

DIPLOMADO DE PROFUNDIZACION CISCO PRUEBA DE
HABILIDADES PRÁCTICAS CCNP

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA - UNAD
ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA - ECBTI
INGENIERÍA TELECOMUNICACIONES
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NOTA DE ACEPTACIÓN

Firma del presidente del Jurado

Firma del Jurado

Firma del Jurado

Medellín, 12 de diciembre de 2019

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RESUMEN

CCNP ROUTE AND SWITCH IP de Cisco, brinda las habilidades para la configuración y operación de redes LAN y WAN, redes de área local y área amplia, su principal objetivo es el de proveer al usuario, la capacidad para planificar, implementar, verificar y solucionar problemas en redes escalables. El especialista al final del entrenamiento contara con habilidades avanzadas para la detección y solución de los problemas que surjan durante la implementación y desarrollo de la red. Los recursos que se emplean durante el adiestramiento, implementación y configuración son los Router y Switch, los cuales constituyen pieza fundamental en el diseño y creación de una red empresarial ideal para la conmutación de grandes lotes de información.

El presente curso se divide en 2 módulos principales CCNP ROUTE, con los temas de protocolos de enrutamiento EIGRP, OSPF, BP, otros temas como Dynamic Multi VPN, VRG Lite, protocolo IPV6 y redistribución de rutas. El segundo módulo es el CCNP Switch, aquí se encontrarán temas como, operaciones y puertos Switch, VLans y troncales, Spanning Tree, seguridad de puertos y configuración de usuarios. Todos ellos encaminados al uso del direccionamiento IP avanzado, a la implementación de enrutadores escalables y la planificación, configuración y verificación de soluciones complejas de conmutación empresarial que utilizan la arquitectura de campus empresarial de Cisco,

Palabras Clave: OSPF, VPN, VRG, EIGRP, BP, VGP, CCNP, ITL, DYNAMIC, PROTOCOLO IPV6, VLANS, SPANNING TREE, LAN, WAN, CISCO, PROTOCOLOS DE RED, ROUTING, SWITCHING, TRONCALES, CONMUTACIÓN, DIRECCIONAMIENTO

ABSTRACT

Cisco CCNP ROUTE AND SWITCH IP, provides the skills for the configuration and operation of LAN and WAN networks, local and wide area networks, its main objective is to provide the user, the ability to plan, implement, verify and solve Problems in scalable networks. The specialist at the end of the training will have advanced skills to detect and solve problems that arise during the implementation and development of the network. The resources used during training, implementation, and configuration are the Router and Switch, which constitute a fundamental piece in the design and creation of an ideal business network for switching large batches of information.

This course is divided into 2 main CCNP ROUTE modules, with the topics of routing protocols EIGRP, OSPF, BP, other topics such as Dynamic Multi VPN, VRG Lite, IPV6 protocol, and route redistribution. The second module is the CCNP Switch, here you will find topics such as Switch operations and ports, VLANs and trunks, Spanning Tree, port security and user configuration. All of them aimed at the use of advanced IP addressing, the implementation of scalable routers and the planning, configuration and verification of complex business switching solutions that use the Cisco enterprise campus architecture,

Keywords: OSPF, VPN, VRG, EIGRP, BP, VGP, CCNP, ITL, DYNAMIC, PROTOCOLO IPV6, VLANS, SPANNING TREE, LAN, WAN, CISCO, PROTOCOLOS DE RED, ROUTING, SWITCHING, TRONCALES, CONMUTACIÓN, DIRECCIONAMIENTO

INTRODUCCIÓN

Para la interconexión de las redes empresariales, se requiere la instalación de 2 dispositivos fundamentales, los Routers y los Switches, estos permitirán la segmentación de esta en pequeños dominios con el propósito de poder resolver los problemas de forma aislada sin comprometer el resto de la red ni su rendimiento. Los dos recursos operan en la capa 2, que es la capa de enlace del modelo OSI.

Los Switches son dispositivos que permiten el puente entre recursos a través de sus múltiples puertos para el enlace de múltiples segmentos de la red, ellos al igual que los router, almacenan información, construyen tablas de envío y determinan el destino de la información. Las tablas contienen direcciones físicas de todos los recursos conectados a él.

Los Switches permiten que la red se expanda, con la conexión de diferentes medios, algunos de sus puertos son dedicados, otros son compartidos, lo que permite manejar varias direcciones MAC de diferentes dispositivos que están conectados por medio de un HUB.

Durante el desarrollo del curso se optimizan todos recursos de este dispositivo, tales como transacciones Dúplex, acumulación de enlaces o Trunking, comunicación entre las Vlans, seguridad en el acceso restringido, unicast y multicast, protocolo de spanning tree que permite que la red sea tolerante con la implementación de la redundancia de la red.

En cuanto a los Routers, se puede decir que son dispositivos que aseguran el enrutamiento de paquetes entre los dispositivos interconectados con la red, este segmenta la red con el fin de proveer seguridad, redundancia, control y limitar el broadcast.

Otros temas específicos son: Escalamiento y seguridad, encontraremos temáticas como RIPng, Blancing, IPV6, OSPF, Virtual Links, Redistribucion EIGRP y OSPF, controlling Routing, Path control y PBR, BGP, Sincronización IBGP-EBGP, Protocolos de autenticación de enrutamiento y Secure Management

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

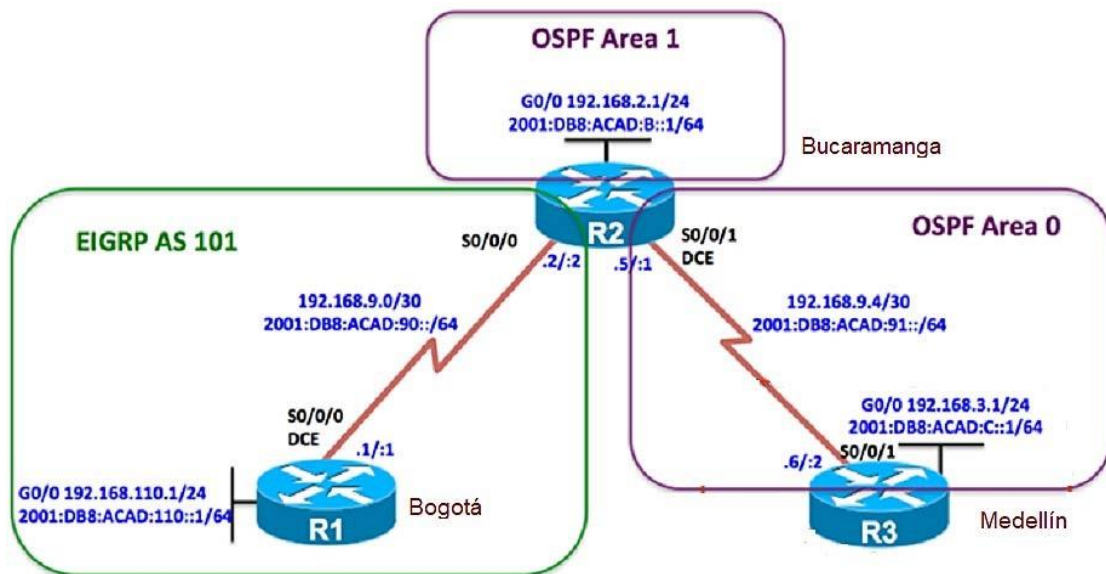


Figura 1, Topología de red propuesta del escenario 1

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

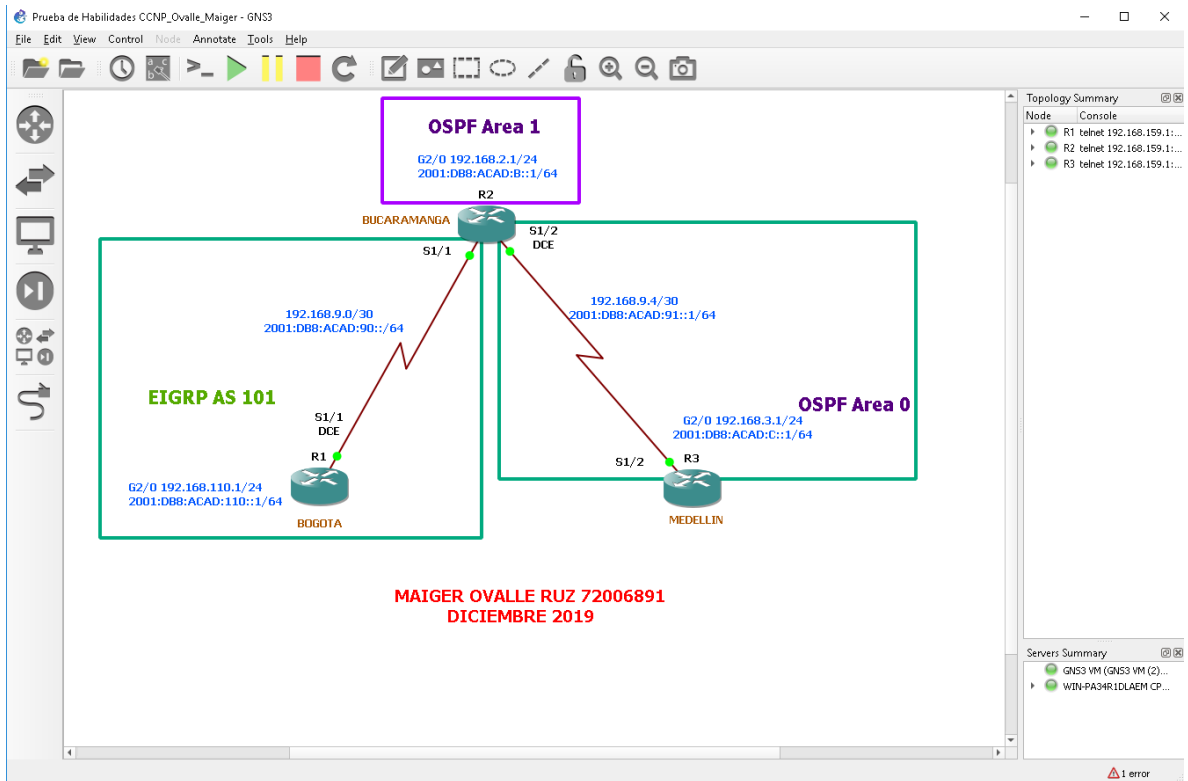


Figura 2, Topología de red creada en GNS3 escenario 1

Parte 1: Configuración del escenario propuesto

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

R1

```
int g2/0
ip address 192.168.110.1 255.255.255.0
ipv6 address 2001:db8:acad:110::1/64
exit
```

```
int s1/1
ip address 192.168.9.1 255.255.255.252
ipv6 address 2001:db8:acad:90::1/64
clock rate 64000
exit
```

```
int s1/0
no ip address
clock rate 200000
no shutdown
exit
```

```
int s1/2
no ip address
clock rate 200000
shutdown
exit
```

```
int s1/3
no ip address
clock rate 200000
shutdown
exit
```

```
R1
R1(config)#
R1(config)#int g2/0
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)#EXIT
R1(config)#
R1(config)#int s1/1
R1(config-if)#ip address 192.168.9.1 255.255.255.252
R1(config-if)#ipv6 address 2001:DB8:ACAD:90::1/64
R1(config-if)#clock rate 64000
R1(config-if)#
R1(config-if)#exit
R1(config)#
R1(config)#int 1/0
R1(config-if)#
^
% Invalid input detected at '^' marker.

R1(config)#int s1/0
R1(config-if)#no ip address
R1(config-if)#clock rate 2000000
%Clockrate bestfitted (rounded) to 2016000
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#
R1(config)#
*Dec 9 12:55:39.063: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
R1(config)#o
*Dec 9 12:55:40.071: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0,
changed state to up
R1(config)#
R1(config)#int s1/2
R1(config-if)#no ip address
R1(config-if)#clock rate
*Dec 9 12:56:01.383: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0,
changed state to down
R1(config-if)#clock rate 2000000
%Clockrate bestfitted (rounded) to 2016000
R1(config-if)#shutdown
R1(config-if)#
R1(config-if)#exit
R1(config)#
R1(config)#int s1/0
R1(config-if)#shutdown
R1(config-if)#exit
R1(config)#
*Dec 9 12:56:38.819: %LINK-5-CHANGED: Interface Serial1/0, changed state to adm
inistratively down
R1(config)#
R1(config)#int s1/3
R1(config-if)#no ip address
R1(config-if)#clock rate 2000000
%Clockrate bestfitted (rounded) to 2016000
R1(config-if)#shutdown
R1(config-if)#exit
R1(config)#
```

Figura 3, configuración interfaces R1 escenario 1

R2

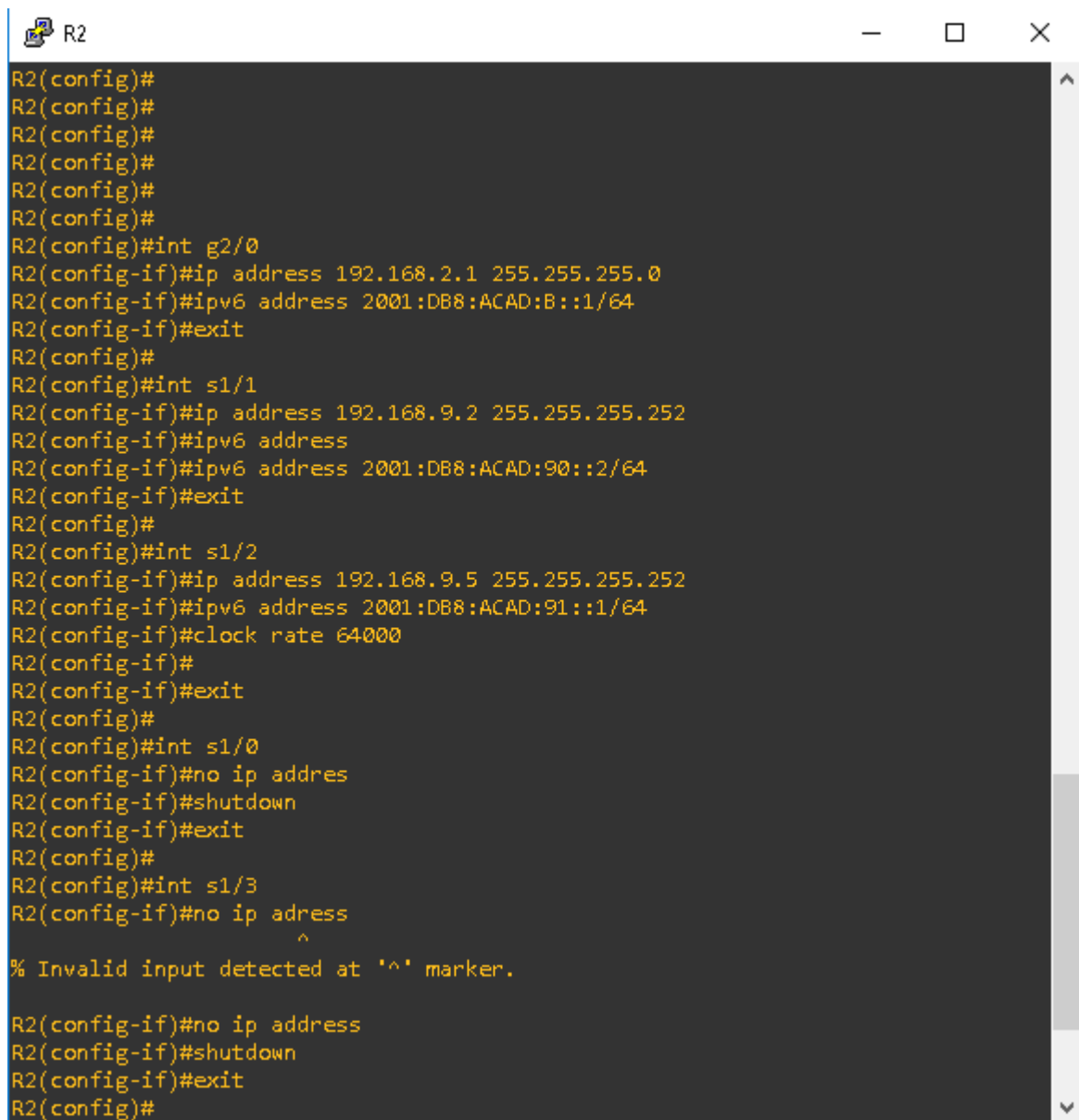
```
int g2/0
ip address 192.168.2.1 255.255.255.0
ipv6 address 2001:db8:acad:b::1/64
exit
```

```
int s1/1
ip address 192.168.9.2 255.255.255.252
ipv6 address 2001:db8:acad:90::2/64
exit
```

```
int s1/2
ip address 192.168.9.5 255.255.255.252
ipv6 address 2001:db8:acad:91::1/64
clock rate 64000
exit
```

```
int s1/0
no ip address
shutdown
```

```
int s1/3
no ip address
shutdown
exit
```



```
R2
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#int g2/0
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)#exit
R2(config)#
R2(config)#int s1/1
R2(config-if)#ip address 192.168.9.2 255.255.255.252
R2(config-if)#ipv6 address
R2(config-if)#ipv6 address 2001:DB8:ACAD:90::2/64
R2(config-if)#exit
R2(config)#
R2(config)#int s1/2
R2(config-if)#ip address 192.168.9.5 255.255.255.252
R2(config-if)#ipv6 address 2001:DB8:ACAD:91::1/64
R2(config-if)#clock rate 64000
R2(config-if)#
R2(config-if)#exit
R2(config)#
R2(config)#int s1/0
R2(config-if)#no ip address
R2(config-if)#shutdown
R2(config-if)#exit
R2(config)#
R2(config)#int s1/3
R2(config-if)#no ip address
R2(config-if)#no ip address
R2(config-if)#shutdown
R2(config-if)#exit
R2(config)#
```

Figura 4, configuración interfaces R2 escenario 1

R3

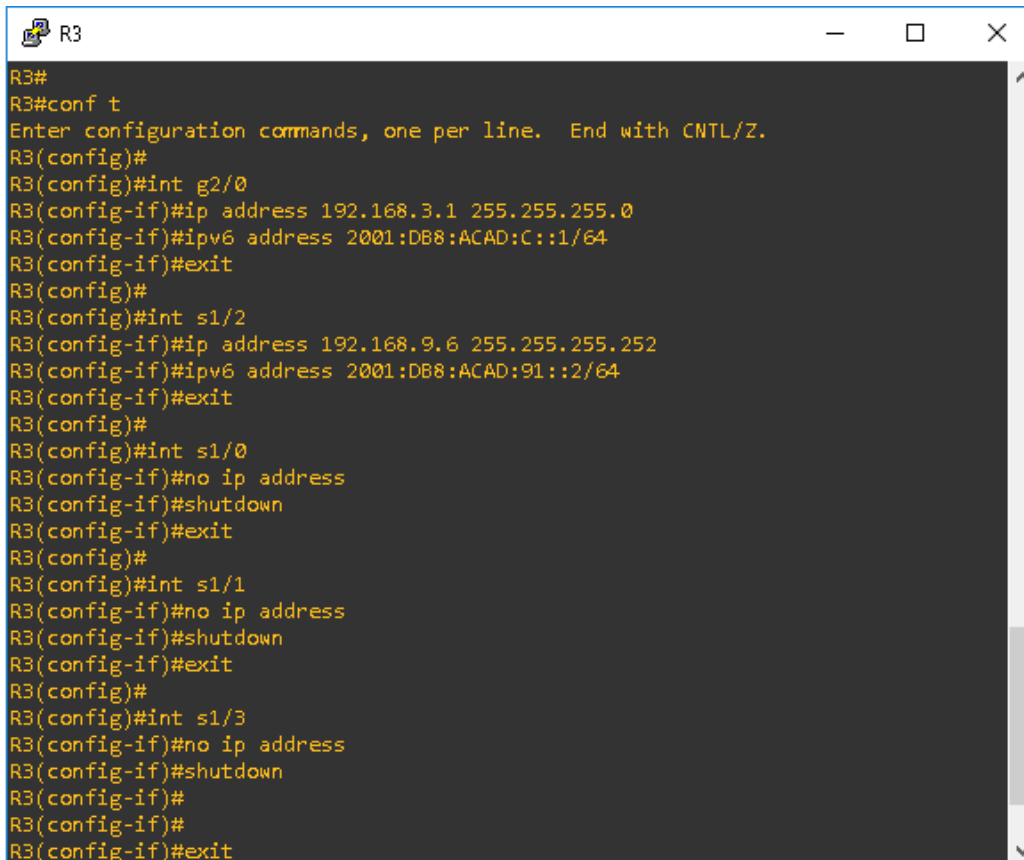
```
int g2/0
ip address 192.168.3.1 255.255.255.0
ipv6 address 2001:db8:acad:c::1/64
exit
```

```
int s1/2
ip address 192.168.9.6 255.255.255.252
ipv6 address 2001:db8:acad:91::2/64
exit
```

```
int s1/0
no ip address
shutdown
exit
```

```
int s1/1
no ip address
shutdown
exit
```

```
int s1/3
no ip address
shutdown
exit
```

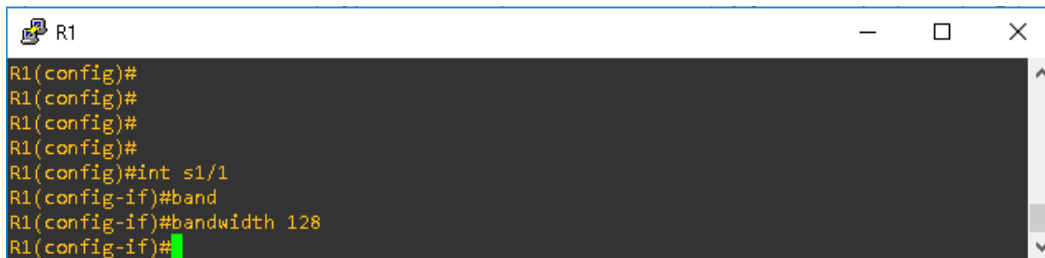


```
R3#
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#
R3(config)#int g2/0
R3(config-if)#ip address 192.168.3.1 255.255.255.0
R3(config-if)#ipv6 address 2001:DB8:ACAD:C::1/64
R3(config-if)#exit
R3(config)#
R3(config)#int s1/2
R3(config-if)#ip address 192.168.9.6 255.255.255.252
R3(config-if)#ipv6 address 2001:DB8:ACAD:91::2/64
R3(config-if)#exit
R3(config)#
R3(config)#int s1/0
R3(config-if)#no ip address
R3(config-if)#shutdown
R3(config-if)#exit
R3(config)#
R3(config)#int s1/1
R3(config-if)#no ip address
R3(config-if)#shutdown
R3(config-if)#exit
R3(config)#
R3(config)#int s1/3
R3(config-if)#no ip address
R3(config-if)#shutdown
R3(config-if)#
R3(config-if)#
R3(config-if)#exit
```

Figura 5, configuración interfaces R3 escenario 1

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.

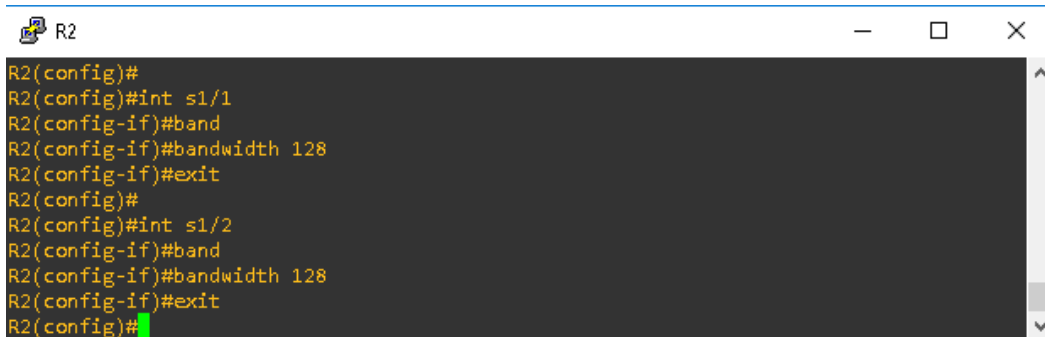
```
Int s1/1  
Bandwidth 128  
exit
```



```
R1  
R1(config)#  
R1(config)#  
R1(config)#  
R1(config)#  
R1(config)#int s1/1  
R1(config-if)#band  
R1(config-if)#bandwidth 128  
R1(config-if)#
```

Figura 6, ajustar el ancho de banda R1 escenario 1

```
Int s1/1  
Bandwidth 128  
exit
```



```
R2  
R2(config)#  
R2(config)#int s1/1  
R2(config-if)#band  
R2(config-if)#bandwidth 128  
R2(config-if)#exit  
R2(config)#  
R2(config)#int s1/2  
R2(config-if)#band  
R2(config-if)#bandwidth 128  
R2(config-if)#exit  
R2(config)#
```

Figura 7, ajustar el ancho de banda R2 escenario 1

```
Int s1/1  
Bandwidth 128  
exit
```



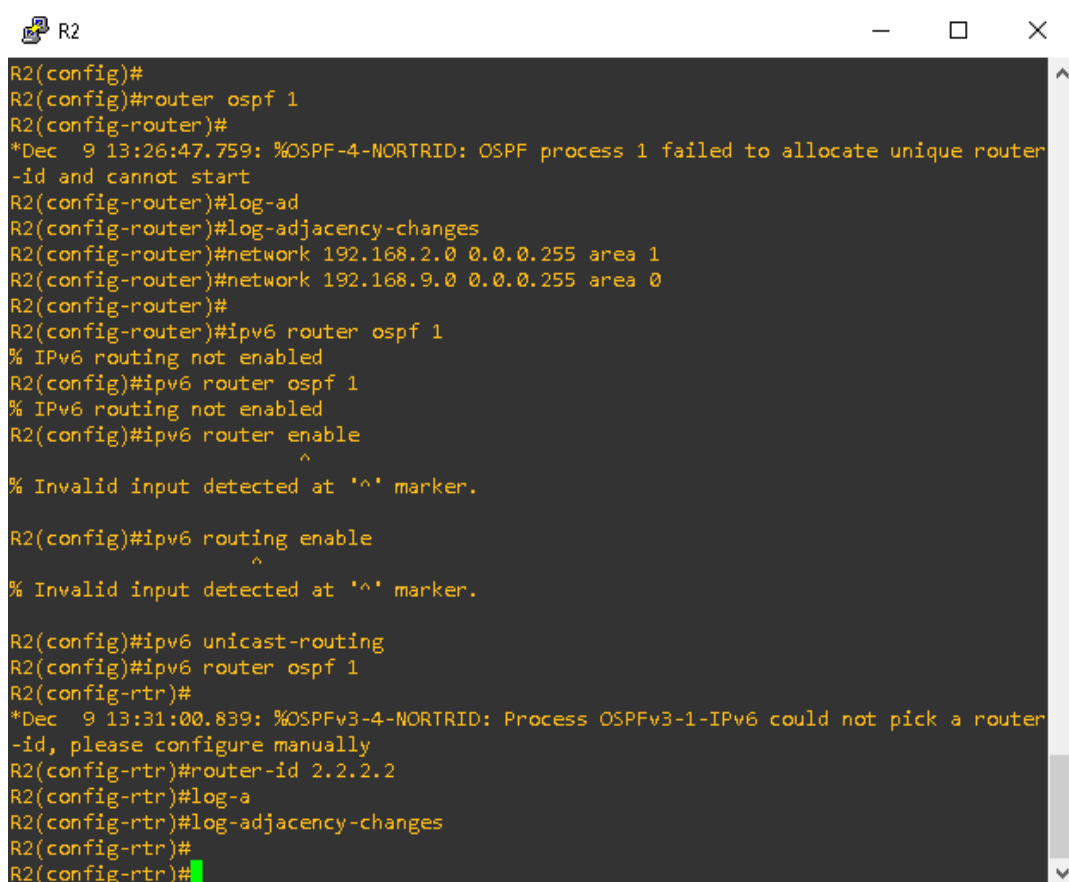
```
R3  
R3(config)#  
R3(config)#  
R3(config)#  
R3(config)#int s1/2  
R3(config-if)#band  
R3(config-if)#bandwidth 128  
R3(config-if)#exit  
R3(config)#
```

Figura 8, ajustar el ancho de banda R3 escenario 1

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.

R2

```
router ospf 1
log-ad
log-adjacency-changes
network 192.168.2.0 0.0.0.255 area1
network 192.168.9.0 0.0.0.255 area0
ipv6 router ospf 1
ipv6 unicast-routing
ipv6 router ospf 1
router-id 2.2.2.2
log-adjacency-changes
```

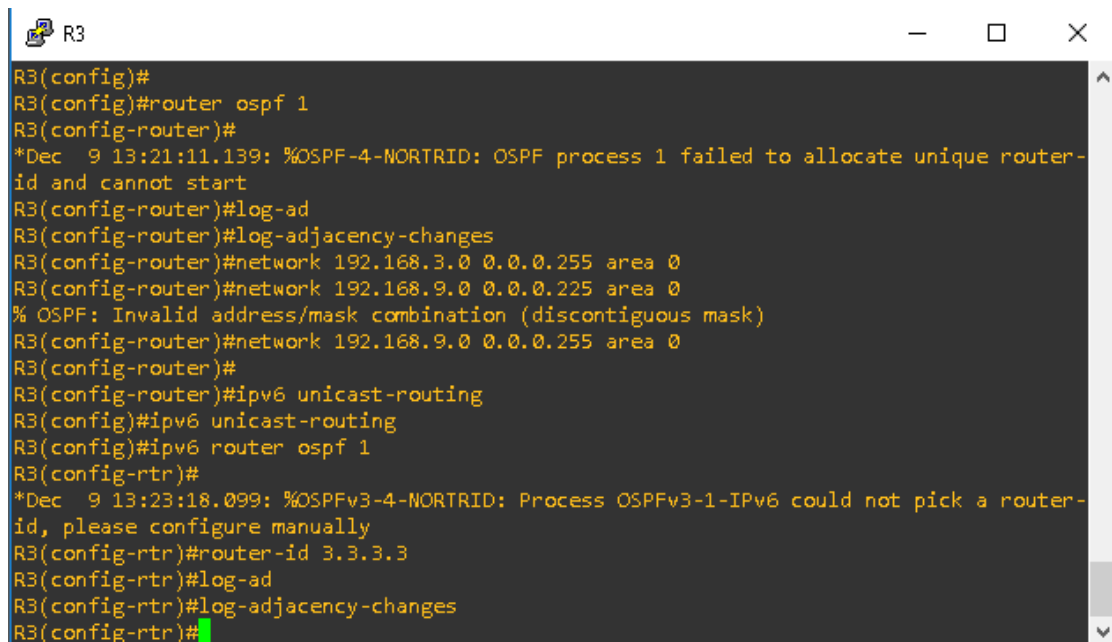


```
R2
R2(config)#
R2(config)#router ospf 1
R2(config-router)#
*Dec  9 13:26:47.759: %OSPF-4-NORTRID: OSPF process 1 failed to allocate unique router
-id and cannot start
R2(config-router)#log-ad
R2(config-router)#log-adjacency-changes
R2(config-router)#network 192.168.2.0 0.0.0.255 area 1
R2(config-router)#network 192.168.9.0 0.0.0.255 area 0
R2(config-router)#
R2(config-router)#ipv6 router ospf 1
% IPv6 routing not enabled
R2(config)#ipv6 router ospf 1
% IPv6 routing not enabled
R2(config)#ipv6 router enable
^
% Invalid input detected at '^' marker.
R2(config)#ipv6 routing enable
^
% Invalid input detected at '^' marker.
R2(config)#ipv6 unicast-routing
R2(config)#ipv6 router ospf 1
R2(config-rtr)#
*Dec  9 13:31:00.839: %OSPFv3-4-NORTRID: Process OSPFv3-1-IPv6 could not pick a router
-id, please configure manually
R2(config-rtr)#router-id 2.2.2.2
R2(config-rtr)#log-a
R2(config-rtr)#log-adjacency-changes
R2(config-rtr)#
R2(config-rtr)#
```

Figura 9, configurar las familias de direcciones OSPFv3 para IPv4 e IPv6 en R2

R3

```
Router ospf 1
Log-adjacency-changes
Network 192.168.3.0 0.0.0.255 area0
Network 192.168.9.0 0.0.0.255 area0
Ipv6 router ospf 1
Ipv6 unicast-routing
Ipv6 router ospf 1
Router-id 3.3.3.3
Log-adjacency-changes
```



```
R3
R3(config)#
R3(config)#router ospf 1
R3(config-router)#
*Dec  9 13:21:11.139: %OSPF-4-NORTRID: OSPF process 1 failed to allocate unique router-
id and cannot start
R3(config-router)#log-ad
R3(config-router)#log-adjacency-changes
R3(config-router)#network 192.168.3.0 0.0.0.255 area 0
R3(config-router)#network 192.168.9.0 0.0.0.225 area 0
% OSPF: Invalid address/mask combination (discontiguous mask)
R3(config-router)#network 192.168.9.0 0.0.0.255 area 0
R3(config-router)#
R3(config-router)#ipv6 unicast-routing
R3(config)#ipv6 unicast-routing
R3(config)#ipv6 router ospf 1
R3(config-rtr)#
*Dec  9 13:23:18.099: %OSPFv3-4-NORTRID: Process OSPFv3-1-IPv6 could not pick a router-
id, please configure manually
R3(config-rtr)#router-id 3.3.3.3
R3(config-rtr)#log-ad
R3(config-rtr)#log-adjacency-changes
R3(config-rtr)#
```

Figura 10, configurar las familias de direcciones OSPFv3 para IPv4 e IPv6 en R3

4. En R2, configurar la interfaz E0/0 en el área 1 de OSPF y la conexión serial entre R2 y R3 en OSPF área 0.

R2

```
int g2/0
ip ospf 1 area 1
exit
```

```
int s1/2
ip ospf 1 area 0
exit
```



```
R2
R2(config)#
R2(config)#int g2/0
R2(config-if)#ip ospf 1 area 1
R2(config-if)#exit
R2(config)#
R2(config)#int s1/2
R2(config-if)#ip ospf 1 area 0
R2(config-if)#exit
R2(config)#
```

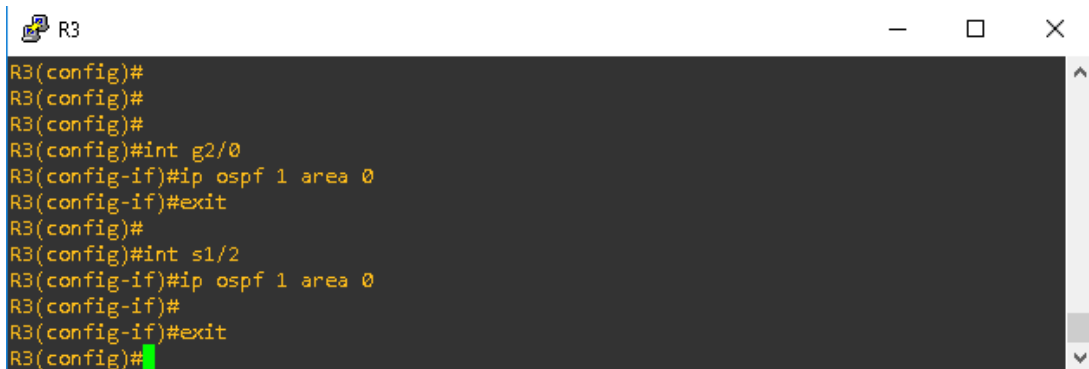
Figura 11, configurar la interfaz E0/0 en el área 1 de OSPF y la conexión serial

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

R3

```
int g2/0
ip ospf 1 area 0
exit
```

```
int s1/2
ip ospf 1 area 0
exit
```



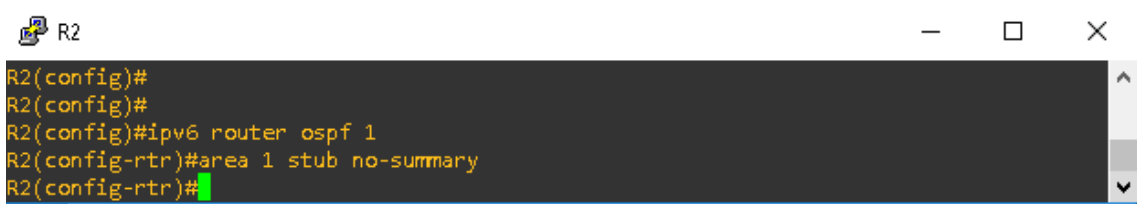
```
R3
R3(config)#
R3(config)#
R3(config)#
R3(config)#int g2/0
R3(config-if)#ip ospf 1 area 0
R3(config-if)#exit
R3(config)#
R3(config)#int s1/2
R3(config-if)#ip ospf 1 area 0
R3(config-if)#
R3(config-if)#exit
R3(config)#
```

Figura 12, configurar la interfaz F0/0 y la conexión serial entre R2 y R3 en OSPF

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

R2

```
ipv6 router ospf1
area 1 stub no-summary
```



```
R2
R2(config)#
R2(config)#
R2(config)#ipv6 router ospf 1
R2(config-rtr)#area 1 stub no-summary
R2(config-rtr)#
```

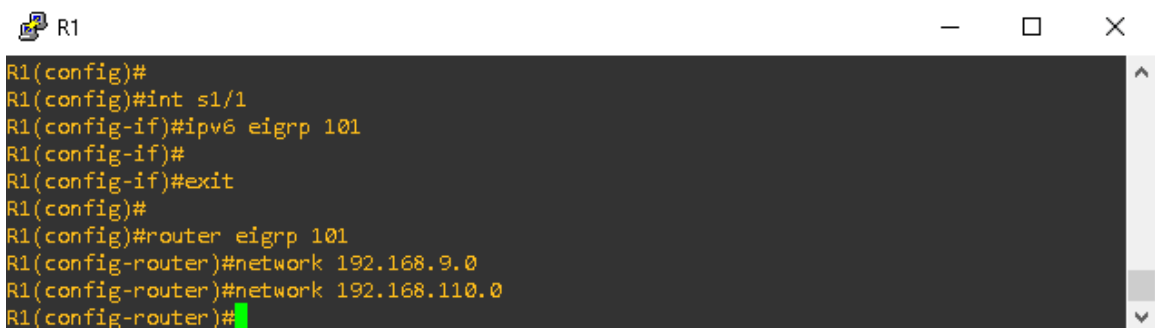
Figura 13, Configurar el área 1 como un área totalmente Stubby en R2

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.**
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.

R1

```
int s1/1
ipv6 eigrp 101
exit
```

```
router eigrp 101
network 192.168.9.0
network 192.168.110.0
```



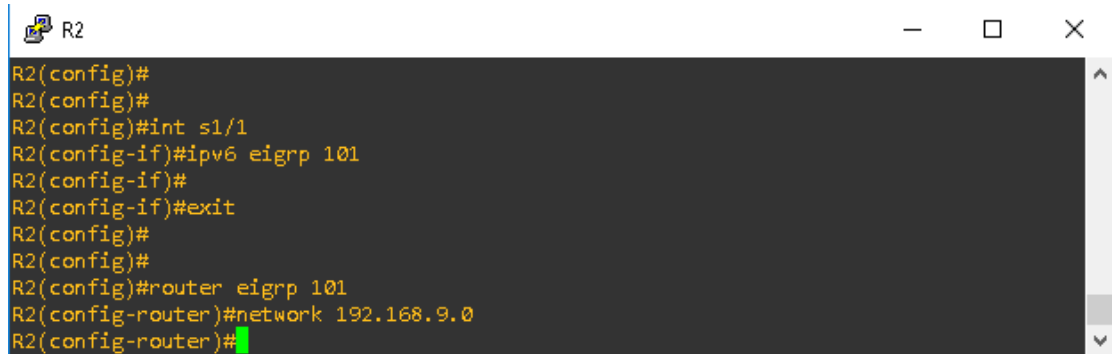
```
R1
R1(config)#
R1(config)#int s1/1
R1(config-if)#ipv6 eigrp 101
R1(config-if)#
R1(config-if)#exit
R1(config)#
R1(config)#router eigrp 101
R1(config-router)#network 192.168.9.0
R1(config-router)#network 192.168.110.0
R1(config-router)#
```

Figura 14, configuración del protocolo EIGRP para IPv4 como IPv6 en R1

R2

```
int s1/1
ipv6 eigrp 101
exit
```

```
router eigrp 101
network 192.168.9.0
```



```
R2
R2(config)#
R2(config)#
R2(config)#int s1/1
R2(config-if)#ipv6 eigrp 101
R2(config-if)#
R2(config-if)#exit
R2(config)#
R2(config)#
R2(config)#router eigrp 101
R2(config-router)#network 192.168.9.0
R2(config-router)#
```

Figura 15, configuración del protocolo EIGRP para IPv4 como IPv6 en R2

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

R1

```
ipv6 router eigrp 101
passive-interface g2/0
```



```
R1
R1(config)#
R1(config)#
R1(config)#ipv6 router eigrp 101
R1(config-rtr)#passive-interface g2/0
R1(config-rtr)#
```

Figura 16, Configurar las interfaces pasivas para EIGRP según sea apropiado

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

R2

```
router ospf 1
redistribute eigrp 101 subnets
exit
router eigrp 101
redistribute ospf 1 metric 10000 100 255 1 1500
exit
```

```
R2
R2(config)#
R2(config)#
R2(config)#router ospf 1
R2(config-router)#red
R2(config-router)#redistribute eigrp 101 su
R2(config-router)#redistribute eigrp 101 subnets
R2(config-router)#exit
R2(config)#
R2(config)#eouter eigrp 101
^
% Invalid input detected at '^' marker.
R2(config)#router eigrp 101
R2(config-router)#redis
R2(config-router)#redistribute ospf 1 metric 10000 100 255 1 1500
R2(config-router)#exit
R2(config)#
```

Figura 17, configurar la redistribución mutua entre OSPF y EIGRP para IPv4 e IPv6

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

```
ip access-list standar ospf-filter
emark used with dlist to filter ospf 1
deny 192.168.3.0 0.0.0.255
permit eny
```

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.

R1

```
ip route eigrp
```

```
R1
R1#show ip route eigrp
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

R1#
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

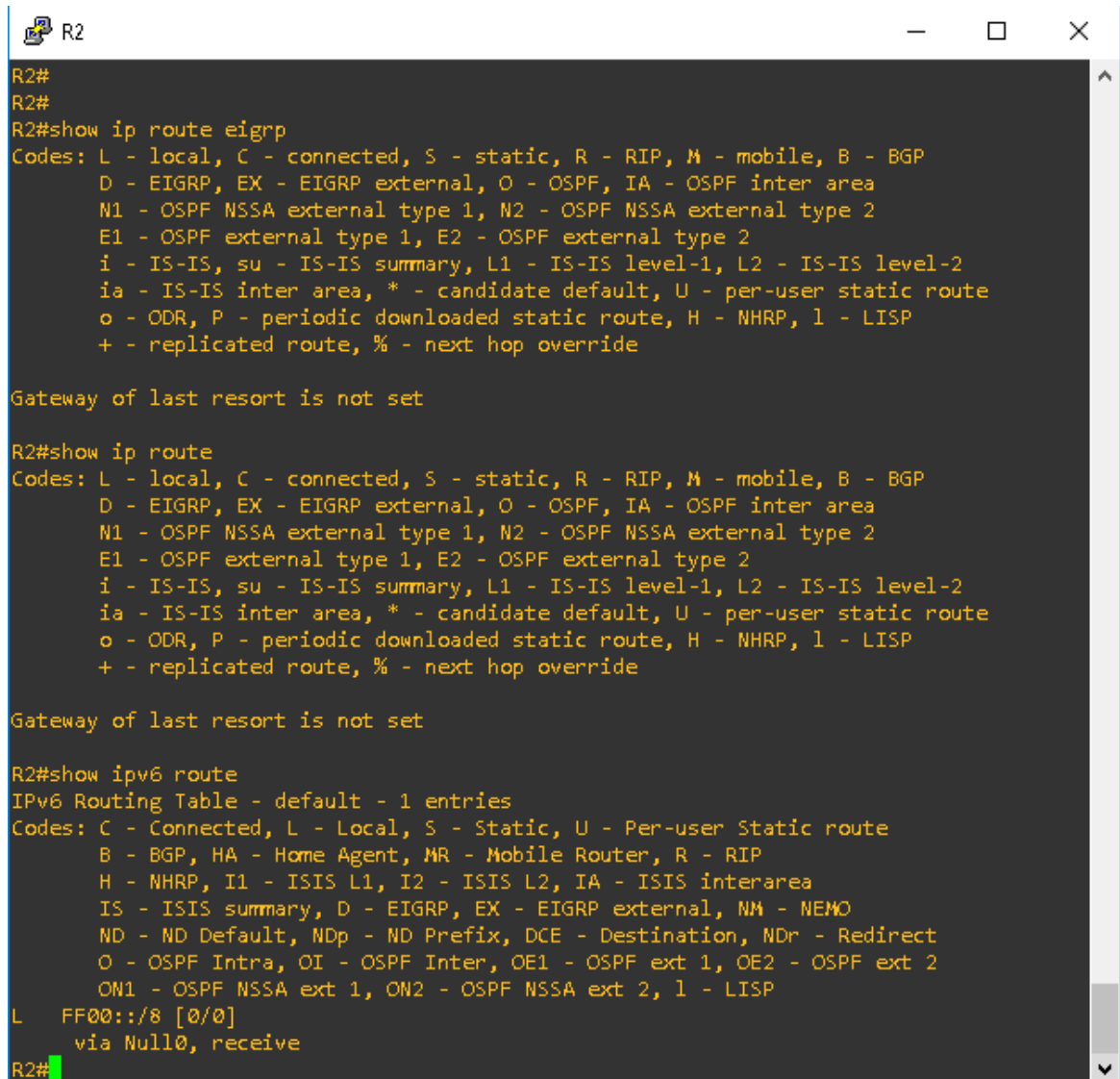
Gateway of last resort is not set

R1#show ipv6 route
IPv6 Routing Table - default - 1 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
L   FF00::/8 [0/0]
   via Null0, receive
R1#
```

Figura 18, Verificar conectividad de red y control de la trayectoria R1

R2

ip route eigrp



```
R2#
R2#
R2#show ip route eigrp
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

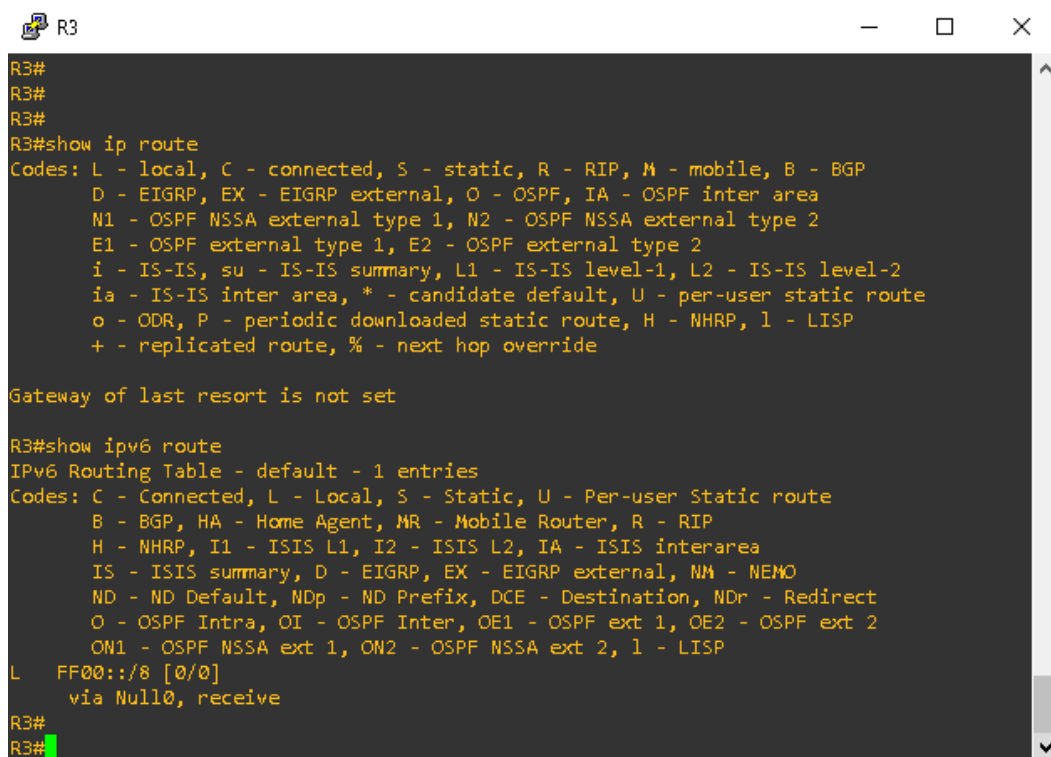
R2#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - 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 not set

R2#show ipv6 route
IPv6 Routing Table - default - 1 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
L   FF00::/8 [0/0]
   via Null0, receive
R2#
```

Figura 19, Verificar conectividad de red y control de la trayectoria R2

ip route



```
R3#
R3#
R3#
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

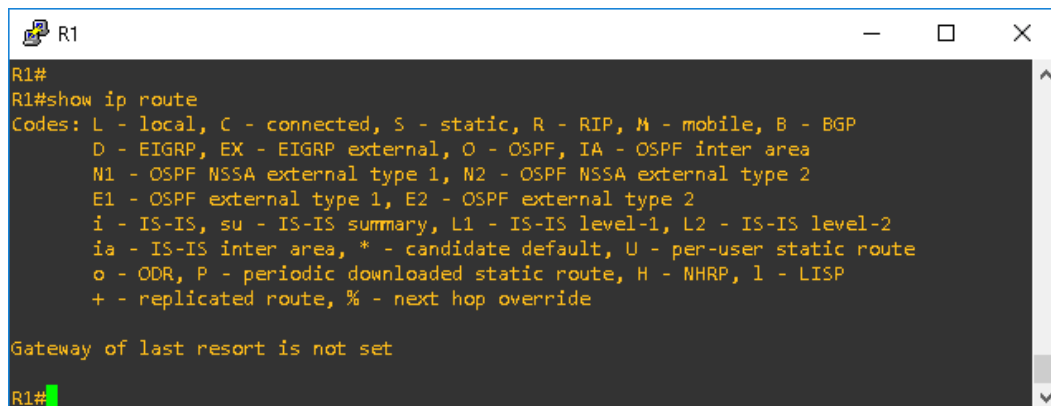
Gateway of last resort is not set

R3#show ipv6 route
IPv6 Routing Table - default - 1 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
L   FF00::/8 [0/0]
    via Null0, receive
R3#
R3#
```

Figura 20, Verificar conectividad de red y control de la trayectoria R3

- b. Verificar comunicación entre routers mediante el comando ping y traceroute
- c. Verificar que las rutas filtradas no están presentes en las tablas de enrutamiento de los routers correctas.

ip route



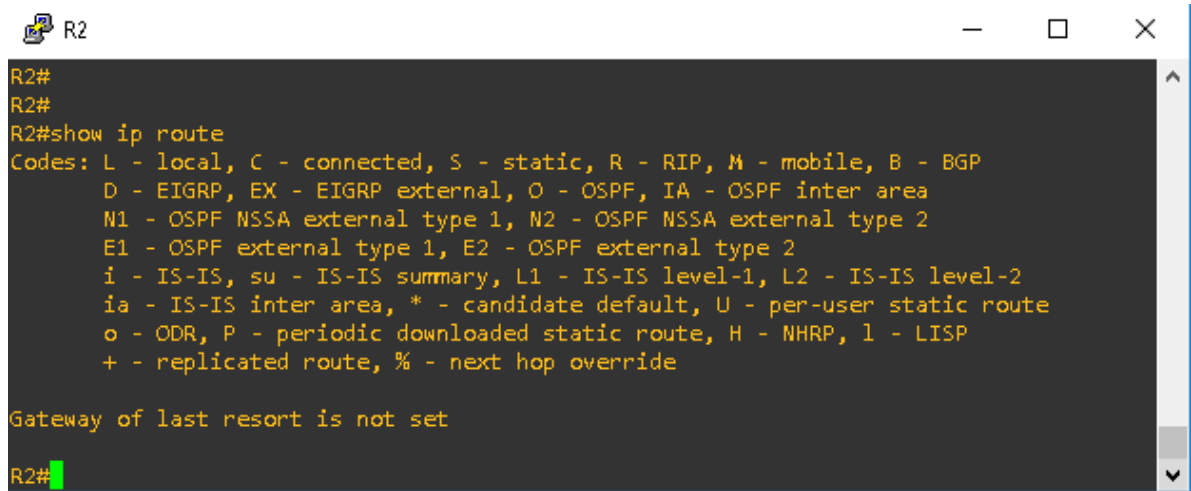
```
R1#
R1#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
i - IS-IS, su - IS-IS summary, 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 not set

R1#
```

Figura 21, Verificar que las rutas filtradas en R1

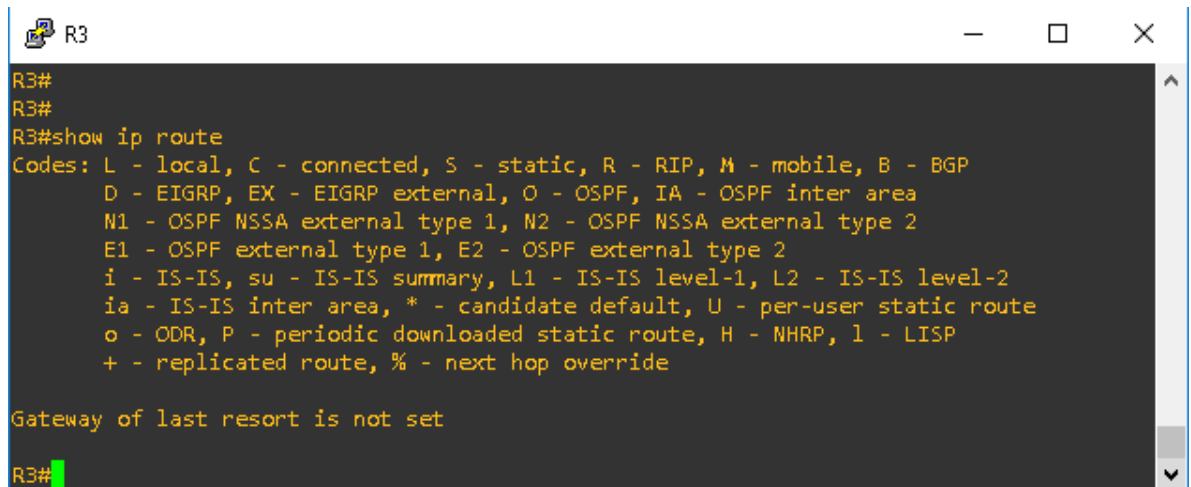
R2
ip route



```
R2#  
R2#  
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 not set  
  
R2#
```

Figura 22, Verificar que las rutas filtradas en R2

R3
ip route



```
R3#  
R3#  
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  
  
R3#
```

Figura 23, Verificar que las rutas filtradas en R3

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.

R1

Copy running-config startup-config



```
R2#
R2#
R2#
R2#
R2#
R2#
R2#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]
R2#
```

Figura 24, guardar configuracon en la RAM en R2

R1

Copy running-config startup-config



```
R3#
R3#
R3#
R3#^copy running-config startup-config
^
% Invalid input detected at '^' marker.

R3#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]
R3#
```

Figura 25, guardar configuracon en la RAM en R3

ESCENARIO 2

Una empresa de comunicaciones presenta una estructura Core acorde a la topología de red, en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los lineamientos establecidos para el direccionamiento IP, etherchannels, VLANs y demás aspectos que forman parte del escenario propuesto. **Topología de red**

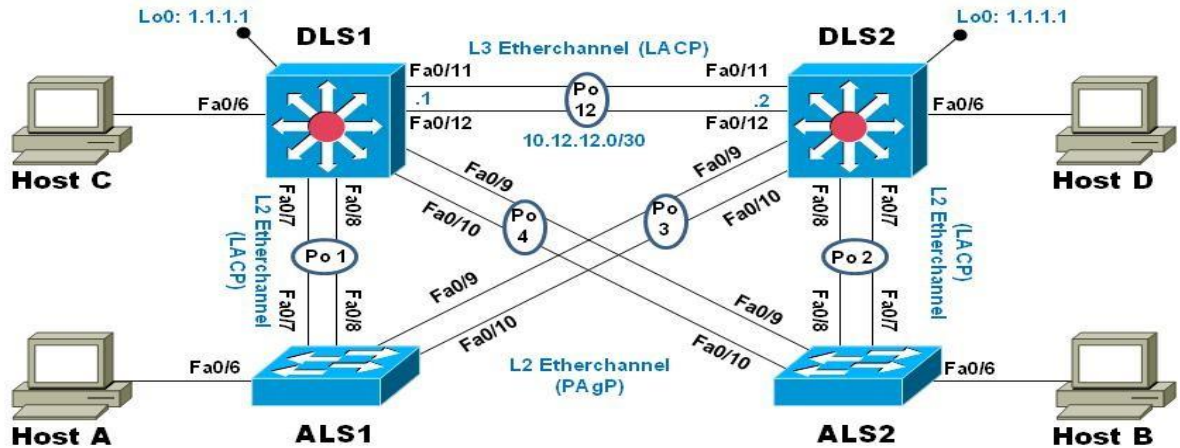


Figura 26, topología de red sugerida escenario 2

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

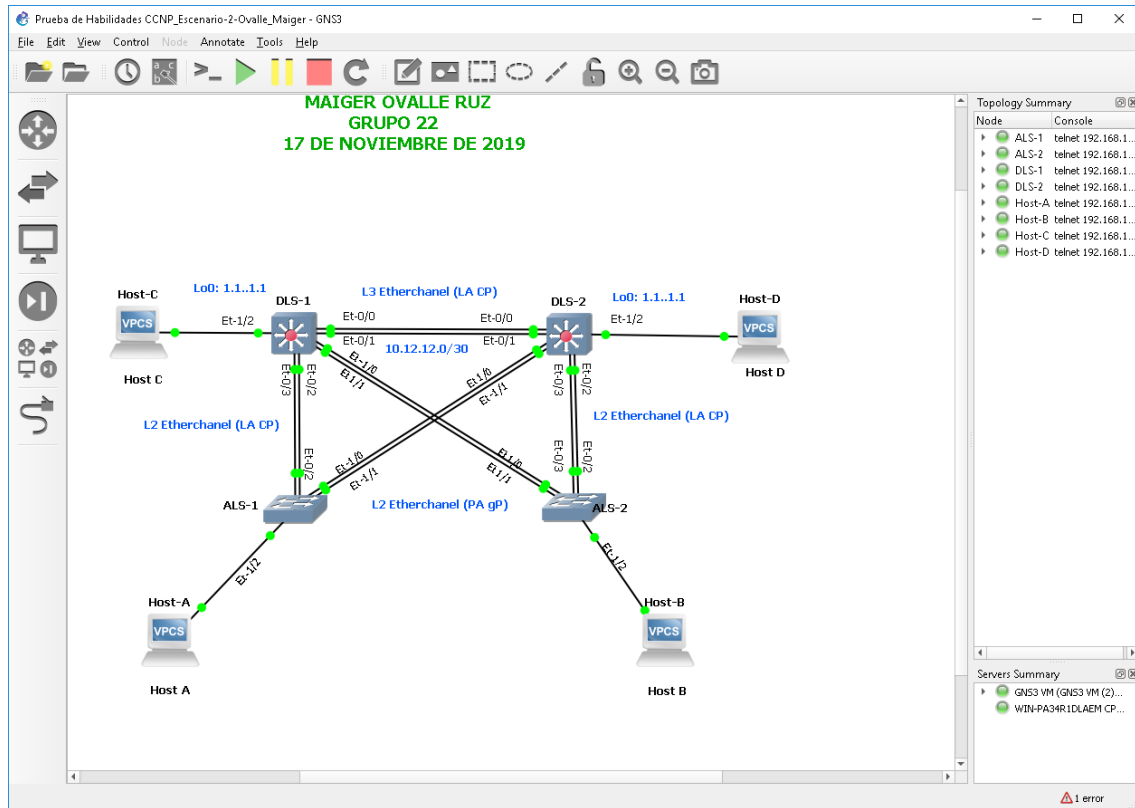


Figura 27, topología de red creada en GNS3 escenario 2

a. Apagar todas las interfaces en cada switch.

ALS2

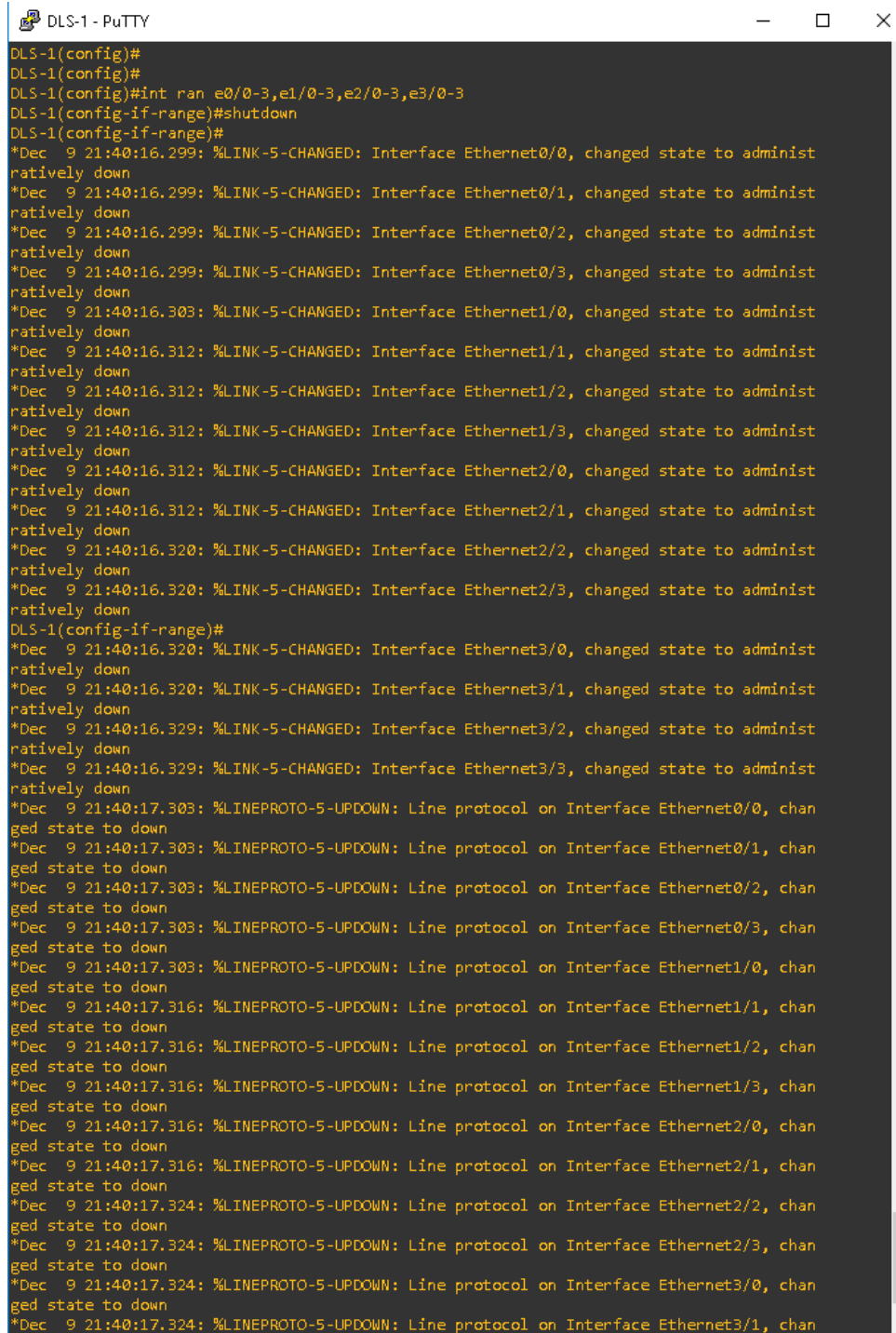
```
int ran e0/0-3,e1/0-3,e2/0-3,e3/0-3
```

```
ALS-2 - PuTTY
ALS-2(config)#
ALS-2(config)#int ran e0/0-3,e1/0-3,e2/0-3,e3/0-3
ALS-2(config-if-range)#shutdown
ALS-2(config-if-range)#
*Dec 9 21:41:44.777: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to administratively down
*Dec 9 21:41:44.778: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively down
*Dec 9 21:41:44.778: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to administratively down
*Dec 9 21:41:44.784: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to administratively down
*Dec 9 21:41:44.784: %LINK-5-CHANGED: Interface Ethernet1/0, changed state to administratively down
*Dec 9 21:41:44.784: %LINK-5-CHANGED: Interface Ethernet1/1, changed state to administratively down
*Dec 9 21:41:44.789: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to administratively down
*Dec 9 21:41:44.789: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to administratively down
*Dec 9 21:41:44.789: %LINK-5-CHANGED: Interface Ethernet2/0, changed state to administratively down
*Dec 9 21:41:44.798: %LINK-5-CHANGED: Interface Ethernet2/1, changed state to administratively down
*Dec 9 21:41:44.798: %LINK-5-CHANGED: Interface Ethernet2/2, changed state to administratively down
*Dec 9 21:41:44.798: %LINK-5-CHANGED: Interface Ethernet2/3, changed state to administratively down
ALS-2(config-if-range)#
*Dec 9 21:41:44.798: %LINK-5-CHANGED: Interface Ethernet3/0, changed state to administratively down
*Dec 9 21:41:44.798: %LINK-5-CHANGED: Interface Ethernet3/1, changed state to administratively down
*Dec 9 21:41:44.806: %LINK-5-CHANGED: Interface Ethernet3/2, changed state to administratively down
*Dec 9 21:41:44.806: %LINK-5-CHANGED: Interface Ethernet3/3, changed state to administratively down
*Dec 9 21:41:45.778: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to down
*Dec 9 21:41:45.778: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*Dec 9 21:41:45.778: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
*Dec 9 21:41:45.789: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to down
*Dec 9 21:41:45.789: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to down
*Dec 9 21:41:45.789: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
*Dec 9 21:41:45.789: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to down
*Dec 9 21:41:45.789: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/3, changed state to down
*Dec 9 21:41:45.789: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to down
*Dec 9 21:41:45.802: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to down
*Dec 9 21:41:45.802: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to down
*Dec 9 21:41:45.802: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to down
*Dec 9 21:41:45.802: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/0, changed state to down
*Dec 9 21:41:45.802: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/1, changed state to down
```

Figura 28, Apagar todas las interfaces ALS2

DLS1

int ran e0/0-3,e1/0-3,e2/0-3,e3/0-3

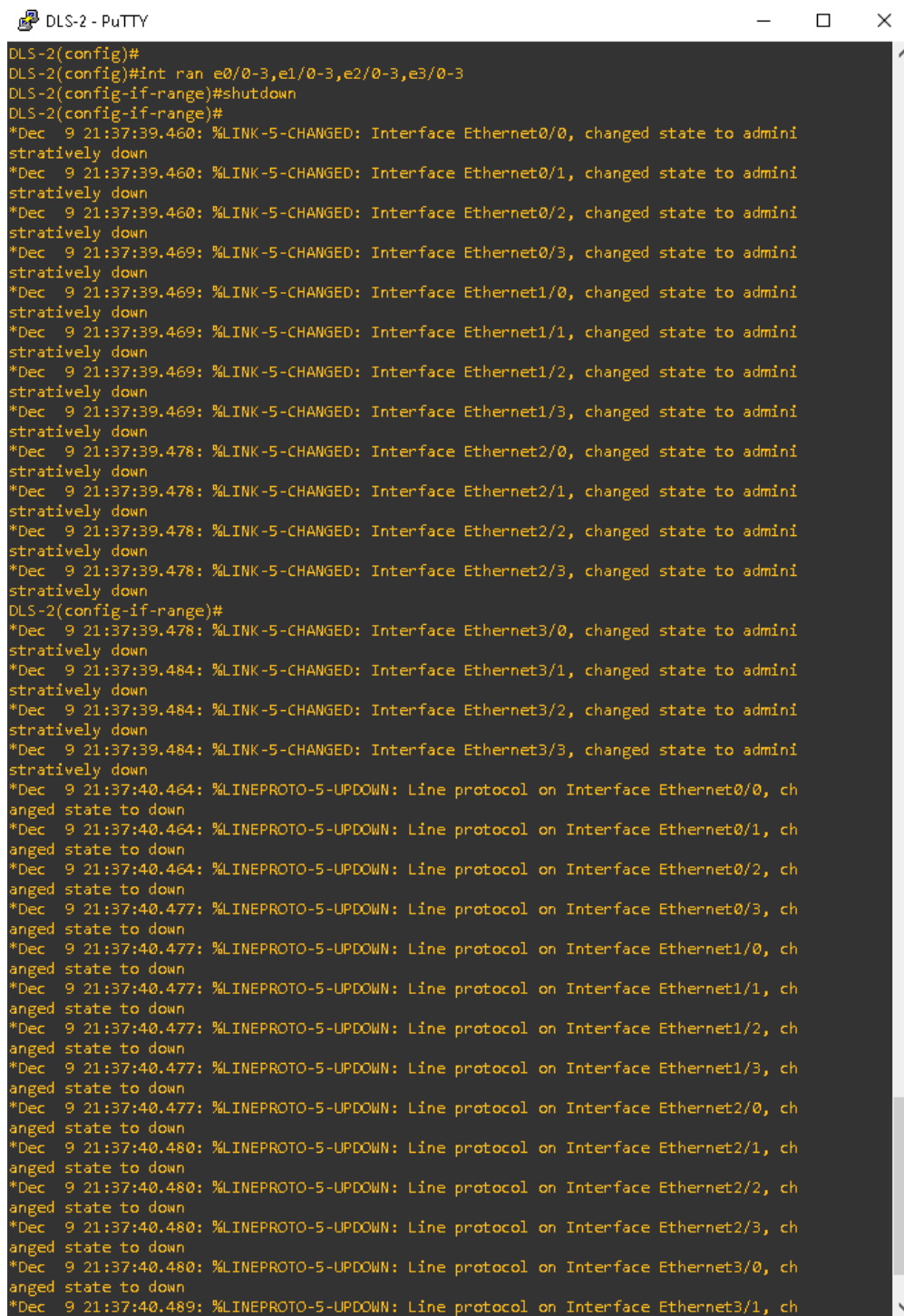


```
DLS-1 - PuTTY
DLS-1(config)#
DLS-1(config)#
DLS-1(config)#int ran e0/0-3,e1/0-3,e2/0-3,e3/0-3
DLS-1(config-if-range)#shutdown
DLS-1(config-if-range)#
*Dec 9 21:40:16.299: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to administratively down
*Dec 9 21:40:16.299: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively down
*Dec 9 21:40:16.299: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to administratively down
*Dec 9 21:40:16.299: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to administratively down
*Dec 9 21:40:16.303: %LINK-5-CHANGED: Interface Ethernet1/0, changed state to administratively down
*Dec 9 21:40:16.312: %LINK-5-CHANGED: Interface Ethernet1/1, changed state to administratively down
*Dec 9 21:40:16.312: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to administratively down
*Dec 9 21:40:16.312: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to administratively down
*Dec 9 21:40:16.312: %LINK-5-CHANGED: Interface Ethernet2/0, changed state to administratively down
*Dec 9 21:40:16.312: %LINK-5-CHANGED: Interface Ethernet2/1, changed state to administratively down
*Dec 9 21:40:16.320: %LINK-5-CHANGED: Interface Ethernet2/2, changed state to administratively down
*Dec 9 21:40:16.320: %LINK-5-CHANGED: Interface Ethernet2/3, changed state to administratively down
DLS-1(config-if-range)#
*Dec 9 21:40:16.320: %LINK-5-CHANGED: Interface Ethernet3/0, changed state to administratively down
*Dec 9 21:40:16.320: %LINK-5-CHANGED: Interface Ethernet3/1, changed state to administratively down
*Dec 9 21:40:16.329: %LINK-5-CHANGED: Interface Ethernet3/2, changed state to administratively down
*Dec 9 21:40:16.329: %LINK-5-CHANGED: Interface Ethernet3/3, changed state to administratively down
*Dec 9 21:40:17.303: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to down
*Dec 9 21:40:17.303: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*Dec 9 21:40:17.303: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
*Dec 9 21:40:17.303: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to down
*Dec 9 21:40:17.303: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to down
*Dec 9 21:40:17.316: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
*Dec 9 21:40:17.316: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to down
*Dec 9 21:40:17.316: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/3, changed state to down
*Dec 9 21:40:17.316: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to down
*Dec 9 21:40:17.316: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to down
*Dec 9 21:40:17.324: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to down
*Dec 9 21:40:17.324: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to down
*Dec 9 21:40:17.324: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/0, changed state to down
*Dec 9 21:40:17.324: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/1, chan
```

Figura 29, Apagar todas las interfaces DLS1

DLS2

int ran e0/0-3,e1/0-3,e2/0-3,e3/0-3

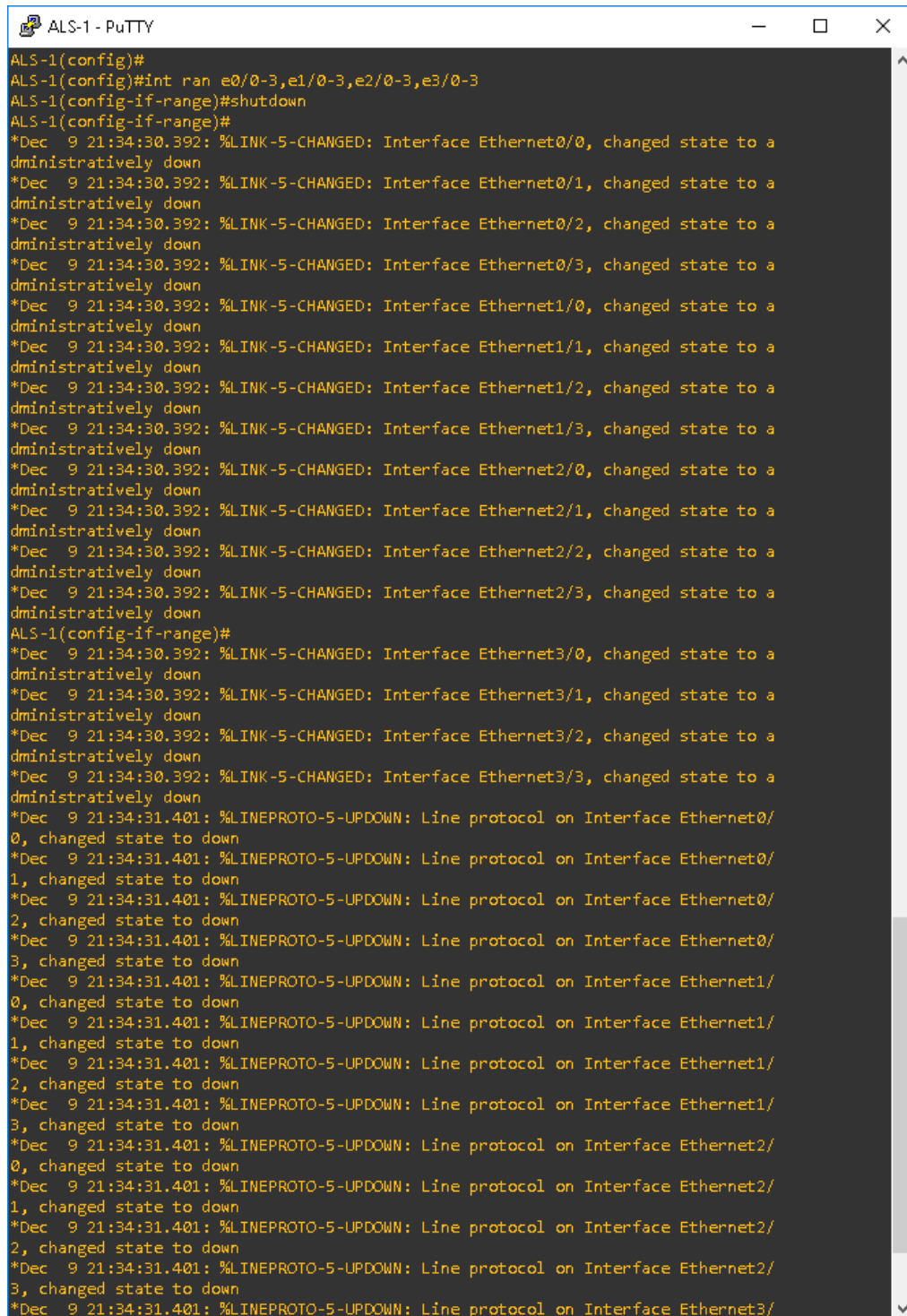


```
DLS-2 - PuTTY
DLS-2(config)#
DLS-2(config)#int ran e0/0-3,e1/0-3,e2/0-3,e3/0-3
DLS-2(config-if-range)#shutdown
DLS-2(config-if-range)#
*Dec 9 21:37:39.460: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to administratively down
*Dec 9 21:37:39.460: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively down
*Dec 9 21:37:39.460: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to administratively down
*Dec 9 21:37:39.469: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to administratively down
*Dec 9 21:37:39.469: %LINK-5-CHANGED: Interface Ethernet1/0, changed state to administratively down
*Dec 9 21:37:39.469: %LINK-5-CHANGED: Interface Ethernet1/1, changed state to administratively down
*Dec 9 21:37:39.469: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to administratively down
*Dec 9 21:37:39.469: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to administratively down
*Dec 9 21:37:39.478: %LINK-5-CHANGED: Interface Ethernet2/0, changed state to administratively down
*Dec 9 21:37:39.478: %LINK-5-CHANGED: Interface Ethernet2/1, changed state to administratively down
*Dec 9 21:37:39.478: %LINK-5-CHANGED: Interface Ethernet2/2, changed state to administratively down
*Dec 9 21:37:39.478: %LINK-5-CHANGED: Interface Ethernet2/3, changed state to administratively down
DLS-2(config-if-range)#
*Dec 9 21:37:39.478: %LINK-5-CHANGED: Interface Ethernet3/0, changed state to administratively down
*Dec 9 21:37:39.484: %LINK-5-CHANGED: Interface Ethernet3/1, changed state to administratively down
*Dec 9 21:37:39.484: %LINK-5-CHANGED: Interface Ethernet3/2, changed state to administratively down
*Dec 9 21:37:39.484: %LINK-5-CHANGED: Interface Ethernet3/3, changed state to administratively down
*Dec 9 21:37:40.464: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to down
*Dec 9 21:37:40.464: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*Dec 9 21:37:40.464: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
*Dec 9 21:37:40.477: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to down
*Dec 9 21:37:40.477: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to down
*Dec 9 21:37:40.477: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
*Dec 9 21:37:40.477: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to down
*Dec 9 21:37:40.477: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/3, changed state to down
*Dec 9 21:37:40.477: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to down
*Dec 9 21:37:40.480: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to down
*Dec 9 21:37:40.480: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to down
*Dec 9 21:37:40.480: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to down
*Dec 9 21:37:40.480: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/0, changed state to down
*Dec 9 21:37:40.489: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/1, ch
```

Figura 30, Apagar todas las interfaces DLS2

ALS1

int ran e0/0-3,e1/0-3,e2/0-3,e3/0-3

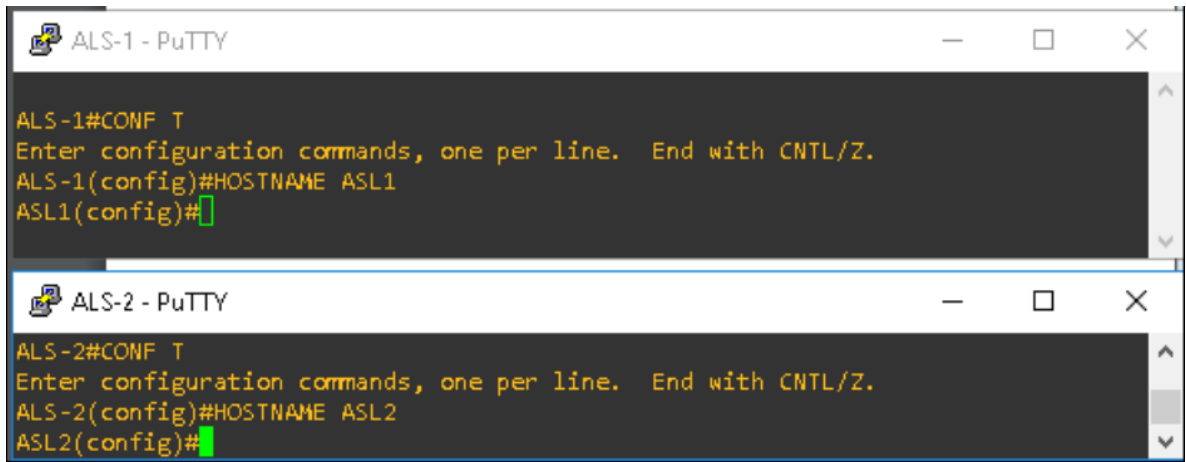


```
ALS-1 - PuTTY
ALS-1(config)#
ALS-1(config)#int ran e0/0-3,e1/0-3,e2/0-3,e3/0-3
ALS-1(config-if-range)#shutdown
ALS-1(config-if-range)#
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to a
dministratively down
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to a
dministratively down
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to a
dministratively down
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to a
dministratively down
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet1/0, changed state to a
dministratively down
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet1/1, changed state to a
dministratively down
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to a
dministratively down
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to a
dministratively down
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet2/0, changed state to a
dministratively down
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet2/1, changed state to a
dministratively down
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet2/2, changed state to a
dministratively down
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet2/3, changed state to a
dministratively down
ALS-1(config-if-range)#
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet3/0, changed state to a
dministratively down
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet3/1, changed state to a
dministratively down
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet3/2, changed state to a
dministratively down
*Dec 9 21:34:30.392: %LINK-5-CHANGED: Interface Ethernet3/3, changed state to a
dministratively down
*Dec 9 21:34:31.401: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
0, changed state to down
*Dec 9 21:34:31.401: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
1, changed state to down
*Dec 9 21:34:31.401: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
2, changed state to down
*Dec 9 21:34:31.401: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
3, changed state to down
*Dec 9 21:34:31.401: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
0, changed state to down
*Dec 9 21:34:31.401: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
1, changed state to down
*Dec 9 21:34:31.401: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
2, changed state to down
*Dec 9 21:34:31.401: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
3, changed state to down
*Dec 9 21:34:31.401: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/
0, changed state to down
*Dec 9 21:34:31.401: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/
1, changed state to down
*Dec 9 21:34:31.401: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/
2, changed state to down
*Dec 9 21:34:31.401: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/
3, changed state to down
*Dec 9 21:34:31.401: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/
```

Figura 31, Apagar todas las interfaces ALS1

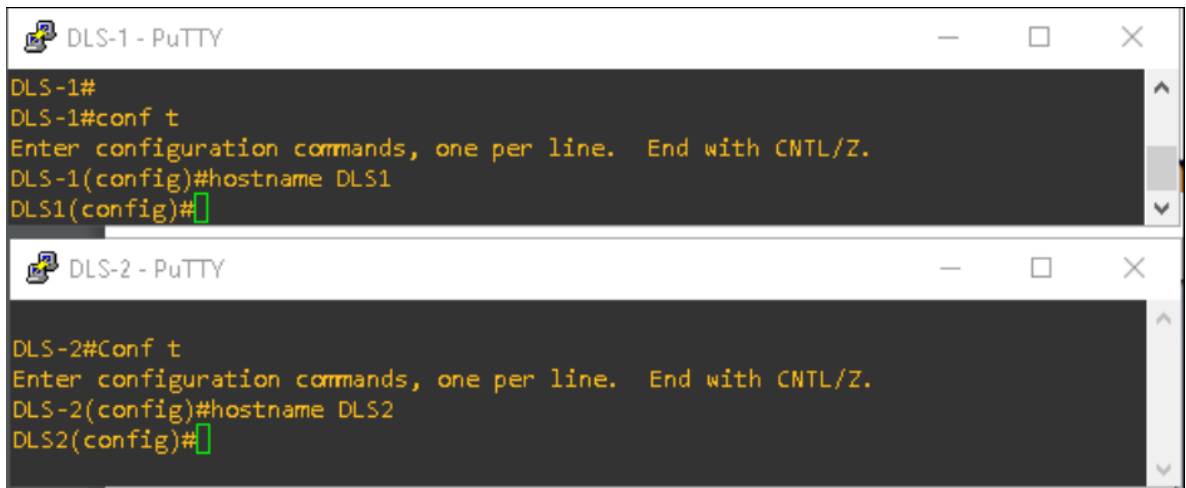
- b. Asignar un nombre a cada switch acorde al escenario establecido.

hostname



The image shows two PuTTY terminal windows. The top window, titled 'ALS-1 - PuTTY', displays the following text: 'ALS-1#CONF T', 'Enter configuration commands, one per line. End with CNTL/Z.', 'ALS-1(config)#HOSTNAME ASL1', and 'ASL1(config)#'. The bottom window, titled 'ALS-2 - PuTTY', displays: 'ALS-2#CONF T', 'Enter configuration commands, one per line. End with CNTL/Z.', 'ALS-2(config)#HOSTNAME ASL2', and 'ASL2(config)#'.

Figura 32, Asignar un nombre a cada switch ALS1 – ALS2



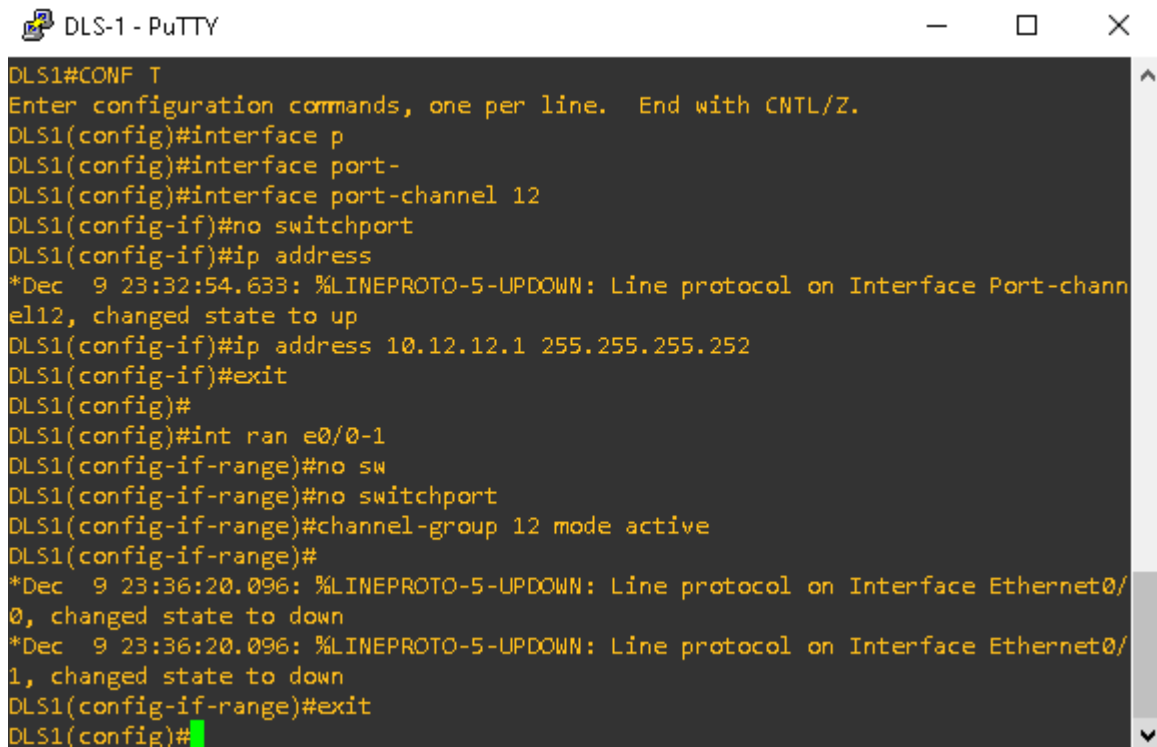
The image shows two PuTTY terminal windows. The top window, titled 'DLS-1 - PuTTY', displays the following text: 'DLS-1#', 'DLS-1#conf t', 'Enter configuration commands, one per line. End with CNTL/Z.', 'DLS-1(config)#hostname DLS1', and 'DLS1(config)#'. The bottom window, titled 'DLS-2 - PuTTY', displays: 'DLS-2#Conf t', 'Enter configuration commands, one per line. End with CNTL/Z.', 'DLS-2(config)#hostname DLS2', and 'DLS2(config)#'.

Figura 33, Asignar un nombre a cada switch DLS1 – DLS2

- 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.

```
int port-chanel 12
```

```
no switchport
ip address 10.12.12.1 255.255.255.252
exit
int ran e0/0-1
no switchport
channel-group 12 mode active
exit
```



```
DLS-1 - PuTTY
DLS1#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface p
DLS1(config)#interface port-
DLS1(config)#interface port-channel 12
DLS1(config-if)#no switchport
DLS1(config-if)#ip address
*Dec 9 23:32:54.633: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-chann
el12, changed state to up
DLS1(config-if)#ip address 10.12.12.1 255.255.255.252
DLS1(config-if)#exit
DLS1(config)#
DLS1(config)#int ran e0/0-1
DLS1(config-if-range)#no sw
DLS1(config-if-range)#no switchport
DLS1(config-if-range)#channel-group 12 mode active
DLS1(config-if-range)#
*Dec 9 23:36:20.096: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
0, changed state to down
*Dec 9 23:36:20.096: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
1, changed state to down
DLS1(config-if-range)#exit
DLS1(config)#
```

Figura 34, Configurar los puertos troncales y Port-channels DLS1

```
int port-chanel 12
no switchport
ip address 10.12.12.1 255.255.255.252
exit
```

```
int ran e0/0-1
no switchport
channel-group 12 mode active
exit
```

```
DLS2#
DLS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#interface port
DLS2(config)#interface port-ch
DLS2(config)#interface port-channel 12
DLS2(config-if)#no switchport
DLS2(config-if)#ip address
*Dec  9 23:37:43.308: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-chann
el12, changed state to up
DLS2(config-if)#ip address 10.12.12.2 255.255.255.252
DLS2(config-if)#exit
DLS2(config)#
DLS2(config)#int ran e0/0-1
DLS2(config-if-range)#no switchport
DLS2(config-if-range)#channel-group 12 mode active
^
% Invalid input detected at '^' marker.
DLS2(config-if-range)#channel-group 12 mode active
DLS2(config-if-range)#
*Dec  9 23:39:29.523: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
0, changed state to down
*Dec  9 23:39:29.523: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
1, changed state to down
DLS2(config-if-range)#exit
DLS2(config)#
```

Figura 35, Configurar los puertos troncales y Port-channels DLS2

2) Los Port-channels en las interfaces e0/2 y e0/3 utilizarán LACP.

```
int ran e0/2-3
switchport trunk encapsulation dot1q
switchport mode trunk
channel-group 1 mode active
no shutdown
end
```

```
show etherchannel summary
```

```

DLS1#
DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#int ran e0/2-3
DLS1(config-if-range)#switchport trunk encapsulation dot1q
DLS1(config-if-range)#switchport mode trunk
DLS1(config-if-range)#
DLS1(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1

DLS1(config-if-range)#no shutdown
DLS1(config-if-range)#
*Dec  9 23:44:50.447: %LINK-3-UPDOWN: Interface Ethernet0/2, changed state to up
*Dec  9 23:44:50.447: %LINK-3-UPDOWN: Interface Ethernet0/3, changed state to up
DLS1(config-if-range)#
DLS1(config-if-range)#end
DLS1#
DLS1#s
*Dec  9 23:44:55.757: %SYS-5-CONFIG_I: Configured from console by console
DLS1#sho
*Dec  9 23:44:59.958: %EC-5-L3DONTBNDL2: Et0/2 suspended: LACP currently not ena
bled on the remote port.
*Dec  9 23:45:00.138: %EC-5-L3DONTBNDL2: Et0/3 suspended: LACP currently not ena
bled on the remote port.
DLS1#
DLS1#show etherchannel summary
Flags:  D - down          P - bundled 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

        M - not in use, minimum links not met
        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(SD)        LACP       Et0/2(s)  Et0/3(s)
12     Po12(RD)       LACP       Et0/0(D)  Et0/1(D)
DLS1#

```

Figura 36, Port-channels en las interfaces e0/2 y e0/3 utilizarán LACP.DLS1

```

int ran e0/2-3
switchport trunk encapsulation dot1q
switchport mode trunk
channel-group 1 mode active
no shutdown
end

```

```
show etherchannel summary
```

```

ALS-1 - PuTTY
ASL1(config)#
ASL1(config)#int ran e0/2-3
ASL1(config-if-range)#switchport trunk encapsulation dot1q
ASL1(config-if-range)#switchport mode trunk
ASL1(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1

ASL1(config-if-range)#no shutdown
ASL1(config-if-range)#
*Dec  9 23:49:57.861: %LINK-3-UPDOWN: Interface Ethernet0/2, changed state to up
*Dec  9 23:49:57.861: %LINK-3-UPDOWN: Interface Ethernet0/3, changed state to up
ASL1(config-if-range)#
*Dec  9 23:49:59.868: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
3, changed state to up
*Dec  9 23:49:59.872: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
2, changed state to up
ASL1(config-if-range)#
*Dec  9 23:50:03.647: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-chann
el1, changed state to up
ASL1(config-if-range)#
ASL1(config-if-range)#end
ASL1#
ASL1#
ASL1#show etherchannel summary
*Dec  9 23:50:14.631: %SYS-5-CONFIG_I: Configured from console by console
ASL1#show etherchannel summary
Flags: D - down          P - bundled 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

       M - not in use, minimum links not met
       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        Et0/2(P)   Et0/3(P)

ASL1#

```

Figura 37, Port-channels en las interfaces e0/2 y e0/3 utilizarán LACP.ALS1

```

int ran e0/2-3
switchport trunk encapsulation dot1q
switchport mode trunk
channel-group 1 mode active
no shutdown
end

```

```
show etherchannel summary
```

```

DLS2#
DLS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#
DLS2(config)#int ran e0/2-3
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(config-if-range)#
DLS2(config-if-range)#end
DLS2#
DLS2#
*Dec  9 23:52:52.115: %LINK-3-UPDOWN: Interface Ethernet0/2, changed state to up
*Dec  9 23:52:52.115: %LINK-3-UPDOWN: Interface Ethernet0/3, changed state to up
DLS2#
*Dec  9 23:52:52.192: %SYS-5-CONFIG_I: Configured from console by console
DLS2#
*Dec  9 23:53:01.567: %EC-5-L3DONTBNDL2: Et0/2 suspended: LACP currently not enabled
the remote port.
*Dec  9 23:53:01.641: %EC-5-L3DONTBNDL2: Et0/3 suspended: LACP currently not enabled
the remote port.
DLS2#
DLS2#
DLS2#show etherchannel summary
Flags:  D - down          P - bundled 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

        M - not in use, minimum links not met
        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(SD)         LACP       Et0/2(s)  Et0/3(s)
12     Po12(RD)        LACP       Et0/0(D)  Et0/1(D)
DLS2#

```

Figura 38, Port-channels en las interfaces e0/2 y e0/3 utilizarán LACP. DLS2

```

int ran e0/2-3
switchport trunk encapsulation dot1q
switchport mode trunk
channel-group 1 mode active
no shutdown
end

show etherchannel summary

```

```

ALS2#
ALS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#
ALS2(config)#int ran e0/2-3
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(config-if-range)#end
ALS2#
*Dec  9 23:54:35.791: %LINK-3-UPDOWN: Interface Ethernet0/2, changed state to up
*Dec  9 23:54:35.791: %LINK-3-UPDOWN: Interface Ethernet0/3, changed state to up
ALS2#
ALS2#
*Dec  9 23:54:36.341: %SYS-5-CONFIG_I: Configured from console by console
ALS2#
ALS2#
*Dec  9 23:54:37.799: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
3, changed state to up
*Dec  9 23:54:37.800: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
2, changed state to up
ALS2#
*Dec  9 23:54:41.592: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-chann
el2, changed state to up
ALS2#
ALS2#
ALS2#
ALS2#show etherchannel summary
Flags:  D - down          P - bundled 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

        M - not in use, minimum links not met
        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        Et0/2(P)   Et0/3(P)
ALS2#

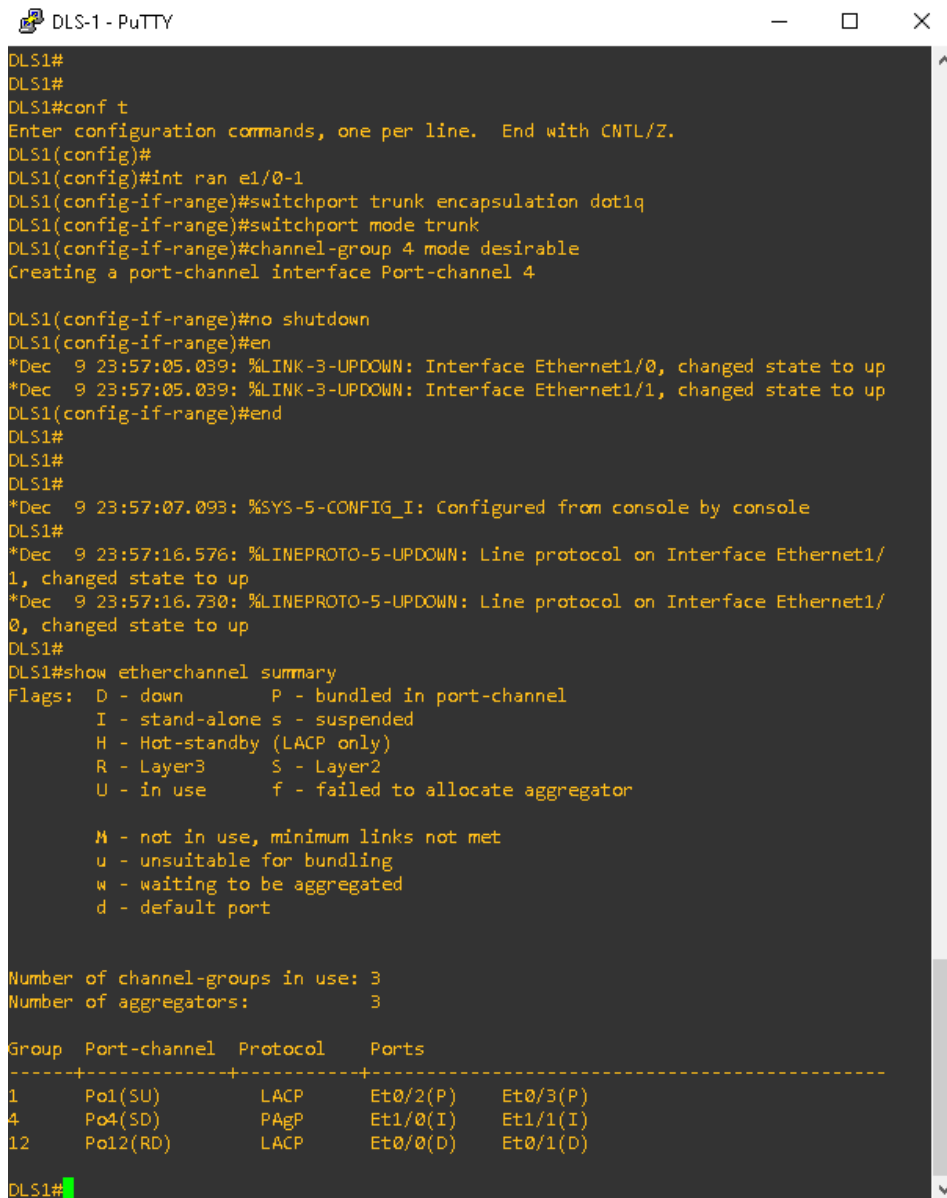
```

Figura 39, Port-channels en las interfaces e0/2 y e0/3 utilizarán LACP. ALS2

3) Los Port-channels en las interfaces e1/0 y e1/1 utilizará PAgP.

```
int ran e1/0-1
switchport trunk encapsulation dot1q
switchport mode trunk
channel-group 4 mode desirable
no shutdown
end
```

```
show etherchannel summary
```



```
DLS1#
DLS1#
DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#
DLS1(config)#int ran e1/0-1
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(config-if-range)#en
*Dec  9 23:57:05.039: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Dec  9 23:57:05.039: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
DLS1(config-if-range)#end
DLS1#
DLS1#
DLS1#
*Dec  9 23:57:07.093: %SYS-5-CONFIG_I: Configured from console by console
DLS1#
*Dec  9 23:57:16.576: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
1, changed state to up
*Dec  9 23:57:16.730: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
0, changed state to up
DLS1#
DLS1#show etherchannel summary
Flags: D - down          P - bundled 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

       M - not in use, minimum links not met
       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       Et0/2(P)   Et0/3(P)
 4     Po4(SD)        PAgP       Et1/0(I)   Et1/1(I)
12     Po12(RD)       LACP       Et0/0(D)   Et0/1(D)

DLS1#
```

Figura 40, Port-channels en las interfaces e1/0 y e1/1 utilizará PAgP. DLS1

```

int ran e1/0-1
switchport trunk encapsulation dot1q
switchport mode trunk
channel-group 3 mode desirable
no shutdown
end

```

```
show etherchannel summary
```

```

DLS2#
DLS2#
DLS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#int ran e1/0-1
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(config-if-range)#
DLS2(config-if-range)#end
DLS2#
*Dec 10 00:01:16.324: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Dec 10 00:01:16.324: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
DLS2#
*Dec 10 00:01:17.592: %SYS-5-CONFIG_I: Configured from console by console
DLS2#
*Dec 10 00:01:27.942: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
*Dec 10 00:01:27.976: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
DLS2#
DLS2#show etherchannel summary
Flags: D - down          P - bundled 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

       M - not in use, minimum links not met
       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       Et0/2(P)   Et0/3(P)
 3     Po3(SD)         PAgP       Et1/0(I)   Et1/1(I)
12     Po12(RD)        LACP       Et0/0(D)   Et0/1(D)
DLS2#

```

Figura 41, Port-channels en las interfaces e1/0 y e1/1 utilizará PAgP. ALS2

```

int ran e1/0-1
switchport trunk encapsulation dot1q
switchport mode trunk
channel-group 3 mode desirable
no shutdown
end

```

```
show etherchannel summary
```

```

ALS1#
ALS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#int ran e1/0-1
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(config-if-range)#end
ALS1#
*Dec 10 00:03:02.592: %SYS-5-CONFIG_I: Configured from console by console
ALS1#
*Dec 10 00:03:03.094: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Dec 10 00:03:03.094: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
*Dec 10 00:03:04.098: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
*Dec 10 00:03:04.098: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
ALS1#
*Dec 10 00:03:10.873: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel3, changed state to up
ALS1#
ALS1#show etherchannel summary
Flags: D - down          P - bundled 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

       M - not in use, minimum links not met
       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        Et0/2(P)   Et0/3(P)
3      Po3(SU)          PAgP        Et1/0(P)   Et1/1(P)
ALS1#

```

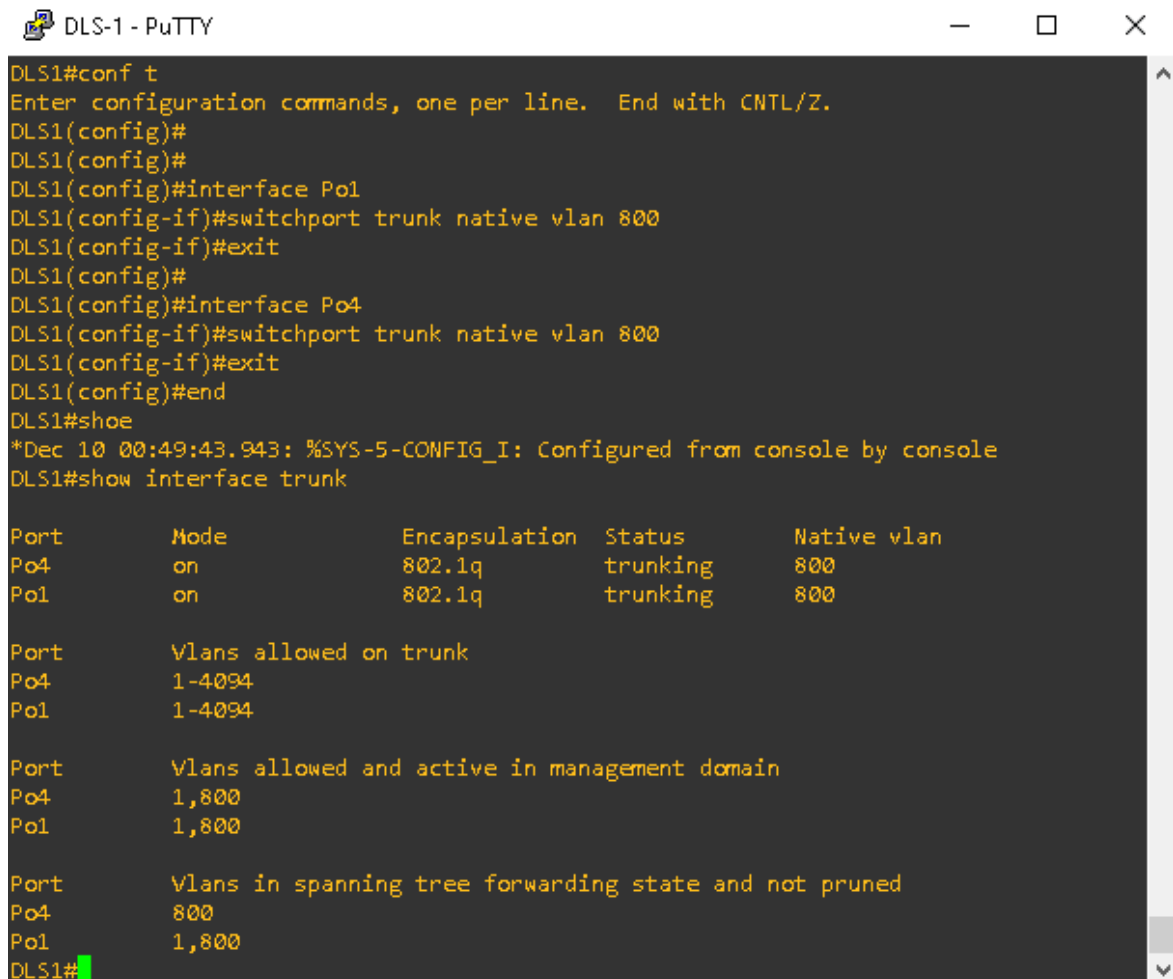
Figura 42, Port-channels en las interfaces e1/0 y e1/1 utilizará PAgP. ALS1

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

```
interface po1
switchport trunk native Vlan 800
exit
```

```
interface po4
switchport trunk native Vlan 800
exit
```

```
show interface trunk
```



```
DLS1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
DLS1(config)#
DLS1(config)#
DLS1(config)#interface Po1
DLS1(config-if)#switchport trunk native vlan 800
DLS1(config-if)#exit
DLS1(config)#
DLS1(config)#interface Po4
DLS1(config-if)#switchport trunk native vlan 800
DLS1(config-if)#exit
DLS1(config)#end
DLS1#shoe
*Dec 10 00:49:43.943: %SYS-5-CONFIG_I: Configured from console by console
DLS1#show interface trunk

Port        Mode           Encapsulation  Status        Native vlan
-----
Po4         on             802.1q         trunking     800
Po1         on             802.1q         trunking     800

Port        Vlans allowed on trunk
-----
Po4         1-4094
Po1         1-4094

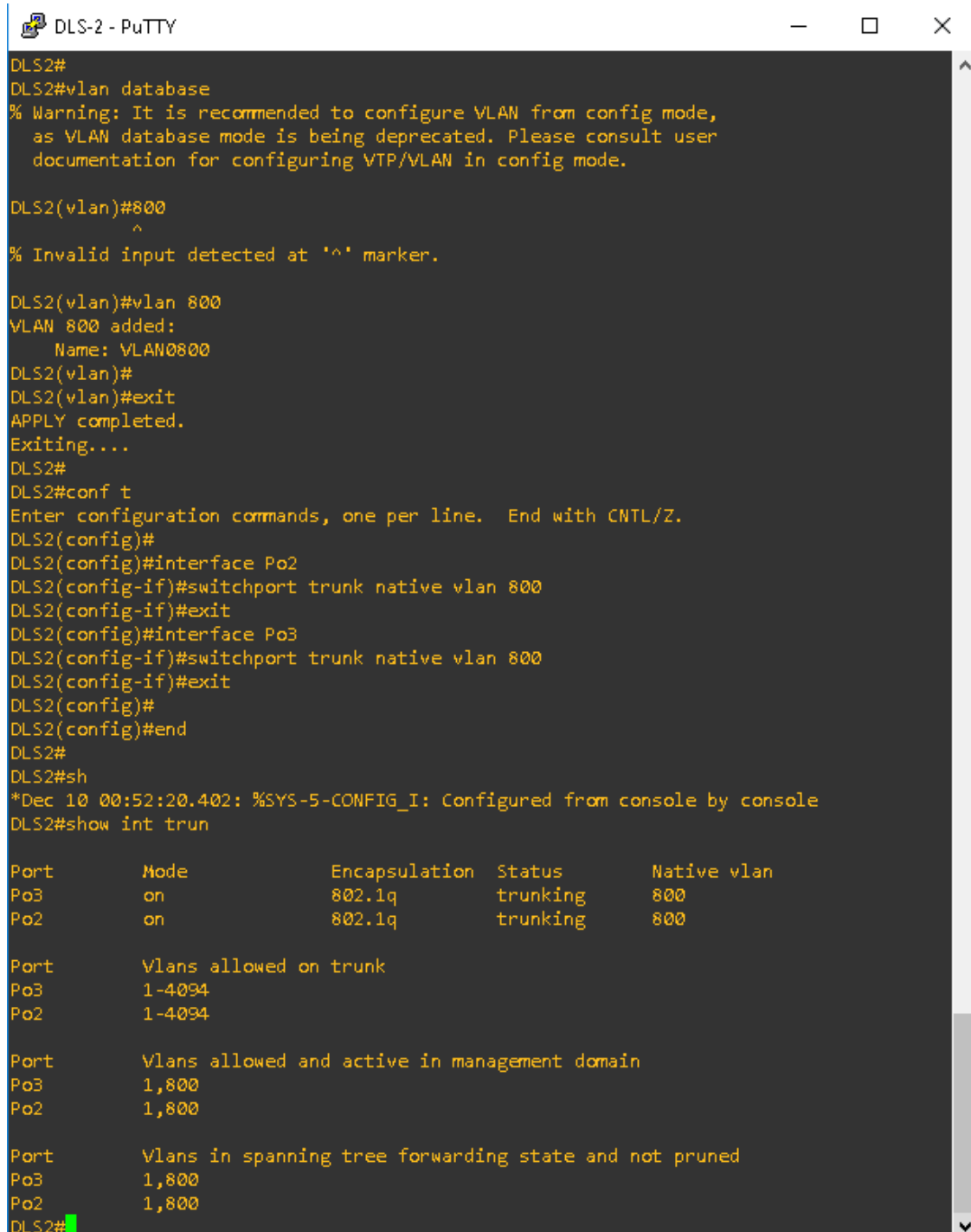
Port        Vlans allowed and active in management domain
-----
Po4         1,800
Po1         1,800

Port        Vlans in spanning tree forwarding state and not pruned
-----
Po4         800
Po1         1,800
DLS1#
```

Figura 43, asignados a la VLAN 800 como la VLAN nativa. DLS1

```
vlan database
vlan 800
exit
```

```
interface po2
switchport trunk native Vlan 800
exit
```



```
DLS2-2 - PuTTY
DLS2#
DLS2#vlan database
% Warning: It is recommended to configure VLAN from config mode,
as VLAN database mode is being deprecated. Please consult user
documentation for configuring VTP/VLAN in config mode.
DLS2(vlan)#800
^
% Invalid input detected at '^' marker.
DLS2(vlan)#vlan 800
VLAN 800 added:
    Name: VLAN0800
DLS2(vlan)#
DLS2(vlan)#exit
APPLY completed.
Exiting...
DLS2#
DLS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#
DLS2(config)#interface Po2
DLS2(config-if)#switchport trunk native vlan 800
DLS2(config-if)#exit
DLS2(config)#interface Po3
DLS2(config-if)#switchport trunk native vlan 800
DLS2(config-if)#exit
DLS2(config)#
DLS2(config)#end
DLS2#
DLS2#sh
*Dec 10 00:52:20.402: %SYS-5-CONFIG_I: Configured from console by console
DLS2#show int trunk

Port      Mode           Encapsulation  Status        Native vlan
Po3       on             802.1q         trunking     800
Po2       on             802.1q         trunking     800

Port      Vlans allowed on trunk
Po3       1-4094
Po2       1-4094

Port      Vlans allowed and active in management domain
Po3       1,800
Po2       1,800

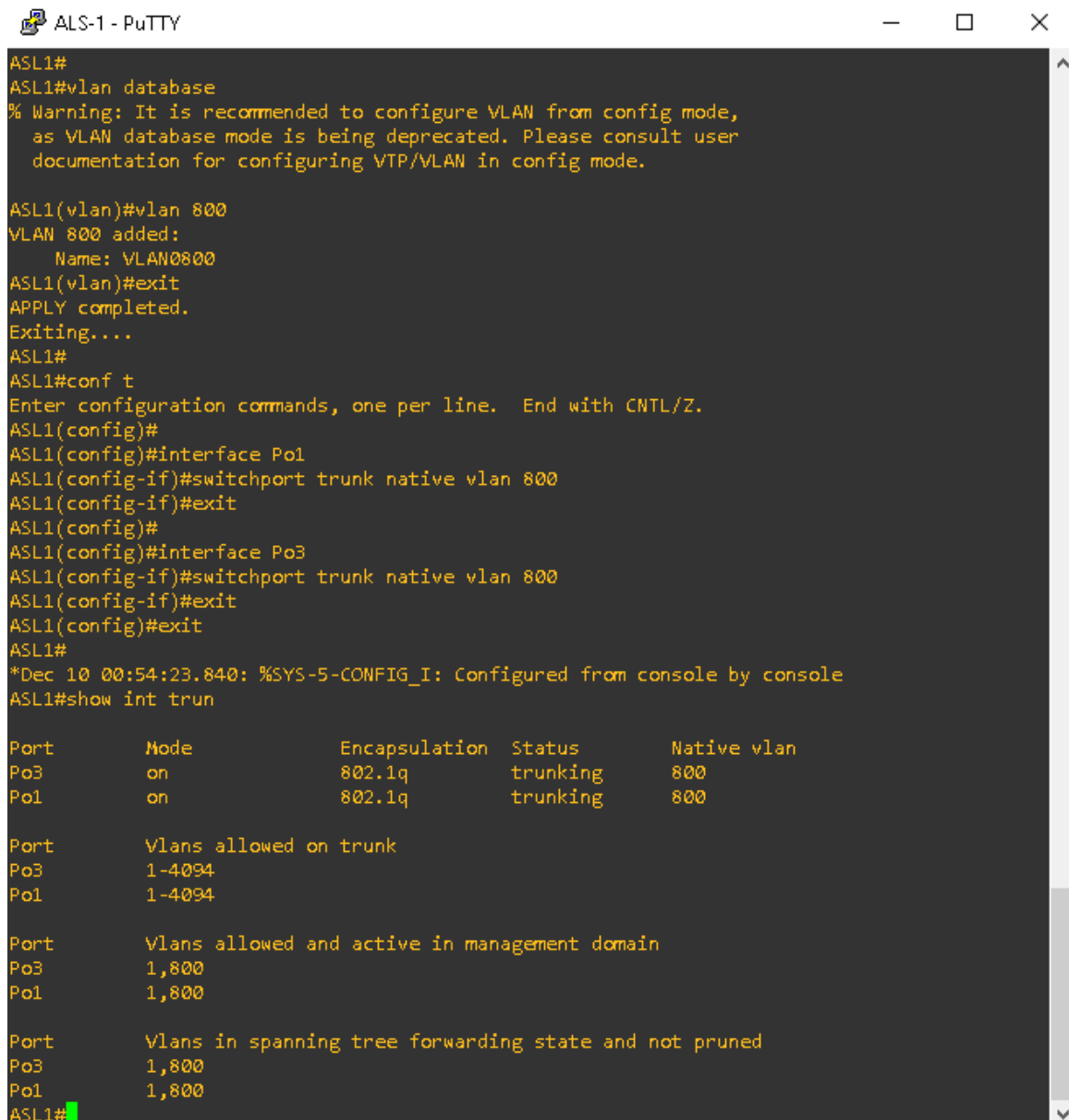
Port      Vlans in spanning tree forwarding state and not pruned
Po3       1,800
Po2       1,800
DLS2#
```

Figura 44, asignados a la VLAN 800 como la VLAN nativa. DLS2

```
interface po1
switchport trunk native Vlan 800
exit
```

```
interface po3
switchport trunk native Vlan 800
exit
```

```
show interface trunk
```



```
ALS-1 - PuTTY
ASL1#
ASL1#vlan database
% Warning: It is recommended to configure VLAN from config mode,
as VLAN database mode is being deprecated. Please consult user
documentation for configuring VTP/VLAN in config mode.
ASL1(vlan)#vlan 800
VLAN 800 added:
  Name: VLAN0800
ASL1(vlan)#exit
APPLY completed.
Exiting...
ASL1#
ASL1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ASL1(config)#
ASL1(config)#interface Po1
ASL1(config-if)#switchport trunk native vlan 800
ASL1(config-if)#exit
ASL1(config)#
ASL1(config)#interface Po3
ASL1(config-if)#switchport trunk native vlan 800
ASL1(config-if)#exit
ASL1(config)#exit
ASL1#
*Dec 10 00:54:23.840: %SYS-5-CONFIG_I: Configured from console by console
ASL1#show int trun

Port      Mode           Encapsulation  Status        Native vlan
Po3       on             802.1q         trunking     800
Po1       on             802.1q         trunking     800

Port      Vlans allowed on trunk
Po3       1-4094
Po1       1-4094

Port      Vlans allowed and active in management domain
Po3       1,800
Po1       1,800

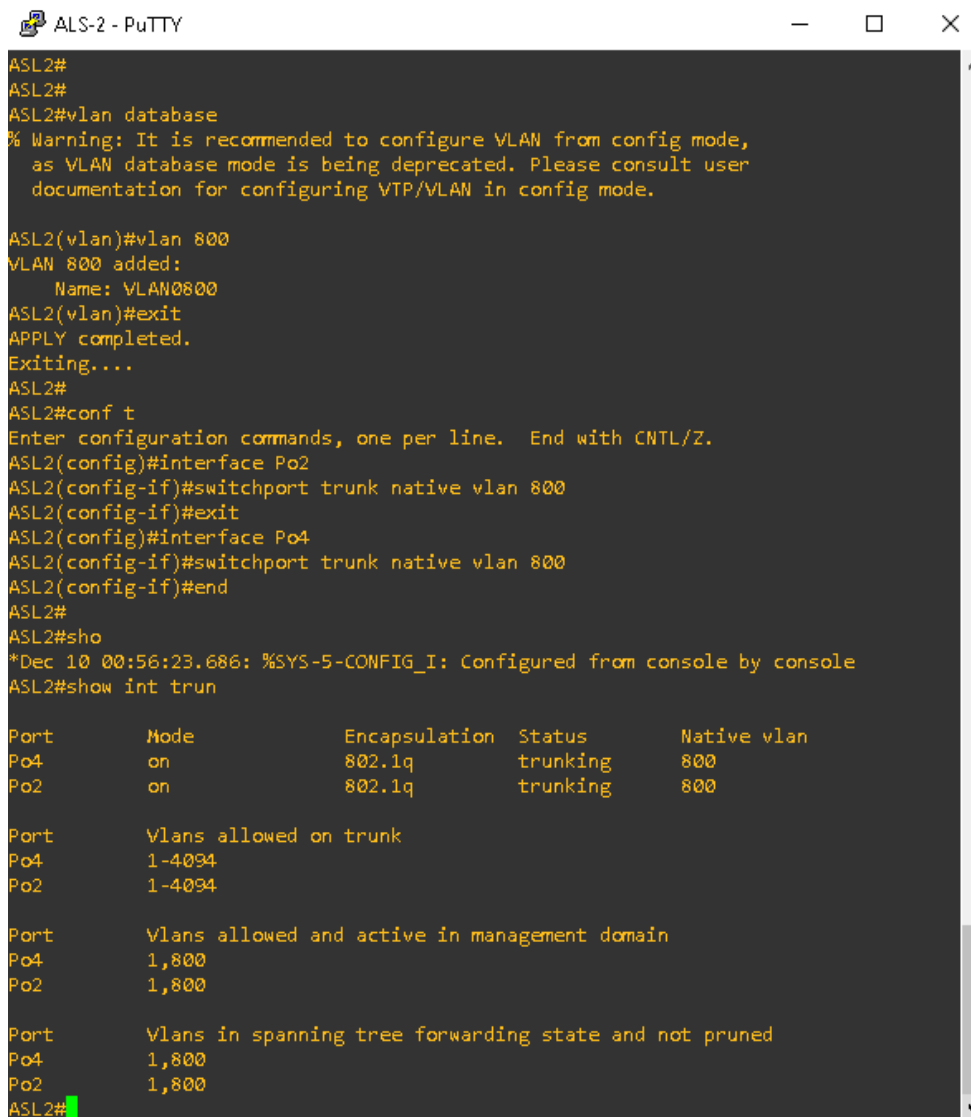
Port      Vlans in spanning tree forwarding state and not pruned
Po3       1,800
Po1       1,800
ASL1#
```

Figura 45, asignados a la VLAN 800 como la VLAN nativa. ALS1

```
vlan database
vlan 800
exit

interface po2
switchport trunk native Vlan 800
exit

interface po4
switchport trunk native Vlan 800
end
show interface trunk
```



```
ALS-2 - PuTTY
ALS2#
ALS2#
ALS2#vlan database
% Warning: It is recommended to configure VLAN from config mode,
as VLAN database mode is being deprecated. Please consult user
documentation for configuring VTP/VLAN in config mode.
ALS2(vlan)#vlan 800
VLAN 800 added:
    Name: VLAN0800
ALS2(vlan)#exit
APPLY completed.
Exiting....
ALS2#
ALS2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
ALS2(config)#interface Po2
ALS2(config-if)#switchport trunk native vlan 800
ALS2(config-if)#exit
ALS2(config)#interface Po4
ALS2(config-if)#switchport trunk native vlan 800
ALS2(config-if)#end
ALS2#
ALS2#sho
*Dec 10 00:56:23.686: %SYS-5-CONFIG_I: Configured from console by console
ALS2#show int trun

Port      Mode           Encapsulation  Status        Native vlan
Po4       on             802.1q         trunking      800
Po2       on             802.1q         trunking      800

Port      Vlans allowed on trunk
Po4       1-4094
Po2       1-4094

Port      Vlans allowed and active in management domain
Po4       1,800
Po2       1,800

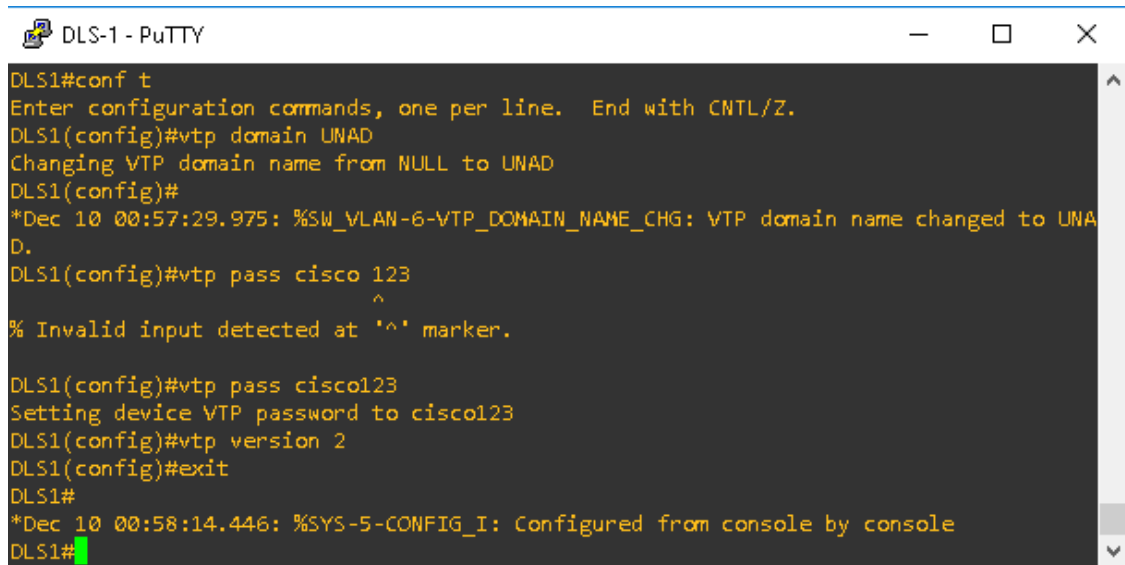
Port      Vlans in spanning tree forwarding state and not pruned
Po4       1,800
Po2       1,800
ALS2#
```

Figura 46, asignados a la VLAN 800 como la VLAN nativa. ALS2

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

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

```
vtp domain unad
vtp pass cisco123
vtp version 2
exit
```

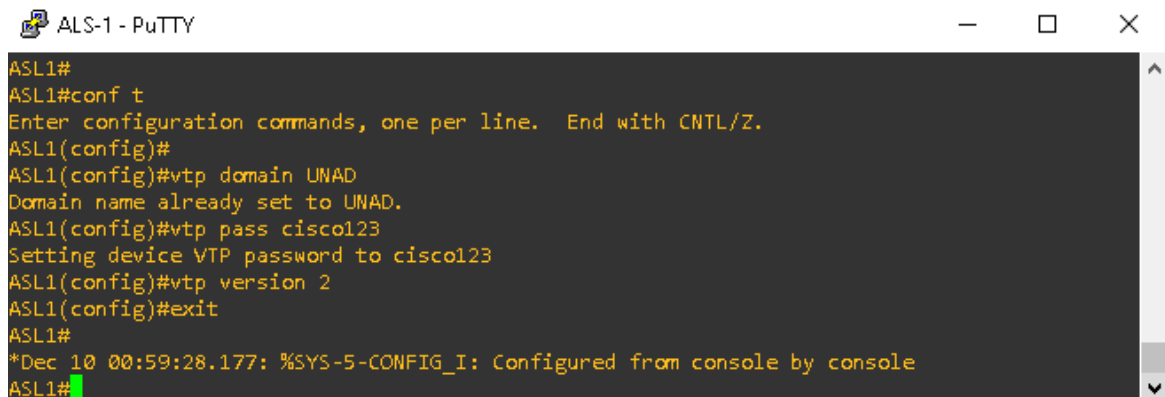


```
DLS1 - PuTTY
DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#vtp domain UNAD
Changing VTP domain name from NULL to UNAD
DLS1(config)#
*Dec 10 00:57:29.975: %SW_VLAN-6-VTP_DOMAIN_NAME_CHG: VTP domain name changed to UNAD.
DLS1(config)#vtp pass cisco 123
      ^
% Invalid input detected at '^' marker.

DLS1(config)#vtp pass cisco123
Setting device VTP password to cisco123
DLS1(config)#vtp version 2
DLS1(config)#exit
DLS1#
*Dec 10 00:58:14.446: %SYS-5-CONFIG_I: Configured from console by console
DLS1#
```

Figura 47, Configurar DLS1 para utilizar VTP versión 3

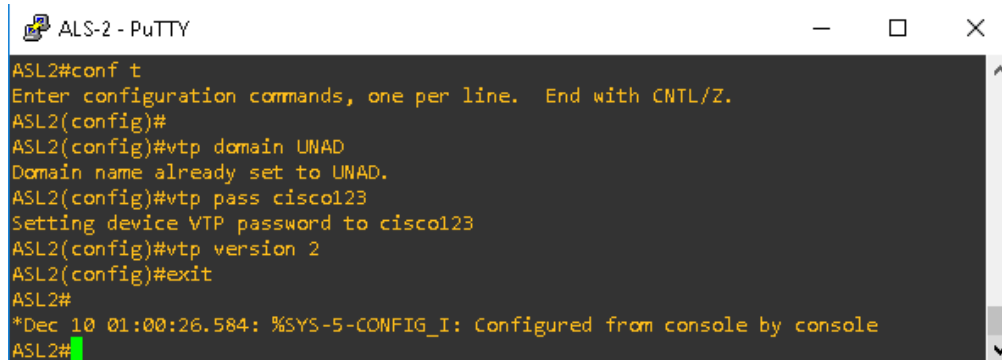
```
vtp domain unad
vtp pass cisco123
vtp version 2
exit
```



```
ALS1 - PuTTY
ALS1#
ALS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#
ALS1(config)#vtp domain UNAD
Domain name already set to UNAD.
ALS1(config)#vtp pass cisco123
Setting device VTP password to cisco123
ALS1(config)#vtp version 2
ALS1(config)#exit
ALS1#
*Dec 10 00:59:28.177: %SYS-5-CONFIG_I: Configured from console by console
ALS1#
```

Figura 48, Configurar ALS1 para utilizar VTP versión 3

```
vtp domain unad
vtp pass cisco123
vtp version 2
exit
```

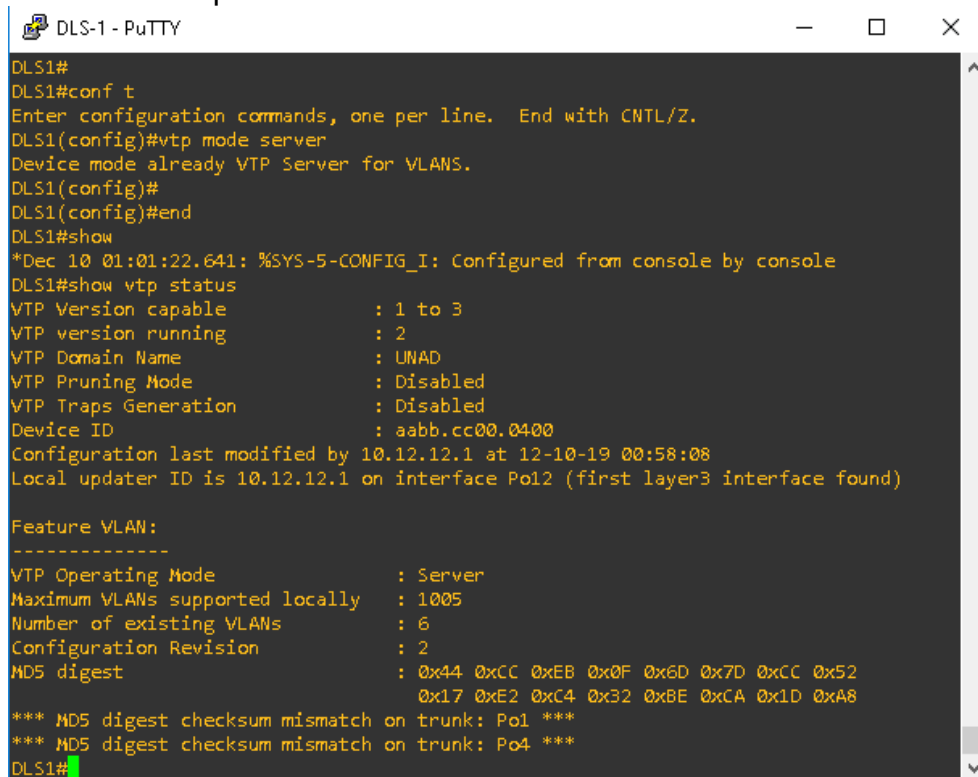


```
ALS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#
ALS2(config)#vtp domain UNAD
Domain name already set to UNAD.
ALS2(config)#vtp pass cisco123
Setting device VTP password to cisco123
ALS2(config)#vtp version 2
ALS2(config)#exit
ALS2#
*Dec 10 01:00:26.584: %SYS-5-CONFIG_I: Configured from console by console
ALS2#
```

Figura 49, Configurar ALS2 para utilizar VTP versión 3

2) Configurar DLS1 como servidor principal para las VLAN.

```
vtp mode server
end
show vtp status
```



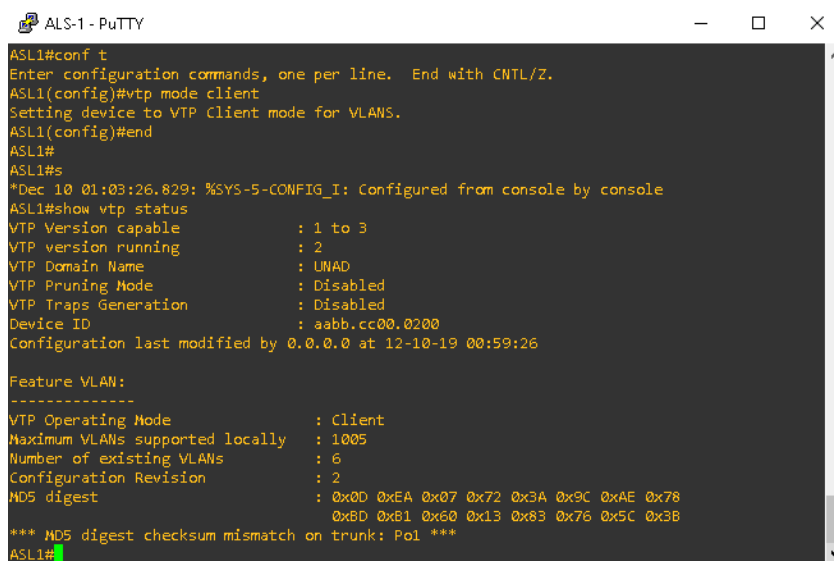
```
DLS1#
DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#vtp mode server
Device mode already VTP Server for VLANs.
DLS1(config)#
DLS1(config)#end
DLS1#show
*Dec 10 01:01:22.641: %SYS-5-CONFIG_I: Configured from console by console
DLS1#show vtp status
VTP Version capable      : 1 to 3
VTP version running     : 2
VTP Domain Name         : UNAD
VTP Pruning Mode        : Disabled
VTP Traps Generation    : Disabled
Device ID                : aabb.cc00.0400
Configuration last modified by 10.12.12.1 at 12-10-19 00:58:08
Local updater ID is 10.12.12.1 on interface Po12 (first layer3 interface found)

Feature VLAN:
-----
VTP Operating Mode      : Server
Maximum VLANs supported locally : 1005
Number of existing VLANs : 6
Configuration Revision  : 2
MD5 digest              : 0x44 0xCC 0xEB 0x0F 0x6D 0x7D 0xCC 0x52
                        : 0x17 0xE2 0xC4 0x32 0xBE 0xCA 0x1D 0xA8
*** MD5 digest checksum mismatch on trunk: Po1 ***
*** MD5 digest checksum mismatch on trunk: Po4 ***
DLS1#
```

Figura 50, Configurar DLS1 como servidor principal para las VLAN

3) Configurar ALS1 y ALS2 como clientes VTP.

```
vtp mode cliente
end
show vtp status
```

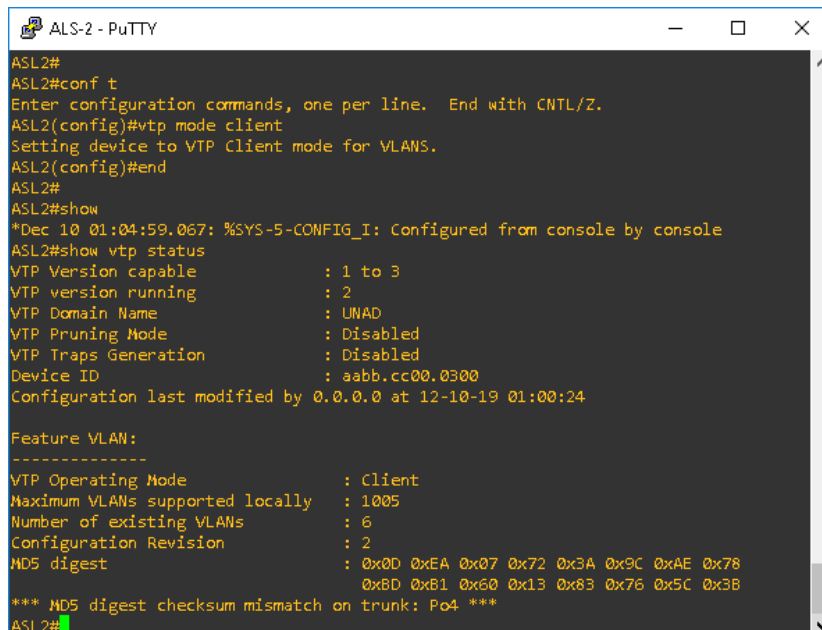


```
ALS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#vtp mode client
Setting device to VTP Client mode for VLANs.
ALS1(config)#end
ALS1#
ALS1#s
*Dec 10 01:03:26.829: %SYS-5-CONFIG_I: Configured from console by console
ALS1#show vtp status
VTP Version capable      : 1 to 3
VTP version running     : 2
VTP Domain Name         : UNAD
VTP Pruning Mode        : Disabled
VTP Traps Generation    : Disabled
Device ID                : aabb.cc00.0200
Configuration last modified by 0.0.0.0 at 12-10-19 00:59:26

Feature VLAN:
-----
VTP Operating Mode       : Client
Maximum VLANs supported locally : 1005
Number of existing VLANs : 6
Configuration Revision   : 2
MD5 digest               : 0x0D 0xEA 0x07 0x72 0x3A 0x9C 0xAE 0x78
                        0xBD 0xB1 0x60 0x13 0x83 0x76 0x5C 0x3B
*** MD5 digest checksum mismatch on trunk: Po1 ***
ALS1#
```

Figura 51, Configurar ALS1 como clientes VTP

```
vtp mode cliente
end
show vtp status
```



```
ALS2#
ALS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#vtp mode client
Setting device to VTP Client mode for VLANs.
ALS2(config)#end
ALS2#
ALS2#show
*Dec 10 01:04:59.067: %SYS-5-CONFIG_I: Configured from console by console
ALS2#show 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                : aabb.cc00.0300
Configuration last modified by 0.0.0.0 at 12-10-19 01:00:24

Feature VLAN:
-----
VTP Operating Mode       : Client
Maximum VLANs supported locally : 1005
Number of existing VLANs : 6
Configuration Revision   : 2
MD5 digest               : 0x0D 0xEA 0x07 0x72 0x3A 0x9C 0xAE 0x78
                        0xBD 0xB1 0x60 0x13 0x83 0x76 0x5C 0x3B
*** MD5 digest checksum mismatch on trunk: Po4 ***
ALS2#
```

Figura 52, Configurar ALS2 como clientes VTP

- 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	1010	VOZ
1111	VIDEONET	3456	ADMINISTRACIÓN

Tabla 1, Configurar en el servidor principal las siguientes VLAN

- f. En DLS1, suspender la VLAN 434.

```

DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#
DLS1(config)#vlan 434
DLS1(config-vlan)#state suspend
DLS1(config-vlan)#
  
```

Figura 53, suspender la VLAN 434 DLS1

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

```

Vlan 800
Name NATIVA
Vlan 12
Name EJECUTIVOS
vlan 234
name huespedes
vlan 111
name VIDEONET
vlan 434
name ESTACIONAMIENTO
vlan 101
name VOZ
vlan 345
name ADMINISTRACION
exit
  
```

```

DLS2#
DLS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#vlan 800
DLS2(config-vlan)#name NATIVA
DLS2(config-vlan)#vlan 12
DLS2(config-vlan)#name EJECUTIVEB?
LINE    <cr>

DLS2(config-vlan)#name EJECUTIVEBB?
LINE    <cr>

DLS2(config-vlan)#name EJECUTIVOS
DLS2(config-vlan)#vlan 234
DLS2(config-vlan)#name HUESPEDES
DLS2(config-vlan)#vlan 111
DLS2(config-vlan)#name VIDEONET
DLS2(config-vlan)#vlan 434
DLS2(config-vlan)#name ESTACIONAMIENTO
DLS2(config-vlan)#vlan 123
DLS2(config-vlan)#name MANTENIMIENTO
DLS2(config-vlan)#vlan 101
DLS2(config-vlan)#name VOZ
DLS2(config-vlan)#vlan 345
DLS2(config-vlan)#name ADMINISTRACION
DLS2(config-vlan)#EXIT
DLS2(config)#END
DLS2#
DLS2#
*Dec 10 01:11:13.811: %SYS-5-CONFIG_I: Configured from console by console
DLS2#show vlan

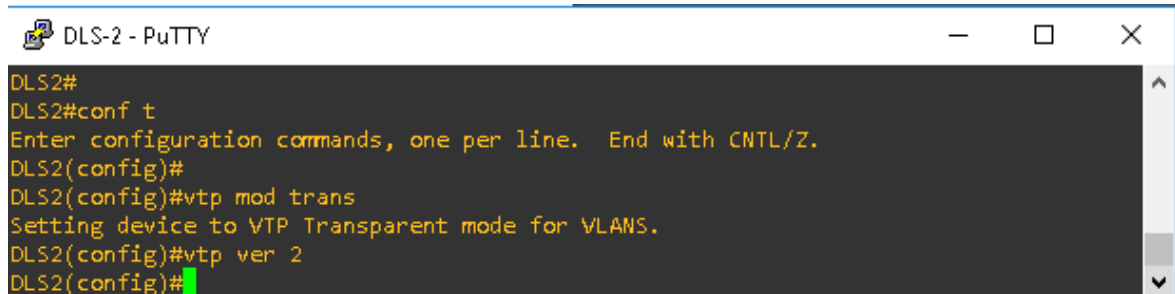
VLAN Name                Status    Ports
-----
1    default                active    Et1/2, Et1/3, Et2/0, Et2/1
                                           Et2/2, Et2/3, Et3/0, Et3/1
                                           Et3/2, Et3/3
12   EJECUTIVOS             active
101  VOZ                     active
111  VIDEONET                active
123  MANTENIMIENTO           active
234  HUESPEDES               active
345  ADMINISTRACION           active
434  ESTACIONAMIENTO         active
800  NATIVA                   active
1002 fddi-default            act/unsup
1003 token-ring-default    act/unsup
1004 fddinet-default        act/unsup
1005 trnet-default         act/unsup

VLAN Type  SAID          MTU   Parent RingNo BridgeNo Stp    BrdgMode Trans1 Trans2
----  -
1    enet  100001        1500  -     -     -     -     -     0     0
12   enet  100012        1500  -     -     -     -     -     0     0
--More--

```

Figura 54, Configurar en modo VTP transparente VTP utilizando VTP versión 2

```
vtp mod trans
vtp ver 2
```

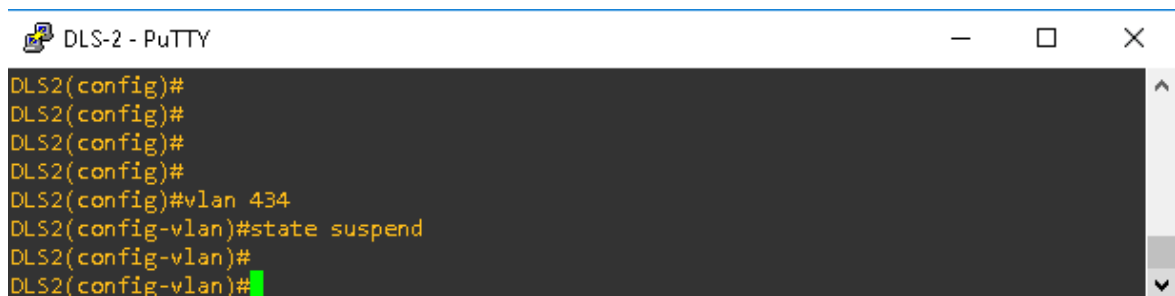


```
DLS2#
DLS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#
DLS2(config)#vtp mod trans
Setting device to VTP Transparent mode for VLANs.
DLS2(config)#vtp ver 2
DLS2(config)#
```

Figura 55, configurar en DLS2 las mismas VLAN que en DLS1

- h. Suspender VLAN 434 en DLS2.

```
Vlan 434
State suspend
```



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

Figura 56, Suspender VLAN 434 en DLS2

- 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.

```
vlan 567
name contabilidad
exit
```

```
int port-channel 2
switchport trunk allowed vlan except 567
interface port-channel 3
switchport trunk allowed vlan except 567
```

```
DLS2(config)#
DLS2(config)#vlan 567
DLS2(config-vlan)#name CONTABILIDAD
DLS2(config-vlan)#
DLS2(config-vlan)#EXIT
DLS2(config)#
DLS2(config)#int port-channel 2
DLS2(config-if)#switchport trunk allowed vlan except 567
DLS2(config-if)#interface port-channel 3
DLS2(config-if)#switchport trunk allowed vlan except 567
DLS2(config-if)#
```

Figura 57, crear VLAN 567

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

```
spanning-tree vlan 1.12.434.800.1010.111.3456 root primary
spanning-tree vlan 123.234 root secondary
```

```
DLS1(config)#
DLS1(config)#spanning-tree vlan 1,12,434,800,1010,1111,3456 root primary
DLS1(config)#spanning-tree vlan 123,234 root secondary
DLS1(config)#
```

Figura 58, Configurar DLS1 como Spanning tree root

- 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.

```
spanning-tree vlan 123.234 root primary
spanning-tree vlan 1.12.434.800.1010.111.3456 root secondary
```

```
DLS2(config)#
DLS2(config)#spanning-tree vlan 123,234 root primary
DLS2(config)#spanning-tree vlan 1,12,434,800,1010,1111,3456 root secondary
DLS2(config)#
```

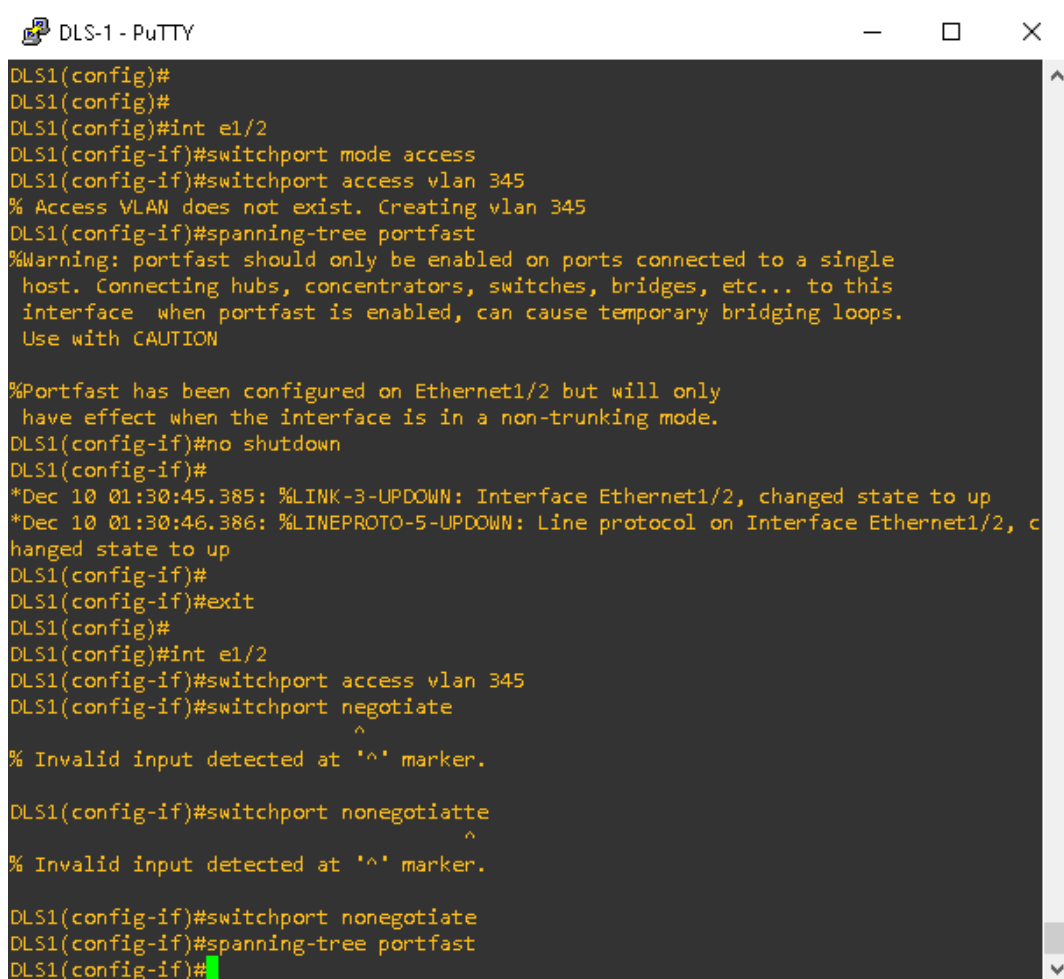
Figura 59, Configurar DLS2 como Spanning tree root

1. 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.

```
int e1/2
switchport mode acces
switchport acces vlan 345
spanning-tree portfast
no shutdown
```

```
exit
```

```
int e1/2
switchport acces vlan 345
switchport nonegotiate
spanning-tree portfast
exit
```



```
DLS1(config)#
DLS1(config)#
DLS1(config)#int e1/2
DLS1(config-if)#switchport mode access
DLS1(config-if)#switchport access vlan 345
% Access VLAN does not exist. Creating vlan 345
DLS1(config-if)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single
  host. Connecting hubs, concentrators, switches, bridges, etc... to this
  interface when portfast is enabled, can cause temporary bridging loops.
  Use with CAUTION

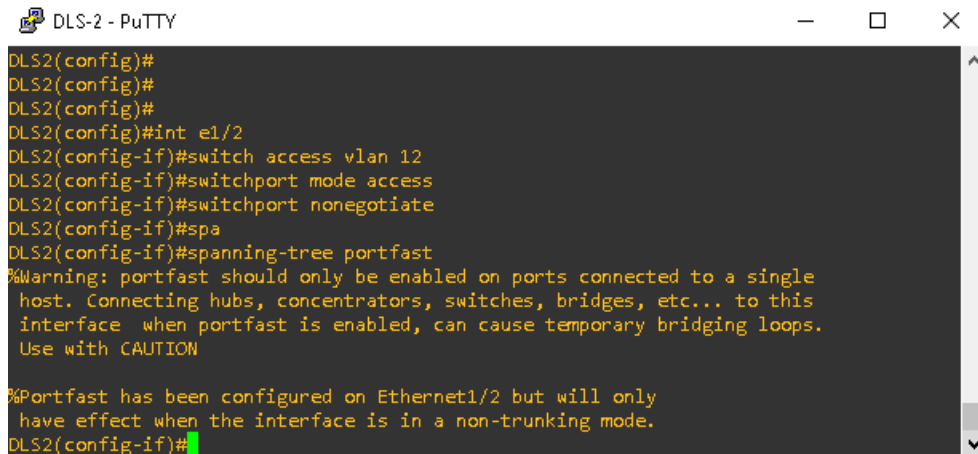
%Portfast has been configured on Ethernet1/2 but will only
  have effect when the interface is in a non-trunking mode.
DLS1(config-if)#no shutdown
DLS1(config-if)#
*Dec 10 01:30:45.385: %LINK-3-UPDOWN: Interface Ethernet1/2, changed state to up
*Dec 10 01:30:46.386: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, c
changed state to up
DLS1(config-if)#
DLS1(config-if)#exit
DLS1(config)#
DLS1(config)#int e1/2
DLS1(config-if)#switchport access vlan 345
DLS1(config-if)#switchport negotiate
^
% Invalid input detected at '^' marker.

DLS1(config-if)#switchport nonegotiate
^
% Invalid input detected at '^' marker.

DLS1(config-if)#switchport nonegotiate
DLS1(config-if)#spanning-tree portfast
DLS1(config-if)#
```

Figura 60, Configurar interfaces como puertos de acceso DLS1

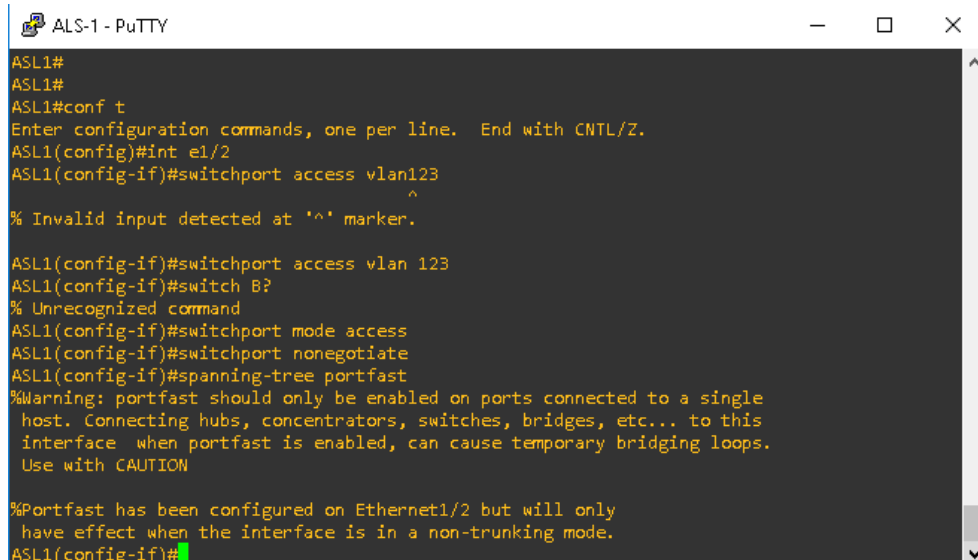
```
int e1/2
switchport acces vlan 12
switchport mode access
switchport nonegotiate
spanning-tree portfast
exit
```



```
DLS2(config)#
DLS2(config)#
DLS2(config)#
DLS2(config)#int e1/2
DLS2(config-if)#switch access vlan 12
DLS2(config-if)#switchport mode access
DLS2(config-if)#switchport nonegotiate
DLS2(config-if)#spa
DLS2(config-if)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single
  host. Connecting hubs, concentrators, switches, bridges, etc.. to this
  interface when portfast is enabled, can cause temporary bridging loops.
  Use with CAUTION
%Portfast has been configured on Ethernet1/2 but will only
  have effect when the interface is in a non-trunking mode.
DLS2(config-if)#
```

Figura 61, Configurar interfaces como puertos de acceso DLS2

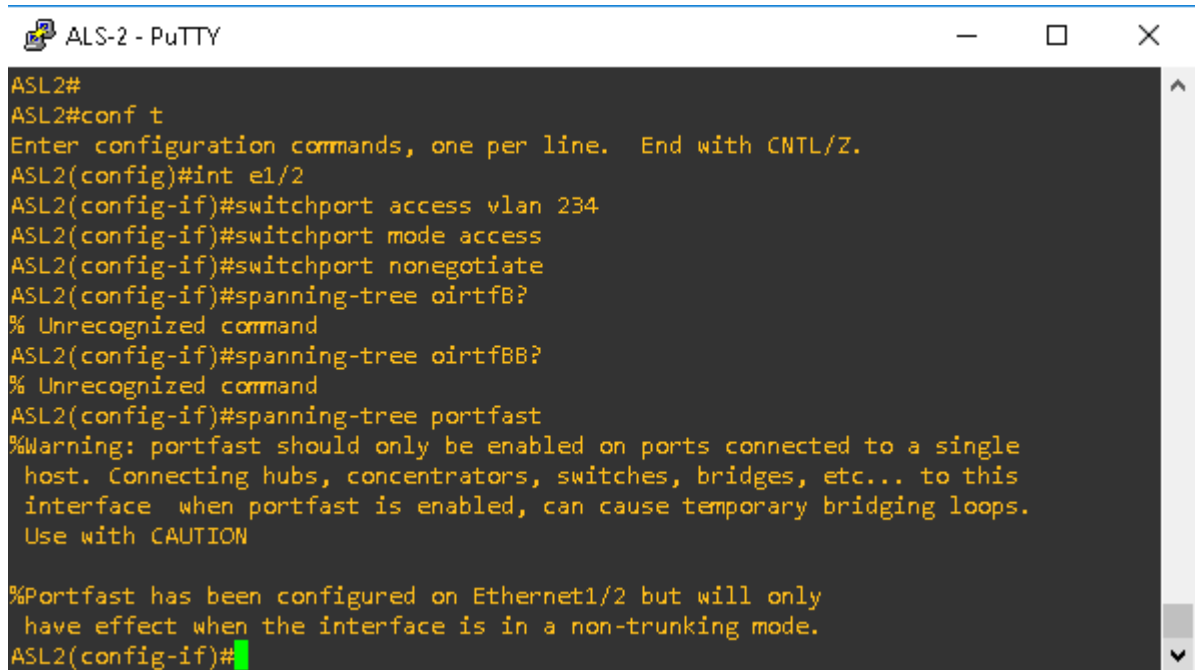
```
int e1/2
switchport acces vlan 123
switchport mode acces
switchport nonegotiate
spanning-tree portfast
exit
```



```
ALS1#
ALS1#
ALS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#int e1/2
ALS1(config-if)#switchport access vlan123
% Invalid input detected at '^' marker.
ALS1(config-if)#switchport access vlan 123
ALS1(config-if)#switch B?
% Unrecognized command
ALS1(config-if)#switchport mode access
ALS1(config-if)#switchport nonegotiate
ALS1(config-if)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single
  host. Connecting hubs, concentrators, switches, bridges, etc.. to this
  interface when portfast is enabled, can cause temporary bridging loops.
  Use with CAUTION
%Portfast has been configured on Ethernet1/2 but will only
  have effect when the interface is in a non-trunking mode.
ALS1(config-if)#
```

Figura 62, Configurar interfaces como puertos de acceso ALS1

```
int e1/2
switchport access vlan 234
switchport mode access
switchport nonegotiate
spanning-tree portfast
exit
```



```
ALS2#
ALS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#int e1/2
ALS2(config-if)#switchport access vlan 234
ALS2(config-if)#switchport mode access
ALS2(config-if)#switchport nonegotiate
ALS2(config-if)#spanning-tree oirtfB?
% Unrecognized command
ALS2(config-if)#spanning-tree oirtfBB?
% Unrecognized command
ALS2(config-if)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single
  host. Connecting hubs, concentrators, switches, bridges, etc... to this
  interface when portfast is enabled, can cause temporary bridging loops.
  Use with CAUTION

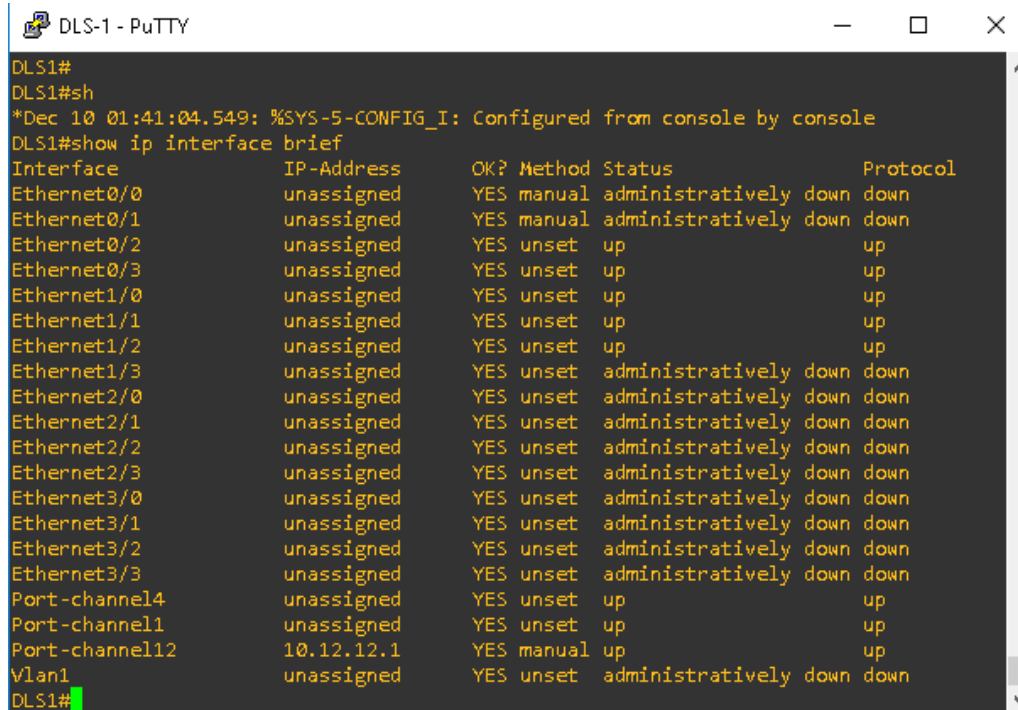
%Portfast has been configured on Ethernet1/2 but will only
  have effect when the interface is in a non-trunking mode.
ALS2(config-if)#
```

Figura 63, Configurar interfaces como puertos de acceso ALS2

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

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

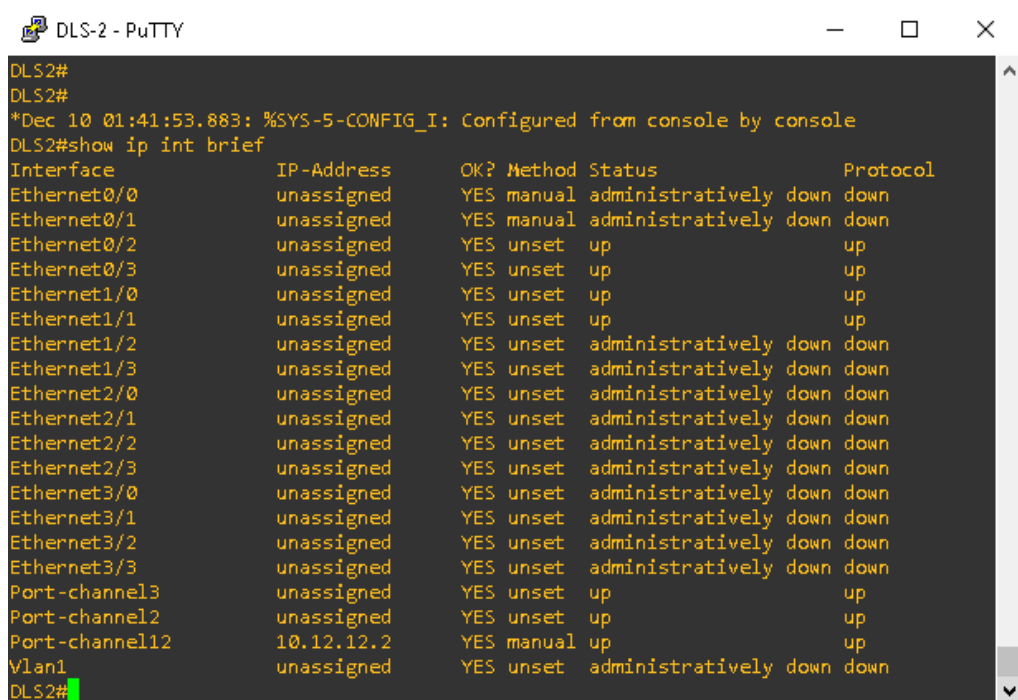
show ip interface brief



```
DLS1#
DLS1#sh
*Dec 10 01:41:04.549: %SYS-5-CONFIG_I: Configured from console by console
DLS1#show ip interface brief
Interface                IP-Address      OK? Method Status          Protocol
Ethernet0/0              unassigned     YES manual administratively down down
Ethernet0/1              unassigned     YES manual administratively down down
Ethernet0/2              unassigned     YES unset        up              up
Ethernet0/3              unassigned     YES unset        up              up
Ethernet1/0              unassigned     YES unset        up              up
Ethernet1/1              unassigned     YES unset        up              up
Ethernet1/2              unassigned     YES unset        up              up
Ethernet1/3              unassigned     YES unset        administratively down down
Ethernet2/0              unassigned     YES unset        administratively down down
Ethernet2/1              unassigned     YES unset        administratively down down
Ethernet2/2              unassigned     YES unset        administratively down down
Ethernet2/3              unassigned     YES unset        administratively down down
Ethernet3/0              unassigned     YES unset        administratively down down
Ethernet3/1              unassigned     YES unset        administratively down down
Ethernet3/2              unassigned     YES unset        administratively down down
Ethernet3/3              unassigned     YES unset        administratively down down
Port-channel4            unassigned     YES unset        up              up
Port-channel1            unassigned     YES unset        up              up
Port-channel12           10.12.12.1     YES manual      up              up
Vlan1                    unassigned     YES unset        administratively down down
DLS1#
```

Figura 64, Verificar la existencia de las VLAN DLS1

show ip interface brief



```
DLS2#
DLS2#
*Dec 10 01:41:53.883: %SYS-5-CONFIG_I: Configured from console by console
DLS2#show ip int brief
Interface                IP-Address      OK? Method Status          Protocol
Ethernet0/0              unassigned     YES manual administratively down down
Ethernet0/1              unassigned     YES manual administratively down down
Ethernet0/2              unassigned     YES unset        up              up
Ethernet0/3              unassigned     YES unset        up              up
Ethernet1/0              unassigned     YES unset        up              up
Ethernet1/1              unassigned     YES unset        up              up
Ethernet1/2              unassigned     YES unset        administratively down down
Ethernet1/3              unassigned     YES unset        administratively down down
Ethernet2/0              unassigned     YES unset        administratively down down
Ethernet2/1              unassigned     YES unset        administratively down down
Ethernet2/2              unassigned     YES unset        administratively down down
Ethernet2/3              unassigned     YES unset        administratively down down
Ethernet3/0              unassigned     YES unset        administratively down down
Ethernet3/1              unassigned     YES unset        administratively down down
Ethernet3/2              unassigned     YES unset        administratively down down
Ethernet3/3              unassigned     YES unset        administratively down down
Port-channel3            unassigned     YES unset        up              up
Port-channel2            unassigned     YES unset        up              up
Port-channel12           10.12.12.2     YES manual      up              up
Vlan1                    unassigned     YES unset        administratively down down
DLS2#
```

Figura 65, Verificar la existencia de las VLAN DLS2

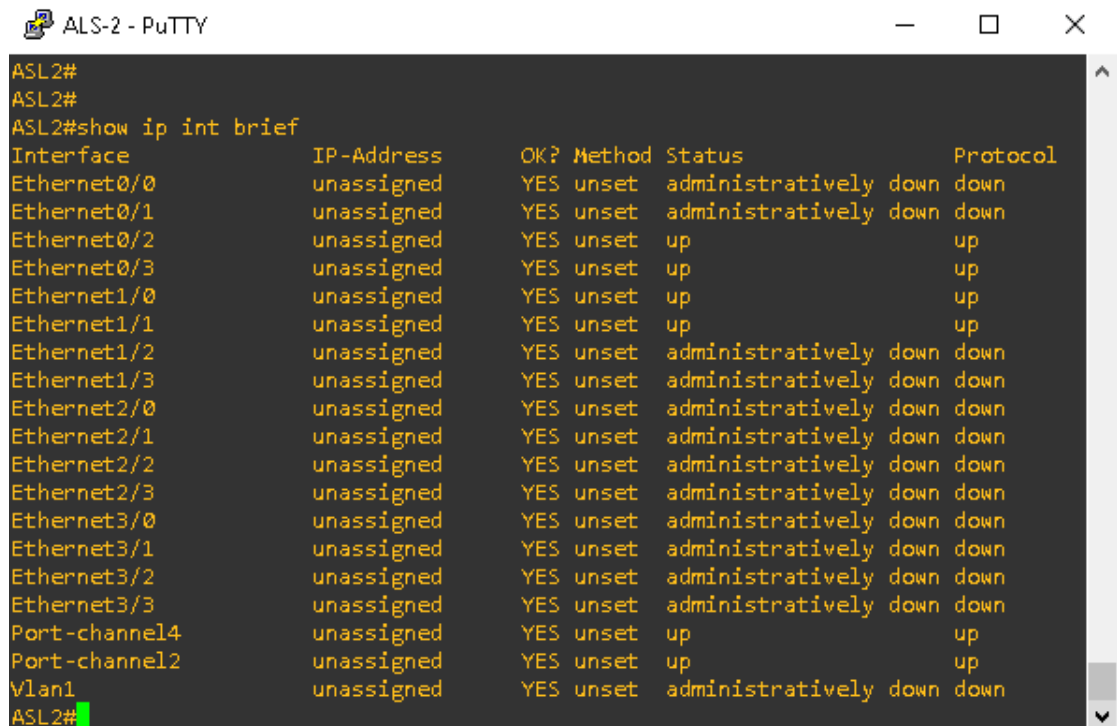
show ip interface brief



```
ALS-1 - PuTTY
ALS1#
ALS1#sh
*Dec 10 01:42:26.056: %SYS-5-CONFIG_I: Configured from console by console
ALS1#show ip int brief
Interface                IP-Address      OK? Method Status          Protocol
Ethernet0/0              unassigned     YES unset  administratively down  down
Ethernet0/1              unassigned     YES unset  administratively down  down
Ethernet0/2              unassigned     YES unset  up                up
Ethernet0/3              unassigned     YES unset  up                up
Ethernet1/0              unassigned     YES unset  up                up
Ethernet1/1              unassigned     YES unset  up                up
Ethernet1/2              unassigned     YES unset  administratively down  down
Ethernet1/3              unassigned     YES unset  administratively down  down
Ethernet2/0              unassigned     YES unset  administratively down  down
Ethernet2/1              unassigned     YES unset  administratively down  down
Ethernet2/2              unassigned     YES unset  administratively down  down
Ethernet2/3              unassigned     YES unset  administratively down  down
Ethernet3/0              unassigned     YES unset  administratively down  down
Ethernet3/1              unassigned     YES unset  administratively down  down
Ethernet3/2              unassigned     YES unset  administratively down  down
Ethernet3/3              unassigned     YES unset  administratively down  down
Port-channel3           unassigned     YES unset  up                up
Port-channel1           unassigned     YES unset  up                up
Vlan1                   unassigned     YES unset  administratively down  down
ALS1#
```

Figura 66, Verificar la existencia de las VLAN ALS1

show ip interface brief



```
ALS-2 - PuTTY
ALS2#
ALS2#
ALS2#show ip int brief
Interface                IP-Address      OK? Method Status          Protocol
Ethernet0/0              unassigned     YES unset  administratively down  down
Ethernet0/1              unassigned     YES unset  administratively down  down
Ethernet0/2              unassigned     YES unset  up                up
Ethernet0/3              unassigned     YES unset  up                up
Ethernet1/0              unassigned     YES unset  up                up
Ethernet1/1              unassigned     YES unset  up                up
Ethernet1/2              unassigned     YES unset  administratively down  down
Ethernet1/3              unassigned     YES unset  administratively down  down
Ethernet2/0              unassigned     YES unset  administratively down  down
Ethernet2/1              unassigned     YES unset  administratively down  down
Ethernet2/2              unassigned     YES unset  administratively down  down
Ethernet2/3              unassigned     YES unset  administratively down  down
Ethernet3/0              unassigned     YES unset  administratively down  down
Ethernet3/1              unassigned     YES unset  administratively down  down
Ethernet3/2              unassigned     YES unset  administratively down  down
Ethernet3/3              unassigned     YES unset  administratively down  down
Port-channel4           unassigned     YES unset  up                up
Port-channel2           unassigned     YES unset  up                up
Vlan1                   unassigned     YES unset  administratively down  down
ALS2#
```

Figura 67, Verificar la existencia de las VLAN ALS2

CONCLUSIONES

La optimización de las redes empresariales es quizás el desafío más importante que los administradores de redes tienen, debido a que gracias a ello, las redes pueden trabajar sin parar, proveyendo de servicios convergentes de calidad, es por eso que existen muchos dispositivos y protocolos que ayudan a que las redes tengan una operación óptima, entre ellos está el OSPF que en español significa “abrir el camino más corto primero”, este protocolo permite que los datos que circulan en la red, sean encaminados de manera jerárquica entre todos los router y switch que interconectan las diferentes LAN dentro de las WAN, este calcula la ruta más corta entre ellos, para ello emplea su medida métrica cost, teniendo en cuenta al tiempo parámetros como ancho de banda y congestión en los canales. Así mismo opera con seguridad, autenticando cada punto de las rutas.

EIGRP, que en español significa “Protocolo de enrutamiento de puerta de enlace interior mejorado”, su operación está basada en encaminamiento de vector de distancia, es un protocolo avanzado y de fácil configuración. Tiene propiedades que mejoran la convergencia, es un protocolo de transporte confiable, empleado también para establecimiento de adyacencias, creando tablas de vecinos y de topología. Igualmente fue empleado el protocolo de comunicaciones de capa dos del modelo OSI, para gestionar la existencia de bucles, dado la configuración enlaces redundantes que permitirán la operación de la red sin interrupciones. En síntesis, este protocolo ayudara a nuestra red activar o desactivar automáticamente los enlaces de conexión para eliminar los bucles que puedan producirse.

Finalmente podemos decir que nuestra red tiene todos los protocolos necesarios para operar de forma segura, continua, con servicio de calidad y sin interrupciones

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