

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

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA - UNAD  
ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA - ECBTI  
INGENIERÍA DE TELECOMUNICACIONES  
SAN JUAN DE PASTO  
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ALVARO LEGARDA MARTINEZ

Diplomado de opción de grado presentado para optar el título de  
INGENIERO DE TELECOMUNICACIONES

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INGENIERÍA DE TELECOMUNICACIONES  
SAN JUAN DE PASTO  
2020

## NOTA DE ACEPTACIÓN

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Firma del Presidente del Jurado

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Firma del Jurado

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Firma del Jurado

San Juan de Pasto, 30 de noviembre de 2020

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Agradezco a Dios el centro de todos mis triunfos personales y a través del cual recibí todo el apoyo, las fuerzas, la disposición, el aliento y las ganas de alcanzar esta tan apreciada meta, agradezco a mi esposa y mis dos hijitas quienes me brindaron todo su amor y comprensión para poder dedicarme a estudiar con tranquilidad, gracias a mi mamá, mis hermanos y en general a toda mi familia que de una o de otra forma me apoyaron en este hermoso proceso de capacitación, muchas gracias a todos mis compañeros de estudio por todos sus aportes a mi vida profesional y personal, muchísimas gracias a todos mis tutores, directores, profesores y demás familia UNAD porque realmente me hicieron sentir siempre como parte de su familia, siempre dispuestos a ayudarme a colaborarme con ese cariño particular que tienen todos los miembros de nuestra hermosa universidad

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## GLOSARIO

**PROTOCOLO DE ENRUTAMIENTO:** Es el conjunto de reglas utilizadas por un router con el propósito de compartir información de enrutamiento a través de la construcción de tablas de enrutamiento.

**PUERTO TRONCAL:** Es un enlace que se encarga de configurar uno o más puertos de un switch con el fin de permitir el tráfico de diferentes VLANs, lo cual reduce los enlaces físicos en una red.

**ROUTER:** Dispositivo enrutador o encaminador utilizado para interconectar equipos de cómputo en una red, muestra y establece las rutas más adecuadas por las que envía paquetes de datos en cada momento, a través de una labor denominada encaminamiento.

**SPANNING TREE:** Es un protocolo de árbol de expansión cuya función principal está en evitar bucles de puente en la red, además de que permite elaborar diseños de red y como parte primordial que deshabilita los enlaces que no forman parte del árbol de expansión dejando una única ruta activa entre dos nodos de red.

**TABLA DE ENRUTAMIENTO:** Son conocidas como tablas de encaminamiento que se almacenan en los routers en un documento electrónico donde se almacenan de forma ordenada las diferentes rutas a los diferentes nodos de la red, es un elemento esencial para encontrar la mejor ruta para el encaminamiento y transferencia de los datos en cada momento del proceso de comunicación en una red.

**VLANs:** Como su nombre lo indica red de área local Virtual es un método que se usa en la configuración de redes para crear redes lógicas independientes dentro de una misma red física, logrando configurar segmentos lógicos de red de gran beneficio en las diferentes necesidades de cualquier empresa.

## RESUMEN

Este trabajo incluye el desarrollo de dos (2) escenarios de red propuestos mediante los cuales se evalúan el nivel de conocimientos, habilidades, comprensión y solución de problemas reales y que aprendidos en desarrollo del Diplomado de Profundización CISCO CCNP, mediante la propuesta de una solución a cada escenario y se explican de manera detallada mediante los códigos y el procedimiento de solución y que incluyen temas como relacionados con conmutación, enrutamiento de redes, electrónica mediante el uso de protocolos de red como IERGP Y OSPF acompañado de la configuración de routers y switches, configuración de VLANs entre otros mediante el uso de la herramienta de simulación Packet Tracer.

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

## ABSTRACT

This work includes the development of two (2) proposed network scenarios through which the level of knowledge, skills, understanding and solution of real problems and that learned in development of the CISCO CCNP Deepening Diploma are evaluated, by proposing a solution to each scenario and is explained in detail by means of the codes and the solution procedure and that include topics such as related to switching, network routing, electronics through the use of red protocols such as IERGP and OSPF accompanied by the configuration of routers and switches , VLAN configuration among others by using the Packet Tracer simulation tool

Keywords: CISCO, CCNP, Switching, Routing, Networks, Electronics.

## INTRODUCCIÓN

El objetivo del presente trabajo del diplomado de profundización cisco CCNP está enfocado en fortalecer nuestros conocimientos en el diseño de redes escalables y de conmutación al tiempo validar la capacidad y habilidades para planificar, implementar, verificar y solucionar problemas en redes empresariales LAN y WAN del entorno real mediante el uso de simuladores como Packet tracer y GNS3 a través de los cuales se desarrollan habilidades en la solución de redes a través de dos (2) escenarios propuestos.

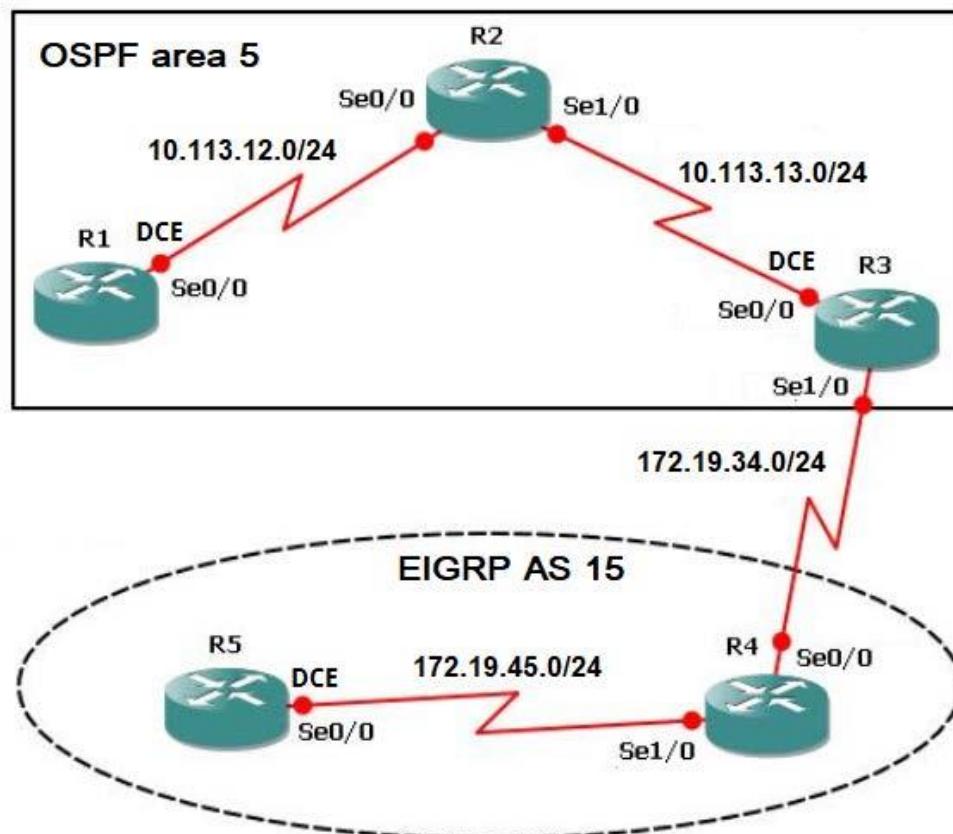
El desarrollo del primer escenario 1 está relacionado con las temáticas tratadas en el módulo CCNP ROUTE donde se abordaron conceptos principales como protocolos de enrutamiento EIGRP, OSPF, BGP, redistribución de rutas, así como lo relacionado con los temas Dynamic Multi VPN, VRF Lite y protocolos en IPv6.

En el desarrollo del escenario 2 tratas las temáticas abordadas en el módulo CCNP SWITCH y se tratan conceptos principales como operaciones y puertos de switches, VLANs y troncales, Spanning Tree y configuración de usuarios entre otros, estableciendo alternativas de solución a los problemas de interconectividad propuestos en los dos escenarios.

## DESARROLLO

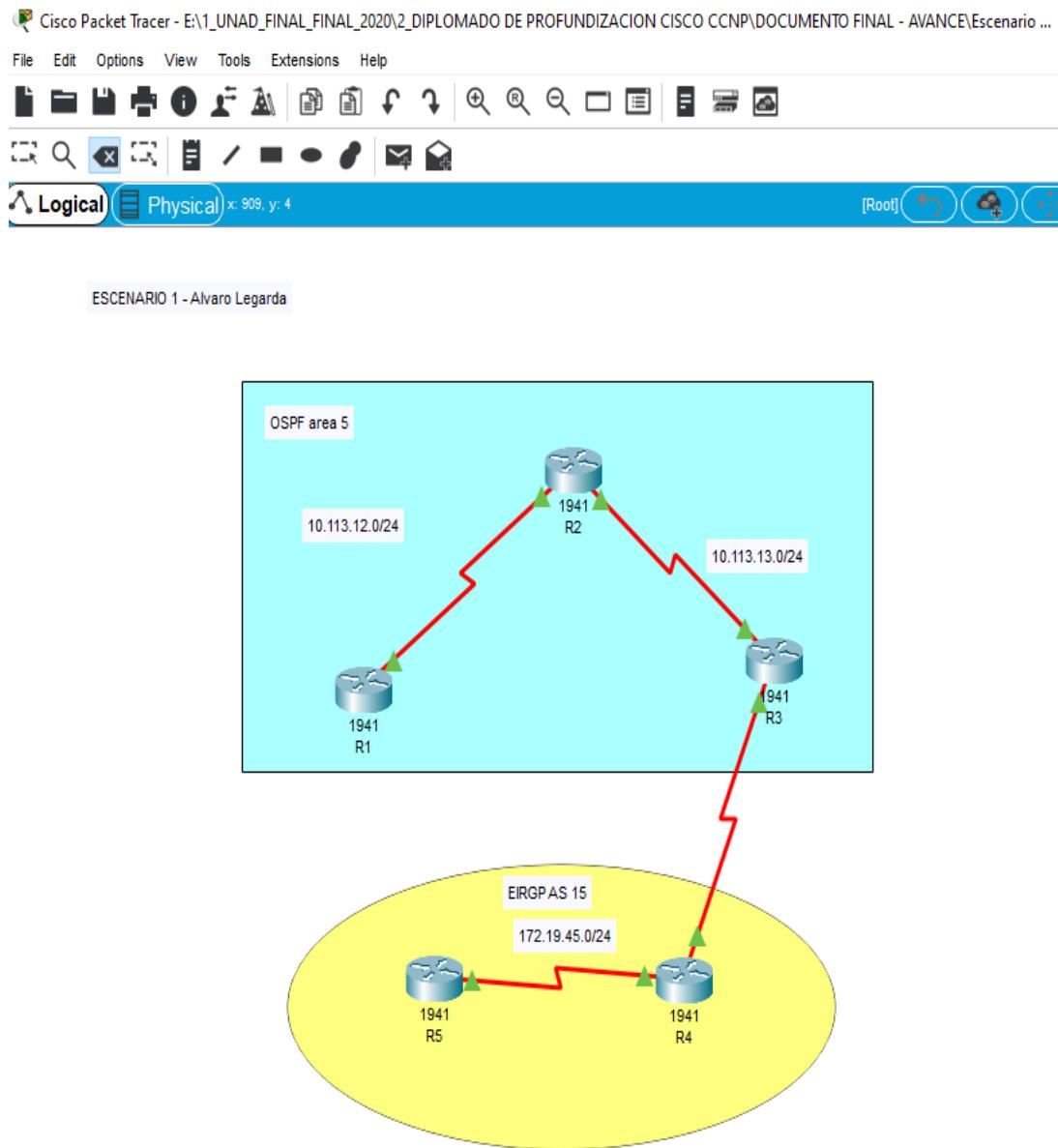
### 1. ESCENARIO 1

Figura 1. Escenario 1



## SIMULACION ESCENARIO 1

Figura 2. Simulación de escenario 1



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.

Se procede a configurar cada uno de los enrutadores. 1, 2, 3, 4, 5

Se asignan nombre y protocolos de comunicación mediante EIGRP que fueron asignados.

Se adjunta código y pantallazos con veracidad del código.

Router R1

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#line console 0
Router(config-line)#loggin synchronous
Router(config-line)#exec-timeout 00
Router(config-line)#exit
```

```
Router(config)#hostname R1
R1(config)#interface s0/0/0
R1(config-if)#ip address 10.113.12.1 255.255.255.0
R1(config-if)#clock rate 64000
R1(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)#router ospf 1
R1(config-router)#router-id 1.1.1.1
R1(config-router)#network 10.113.12.0 255.255.255.0 area 5
R1(config-router)#exit
R1(config)#exit
```

```
R1#
%SYS-5-CONFIG_I: Configured from console by console
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface s0/0/0
R1(config-if)#description to R2
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console
R1#
```

## Router R2

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip domain-lookup
Router(config)#line console 0
Router(config-line)#logging synchronous
Router(config-line)#exec-timeout 00
Router(config-line)#exit

Router(config)#hostname R2
R2(config)#interface s0/0/0
R2(config-if)#ip address 10.113.12.2 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
R2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up
R2(config-if)#exit

R2(config)#interface s0/0/1
R2(config-if)#ip address 10.113.13.1 255.255.255.0
R2(config-if)#clock rate 64000
R2(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
R2(config-if)#exit

R2(config)#router ospf 1
R2(config-router)#router-id 2.2.2.2
R2(config-router)#network 10.113.13.0 255.255.255.0 area 5
R2(config-router)#exit

R2(config)#interface s0/0/0
R2(config-if)#description R1
R2(config-if)#exit

R2(config)#interface s0/0/1
R2(config-if)#description R3
R2(config-if)#exit
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console
R2#
```

## Router R3

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip domain-lookup
Router(config)#line console 0
Router(config-line)#logging synchronous
Router(config-line)#exec-timeout 0 0
Router(config-line)#exit

Router(config)#hostname R3
R3(config)#interface s0/0/0
R3(config-if)#ip address 10.113.13.2 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
R3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up
R3(config-if)#exit
R3(config)#interface s0/0/1
R3(config-if)#ip address 172.19.34.1 255.255.255.0
R3(config-if)#clock rate 64000
R3(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
R3(config-if)#exit
R3(config)#router ospf 1
R3(config-router)#router-id 3.3.3.3
R3(config-router)#network 10.113.13.0 255.255.255.0 area 5
R3(config-router)#
02:20:15: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial0/0/0 from
LOADING to FULL, Loading Done
R3(config-router)#exit
R3(config)#interface s0/0/0
R3(config-if)#description R2
R3(config-if)#exit
R3(config)#interface s0/0/1
R3(config-if)#description R4
R3(config-if)#exit
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console
R3#
```

## Router R4

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip domain-lookup
Router(config)#line console 0
Router(config-line)#logging synchronous
Router(config-line)#exec-timeout 0 0
Router(config-line)#exit

Router(config)#hostname R4
R4(config)#interface s0/0/0
R4(config-if)#ip address 172.19.34.2 255.255.255.0
R4(config-if)#no shutdown
R4(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
R4(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up
R4(config-if)#exit

R4(config)#interface s0/0/1
R4(config-if)#ip address 172.19.45.1 255.255.255.0
R4(config-if)#clock rate 64000
R4(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
R4(config-if)#exit

R4(config)#router eigrp 15
R4(config-router)#eigrp router-id 4.4.4.4
R4(config-router)#network 172.19.34.0 255.255.255.0
R4(config-router)#network 172.29.45.0 255.255.255.0
R4(config-router)#exit

R4(config)#exit

R4#
%SYS-5-CONFIG_I: Configured from console by console

R4#
```

## Router R5

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip domain-lookup
Router(config)#line console 0
Router(config-line)#Logging synchronous
Router(config-line)#exec-timeout 0 0
Router(config-line)#exit

Router(config)#hostname R5
R5(config)#Interface s0/0/0
R5(config-if)#ip address 172.19.45.2 255.255.255.0
R5(config-if)#no shutdown
R5(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
R5(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up
R5(config-if)#exit

R5(config)#router eigrp 15
R5(config-router)#network 172.19.45.0 255.255.255.0
R5(config-router)#exit

R5(config)#exit

R5#
%SYS-5-CONFIG_I: Configured from console by console

R5#
```

2. Cree cuatro nuevas interfaces de Loopback en R1 utilizando la asignación de direcciones 10.1.0.0/22 y configure esas interfaces para participar en el área 5 de OSPF.

Tabla 1. Interfaces loopback para crear R1

INTERFACES LOOPBACK EN R1		
Looback	Dirección	Mascara de Red
1	10.1.0.1	255.255.252.0
4	10.1.4.1	255.255.252.0
8	10.1.8.1	255.255.252.0
12	10.1.12.1	255.255.252.0

Configuración de interfaces para participar en el área 5 de OSPF

R1#configure terminal

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

R1(config)#interface Lo1

R1(config-if)#

%LINK-5-CHANGED: Interface Loopback1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up

R1(config-if)#ip address 10.1.0.1 255.255.252.0

R1(config-if)#exit

R1(config)#interface Lo4

R1(config-if)#

%LINK-5-CHANGED: Interface Loopback4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback4, changed state to up

R1(config-if)#ip address 10.1.4.1 255.255.252.0

R1(config-if)#exit

R1(config)#interface Lo8

R1(config-if)#

%LINK-5-CHANGED: Interface Loopback8, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback8, changed state to up

R1(config-if)#ip address 10.1.8.1 255.255.252.0

R1(config-if)#exit

R1(config)#interface Lo12

```

R1(config-if)#
%LINK-5-CHANGED: Interface Loopback12, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback12, changed
state to up
R1(config-if)#ip address 10.1.12.1 255.255.252.0
R1(config-if)#exit

```

R1(config)#exit

```

R1#
%SYS-5-CONFIG_I: Configured from console by console
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#network 10.1.0.0 0.0.0.255 area 5
R1(config-router)#network 10.1.4.0 0.0.0.255 area 5
R1(config-router)#network 10.1.8.0 0.0.0.255 area 5
R1(config-router)#network 10.1.12.0 0.0.0.255 area 5
R1(config-router)#exit
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

```

Figura 3. Aplicando código R1

```

%SYS-5-CONFIG_I: Configured from console by console
R1#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B -
BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

      10.0.0.0/8 is variably subnetted, 10 subnets, 3 masks
C        10.1.0.0/22 is directly connected, Loopback1
L        10.1.0.1/32 is directly connected, Loopback1
C        10.1.4.0/22 is directly connected, Loopback4
L        10.1.4.1/32 is directly connected, Loopback4
C        10.1.8.0/22 is directly connected, Loopback8
L        10.1.8.1/32 is directly connected, Loopback8
C        10.1.12.0/22 is directly connected, Loopback12
L        10.1.12.1/32 is directly connected, Loopback12
C        10.113.12.0/24 is directly connected, Serial0/0/0
L        10.113.12.1/32 is directly connected, Serial0/0/0

R1#

```

Ctrl+F6 to exit CLI focus     

Top

3. Cree cuatro nuevas interfaces de Loopback en R5 utilizando la asignación de direcciones 172.5.0.0/22 y configure esas interfaces para participar en el Sistema Autónomo EIGRP 15.

Tabla 2. Interfaces loopback para crear R5

INTERFACES LOOPBACK EN R5		
Looback	Dirección	Mascara de Red
1	172.5.0.1	255.255.252.0
4	172.5.4.1	255.255.252.0
8	172.5.8.1	255.255.252.0
12	172.5.12.1	255.255.252.0

R5(config)#interface Lo1

R5(config-if)#

%LINK-5-CHANGED: Interface Loopback1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up

R5(config-if)#ip address 172.5.0.1 255.255.252.0

R5(config-if)#exit

R5(config)#interface Lo4

R5(config-if)#

%LINK-5-CHANGED: Interface Loopback4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback4, changed state to up

R5(config-if)#ip address 172.5.4.1 255.255.252.0

R5(config-if)#exit

R5(config)#interface Lo8

R5(config-if)#

%LINK-5-CHANGED: Interface Loopback8, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback8, changed state to up

R5(config-if)#ip address 172.5.8.1 255.255.252.0

R5(config-if)#exit

R5(config)#interface Lo12

R5(config-if)#

%LINK-5-CHANGED: Interface Loopback12, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback12, changed

```
state to up  
R5(config-if)#ip address 172.5.12.1 255.255.252.0  
R5(config-if)#exit
```

```
R5(config)#router eigrp 15  
R5(config-router)#network 172.5.0.0 0.0.0.255  
R5(config-router)#network 172.5.4.0 0.0.0.255  
R5(config-router)#network 172.5.8.0 0.0.0.255  
R5(config-router)#network 172.5.12.0 0.0.0.255  
R5(config-router)#exit  
R5(config)#exit  
R5#
```

%SYS-5-CONFIG\_I: Configured from console by console

R5#

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

Figura 4. Aplicando código R2

The screenshot shows a terminal window titled 'R5'. The tab bar has 'Physical', 'Config', 'CLI' (which is selected), and 'Attributes'. The window title is 'IOS Command Line Interface'. The main area displays the output of the 'show ip interface brief' command:

```
R5(config)#exit  
R5#  
*SYS-5-CONFIG_I: Configured from console by console  
  
R5#show ip interface brief  
Interface IP-Address OK? Method Status  
Protocol  
GigabitEthernet0/0 unassigned YES unset administratively  
down down  
GigabitEthernet0/1 unassigned YES unset administratively  
down down  
Serial0/0/0 172.19.45.2 YES manual up  
up  
Serial0/0/1 unassigned YES unset administratively  
down down  
Loopback1 172.5.0.1 YES manual up  
up  
Loopback2 unassigned YES unset up  
up  
Loopback4 172.5.4.1 YES manual up  
up  
Loopback8 172.5.8.1 YES manual up  
up  
Loopback12 172.5.12.1 YES manual up  
up  
Vlan1 unassigned YES unset administratively  
down down  
R5#
```

At the bottom of the terminal window, there are 'Copy' and 'Paste' buttons, and a 'Top' button.

Figura 5. Aplicando código R3

The screenshot shows a Windows application window titled 'R3'. The tab bar at the top has 'Physical', 'Config', 'CLI' (which is highlighted in blue), and 'Attributes'. Below the tabs is the text 'IOS Command Line Interface'. The main pane displays the following CLI session output:

```
R3#
*LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

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

R3#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B -
BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

      10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        10.113.13.0/24 is directly connected, Serial0/0/0
L        10.113.13.2/32 is directly connected, Serial0/0/0
      172.19.0.0/16 is variably subnetted, 2 subnets, 2 masks
C        172.19.34.0/24 is directly connected, Serial0/0/1
L        172.19.34.1/32 is directly connected, Serial0/0/1

R3#
```

At the bottom left of the window, it says 'Ctrl+F6 to exit CLI focus'. On the right side, there are 'Copy' and 'Paste' buttons. At the very bottom left is a 'Top' button.

Prueba de que R3 está reconociendo las nuevas interfaces de Loopback

5. Configure R3 para redistribuir las rutas EIGRP en OSPF usando el costo de 50000 y luego redistribuya las rutas OSPF en EIGRP usando un ancho de banda T1 y 20,000 microsegundos de retardo.

R3#configure terminal

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

R3(config)#router ospf 1

R3(config-router)#redistribute eigrp 10 metric 50000 subnets

R3(config-router)#exit

R3(config)#router eigrp 15

```
R3(config-router)#redistribute ospf 1 metric 1544 20000 255 1 1500
R3(config-router)#exit
R3(config)#exit
```

```
R3#
%SYS-5-CONFIG_I: Configured from console by console
```

```
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.

Figura 6. Verificando en R1 rutas del sistema autónomo

```
R1
Physical Config CLI Attributes
IOS Command Line Interface
L      10.113.12.1/32 is directly connected, Serial0/0/0
R1#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
      inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

      10.0.0.0/8 is variably subnetted, 10 subnets, 3 masks
C        10.1.0.0/22 is directly connected, Loopback1
L        10.1.0.1/32 is directly connected, Loopback1
C        10.1.4.0/22 is directly connected, Loopback4
L        10.1.4.1/32 is directly connected, Loopback4
C        10.1.8.0/22 is directly connected, Loopback8
L        10.1.8.1/32 is directly connected, Loopback8
C        10.1.12.0/22 is directly connected, Loopback12
L        10.1.12.1/32 is directly connected, Loopback12
C        10.113.12.0/24 is directly connected, Serial0/0/0
L        10.113.12.1/32 is directly connected, Serial0/0/0
R1#
```

Ctrl+F6 to exit CLI focus     

Top

Figura 7. Verificando en R5 rutas del sistema autónomo

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, E - EGP  
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS  
inter area  
\* - candidate default, U - per-user static route, o - ODR  
P - periodic downloaded static route  
  
Gateway of last resort is not set  
  
172.5.0.0/16 is variably subnetted, 8 subnets, 2 masks  
C 172.5.0.0/22 is directly connected, Loopback1  
L 172.5.0.1/32 is directly connected, Loopback1  
C 172.5.4.0/22 is directly connected, Loopback4  
L 172.5.4.1/32 is directly connected, Loopback4  
C 172.5.8.0/22 is directly connected, Loopback8  
L 172.5.8.1/32 is directly connected, Loopback8  
C 172.5.12.0/22 is directly connected, Loopback12  
L 172.5.12.1/32 is directly connected, Loopback12  
172.19.0.0/16 is variably subnetted, 2 subnets, 2 masks  
C 172.19.45.0/24 is directly connected, Serial0/0/0  
L 172.19.45.2/32 is directly connected, Serial0/0/0  
  
R5#

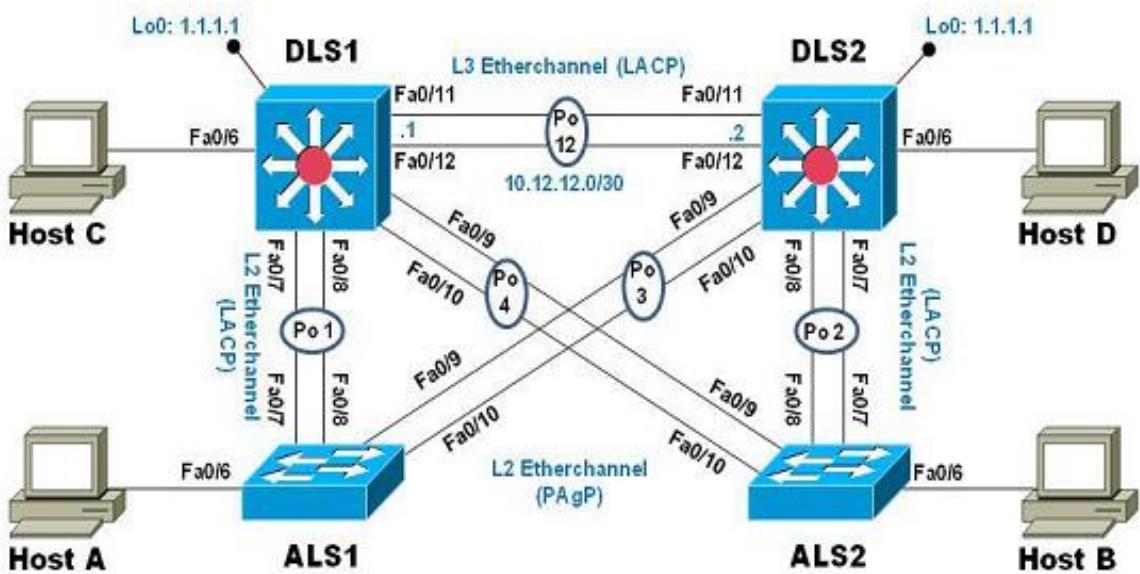
Ctrl+F6 to exit CLI focus Copy Paste

Top

## 2. ESCENARIO 2

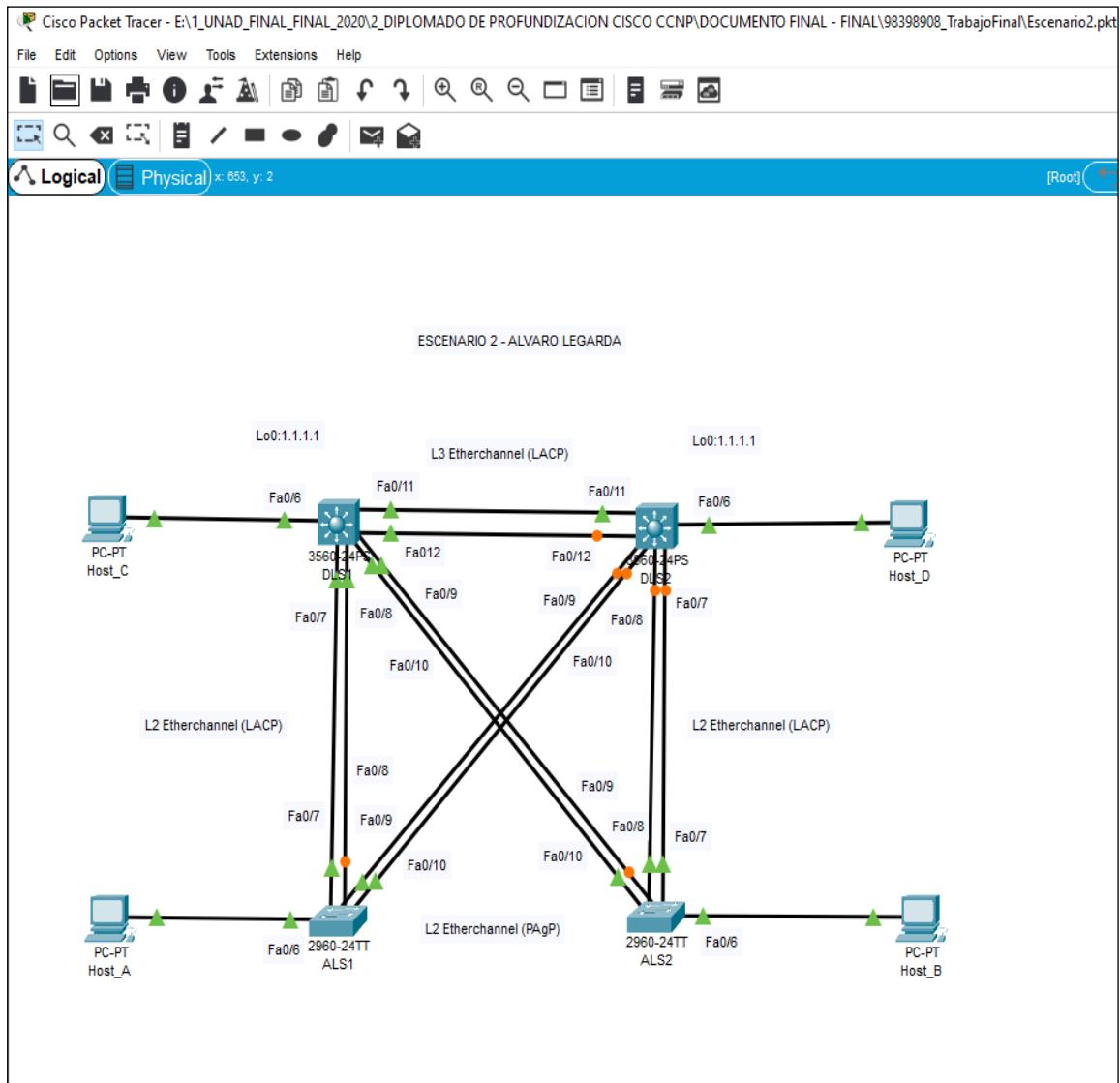
Una empresa de comunicaciones presenta una estructura Core acorde a la topología de red, en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los lineamientos establecidos para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

Figura 8. Topología de red - Escenario 2



## SIMULACION ESCENARIO 2

Figura 9. Simulación escenario 2



## DESARROLLO DE LA SOLUCION

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

- a. Apagar todas las interfaces en cada switch.

Apagamos la interfaz de DLS2

DLS1>enable

DLS1#configure terminal

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

DLS1(config)#interface range f0/1-24

DLS1(config-if-range)#shutdown

Apagamos la interfaz de DLS2

DLS2>enable

DLS2#configure terminal

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

DLS2(config)#interface range f0/1-24

DLS2(config-if-range)#shutdown

Apagamos la interfaz de ALS1

ALS1>enable

ALS1#configure terminal

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

ALS1(config)#interface range f0/1-24

ALS1(config-if-range)#shutdown

Apagamos la interfaz de ALS2

ALS2>enable

ALS2#configure terminal

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

ALS2(config)#interface range f0/1-24

ALS2(config-if-range)#shutdown

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

Asignamos nombre a Switch1 como DLS1

Switch>enable

Switch#configure terminal

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

Switch(config)#hostname DLS1

DLS1(config)#+

DLS1>

```
Asignamos nombre a Switch2 como DLS2
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname DLS2
DLS2(config)#
DLS2>
```

```
Asignamos nombre a Switch3 como ALS1
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname ALS1
ALS1(config)#
ALS1>
```

```
Asignamos nombre a Switch3 como ALS2
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname ALS2
ALS2(config)#
ALS2>
```

- 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.

```
DLS1>enable
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface range fa0/11-12
DLS1(config-if-range)#channel-group 12 mode active
DLS1(config-if-range)#
Creating a port-channel interface Port-channel 12
```

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

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

```
%LINK-5-CHANGED: Interface FastEthernet0/12, changed state to down
DLS1(config-if-range)#exit
```

```

DLS1(config)#interface port-channel 12
DLS1(config-if)#no switchport
DLS1(config-if)#ip address 10.12.12.1 255.255.255.252
DLS1(config-if)#exit
DLS1(config)#

```

Figura 10. Switch DLS1 EtherChannel LACAP

The screenshot shows the Cisco IOS Command Line Interface (CLI) running on a device named 'DLS1'. The window title is 'DLS1'. The tabs at the top are 'Physical', 'Config', 'CLI' (which is selected), and 'Attributes'. The main area displays the output of several commands:

```

DLS1#show etherchannel summary
% Invalid input detected at '^' marker.

DLS1#show Eterchannel summary
% Invalid input detected at '^' marker.

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

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

Group  Port-channel  Protocol    Ports
-----+-----+-----+
-----+
12     Po12(RU)       LACP      Fa0/11(P)  Fa0/12(P)
DLS1#

```

At the bottom of the CLI window, there are buttons for 'Copy' and 'Paste', and a checkbox labeled 'Top'.

```

DLS2>enable
DLS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS2 (config)#interface range fa0/11-12
DLS2 (config-if-range)#channel-group 12 mode active
DLS2 (config-if-range)#
Creating a port-channel interface Port-channel 12

DLS2 (config-if-range)#no shutdown

```

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

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

DLS2 (config-if-range)#exit

DLS2 (config)#interface port-channel 12

DLS2 (config-if)#no switchport

DLS2 (config-if)#ip address 10.12.12.2 255.255.255.252

DLS2 (config-if)#exit

DLS2 (config)#

Figura 11. Switch DLS2 EtherChannel LACAP

```

DLS2>enable
DLS2#show Etherchannel summary
^
% Invalid input detected at '^' marker.

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

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

Group  Port-channel  Protocol    Ports
-----+-----+-----+
+-----+
12     Po12(RU)      LACP      Fa0/11(P) Fa0/12(P)
DLS2#

```

Ctrl+F6 to exit CLI focus     

Top

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

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

```

DLS1(config)#interface range fa0/7-8
DLS1(config-if-range)#channel-group 1 mode active
DLS1(config-if-range)#no shutdown
DLS1(config-if-range)#exit
DLS1(config)#exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console

```

Figura 12. Switch DLS1 Port-channels\_LACP

The screenshot shows the Cisco IOS Command Line Interface (CLI) for switch DLS1. The window title is "DLS1". The tabs at the top are "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area displays the following output:

```

IOS Command Line Interface

DLS1(config-if-range)#no shutdown
DLS1(config-if-range)#exit
DLS1(config)#exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console

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

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

Group  Port-channel  Protocol    Ports
-----+-----+-----+
+-----+
1      Po1(SD)      LACP        Fa0/7(D)  Fa0/8(D)
12     Po12(RU)     LACP        Fa0/11(P) Fa0/12(P)
DLS1#
DLS1#

```

At the bottom of the CLI window, there are "Copy" and "Paste" buttons, and a "Ctrl+F6 to exit CLI focus" instruction. A "Top" button is also present.

```

ALS1>enable
ALS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#interface range fa0/7-8
ALS1(config-if-range)#channel-group 1 mode active
ALS1(config-if-range)#no shutdown

```

```

ALS1(config-if-range)#exit
Creating a port-channel interface Port-channel 1

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

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

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

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

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

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

ALS1#
%SYS-5-CONFIG_I: Configured from console by console

```

Figura 13. Switch ALS1 Port-channels\_LACP

The screenshot shows a Windows application window titled "ALS1" running the Cisco IOS CLI. The tabs at the top are "Physical", "Config", "CLI" (which is selected), and "Attributes". The main pane displays the following text:

```

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

ALS1#
%SYS-5-CONFIG_I: Configured from console by console

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

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

Group  Port-channel  Protocol    Ports
-----+-----+-----+
+-----+
1      Po1(SU)       LACP        Fa0/7(P) Fa0/8(P)
ALS1#

```

At the bottom of the window, there are "Copy" and "Paste" buttons, and a "Top" checkbox.

```

DLS2>enable
DLS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#interface range fa0/7-8
DLS2(config-if-range)#channel-group 2 mode active
DLS2(config-if-range)#no shutdown
%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to down
DLS2(config-if-range)#exit
Creating a port-channel interface Port-channel 2
DLS2(config)#exit
DLS2#
%SYS-5-CONFIG_I: Configured from console by console
DLS2#

```

Figura 14. Switch DLS2 Port-channels\_LACP

DLS2

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```

%SYS-5-CONFIG_I: Configured from console by console

DLS2#
DLS2#show etherchannel summary
^
% Invalid input detected at '^' marker.

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

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

Group  Port-channel  Protocol    Ports
-----+-----+-----+
+-----+
2      Po2 (SD)      LACP        Fa0/7(D) Fa0/8(D)
12     Po12 (RU)     LACP        Fa0/11(P) Fa0/12(P)
DLS2#

```

Ctrl+F6 to exit CLI focus     

Top

```

ALS2>enable
ALS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#interface range fa0/7-8
ALS2(config-if-range)#channel-group 2 mode active
ALS2(config-if-range)#no shutdown

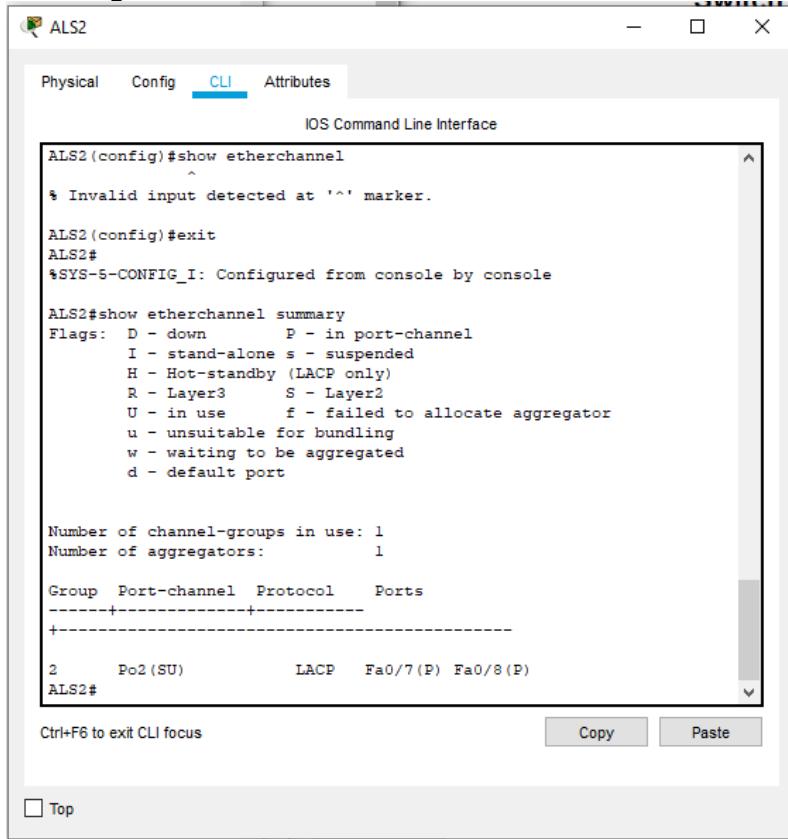
```

```

ALS2(config-if-range)#exit
Creating a port-channel interface Port-channel 2
%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7, changed
state to up
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed
state to up
%LINK-5-CHANGED: Interface Port-channel2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel2, changed
state to up

```

Figura 15. Switch ALS2 Port-channels\_LACP



The screenshot shows a Windows-style application window titled "ALS2". The tab bar at the top has four tabs: "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area contains the output of the "show etherchannel" command:

```

ALS2(config)#show etherchannel
^
% Invalid input detected at '^' marker.

ALS2(config)#exit
ALS2#
%SYS-5-CONFIG_I: Configured from console by console

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

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

Group  Port-channel  Protocol    Ports
-----+-----+-----+
-----+
2      Po2 (SU)      LACP      Fa0/7 (P)  Fa0/8 (P)
ALS2#

```

At the bottom of the window, there are two buttons: "Copy" and "Paste". A status bar at the very bottom says "Ctrl+F6 to exit CLI focus".

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

```
DLS1>enable
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface port-channel 4
DLS1(config-if)#switchport mode trunk
Command rejected: An interface whose trunk encapsulation is "Auto" can not be
configured to "trunk" mode.
DLS1(config-if)#exit
DLS1(config)#interface range fa0/9-10
DLS1(config-if-range)#channel-protocol pagp
DLS1(config-if-range)#channel-group 4 mode auto
DLS1(config-if-range)#exit
DLS1(config)#exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console
```

Figura 16. Switch DLS1 Port-channels\_ PAgP

```
DLS1(config-if-range)#channel-group 4 mode auto
DLS1(config-if-range)#exit
DLS1(config)#exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console

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

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

Group  Port-channel  Protocol    Ports
-----+-----+-----+
+-----+
1      Po1(SU)       LACP        Fa0/7(P) Fa0/8(P)
4      Po4(SD)       PAgP        Fa0/9(D) Fa0/10(D)
12     Po12(RU)      LACP        Fa0/11(P) Fa0/12(P)
DLS1#
```

```
ALS2>enable
ALS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
```

```

ALS2(config)#interface port-channel 4
ALS2(config-if)#switchport mode trunk
ALS2(config-if)#exit
ALS2(config)#interface range fa0/9-10
ALS2(config-if-range)#channel-protocol pagp
ALS2(config-if-range)#channel-group 4 mode auto
ALS2(config-if-range)#
%EC-5-CANNOT_BUNDLE2: Fa0/9 is not compatible with Po4 and will be
suspended (dtp mode of Fa0/9 is off, Po4 is on)

ALS2(config-if-range)#exit
ALS2(config)#exit
ALS2#
%SYS-5-CONFIG_I: Configured from console by consol

```

Figura 17. Switch ALS2 Port-channels\_ PAgP

The screenshot shows the Cisco IOS CLI interface for switch 'ALS2'. The 'Physical' tab is active. The command-line area displays the configuration commands you provided, along with a warning message about Fa0/9 being incompatible with Po4. The 'Attributes' tab is also visible at the top.

```

suspended (dtp mode of Fa0/9 is off, Po4 is on)

ALS2(config-if-range)#exit
ALS2(config)#exit
ALS2#
%SYS-5-CONFIG_I: Configured from console by console

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

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

Group  Port-channel  Protocol    Ports
-----+-----+-----+
+-----+
2      Po2 (SU)       LACP        Fa0/7 (P)  Fa0/8 (P)
4      Po4 (SD)       PAgP       Fa0/9 (D)  Fa0/10 (D)
ALS2#

```

At the bottom of the window, there are 'Copy' and 'Paste' buttons, and a 'Top' button.

```

DLS2>enable
DLS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.

```

```

DLS2(config)#interface port-channel 3
DLS2(config-if)#switchport mode trunk
Command rejected: An interface whose trunk encapsulation is "Auto" can not be
configured to "trunk" mode.
DLS2(config-if)#exit
DLS2(config)#interface range fa0/9-10
DLS2(config-if-range)#channel-protocol pagp
DLS2(config-if-range)#channel-group 3 mode auto
DLS2(config-if-range)#exit
DLS2(config)#exit
DLS2#
%SYS-5-CONFIG_I: Configured from console by console

```

Figura 18. Switch DLS2 Port-channels\_ PAgP

```

DLS2(config-if-range)#channel-group 3 mode auto
DLS2(config-if-range)#exit
DLS2(config)#exit
DLS2#
%SYS-5-CONFIG_I: Configured from console by console

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

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

Group  Port-channel  Protocol    Ports
-----+-----+-----+
+-----+
2      Po2(SU)       LACP        Fa0/7(P)  Fa0/8(P)
3      Po3(SD)       PAgP        Fa0/9(D)  Fa0/10(D)
12     Po12(RU)      LACP        Fa0/11(P) Fa0/12(P)
DLS2#

```

Ctrl+F6 to exit CLI focus

Top

**Copy**    **Paste**

```

ALS1>enable
ALS1#configure terminal

```

```

Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#interface port-channel 3
ALS1(config-if)#switchport mode trunk
ALS1(config-if)#exit
ALS1(config)#interface range fa0/9-10
ALS1(config-if-range)#channel-protocol pAgP
ALS1(config-if-range)#channel-group 3 mode auto
ALS1(config-if-range)#
%EC-5-CANNOT_BUNDLE2: Fa0/9 is not compatible with Po3 and will be
suspended (dtp mode of Fa0/9 is off, Po3 is on)
exit
ALS1(config)#exit
ALS1#
%SYS-5-CONFIG_I: Configured from console by consol

```

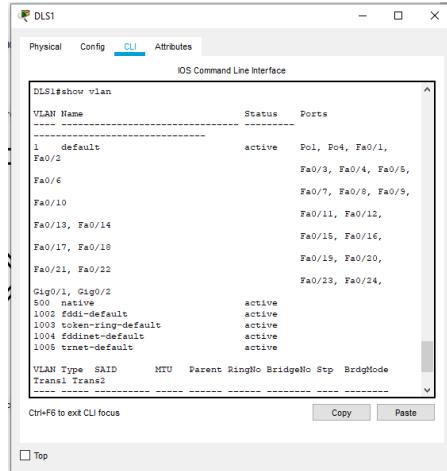
4) Todos los puertos troncales serán asignados a la VLAN 500 como la VLAN nativa.

```

DLS1#enable
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface po1
DLS1(config-if)#switchport trunk native vlan 500
DLS1(config-if)#exit
DLS1(config)#interface po4
DLS1(config-if)#switchport trunk native vlan 500
DLS1(config-if)#exit
DLS1(config)#exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console

```

Figura 19. Switch DLS1 Port-channels\_ PAgP



```

DLS2>enable
DLS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#interface po2
DLS2(config-if)#switchport trunk native vlan 500
DLS2(config-if)#exit
DLS2(config)#interface po3
DLS2(config-if)#switchport trunk native vlan 500
DLS2(config-if)#exit
DLS2(config)#exit
DLS2#
%SYS-5-CONFIG_I: Configured from console by console

```

Figura 20. Switch DLS2 Port-channels\_ PAgP

VLAN Name	Status	Ports
1 default	active	Po2, Po3, Fa0/1, Fa0/2, Fa0/3, Fa0/4, Fa0/5, Fa0/6, Fa0/7, Fa0/8, Fa0/9, Fa0/10, Fa0/11, Fa0/12, Fa0/13, Fa0/14, Fa0/15, Fa0/16, Fa0/17, Fa0/18, Fa0/19, Fa0/20, Fa0/21, Fa0/22, Fa0/23, Fa0/24, Gig0/1, Gig0/2
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

VLAN Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode
Transl	Trans2						

Ctrl+F6 to exit CLI focus     

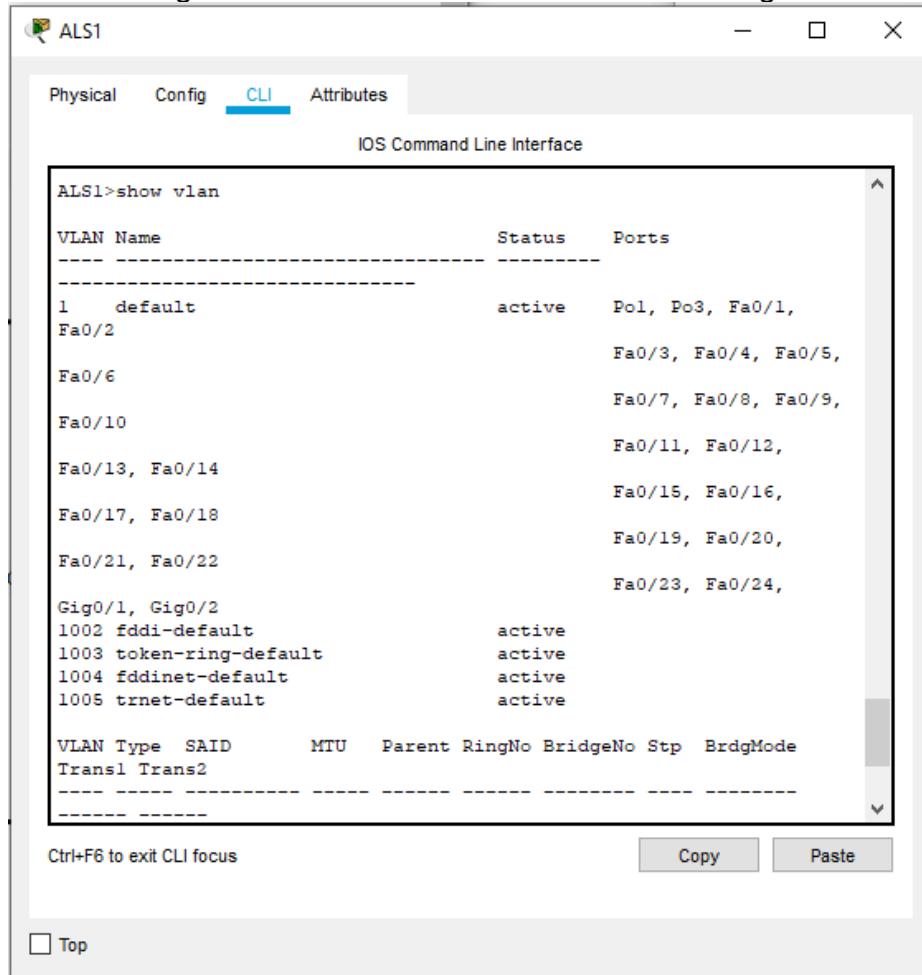
Top

```

ALS1>enable
ALS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#interface po1
ALS1(config-if)#switchport trunk native vlan 500
ALS1(config-if)#interface po3
ALS1(config-if)#switchport trunk native vlan 500
ALS1(config-if)#exit
ALS1(config)#EXIT
ALS1#
%SYS-5-CONFIG_I: Configured from console by console

```

Figura 21. Switch ALS1 Port-channels\_ PAgP



```

ALS2>enable
ALS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.

```

```

ALS2(config)#interface po2
ALS2(config-if)#switchport trunk native vlan 500
ALS2(config-if)#exit
ALS2(config)#interface po4
ALS2(config-if)#switchport trunk native vlan 500
ALS2(config-if)#exit
ALS2(config)#exit
ALS2#
%SYS-5-CONFIG_I: Configured from console by console

```

Figura 22. Switch ALS2 Port-channels\_ PAgP

```

IOS Command Line Interface

ALS2#show vlan

VLAN Name          Status      Ports
----- -----
1    default        active     Po2, Po4, Fa0/1,
                           Fa0/2
                           Fa0/6
                           Fa0/10
                           Fa0/13, Fa0/14
                           Fa0/17, Fa0/18
                           Fa0/21, Fa0/22
                           Gig0/1, Gig0/2
                           1002 fddi-default
                           1003 token-ring-default
                           1004 fddinet-default
                           1005 trnet-default

VLAN Type   SAID      MTU      Parent RingNo BridgeNo Stp  BrdgMode
Transl Trans2
----- -----

```

Ctrl+F6 to exit CLI focus     

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- d. Configurar DLS1, ALS1, y ALS2 para utilizar VTP versión 3  
 1) Utilizar el nombre de dominio CISCO con la contraseña ccnp321

```

DLS1>enable
DLS1#configure terminal

```

Enter configuration commands, one per line. End with CNTL/Z.  
DLS1(config)#vtp domain CISCO  
Changing VTP domain name from NULL to CISCO  
DLS1(config)#vtp version 2  
DLS1(config)#vtp password ccnp321  
Setting device VLAN database password to ccnp321  
DLS1(config)#exit  
DLS1#  
%SYS-5-CONFIG\_I: Configured from console by console

ALS1>enable  
ALS1#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
ALS1(config)#vtp domain CISCO  
Changing VTP domain name from NULL to CISCO  
ALS1(config)#vtp version 2  
ALS1(config)#vtp password ccnp321  
Setting device VLAN database password to ccnp321  
ALS1(config)#exit  
ALS1#  
%SYS-5-CONFIG\_I: Configured from console by console

ALS2>enable  
ALS2#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
ALS2(config)#vtp domain CISCO  
Changing VTP domain name from NULL to CISCO  
ALS2(config)#vtp version 2  
ALS2(config)#vtp password ccnp321  
Setting device VLAN database password to ccnp321  
ALS2(config)#exit  
ALS2#  
%SYS-5-CONFIG\_I: Configured from console by console

2) Configurar DLS1 como servidor principal para las VLAN.

DLS1>enable  
DLS1#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
DLS1(config)#vtp mode server  
Device mode already VTP SERVER.  
DLS1(config)#exit  
DLS1#  
%SYS-5-CONFIG\_I: Configured from console by console

3) Configurar ALS1 y ALS2 como clientes VTP.

```
ALS1>enable
ALS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#vtp mode client
Setting device to VTP CLIENT mode.
ALS1(config)#exit
ALS1#
%SYS-5-CONFIG_I: Configured from console by console
```

```
ALS2>enable
ALS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#vtp mode client
Setting device to VTP CLIENT mode.
ALS2(config)#exit
ALS2#
%SYS-5-CONFIG_I: Configured from console by console
```

e. Configurar en el servidor principal las siguientes VLAN:

Tabla 3. Configuración de VLAN

Número de VLAN	Nombre de VLAN	Número de VLAN	Nombre de VLAN
500	NATIVA	434	PROVEEDORES
12	ADMON	123	SEGUROS
234	CLIENTES	1010	VENTAS
1111	MULTIMEDIA	3456	PERSONAL

Nota: Por motivo del siguiente error generado en Packet Tracer  
“DLS1(config)#vlan 1111 VLAN\_CREATE\_FAIL: Failed to create VLANs 1111 : extended VLAN(s) not allowed in current VTP mode” se asignan numero de vlans: 1111 por 11, 1010 por 10, 3456 por 34 por lo tanto la configuración de todas las vlans quedo de la siguiente forma:

```
DLS1>enable
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#vlan 500
DLS1(config-vlan)#name NATIVA
```

```

DLS1(config-vlan)#vlan 12
DLS1(config-vlan)#name ADMON
DLS1(config-vlan)#vlan 234
DLS1(config-vlan)#name CLIENTES
DLS1(config-vlan)#vlan 11
DLS1(config-vlan)#name MULTIMEDIA
DLS1(config-vlan)#vlan 434
DLS1(config-vlan)#name PROVEEDORES
DLS1(config-vlan)#vlan 123
DLS1(config-vlan)#name SEGUROS
DLS1(config-vlan)#vlan 10
DLS1(config-vlan)#name VENTAS
DLS1(config-vlan)#vlan 34
DLS1(config-vlan)#name PERSONAL
DLS1(config-vlan)#exit
DLS1(config)#exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console

```

Figura 23. Configuración VLAN

```

DLS1
Physical Config CLI Attributes
IOS Command Line Interface

-----+-----+-----+-----+
1     default          active   Po1, Po4, Fa0/1,
Fa0/2                           Fa0/3, Fa0/4, Fa0/5,
Fa0/6                           Fa0/7, Fa0/8, Fa0/9,
Fa0/10                          Fa0/11, Fa0/12,
Fa0/13, Fa0/14                  Fa0/15, Fa0/16,
Fa0/17, Fa0/18                  Fa0/19, Fa0/20,
Fa0/21, Fa0/22                  Fa0/23, Fa0/24,
Gig0/1, Gig0/2
10    VENTAS          active
11    MULTIMEDIA       active
12    ADMON           active
34    PERSONAL         active
123   SEGUROS         active
234   CLIENTES        active
434   PROVEEDORES     active
500   NATIVA          active
1002  fddi-default    active
1003  token-ring-default active
1004  fddinet-default active
1005  trnet-default   active
--More--

```

Ctrl+F6 to exit CLI focus     

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- e. En DLS1, suspender la VLAN 434. (Packet tracer no soporta el comando state suspend usado para suspender el servicio de una vlan)

```
DLS1#
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#vlan 434
DLS1(config-vlan)#name PROVEEDORES
DLS1(config-vlan)#state suspend
^
% Invalid input detected at '^' marker.
DLS1(config-vlan)#exit
DLS1(config)#exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console
```

Figura 24. Suspender VLAN 434

```
DLS1
Physical Config CLI Attributes
IOS Command Line Interface
0
VLAN Type SAID MTU Parent RingNo BridgeNo Stp BrdgMode
Transl Trans2
-----
-----
Remote SPAN VLANs
-----
Primary Secondary Type Ports
-----
DLS1#
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#vlan 434
DLS1(config-vlan)#name PROVEEDORES
DLS1(config-vlan)#state suspend
^
% Invalid input detected at '^' marker.

DLS1(config-vlan)#exit
DLS1(config)#exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console

Ctrl+F6 to exit CLI focus
Copy Paste
Top
```

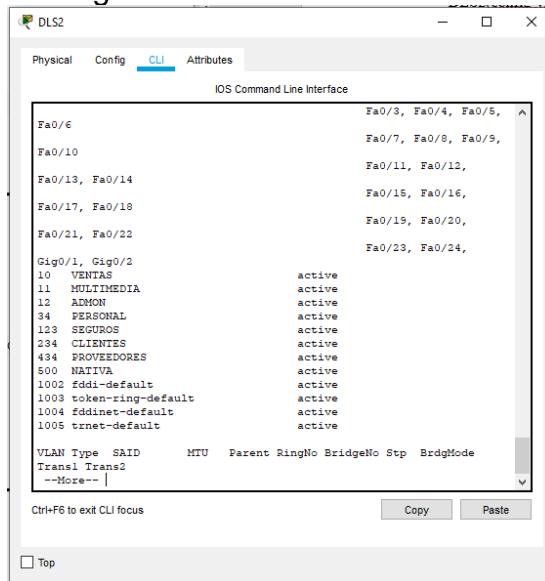
- f. Configurar DLS2 en modo VTP transparente VTP utilizando VTP versión 2, y configurar en DLS2 las mismas VLAN que en DLS1.

```

DLS2>enable
DLS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#vtp mode transparent
Setting device to VTP TRANSPARENT mode.
DLS2(config)#exit
DLS2#
%SYS-5-CONFIG_I: Configured from console by console
DLS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#vlan 500
DLS2(config-vlan)#name NATIVA
DLS2(config-vlan)#vlan 12
DLS2(config-vlan)#name ADMON
DLS2(config-vlan)#vlan 234
DLS2(config-vlan)#name CLIENTES
DLS2(config-vlan)#vlan 11
DLS2(config-vlan)#name MULTIMEDIA
DLS2(config-vlan)#vlan 434
DLS2(config-vlan)#name PROVEEDORES
DLS2(config-vlan)#vlan 123
DLS2(config-vlan)#name SEGUROS
DLS2(config-vlan)#vlan 10
DLS2(config-vlan)#name VENTAS
DLS2(config-vlan)#vlan 34
DLS2(config-vlan)#name PERSONAL
DLS2(config-vlan)#exit

```

Figura 25. Configuración DLS2 en modo VTP transparente



- g. Suspender VLAN 434 en DLS2. (Packet tracer no soporta el comando state suspend usado para suspender el servicio de una vlan)

```
DLS2>enable
DLS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#vlan 434
DLS2(config-vlan)#name PROVEEDORES
DLS2(config-vlan)#state suspend
^
% Invalid input detected at '^' marker.
DLS2(config-vlan)#exit
DLS2(config)#exit
DLS2#
%SYS-5-CONFIG_I: Configured from console by console
```

- h. 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>enable
DLS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#vlan 567
DLS2(config-vlan)#name PRODUCCION
DLS2(config-vlan)#exit
DLS2(config)#interface port-channel 2
DLS2(config-if)#switchport trunk allowed vlan except 567
DLS2(config-if)#exit
DLS2(config)#interface port-channel 3
DLS2(config-if)#switchport trunk allowed vlan except 567
DLS2(config-if)#exit
DLS2(config)#exit
DLS2#
%SYS-5-CONFIG_I: Configured from console by console
```

Figura 26. Creación en DLS2 VLAN 567 nombre PRODUCCION

The screenshot shows the DLS2 software interface with the 'CLI' tab selected. The main window displays the IOS Command Line Interface output for creating a new VLAN. The command entered is '567 PRODUCCION'. The output shows the VLAN ID 567 and its name 'PRODUCCION' highlighted in yellow. Other VLAN entries are listed below, such as VENTAS (10), MULTIMEDIA (11), ADMON (12), PERSONAL (34), SEGUROS (123), CLIENTES (234), PROVEEDORES (434), NATIVA (500), and several default interfaces (1, 1002, 1003, 1004, 1005). All entries show the status 'active'. At the bottom of the CLI window, there are 'Copy' and 'Paste' buttons.

Figura 27. VLAN de PRODUCCION no disponible en otros Switch

The screenshot shows the DLS1 software interface with the 'CLI' tab selected. The main window displays the IOS Command Line Interface output for listing available VLANs. The output shows a list of VLANs and their associated interfaces. VLAN 1 is the default, and other VLANs (10, 11, 12, 34, 123, 234, 434, 500) are also listed with their respective active interfaces. The output ends with a 'More--' prompt at the bottom. At the bottom of the CLI window, there are 'Copy' and 'Paste' buttons.

- i. Configurar DLS1 como Spanning tree root para las VLAN 1, 12, 434, 500, 1010, 1111 y 3456 y como raíz secundaria para las VLAN 123 y 234.

```
DLS1>
DLS1>
DLS1>enable
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#spanning-tree vlan 1,12,434,500,10,11,34 root primary
DLS1(config)#exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console
```

```
DLS1>enable
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#spanning-tree vlan 123,234 root secondary
DLS1(config)#exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console
```

- j. Configurar DLS2 como Spanning tree root para las VLAN 123 y 234 y como una raíz secundaria para las VLAN 12, 434, 500, 1010, 1111 y 3456.

```
DLS2>enable
DLS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#spanning-tree vlan 123,234 root primary
DLS2(config)#exit
DLS2#
%SYS-5-CONFIG_I: Configured from console by console
```

```
DLS2>enable
DLS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#spanning-tree vlan 12,434,500,10,11,34 root secondary
DLS2(config)#exit
DLS2#
%SYS-5-CONFIG_I: Configured from console by console
```

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

```
DLS1>enable
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface port-channel 1
DLS1(config-if)#switchport trunk allowed vlan 1,12,123,234,434,500,10,11,34
DLS1(config-if)#exit
DLS1(config)#interface port-channel 4
DLS1(config-if)#switchport trunk allowed vlan 1,12,123,234,434,500,10,11,34
DLS1(config-if)#exit
DLS1(config)#
DLS1(config)#exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console
```

```
DLS2>enable
DLS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#interface port-channel 2
DLS2(config-if)#switchport trunk allowed vlan 1,12,123,234,434,500,10,11,34,567
DLS2(config-if)#exit
DLS2(config)#interface port-channel 3
DLS2(config-if)#switchport trunk allowed vlan 1,12,123,234,434,500,10,11,34,567
DLS2(config-if)#exit
DLS2(config)#exit
DLS2#
%SYS-5-CONFIG_I: Configured from console by console
```

```
ALS1>enable
ALS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#interface port-channel 1
ALS1(config-if)#switchport trunk allowed vlan 1,12,123,234,434,500,10,11,34
ALS1(config-if)#exit
ALS1(config)#interface port-channel 3
ALS1(config-if)#switchport trunk allowed vlan 1,12,123,234,434,500,10,11,34
ALS1(config-if)#exit
ALS1(config)#exit
ALS1#
%SYS-5-CONFIG_I: Configured from console by console
```

```
ALS2>enable
ALS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#interface port-channel 2
ALS2(config-if)#switchport trunk allowed vlan 1,12,123,234,434,500,10,11,34
```

```

ALS2(config-if)#exit
ALS2(config)#interface port-channel 4
ALS2(config-if)#switchport trunk allowed vlan 1,12,123,234,434,500,10,11,34
ALS2(config-if)#exit
ALS2(config)#exit
ALS2#
%SYS-5-CONFIG_I: Configured from console by console

```

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

Tabla 4. Configuración interfaces puertos de acceso a VLAN

Interfaz	DLS1	DLS2	ALS1	ALS2
Interfaz Fa0/6	3456	12, 1010	123, 1010	234
Interfaz Fa0/15	1111	1111	1111	1111
Interfaz Fa0/16-18		567		

```

DLS1>enable
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface fa0/6
DLS1(config-if)#switchport mode access
DLS1(config-if)#switchport access vlan 34
DLS1(config-if)#no shutdown

DLS1(config-if)#exit
DLS1(config)#interface fa0/15
DLS1(config-if)#switchport mode access
DLS1(config-if)#switchport access vlan 11
DLS1(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to down
DLS1(config-if)#exit
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up

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

DLS1(config)#
DLS1#
%SYS-5-CONFIG_I: Configured from console by console
DLS2>enable
DLS2#configure terminal

```

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

```
DLS2(config)#interface fa0/6
DLS2(config-if)#switchport mode access
DLS2(config-if)#switchport access vlan 12
DLS2(config-if)#no shutdown

DLS2(config-if)#exit
DLS2(config)#interface fa0/6
DLS2(config-if)#switchport mode access
DLS2(config-if)#switchport access vlan 10
DLS2(config-if)#no shutdown
DLS2(config-if)#exit
DLS2(config)#interface fa0/15
DLS2(config-if)#switchport mode access
DLS2(config-if)#switchport access vlan 11
DLS2(config-if)#no shutdown
```

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

```
DLS2(config-if)#exit
DLS2(config)#interface fa0/16-18
^
% Invalid input detected at '^' marker.
DLS2(config)#switchport mode access
^
% Invalid input detected at '^' marker.
DLS2(config)#switchport access vlan 567
^
% Invalid input detected at '^' marker.
DLS2(config)#no shutdown
^
% Invalid input detected at '^' marker.
DLS2(config)#exit
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up
```

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

```
DLS2#
%SYS-5-CONFIG_I: Configured from console by console
```

```
ALS1>enable
ALS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#interface fa0/6
ALS1(config-if)#switchport mode access
```

```
ALS1(config-if)#switchport access vlan 123  
ALS1(config-if)#no shutdown
```

```
ALS1(config-if)#exit  
ALS1(config)#interface fa0/6  
ALS1(config-if)#switchport mode access  
ALS1(config-if)#switchport access vlan 10  
ALS1(config-if)#no shutdown  
ALS1(config-if)#exit  
ALS1(config)#interface fa0/15  
ALS1(config-if)#switchport mode access  
ALS1(config-if)#switchport access vlan 11  
ALS1(config-if)#no shutdown
```

```
%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to down  
ALS1(config-if)#exit  
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up
```

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

```
ALS2>enable  
ALS2#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
ALS2(config)#interface fa0/6  
ALS2(config-if)#switchport mode access  
ALS2(config-if)#switchport access vlan 234  
ALS2(config-if)#no shutdown
```

```
ALS2(config-if)#exit  
ALS2(config)#interface fa0/15  
ALS2(config-if)#switchport mode access  
ALS2(config-if)#switchport access vlan 11  
ALS2(config-if)#no shutdown
```

```
%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to down  
ALS2(config-if)#exit  
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up
```

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

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 (con show vlan brief)

Figura 28. VLAN correcta en switch DLS1

```
DLS1#show vlan brief
VLAN Name          Status    Ports
---- -----
1    default        active    Po1, Po4, Fa0/1,
                           Fa0/2, Fa0/7, Fa0/11,
                           Fa0/14, Fa0/16, Fa0/19,
                           Fa0/20, Fa0/23, Fa0/24
                           Fa0/12, Fa0/13,
                           Fa0/17, Fa0/18,
                           Fa0/21, Fa0/22,
                           Gig0/1, Gig0/2
10   VENTAS         active
11   MULTIMEDIA     active
12   ADMON          active
34   PERSONAL       active
123  SEGUROS        active
234  CLIENTES       active
434  PROVEEDORES    active
500  NATIVA          active
1002 fddi-default   active
1003 token-ring-default active

Ctrl+F6 to exit CLI focus      Copy      Paste
□ Top
```

Figura 29. VLAN correcta en switch DLS2

```
DLS2#show vlan brief
VLAN Name          Status    Ports
---- -----
1    default        active    Po2, Po3, Fa0/1,
                           Fa0/2, Fa0/7, Fa0/11,
                           Fa0/14, Fa0/16, Fa0/19,
                           Fa0/20, Fa0/23, Fa0/24
                           Fa0/12, Fa0/13,
                           Fa0/17, Fa0/18,
                           Fa0/21, Fa0/22,
                           Gig0/1, Gig0/2
10   VENTAS         active
11   MULTIMEDIA     active
12   ADMON          active
34   PERSONAL       active
123  SEGUROS        active
234  CLIENTES       active
434  PROVEEDORES    active
500  NATIVA          active
567  PRODUCCION     active
1002 fddi-default   active

Ctrl+F6 to exit CLI focus      Copy      Paste
□ Top
```

Figura 30. VLAN correcta en switche ALS1

The screenshot shows the CLI interface for switch ALS1. The user has entered the command `show vlan brief` to view the current VLAN configuration. The output displays the following information:

VLAN Name	Status	Ports
1 default	active	Po1, Po3, Fa0/1, Fa0/2 Fa0/7 Fa0/11 Fa0/14, Fa0/16 Fa0/19, Fa0/20 Fa0/23, Fa0/24
1002 fddi-default	active	Fa0/3, Fa0/4, Fa0/5,
1003 token-ring-default	active	Fa0/8, Fa0/9, Fa0/10,
1004 fddinet-default	active	Fa0/12, Fa0/13,
1005 trnet-default	active	Fa0/17, Fa0/18,
		Fa0/21, Fa0/22,
		Gig0/1, Gig0/2
ALS1#		

At the bottom of the CLI window, there are buttons for "Copy" and "Paste".

Figura 31. VLAN correcta en switche ALS2

The screenshot shows the CLI interface for switch ALS2. The user has entered the command `show vlan brief` to view the current VLAN configuration. The output displays the following information:

VLAN Name	Status	Ports
1 default	active	Po2, Po4, Fa0/1, Fa0/2 Fa0/7 Fa0/11 Fa0/14, Fa0/16 Fa0/19, Fa0/20 Fa0/23, Fa0/24
1002 fddi-default	active	Fa0/3, Fa0/4, Fa0/5,
1003 token-ring-default	active	Fa0/8, Fa0/9, Fa0/10,
1004 fddinet-default	active	Fa0/12, Fa0/13,
1005 trnet-default	active	Fa0/17, Fa0/18,
		Fa0/21, Fa0/22,
		Gig0/1, Gig0/2
ALS2#		

At the bottom of the CLI window, there are buttons for "Copy" and "Paste".

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

Figura 32. EtherChannel entre DLS1 y ALS1 configurado

```

DLS1
Physical Config CLI Attributes
IOS Command Line Interface
1002 fddi-default           active
1003 token-ring-default     active
1004 fddinet-default        active
1005 trnet-default          active
DLS1#
DLS1#
DLS1#show etherchannel summary
Flags: D - down            P - in port-channel
       I - stand-alone s - suspended
       H - Hot-standby (LACP only)
       R - Layer3             S - Layer2
       U - in use              f - failed to allocate aggregator
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port

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

Group Port-channel Protocol Ports
-----+-----+-----+
+-----+
1      Po1 (SU)          LACP   Fa0/7(P) Fa0/8(P)
4      Po4 (SD)          PAgP   Fa0/9(D) Fa0/10(D)
12     Po12 (RU)         LACP   Fa0/11(P) Fa0/12(P)
DLS1#

```

Ctrl+F6 to exit CLI focus      Copy      Paste

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Figura 33. EtherChannel entre ALS1 Y DLS1 configurado

```

ALS1
Physical Config CLI Attributes
IOS Command Line Interface
Fa0/23, Fa0/24
                                                Fa0/21, Fa0/22,
                                                Gig0/1, Gig0/2
1002 fddi-default           active
1003 token-ring-default     active
1004 fddinet-default        active
1005 trnet-default          active
ALS1#show etherchannel summary
Flags: D - down            P - in port-channel
       I - stand-alone s - suspended
       H - Hot-standby (LACP only)
       R - Layer3             S - Layer2
       U - in use              f - failed to allocate aggregator
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port

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

Group Port-channel Protocol Ports
-----+-----+-----+
+-----+
1      Po1 (SU)          LACP   Fa0/7(P) Fa0/8(P)
3      Po3 (SD)          PAgP   Fa0/9(D) Fa0/10(D)
ALS1#

```

Ctrl+F6 to exit CLI focus      Copy      Paste

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

Figura 34. Configuración de Spanning tree entre DLS1

```

DLS1#show spanning-tree
VLAN0001
Spanning tree enabled protocol ieee
Root ID Priority 24577
Address 0001.4232.DD38
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 0001.4232.DD38
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
----- -- -- -- -- --
Po1 Desg FWD 9 128.28 Shr
Fa0/7 Desg FWD 19 128.7 P2p
Fa0/8 Desg FWD 19 128.8 P2p

VLAN0034
Spanning tree enabled protocol ieee
Root ID Priority 24610
Address 0001.4232.DD38
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 24610 (priority 24576 sys-id-ext 34)

```

Ctrl+F6 to exit CLI focus     

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Figura 35. Configuración de Spanning tree entre DLS2

```

DLS2>show spanning-tree
VLAN0001
Spanning tree enabled protocol ieee
Root ID Priority 32769
Address 0060.2FA9.B184
Cost 9
Port 28(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 00E0.B028.A5C2
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Nbr Type
----- -- -- -- -- --
Po2 Root FWD 9 128.28 Shr
Fa0/7 Desg FWD 19 128.7 P2p
Fa0/8 Desg FWD 19 128.8 P2p

VLAN0010
Spanning tree enabled protocol ieee
Root ID Priority 28682
Address 00E0.B028.A5C2
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

```

Ctrl+F6 to exit CLI focus     

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## CONCLUSIONES

En el escenario 1 y a través de su desarrollo trabajamos con los dos protocolos de enrutamiento EIGRP y OSPF de los cuales EIGRP de propiedad de CISCO ofrece las mejores características de los algoritmos vector distancia y de estado de enlace este protocolo es muy importante en tanto que puede negociar con otros protocolos sin causar problemas de compatibilidad.

El protocolo OSPF es el más adecuado para servir entre redes heterogéneas de gran tamaño, protocolo que a demás es encargado de recalcular las rutas en muy poco tiempo cuando cambia la topología de la red. OSPF como su nombre lo indica es el encargado de elegir el camino más corto primero además de que puede dividir un sistema autónomo (AS) en áreas y mantenerlas separadas para disminuir el tráfico de direccionamiento.

En el escenario 2 y a través de su desarrollo aprendimos a configurar de manera adecuada switchs de diferentes clases como son los de capa 2 y capa 3 donde la aplicación de protocolos como VTP fueron fundamentales en tanto que evita la redundancia en la red y puede trabajar en sus 3 modos Servidor, cliente y transparente a través de la configuración y administración de VLANs.

La configuración y administración de VLANs brinda flexibilidad en tanto que al estar bien configurada los movimientos de lugar de cierto equipo o funcionario en una empresa no causa mayor problema porque ya los ajustes se los hace a nivel software, a demás de que las VLANs ofrecen seguridad al configurar el dominio de broadcast a unas pocas personas, y finalmente el rendimiento que estas ofrecen en relación a que los paquetes viajan por la red por las rutas mas convenientes mejorando así el desempeño de la red y el ancho de banda.

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