

      192.168.9.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.9.0/24 is directly connected, Serial1/0
L        192.168.9.6/32 is directly connected, Serial1/0
```

```
R3#show ipv6 route
IPv6 Routing Table - default - 3 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, HA - Home Agent, MR - Mobile Router, R - RIP
       H - NHRP, I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea
       IS - ISIS summary, D - EIGRP, EX - EIGRP external, NM - NEMO
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, l - LISP
C   2001:DB8:ACAD:91::/64 [0/0]
     via Serial1/0, directly connected
L   2001:DB8:ACAD:91::2/128 [0/0]
     via Serial1/0, receive
L   FF00::/8 [0/0]
     via Null0, receive
```

```
R3#show ipv6 ospf
 Routing Process "ospfv3 1" with ID 3.3.3.3
 Event-log enabled, Maximum number of events: 1000, Mode: cyclic
 It is an autonomous system boundary router
 Originate Default Route with always
 Router is not originating router-LSAs with maximum metric
 Initial SPF schedule delay 5000 msecs
 Minimum hold time between two consecutive SPFs 10000 msecs
 Maximum wait time between two consecutive SPFs 10000 msecs
 Minimum LSA interval 5 secs
 Minimum LSA arrival 1000 msecs
 LSA group pacing timer 240 secs
 Interface flood pacing timer 33 msecs
 Retransmission pacing timer 66 msecs
 Number of external LSA 1. Checksum Sum 0x00788C
 Number of areas in this router is 1. 1 normal 0 stub 0 nssa
 Graceful restart helper support enabled
 Reference bandwidth unit is 100 mbps
 RFC1583 compatibility enabled
    Area BACKBONE(0)
        Number of interfaces in this area is 2
        SPF algorithm executed 4 times
        Number of LSA 6. Checksum Sum 0x034A51
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
        Flood list length 0
```

```
R3#show ipv6 ospf database

            OSPFv3 Router with ID (3.3.3.3) (Process ID 1)

                Router Link States (Area 0)

ADV Router       Age         Seq#        Fragment ID  Link count  Bits
 2.2.2.2         1217        0x80000004  0            1           E
 3.3.3.3         1575        0x80000004  0            1           E

                Link (Type-8) Link States (Area 0)

ADV Router       Age         Seq#        Link ID    Interface
 2.2.2.2         673         0x80000003  5          Se1/0
 3.3.3.3         607         0x80000003  4          Se1/0

                Intra Area Prefix Link States (Area 0)

ADV Router       Age         Seq#        Link ID    Ref-lstype  Ref-LSID
 2.2.2.2         673         0x80000003  0          0x2001      0
 3.3.3.3         607         0x80000003  0          0x2001      0

                Type-5 AS External Link States

ADV Router       Age         Seq#        Prefix
 3.3.3.3         1575        0x80000002  ::/0
```

Ilustración 20: Tabla enrutamiento R3

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

Procedemos a realizar pruebas de ping en cada uno de los router.

```
R1#tclsh
R1(tcl)#foreach address {
+>(tcl)#192.168.110.1
+>(tcl)#192.168.9.1
+>(tcl)#192.168.9.2
+>(tcl)#192.168.2.1
+>(tcl)#192.168.9.5
+>(tcl)#192.168.9.6
+>(tcl)#192.168.3.1
+>(tcl)#} { ping $address }
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.110.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/8/8 ms
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 = 36/46/72 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 20/20/24 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.2.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 12/20/28 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.5, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.6, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
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)
R1(tcl)#
```

Ilustración 21: Prueba de ping IPV4 R1

```
R1(tcl)#foreach address {
+>(tcl)#2001:db8:acad:110::1
+>(tcl)#2001:db8:acad:90::1
+>(tcl)#2001:db8:acad:90::2
+>(tcl)#2001:db8:acad:b::1
+>(tcl)#2001:db8:acad:91::1
+>(tcl)#2001:db8:acad:91::2
+>(tcl)#2001:db8:acad:c::1
+>(tcl)#
+>(tcl)#} { ping $address }
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:110::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:90::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:90::2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 16/17/20 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:B::1, timeout is 2 seconds:

% No valid route for destination
Success rate is 0 percent (0/1)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:91::1, timeout is 2 seconds:

% No valid route for destination
Success rate is 0 percent (0/1)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:91::2, timeout is 2 seconds:

% No valid route for destination
Success rate is 0 percent (0/1)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:C::1, timeout is 2 seconds:

% No valid route for destination
Success rate is 0 percent (0/1)
R1(tcl)#
```

Ilustración 22: Prueba de ping IPV6 R1

```
R2(tcl)#tclsh
R2(tcl)#foreach address {
+>(tcl)#192.168.110.1
+>(tcl)#192.168.9.1
+>(tcl)#192.168.9.2
+>(tcl)#192.168.2.1
+>(tcl)#192.168.9.5
+>(tcl)#192.168.9.6
+>(tcl)#192.168.3.1
+>(tcl)#} { ping $address }
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.110.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 16/22/36 ms
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 = 8/14/24 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 20/24/36 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.2.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.5, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.6, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
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(tcl)#
```

Ilustración 23: Prueba de ping IPV4 R2

```
R3#tclsh
R3(tcl)#foreach address {
+>(tcl)#192.168.110.1
+>(tcl)#192.168.9.1
+>(tcl)#192.168.9.2
+>(tcl)#192.168.2.1
+>(tcl)#192.168.9.5
+>(tcl)#192.168.9.6
+>(tcl)#192.168.3.1
+>(tcl)#} { ping $address }
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.110.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.2, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.2.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.5, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.6, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.3.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/4/8 ms
R3(tcl)#foreach address {
```

Ilustración 24: Prueba de ping IPV4 R3

```
+>(tcl)#2001:db8:acad:90::1
+>(tcl)#2001:db8:acad:90::2
+>(tcl)#2001:db8:acad:b::1
+>(tcl)#2001:db8:acad:91::1
+>(tcl)#2001:db8:acad:91::2
+>(tcl)#2001:db8:acad:c::1
+>(tcl)#
+>(tcl)#} { ping $address }
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:110::1, timeout is 2 seconds:

% No valid route for destination
Success rate is 0 percent (0/1)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:90::1, timeout is 2 seconds:

% No valid route for destination
Success rate is 0 percent (0/1)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:90::2, timeout is 2 seconds:

% No valid route for destination
Success rate is 0 percent (0/1)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:B::1, timeout is 2 seconds:

% No valid route for destination
Success rate is 0 percent (0/1)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:91::1, timeout is 2 seconds:

% No valid route for destination
Success rate is 0 percent (0/1)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:91::2, timeout is 2 seconds:

% No valid route for destination
Success rate is 0 percent (0/1)
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:C::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
R3(tcl)#
```

Ilustración 25: Prueba de ping IPV6 R3

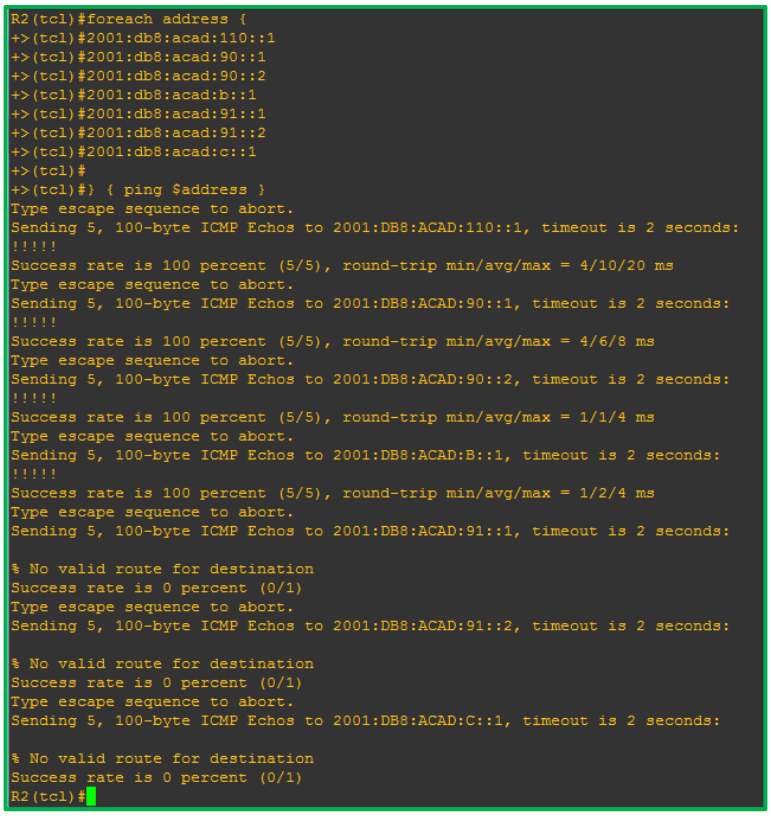


Ilustración 26: Prueba de ping IPV6 R2

Algunas ip´s no responden a ping, esto se debe a la configuración realizada, ya que se configuraron algunas listas de acceso que restringen la comunicación.

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

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.

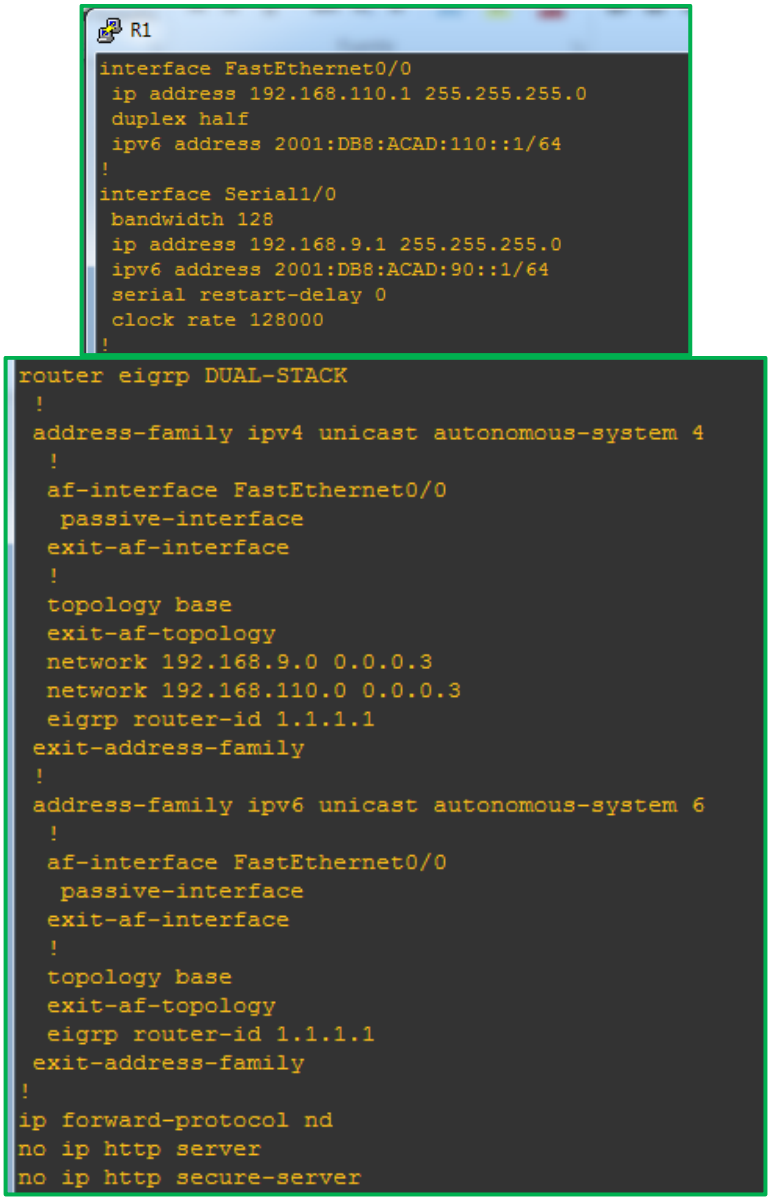


Ilustración 27: Configuración Interfaces y Protocolo en R1

R2#show runn
Building configuration...

Ilustración 28: Configuración Interfaces y Protocolo en R2

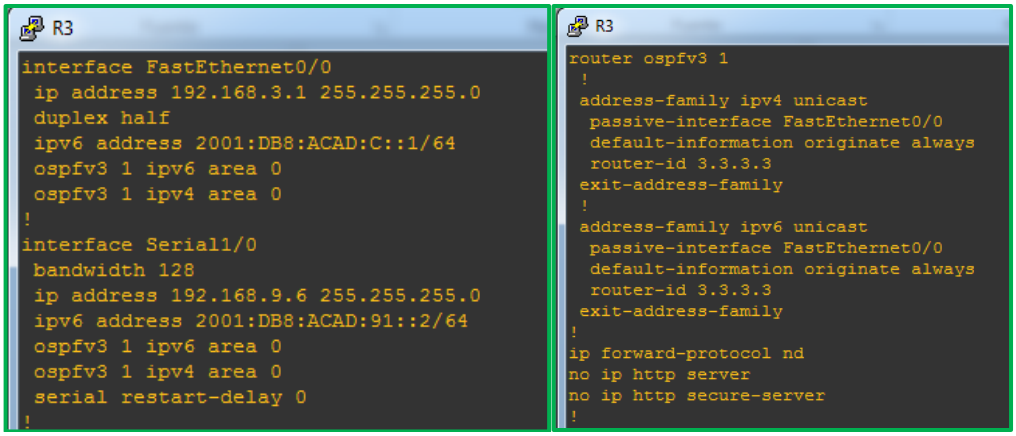


Ilustración 29: Configuración Interfaces y Protocolo en R3

3.2 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, EtherChannel, VLANs y demás aspectos que forman parte del escenario propuesto.

Topología de red

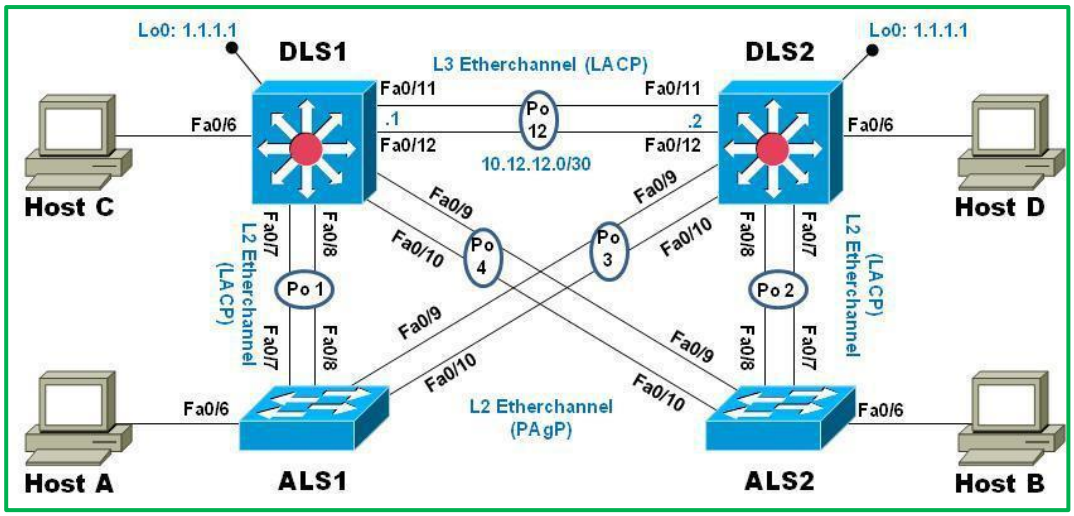


Ilustración 30: Topología Escenario 2

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

a. Apagar todas las interfaces en cada switch.

Para eso ingresamos a cada interface y ejecutamos el comando Shutdown

```
DLS1(config)#interface Fa0/0
DLS1(config-if)#shutdown
DLS1(config-if)#exit
DLS1(config)#
```

```
DLS1#sho ip int bri
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/1        unassigned      YES unset  administratively down down
FastEthernet0/2        unassigned      YES unset  administratively down down
FastEthernet0/3        unassigned      YES unset  administratively down down
FastEthernet0/4        unassigned      YES unset  administratively down down
FastEthernet0/5        unassigned      YES unset  administratively down down
FastEthernet0/6        unassigned      YES unset  administratively down down
FastEthernet0/7        unassigned      YES unset  administratively down down
FastEthernet0/8        unassigned      YES unset  administratively down down
FastEthernet0/9        unassigned      YES unset  administratively down down
FastEthernet0/10       unassigned      YES unset  administratively down down
FastEthernet0/11       unassigned      YES unset  administratively down down
FastEthernet0/12       unassigned      YES unset  administratively down down
FastEthernet0/13       unassigned      YES unset  administratively down down
FastEthernet0/14       unassigned      YES unset  administratively down down
FastEthernet0/15       unassigned      YES unset  administratively down down
FastEthernet0/16       unassigned      YES unset  administratively down down
FastEthernet0/17       unassigned      YES unset  administratively down down
FastEthernet0/18       unassigned      YES unset  administratively down down
FastEthernet0/19       unassigned      YES unset  administratively down down
FastEthernet0/20       unassigned      YES unset  administratively down down
FastEthernet0/21       unassigned      YES unset  administratively down down
FastEthernet0/22       unassigned      YES unset  administratively down down
FastEthernet0/23       unassigned      YES unset  administratively down down
FastEthernet0/24       unassigned      YES unset  administratively down down
GigabitEthernet0/1     unassigned      YES unset  administratively down down
GigabitEthernet0/2     unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
DLS1#
DLS1#
```

Ilustración 31: Verificación Interfaces en DLS1

```
DLS2#sh ip int bri
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/1        unassigned      YES unset  administratively down down
FastEthernet0/2        unassigned      YES unset  administratively down down
FastEthernet0/3        unassigned      YES unset  administratively down down
FastEthernet0/4        unassigned      YES unset  administratively down down
FastEthernet0/5        unassigned      YES unset  administratively down down
FastEthernet0/6        unassigned      YES unset  administratively down down
FastEthernet0/7        unassigned      YES unset  administratively down down
FastEthernet0/8        unassigned      YES unset  administratively down down
FastEthernet0/9        unassigned      YES unset  administratively down down
FastEthernet0/10       unassigned      YES unset  administratively down down
FastEthernet0/11       unassigned      YES unset  administratively down down
FastEthernet0/12       unassigned      YES unset  administratively down down
FastEthernet0/13       unassigned      YES unset  administratively down down
FastEthernet0/14       unassigned      YES unset  administratively down down
FastEthernet0/15       unassigned      YES unset  administratively down down
FastEthernet0/16       unassigned      YES unset  administratively down down
FastEthernet0/17       unassigned      YES unset  administratively down down
FastEthernet0/18       unassigned      YES unset  administratively down down
FastEthernet0/19       unassigned      YES unset  administratively down down
FastEthernet0/20       unassigned      YES unset  administratively down down
FastEthernet0/21       unassigned      YES unset  administratively down down
FastEthernet0/22       unassigned      YES unset  administratively down down
FastEthernet0/23       unassigned      YES unset  administratively down down
FastEthernet0/24       unassigned      YES unset  administratively down down
GigabitEthernet0/1     unassigned      YES unset  administratively down down
GigabitEthernet0/2     unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
DLS2#
```

Ilustración 32: Verificación Interfaces en DLS2

```
ALS1#sh ip int bri
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/1        unassigned      YES unset  administratively down down
FastEthernet0/2        unassigned      YES unset  administratively down down
FastEthernet0/3        unassigned      YES unset  administratively down down
FastEthernet0/4        unassigned      YES unset  administratively down down
FastEthernet0/5        unassigned      YES unset  administratively down down
FastEthernet0/6        unassigned      YES unset  administratively down down
FastEthernet0/7        unassigned      YES unset  administratively down down
FastEthernet0/8        unassigned      YES unset  administratively down down
FastEthernet0/9        unassigned      YES unset  administratively down down
FastEthernet0/10       unassigned      YES unset  administratively down down
FastEthernet0/11       unassigned      YES unset  administratively down down
FastEthernet0/12       unassigned      YES unset  administratively down down
FastEthernet0/13       unassigned      YES unset  administratively down down
FastEthernet0/14       unassigned      YES unset  administratively down down
FastEthernet0/15       unassigned      YES unset  administratively down down
FastEthernet0/16       unassigned      YES unset  administratively down down
FastEthernet0/17       unassigned      YES unset  administratively down down
FastEthernet0/18       unassigned      YES unset  administratively down down
FastEthernet0/19       unassigned      YES unset  administratively down down
FastEthernet0/20       unassigned      YES unset  administratively down down
FastEthernet0/21       unassigned      YES unset  administratively down down
FastEthernet0/22       unassigned      YES unset  administratively down down
FastEthernet0/23       unassigned      YES unset  administratively down down
FastEthernet0/24       unassigned      YES unset  administratively down down
GigabitEthernet0/1     unassigned      YES unset  administratively down down
GigabitEthernet0/2     unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
ALS1#
```

Ilustración 33: Verificación Interfaces en ALS1

```
ALS2#sh ip int bri
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/1        unassigned      YES unset  administratively down down
FastEthernet0/2        unassigned      YES unset  administratively down down
FastEthernet0/3        unassigned      YES unset  administratively down down
FastEthernet0/4        unassigned      YES unset  administratively down down
FastEthernet0/5        unassigned      YES unset  administratively down down
FastEthernet0/6        unassigned      YES unset  administratively down down
FastEthernet0/7        unassigned      YES unset  administratively down down
FastEthernet0/8        unassigned      YES unset  administratively down down
FastEthernet0/9        unassigned      YES unset  administratively down down
FastEthernet0/10       unassigned      YES unset  administratively down down
FastEthernet0/11       unassigned      YES unset  administratively down down
FastEthernet0/12       unassigned      YES unset  administratively down down
FastEthernet0/13       unassigned      YES unset  administratively down down
FastEthernet0/14       unassigned      YES unset  administratively down down
FastEthernet0/15       unassigned      YES unset  administratively down down
FastEthernet0/16       unassigned      YES unset  administratively down down
FastEthernet0/17       unassigned      YES unset  administratively down down
FastEthernet0/18       unassigned      YES unset  administratively down down
FastEthernet0/19       unassigned      YES unset  administratively down down
FastEthernet0/20       unassigned      YES unset  administratively down down
FastEthernet0/21       unassigned      YES unset  administratively down down
FastEthernet0/22       unassigned      YES unset  administratively down down
FastEthernet0/23       unassigned      YES unset  administratively down down
FastEthernet0/24       unassigned      YES unset  administratively down down
GigabitEthernet0/1     unassigned      YES unset  administratively down down
GigabitEthernet0/2     unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
ALS2#
```

Ilustración 34: Verificación Interfaces en ALS2

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

Con el siguiente comando cambiamos el nombre a cada uno de los switch.

IOU1(config)#
IOU1(config)#hostname DLS1

DLS1(config)#

```
switch#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
switch(config)#hostname DLS1
DLS1(config)#exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console

DLS1#
```

Ilustración 35: Cambiar nombre a los equipos.

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.

Creamos el port channel capa 3 y luego lo asignamos a las interfaces, esto lo debemos hacer en el Router DLS1 y DLS2.

DLS1(config)#inter port-channel 12
DLS1(config-if)#no switchport
DLS1(config-if)#ip address 10.12.12.1 255.255.255.252
DLS1(config-if)#exit
DLS1(config)#inter rang fa0/5-6
DLS1(config-if-range)#no switchport
DLS1(config-if-range)#channel-group 12 mode active

Para validar el estado del Etherchannel usamos el comando:
DLS1#show etherchannel summary

```
DLS1#sh etherchannel summary
Flags:  D - down        P - in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 1
Number of aggregators:           1

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------

12     Po12(RU)           LACP   Fa0/5(P) Fa0/6(P)
DLS1#ping 10.12.12.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.12.12.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/2/11 ms

DLS1#
```

Ilustración 36: Configuración de PortChannel en DLS1

```
DLS2#sh etherchannel summary
Flags:  D - down        P - in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 1
Number of aggregators:           1

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------

12     Po12(RU)           LACP   Fa0/5(P) Fa0/6(P)
DLS2#ping 10.12.12.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.12.12.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

DLS2#
```

Ilustración 37: Configuración de PortChannel en DLS2

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

Para etherchannel capa 2 LACP usamos los siguientes comandos:

DLS1(config)#int ran fa0/1-2
DLS1(config-if-range)# switchport trunk encapsulation dot1q
DLS1(config-if-range)# switchport mode trunk
DLS1(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1
DLS1(config-if-range)#no shutdown

```
DLS1#sh etherchannel summary
Flags:  D - down        P - in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 2
Number of aggregators:           2

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------

1      Po1(SU)           LACP   Fa0/1(P) Fa0/2(P)
12     Po12(RU)           LACP   Fa0/5(P) Fa0/6(P)
DLS1#
```

Ilustración 38: Configuración LACP en DLS1

ALS1(config)#int ran fa0/1-2
ALS1(config-if-range)# switchport trunk encapsulation dot1q
ALS1(config-if-range)# switchport mode trunk
ALS1(config-if-range)#channel-group 1 mode active

Creating a port-channel interface Port-channel 1
ALS1(config-if-range)#no shutdown

```
ALS1#show  etherchannel s
ALS1#show  etherchannel summary
Flags:  D - down        P - in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 1
Number of aggregators:           1

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------

1      Po1(SU)           LACP   Fa0/1(P) Fa0/2(P)
ALS1#
```

Ilustración 39: Configuración LACP en ALS1

DLS2(config)#int ran fa0/1-2
DLS2(config-if-range)# switchport trunk encapsulation dot1q
DLS2(config-if-range)# switchport mode trunk
DLS2(config-if-range)#channel-group 2 mode active
Creating a port-channel interface Port-channel 2
DLS2(config-if-range)#no shutdown

```
DLS2#sh etherchannel summary
Flags:  D - down        P - in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 2
Number of aggregators:           2

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------

2      Po2(SU)           LACP   Fa0/1(P) Fa0/2(P)
12     Po12(RU)           LACP   Fa0/5(P) Fa0/6(P)
DLS2#
```

Ilustración 40: Configuración LACP en DLS12

ALS2(config)#int ran fa0/1-2
ALS2(config-if-range)# switchport trunk encapsulation dot1q
ALS2(config-if-range)# switchport mode trunk
ALS2(config-if-range)#channel-group 2 mode active
Creating a port-channel interface Port-channel 2
ALS2(config-if-range)#no shutdown

```
ALS2#show etherchannel summary
Flags:  D - down        P - in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 1
Number of aggregators:           1

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------

2      Po2(SU)           LACP   Fa0/1(P) Fa0/2(P)
ALS2#
```

Ilustración 41: Configuración LACP en ALS2

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

Para etherchannel capa 2 PAgP usamos los siguientes comandos:

DLS1(config)#int ran e0/3-4
DLS1(config-if-range)# switchport trunk encapsulation dot1q
DLS1(config-if-range)# switchport mode trunk
DLS1(config-if-range)#channel-group 4 mode desirable
Creating a port-channel interface Port-channel 4
DLS1(config-if-range)#no shutdown

```
DLS1#sh etherchannel summary
Flags:  D - down        P - in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 3
Number of aggregators:           3

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------

1      Po1(SU)           LACP   Fa0/1(P) Fa0/2(P)
4      Po4(SU)           PAgP   Fa0/3(P) Fa0/4(P)
12     Po12(RU)           LACP   Fa0/5(P) Fa0/6(P)
DLS1#
```

Ilustración 42: Configuración PAgP en DLS1

ALS2(config)#int ran e0/3-4
ALS2(config-if-range)# switchport trunk encapsulation dot1q
ALS2(config-if-range)# switchport mode trunk
ALS2(config-if-range)#channel-group 4 mode desirable
Creating a port-channel interface Port-channel 4
ALS2(config-if-range)#no shutdown

```
ALS2#sh etherchannel summary
Flags:  D - down        P - in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 2
Number of aggregators:           2

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------

2      Po2(SU)           LACP   Fa0/1(P) Fa0/2(P)
4      Po4(SU)           PAgP   Fa0/3(P) Fa0/4(P)
ALS2#
```

Ilustración 43: Configuración PAgP en ALS2

DLS2(config)#int ran e0/3-4
DLS2(config-if-range)# switchport trunk encapsulation dot1q
DLS2(config-if-range)# switchport mode trunk
DLS2(config-if-range)#channel-group 3 mode desirable
Creating a port-channel interface Port-channel 3
DLS2(config-if-range)#no shutdown

```
DLS2#show etherchannel summary
Flags:  D - down        P - in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 3
Number of aggregators:           3

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------

2      Po2(SU)           LACP   Fa0/1(P) Fa0/2(P)
3      Po3(SU)           PAgP   Fa0/3(P) Fa0/4(P)
12     Po12(RU)           LACP   Fa0/5(P) Fa0/6(P)
DLS2#
```

Ilustración 44: Configuración PAgP en DLS2

ALS1(config)#int ran e0/3-4
ALS1(config-if-range)# switchport trunk encapsulation dot1q
ALS1(config-if-range)# switchport mode trunk
ALS1(config-if-range)#channel-group 3 mode desirable
Creating a port-channel interface Port-channel 3
ALS1(config-if-range)#no shutdown

```
ALS1#show  etherchannel summary
Flags:  D - down        P - in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 2
Number of aggregators:           2

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------

1      Po1(SU)           LACP   Fa0/1(P) Fa0/2(P)
3      Po3(SU)           PAgP   Fa0/3(P) Fa0/4(P)
ALS1#
```

Ilustración 45: Configuración PAgP en ALS1

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

Para validar que puertos son troncales usamos el siguiente comando en cada uno de los switches:

DLS1#show interfaces trunk

```
DLS1#sh int trun
Port        Mode         Encapsulation  Status        Native vlan
Po1         on           802.1q         trunking      1
Po4         on           802.1q         trunking      1

Port        Vlans allowed on trunk
Po1         1-1005
Po4         1-1005

Port        Vlans allowed and active in management domain
Po1         1
Po4         1

Port        Vlans in spanning tree forwarding state and not pruned
Po1         none
Po4         1

DLS1#
```

Ilustración 46: Validación de vlan Nativa actual en puertos troncales

Luego usamos el siguiente comando para asignar la vlan 800 como vlan nativa para todos los puertos troncales en todos los Switches, en nuestro caso son la inerfaces que pertenecen a los pot-channel 1, 2, 3 y 4.

DLS1#conf ter
DLS1(config)#int port-channel 1
DLS1(config-if)#switchport trunk native vlan 800
DLS1(config-if)#exit
DLS1(config)#

Luego validamos que las interfaces troncales hayan quedado con la vlan nativa 800.

```
DLS1#sh int trun
Port        Mode         Encapsulation  Status        Native vlan
Po1         on           802.1q         trunking      800
Po4         on           802.1q         trunking      800

Port        Vlans allowed on trunk
Po1         1-1005
Po4         1-1005

Port        Vlans allowed and active in management domain
Po1         1
Po4         1

Port        Vlans in spanning tree forwarding state and not pruned
Po1         1
Po4         1

DLS1#
```

Ilustración 47: Validación nueva vlan Nativa puertos troncales DLS1

```
DLS2#sh int trun
Port        Mode         Encapsulation  Status        Native vlan
Po2         on           802.1q         trunking      800
Po3         on           802.1q         trunking      800

Port        Vlans allowed on trunk
Po2         1-1005
Po3         1-1005

Port        Vlans allowed and active in management domain
Po2         1
Po3         1

Port        Vlans in spanning tree forwarding state and not pruned
Po2         1
Po3         1

DLS2#
```

Ilustración 48: Validación nueva vlan Nativa puertos troncales DLS2

```
ALS2#sh int trun
Port        Mode         Encapsulation  Status        Native vlan
Po2         on           802.1q         trunking      800
Po4         on           802.1q         trunking      800

Port        Vlans allowed on trunk
Po2         1-1005
Po4         1-1005

Port        Vlans allowed and active in management domain
Po2         1
Po4         1

Port        Vlans in spanning tree forwarding state and not pruned
Po2         1
Po4         1

ALS2#
```

Ilustración 49: Validación nueva vlan Nativa puertos troncales ALS2

```
ALS1#sh int trun
Port        Mode         Encapsulation  Status        Native vlan
Po1         on           802.1q         trunking      800
Po3         on           802.1q         trunking      800

Port        Vlans allowed on trunk
Po1         1-1005
Po3         1-1005

Port        Vlans allowed and active in management domain
Po1         1
Po3         1

Port        Vlans in spanning tree forwarding state and not pruned
Po1         none
Po3         1

ALS1#
```

Ilustración 50: Validación nueva vlan Nativa puertos troncales ALS1

d. Configurar DLS1, ALS1, y ALS2 para utilizar VTP versión 2

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

DLS1#conf ter
DLS1(config)#vtp doma UNAD
Changing VTP domain name from NULL to UNAD
DLS1(config)#vtp pass cisco123
Setting device VLAN database password to cisco123
DLS1(config)#vtp ver 2
DLS1(config)#exit
DLS1#

2) Configurar DLS1 como servidor principal para las VLAN.

DLS1(config)#vtp mode server
Device mode already VTP SERVER.
DLS1(config)#

Para consultar el estado del Vtp usamos el comando Show VTP status.

```
DLS1#
DLS1#sh vtp status
VTP Version capable             : 1 to 3
VTP version running             : 2
VTP Domain Name                 : UNAD
VTP Pruning Mode                : Disabled
VTP Traps Generation            : Disabled
Device ID                       : 0001.6496.E030
Configuration last modified by 0.0.0.0 at 3-1-93 01:04:57
Local updater ID is 0.0.0.0 (no valid interface found)

Feature VLAN :
--------------
VTP Operating Mode                : Server
Maximum VLANs supported locally   : 1005
Number of existing VLANs          : 5
Configuration Revision            : 1
MD5 digest                        : 0x8C 0xCE 0x85 0x20 0xA1 0xFB 0xD5 0x0A
                                    0x08 0x70 0x71 0xA9 0x43 0x26 0x4E 0xF0

DLS1#
```

Ilustración 51: Validación del estatus del VTP en DLS1

3) Configurar ALS1 y ALS2 como clientes VTP.

Usamos los siguientes comandos:

ALS1#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#vtp domain UNAD
Domain name already set to UNAD.
ALS1(config)#vtp pass cisco123
Setting device VLAN database password to cisco123
ALS1(config)#vtp mode client
Setting device to VTP CLIENT mode.
ALS1(config)#vtp ver 2
Cannot modify version in VTP client mode
ALS1(config)#exit
ALS1#

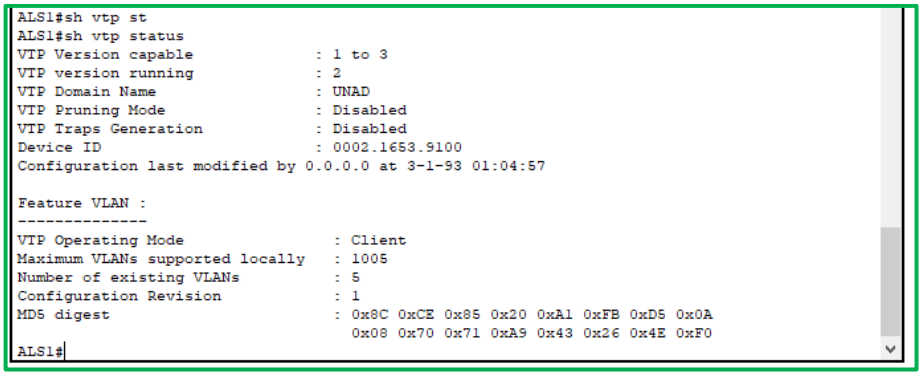


Ilustración 52: Validación del estatus del VTP en ALS1

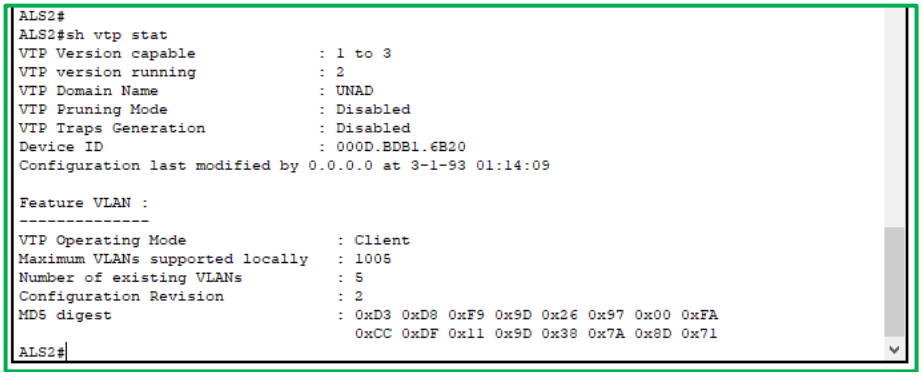
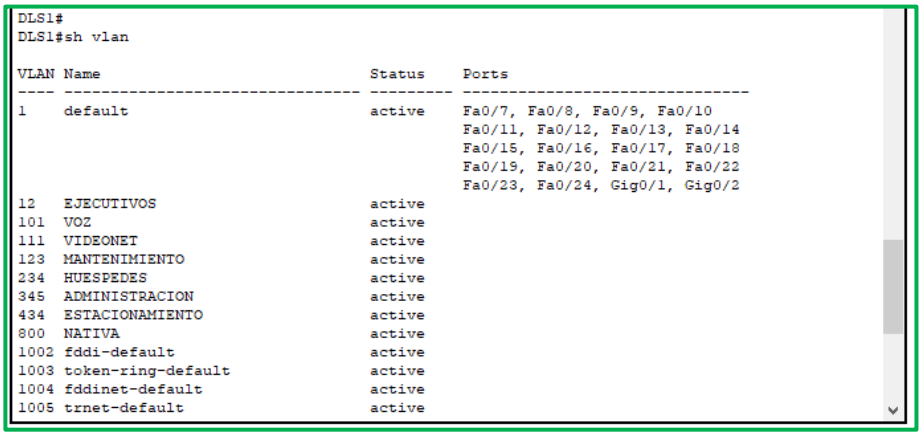


Ilustración 53: Validación del estatus del VTP en ALS2

e. **Configurar en el servidor principal las siguientes VLAN:**

Número de VLAN	Nombre de VLAN	Número de VLAN	Nombre de VLAN
800	NATIVA	434	ESTACIONAMIENTO
12	EJECUTIVOS	123	MANTENIMIENTO
234	HUESPEDES	101	VOZ
111	VIDEONET	345	ADMINISTRACIÓN

El Switch no nos permite configurar vlan de mayor rango que 1005 debido a que el VTP solo permite vlan normales y NO extendidas, por lo cual tuvimos que tomar otras vlan para continuar con el laboratorio.



```
DLS1#
DLS1#sh vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/7, Fa0/8, Fa0/9, Fa0/10
                                                 Fa0/11, Fa0/12, Fa0/13, Fa0/14
                                                 Fa0/15, Fa0/16, Fa0/17, Fa0/18
                                                 Fa0/19, Fa0/20, Fa0/21, Fa0/22
                                                 Fa0/23, Fa0/24, Gig0/1, Gig0/2
12   EJECUTIVOS                        active
101  VOZ                               active
111  VIDEONET                          active
123  MANTENIMIENTO                     active
234  HUESPEDES                         active
345  ADMINISTRACION                    active
434  ESTACIONAMIENTO                   active
800  NATIVA                            active
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
```

Ilustración 54: Verificación de vlan creadas en DLS1

f. En DLS1, suspender la VLAN 434.

DLS1(config)#vlan 434
DLS1(config-vlan)# state suspend
DLS1(config)#

Para la versión de Switch que nos proporciona packet tracert 7.1.1, no se puede ejecutar este comando, por lo cual no podemos suspender la vlan.

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

DLS2#
DLS2#conf ter
DLS2(config)#vtp domain UNAD

Domain name already set to UNAD.
DLS2(config)#vtp pass cisco123
Setting device VLAN database password to cisco123
DLS2(config)#vtp mod trans
Setting device to VTP TRANSPARENT mode.
DLS2(config)#vtp ver 2
DLS2(config)#exit
DLS2#

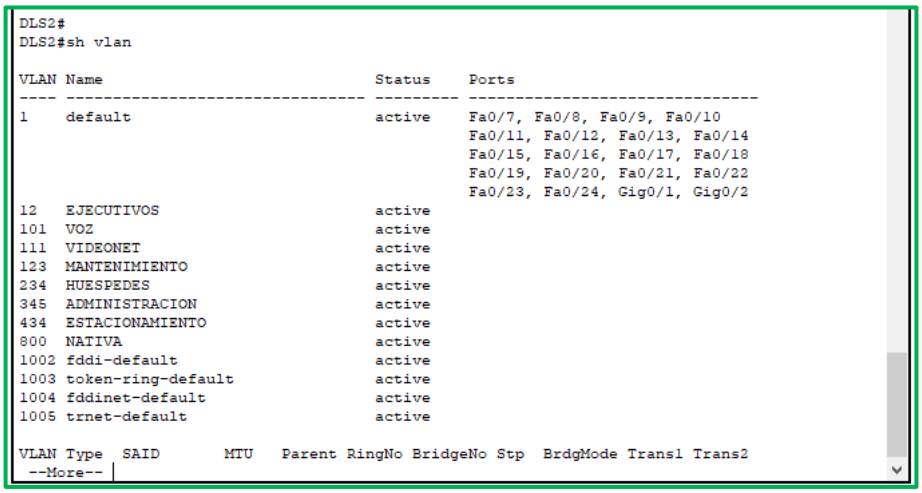


Ilustración 55: Verificación de vlan creadas en DLS2

h. Suspender VLAN 434 en DLS2.

DLS2(config)#vlan 434
DLS2(config-vlan)# state suspend
DLS2(config)#

Para la versión de Switch que nos proporciona packet tracert 7.1.1, no se puede ejecutar este comando, por lo cual no podemos suspender la vlan.

i. 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.

Creamos la vlan

DLS2#conf ter
DLS2(config)#vlan 567
DLS2(config-vlan)#nam CONTABILIDAD
DLS2(config-vlan)#exit

Luego en los 2 port-channel troncales negamos el paso de la vlan 567.

```
DLS2(config)#
DLS2(config)#interface port-channel 2
DLS2(config-if)#switchport trunk allowed vlan except 567
DLS2(config)#interface port-channel 3
DLS2(config-if)#switchport trunk allowed vlan except 567
DLS2(config-if)#end
DLS2#
```

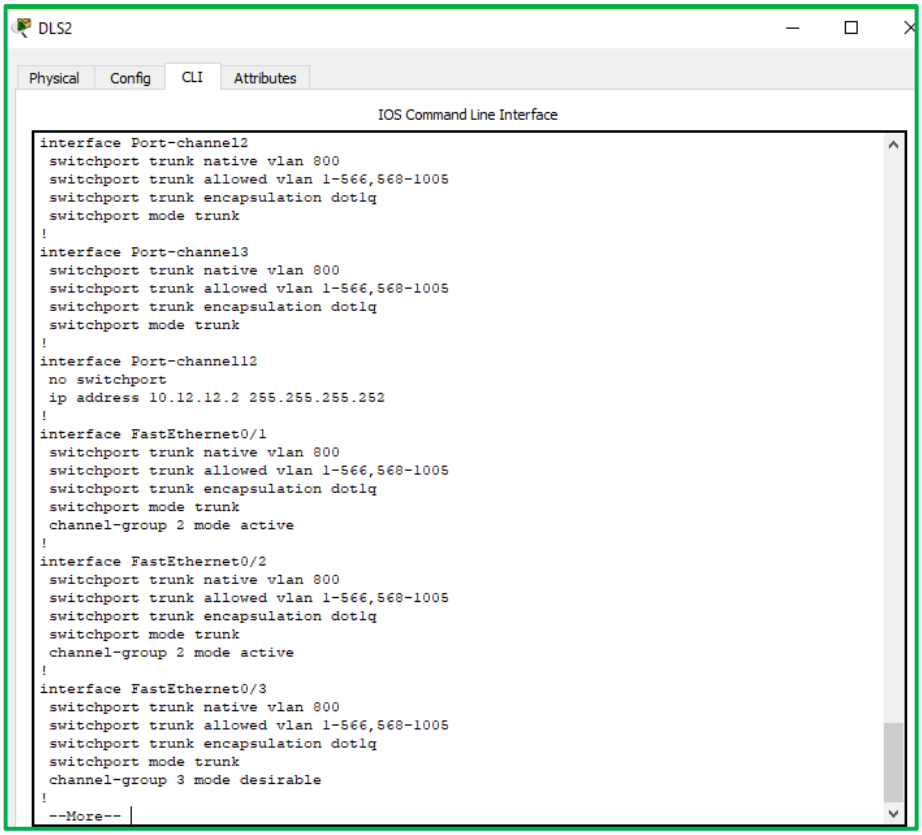


Ilustración 56: Validación de configuración en DLS2

j. Configurar DLS1 como Spanning tree root para las VLAN 1, 12, 434, 800, 101, 111 y 345 y como raíz secundaria para las VLAN 123 y 234.
Asignamos las respectivas vlan como root primary y secondary.

```
DLS1#conf ter
DLS1(config)#spanning-tree vlan 1,12,434,800,101,111,345 root primary
DLS1(config)#spanning-tree vlan 123,234 root secondary
DLS1(config)#
```

```
DLS1#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
DLS1(config)#spanning-tree vlan 1,12,434,800,101,111,345 root primary
DLS1(config)#spanning-tree vlan 123,234 root secondary
DLS1(config)#exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console
```

Ilustración 57: Configuración de STP en DLS1

k. 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.

DLS2#conf ter
DLS2(config)#spanning-tree vlan 123,234 root primary
DLS2(config)#spanning-tree vlan 1,12,434,800,101,111,345 root secondary
DLS2(config)#

```
DLS2#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
DLS2(config)#spanning-tree vlan 123,234 root primary
DLS2(config)#spanning-tree vlan 1,12,434,800,101,111,345 root secondary
DLS2(config)#exit
DLS2#
%SYS-5-CONFIG_I: Configured from console by console
```

Ilustración 58: Configuración de STP en DLS2

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

DLS1

Physical | Config | CLI | Attributes

IOS Command Line Interface

```
interface Port-channel1
 switchport trunk native vlan 800
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface Port-channel4
 switchport trunk native vlan 800
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface Port-channel12
 no switchport
 ip address 10.12.12.1 255.255.255.252
!
interface FastEthernet0/1
 switchport trunk native vlan 800
 switchport trunk encapsulation dot1q
 switchport mode trunk
 channel-group 1 mode active
!
interface FastEthernet0/2
 switchport trunk native vlan 800
 switchport trunk encapsulation dot1q
 switchport mode trunk
 channel-group 1 mode active
!
interface FastEthernet0/3
 switchport trunk native vlan 800
 switchport trunk encapsulation dot1q
 switchport mode trunk
 channel-group 4 mode desirable
!
interface FastEthernet0/4
 switchport trunk native vlan 800
 switchport trunk encapsulation dot1q
 switchport mode trunk
 channel-group 4 mode desirable
!
```

Ilustración 59: Validación de configuración en DLS1

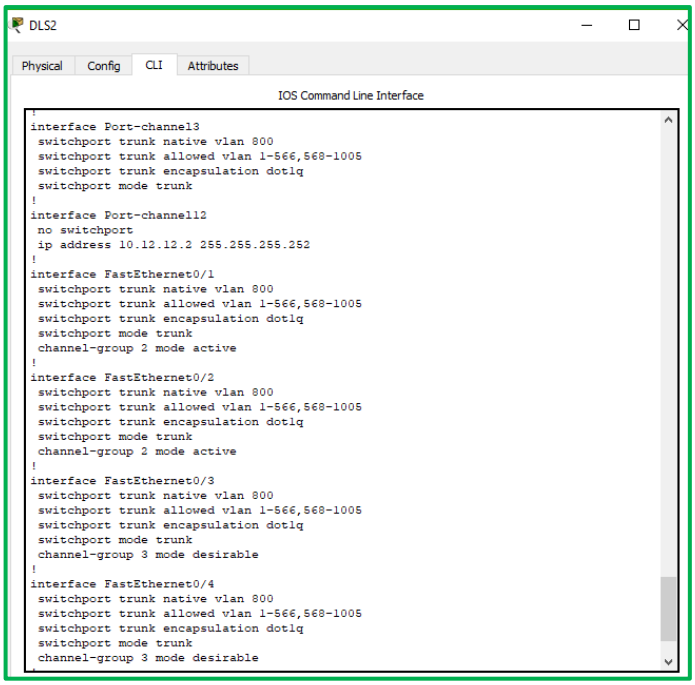


Ilustración 60: Validación de configuración en DLS2

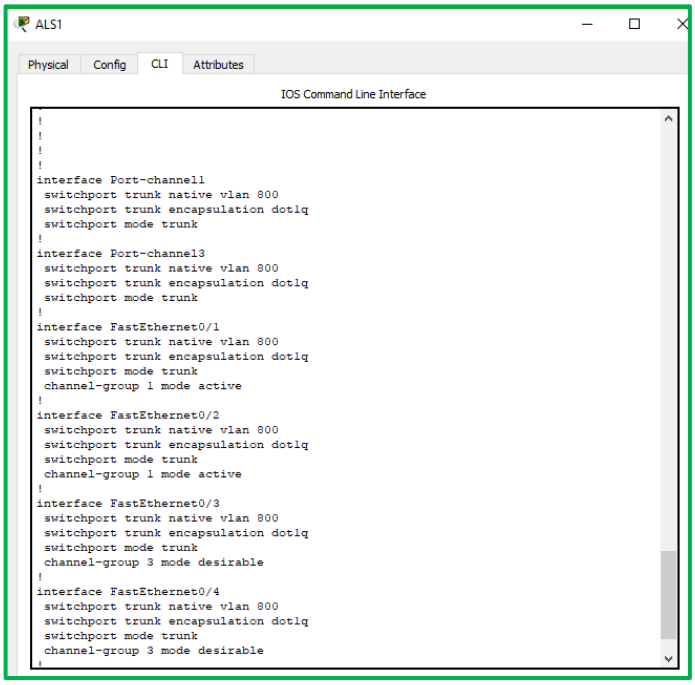


Ilustración 61: Validación de configuración en ALS1

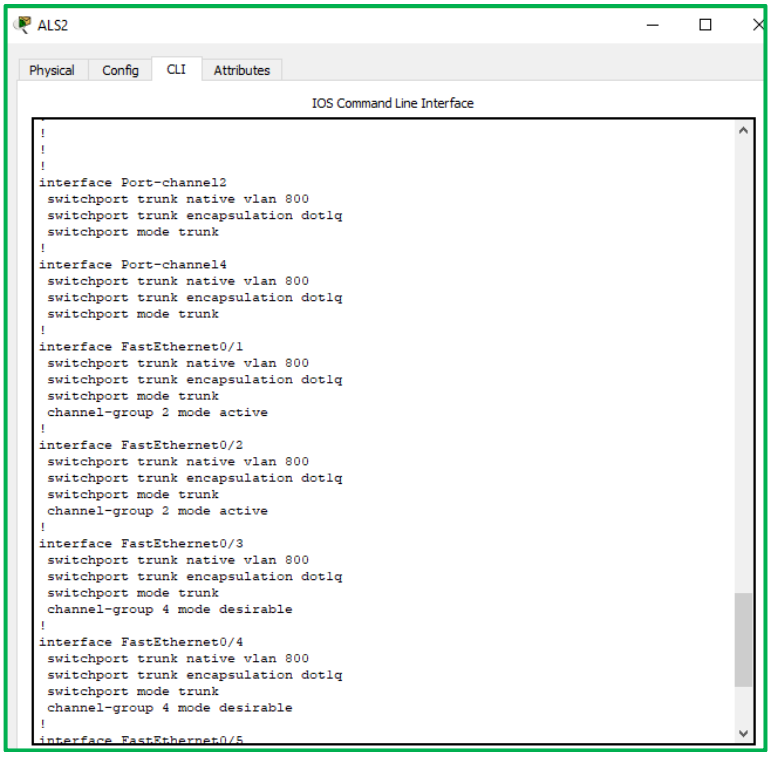


Ilustración 62: Validación de configuración en ALS2

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

Interfaz	DLS1	DLS2	ALS1	ALS2
Interfaz Fa0/6	345	12, 101	123, 101	234
Interfaz Fa0/15	111	111	111	111
Interfaces F0 /16-18		567		

Usamos el siguiente comando en cada una de las interfaces que conectan cada uno de los hosts y asignando la respectiva vlan según la tabla.

Se debe tener en cuenta que si un puerto está en acceso solo se puede asignar una sola vlan, si queremos configurar más vlan como acceso debemos tener más puertos disponibles, o configurar el puerto como troncal.

DLS1#conf ter
DLS1(config-if)#interface fastEthernet 0/7
DLS1(config-if)#switchport mode access
DLS1(config-if)#switchport access vlan 345
DLS1(config-if)#spanning-tree portfast
DLS1(config-if)#no shutdown
DLS1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7, changed state to up
DLS1(config-if)#exit
DLS1(config)#

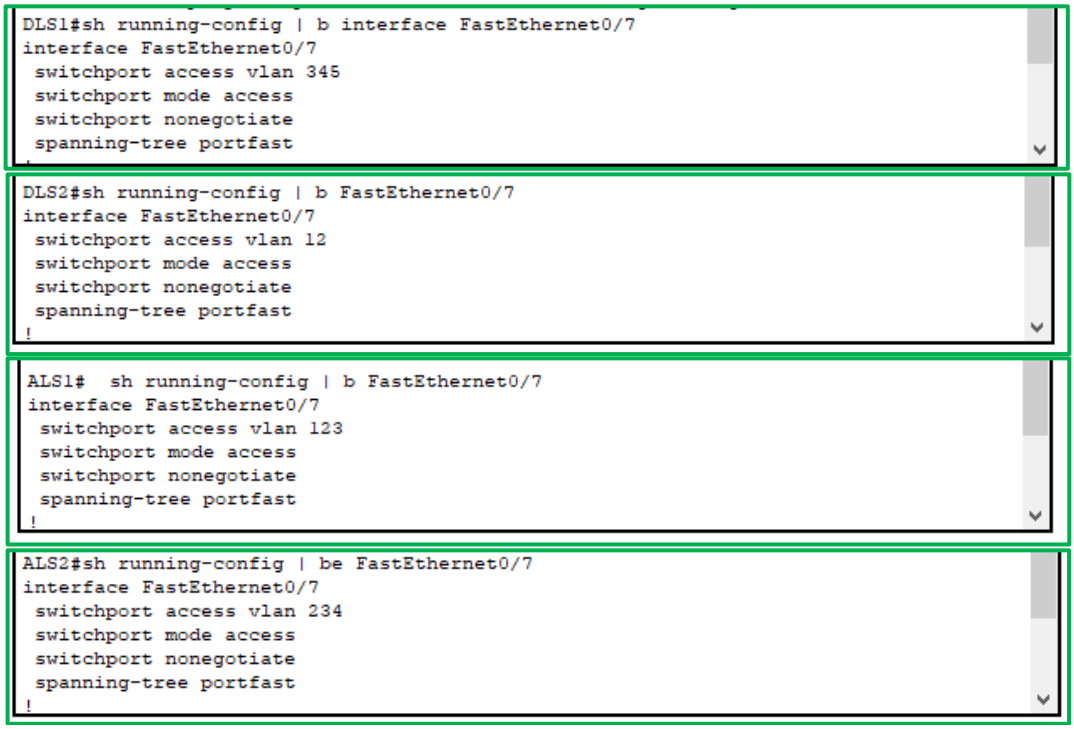


Ilustración 63: Configuración puertos de Acceso

n. Todas las interfaces que no sean utilizadas o asignadas a alguna VLAN deberán ser apagadas.

Para validar eso usamos el comando Show ip interface brief.

```
DLS1#sh ip int bri
Interface              IP-Address      OK? Method Status                Protocol
Port-channel1          unassigned      YES unset  up                    up
Port-channel4          unassigned      YES unset  up                    up
Port-channel12         10.12.12.1      YES manual up                    up
FastEthernet0/1        unassigned      YES unset  up                    up
FastEthernet0/2        unassigned      YES unset  up                    up
FastEthernet0/3        unassigned      YES unset  up                    up
FastEthernet0/4        unassigned      YES unset  up                    up
FastEthernet0/5        unassigned      YES unset  up                    up
FastEthernet0/6        unassigned      YES unset  up                    up
FastEthernet0/7        unassigned      YES unset  up                    up
FastEthernet0/8        unassigned      YES unset  administratively down down
FastEthernet0/9        unassigned      YES unset  administratively down down
FastEthernet0/10       unassigned      YES unset  administratively down down
FastEthernet0/11       unassigned      YES unset  administratively down down
FastEthernet0/12       unassigned      YES unset  administratively down down
FastEthernet0/13       unassigned      YES unset  administratively down down
FastEthernet0/14       unassigned      YES unset  administratively down down
FastEthernet0/15       unassigned      YES unset  administratively down down
FastEthernet0/16       unassigned      YES unset  administratively down down
FastEthernet0/17       unassigned      YES unset  administratively down down
FastEthernet0/18       unassigned      YES unset  administratively down down
FastEthernet0/19       unassigned      YES unset  administratively down down
FastEthernet0/20       unassigned      YES unset  administratively down down
FastEthernet0/21       unassigned      YES unset  administratively down down
FastEthernet0/22       unassigned      YES unset  administratively down down
FastEthernet0/23       unassigned      YES unset  administratively down down
FastEthernet0/24       unassigned      YES unset  administratively down down
GigabitEthernet0/1     unassigned      YES unset  administratively down down
GigabitEthernet0/2     unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
DLS1#
```

Ilustración 64: Validación estado de interfaces DLS1

```
DLS2#sh ip int bri
Interface              IP-Address      OK? Method Status                Protocol
Port-channel2          unassigned      YES unset  up                    up
Port-channel3          unassigned      YES unset  up                    up
Port-channel12         10.12.12.2      YES manual up                    up
FastEthernet0/1        unassigned      YES unset  up                    up
FastEthernet0/2        unassigned      YES unset  up                    up
FastEthernet0/3        unassigned      YES unset  up                    up
FastEthernet0/4        unassigned      YES unset  up                    up
FastEthernet0/5        unassigned      YES unset  up                    up
FastEthernet0/6        unassigned      YES unset  up                    up
FastEthernet0/7        unassigned      YES unset  up                    up
FastEthernet0/8        unassigned      YES unset  administratively down down
FastEthernet0/9        unassigned      YES unset  administratively down down
FastEthernet0/10       unassigned      YES unset  administratively down down
FastEthernet0/11       unassigned      YES unset  administratively down down
FastEthernet0/12       unassigned      YES unset  administratively down down
FastEthernet0/13       unassigned      YES unset  administratively down down
FastEthernet0/14       unassigned      YES unset  administratively down down
FastEthernet0/15       unassigned      YES unset  administratively down down
FastEthernet0/16       unassigned      YES unset  administratively down down
FastEthernet0/17       unassigned      YES unset  administratively down down
FastEthernet0/18       unassigned      YES unset  administratively down down
FastEthernet0/19       unassigned      YES unset  administratively down down
FastEthernet0/20       unassigned      YES unset  administratively down down
FastEthernet0/21       unassigned      YES unset  administratively down down
FastEthernet0/22       unassigned      YES unset  administratively down down
FastEthernet0/23       unassigned      YES unset  administratively down down
FastEthernet0/24       unassigned      YES unset  administratively down down
GigabitEthernet0/1     unassigned      YES unset  administratively down down
GigabitEthernet0/2     unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
DLS2#
```

Ilustración 65: Validación estado de interfaces DLS2

```
ALS1#sh ip int bri
Interface              IP-Address      OK? Method Status                Protocol
Port-channel1          unassigned      YES unset  up                    up
Port-channel3          unassigned      YES unset  up                    up
FastEthernet0/1        unassigned      YES unset  up                    up
FastEthernet0/2        unassigned      YES unset  up                    up
FastEthernet0/3        unassigned      YES unset  up                    up
FastEthernet0/4        unassigned      YES unset  up                    up
FastEthernet0/5        unassigned      YES unset  administratively down down
FastEthernet0/6        unassigned      YES unset  administratively down down
FastEthernet0/7        unassigned      YES unset  up                    up
FastEthernet0/8        unassigned      YES unset  administratively down down
FastEthernet0/9        unassigned      YES unset  administratively down down
FastEthernet0/10       unassigned      YES unset  administratively down down
FastEthernet0/11       unassigned      YES unset  administratively down down
FastEthernet0/12       unassigned      YES unset  administratively down down
FastEthernet0/13       unassigned      YES unset  administratively down down
FastEthernet0/14       unassigned      YES unset  administratively down down
FastEthernet0/15       unassigned      YES unset  administratively down down
FastEthernet0/16       unassigned      YES unset  administratively down down
FastEthernet0/17       unassigned      YES unset  administratively down down
FastEthernet0/18       unassigned      YES unset  administratively down down
FastEthernet0/19       unassigned      YES unset  administratively down down
FastEthernet0/20       unassigned      YES unset  administratively down down
FastEthernet0/21       unassigned      YES unset  administratively down down
FastEthernet0/22       unassigned      YES unset  administratively down down
FastEthernet0/23       unassigned      YES unset  administratively down down
FastEthernet0/24       unassigned      YES unset  administratively down down
GigabitEthernet0/1     unassigned      YES unset  administratively down down
GigabitEthernet0/2     unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
ALS1#
```

Ilustración 66: Validación estado de interfaces ALS1

```
ALS2#sh ip int bri
Interface              IP-Address      OK? Method Status                Protocol
Port-channel2          unassigned      YES unset  up                    up
Port-channel4          unassigned      YES unset  up                    up
FastEthernet0/1        unassigned      YES unset  up                    up
FastEthernet0/2        unassigned      YES unset  up                    up
FastEthernet0/3        unassigned      YES unset  up                    up
FastEthernet0/4        unassigned      YES unset  up                    up
FastEthernet0/5        unassigned      YES unset  administratively down down
FastEthernet0/6        unassigned      YES unset  administratively down down
FastEthernet0/7        unassigned      YES unset  up                    up
FastEthernet0/8        unassigned      YES unset  administratively down down
FastEthernet0/9        unassigned      YES unset  administratively down down
FastEthernet0/10       unassigned      YES unset  administratively down down
FastEthernet0/11       unassigned      YES unset  administratively down down
FastEthernet0/12       unassigned      YES unset  administratively down down
FastEthernet0/13       unassigned      YES unset  administratively down down
FastEthernet0/14       unassigned      YES unset  administratively down down
FastEthernet0/15       unassigned      YES unset  administratively down down
FastEthernet0/16       unassigned      YES unset  administratively down down
FastEthernet0/17       unassigned      YES unset  administratively down down
FastEthernet0/18       unassigned      YES unset  administratively down down
FastEthernet0/19       unassigned      YES unset  administratively down down
FastEthernet0/20       unassigned      YES unset  administratively down down
FastEthernet0/21       unassigned      YES unset  administratively down down
FastEthernet0/22       unassigned      YES unset  administratively down down
FastEthernet0/23       unassigned      YES unset  administratively down down
FastEthernet0/24       unassigned      YES unset  administratively down down
GigabitEthernet0/1     unassigned      YES unset  administratively down down
GigabitEthernet0/2     unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
ALS2#
```

Ilustración 67: Validación estado de interfaces ALS2

o. Configurar SVI en DLS1 y DLS2 como soporte de todas las VLAN y de enrutamiento entre las VLAN. Utilice la siguiente tabla para las asignaciones de subred:

VLAN	Nombre de VLAN	subred	VLAN	Nombre de VLAN	subred
12	EJECUTIVOS	10.0.12.0/24	123	MANTENIMIENTO	10.0.123.0/24
234	HUESPEDES	10.0.234.0/24	101	VOZ	10.10.10.0/24
111	VIDEONET	10.11.11.0/24	345	ADMINISTRACIÓN	10.34.56.0/24

- **DLS1 siempre utilizará la dirección .252 y DLS2 siempre utilizará la dirección .253 para las direcciones IPv4.**

Para crear cada una de las vlan interface, ejecutamos los siguientes comandos tanto en DLS1 como en DLS2, con cada una de las vlan según la tabla.

DLS1#conf ter
DLS1(config)#interface vlan 12
%LINK-5-CHANGED: Interface Vlan12, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan12, changed state to up
DLS1(config-if)#ip address 10.0.12.252 255.255.255.0
DLS1(config-if)#no shutdown
DLS1(config-if)#exit
DLS1(config)#

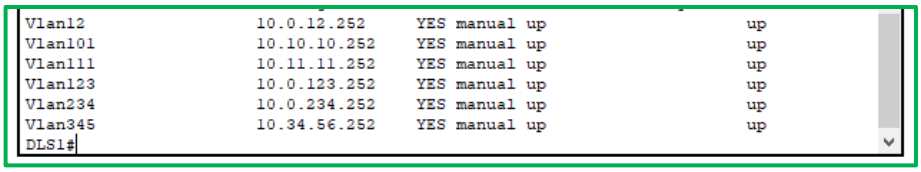


Ilustración 68: Verificación vlan Interface DLS1

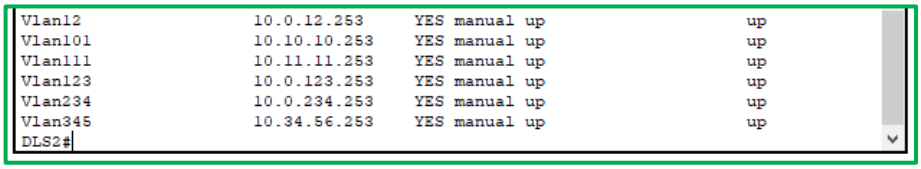


Ilustración 69: Verificación vlan Interface DLS2

- **La VLAN 567 en DLS2 no podrá ser soportada para enrutamiento.**

p. Configurar una interfaz Loopback 0 en DLS1 y DLS2. Esta interfaz será configurada con la dirección IP 1.1.1.1/32 en ambos Switch.

Para eso usamos los siguientes comandos tanto en DLS1 como en DLS2.

DLS1#conf ter
DLS1(config)#int loopback 0
%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
DLS1(config-if)#ip address 1.1.1.1 255.255.255.255
DLS1#

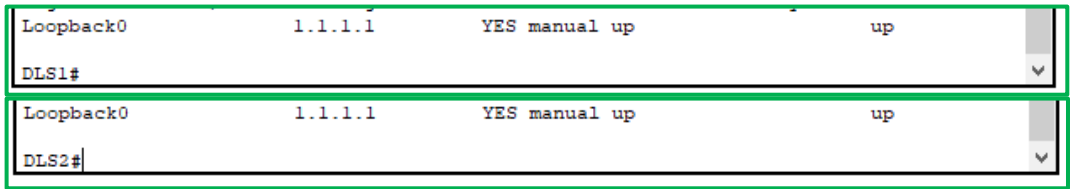


Ilustración 70: Validación LoopBack DLS1 - DLS2

q. Configurar HSRP con interfaz tracking para las VLAN 12, 123, 234, 101, y 111.

1) Utilizar HSRP

2) Crear dos grupos HSRP, alineando VLAN 12, 101, 111, y 345 para el primer grupo y las VLAN 123 y 234 para el segundo grupo.

3) DLS1 será el Switch principal de las VLAN 12, 101, 111, y 345 y DLS2 será el Switch principal para las VLAN 123 y 234.

4) Utilizar la dirección virtual .254 como la dirección de Standby de todas las VLAN

Usamos los siguientes comandos para cada vlan según se requiere.
Debemos tener en cuenta de cambiar la prioridad para el Swith especifico sea principal de algunas vlan según solicitud.

DLS1(config)#
DLS1(config)#interface Vlan 12
DLS1(config-if)# standby 1 ip 10.0.12.254
DLS1(config-if)# standby 1 priority 200
DLS1(config-if)# standby 1 preempt
DLS1(config-if)# standby 1 track FastEthernet0/5
DLS1(config-if)# standby 1 track FastEthernet0/6
DLS1(config-if)#

Con el comando Show Standby podemos verificar que las vlan correspondientes hayan quedado Active y las demás Standby.

Se relaciona a continuación el resultado del comando en el Switch DLS1:

```
DLS1#show standby
Vlan12 - Group 1
State is Active
8 state changes, last state change 01:13:13
Virtual IP address is 10.0.12.254
Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 2.721 secs
Preemption enabled
Active router is local
Standby router is 10.0.12.253
Priority 200 (configured 200)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-1 (default)
Vlan234 - Group 2
State is Standby
6 state changes, last state change 01:17:13
Virtual IP address is 10.0.234.254
Active virtual MAC address is 0000.0C07.AC02
Local virtual MAC address is 0000.0C07.AC02 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 2.617 secs
Preemption enabled
Active router is 10.0.234.253, priority 200 (expires in 7 sec)
MAC address is 0000.0C07.AC02
Standby router is local
Priority 100 (default 100)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl2-2 (default)
Vlan111 - Group 1
State is Active
6 state changes, last state change 01:15:07
Virtual IP address is 10.11.11.254
Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 0.783 secs
```

Preemption enabled
Active router is local
Standby router is 10.11.11.253
Priority 200 (configured 200)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-1 (default)
Vlan123 - Group 2
State is Standby
7 state changes, last state change 01:18:57
Virtual IP address is 10.0.123.254
Active virtual MAC address is 0000.0C07.AC02
Local virtual MAC address is 0000.0C07.AC02 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 0.67 secs
Preemption enabled
Active router is 10.0.123.253, priority 200 (expires in 8 sec)
MAC address is 0000.0C07.AC02
Standby router is local
Priority 100 (default 100)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-2 (default)
Vlan101 - Group 1
State is Active
6 state changes, last state change 01:15:07
Virtual IP address is 10.10.10.254
Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 0.671 secs
Preemption enabled
Active router is local
Standby router is 10.10.10.253
Priority 200 (configured 200)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-1 (default)
Vlan345 - Group 1
State is Active
5 state changes, last state change 01:15:06
Virtual IP address is 10.34.56.254
Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec

Next hello sent in 2.021 secs
Preemption enabled
Active router is local
Standby router is 10.34.56.253
Priority 200 (configured 200)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl3-1 (default)
DLS1#

Se relaciona a continuación el resultado del comando en el Switch DLS2:

DLS2#sho standby
Vlan12 - Group 1
State is Standby
3 state changes, last state change 01:17:21
Virtual IP address is 10.0.12.254
Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 0.9 secs
Preemption enabled
Active router is 10.0.12.252
Standby router is local
Priority 100 (default 100)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-1 (default)
Vlan101 - Group 1
State is Standby
3 state changes, last state change 01:17:21
Virtual IP address is 10.10.10.254
Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 0.394 secs
Preemption enabled
Active router is 10.10.10.252
Standby router is local
Priority 100 (default 100)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-1 (default)

Vlan111 - Group 1
State is Standby
3 state changes, last state change 01:17:22
Virtual IP address is 10.11.11.254
Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 0.025 secs
Preemption enabled
Active router is 10.11.11.252
Standby router is local
Priority 100 (default 100)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-1 (default)
Vlan123 - Group 2
State is Active
2 state changes, last state change 01:18:48
Virtual IP address is 10.0.123.254
Active virtual MAC address is 0000.0C07.AC02
Local virtual MAC address is 0000.0C07.AC02 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 1.383 secs
Preemption enabled
Active router is local
Standby router is 10.0.123.252, priority 100 (expires in 7 sec)
Priority 200 (default 100)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-2 (default)
Vlan234 - Group 2
State is Active
2 state changes, last state change 01:17:03
Virtual IP address is 10.0.234.254
Active virtual MAC address is 0000.0C07.AC02
Local virtual MAC address is 0000.0C07.AC02 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 0.788 secs
Preemption enabled
Active router is local
Standby router is 10.0.234.252, priority 100 (expires in 6 sec)
Priority 200 (configured 200)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl2-2 (default)

Vlan345 - Group 1
State is Standby
3 state changes, last state change 01:17:21
Virtual IP address is 10.34.56.254
Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 0.133 secs
Preemption enabled
Active router is 10.34.56.252
Standby router is local
Priority 100 (default 100)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl3-1 (default)
DLS2#

r. Configurar DLS1 como un servidor DHCP

para las VLAN 12, 123 y 234.

1) Excluir las direcciones desde .251 hasta

.254 en cada subred

2) Establecer el servidor DNS a 1.1.1.1 para los tres Pool.

3) Establecer como default-router las direcciones virtuales HSRP para cada VLAN

Para esto usamos los siguientes comandos:

DLS1#
DLS1#conf t
DLS1(config)#ip dhcp excluded-address 10.0.12.251 10.0.12.254
DLS1(config)#ip dhcp pool VLAN12_DHCP
DLS1(dhcp-config)#network 10.0.12.0 255.255.255.0
DLS1(dhcp-config)#default-router 10.0.12.252
DLS1(dhcp-config)#dns-server 1.1.1.1
DLS1(dhcp-config)#

DLS1(dhcp-config)#ip dhcp excluded-address 10.0.123.251 10.0.12.254
DLS1(config)#ip dhcp pool VLAN123_DHCP
DLS1(dhcp-config)#network 10.0.123.0 255.255.255.0
DLS1(dhcp-config)#default-router 10.0.123.252
DLS1(dhcp-config)#dns-server 1.1.1.1
DLS1(dhcp-config)#

```
DLS1(dhcp-config)#ip dhcp excluded-address 10.0.234.251 10.0.12.254
DLS1(config)#ip dhcp pool VLAN234_DHCP
DLS1(dhcp-config)#network 10.0.234.0 255.255.255.0
DLS1(dhcp-config)#default-router 10.0.234.252
DLS1(dhcp-config)#dns-server 1.1.1.1
DLS1(dhcp-config)#

DLS1(dhcp-config)#end
DLS1#
```

s. Obtener direcciones IPv4 en los host A, B, y D a través de la configuración por DHCP que fue realizada.

Vamos a cada uno de los Host y ponemos la tarjeta de red en DHCp para obtener una IP automática del Switch.

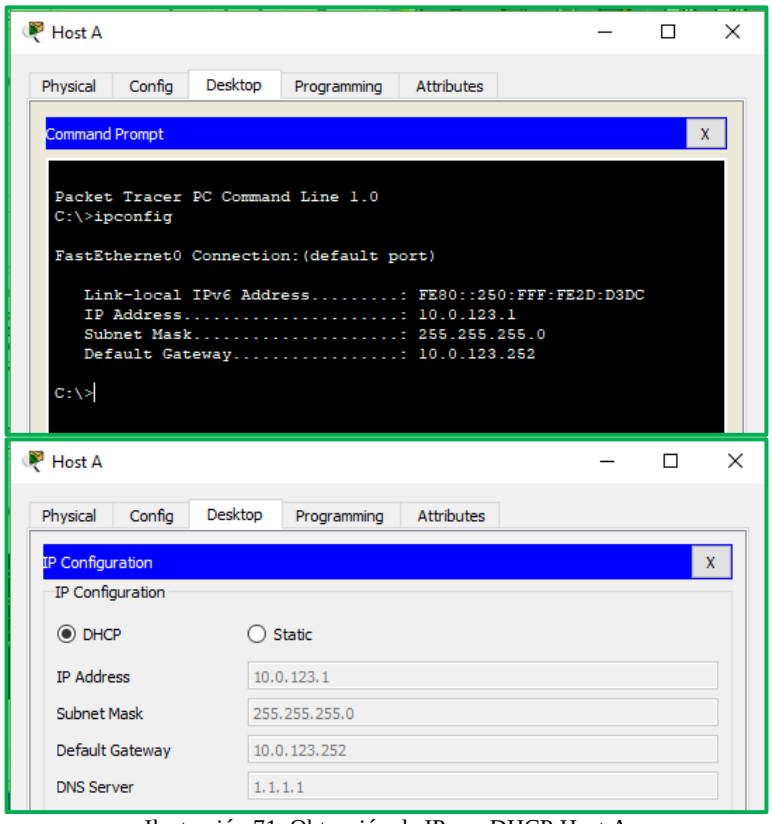


Ilustración 71: Obtención de IP por DHCP Host A

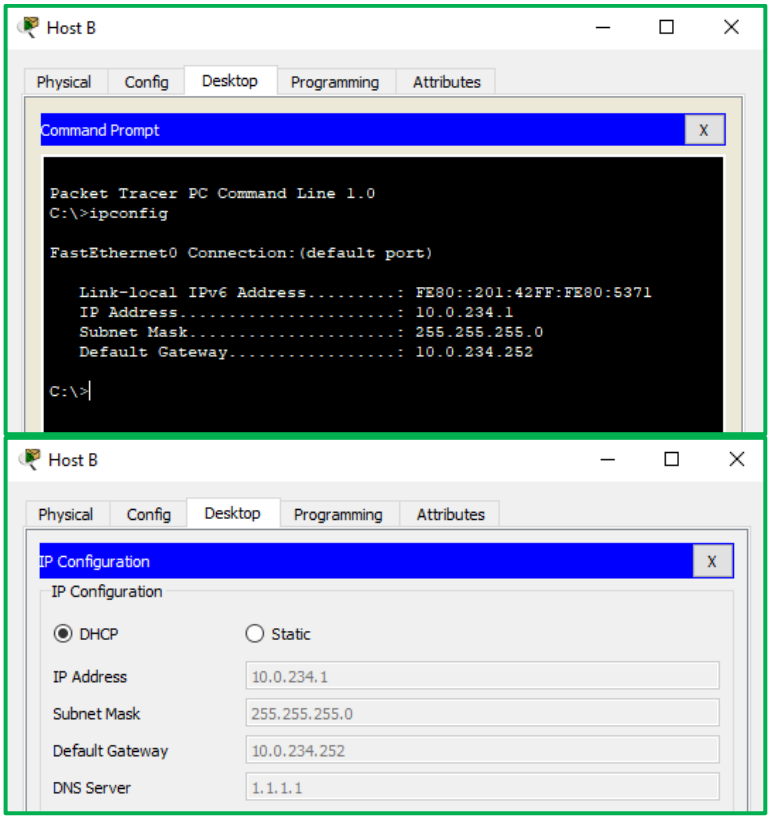
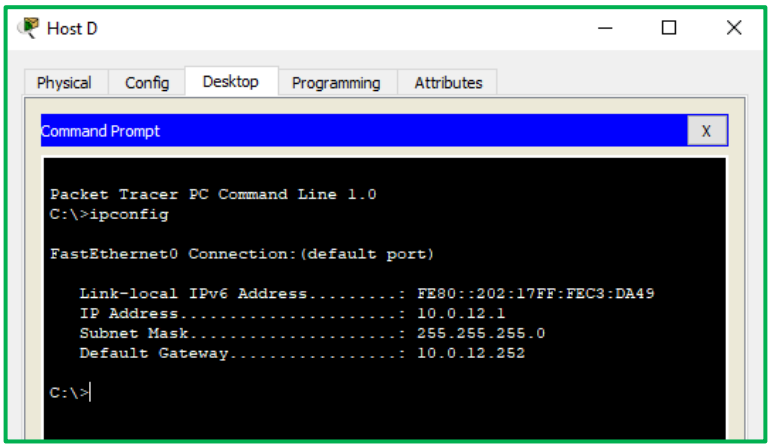


Ilustración 72: Obtención de IP por DHCP Host B



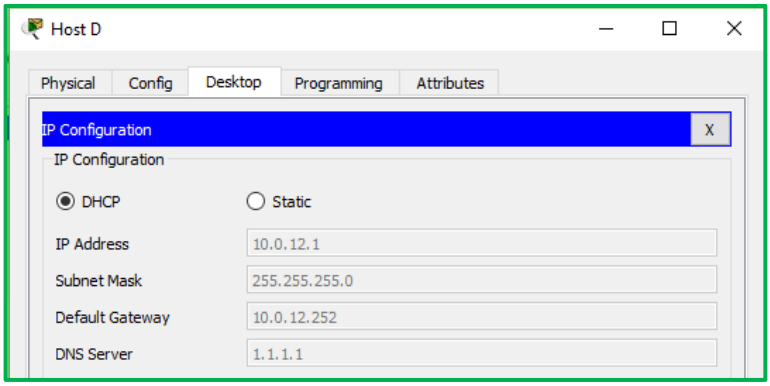


Ilustración 73: Obtención de IP por DHCP Host D

Como podemos observar cada uno de los Host recibe una dirección IPV4 de forma dinámica por medio del DHCP creado en el Switch DLS1.

Part 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.

Con el comando Show inerface trunk podemos observar que puertos están configurados como troncales, con el comando Show vlan observamos las vlan que el equipo tiene creadas o recibe por medio del VTP.

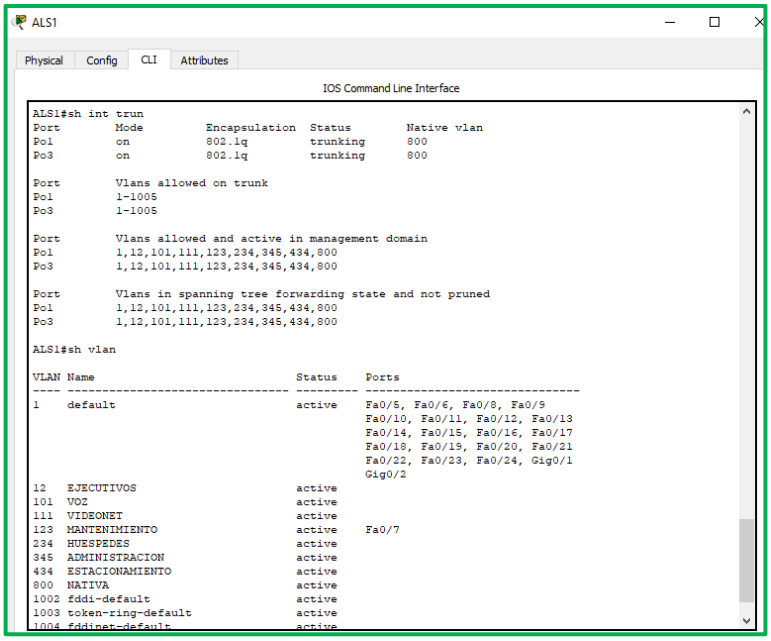


Ilustración 74: Verificación vlan propagadas ALS1

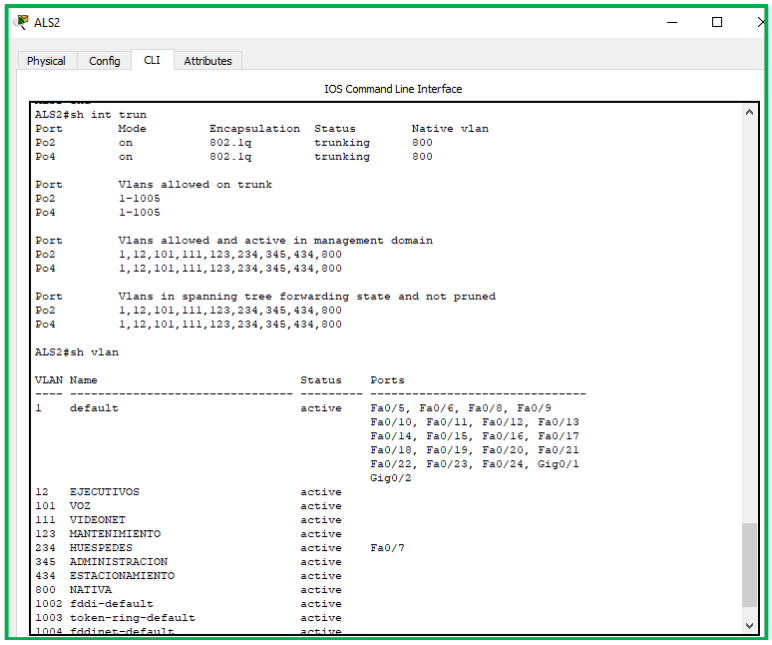


Ilustración 75: Verificación vlan propagadas ALS2

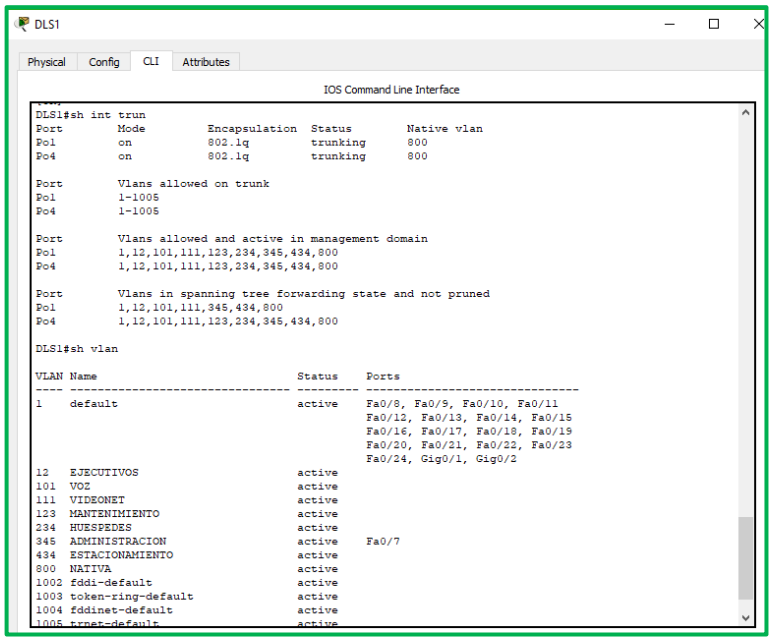


Ilustración 76: Verificación vlan propagadas DLS1

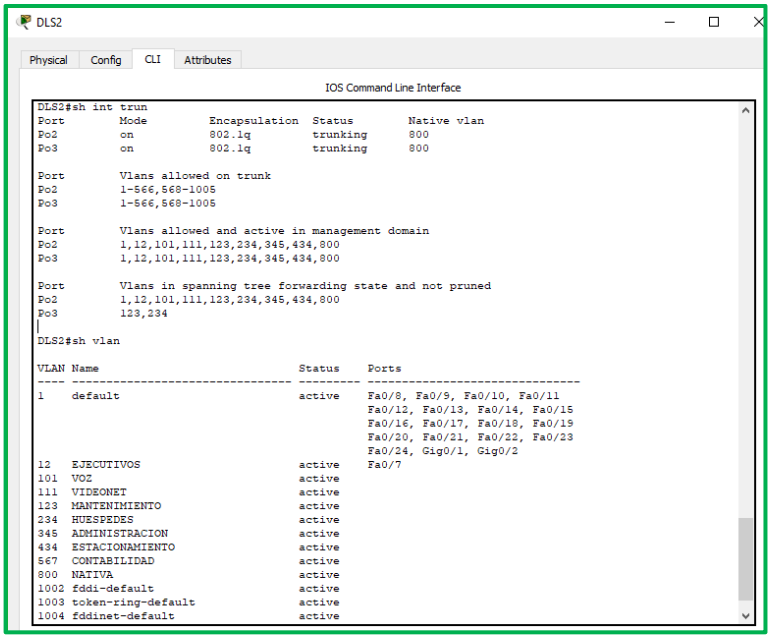


Ilustración 77: Verificación vlan propagadas DLS2

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

Con el comando Show etherchannel summary observamos el estado de los port-channel creados en el equipo.

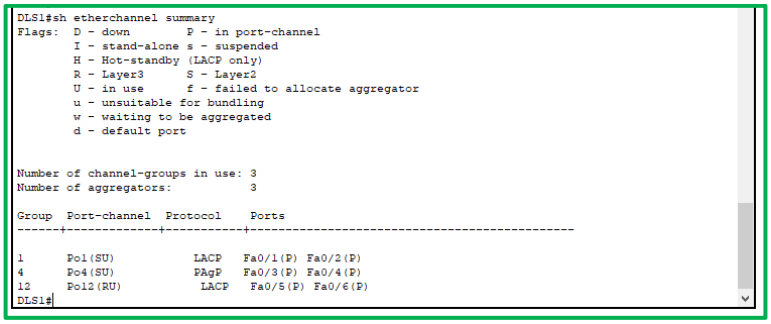


Ilustración 78: Validación Ether Channel DLS1

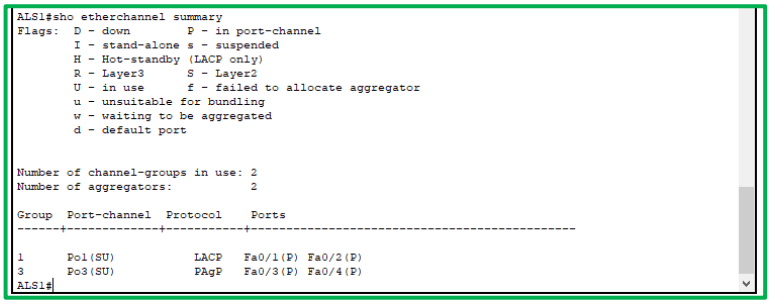


Ilustración 79: Validación Ether Channel ALS1

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

Se valida con el comando show spanning-tree en ambos Switches observando que se encuentra correctamente configurado.

```
DLS1# sh spanning-tree
VLAN0001
Spanning tree enabled protocol ieee
Root ID Priority 24577
Address 00D0.FF42.2753
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 24577 (priority 24576 sys-id-ext 1)
Address 00D0.FF42.2753
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Po1 Desg LSN 9 128.27 Shr
Po4 Desg FWD 9 128.28 Shr

VLAN0012
Spanning tree enabled protocol ieee
Root ID Priority 24588
Address 00D0.FF42.2753
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 24588 (priority 24576 sys-id-ext 12)
Address 00D0.FF42.2753
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Po1 Desg LSN 9 128.27 Shr
Po4 Desg FWD 9 128.28 Shr

VLAN0101
Spanning tree enabled protocol ieee
```

Root ID Priority 24677
Address 00D0.FF42.2753
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 24677 (priority 24576 sys-id-ext 101)
Address 00D0.FF42.2753
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
---------- ---- --- --------- -------- --------------------------------
Po1 Desg LSN 9 128.27 Shr
Po4 Desg FWD 9 128.28 Shr

VLAN0111
Spanning tree enabled protocol ieee
Root ID Priority 24687
Address 00D0.FF42.2753
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 24687 (priority 24576 sys-id-ext 111)
Address 00D0.FF42.2753
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
---------- ---- --- --------- -------- --------------------------------
Po1 Desg LSN 9 128.27 Shr
Po4 Desg FWD 9 128.28 Shr

VLAN0123
Spanning tree enabled protocol ieee
Root ID Priority 24699
Address 0090.0CB9.D2B7
Cost 18
Port 28(Port-channel4)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 28795 (priority 28672 sys-id-ext 123)
Address 00D0.FF42.2753
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

```
Interface Role Sts Cost Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Po1 Altn BLK 9 128.27 Shr
Po4 Root FWD 9 128.28 Shr

VLAN0234
Spanning tree enabled protocol ieee
Root ID Priority 24810
Address 0090.0CB9.D2B7
Cost 18
Port 28(Port-channel4)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 28906 (priority 28672 sys-id-ext 234)
Address 00D0.FF42.2753
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Po1 Altn BLK 9 128.27 Shr
Po4 Root FWD 9 128.28 Shr

VLAN0345
Spanning tree enabled protocol ieee
Root ID Priority 24921
Address 00D0.FF42.2753
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 24921 (priority 24576 sys-id-ext 345)
Address 00D0.FF42.2753
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Fa0/7 Desg FWD 19 128.7 P2p
Po1 Desg LSN 9 128.27 Shr
Po4 Desg FWD 9 128.28 Shr

VLAN0434
Spanning tree enabled protocol ieee
Root ID Priority 25010
Address 00D0.FF42.2753
```

This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 25010 (priority 24576 sys-id-ext 434)
Address 00D0.FF42.2753
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
---------- ---- --- --------- -------- --------------------------------
Po1 Desg LSN 9 128.27 Shr
Po4 Desg FWD 9 128.28 Shr

VLAN0800
Spanning tree enabled protocol ieee
Root ID Priority 25376
Address 00D0.FF42.2753
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 25376 (priority 24576 sys-id-ext 800)
Address 00D0.FF42.2753
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
---------- ---- --- --------- -------- --------------------------------
Po1 Desg LSN 9 128.27 Shr
Po4 Desg FWD 9 128.28 Shr
DLS1#

DLS2#sh spanning-tree
VLAN0001
Spanning tree enabled protocol ieee
Root ID Priority 24577
Address 00D0.FF42.2753
Cost 18
Port 27(Port-channel2)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 28673 (priority 28672 sys-id-ext 1)
Address 0090.0CB9.D2B7
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

```
Interface Role Sts Cost Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Po2 Root FWD 9 128.27 Shr
Po3 Altn BLK 9 128.28 Shr

VLAN0012
Spanning tree enabled protocol ieee
Root ID Priority 24588
Address 00D0.FF42.2753
Cost 18
Port 27(Port-channel2)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 28684 (priority 28672 sys-id-ext 12)
Address 0090.0CB9.D2B7
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Fa0/7 Desg FWD 19 128.7 P2p
Po2 Root FWD 9 128.27 Shr
Po3 Altn BLK 9 128.28 Shr

VLAN0101
Spanning tree enabled protocol ieee
Root ID Priority 24677
Address 00D0.FF42.2753
Cost 18
Port 27(Port-channel2)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 28773 (priority 28672 sys-id-ext 101)
Address 0090.0CB9.D2B7
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Po2 Root FWD 9 128.27 Shr
Po3 Altn BLK 9 128.28 Shr

VLAN0111
Spanning tree enabled protocol ieee
Root ID Priority 24687
```

Address 00D0.FF42.2753
Cost 18
Port 27(Port-channel2)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 28783 (priority 28672 sys-id-ext 111)
Address 0090.0CB9.D2B7
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
---------- ---- --- --------- -------- --------------------------------
Po2 Root FWD 9 128.27 Shr
Po3 Altn BLK 9 128.28 Shr

VLAN0123
Spanning tree enabled protocol ieee
Root ID Priority 24699
Address 0090.0CB9.D2B7
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 24699 (priority 24576 sys-id-ext 123)
Address 0090.0CB9.D2B7
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
---------- ---- --- --------- -------- --------------------------------
Po2 Desg FWD 9 128.27 Shr
Po3 Desg FWD 9 128.28 Shr

VLAN0234
Spanning tree enabled protocol ieee
Root ID Priority 24810
Address 0090.0CB9.D2B7
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 24810 (priority 24576 sys-id-ext 234)
Address 0090.0CB9.D2B7
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type

---------- ---- --- --------- -------- --------------------------------
Po2 Desg FWD 9 128.27 Shr
Po3 Desg FWD 9 128.28 Shr

VLAN0345
Spanning tree enabled protocol ieee
Root ID Priority 24921
Address 00D0.FF42.2753
Cost 18
Port 27(Port-channel2)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 29017 (priority 28672 sys-id-ext 345)
Address 0090.0CB9.D2B7
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
---------- ---- --- --------- -------- --------------------------------
Po2 Root FWD 9 128.27 Shr
Po3 Altn BLK 9 128.28 Shr

VLAN0434
Spanning tree enabled protocol ieee
Root ID Priority 25010
Address 00D0.FF42.2753
Cost 18
Port 27(Port-channel2)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 29106 (priority 28672 sys-id-ext 434)
Address 0090.0CB9.D2B7
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
---------- ---- --- --------- -------- --------------------------------
Po2 Root FWD 9 128.27 Shr
Po3 Altn BLK 9 128.28 Shr

VLAN0800
Spanning tree enabled protocol ieee
Root ID Priority 25376
Address 00D0.FF42.2753
Cost 18

Port 27(Port-channel2)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 29472 (priority 28672 sys-id-ext 800)
Address 0090.0CB9.D2B7
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
---------- ---- --- --------- -------- --------------------------------
Po2 Root FWD 9 128.27 Shr
Po3 Altn BLK 9 128.28 Shr

DLS2#

d. Verificar configuraciones HSRP mediante comandos Show.

Esto lo podemos verificar con el comando show standby.

DLS1#show standby
Vlan12 - Group 1
State is Active
8 state changes, last state change 01:13:13
Virtual IP address is 10.0.12.254
Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 0.799 secs
Preemption enabled
Active router is local
Standby router is 10.0.12.253
Priority 200 (configured 200)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-1 (default)
Vlan234 - Group 2
State is Standby
6 state changes, last state change 01:17:13
Virtual IP address is 10.0.234.254
Active virtual MAC address is 0000.0C07.AC02
Local virtual MAC address is 0000.0C07.AC02 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 2.284 secs
Preemption enabled

Active router is 10.0.234.253, priority 200 (expires in 9 sec)
MAC address is 0000.0C07.AC02
Standby router is local
Priority 100 (default 100)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl2-2 (default)
Vlan111 - Group 1
State is Active
6 state changes, last state change 01:15:07
Virtual IP address is 10.11.11.254
Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 0.667 secs
Preemption enabled
Active router is local
Standby router is 10.11.11.253
Priority 200 (configured 200)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-1 (default)
Vlan123 - Group 2
State is Standby
7 state changes, last state change 01:18:57
Virtual IP address is 10.0.123.254
Active virtual MAC address is 0000.0C07.AC02
Local virtual MAC address is 0000.0C07.AC02 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 1.697 secs
Preemption enabled
Active router is 10.0.123.253, priority 200 (expires in 7 sec)
MAC address is 0000.0C07.AC02
Standby router is local
Priority 100 (default 100)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-2 (default)
Vlan101 - Group 1
State is Active
6 state changes, last state change 01:15:07
Virtual IP address is 10.10.10.254
Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec

Next hello sent in 1.709 secs
Preemption enabled
Active router is local
Standby router is 10.10.10.253
Priority 200 (configured 200)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-1 (default)
Vlan345 - Group 1
State is Active
5 state changes, last state change 01:15:06
Virtual IP address is 10.34.56.254
Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 0.721 secs
Preemption enabled
Active router is local
Standby router is 10.34.56.253
Priority 200 (configured 200)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl3-1 (default)
DLS1#

DLS2#show standby
Vlan12 - Group 1
State is Standby
3 state changes, last state change 01:17:21
Virtual IP address is 10.0.12.254
Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 2.171 secs
Preemption enabled
Active router is 10.0.12.252
Standby router is local
Priority 100 (default 100)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-1 (default)
Vlan101 - Group 1
State is Standby
3 state changes, last state change 01:17:21
Virtual IP address is 10.10.10.254

Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 0.321 secs
Preemption enabled
Active router is 10.10.10.252
Standby router is local
Priority 100 (default 100)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-1 (default)
Vlan111 - Group 1
State is Standby
3 state changes, last state change 01:17:22
Virtual IP address is 10.11.11.254
Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 1.715 secs
Preemption enabled
Active router is 10.11.11.252
Standby router is local
Priority 100 (default 100)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-1 (default)
Vlan123 - Group 2
State is Active
2 state changes, last state change 01:18:48
Virtual IP address is 10.0.123.254
Active virtual MAC address is 0000.0C07.AC02
Local virtual MAC address is 0000.0C07.AC02 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 1.241 secs
Preemption enabled
Active router is local
Standby router is 10.0.123.252, priority 100 (expires in 7 sec)
Priority 200 (default 100)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl1-2 (default)
Vlan234 - Group 2
State is Active
2 state changes, last state change 01:17:03
Virtual IP address is 10.0.234.254

Active virtual MAC address is 0000.0C07.AC02
Local virtual MAC address is 0000.0C07.AC02 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 1.1 secs
Preemption enabled
Active router is local
Standby router is 10.0.234.252, priority 100 (expires in 8 sec)
Priority 200 (configured 200)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl2-2 (default)
Vlan345 - Group 1
State is Standby
3 state changes, last state change 01:17:21
Virtual IP address is 10.34.56.254
Active virtual MAC address is 0000.0C07.AC01
Local virtual MAC address is 0000.0C07.AC01 (v1 default)
Hello time 3 sec, hold time 10 sec
Next hello sent in 0.406 secs
Preemption enabled
Active router is 10.34.56.252
Standby router is local
Priority 100 (default 100)
Track interface FastEthernet0/5 state Up decrement 10
Track interface FastEthernet0/6 state Up decrement 10
Group name is hsrp-Vl3-1 (default)
DLS2#

4. Conclusiones

Después de realizar cada una de las configuraciones necesarias para cada caso de estudio, se llega a las siguientes conclusiones:

Se debe tener muy en cuenta los equipos a elegir de acuerdo a la versión del IOS y de los requerimientos según el problema planteado, esto debido a que no todos tienen las mismas funcionalidades.

Es necesario conocer la estructura del Software para poder aplicar cada uno de los comandos requeridos para configurar los parámetros necesarios.

Al momento de implementar la topología en algún programa, se debe escoger el mejor Software que nos permita configurar los equipos necesarios, sin que se presenten bloqueos o reinicios inesperados que nos afecte el trabajo realizado.

Aquí se plasman las conclusiones que fueron obtenidas del desarrollo práctico del proyecto de grado.

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