

DIPLOMADO DE PROFUNDIZACION CISCO CCNP SOLUCIÓN DE DOS
ESCENARIOS PRESENTES EN ENTORNOS CORPORATIVOS BAJO EL USO
DE TECNOLOGÍA CISCO

Jhon Jairo Gomez Ramírez

UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA - UNAD ESCUELA DE
CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA - ECBTI INGENIERÍA EN
TELECOMUNICACIONES DE CALI 2021

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Diplomado de opción de grado presentado para optar el título de INGENIERO EN
TELCOMUNICACIONES

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NOTA DE ACEPTACION

Firma del Jurado

Firma del Jurado

Cali, 18 de Julio de 2021

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GLOSARIO

EIGRP: Protocolo de enrutamiento dinámico para redes IP basado en el vector distancia obteniendo información de los vecinos conectados directamente.

EtherChannel: (Port-channels) Protocolo que hace posible agregar o unificar enlaces físicos en un solo medio lógico, permitiendo sumar la velocidad de cada enlaces físico en uno solo.

OSPF: Protocolo de enrutamiento dinámico para redes IP basado en algoritmos que facilitan la entrega de paquetes por el camino más corta.

Spanning tree: Protocolo que funciona en capa 2, su objetivo es controlar los enlaces redundantes a fin de evitar loop en la red.

VLAN: Red de área local virtual, su función principal es dividir de manera lógica una red física en varios grupos de redes usando el mismo medio físico de distribución.

VTP: Protocolo de mensajes usado para centralizar la administración de VLAN, permitiendo desde un dominio central de VLAN distribuir las VLAN en los demás nodos sin necesidad de ingresa a cada nodo a modificar las cada VLAN.

RESUMEN

En el presente documento contextualiza el desarrollo final del diplomado de profundización en CISCO CCNP, guiado por la universidad Nacional Abierta y a Distancia UNAD. Este trabajo se divide en dos fases de implementación, la cual permite abarcar de manera general todos los temas visto a lo largo del diplomado.

Con la utilización de dos herramientas prácticas como (Cisco Packet Tracer y GNS3) facilitaron el desarrollo de los esquemas de red propuestos por diplomado, de esta manera aplicar conocimiento adquirido de routing y switch.

Palabras Clave: CISCO, CCNP, Conmutación, Enrutamiento, Redes, Electrónica.

ABSTRACT

In this document he contextualizes the final development of the in-depth diploma at CISCO CCNP, guided by the National Open and Distance University UNAD. This work is divided into two implementation phases, which allows us to cover in a general way all the topics seen throughout the course.

With the use of two practical tools such as (Cisco Packet Tracer and GNS3) they facilitated the development of the network schemes proposed by the graduate, in this way applying knowledge acquired from routing and switch.

Keywords: CISCO, CCNP, Routing, Swicthing, Networking, Electronics.

INTRODUCCION

En el presente trabajo se desarrolló con el fin de evaluar de manera práctica y conceptual los temas vistos durante el proceso de formación del diplomado de profundización de CISCO CCNP. Permitiendo aplicar las habilidades obtenidas en los dos escenarios propuestos, como una primera fase orientada a ambientes de capa 3 y la segunda fase a ambientes de capa 2, con una única finalidad de contextualizar todo lo aprendido de cara a entornos totalmente reales.

En el entorno de capa 3 logramos aplicar protocolos de enrutamiento dinámico permitiendo comunicar un sistema autónomo EIGRP con un área de OSPF aplicando las buenas practicas obtenidas de manera conceptual.

Para el entorno de capa 2 observamos en gran profundidad la aplicación de protocolos como Etherchannel, troncalizacion de puertos, Spanning tree e implantación de un servidor VTP, esto facilita ampliar anchos de banda, distribución de redes y administración centralizada de VLAN, además de garantizar la disponibilidad de los enlaces.

DESARROLLO DE LOS DOS ESCENARIOS

ESCENARIO PRELIMINAR

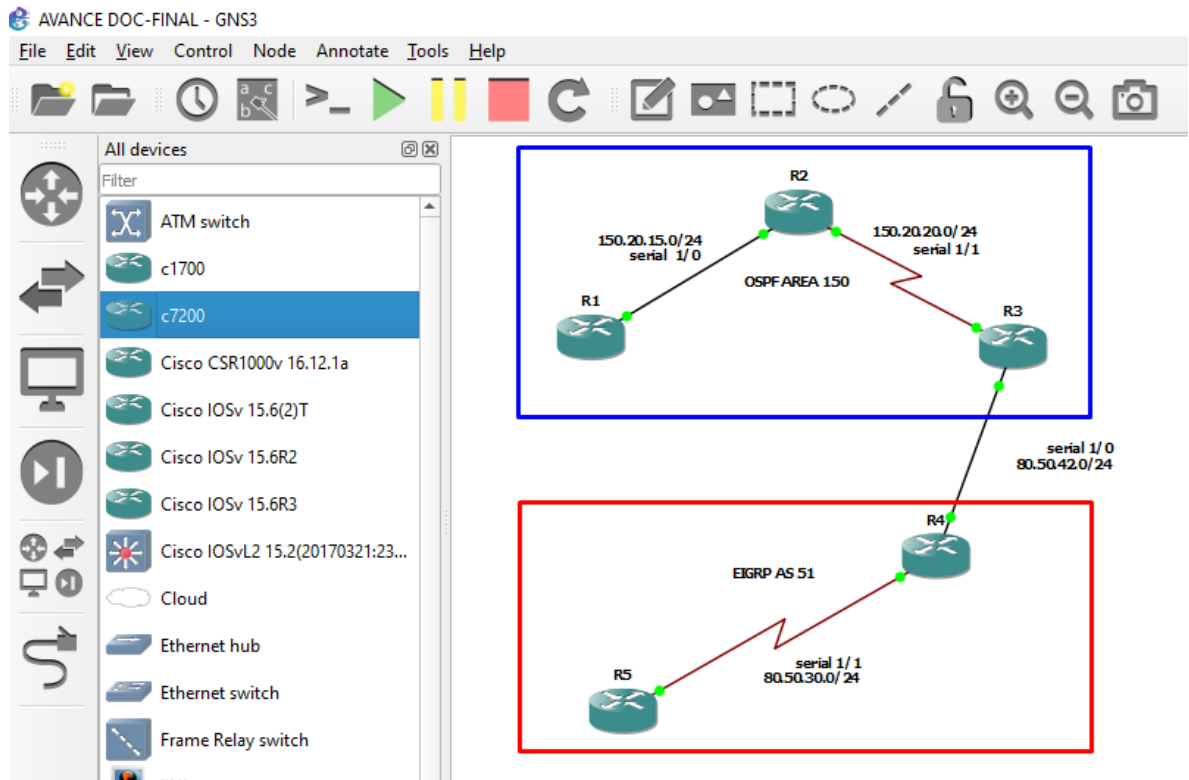


Figura 1. Escenario preliminar

1. Aplique las configuraciones iniciales y los protocolos de enrutamiento para los routers R1, R2, R3, R4 y R5 según el diagrama. No asigne passwords en los routers. Configurar las interfaces con las direcciones que se muestran en la topología de red.

Configuración Hostname

Se realizó configuración del Hostname se R1 de esta manera para el resto de dispositivos.

```
R1#show running-config
Building configuration...

Current configuration : 1702 bytes
!
! Last configuration change at 04:18:23 UTC Sun Jun 6 2021
upgrade fpd auto
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R1
!
boot-start-marker
boot-end-marker
!
```

Figura 2. Configuración Hostname R1

```
R2#show runn
Building configuration...

Current configuration : 1534 bytes
!
! Last configuration change at 04:19:19 UTC Sun Jun 6 2021
upgrade fpd auto
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R2
!
boot-start-marker
boot-end-marker
!
```

Figura 3. Configuración Hostname R2

```
R3#show runn
Building configuration...

Current configuration : 1620 bytes
!
! Last configuration change at 04:08:26 UTC Sun Jun 6 2021
upgrade fpd auto
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R3
!
boot-start-marker
boot-end-marker
!
```

Figura 4. Configuración Hostname R3

```
R4#show runn
Building configuration...

Current configuration : 1513 bytes
!
! Last configuration change at 01:37:52 UTC Sun Jun 6 2021
upgrade fpd auto
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R4
!
boot-start-marker
boot-end-marker
!
```

Figura 5. Configuración Hostname R4

```
R5#show runn
Building configuration...

Current configuration : 1658 bytes
!
! Last configuration change at 04:15:13 UTC Sun Jun 6 2021
upgrade fpd auto
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R5
!
boot-start-marker
boot-end-marker
!
```

Figura 6. Configuración Hostname R5

Configuración Interfaces

Se realiza asignación de Ip y habilitación de cada una con el comando no shutdown.

```
!
interface Serial1/0
ip address 150.20.15.10 255.255.255.0
serial restart-delay 0
clock rate 56000
!
interface Serial1/1
no ip address
shutdown
serial restart-delay 0
!
interface Serial1/2
no ip address
shutdown
serial restart-delay 0
!
interface Serial1/3
```

domingo, 6 de junio de 2021

ESP 10:38 p. m.

Figura 7. Configuración Interface R1

```
!
interface Serial1/0
description R1 -> R2
ip address 150.20.15.20 255.255.255.0
serial restart-delay 0
!
interface Serial1/1
description R2 -> R3
ip address 150.20.20.20 255.255.255.0
serial restart-delay 0
clock rate 56000
!
interface Serial1/2
no ip address
shutdown
serial restart-delay 0
!
```

domingo, 6 de junio de 2021

ESP 10:39 p. m.

Figura 8. Configuración Interface R2

```
!
interface Serial1/0
description R3 -> R4
ip address 80.50.42.30 255.255.255.0
serial restart-delay 0
!
interface Serial1/1
description R2 -> R3
ip address 150.20.20.30 255.255.255.0
serial restart-delay 0
!
interface Serial1/2
no ip address
shutdown
serial restart-delay 0
!
interface Serial1/3
```

domingo, 6 de junio de 2021

ESP 10:40 p. m.

Figura 9. Configuración Interface R3

```
interface Serial1/0
description R3 - > R4
ip address 80.50.42.40 255.255.255.0
serial restart-delay 0
clock rate 56000

interface Serial1/1
description R4 - > R5
ip address 80.50.30.40 255.255.255.0
serial restart-delay 0

interface Serial1/2
no ip address
shutdown
serial restart-delay 0
```

Figura 10. Configuración Interface R4

```
interface Serial1/1
ip address 80.50.30.50 255.255.255.0
serial restart-delay 0
clock rate 56000

interface Serial1/2
no ip address
shutdown
serial restart-delay 0

interface Serial1/3
no ip address
shutdown
serial restart-delay 0
```

Figura 11. Configuración Interface R5

Configuración Protocolo OSPF

Se configura el protocolo de enrutamiento dinámico para habilitarlo con el comando `router(config)# router ospf <id_proceso>`.

Definiremos las redes que se enviarán los mensajes de actualización de las rutas con el comando `router(config-router)# network <dirección_red> <máscara_wildcard> area<id_área>`.

Luego definimos la área que será el que determinaría el Límite de mi Router Backend de exposición a la actualización de estados de los link.

```
router ospf 150
router-id 1.1.1.1
network 150.20.15.0 0.0.0.255 area 150

ip forward-protocol nd
no ip http server
no ip http secure-server

no cdp log mismatch duplex

control-plane
```

Figura 12. Configuración Protocolo OSPF R1

```
router ospf 150
router-id 2.2.2.2
network 150.20.15.0 0.0.0.255 area 150
network 150.20.20.0 0.0.0.255 area 150

ip forward-protocol nd
no ip http server
no ip http secure-server

no cdp log mismatch duplex

control-plane
```

Figura 13. Configuración Protocolo OSPF R2

```
router eigrp 51
network 80.50.42.0 0.0.0.255

router ospf 150
router-id 3.3.3.3
network 150.20.20.0 0.0.0.255 area 150

ip forward-protocol nd
no ip http server
no ip http secure-server
```

Figura 14. Configuración Protocolo OSPF R3

Configuración Protocolo EIGRP

Se configura el protocolo de enrutamiento dinámico para habilitarlo con el comando en mención y que define el sistema autónomo (config)# router eigrp <id_AS>.

Definiremos las redes que se enviarán los mensajes de actualización de las rutas con el comando router(config-router)# network <dirección_red> <máscara_wildcard>

```
router eigrp 51
network 80.0.0.0
network 80.50.30.0 0.0.0.255
network 80.50.42.0 0.0.0.255

ip forward-protocol nd
no ip http server
no ip http secure-server

no cdp log mismatch duplex
```

Figura 15. Configuración Protocolo EIGRP R4

```
router eigrp 51
network 80.50.30.0 0.0.0.255

ip forward-protocol nd
no ip http server
no ip http secure-server

no cdp log mismatch duplex

control-plane
```

Figura 16. Configuración Protocolo EIGRP R5

Pruebas de conectividad

Router R1 ping Router R5

```
R1(tcl)#foreach address {
+>(tcl)#150.20.15.20
+>(tcl)#150.20.20.20
+>(tcl)#150.20.20.30
+>(tcl)#80.50.42.30
+>(tcl)#80.50.42.40
+>(tcl)#80.50.30.40
+>(tcl)#80.50.30.50
+>(tcl)# { ping $address }
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 150.20.15.20, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/18/44 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 150.20.20.20, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/12/16 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 150.20.20.30, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 20/24/40 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 80.50.42.30, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 20/23/28 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 80.50.42.40, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 32/38/52 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 80.50.30.40, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 32/37/52 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 80.50.30.50, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 44/52/68 ms
R1(tcl)#
```

Figura 17. Pruebas de conexión R1 a R5

2. Cree cuatro nuevas interfaces de Loopback en R1 utilizando la asignación de direcciones 20.1.0.0/22 y configure esas interfaces para participar en el área 150de OSPF.

Configuración Interfaces Loopback

Se realiza asignación de Ip y habilitación de cada una con el comando no shutdown.

```
!
interface Loopback1
 ip address 20.1.0.1 255.255.252.0
!
interface Loopback2
 ip address 20.1.4.2 255.255.252.0
!
interface Loopback3
 ip address 20.1.8.3 255.255.252.0
!
interface Loopback4
 ip address 20.1.12.4 255.255.252.0
!
interface Ethernet0/0
 no ip address
 shutdown
 duplex auto
```

Figura 18. Configuración Interfaces Loopback R1

```
!
serial restart-delay 0
!
interface Serial1/3
 no ip address
 shutdown
 serial restart-delay 0
!
router ospf 150
 router-id 1.1.1.1
 network 20.1.0.0 0.0.255.255 area 150
 network 150.20.15.0 0.0.0.255 area 150
!
ip forward-protocol nd
 no ip http server
 no ip http secure-server
!
```

Figura 19. Configuración redes directamente conectadas R1 ospf

3. Cree cuatro nuevas interfaces de Loopback en R5 utilizando la asignación de direcciones 180.5.0.0/22 y configure esas interfaces para participar en el Sistema Autónomo EIGRP 51.

Configuración Interfaces Loopback

Se realiza asignación de Ip y habilitación de cada una con el comando no shutdown.

```
interface Loopback1
ip address 180.5.0.1 255.255.252.0
!
interface Loopback2
ip address 180.5.4.2 255.255.252.0
!
interface Loopback3
ip address 180.5.8.3 255.255.252.0
!
interface Loopback4
ip address 180.5.12.4 255.255.252.0
!
interface Ethernet0/0
no ip address
shutdown
duplex auto
```

Figura 20. Configuración Interfaces Loopback R5

```
router eigrp 51
network 80.50.30.0 0.0.0.255
network 180.5.0.0
!
ip forward-protocol nd
no ip http server
no ip http secure-server
!
```

Figura 21. Configuración redes directamente conectadas R5 ospf

4. Analice la tabla de enrutamiento de R3 y verifique que R3 está aprendiendo las nuevas interfaces de Loopback mediante el comando show ip route.

Pruebas de Validación de rutas

Se identifica las rutas que son aprendidas por el Router 3 por los protocolos OSPF y EIGRP al ver la tabla de enrutamiento actualizada.

```

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

20.0.0.0/32 is subnetted, 4 subnets
O   20.1.0.1 [110/129] via 150.20.20.20, 01:32:48, Serial1/1
O   20.1.4.2 [110/129] via 150.20.20.20, 01:21:15, Serial1/1
O   20.1.8.3 [110/129] via 150.20.20.20, 01:21:04, Serial1/1
O   20.1.12.4 [110/129] via 150.20.20.20, 01:20:54, Serial1/1
80.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
D   80.50.30.0/24 [90/2681856] via 80.50.42.40, 03:53:14, Serial1/0
C   80.50.42.0/24 is directly connected, Serial1/0
L   80.50.42.30/32 is directly connected, Serial1/0
150.20.0.0/16 is variably subnetted, 3 subnets, 2 masks
O   150.20.15.0/24 [110/128] via 150.20.20.20, 01:35:27, Serial1/1
C   150.20.20.0/24 is directly connected, Serial1/1
L   150.20.20.30/32 is directly connected, Serial1/1
180.5.0.0/22 is subnetted, 4 subnets
D   180.5.0.0 [90/2809856] via 80.50.42.40, 03:53:14, Serial1/0
D   180.5.4.0 [90/2809856] via 80.50.42.40, 01:25:48, Serial1/0
D   180.5.8.0 [90/2809856] via 80.50.42.40, 01:25:29, Serial1/0
D   180.5.12.0 [90/2809856] via 80.50.42.40, 01:25:20, Serial1/0
R3#

```

Figura 22. Pruebas de Validación de rutas R3

- Configure R3 para redistribuir las rutas EIGRP en OSPF usando el costo de 80000y luego redistribuya las rutas OSPF en EIGRP usando un ancho de banda T1 y 20,000 microsegundos de retardo.

```

R3#
!
router eigrp 51
network 80.50.42.0 0.0.0.255
redistribute ospf 150 metric 1544 20000 255 1 1500
!
router ospf 150
router-id 3.3.3.3
redistribute eigrp 51 metric 50000 subnets
network 150.20.20.0 0.0.0.255 area 150
!
ip forward-protocol nd
no ip http server
no ip http secure-server
!
!

```

Figura 23. Configuración redistribución de rutas EIGRP en OSPF R3

6. Verifique en R1 y R5 que las rutas del sistema autónomo opuesto existen en su tabla de enrutamiento mediante el comando show ip route

Pruebas de Validación de rutas

Se identifica las rutas que son aprendidas por el Router R1 y R5 por los protocolos OSPF y EIGRP existen en el opuesto de cada routes con el sistema autónomo.

```
privilege level 15
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

20.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
C       20.1.0.0/22 is directly connected, Loopback1
L       20.1.0.1/32 is directly connected, Loopback1
C       20.1.4.0/22 is directly connected, Loopback2
L       20.1.4.2/32 is directly connected, Loopback2
C       20.1.8.0/22 is directly connected, Loopback3
L       20.1.8.3/32 is directly connected, Loopback3
C       20.1.12.0/22 is directly connected, Loopback4
L       20.1.12.4/32 is directly connected, Loopback4
L       80.0.0.0/24 is subnetted, 2 subnets
O E2    80.50.30.0 [110/50000] via 150.20.15.20, 01:39:37, Serial1/0
O E2    80.50.42.0 [110/50000] via 150.20.15.20, 01:39:37, Serial1/0
L       150.20.0.0/16 is variably subnetted, 3 subnets, 2 masks
C       150.20.15.0/24 is directly connected, Serial1/0
L       150.20.15.10/32 is directly connected, Serial1/0
O       150.20.20.0/24 [110/128] via 150.20.15.20, 01:39:37, Serial1/0
L       180.5.0.0/22 is subnetted, 4 subnets
O E2    180.5.0.0 [110/50000] via 150.20.15.20, 01:39:37, Serial1/0
O E2    180.5.4.0 [110/50000] via 150.20.15.20, 01:32:27, Serial1/0
O E2    180.5.8.0 [110/50000] via 150.20.15.20, 01:32:08, Serial1/0
O E2    180.5.12.0 [110/50000] via 150.20.15.20, 01:31:59, Serial1/0
R1#
R1#
```

Figura 24. Validación de rutas aprendidas OSPF R1.

```
R1 R2 R3 R4 R5 x +
!
R5#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

20.0.0.0/32 is subnetted, 4 subnets
D EX 20.1.0.1 [170/7801856] via 80.50.30.40, 01:40:03, Serial1/1
D EX 20.1.4.2 [170/7801856] via 80.50.30.40, 01:28:30, Serial1/1
D EX 20.1.8.3 [170/7801856] via 80.50.30.40, 01:28:19, Serial1/1
D EX 20.1.12.4 [170/7801856] via 80.50.30.40, 01:28:09, Serial1/1
80.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
C 80.50.30.0/24 is directly connected, Serial1/1
L 80.50.30.50/32 is directly connected, Serial1/1
D 80.50.42.0/24 [90/2681856] via 80.50.30.40, 04:19:45, Serial1/1
150.20.0.0/24 is subnetted, 2 subnets
D EX 150.20.15.0 [170/7801856] via 80.50.30.40, 01:42:42, Serial1/1
D EX 150.20.20.0 [170/7801856] via 80.50.30.40, 03:58:01, Serial1/1
180.5.0.0/16 is variably subnetted, 8 subnets, 2 masks
C 180.5.0.0/22 is directly connected, Loopback1
L 180.5.0.1/32 is directly connected, Loopback1
C 180.5.4.0/22 is directly connected, Loopback2
L 180.5.4.2/32 is directly connected, Loopback2
C 180.5.8.0/22 is directly connected, Loopback3
L 180.5.8.3/32 is directly connected, Loopback3
C 180.5.12.0/22 is directly connected, Loopback4
L 180.5.12.4/32 is directly connected, Loopback4
R5#
R5#
```

Figura 25. Validación de rutas aprendidas EIGRP R5.

SEGUNDO ESCENARIO

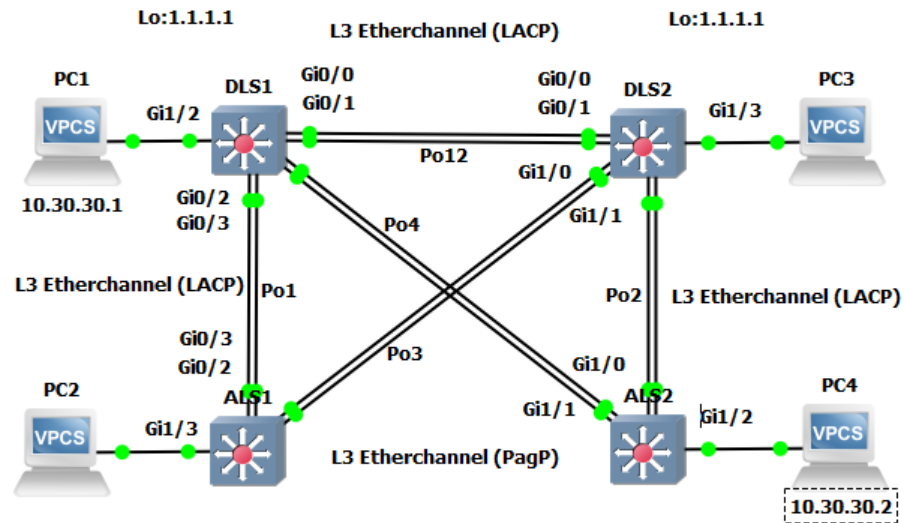


Figura 26. Segundo Escenario

Parte 1: Se Configuro la red de acuerdo a las especificaciones del esquemas de la figura 26.

a. A continuación Desactivaremos todas las interfaces en cada switch.

```

Switch#
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface range Gi0/0-3
Switch(config-if-range)#shutdown
Switch(config-if-range)#
*Jul 25 19:30:56.501: %LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to administratively down
*Jul 25 19:30:56.581: %LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to administratively down
*Jul 25 19:30:56.638: %LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to administratively down
*Jul 25 19:30:56.776: %LINK-5-CHANGED: Interface GigabitEthernet0/3, changed state to administratively down
% Incomplete command.

Switch(config-if-range)#interface range Gi1/0-3
Switch(config-if-range)#shutdown
Switch(config-if-range)#
*Jul 25 19:31:31.051: %LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state to administratively down
*Jul 25 19:31:31.115: %LINK-5-CHANGED: Interface GigabitEthernet1/1, changed state to administratively down
*Jul 25 19:31:31.176: %LINK-5-CHANGED: Interface GigabitEthernet1/2, changed state to administratively down
*Jul 25 19:31:31.237: %LINK-5-CHANGED: Interface GigabitEthernet1/3, changed state to administratively down
Switch(config-if-range)#exi
    
```

Figura 27. Validación de Interfaces deshabilitadas DSL2

```

Switch#
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface range Gi0/0-3
Switch(config-if-range)#shutdown
Switch(config-if-range)#
*Jul 25 19:35:39.618: %LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to administratively down
*Jul 25 19:35:39.656: %LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to administratively down
*Jul 25 19:35:39.725: %LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to administratively down
*Jul 25 19:35:39.776: %LINK-5-CHANGED: Interface GigabitEthernet0/3, changed state to administratively down
Switch(config-if-range)#interface range Gi1/0-3
Switch(config-if-range)#shutdown
Switch(config-if-range)#
*Jul 25 19:36:04.468: %LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state to administratively down
*Jul 25 19:36:04.529: %LINK-5-CHANGED: Interface GigabitEthernet1/1, changed state to administratively down
*Jul 25 19:36:04.592: %LINK-5-CHANGED: Interface GigabitEthernet1/2, changed state to administratively down
*Jul 25 19:36:04.715: %LINK-5-CHANGED: Interface GigabitEthernet1/3, changed state to administratively down
Switch(config-if-range)#

```

Figura 28. Validación de Interfaces deshabilitadas DSL1

```

Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface range Gi0/0-3
Switch(config-if-range)#shutdown
Switch(config-if-range)#
*Jul 25 19:35:36.947: %LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to administratively down
*Jul 25 19:35:37.022: %LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to administratively down
*Jul 25 19:35:37.095: %LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to administratively down
*Jul 25 19:35:37.232: %LINK-5-CHANGED: Interface GigabitEthernet0/3, changed state to administratively down
Switch(config-if-range)#interface range Gi1/0-3
Switch(config-if-range)#shutdown
Switch(config-if-range)#
*Jul 25 19:36:08.080: %LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state to administratively down
*Jul 25 19:36:08.144: %LINK-5-CHANGED: Interface GigabitEthernet1/1, changed state to administratively down
*Jul 25 19:36:08.206: %LINK-5-CHANGED: Interface GigabitEthernet1/2, changed state to administratively down
*Jul 25 19:36:08.264: %LINK-5-CHANGED: Interface GigabitEthernet1/3, changed state to administratively down
Switch(config-if-range)#
Switch(config-if-range)#end

```

Figura 29. Validación de Interfaces deshabilitadas ASL1

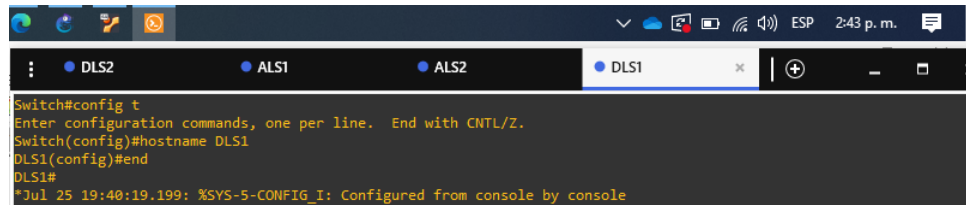
```

Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface range Gi0/0-3
Switch(config-if-range)#shutdown
Switch(config-if-range)#
*Jul 25 19:35:34.223: %LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to administratively down
*Jul 25 19:35:34.296: %LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to administratively down
*Jul 25 19:35:34.355: %LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to administratively down
*Jul 25 19:35:34.464: %LINK-5-CHANGED: Interface GigabitEthernet0/3, changed state to administratively down
Switch(config-if-range)#interface range Gi1/0-3
Switch(config-if-range)#shutdown
Switch(config-if-range)#
*Jul 25 19:36:01.381: %LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state to administratively down
*Jul 25 19:36:01.463: %LINK-5-CHANGED: Interface GigabitEthernet1/1, changed state to administratively down
*Jul 25 19:36:01.568: %LINK-5-CHANGED: Interface GigabitEthernet1/2, changed state to administratively down
*Jul 25 19:36:01.666: %LINK-5-CHANGED: Interface GigabitEthernet1/3, changed state to administratively down
Switch(config-if-range)#
Switch(config-if-range)#

```

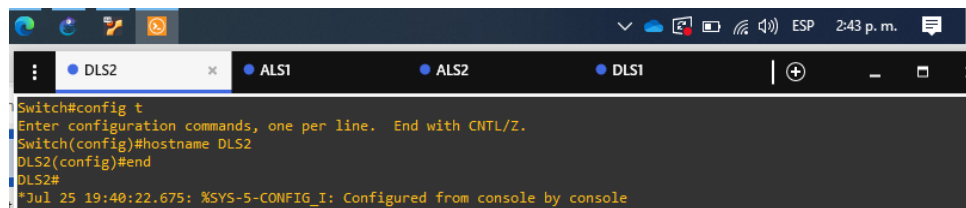
Figura 30. Validación de Interfaces deshabilitadas ASL2

b. Asignar un nombre a cada switch acorde con la figura 26 establecida.



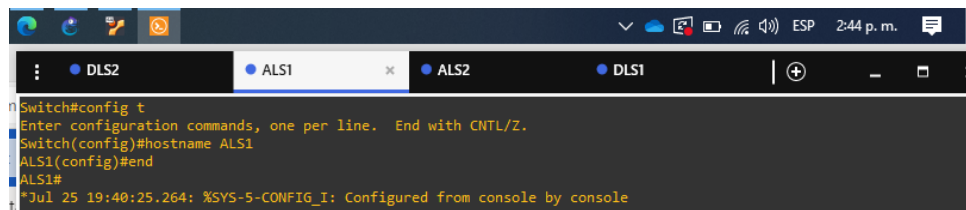
```
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname DLS1
DLS1(config)#end
DLS1#
*Jul 25 19:40:19.199: %SYS-5-CONFIG_I: Configured from console by console
```

Figura 31. Configuración hostname DLS1



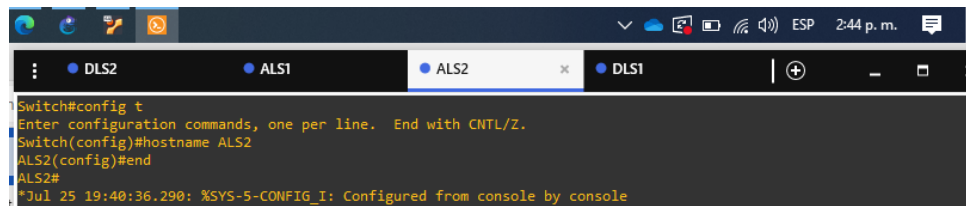
```
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname DLS2
DLS2(config)#end
DLS2#
*Jul 25 19:40:22.675: %SYS-5-CONFIG_I: Configured from console by console
```

Figura 32. Configuración hostname DLS2



```
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname ALS1
ALS1(config)#end
ALS1#
*Jul 25 19:40:25.264: %SYS-5-CONFIG_I: Configured from console by console
```

Figura 33. Configuración hostname ALS1

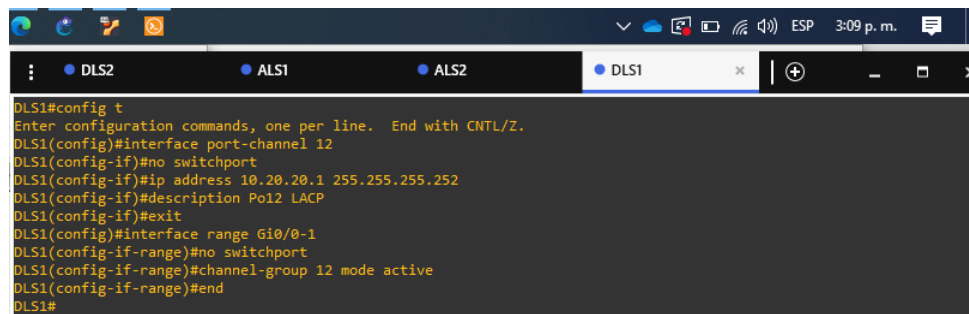


```
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname ALS2
ALS2(config)#end
ALS2#
*Jul 25 19:40:36.290: %SYS-5-CONFIG_I: Configured from console by console
```

Figura 34. Configuración hostname ALS2

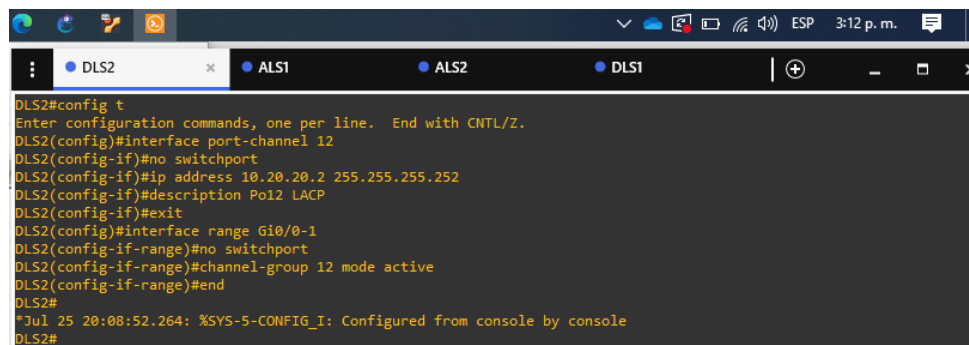
c. Se configura los puertos troncales y Port-channels tal como se muestra en la figura 26.

1. La conexión entre DLS1 y DLS2 será aplicada en EtherChannel capa-3 utilizando LACP. Para DLS1 se utilizará la dirección IP 10.20.20.1/30 y para DLS2 utilizará 10.20.20.2/30.



```
DLS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface port-channel 12
DLS1(config-if)#no switchport
DLS1(config-if)#ip address 10.20.20.1 255.255.255.252
DLS1(config-if)#description Po12 LACP
DLS1(config-if)#exit
DLS1(config)#interface range Gi0/0-1
DLS1(config-if-range)#no switchport
DLS1(config-if-range)#channel-group 12 mode active
DLS1(config-if-range)#end
DLS1#
```

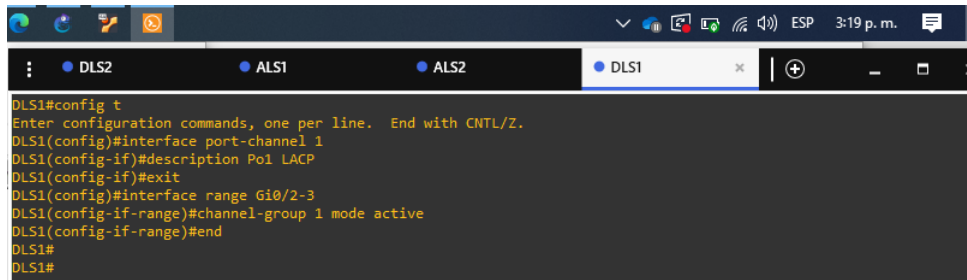
Figura 35. Configuración de Port-channels Gi0/0-1 en L3 DLS1 usando LACP



```
DLS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#interface port-channel 12
DLS2(config-if)#no switchport
DLS2(config-if)#ip address 10.20.20.2 255.255.255.252
DLS2(config-if)#description Po12 LACP
DLS2(config-if)#exit
DLS2(config)#interface range Gi0/0-1
DLS2(config-if-range)#no switchport
DLS2(config-if-range)#channel-group 12 mode active
DLS2(config-if-range)#end
DLS2#
*Jul 25 20:08:52.264: %SYS-5-CONFIG_I: Configured from console by console
DLS2#
```

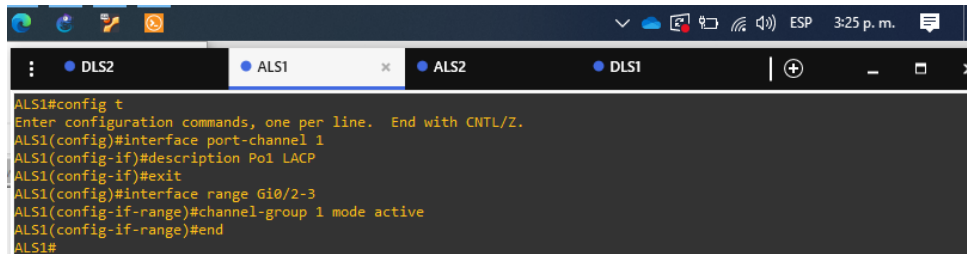
Figura 36. Configuración de Port-channels Gi0/0-1 en L3 DLS2 usando LACP

2. Los Port-channels en las interfaces Gi0/2 y Gi0/3 utilizarán LACP.



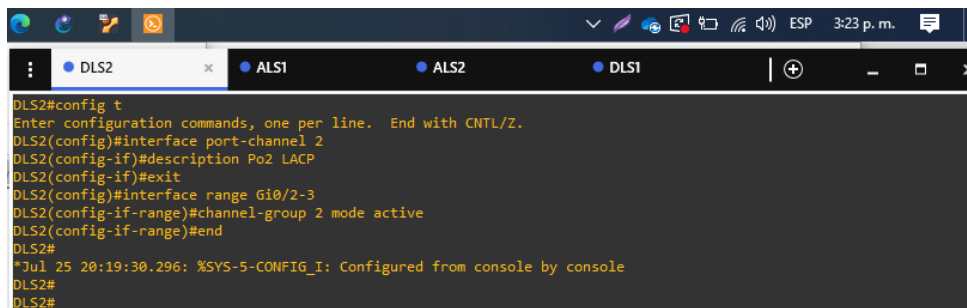
```
DLS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface port-channel 1
DLS1(config-if)#description Po1 LACP
DLS1(config-if)#exit
DLS1(config)#interface range Gi0/2-3
DLS1(config-if-range)#channel-group 1 mode active
DLS1(config-if-range)#end
DLS1#
DLS1#
```

Figura 37. Configuración de Port-channels Gi0/2-3 DLS1 usando LACP



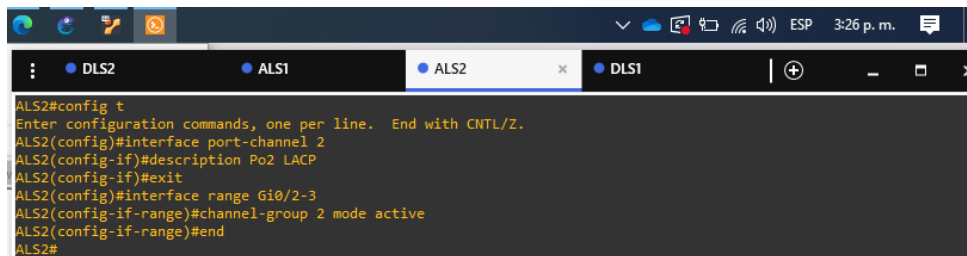
```
ALS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#interface port-channel 1
ALS1(config-if)#description Po1 LACP
ALS1(config-if)#exit
ALS1(config)#interface range Gi0/2-3
ALS1(config-if-range)#channel-group 1 mode active
ALS1(config-if-range)#end
ALS1#
```

Figura 38. Configuración de Port-channels Gi0/2-3 ALS1 usando LACP



```
DLS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#interface port-channel 2
DLS2(config-if)#description Po2 LACP
DLS2(config-if)#exit
DLS2(config)#interface range Gi0/2-3
DLS2(config-if-range)#channel-group 2 mode active
DLS2(config-if-range)#end
DLS2#
*Jul 25 20:19:30.296: %SYS-5-CONFIG_I: Configured from console by console
DLS2#
DLS2#
```

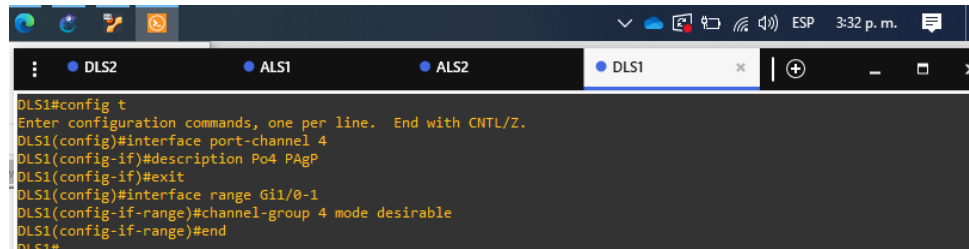
Figura 39. Configuración de Port-channels Gi0/2-3 DLS2 usando LACP



```
ALS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#interface port-channel 2
ALS2(config-if)#description Po2 LACP
ALS2(config-if)#exit
ALS2(config)#interface range Gi0/2-3
ALS2(config-if-range)#channel-group 2 mode active
ALS2(config-if-range)#end
ALS2#
```

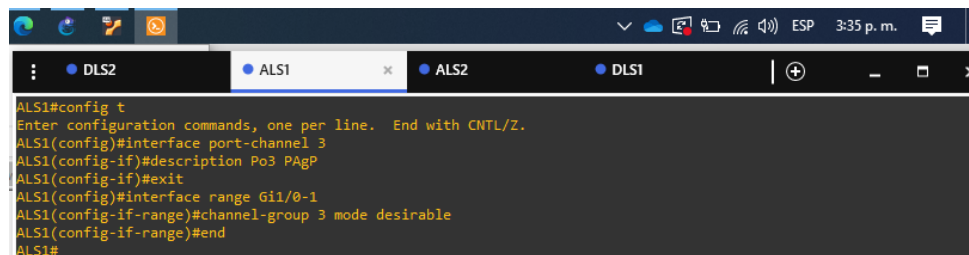
Figura 40. Configuración de Port-channels Gi0/2-3 ALS2 usando LACP

3. Los Port-channels en las interfaces Gi1/0 y Gi1/1 utilizará PAgP.



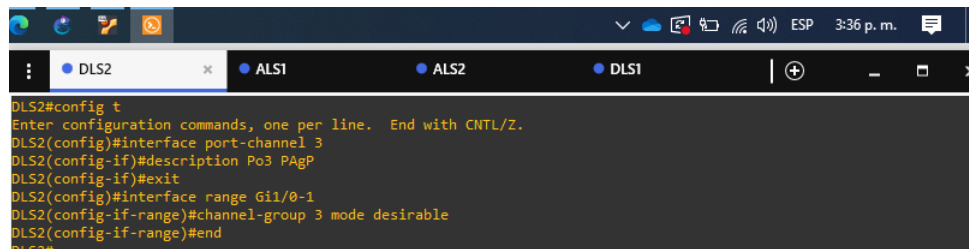
```
DLS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface port-channel 4
DLS1(config-if)#description Po4 PAgP
DLS1(config-if)#exit
DLS1(config)#interface range Gi1/0-1
DLS1(config-if-range)#channel-group 4 mode desirable
DLS1(config-if-range)#end
DLS1#
```

Figura 41. Configuración de Port-channels Gi1/0-1 DLS1 usando PAgP



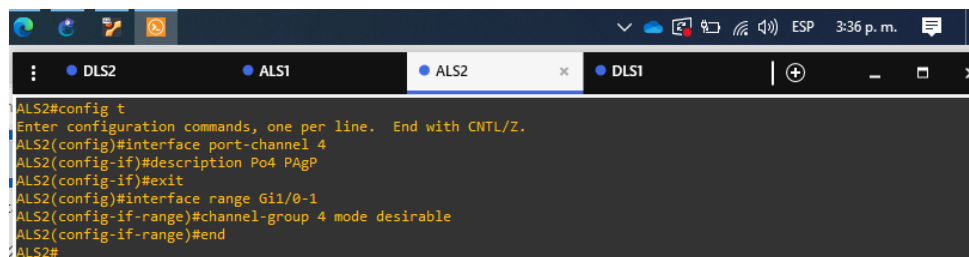
```
ALS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#interface port-channel 3
ALS1(config-if)#description Po3 PAgP
ALS1(config-if)#exit
ALS1(config)#interface range Gi1/0-1
ALS1(config-if-range)#channel-group 3 mode desirable
ALS1(config-if-range)#end
ALS1#
```

Figura 42. Configuración de Port-channels Gi1/0-1 ALS1 usando PAgP



```
DLS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#interface port-channel 3
DLS2(config-if)#description Po3 PAgP
DLS2(config-if)#exit
DLS2(config)#interface range Gi1/0-1
DLS2(config-if-range)#channel-group 3 mode desirable
DLS2(config-if-range)#end
DLS2#
```

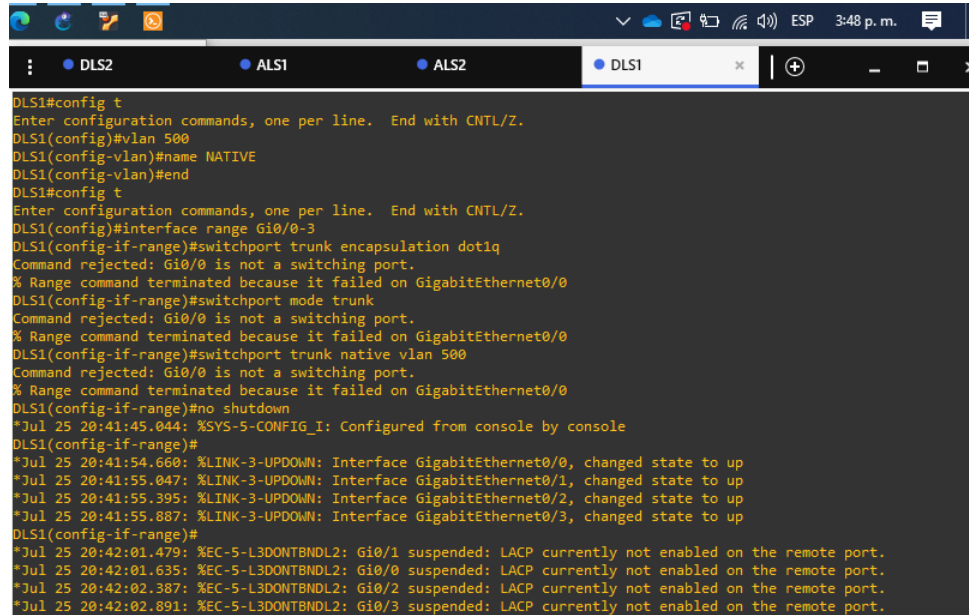
Figura 43. Configuración de Port-channels Gi1/0-1 DLS2 usando PAgP



```
ALS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#interface port-channel 4
ALS2(config-if)#description Po4 PAgP
ALS2(config-if)#exit
ALS2(config)#interface range Gi1/0-1
ALS2(config-if-range)#channel-group 4 mode desirable
ALS2(config-if-range)#end
ALS2#
```

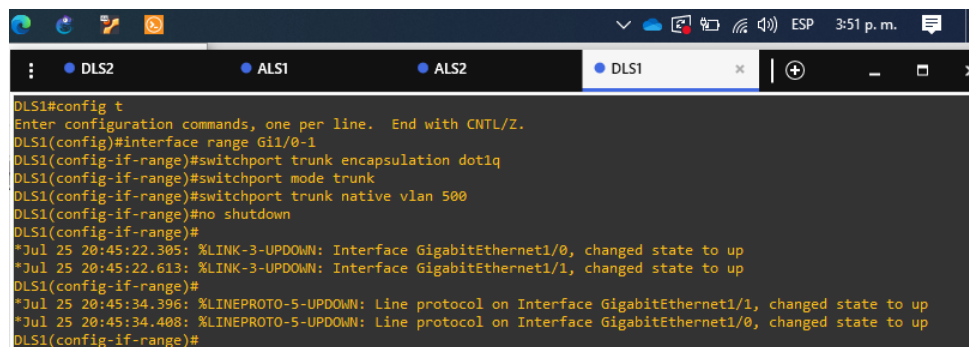
Figura 44. Configuración de Port-channels Gi1/0-1 ALS2 usando PAgP

4. Todos los puertos troncales serán asignados a la VLAN 500 como la VLAN nativa.



```
DLS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#vlan 500
DLS1(config-vlan)#name NATIVE
DLS1(config-vlan)#end
DLS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface range Gi0/0-3
DLS1(config-if-range)#switchport trunk encapsulation dot1q
Command rejected: Gi0/0 is not a switching port.
% Range command terminated because it failed on GigabitEthernet0/0
DLS1(config-if-range)#switchport mode trunk
Command rejected: Gi0/0 is not a switching port.
% Range command terminated because it failed on GigabitEthernet0/0
DLS1(config-if-range)#switchport trunk native vlan 500
Command rejected: Gi0/0 is not a switching port.
% Range command terminated because it failed on GigabitEthernet0/0
DLS1(config-if-range)#no shutdown
*Jul 25 20:41:45.044: %SYS-5-CONFIG_I: Configured from console by console
DLS1(config-if-range)#
*Jul 25 20:41:54.660: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
*Jul 25 20:41:55.047: %LINK-3-UPDOWN: Interface GigabitEthernet0/1, changed state to up
*Jul 25 20:41:55.395: %LINK-3-UPDOWN: Interface GigabitEthernet0/2, changed state to up
*Jul 25 20:41:55.887: %LINK-3-UPDOWN: Interface GigabitEthernet0/3, changed state to up
DLS1(config-if-range)#
*Jul 25 20:42:01.479: %EC-5-L3DONTBNDL2: Gi0/1 suspended: LACP currently not enabled on the remote port.
*Jul 25 20:42:01.635: %EC-5-L3DONTBNDL2: Gi0/0 suspended: LACP currently not enabled on the remote port.
*Jul 25 20:42:02.387: %EC-5-L3DONTBNDL2: Gi0/2 suspended: LACP currently not enabled on the remote port.
*Jul 25 20:42:02.891: %EC-5-L3DONTBNDL2: Gi0/3 suspended: LACP currently not enabled on the remote port.
DLS1(config-if-range)#
```

Figura 45. Configuración VLAN nativa 500 en los puerto trunk Gi0/0-3 DLS1



```
DLS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface range Gi1/0-1
DLS1(config-if-range)#switchport trunk encapsulation dot1q
DLS1(config-if-range)#switchport mode trunk
DLS1(config-if-range)#switchport trunk native vlan 500
DLS1(config-if-range)#no shutdown
DLS1(config-if-range)#
*Jul 25 20:45:22.305: %LINK-3-UPDOWN: Interface GigabitEthernet1/0, changed state to up
*Jul 25 20:45:22.613: %LINK-3-UPDOWN: Interface GigabitEthernet1/1, changed state to up
DLS1(config-if-range)#
*Jul 25 20:45:34.396: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/1, changed state to up
*Jul 25 20:45:34.408: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0, changed state to up
DLS1(config-if-range)#
```

Figura 46. Configuración VLAN nativa 500 en los puerto trunk Gi1/0-1 DLS1

```
DLS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#vlan 500
DLS2(config-vlan)#name NATIVE
DLS2(config-vlan)#end
DLS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#interface range Gi0/0-3
DLS2(config-if-range)#switchport trunk encapsulation dot1q
Command rejected: Gi0/0 is not a switching port.
% Range command terminated because it failed on GigabitEthernet0/0
DLS2(config-if-range)#switchport mode trunk
Command rejected: Gi0/0 is not a switching port.
% Range command terminated because it failed on GigabitEthernet0/0
DLS2(config-if-range)#switchport trunk native vlan 500
Command rejected: Gi0/0 is not a switching port.
% Range command terminated because it failed on GigabitEthernet0/0
DLS2(config-if-range)#no shutdown
*Jul 25 20:51:51.836: %SYS-5-CONFIG_I: Configured from console by console
DLS2(config-if-range)#
*Jul 25 20:51:57.686: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
*Jul 25 20:51:58.108: %LINK-3-UPDOWN: Interface GigabitEthernet0/1, changed state to up
*Jul 25 20:51:58.496: %LINK-3-UPDOWN: Interface GigabitEthernet0/2, changed state to up
*Jul 25 20:51:58.714: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
*Jul 25 20:51:59.084: %LINK-3-UPDOWN: Interface GigabitEthernet0/3, changed state to up
*Jul 25 20:51:59.122: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
*Jul 25 20:52:02.286: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to down
*Jul 25 20:52:02.946: %LINK-3-UPDOWN: Interface Port-channel12, changed state to up
*Jul 25 20:52:03.948: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel12, changed state to up
*Jul 25 20:52:05.190: %EC-5-L3DONTBNDL2: Gi0/2 suspended: LACP currently not enabled on the remote port.
*Jul 25 20:52:05.308: %EC-5-L3DONTBNDL2: Gi0/3 suspended: LACP currently not enabled on the remote port.
DLS2(config-if-range)#end
DLS2#
```

Figura 47. Configuración VLAN nativa 500 en los puerto trunk Gi0/0-3 DLS2

```
DLS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#interface range Gi1/0-1
DLS2(config-if-range)#switchport trunk encapsulation dot1q
DLS2(config-if-range)#switchport mode trunk
DLS2(config-if-range)#switchport trunk native vlan 500
DLS2(config-if-range)#no shutdown
DLS2(config-if-range)#
*Jul 25 20:52:43.062: %LINK-3-UPDOWN: Interface GigabitEthernet1/0, changed state to up
*Jul 25 20:52:43.399: %LINK-3-UPDOWN: Interface GigabitEthernet1/1, changed state to up
DLS2(config-if-range)#
*Jul 25 20:52:54.313: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0, changed state to up
*Jul 25 20:52:54.703: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/1, changed state to up
```

Figura 48. Configuración VLAN nativa 500 en los puerto trunk Gi1/0-1 DLS2

```

ALS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#vlan 500
ALS1(config-vlan)#name NATIVE
ALS1(config-vlan)#end
ALS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#interface range Gi0/2-3
ALS1(config-if-range)#switchport trunk encapsulation dot1q
ALS1(config-if-range)#switchport mode trunk
ALS1(config-if-range)#switchport trunk native vlan 500
ALS1(config-if-range)#no shutdown
*Jul 25 21:00:32.992: %SYS-5-CONFIG_I: Configured from console by console
ALS1(config-if-range)#
*Jul 25 21:00:42.318: %LINK-3-UPDOWN: Interface GigabitEthernet0/2, changed state to up
*Jul 25 21:00:42.638: %LINK-3-UPDOWN: Interface GigabitEthernet0/3, changed state to up
*Jul 25 21:00:43.871: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/2 (500), w

```

Figura 49. Configuración VLAN nativa 500 en los puerto trunk Gi0/2-3 ALS1

```

ALS1(config-if-range)#
ALS1(config-if-range)#interface range Gi1/0-1
ALS1(config-if-range)#switchport trunk encapsulation dot1q
ALS1(config-if-range)#switchport mode trunk
ALS1(config-if-range)#switchport trunk native vlan 500
ALS1(config-if-range)#no shutdown
*Jul 25 21:01:03.008: %EC-5-CANNOT_BUNDLE2: Gi1/0 is not compatible with Po3 and will be suspended (native vlan o
f Gi1/0 is 1, Po3 id 500)
*Jul 25 21:01:03.048: %EC-5-CANNOT_BUNDLE2: Gi1/1 is not compatible with Po3 and will be suspended (native vlan o
f Gi1/1 is 1, Po3 id 500)
*Jul 25 21:01:03.445: %EC-5-CANNOT_BUNDLE2: Gi1/1 is not compatible with Po3 and will be suspended (native vlan o
f Gi1/1 is 1, Po3 id 500)
*Jul 25 21:01:04.011: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0, changed state to up
*Jul 25 21:01:04.057: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/1, changed state to up
ALS1(config-if-range)#
*Jul 25 21:01:07.704: %LINK-3-UPDOWN: Interface Port-channel3, changed state to up
*Jul 25 21:01:08.706: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel3, changed state to up

```

Figura 50. Configuración VLAN nativa 500 en el puerto trunk Gi1/0-1 ALS1

```

ALS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#vlan 500
ALS2(config-vlan)#name NATIVE
ALS2(config-vlan)#end
ALS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#interface range Gi0/2-3
ALS2(config-if-range)#switchport trunk encapsulation dot1q
ALS2(config-if-range)#switchport mode trunk
ALS2(config-if-range)#switchport trunk native vlan 500
ALS2(config-if-range)#no shutdown
*Jul 25 21:06:28.792: %SYS-5-CONFIG_I: Configured from console by console
ALS2(config-if-range)#
*Jul 25 21:06:34.691: %LINK-3-UPDOWN: Interface GigabitEthernet0/2, changed state to up
*Jul 25 21:06:35.111: %LINK-3-UPDOWN: Interface GigabitEthernet0/3, changed state to up
*Jul 25 21:06:36.891: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/3 (500), with

```

Figura 51. Configuración VLAN nativa 500 en los puerto trunk Gi0/2-3 ALS2

```
*Jul 25 21:07:36.231: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/2 (500), with GigabitEthernet0/2 (1).
ALS2(config-if-range)#switchport trunk encapsulation dot1q
ALS2(config-if-range)#switchport mode trunk
ALS2(config-if-range)#switchport trunk native vlan 500
ALS2(config-if-range)#no shutdown

*Jul 25 21:07:37.731: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/3 (500), with GigabitEthernet0/3 (1).
ALS2(config-if-range)#

*Jul 25 21:07:41.196: %LINK-3-UPDOWN: Interface GigabitEthernet1/0, changed state to up
*Jul 25 21:07:41.746: %LINK-3-UPDOWN: Interface GigabitEthernet1/1, changed state to up
ALS2(config-if-range)#

*Jul 25 21:07:46.300: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0, changed state to up
*Jul 25 21:07:46.783: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/1, changed state to up
```

Figura 52. Configuración VLAN nativa 500 en los puertos trunk Gi1/0-1 ALS2

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

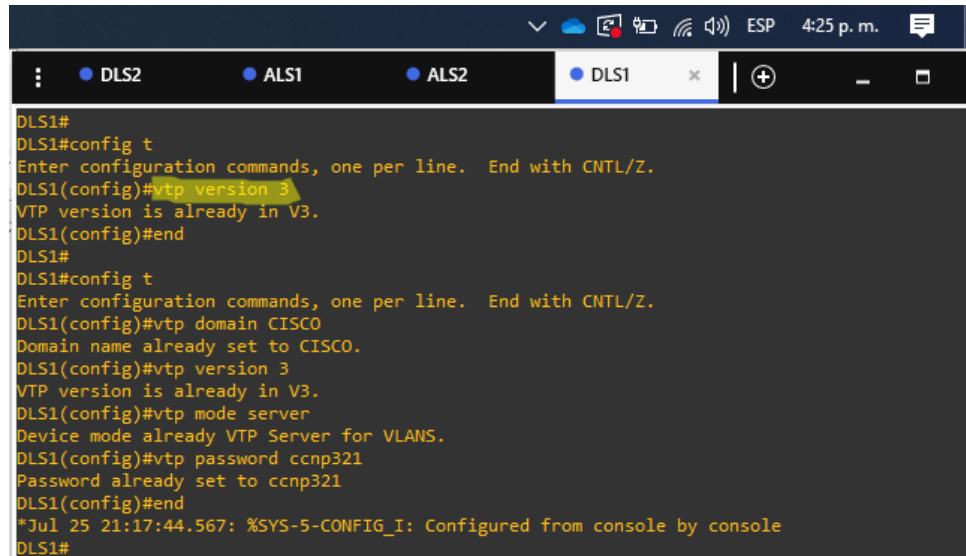
```
DLS1#show vtp status
VTP Version capable          : 1 to 3
VTP version running         : 1
VTP Domain Name              :
VTP Pruning Mode             : Disabled
VTP Traps Generation         : Disabled
Device ID                    : 0c65.239d.8000
Configuration last modified by 0.0.0.0 at 7-25-21 20:41:44
Local updater ID is 10.20.20.1 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       : 1
MD5 digest                   : 0xBC 0x76 0x06 0x80 0x6B 0x1F 0x52 0x9A
                              0xAA 0x10 0x04 0x37 0xE6 0xEA 0xA7 0x8B

DLS1#
DLS1#
DLS1#
```

Figura 53. Validación versión VTP soportado por DLS1

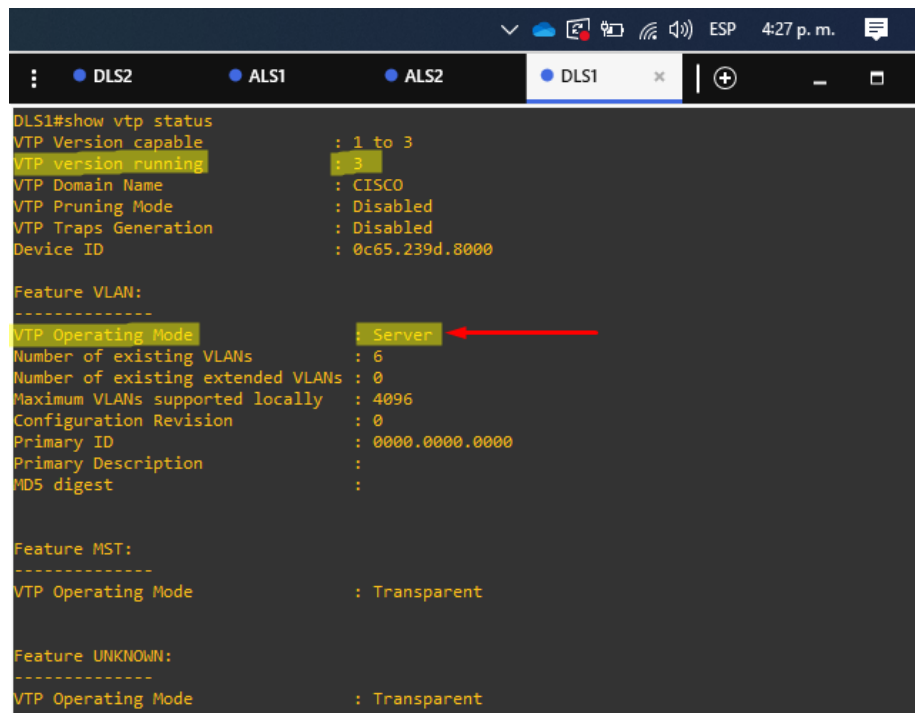
1. Utilizar el nombre de dominio CISCO con la contraseña ccnp321



```
DLS1#
DLS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#vtp version 3
VTP version is already in V3.
DLS1(config)#end
DLS1#
DLS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#vtp domain CISCO
Domain name already set to CISCO.
DLS1(config)#vtp version 3
VTP version is already in V3.
DLS1(config)#vtp mode server
Device mode already VTP Server for VLANs.
DLS1(config)#vtp password ccnp321
Password already set to ccnp321
DLS1(config)#end
*Jul 25 21:17:44.567: %SYS-5-CONFIG_I: Configured from console by console
DLS1#
```

Figura 54. Configuración del Dominio VTP DLS1

2. Configurar DLS1 como servidor principal para las VLAN.



```
DLS1#show vtp status
VTP Version capable      : 1 to 3
VTP version running      : 3
VTP Domain Name         : CISCO
VTP Pruning Mode        : Disabled
VTP Traps Generation     : Disabled
Device ID                : 0c65.239d.8000

Feature VLAN:
-----
VTP Operating Mode      : Server
Number of existing VLANs : 6
Number of existing extended VLANs : 0
Maximum VLANs supported locally : 4096
Configuration Revision  : 0
Primary ID              : 0000.0000.0000
Primary Description     :
MD5 digest              :

Feature MST:
-----
VTP Operating Mode      : Transparent

Feature UNKNOWN:
-----
VTP Operating Mode      : Transparent
```

Figura 55. Configuración DLS1 como servidor VTP

3. Configurar ALS1 y ALS2 como clientes VTP.

```
ALS1(config)#end
ALS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#vtp mode client
Setting device to VTP Client mode for VLANs.
*Jul 25 21:29:00.945: %SYS-5-CONFIG_I: Configured from console by console
ALS1(config)#vtp domain CISCO
Changing VTP domain name from client to CISCO
ALS1(config)#vtp password ccnp321
Password already set to ccnp321
ALS1(config)#end
ALS1#show vtp status
VTP Version capable      : 1 to 3
VTP version running     : 3
VTP Domain Name         : CISCO
VTP Pruning Mode        : Disabled
VTP Traps Generation    : Disabled
Device ID               : 0c65.2352.8000

Feature VLAN:
-----
VTP Operating Mode      : Client
Number of existing VLANs : 6
Number of existing extended VLANs : 0
Maximum VLANs supported locally : 4096
Configuration Revision  : 0
Primary ID              : 0000.0000.0000
Primary Description     :
MD5 digest              :

Feature MST:
-----
VTP Operating Mode      : Transparent
```

Figura 56. Configuración ALS1 como clientes VTP

```
ALS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#vtp mode client
Device mode already VTP Client for VLANs.
ALS2(config)#vtp domain CISCO
Domain name already set to CISCO.
ALS2(config)#vtp password ccnp321
Password already set to ccnp321
ALS2(config)#end
ALS2#show vtp status
VTP Version capable      : 1 to 3
VTP version running     : 3
VTP Domain Name         : CISCO
VTP Pruning Mode        : Disabled
VTP Traps Generation    : Disabled
Device ID               : 0c65.2344.8000

Feature VLAN:
-----
VTP Operating Mode      : Client
Number of existing VLANs : 6
Number of existing extended VLANs : 0
Maximum VLANs supported locally : 4096
Configuration Revision  : 0
Primary ID              : 0000.0000.0000
Primary Description     :
MD5 digest              :

Feature MST:
-----
VTP Operating Mode      : Transparent
```

Figura 57. Configuración ALS2 como clientes VTP

e. Se Configura en el servidor DLS1 las siguientes VLAN:

Número de VLAN	Número de VLAN	Número de VLAN	Número de VLAN
500	NATIVA	420	PROVEEDORES
15	ADMON	100	SEGUROS
240	CLIENTES	150	VENTAS
112	MULTIMEDIA	350	PERSONAL

Tabla 1. VLAN Servidor VTP

```

DLS1#
DLS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#vlan 15
DLS1(config-vlan)#name ADMON
DLS1(config-vlan)#exit
DLS1(config)#vlan 240
DLS1(config-vlan)#name CLIENTES
DLS1(config-vlan)#exit
DLS1(config)#vlan 112
DLS1(config-vlan)#name MULTIMEDIA
DLS1(config-vlan)#exit
DLS1(config)#vlan 420
DLS1(config-vlan)#name PROVEEDORES
DLS1(config-vlan)#exit
DLS1(config)#vlan 100
DLS1(config-vlan)#n
*Jul 25 21:57:39.427: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, ch
anged state to upame SEGUROS
DLS1(config-vlan)#exit
DLS1(config)#vlan 150
DLS1(config-vlan)#name VENTAS
DLS1(config-vlan)#exit
DLS1(config)#vlan 350
DLS1(config-vlan)#name PERSONAL
DLS1(config-vlan)#exit
*Jul 25 21:57:39.475: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Gigabi
tEthernet0/3 (1), with ALS1 GigabitEthernet0/3 (500).
DLS1(config)#
DLS1(config)#
    
```

Figura 58. Configuración de VLAN en el servidor VTP DLS1

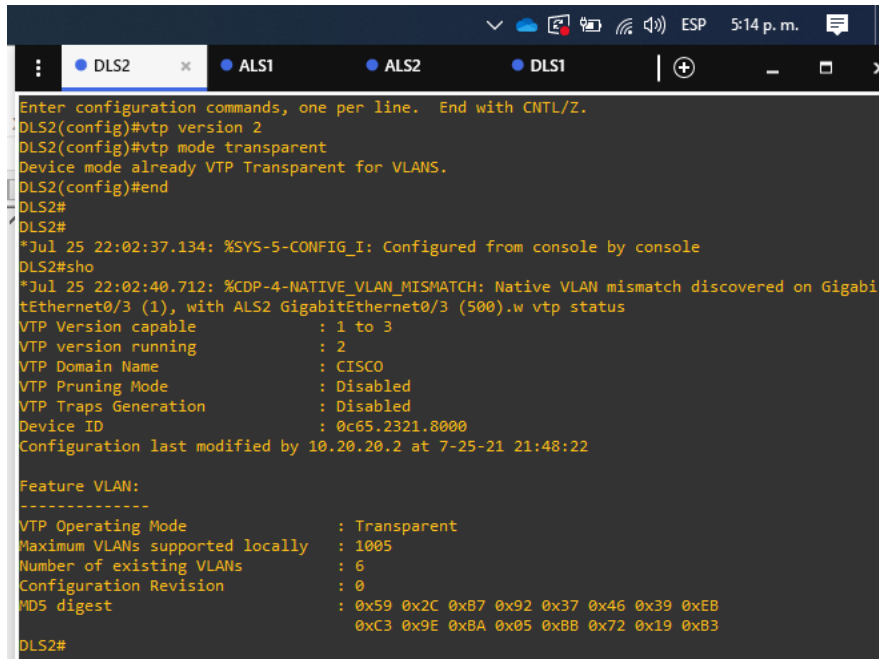
f. En DLS1, suspender la VLAN 420.

```

DLS1(config)#vlan 420
DLS1(config-vlan)#
*Jul 25 21:59:32.189: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Gigabi
tEthernet0/3 (1), with ALS1 GigabitEthernet0/3 (500).
DLS1(config-vlan)#
DLS1(config-vlan)#state sus
DLS1(config-vlan)#state suspend
DLS1(config-vlan)#
    
```

Figura 59. Suspender de VLAN “comando no soportado” DLS1

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

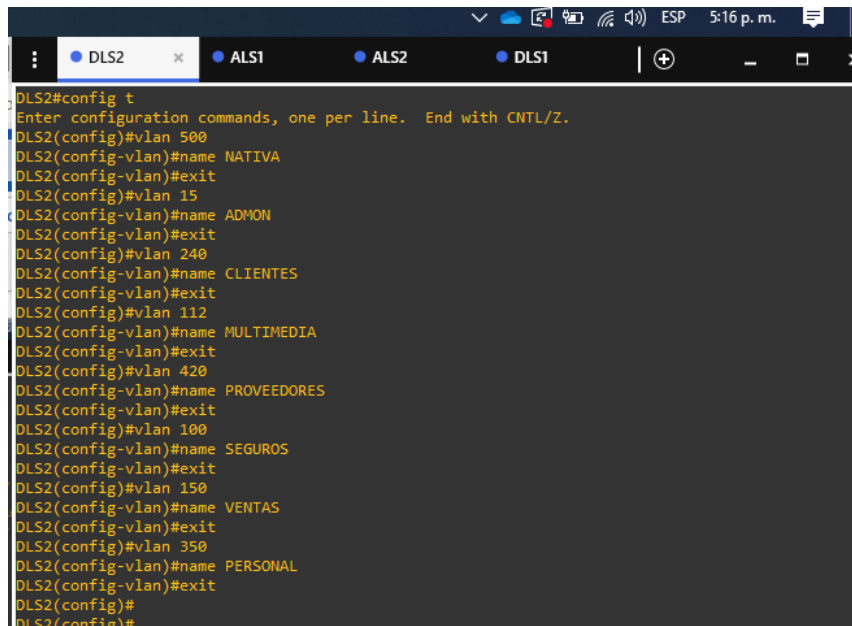


```
DLS2#
DLS2(config)#vtp version 2
DLS2(config)#vtp mode transparent
Device mode already VTP Transparent for VLANs.
DLS2(config)#end
DLS2#
DLS2#
*Jul 25 22:02:37.134: %SYS-5-CONFIG_I: Configured from console by console
DLS2#sho
*Jul 25 22:02:40.712: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/3 (1), with ALS2 GigabitEthernet0/3 (500).w vtp status
VTP Version capable      : 1 to 3
VTP version running      : 2
VTP Domain Name          : CISCO
VTP Pruning Mode         : Disabled
VTP Traps Generation     : Disabled
Device ID                 : 0c65.2321.8000
Configuration last modified by 10.20.20.2 at 7-25-21 21:48:22

Feature VLAN:
-----
VTP Operating Mode       : Transparent
Maximum VLANs supported locally : 1005
Number of existing VLANs : 6
Configuration Revision   : 0
MD5 digest               : 0x59 0x2C 0xB7 0x92 0x37 0x46 0x39 0xEB
                          0xC3 0x9E 0xBA 0x05 0xBB 0x72 0x19 0xB3

DLS2#
```

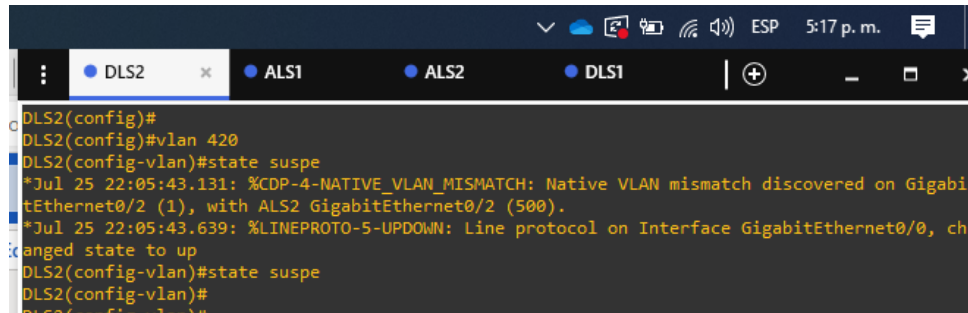
Figura 60. Configurar DLS2 en modo VTP transparente



```
DLS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#vlan 500
DLS2(config-vlan)#name NATIVA
DLS2(config-vlan)#exit
DLS2(config)#vlan 15
DLS2(config-vlan)#name ADMON
DLS2(config-vlan)#exit
DLS2(config)#vlan 240
DLS2(config-vlan)#name CLIENTES
DLS2(config-vlan)#exit
DLS2(config)#vlan 112
DLS2(config-vlan)#name MULTIMEDIA
DLS2(config-vlan)#exit
DLS2(config)#vlan 420
DLS2(config-vlan)#name PROVEEDORES
DLS2(config-vlan)#exit
DLS2(config)#vlan 100
DLS2(config-vlan)#name SEGUROS
DLS2(config-vlan)#exit
DLS2(config)#vlan 150
DLS2(config-vlan)#name VENTAS
DLS2(config-vlan)#exit
DLS2(config)#vlan 350
DLS2(config-vlan)#name PERSONAL
DLS2(config-vlan)#exit
DLS2(config)#
DLS2(config)#
```

Figura 61. Configurar de VLAN en DLS2

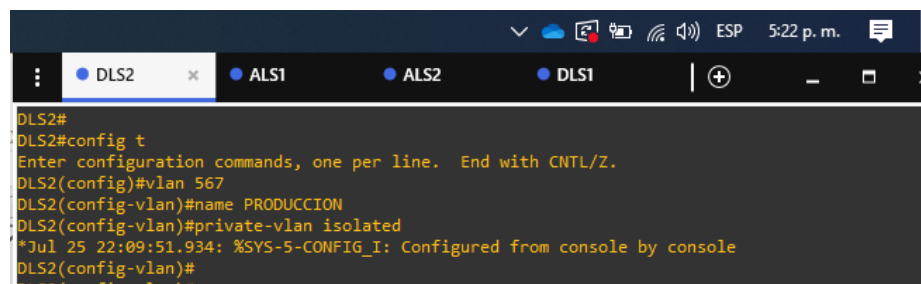
h. Suspende VLAN 420 en DLS2.



```
DLS2(config)#
DLS2(config)#vlan 420
DLS2(config-vlan)#state suspede
*Jul 25 22:05:43.131: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/2 (1), with ALS2 GigabitEthernet0/2 (500).
*Jul 25 22:05:43.639: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
DLS2(config-vlan)#state suspede
DLS2(config-vlan)#
DLS2(config-vlan)#
```

Figura 62. Suspende de VLAN “comando no soportado” DLS2

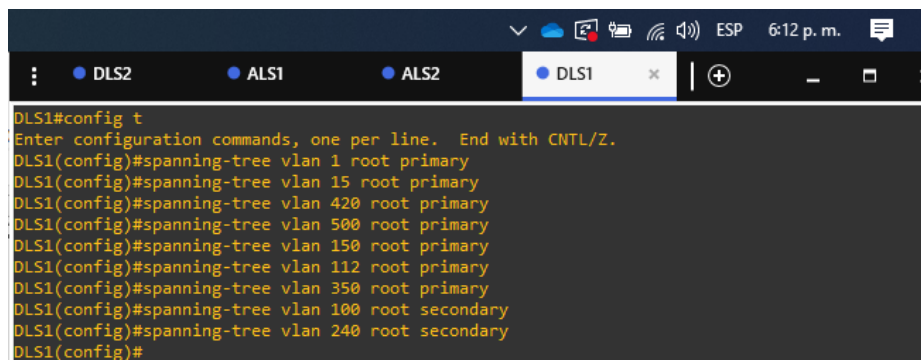
i. En DLS2, crear VLAN 567 con el nombre de PRODUCCION. La VLAN de PRODUCCION no podrá estar disponible en cualquier otro Switch de la red.



```
DLS2#
DLS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#vlan 567
DLS2(config-vlan)#name PRODUCCION
DLS2(config-vlan)#private-vlan isolated
*Jul 25 22:09:51.934: %SYS-5-CONFIG_I: Configured from console by console
DLS2(config-vlan)#
DLS2(config-vlan)#
```

Figura 63. Creación de VLAN privada DLS2 “comando no soportado”

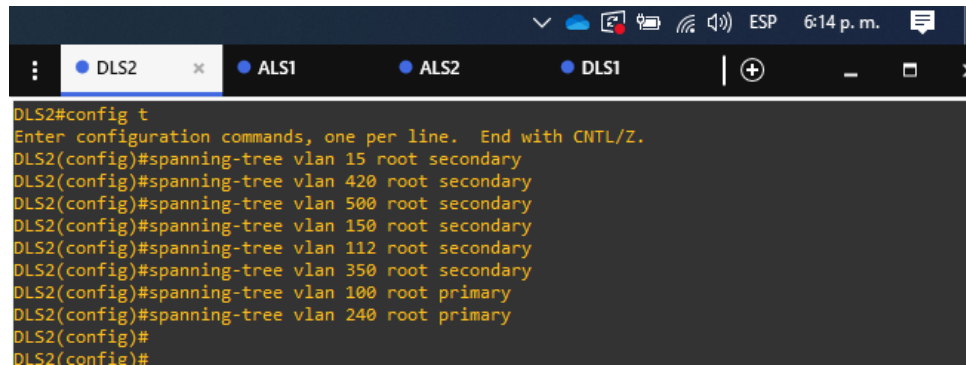
j. Configurar DLS1 como Spanning tree root para las VLANs 1, 15, 420, 500, 150, 112 y 350 y como raíz secundaria para las VLAN 100 y 240.



```
DLS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#spanning-tree vlan 1 root primary
DLS1(config)#spanning-tree vlan 15 root primary
DLS1(config)#spanning-tree vlan 420 root primary
DLS1(config)#spanning-tree vlan 500 root primary
DLS1(config)#spanning-tree vlan 150 root primary
DLS1(config)#spanning-tree vlan 112 root primary
DLS1(config)#spanning-tree vlan 350 root primary
DLS1(config)#spanning-tree vlan 100 root secondary
DLS1(config)#spanning-tree vlan 240 root secondary
DLS1(config)#
```

Figura 64. Configurar DLS1 como Spanning tree root

- k. Configurar DLS2 como Spanning tree root para las VLAN 100 y 240 y como una raíz secundaria para las VLAN 15, 420, 500, 150, 112 y 350.



```
DLS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#spanning-tree vlan 15 root secondary
DLS2(config)#spanning-tree vlan 420 root secondary
DLS2(config)#spanning-tree vlan 500 root secondary
DLS2(config)#spanning-tree vlan 150 root secondary
DLS2(config)#spanning-tree vlan 112 root secondary
DLS2(config)#spanning-tree vlan 350 root secondary
DLS2(config)#spanning-tree vlan 100 root primary
DLS2(config)#spanning-tree vlan 240 root primary
DLS2(config)#
DLS2(config)#
```

Figura 65. Configurar DLS2 como Spanning tree root

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



```
!
!
interface Port-channel1
description Po1 LACP
switchport trunk encapsulation dot1q
switchport trunk native vlan 500
switchport mode trunk
!
interface Port-channel4
description Po4 PAgP
switchport trunk encapsulation dot1q
switchport trunk native vlan 500
switchport mode trunk
!
interface Port-channel12
description Po12 LACP
no switchport
ip address 10.20.20.1 255.255.255.252
!
```

Figura 66. Configurar todos los puertos como troncales DLS1

```
!
interface Port-channel2
  --More--
  *Jul 25 23:08:34.243: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, ch
  aged sta description Po2 LACP
  switchport trunk encapsulation dot1q
  switchport trunk native vlan 500
  switchport mode trunk
!
interface Port-channel3
  description Po3 PAgP
  switchport trunk encapsulation dot1q
  switchport trunk native vlan 500
  switchport mode trunk
!
interface Port-channel12
  description Po12 LACP
  no switchport
  ip address 10.20.20.2 255.255.255.252
!
```

Figura 67. Configurar todos los puertos como troncales DLS2

```
!
!
interface Port-channel1
  description Po1 LACP
  switchport trunk encapsulation dot1q
  switchport trunk native vlan 500
  switchport mode trunk
!
interface Port-channel3
  description Po3 PAgP
  switchport trunk encapsulation dot1q
  switchport trunk native vlan 500
  switchport mode trunk
!
```

Figura 68. Configurar todos los puertos como troncales ALS1

```
!
interface Port-channel2
  description Po2 LACP
  switchport trunk encapsulation dot1q
  switchport trunk native vlan 500
  switchport mode trunk
!
interface Port-channel4
  description Po4 PAgP
  switchport trunk encapsulation dot1q
  switchport trunk native vlan 500
  switchport mode trunk
!
```

Figura 69. Configurar todos los puertos como troncales ALS2

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

Interfaz	DLS1	DLS2	ALS1	ALS2
Interfaz Gi1/3	350	15, 150	100, 150	240
Interfaz Gi1/2	112	112	112	112
No tiene más Interface		567		

Tabla 2. Configuración Interfaces con las VLAN de acceso

```

DLS1#
DLS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface Gi1/3
DLS1(config-if)#switchport access vlan 350
DLS1(config-if)#no shutdown
DLS1(config-if)#interface Gi1/2
DLS1(config-if)#switchport access vlan 112
DLS1(config-if)#no shutdown
DLS1(config-if)#
*Jul 25 23:13:28.412: %LINK-3-UPDOWN: Interface GigabitEthernet1/3, changed state to up
  
```

Figura 70. Configuración VLAN 350, 112 en interfaces DLS1

```

DLS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#interface Gi1/3
DLS2(config-if)#switchport access vlan 15
DLS2(config-if)#switchport access vlan 150
DLS2(config-if)#no shutdown
DLS2(config-if)#interface Gi1/2
DLS2(config-if)#switchport access vlan 112
DLS2(config-if)#no shutdown
DLS2(config-if)#
  
```

Figura 71. Configuración VLAN 15, 150, 112, 567 en interfaces DLS2

```

ALS1#config t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#interface Gi1/3
ALS1(config-if)#switchport access vlan 100
ALS1(config-if)#switchport access vlan 150
ALS1(config-if)#no shutdown
ALS1(config-if)#interface Gi1/2
ALS1(config-if)#switchport access vlan 112
ALS1(config-if)#no shutdown
ALS1(config-if)#
ALS1(config-if)#

```

Figura 72. Configuración VLAN 100, 150, 112, en interfaces ALS1

```

ALS2#config t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#interface Gi1/3
ALS2(config-if)#switchport access vlan 240
ALS2(config-if)#no shutdown
ALS2(config-if)#interface Gi1/2
ALS2(config-if)#switchport access vlan 112
ALS2(config-if)#no shutdown
ALS2(config-if)#
ALS2(config-if)#
ALS2(config-if)#

```

Figura 73. Configuración VLAN 240, 112, en interfaces 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

```

DLS1#
DLS1#show interface trunk

Port      Mode      Encapsulation  Status      Native vlan
-----
Po1       on        802.1q         trunking   500
Po4       on        802.1q         trunking   500

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

Port      Vlans allowed and active in management domain
-----
Po1       1,15,100,112,150,240,350,500
Po4       1,15,100,112,150,240,350,500

Port      Vlans in spanning tree forwarding state and not pruned
-----
Po1       1,15,112,150,350,500
Po4       1,15,100,112,150,240,350,500
DLS1#
DLS1#

```

Figura 74. Verificación de troncales y VLAN de DLS1

```

DLS1#show vlan
VLAN Name                Status    Ports
-----
1    default                 active
15   ADMON                   active
100  SEGUROS                  active
112  MULTIMEDIA              active    Gi1/2
150  VENTAS                   active
240  CLIENTES                 active
350  PERSONAL                 active    Gi1/3
420  PROVEEDORES             suspended
500  NATIVE                   active
1002 fddi-default             act/unsup
1003 trcrf-default           act/unsup
1004 fddinet-default         act/unsup
1005 trbrf-default         act/unsup

```

Figura 75. Verificación de VLAN de acceso en las fastethernet de DLS1

```

DLS2#
*Jul 25 23:23:19.533: %SYS-5-CONFIG_I: Configured from console by console
DLS2#
DLS2#show interface trunk
Port      Mode          Encapsulation  Status        Native vlan
Po2       on            802.1q         trunking      500
Po3       on            802.1q         trunking      500

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

Port      Vlans allowed and active in management domain
Po2       1,15,100,112,150,240,350,500,567
Po3       1,15,100,112,150,240,350,500,567

Port      Vlans in spanning tree forwarding state and not pruned
Po2       1,15,100,112,150,240,350,500,567
Po3       100,240,567
DLS2#

```

Figura 76. Verificación de troncales y VLAN de DLS2

```

DLS2#show vlan
VLAN Name                Status    Ports
-----
1    default                 active
15   ADMON                   active
100  SEGUROS                 active
112  MULTIMEDIA              active    Gi1/2
150  VENTAS                  active    Gi1/3
240  CLIENTES                active
350  PERSONAL                active
420  PROVEEDORES             suspended
500  NATIVA                  active
567  PRODUCCION              active
1002 fddi-default            act/unsup
1003 trcrf-default          act/unsup
1004 fddinet-default        act/unsup
1005 trbrf-default         act/unsup

```

Figura 77. Verificación de VLAN de acceso en las fastethernet de DLS2

```

ALS1#show interface trunk
Port      Mode      Encapsulation  Status        Native vlan
Po1       on        802.1q          trunking      500
Po3       on        802.1q          trunking      500

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

Port      Vlans allowed and active in management domain
Po1       1,15,100,112,150,240,350,500
Po3       1,15,100,112,150,240,350,500

Port      Vlans in spanning tree forwarding state and not pruned
Po1       1,15,100,112,150,240,350,500
Po3       1,15,100,112,150,240,350,500
ALS1#
*Jul 25 23:24:31.841: %SYS-5-CONFIG_I: Configured from console by console
ALS1#

```

Figura 78. Verificación de troncales y VLAN de ALS1

```

ALS1#show vlan
VLAN Name                Status    Ports
-----
1    default                active    Gi0/0, Gi0/1
15   ADMON                  active
100  SEGUROS                active
112  MULTIMEDIA             active    Gi1/2
150  VENTAS                 active    Gi1/3
240  CLIENTES               active
350  PERSONAL               active
420  PROVEEDORES            suspended
500  NATIVE                 active
1002 fddi-default            act/unsup
1003 trcrf-default           act/unsup
1004 fddinet-default         act/unsup
1005 trbrf-default          act/unsup

VLAN Type  SAID      MTU    Parent RingNo BridgeNo  Stp  BrdgMode Trans1 Trans2
-----
1    enet  100001   1500   -     -     -     -     -     0     0
15   enet  100015   1500   -     -     -     -     -     0     0
100  enet  100100   1500   -     -     -     -     -     0     0
112  enet  100112   1500   -     -     -     -     -     0     0
150  enet  100150   1500   -     -     -     -     -     0     0
240  enet  100240   1500   -     -     -     -     -     0     0
350  enet  100350   1500   -     -     -     -     -     0     0
420  enet  100420   1500   -     -     -     -     -     0     0
500  enet  100500   1500   -     -     -     -     -     0     0

```

Figura 79. Verificación de VLAN de acceso en las fastethernet de ALS1

```

ALS2#
*Jul 25 23:27:22.693: %SYS-5-CONFIG_I: Configured from console by console
ALS2#show interface trunk

Port      Mode      Encapsulation  Status        Native vlan
Po2       on        802.1q         trunking      500
Po4       on        802.1q         trunking      500

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

Port      Vlans allowed and active in management domain
Po2       1,15,100,112,150,240,350,500
Po4       1,15,100,112,150,240,350,500

Port      Vlans in spanning tree forwarding state and not pruned
Po2       1,15,100,112,150,240,350,500
Po4       1,15,100,112,150,240,350,500
ALS2#
ALS2#

```

Figura 80. Verificación de troncales y VLAN de ALS2

```

ALS2#show vlan
-----
VLAN Name                Status    Ports
-----
1    default                 active    Gi0/0, Gi0/1
15   ADMON                   active
100  SEGUROS                 active
112  MULTIMEDIA             active    Gi1/2
150  VENTAS                 active
240  CLIENTES               active    Gi1/3
350  PERSONAL               active
420  PROVEEDORES           suspended
500  NATIVE                 active
1002 fddi-default           act/unsup
1003 trcrf-default        act/unsup
1004 fddinet-default       act/unsup
1005 trbrf-default        act/unsup

VLAN Type  SAID      MTU   Parent RingNo BridgeNo  Stp  BrdgMode  Trans1  Trans2
-----
1    enet  100001   1500  -    -    -    -    -    0      0
15   enet  100015   1500  -    -    -    -    -    0      0
100  enet  100100   1500  -    -    -    -    -    0      0
112  enet  100112   1500  -    -    -    -    -    0      0
150  enet  100150   1500  -    -    -    -    -    0      0
240  enet  100240   1500  -    -    -    -    -    0      0
350  enet  100350   1500  -    -    -    -    -    0      0
420  enet  100420   1500  -    -    -    -    -    0      0
500  enet  100500   1500  -    -    -    -    -    0      0
1002 fddi  101002   1500  -    -    -    -    -    0      0

```

Figura 81. Verificación de VLAN de acceso en las fastethernet de ALS2

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

```

DLS1#show etherchannel
Channel-group listing:
-----
Group: 1
-----
Group state = L2
Ports: 2  Maxports = 4
Port-channels: 1 Max Port-channels = 4
Protocol:  LACP
Minimum Links: 0

Group: 4
-----
Group state = L2
Ports: 2  Maxports = 4
Port-channels: 1 Max Port-channels = 1
Protocol:  PAgP
Minimum Links: 0

Group: 12
-----
Group state = L3
Ports: 2  Maxports = 4
Port-channels: 1 Max Port-channels = 4
Protocol:  LACP
Minimum Links: 0

```

Figura 82. Verificación de EtherChannel en DLS1

```

DLS2  ALS1  ALS2  DLS1
ALS1#
ALS1#show etherchannel
      Channel-group listing:
      -----
Group: 1
-----
Group state = L2
Ports: 2  Maxports = 4
Port-channels: 1 Max Port-channels = 4
Protocol:  LACP
Minimum Links: 0

Group: 3
-----
Group state = L2
Ports: 2  Maxports = 4
Port-channels: 1 Max Port-channels = 1
Protocol:  PAgP
Minimum Links: 0

```

Figura 83. Verificación de EtherChannel en ALS1

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

```

DLS2  ALS1  ALS2  DLS1
DLS1#show spanning-tree
VLAN0001
Spanning tree enabled protocol ieee
Root ID    Priority    24577
           Address    0c65.239d.8600
           This bridge is the root
           Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

Bridge ID  Priority    24577 (priority 24576 sys-id-ext 1)
           Address    0c65.239d.8600
           Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
           Aging Time  300 sec

Interface      Role Sts Cost      Prio.Nbr Type
-----
Po1            Desg FWD 3         128.66 P2p
Po4            Desg FWD 3         128.67 P2p

```

Figura 84. Verificación de Spanning tree DLS1 VLAN 1

```

VLAN0015
Spanning tree enabled protocol ieee
Root ID    Priority    24591
           Address    0c65.239d.8600
           This bridge is the root
           Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

Bridge ID  Priority    24591 (priority 24576 sys-id-ext 15)
           Address    0c65.239d.8600
           Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
           Aging Time  300 sec

Interface      Role Sts Cost      Prio.Nbr Type
-----
Po1             Desg FWD 3         128.66 P2p
Po4             Desg FWD 3         128.67 P2p

```

Figura 85. Verificación de Spanning tree DLS1 VLAN 15

```

VLAN0500
Spanning tree enabled protocol ieee
Root ID    Priority    25076
           Address    0c65.239d.8600
           This bridge is the root
           Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

Bridge ID  Priority    25076 (priority 24576 sys-id-ext 500)
           Address    0c65.239d.8600
           Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
           Aging Time  300 sec

Interface      Role Sts Cost      Prio.Nbr Type
-----
Po1             Desg FWD 3         128.66 P2p
Po4             Desg FWD 3         128.67 P2p

```

Figura 86. Verificación de Spanning tree DLS1 VLAN 500

```

VLAN0112
Spanning tree enabled protocol ieee
Root ID    Priority    24688
Address    0c65.239d.8600
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID  Priority    24688 (priority 24576 sys-id-ext 112)
Address    0c65.239d.8600
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 300 sec

Interface      Role Sts Cost      Prio.Nbr Type
-----
Gi1/2          Desg FWD 4        128.7   P2p
Po1            Desg FWD 3        128.66  P2p
Po4            Desg FWD 3        128.67  P2p

```

Figura 87. Verificación de Spanning tree DLS1 VLAN 112

```

DLS1#show spanning-tree vlan 420
Spanning tree instance(s) for vlan 420 does not exist.

DLS1#sho
DLS1#show vla
DLS1#show vlan

VLAN Name                Status    Ports
-----
1    default                active
15   ADMON                  active
100  SEGUROS                active
112  MULTIMEDIA             active    Gi1/2
150  VENTAS                 active
240  CLIENTES               active
350  PERSONAL               active    Gi1/3
420  PROVEEDORES            suspended
500  NATIVE                 active
1002 fddi-default           act/unsup
1003 trcrf-default        act/unsup
1004 fddinet-default       act/unsup
1005 trbrf-default         act/unsup

VLAN Type SAID      MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
-----
1    enet  100001   1500  -     -     -     -     -     0     0
15   enet  100015   1500  -     -     -     -     -     0     0
100  enet  100100   1500  -     -     -     -     -     0     0
112  enet  100112   1500  -     -     -     -     -     0     0
--More--
*Jul 26 02:16:31.109: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed

```

Figura 88. Verificación de Spanning tree DLS1 VLAN 420 esta suspendida

```

VLAN0100
Spanning tree enabled protocol ieee
Root ID    Priority    24676
Address    0c65.2321.1200
Cost       6
Port       67 (Port-channel4)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID  Priority    28772 (priority 28672 sys-id-ext 100)
Address    0c65.239d.8600
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 300 sec

Interface      Role Sts Cost      Prio.Nbr Type
-----
Po1             Altn BLK 3        128.66 P2p
Po4             Root FWD 3        128.67 P2p

```

Figura 89. Verificación de Spanning tree DLS1 VLAN 100

```

VLAN0150
Spanning tree enabled protocol ieee
Root ID    Priority    24726
Address    0c65.239d.8600
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID  Priority    24726 (priority 24576 sys-id-ext 150)
Address    0c65.239d.8600
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 300 sec

Interface      Role Sts Cost      Prio.Nbr Type
-----
Po1             Desg FWD 3        128.66 P2p
Po4             Desg FWD 3        128.67 P2p

```

Figura 90. Verificación de Spanning tree DLS1 VLAN 150

```

VLAN0350
Spanning tree enabled protocol ieee
  Root ID    Priority    24926
            Address    0c65.239d.8600
            This bridge is the root
            Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    24926 (priority 24576 sys-id-ext 350)
            Address    0c65.239d.8600
            Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
            Aging Time  300 sec

Interface                Role Sts Cost      Prio.Nbr Type
-----
Gi1/3                    Desg FWD 4        128.8   P2p
Po1                      Desg FWD 3        128.66  P2p
Po4                      Desg FWD 3        128.67  P2p

```

Figura 91. Verificación de Spanning tree DLS1 VLAN 350

```

VLAN0240
--More--
*Jul 25 23:36:56.922: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to down
*Jul 25 23:37:56.089: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
Spanning tree enabled protocol ieee
  Root ID    Priority    24816
            Address    0c65.2321.1200
            Cost        6
            Port        67 (Port-channel4)
            Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    28912 (priority 28672 sys-id-ext 240)
            Address    0c65.239d.8600
            Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
            Aging Time  300 sec

Interface                Role Sts Cost      Prio.Nbr Type
-----
Po1                      Altn BLK 3        128.66  P2p
Po4                      Root FWD 3        128.67  P2p

```

Figura 92. Verificación de Spanning tree DLS1 VLAN 240

```

DLS2#show spanning-tree

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    24577
            Address    0c65.239d.8600
            Cost      6
            Port      66 (Port-channel2)
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32769 (priority 32768 sys-id-ext 1)
            Address    0c65.2321.1200
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec
            Aging Time 300 sec

Interface                Role Sts Cost      Prio.Nbr Type
-----
Po2                       Root FWD 3         128.66 P2p
Po3                       Altn BLK 3         128.67 P2p

```

Figura 93. Verificación de Spanning tree DLS2 VLAN 1

```

DLS2#show spanning-tree

VLAN0015
  Spanning tree enabled protocol ieee
  Root ID    Priority    24591
            Address    0c65.239d.8600
            Cost      6
            Port      66 (Port-channel2)
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    28687 (priority 28672 sys-id-ext 15)
            Address    0c65.2321.1200
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec
            Aging Time 300 sec

Interface                Role Sts Cost      Prio.Nbr Type
-----
Po2                       Root FWD 3         128.66 P2p
Po3                       Altn BLK 3         128.67 P2p

```

Figura 94. Verificación de Spanning tree DLS2 VLAN 15

```

VLAN0500
Spanning tree enabled protocol ieee
Root ID    Priority    25076
           Address    0c65.239d.8600
           Cost      6
           Port      66 (Port-channel2)
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID  Priority    29172 (priority 28672 sys-id-ext 500)
           Address    0c65.2321.1200
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
           Aging Time 300 sec

Interface Role Sts Cost Prio.Nbr Type
-----
Po2       Root FWD 3    128.66 P2p
Po3       Altn BLK 3    128.67 P2p

```

Figura 95. Verificación de Spanning tree DLS2 VLAN 500

```

VLAN0112
Spanning tree enabled protocol ieee
Root ID    Priority    24688
           Address    0c65.239d.8600
           Cost      6
           Port      66 (Port-channel2)
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID  Priority    28784 (priority 28672 sys-id-ext 112)
           Address    0c65.2321.1200
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
           Aging Time 300 sec

Interface Role Sts Cost Prio.Nbr Type
-----
Gi1/2    Desg FWD 4    128.7   P2p
Po2       Root FWD 3    128.66 P2p
Po3       Altn BLK 3    128.67 P2p

```

Figura 96. Verificación de Spanning tree DLS2 VLAN 112

```

VLAN0567
Spanning tree enabled protocol ieee
Root ID    Priority    33335
           Address    0c65.2321.1200
           This bridge is the root
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID  Priority    33335 (priority 32768 sys-id-ext 567)
           Address    0c65.2321.1200
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
           Aging Time 300 sec

Interface Role Sts Cost Prio.Nbr Type
-----
Po2       Desg FwD 3 128.66 P2p
Po3       Desg FwD 3 128.67 P2p

```

Figura 97. Verificación de Spanning tree DLS2 VLAN 420

```

VLAN0100
Spanning tree enabled protocol ieee
Root ID    Priority    24676
           Address    0c65.2321.1200
           This bridge is the root
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID  Priority    24676 (priority 24576 sys-id-ext 100)
           Address    0c65.2321.1200
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
           Aging Time 300 sec

Interface Role Sts Cost Prio.Nbr Type
-----
Po2       Desg FwD 3 128.66 P2p
Po3       Desg FwD 3 128.67 P2p

```

Figura 98. Verificación de Spanning tree DLS1 VLAN 100

```

VLAN0150
Spanning tree enabled protocol ieee
Root ID    Priority    24726
           Address    0c65.239d.8600
           Cost        6
           Port        66 (Port-channel2)
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID  Priority    28822 (priority 28672 sys-id-ext 150)
           Address    0c65.2321.1200
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
           Aging Time 300 sec

Interface Role Sts Cost Prio.Nbr Type
-----
G11/3    Desg FwD 4 128.8 P2p
Po2       Root FwD 3 128.66 P2p
Po3       Altn BLK 3 128.67 P2p

```

Figura 99. Verificación de Spanning tree DLS2 VLAN 150

```

VLAN0350
Spanning tree enabled protocol ieee
Root ID    Priority    24926
           Address    0c65.239d.8600
           Cost      6
           Port      66 (Port-channel2)
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID  Priority    29022 (priority 28672 sys-id-ext 350)
           Address    0c65.2321.1200
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
           Aging Time 300 sec

Interface Role Sts Cost Prio.Nbr Type
-----
Po2       Root FWD 3    128.66 P2p
Po3       Altn BLK 3    128.67 P2p

```

Figura 100. Verificación de Spanning tree DLS2 VLAN 350

```

VLAN0240
Spanning tree enabled protocol ieee
Root ID    Priority    24816
           Address    0c65.2321.1200
           This bridge is the root
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID  Priority    24816 (priority 24576 sys-id-ext 240)
           Address    0c65.2321.1200
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
           Aging Time 300 sec

Interface Role Sts Cost Prio.Nbr Type
-----
Po2       Desg FWD 3    128.66 P2p
Po3       Desg FWD 3    128.67 P2p

```

Figura 101. Verificación de Spanning tree DLS2 VLAN 240

```

DLS1#show interfaces status

Port      Name          Status      Vlan      Duplex  Speed Type
-----
Gi0/0     a-full        connected   routed    a-full  auto RJ45
Gi0/1     a-full        connected   routed    a-full  auto RJ45
Gi0/2     a-full        connected   trunk     a-full  auto RJ45
Gi0/3     a-full        connected   trunk     a-full  auto RJ45
Gi1/0     a-full        connected   trunk     a-full  auto RJ45
Gi1/1     a-full        connected   trunk     a-full  auto RJ45
Gi1/2     a-full        connected   112      a-full  auto RJ45
Gi1/3     a-full        notconnect  350      a-full  auto RJ45
Po1       Po1 LACP      connected   trunk     a-full  auto
Po4       Po4 PAgP      connected   trunk     a-full  auto
Po12      a-full        connected   routed    a-full  auto
DLS1#

```

Figura 102. Verificación VLAN Conectividad PC1 en DLS1

```

ALS2#show interfaces status

Port      Name          Status      Vlan      Duplex  Speed  Type
-----
Gi0/0     Gi0/0         disabled   1         auto    auto   RJ45
Gi0/1     Gi0/1         disabled   1         auto    auto   RJ45
Gi0/2     Gi0/2         connected  trunk     a-full  auto   RJ45
Gi0/3     Gi0/3         connected  trunk     a-full  auto   RJ45
Gi1/0     Gi1/0         connected  trunk     a-full  auto   RJ45
Gi1/1     Gi1/1         connected  trunk     a-full  auto   RJ45
Gi1/2     Gi1/2         connected  112      a-full  auto   RJ45
Gi1/3     Gi1/3         notconnect 240      a-full  auto   RJ45
Po2       Po2 LACP      connected  trunk     a-full  auto
Po4       Po4 PAgP        connected  trunk     a-full  auto
ALS2#

```

Figura 103. Verificación VLAN Conectividad PC4 en ALS2

```

PC4> ping 10.30.30.1

84 bytes from 10.30.30.1 icmp_seq=1 ttl=64 time=17.567 ms
84 bytes from 10.30.30.1 icmp_seq=2 ttl=64 time=22.741 ms
84 bytes from 10.30.30.1 icmp_seq=3 ttl=64 time=22.118 ms
84 bytes from 10.30.30.1 icmp_seq=4 ttl=64 time=24.433 ms
84 bytes from 10.30.30.1 icmp_seq=5 ttl=64 time=27.183 ms
^C
PC4> tracer 10.30.30.1
trace to 10.30.30.1, 8 hops max, press Ctrl+C to stop
 1 *10.30.30.1 17.106 ms (ICMP type:3, code:3, Destination port unreachable)

PC4> show

NAME      IP/MASK      GATEWAY      MAC          LPORT  RHOST:PORT
PC4      10.30.30.2/24 255.255.255.0 00:50:79:66:68:03 20098 127.0.0.1:20099
         fe80::250:79ff:fe66:6803/64

PC4>
PC4>

```

Figura 104. Verificación PING Conexión PC1 a PC4

```

PC1> show

NAME      IP/MASK      GATEWAY      MAC          LPORT  RHOST:PORT
PC1      10.30.30.1/24 255.255.255.0 00:50:79:66:68:00 20092 127.0.0.1:20093
         fe80::250:79ff:fe66:6800/64

PC1> ping 10.30.30.2

84 bytes from 10.30.30.2 icmp_seq=1 ttl=64 time=24.448 ms
84 bytes from 10.30.30.2 icmp_seq=2 ttl=64 time=12.646 ms
84 bytes from 10.30.30.2 icmp_seq=3 ttl=64 time=15.666 ms
84 bytes from 10.30.30.2 icmp_seq=4 ttl=64 time=15.325 ms
84 bytes from 10.30.30.2 icmp_seq=5 ttl=64 time=18.061 ms

PC1> █

```

Figura 105. Verificación PING Conexión PC4 a PC1

CONCLUSIONES

- ❖ Logramos implementar con éxito los escenarios planteados en el contexto del trabajo, usando herramientas que nos permitieron llevar un ambiente conceptual a lo real y práctico, usando aplicativos como GNS3 y PT para el desarrollo y visualización de resultados.
- ❖ Logramos aplicar los protocolos de enrutamientos vistos en el módulo de routing de CCNP, evidenciando como convergen protocolos de enrutamiento distintos que permitiera la comunicación entre áreas y sistemas autónomos (SA) distintos.
- ❖ Logramos implementar a cabalidad el escenario de switching identificando la necesidad de aplicar en entornos de redes de capa 2, como buena práctica el uso de Etherchannel, el cual permite y garantiza un mayor ancho de banda y redundancia en cuanto a disponibilidad del enlace, además de verificar la administración centralizada de la gestión de VLAN con el protocolo VTP.

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