

**DIPLOMADO DE PROFUNDIZACION CISCO
PRUEBA DE HABILIDADES PRÁCTICAS CCNP**

JUAN RICARDO BERMEJO TIBADUISA

**UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA - UNAD
ESCUELA DE CIENCIAS BÁSICAS DE TECNOLOGÍAS E INGENIERÍA – ECBTI
INGENIERÍA ELECTRÓNICA
IBAGUE
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JUAN RICARDO BERMEJO TIBADUISA

**Diplomado de opción de grado presentado para optar
el título de INGENIERO ELECTRÓNICO**

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**UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA - UNAD
ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA - ECBTI
INGENIERÍA ELECTRÓNICA
IBAGUÉ
2019**

NOTA DE ACEPTACIÓN

Firma del presidente del Jurado

Firma del Jurado

Firma del Jurado

Ibagué, 12 de diciembre de 2019

AGRADECIMIENTOS

Este trabajo lo dedico a mi familia, en especial a mi mamá, a mi abuelita y a mi esposa Olga Lucia porque gracias a su apoyo e incondicional ayuda me alientan para superarme y ser una persona integral cada día. También un agradecimiento especial a mis amigos, compañeros de curso y a los tutores de la universidad UNAD y del CEAD Ibagué.

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RESUMEN

El desarrollo de la "Prueba de habilidades prácticas", es la actividad final para concretar conocimientos adquiridos en el Diplomado de Profundización CCNP, donde nos ponemos a prueba manejando un entorno de simulación y programación reflejando destrezas en la implementación de protocolos de enrutamiento como lo son EIGRP, OSPF, BGP, redistribución de rutas, Dynamic Multi VPN, VRF Lite y protocolos en IPv6, VLANs y troncales, Spanning Tree, entre otros.

Palabras clave: CCNP, Simulación, Enrutamiento, IPv6.

ABSTRACT

HHG The development of the "Practical skills test" is the final activity to concretize knowledge acquired in the CCNP Deepening Diploma, where we test ourselves by managing a simulation and programming environment reflecting skills in the implementation of routing protocols such as EIGRP, OSPF, BGP, route redistribution, Dynamic Multi VPN, VRF Lite and protocols in IPv6, VLAN and trunks, Spanning Tree, among others.

Keywords: CCNP, Simulation, Routing, IPv6.

INTRODUCCIÓN

El curso Profundización CCNP (Cisco Certified Network Professional) como opción de grado en Ingeniería Electrónica busca identificar el grado de desarrollo de competencias y habilidades que fueron adquiridas a lo largo del diplomado. Lo esencial es poner a prueba los niveles de comprensión y solución de problemas relacionados con diversos aspectos de Networking.

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

DESARROLLO

Descripción de escenarios propuestos para la prueba de habilidades

Escenario 1

Una empresa de confecciones posee tres sucursales distribuidas en las ciudades de Bogotá, Medellín y Bucaramanga, en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los lineamientos establecidos para el direccionamiento IP, protocolos de enrutamiento y demás aspectos que forman parte de la topología de red.

Topología de red

Figura 1. Escenario 1

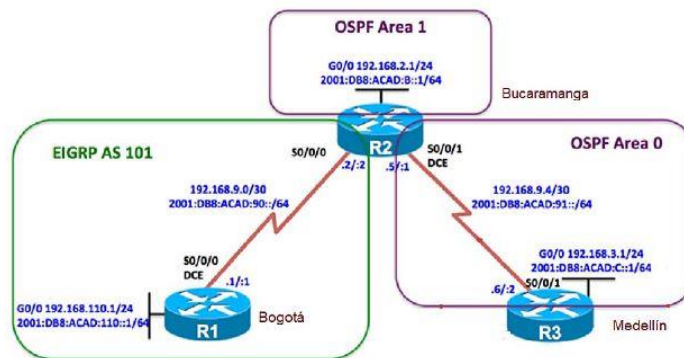
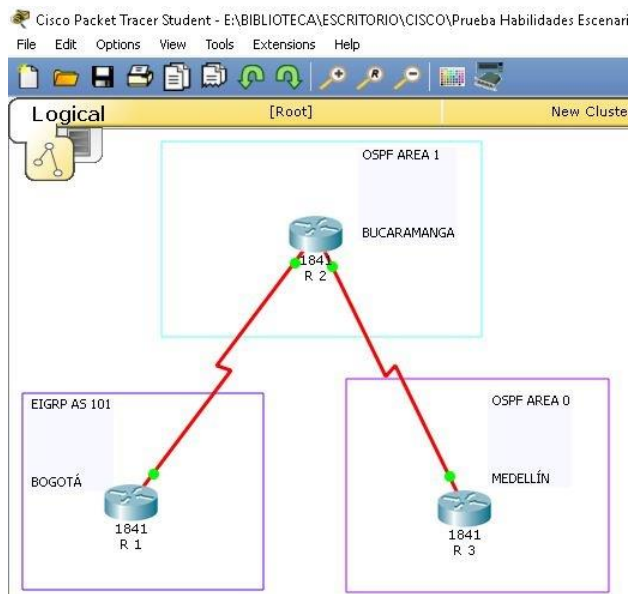


Figura 2. Simulación Escenario 1



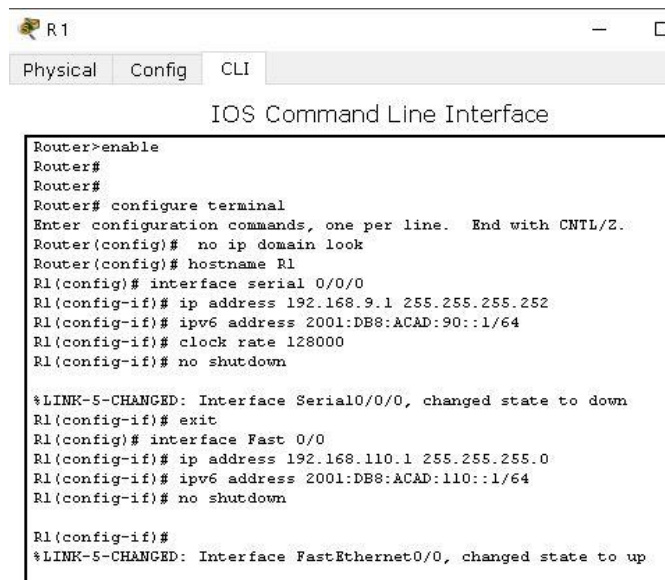
Parte 1: Configuración del escenario propuesto

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

Configuraciones iniciales: Se adjunta código y pantallazos con veracidad del código

```
Router>
Router>
Router>enable
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# hostname R1
R1(config)# interface serial 0/0/0
R1(config-if)# ip address 192.168.9.1 255 255 255 252
% Invalid input detected at '^' marker.
R1(config-if)# ip address 192.168.9.1 255.255.255.252
R1(config-if)# ipv6 address 2001:DB8:ACAD:90::1/64
R1(config-if)# clock rate 128000
R1(config-if)# no shutdown
R1(config-if)# exit
R1(config)# interface giga 0/0
R1(config-if)# ip address 192.168.110.1 255.255.255.0
R1(config-if)# ipv6 address 2001:DB8:ACAD:110::1/64
R1(config-if)# no shutdown
R1(config-if)#
```

Figura 3. Configuración R1



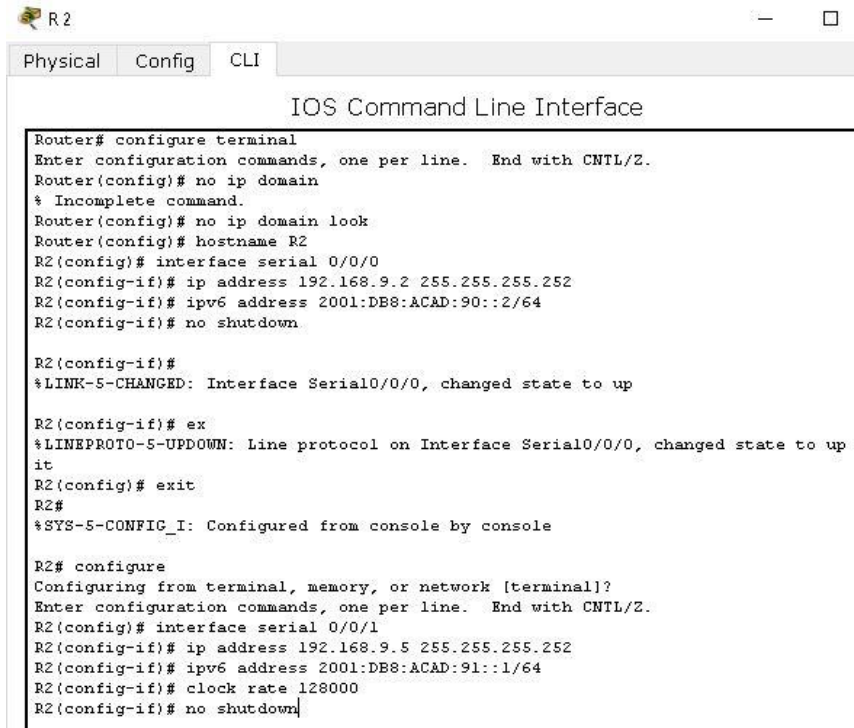
```
R1
Physical Config CLI
IOS Command Line Interface

Router>enable
Router#
Router#
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# no ip domain look
Router(config)# hostname R1
R1(config)# interface serial 0/0/0
R1(config-if)# ip address 192.168.9.1 255.255.255.252
R1(config-if)# ipv6 address 2001:DB8:ACAD:90::1/64
R1(config-if)# clock rate 128000
R1(config-if)# no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)# exit
R1(config)# interface Fast 0/0
R1(config-if)# ip address 192.168.110.1 255.255.255.0
R1(config-if)# ipv6 address 2001:DB8:ACAD:110::1/64
R1(config-if)# no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
```

Figura 4. Configuración R2



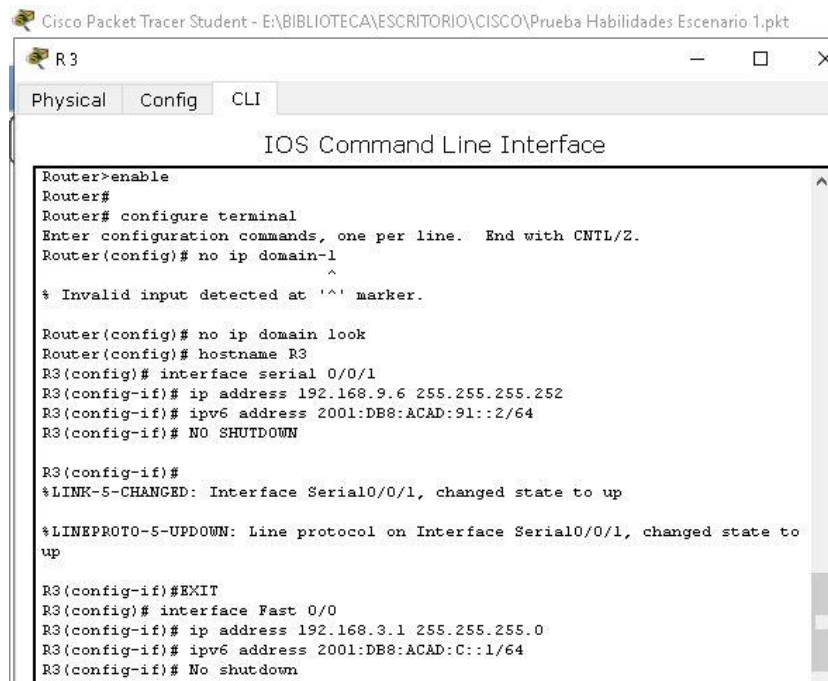
```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# no ip domain
% Incomplete command.
Router(config)# no ip domain look
Router(config)# hostname R2
R2(config)# interface serial 0/0/0
R2(config-if)# ip address 192.168.9.2 255.255.255.252
R2(config-if)# ipv6 address 2001:DB8:ACAD:90::2/64
R2(config-if)# no shutdown

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

R2(config-if)# ex
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
it
R2(config)# exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2# configure
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)# interface serial 0/0/1
R2(config-if)# ip address 192.168.9.5 255.255.255.252
R2(config-if)# ipv6 address 2001:DB8:ACAD:91::1/64
R2(config-if)# clock rate 128000
R2(config-if)# no shutdown
```

Figura 5. Configuración R3



```
Cisco Packet Tracer Student - E:\BIBLIOTECA\ESCRITORIO\CISCO\Prueba Habilidades Escenario 1.pkt
R3
Physical Config CLI
IOS Command Line Interface

Router>enable
Router#
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# no ip domain-1
^
% Invalid input detected at '^' marker.

Router(config)# no ip domain look
Router(config)# hostname R3
R3(config)# interface serial 0/0/1
R3(config-if)# ip address 192.168.9.6 255.255.255.252
R3(config-if)# ipv6 address 2001:DB8:ACAD:91::2/64
R3(config-if)# NO SHUTDOWN

R3(config-if)#
%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(config-if)#EXIT
R3(config)# interface Fast 0/0
R3(config-if)# ip address 192.168.3.1 255.255.255.0
R3(config-if)# ipv6 address 2001:DB8:ACAD:C::1/64
R3(config-if)# No shutdown
```

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

Figura 6. Ajuste Enlaces R1,R2,R3

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

R2(config)# bandwid
^
% Invalid input detected at '^' marker.

R2(config)# bandwidth 128000
^
% Invalid input detected at '^' marker.

R2(config)# interface serial 0/0/0
R2(config-if)# bandwidth 128000
R2(config-if)#

R3>enable
R3# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)# interface serial 0/0/0
R3(config-if)# bandwidth 128000
R3(config-if)#
R3(config-if)#exit
R3(config)# interface Fast 0/0
R3(config-if)# bandwidth 128000
R3(config-if)#
R3(config-if)#
```

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

```
R2(config-if)#exit
R2(config)# router ospf 1
R2(config-router)# router-id 2.2.2.2
R2(config-router)# reload or use "clear ip ospf process"
R2(config-router)# exit
R2(config)# ipv6 unicast-routing
R2(config)# ipv6 router ospf 1
R2(config-rtr)# router-id 2.2.2.2
R2(config-rtr)#
R2(config-rtr)#exit
R2(config)#
```

Figura 7. R2 y R3 configurar direcciones OSPFv3

```
R2
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)# bandwidth
% Invalid input detected at '^' marker.
R2(config)# bandwidth 128000
% Invalid input detected at '^' marker.
R2(config)# interface serial 0/0/0
R2(config-if)# bandwidth 128000
R2(config-if)#
R2(config-if)#
R2(config-if)#exit
R2(config)# router ospf 1
R2(config-router)# router-id 2.2.2.2
R2(config-router)# reload or use "clear ip ospf process" command, for this
take effect
% Invalid input detected at '^' marker.
R2(config-router)# exit
R2(config)# ipv6 unicast-routing
R2(config)# ipv6 router ospf 1
R2(config-rtr)# router-id 2.2.2.2
R2(config-rtr)#

R3
R3# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)# router ospf 1
R3(config-router)# network 192.168.9.0 0.0.0.255 area 0
R3(config-router)# network 192.168.9.4 0.0.0.3 area 0
R3(config-router)# ipv6 unicast-routing
00:17:50: %OSPF-5-ADJCHG: Process 1, Mbr 2.2.2.2 on Serial0/0/1 from LOADING to
FULL, Loading Done
R3(config)# ipv6 router ospf 1
R3(config-rtr)# router-id 3.3.3.3
R3(config-rtr)# exit
R3(config)# interface Fast 0/0
R3(config-if)# ipv6 ospf 1 area 0
R3(config-if)# no shutdown
R3(config-if)# exit
R3(config)# interface serial 0/0/1
R3(config-if)#
R3(config-if)#ipv6 ospf 1 area 0
R3(config-if)# no shutdown
00:22:40: %OSPFv3-5-ADJCHG: Process 1, Mbr 2.2.2.2 on Serial0/0/1 from LOADING to
FULL, Loading Done
```


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

```
R2>Enable
R2# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)# router ospf 1
R2(config-router)# network 192.168.9.0 0.0.0.3 area 0
R2(config-router)#
R2(config-router)# 01:11:33: %ospf-6-areachg: 192.168.9.0/0 changed from area 1
to area 0
% Invalid input detected at '^' marker.
R2(config-router)#
R2(config-router)# network 192.168.2.0 0.0.0.255 area 1
R2(config-router)# network 192.168.9.4 0.0.0.3 area 0
R2(config-router)# ipv6 unicast-routing
R2(config)# ipv6 router ospf 1
R2(config-rtr)# router-id 2.2.2.2
R2(config-rtr)# exit
R2(config)# interface Fast 0/0
R2(config-if)# ipv6 ospf 1 area 1
R2(config-if)# no shutdown
R2(config-if)# exit
R2(config)# interface serial 0/0/1
R2(config-if)# ipv6 ospf 1 area 0
R2(config-if)# no shutdown
R2(config-if)#
```

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

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

Figura 8. R3, configurar la interfaz F0/0



```
Cisco Packet Tracer Student - E:\BIBLIOTECA\ESCRITORIO\CISCO\Prueba Habilidades Escenario 1.pkt
File Edit Options View Tools Extensions Help

R3
Physical Config CLI
IOS Command Line Interface

R3#
%SYS-5-CONFIG_I: Configured from console by console
R3# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)# router ospf 1
R3(config-router)# network 192.168.3.0 0.0.0.255 area 0
R3(config-router)# network 192.168.9.4 0.0.0.3 area 0
R3(config-router)# ipv6 unica
00:17:50: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial0/0/1 from LOADING to FULL, Loading Done
R3(config)# ipv6 router ospf 1
R3(config-rtr)# router-id 3.3.3.3
R3(config-rtr)# exit
R3(config)# interface Fast 0/0
R3(config-if)# ipv6 ospf 1 area 0
R3(config-if)# no shutdown
R3(config-if)# exit
R3(config)# interface serial 0/0/1
R3(config-if)#
R3(config-if)#ipv6 ospf 1 area 0
R3(config-if)# no shutdown
00:22:40: %OSPFv3-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial0/0/1 from LOADING to FULL, Loading Done
```

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

7. Propagar rutas por defecto de IPv4 y IPv6 en R3 al interior del dominio OSPFv3.

Nota: Es importante tener en cuenta que una ruta por defecto es diferente a la definición de rutas estáticas.

```
R3>enable
R3#configure t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#
R3(config)# ipv6 route ::/0 2001:DB8:ACAD:91::
R3(config)# ipv6 router ospf 1
R3(config-rtr)# default-information originate
R3(config-rtr)# end
R3#
%SYS-5-CONFIG_I: Configured from console by console
R3#
```

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

Figura 9. Protocolo EIGRP

```

Cisco Packet Tracer Student - E:\BIBLIOTECA\ESCRITORIO\CISCO\Prueba Habilidades Escenario 1.pkt
File Edit Options View Tools Extensions Help

R1
Physical Config CLI

IOS Command Line Interface

Processor board ID FTX0947218E
M860 processor: part number 0, mask 49
2 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
191K bytes of NVRAM.
63488K bytes of ATA CompactFlash (Read/Write)
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version 12.4(15)T1,
RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team

Press RETURN to get started!

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

R1>enable
R1# config t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)# router eigrp 101
R1(config-router)# network 192.168.110.0
R1(config-router)# network 192.168.9.0
R1(config-router)# no auto-summary
R1(config-router)#
R1(config-router)#
R1(config-router)#
  
```

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

Figura 10. Interfaces pasivas

```

R1
Physical Config CLI

IOS Command Line Interface

R1(config-router)# exit
R1(config)# ipv6 unicast-r
R1(config)# ipv6 router eigrp 101
R1(config-rtr)# eigrp router-id 1.1.1.1
R1(config-rtr)# no shutdown
R1(config-rtr)# exit
R1(config)# interface Fast 0/0
R1(config-if)# ipv6 eigrp 101
R1(config-if)#
R1(config-if)#exit
R1(config)# interface serial 0/0/0
R1(config-if)# ipv6 eigrp 101
R1(config-if)# exit
R1(config)#
R1(config)#
R1(config)#
R1(config)#
R1(config)# router eigrp 101
R1(config-router)# router eigrp 101
R1(config-router)# passive-interface serial 0/0/0
R1(config-router)# passive-
%DUAL-5-MRCHANGE: IP-EIGRP 101: Neighbor 192.168.9.2 (Serial0/0/0) is down:
holding time expired

% Incomplete command.
R1(config-router)# passive-interface Fast 0/0
R1(config-router)#
R1(config-router)#
  
```

Copy Paste

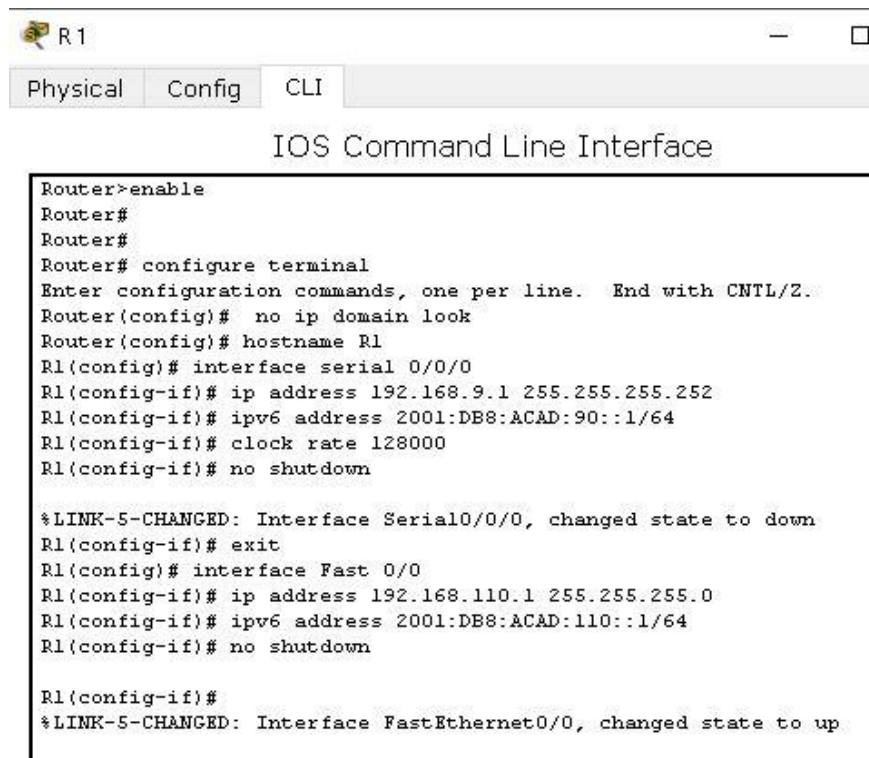
10. En R2, configurar la redistribución mutua entre OSPF y EIGRP para IPv4 e IPv6. Asignar métricas apropiadas cuando sea necesario.

Figura 11. Asignar métricas

```
R2>enable
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#
R2(config)# router ospf 1
R2(config-router)# redistribute eigrp 101 subnets
R2(config-router)# exit
R2(config)# router eigrp 101
R2(config-router)# redistribute ospf 1 metric 1000 100 255 1 1500
R2(config-router)# exit
R2(config)#
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console
```

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

Figura 12. Publicidad de la Ruta

The image shows a terminal window for router R1. At the top, there are tabs for 'Physical', 'Config', and 'CLI'. Below the tabs, the text 'IOS Command Line Interface' is displayed. The terminal content shows the configuration process starting with 'enable', followed by 'configure terminal'. The configuration includes setting the hostname to 'R1', configuring the serial interface 0/0/0 with IP address 192.168.9.1 and IPv6 address 2001:DB8:ACAD:90::1/64, and configuring the fast ethernet interface 0/0 with IP address 192.168.110.1 and IPv6 address 2001:DB8:ACAD:110::1/64. There are also status messages for the interfaces.

```
R1
Physical Config CLI
IOS Command Line Interface

Router>enable
Router#
Router#
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# no ip domain look
Router(config)# hostname R1
R1(config)# interface serial 0/0/0
R1(config-if)# ip address 192.168.9.1 255.255.255.252
R1(config-if)# ipv6 address 2001:DB8:ACAD:90::1/64
R1(config-if)# clock rate 128000
R1(config-if)# no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)# exit
R1(config)# interface Fast 0/0
R1(config-if)# ip address 192.168.110.1 255.255.255.0
R1(config-if)# ipv6 address 2001:DB8:ACAD:110::1/64
R1(config-if)# no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
```

Figura 13. Publicidad de la Ruta ACL

```

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

R2#
R2# configure t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)# ip access-list standard ospf-filter
R2(config-std-nacl)# remark used with dlist to filter ospf 1
R2(config-std-nacl)# deny 192.168.3.0. 0.0.0.255
^
% Invalid input detected at '^' marker.

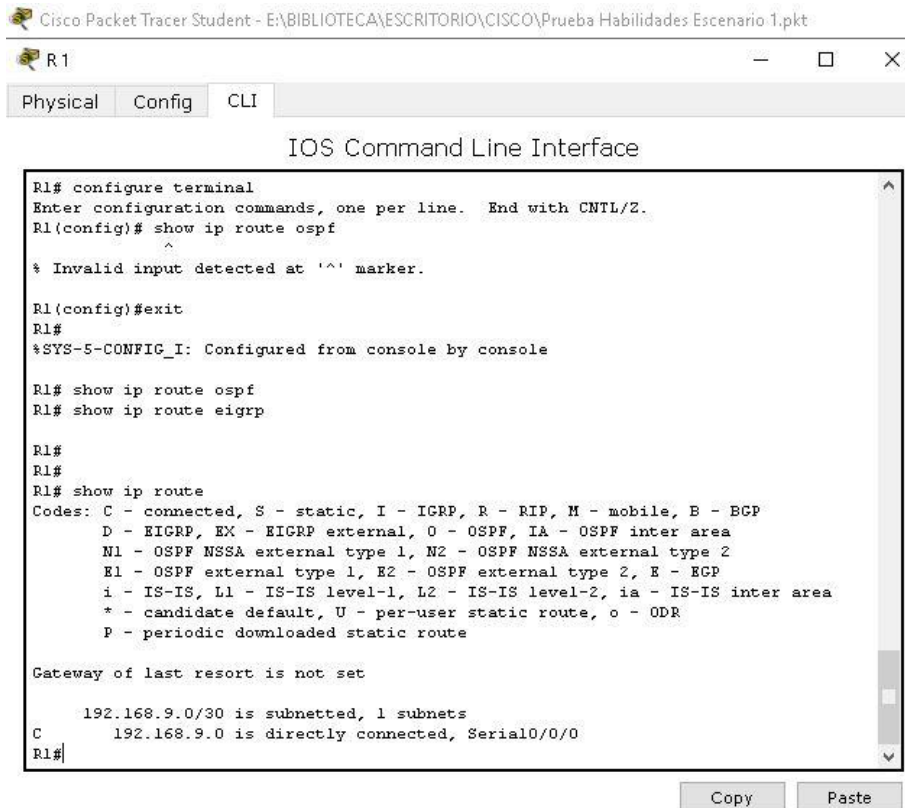
R2(config-std-nacl)# exit
R2(config)# access-list 1 permit 192.168.30.0 0.0.0.255
R2(config)# access-list 1 permit 192.168.40.0 0.0.0.255
R2(config)# access-list 1 permit 192.168.4.0 0.0.3.255
R2(config)#
R2(config)#

```

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

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

Figura 14. Enrutamiento R1



```

Cisco Packet Tracer Student - E:\BIBLIOTECA\ESCRITORIO\CISCO\Prueba Habilidades Escenario 1.pkt

R1

Physical Config CLI

IOS Command Line Interface

R1# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)# show ip route ospf
^
% Invalid input detected at '^' marker.

R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1# show ip route ospf
R1# show ip route eigrp

R1#
R1#
R1# show ip route
Codes: C - connected, S - static, I - IGRP, 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 - ECP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

      192.168.9.0/30 is subnetted, 1 subnets
C       192.168.9.0 is directly connected, Serial0/0/0
R1#

```

Copy Paste

Figura 15. Enrutamiento R2

```
R2>enable
R2# show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

      192.168.9.0/30 is subnetted, 2 subnets
C       192.168.9.0 is directly connected, Serial0/0/0
C       192.168.9.4 is directly connected, Serial0/0/1
R2#
```

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Figura 16. Enrutamiento R3

```
R3>enable
R3# show ip router
^
% Invalid input detected at '^' marker.

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

Gateway of last resort is not set

      192.168.9.0/30 is subnetted, 2 subnets
O       192.168.9.0 [110/65] via 192.168.9.5, 01:14:49, Serial0/0/1
C       192.168.9.4 is directly connected, Serial0/0/1
```

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

Figura 17. Verificar Comunicación - Ping

```
R1
Physical Config CLI
IOS Command Line Interface

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

      192.168.9.0/30 is subnetted, 1 subnets
C       192.168.9.0 is directly connected, Serial0/0/0
R1#
R1#
R1# ping 192.168.9.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/8/18 ms

R1#
R1#ping 192.168.9.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 5/8/11 ms
```

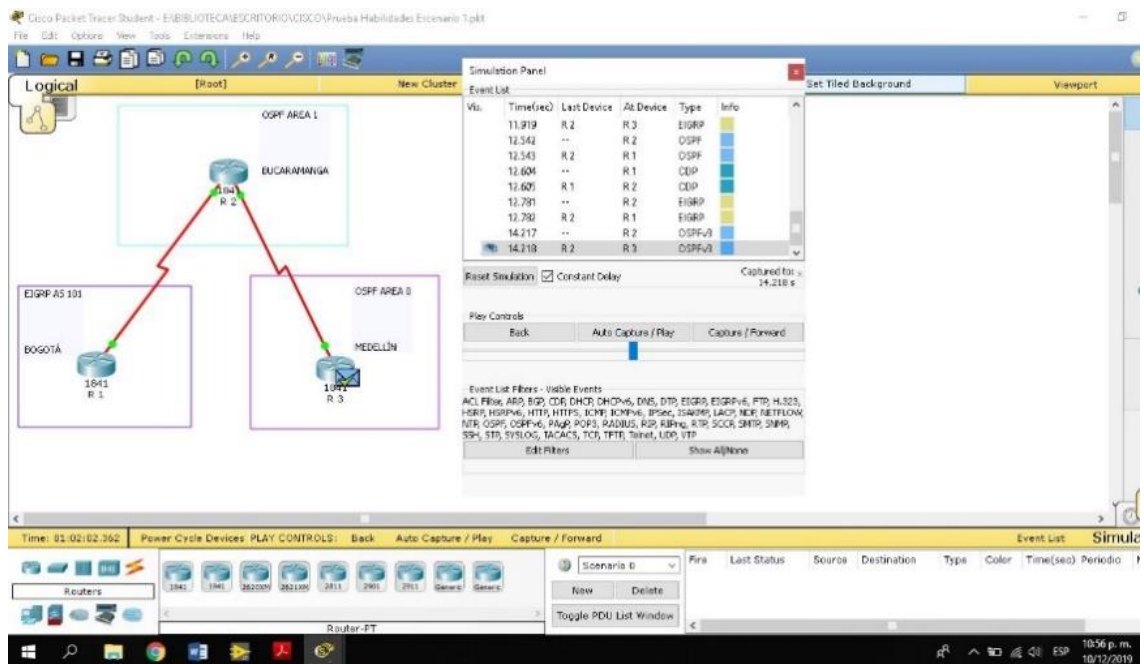
Figura 18. Verificar Comunicación

```
R3#
R3# ping 192.168.9.5

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.5, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/8/8 ms
```

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

Figura 19. Verificación Final

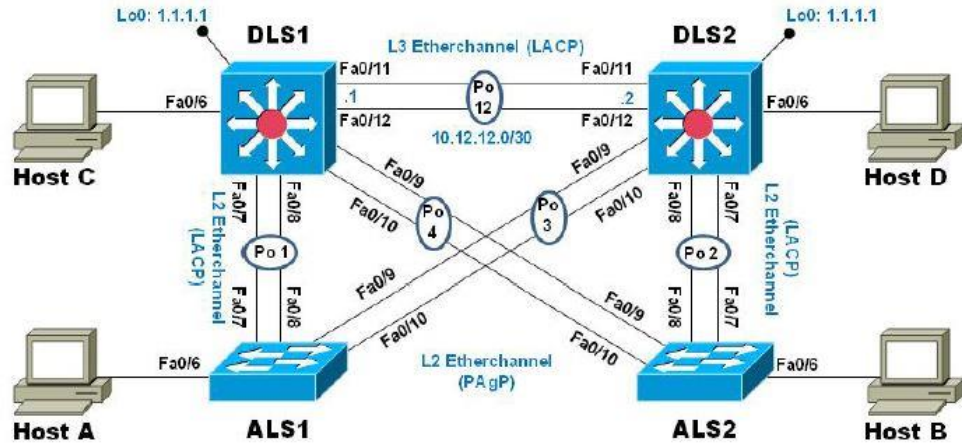


Escenario 2

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

Topología de red

Figura 20. Escenario 2



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

- a) Apagar todas las interfaces en cada switch.
- b) Asignar un nombre a cada switch acorde al escenario establecido.

```
Switch>enable
Switch#configure t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# hostname ALS 1
% Invalid input detected at '^' marker.
Switch(config)# hostname ALS1
ALS1(config)#
```

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

```
Switch>ENABLE
Switch#CONFIGURE T
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# DLS1
% Invalid input detected at '^' marker.
Switch(config)#HOSTNAME DLS1
DLS1(config)#
```

Figura 21. Apagar SW

```
ALS1
Physical Config CLI Attributes
IOS Command Line Interface
Switch(config-if-range)#
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to
administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6,
changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to
administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7,
changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to
administratively down
```

Figura 22. Apagar SW - (Simulación)

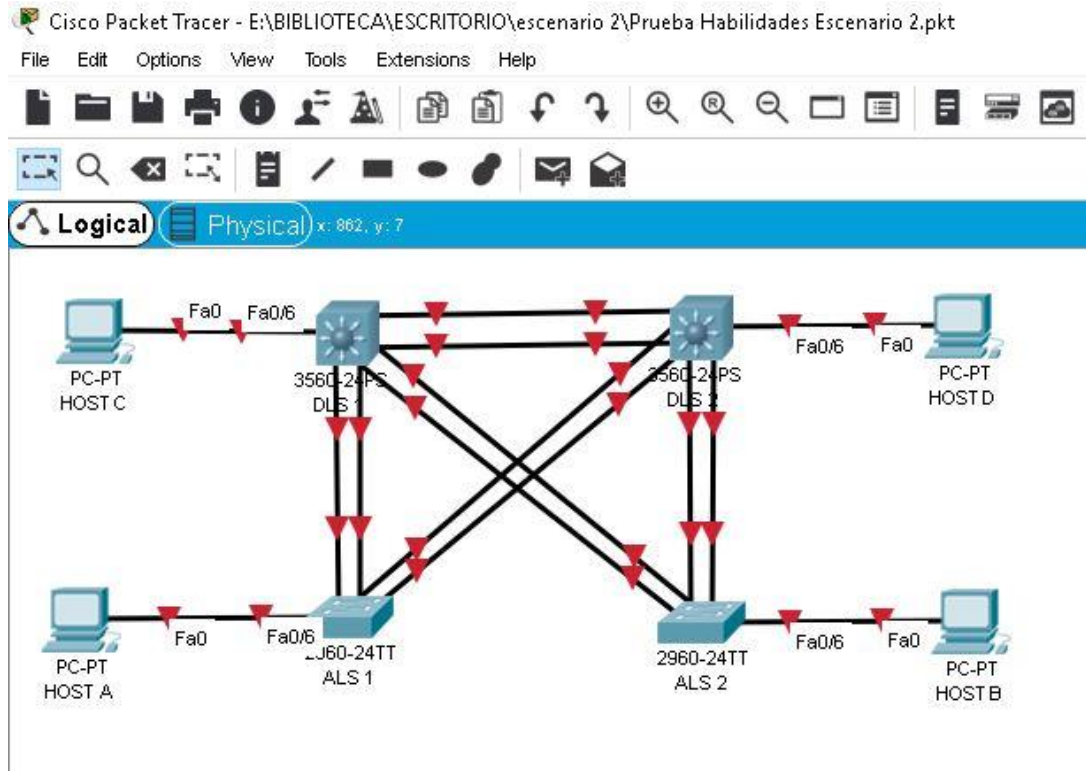
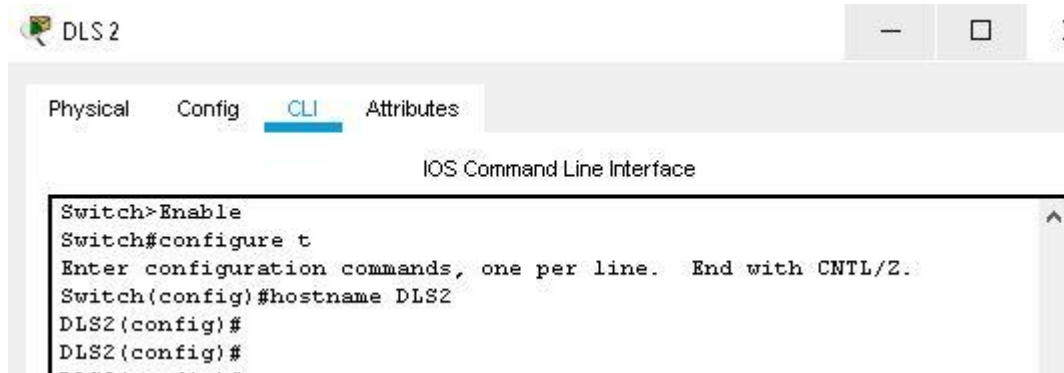


Figura 23. Nombrar SWs



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 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)# interface range Fast 0/11-12
DLS1(config-if-range)# no switchport
DLS1(config-if-range)# channel-group 12 mode active
DLS1(config-if-range)# exit
DLS1(config)# exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console
```

```
DLS2>enable
DLS2#config terminal
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 10.12.12.2 255.255.255.252
DLS2(config-if)# exit
DLS2(config)# interface range Fast 0/11-12
DLS2(config-if-range)# no switchport
DLS2(config-if-range)# Channel-group 12 mode active
```

```
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: 1
Number of aggregators: 1
```

Group Port-channel Protocol Ports

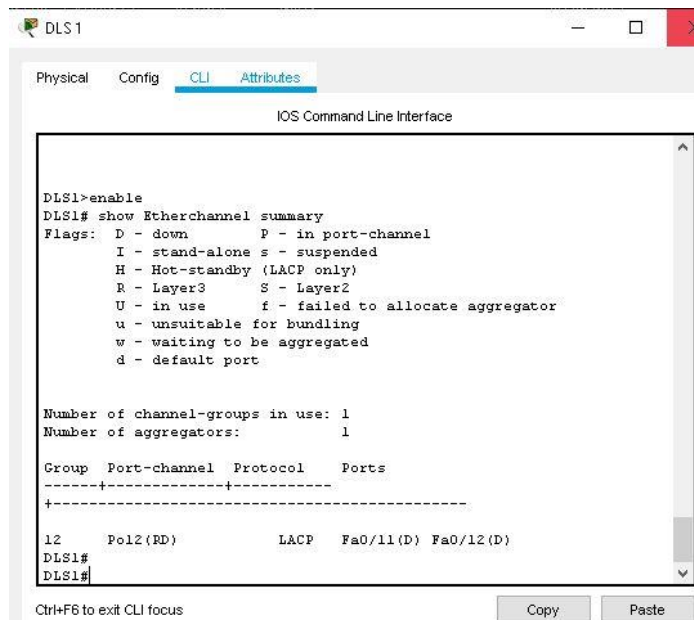
-----+-----+-----+-----

```
12 Po12(RD) LACP Fa0/11(D) Fa0/12(D)
DLS2#
```

Figura 24. Conexión DLS1 y DLS2

```
DLS1>enable
DLS1# configure terminal
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 10.12.12.1 255.255.255.252
DLS1(config-if)# exit
DLS1(config)# interface range Fast 0/11-12
DLS1(config-if-range)# no switchport
DLS1(config-if-range)# channel-group 12 mode active
DLS1(config-if-range)# exit
DLS1(config)# exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console
```

Figura 25. Verificación Conexión utilizando LACP



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

DLS1#enable

DLS1#configure t

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

DLS1(config)#

DLS1(config)#interface range Fast0/7-8

DLS1(config-if-range)# switchport mode Trunk

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

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

DLS1(config-if-range)#

DLS1(config-if-range)# switchport Trunk encapsulation dot1q

DLS1(config-if-range)# switchport mode Trunk

DLS1(config-if-range)# Channel-group 1 mode active

DLS1(config-if-range)#

Creating a port-channel interface Port-channel 1

DLS1(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

```

DLS1(config-if-range)#
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(RD) LACP Fa0/11(D) Fa0/12(D)
DLS1#

```

Figura 26. Port - Channels

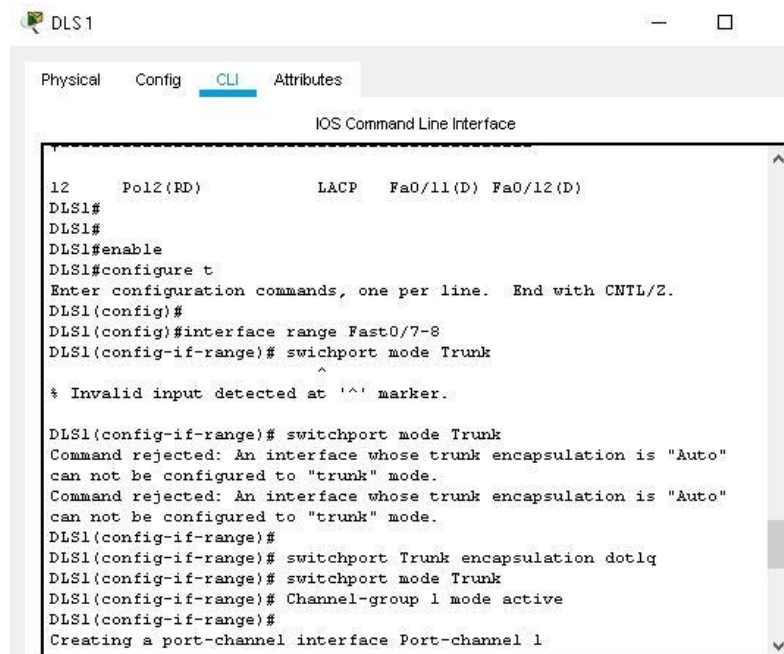
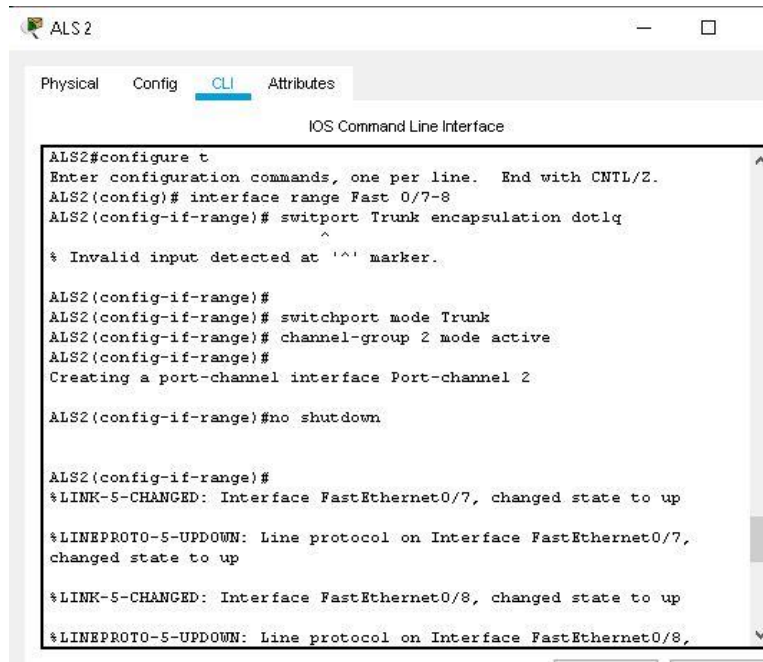


Figura 27. Port - Channels ALS2



```
ALS2
Physical Config CLI Attributes
IOS Command Line Interface
ALS2#configure t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)# interface range Fast 0/7-8
ALS2(config-if-range)# switport Trunk encapsulation dot1q
^
% Invalid input detected at '^' marker.
ALS2(config-if-range)#
ALS2(config-if-range)# switchport mode Trunk
ALS2(config-if-range)# channel-group 2 mode active
ALS2(config-if-range)#
Creating a port-channel interface Port-channel 2
ALS2(config-if-range)#no shutdown
ALS2(config-if-range)#
%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,
```

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

```
DLS1# configure t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)# interface range Fast 0/9-10
DLS1(config-if-range)# switchport trunk encapsulation dot1q
DLS1(config-if-range)# switchport mode trunk
DLS1(config-if-range)# channel-group 4 mode desirable
DLS1(config-if-range)#
Creating a port-channel interface Port-channel 4

DLS1(config-if-range)# no shutdown

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

%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to down
DLS1(config-if-range)#
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

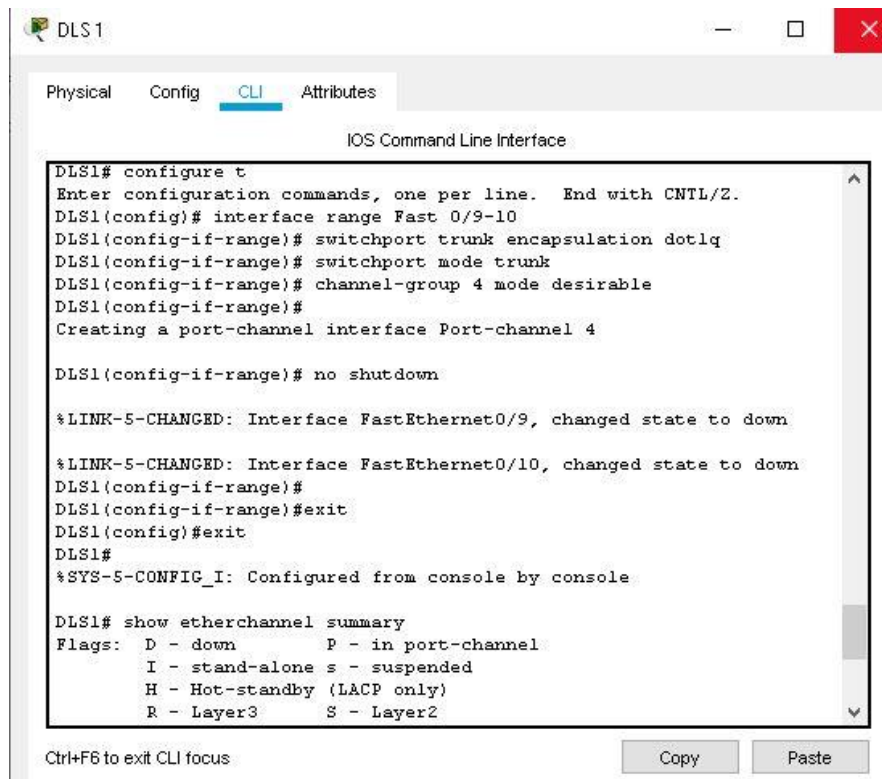
Number of aggregators: 3

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(RD) LACP Fa0/11(D) Fa0/12(D)
 DLS1#

Figura 28. Port - Channels en las Interfaces



- 4) Todos los puertos troncales serán asignados a la VLAN 800 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 800
DLS1(config-if)# exit
DLS1(config)# interface po4
DLS1(config-if)# switchport trunk native vlan 800
DLS1(config-if)# exit
DLS1(config)#
```

- d) Configurar DLS1, ALS1, y ALS2 para utilizar VTP versión 3
 - 1) Utilizar el nombre de dominio UNAD con la contraseña cisco123

```
DLS1>enable
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)# vtp domain UNAD
% Invalid input detected at '^' marker.
DLS1(config)# vtp domain UNAD
Changing VTP domain name from NULL to UNAD
DLS1(config)# vtp pass cisco123
Setting device VLAN database password to cisco123
DLS1(config)# vtp version 3
% Invalid input detected at '^' marker.
DLS1(config)# vtp version 2
DLS1(config)# exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console
DLS1#
```

Figura 29. Dominio UNAD



```
DLS1>enable
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)# vtp domain UNAD
^
% Invalid input detected at '^' marker.

DLS1(config)# vtp domain UNAD
Changing VTP domain name from NULL to UNAD
DLS1(config)# vtp pass cisco123
Setting device VLAN database password to cisco123
DLS1(config)# vtp version 3
^
% Invalid input detected at '^' marker.

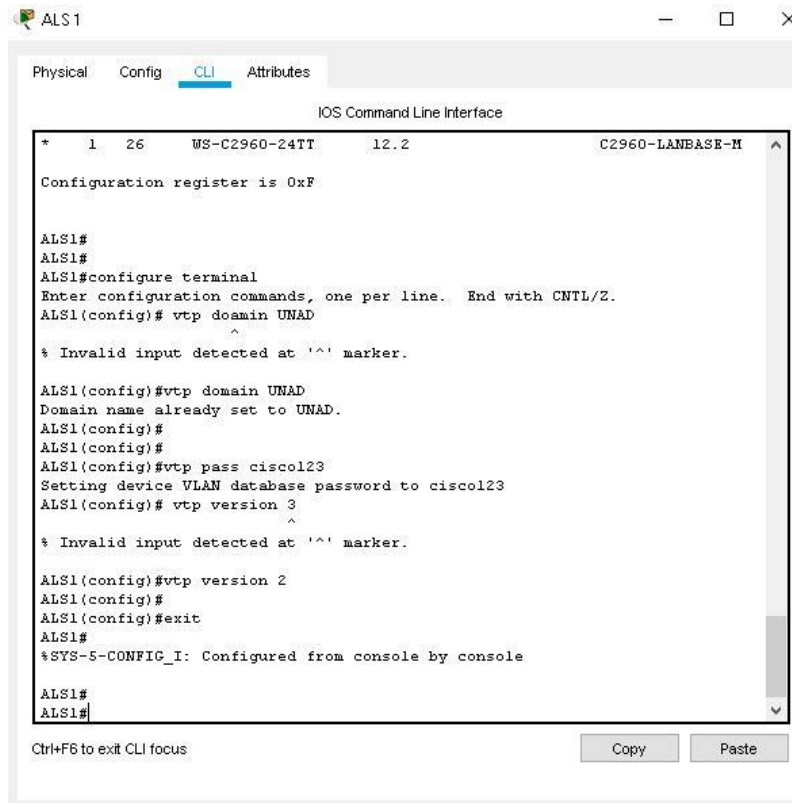
DLS1(config)# vtp version 2
DLS1(config)# exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console

DLS1#
```

Ctrl+F6 to exit CLI focus

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Figura 30. Dominio UNAD - ALS1



```
ALS1#
ALS1#
ALS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)# vtp doamin UNAD
^
% Invalid input detected at '^' marker.

ALS1(config)#vtp domain UNAD
Domain name already set to UNAD.
ALS1(config)#
ALS1(config)#
ALS1(config)#vtp pass cisco123
Setting device VLAN database password to cisco123
ALS1(config)# vtp version 3
^
% Invalid input detected at '^' marker.

ALS1(config)#vtp version 2
ALS1(config)#
ALS1(config)#exit
ALS1#
%SYS-5-CONFIG_I: Configured from console by console

ALS1#
ALS1#
```

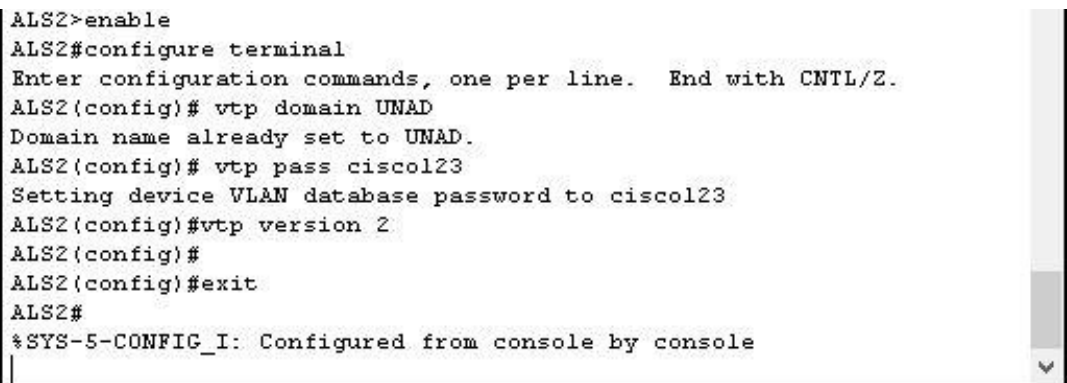
Ctrl+F6 to exit CLI focus

Copy Paste

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)#
DLS1(config)# exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console
DLS1# show vtp status
VTP Version capable : 1 to 2
VTP version running : 2
VTP Domain Name : UNAD
VTP Pruning Mode : Disabled
VTP Traps Generation : Disabled
Device ID : 0000.0C91.4BA0
Configuration last modified by 0.0.0.0 at 3-1-93 03:47:11
Local updater ID is 0.0.0.0 (no valid interface found)
Feature VLAN :
-----
VTP Operating Mode : Server
Maximum VLANs supported locally : 1005
Number of existing VLANs : 5
Configuration Revision : 3
MD5 digest : 0xAC 0xE4 0x38 0xC1 0xA1 0xBF 0x65 0x0A
0x55 0x39 0x76 0x2C 0x15 0xA6 0x40 0xC6
DLS1#
```

Figura 31. Configurar DLS1 – VLAN



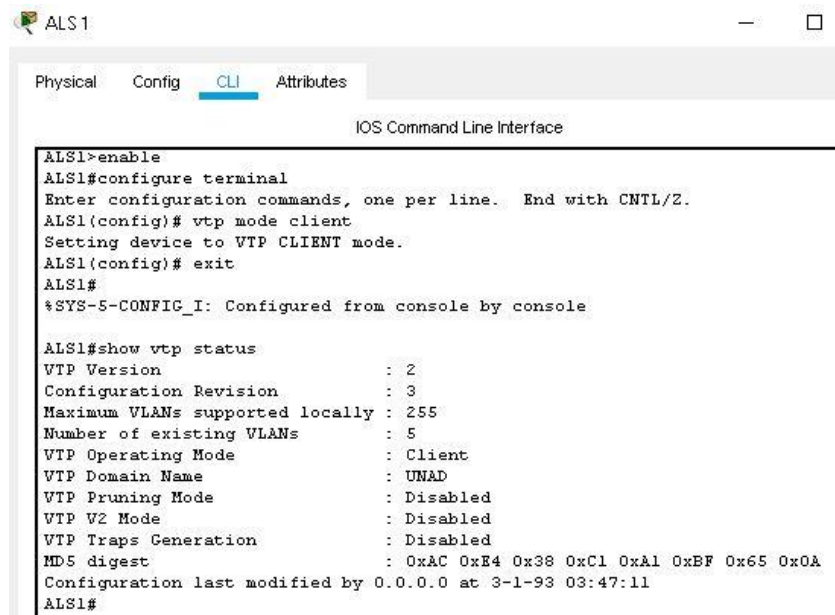
```
ALS2>enable
ALS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)# vtp domain UNAD
Domain name already set to UNAD.
ALS2(config)# vtp pass cisco123
Setting device VLAN database password to cisco123
ALS2(config)#vtp version 2
ALS2(config)#
ALS2(config)#exit
ALS2#
%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

ALS1#show vtp status
VTP Version : 2
Configuration Revision : 3
Maximum VLANs supported locally : 255
Number of existing VLANs : 5
VTP Operating Mode : Client
VTP Domain Name : UNAD
VTP Pruning Mode : Disabled
VTP V2 Mode : Disabled
VTP Traps Generation : Disabled
MD5 digest : 0xAC 0xE4 0x38 0xC1 0xA1 0xBF 0x65 0x0A
Configuration last modified by 0.0.0.0 at 3-1-93 03:47:11
```

Figura 32. ALS1 y ALS 2 Como Clientes



The screenshot shows a terminal window titled 'ALS1' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The terminal output matches the text in the previous block, showing the configuration of ALS1 as a VTP client and the resulting status.

```
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

ALS1#show vtp status
VTP Version : 2
Configuration Revision : 3
Maximum VLANs supported locally : 255
Number of existing VLANs : 5
VTP Operating Mode : Client
VTP Domain Name : UNAD
VTP Pruning Mode : Disabled
VTP V2 Mode : Disabled
VTP Traps Generation : Disabled
MD5 digest : 0xAC 0xE4 0x38 0xC1 0xA1 0xBF 0x65 0x0A
Configuration last modified by 0.0.0.0 at 3-1-93 03:47:11
ALS1#
```

e) Configurar en el servidor principal las siguientes VLAN:

Tabla 1. Configurar VLAN

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

```

DLS1#
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)# vlan 800
DLS1(config-vlan)# name NATIVA
DLS1(config-vlan)# VLAN 12
DLS1(config-vlan)# Name EJECUTIVOS
DLS1(config-vlan)# vlan 234
DLS1(config-vlan)# name HUESPEDES
DLS1(config-vlan)# vlan 1111
VLAN_CREATE_FAIL: Failed to create VLANs 1111 : extended VLAN(s) not
allowed in current VTP mode
DLS1(config)# vlan 1 1 1 1

% Invalid input detected at '^' marker.
DLS1(config)# vlan 111
DLS1(config-vlan)# name VIDEONET
DLS1(config-vlan)# VLAN 34
DLS1(config-vlan)# name ESTACIONAMIENTO
DLS1(config-vlan)# Vlan 123
DLS1(config-vlan)# name MANTENIMIENTO
DLS1(config-vlan)# vlan 101
DLS1(config-vlan)# name VOZ
DLS1(config-vlan)# vlan 3456
VLAN_CREATE_FAIL: Failed to create VLANs 3456 : extended VLAN(s) not
allowed in current VTP mode
DLS1(config)# vlan 345
DLS1(config-vlan)# name ADMINISTRACION

```

Figura 33. Configurar servidor

```

DLS1#
DLS1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)# vlan 800
DLS1(config-vlan)# name NATIVA
DLS1(config-vlan)# VLAN 12
DLS1(config-vlan)# Name EJECUTIVOS
DLS1(config-vlan)# vlan 234
DLS1(config-vlan)# name HUESPEDES
DLS1(config-vlan)# vlan 1111
VLAN_CREATE_FAIL: Failed to create VLANs 1111 : extended VLAN(s) not
allowed in current VTP mode
DLS1(config)# vlan 1 1 1 1
^
% Invalid input detected at '^' marker.

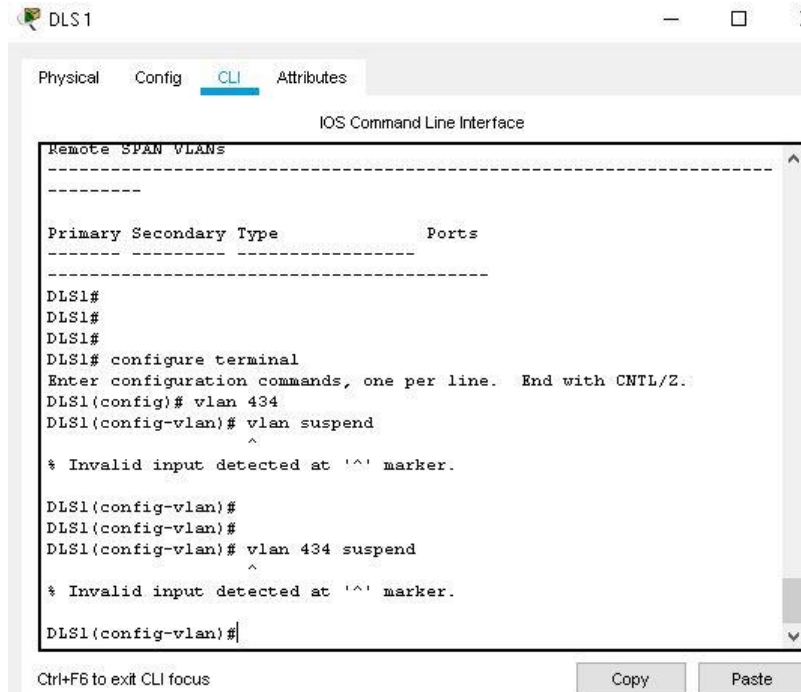
DLS1(config)# vlan 111
DLS1(config-vlan)# name VIDEONET
DLS1(config-vlan)# VLAN 34
DLS1(config-vlan)# name ESTACIONAMIENTO
DLS1(config-vlan)# Vlan 123
DLS1(config-vlan)# name MANTENIMIENTO
DLS1(config-vlan)# vlan 101
DLS1(config-vlan)# name VOZ
    
```

Figura 34. Configuración Servidor Principal

VLAN Name	Status	Ports
1 default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4, Fa0/5, Fa0/6, Fa0/13, Fa0/14, Fa0/15, Fa0/16, Fa0/17, Fa0/18, Fa0/19, Fa0/20, Fa0/21, Fa0/22, Fa0/23, Fa0/24, Gig0/1, Gig0/2
12 EJECUTIVOS	active	
34 ESTACIONAMIENTO	active	
101 VOZ	active	
111 VIDEONET	active	
123 MANTENIMIENTO	active	
234 HUESPEDES	active	
345 ADMINISTRACION	active	
800 NATIVA	active	
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	

- f) En DLS1, suspender la VLAN 434.

Figura 35. DLS1 Suspende VLAN 434



- g) 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#
```

Figura 36. Modo VPT Transparente

```
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
```

h) Suspende VLAN 434 en DLS2.

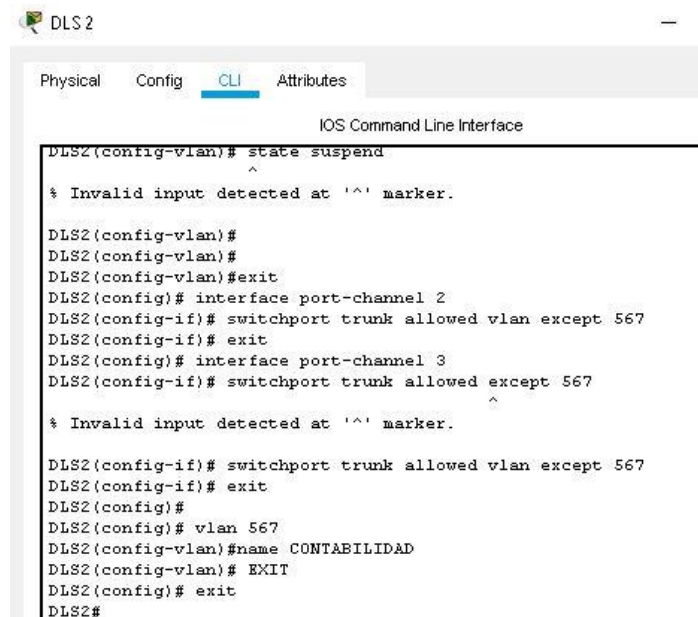
Figura 37. DLS2 Suspende VLAN

```
DLS2#
DLS2#
DLS2#
DLS2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)# vlan 434
DLS2(config-vlan)# state suspend 434
^
% Invalid input detected at '^' marker.
DLS2(config-vlan)# state suspend
^
% Invalid input detected at '^' marker.
DLS2(config-vlan)#
```

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

```
DLS2(config-vlan)#
DLS2(config-vlan)#
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)#
```

Figura 38. VLAN 567 Contabilidad

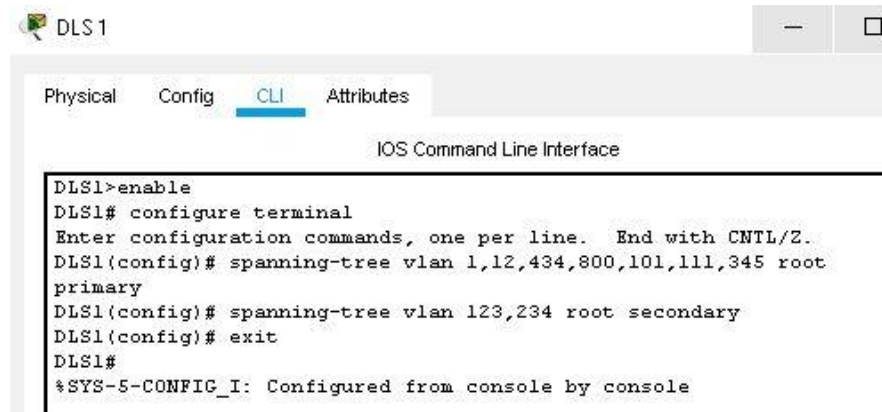


```
DLS2
Physical Config CLI Attributes
IOS Command Line Interface
DLS2(config-vlan)# state suspend
^
% Invalid input detected at '^' marker.
DLS2(config-vlan)#
DLS2(config-vlan)#
DLS2(config-vlan)#exit
DLS2(config)# interface port-channel 2
DLS2(config-if)# switchport trunk allowed vlan except 567
DLS2(config-if)# exit
DLS2(config)# interface port-channel 3
DLS2(config-if)# switchport trunk allowed vlan except 567
^
% Invalid input detected at '^' marker.
DLS2(config-if)# switchport trunk allowed vlan except 567
DLS2(config-if)# exit
DLS2(config)#
DLS2(config)# vlan 567
DLS2(config-vlan)#name CONTABILIDAD
DLS2(config-vlan)# EXIT
DLS2(config)# exit
DLS2#
```

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

```
DLS1>enable
DLS1# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)# spanning-tree vlan 1,12,434,800,101,111,345 root primary
DLS1(config)# spanning-tree vlan 123,234 root secondary
DLS1(config)# exit
DLS1#
```

Figura 39. Configurar DLS1- Spanning tree



```
DLS1
Physical Config CLI Attributes
IOS Command Line Interface
DLS1>enable
DLS1# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)# spanning-tree vlan 1,12,434,800,101,111,345 root
primary
DLS1(config)# spanning-tree vlan 123,234 root secondary
DLS1(config)# exit
DLS1#
%SYS-5-CONFIG_I: Configured from console by console
```

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

Figura 40. Configurar DLS2 - Spanning tree

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

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

```
ALS1>enable
ALS1# configure t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)# interface fastethernet0/1
ALS1(config-if)# switchport mode trunk
ALS1(config-if)# switchport trunk native vlan 800
```

```

ALS1(config-if)# switchport trunk allowed vlan 12,234,111,434,123,101,345
ALS1(config-if)#
ALS1(config-if)#exit
ALS1(config)#

```

Figura 41. Configurar Puertos Troncales

```

DLS1
Physical Config CLI Attributes
IOS Command Line Interface
DLS1(config-if-range)# switchport mode trunk
% Interface range command failed for FastEthernet0/11
% Command failed on interface FastEthernet0/11. Aborting
DLS1(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7,
changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7,
changed state to up
%LINK-3-UPDOWN: Interface Port-channel1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel1,
changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8,
changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8,
changed state to up
%LINK-3-UPDOWN: Interface Port-channel4, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel4,
changed state to down

```

Figura 42. Puertos Troncales DLS2

```

DLS2
Physical Config CLI Attributes
IOS Command Line Interface
DLS2>enable
DLS2#configure t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)# interface range f0/7-8
DLS2(config-if-range)#switchport mode trunk
DLS2(config-if-range)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7,
changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7,
changed state to up
%LINK-3-UPDOWN: Interface Port-channel2, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel2,
changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8,
changed state to down

```

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

Tabla 2. Interfaces VLAN

Interfaz	DLS1	DLS2	ALS1	ALS2
Interfaz Fa0/6	3456	12 , 1010	123, 1010	234
Interfaz Fa0/15	1111	1111	1111	1111
Interfaces F0 /16-18	567			

```
DLS1>
DLS1> enable
DLS1# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)# interface Fast0/6
DLS1(config-if)# switchport access vlan 3456
% Access VLAN does not exist. Creating vlan 3456
DLS1(config-if)# switchport access vlan 345
DLS1(config-if)# spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single
host. Connecting hubs, concentrators, switches, bridges, etc... to this
interface when portfast is enabled, can cause temporary bridging loops.
Use with CAUTION

%Portfast has been configured on FastEthernet0/6 but will only
have effect when the interface is in a non-trunking mode.
DLS1(config-if)#no shut
```

Figura 43. Interfaces como puertos de Acceso

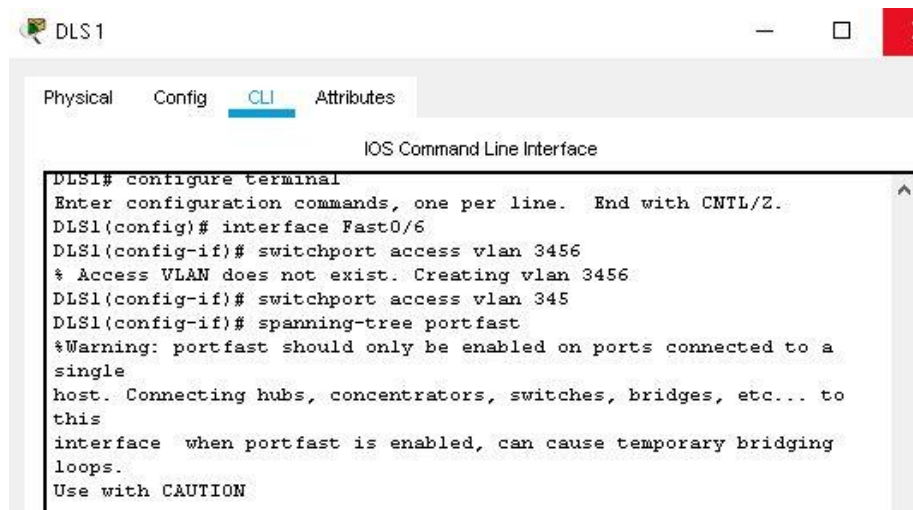
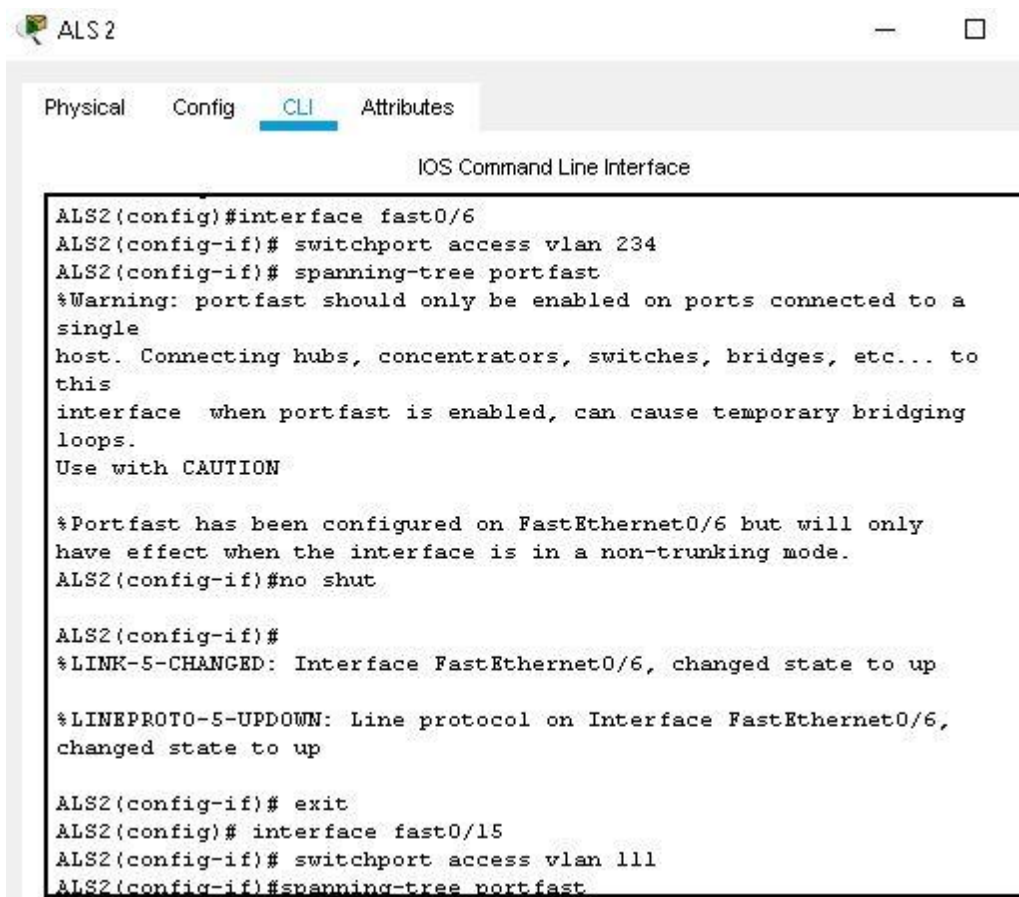


Figura 44. Interfaces Puertos de Acceso ALS1

```
ALS1>enable
ALS1#configure t
Enter configuration commands, one per line.  End with CNTL/Z.
ALS1(config)# interface fa0/6
ALS1(config-if)# switchport access vlan 123
ALS1(config-if)# swichport access vlan 101
      ^
% Invalid input detected at '^' marker.

ALS1(config-if)#switchport access vlan 101
ALS1(config-if)# exit
ALS1(config)#interface Fast0/15
ALS1(config-if)# switchport access vlan 111
ALS1(config-if)#
ALS1(config-if)#no shutdown
ALS1(config-if)#
ALS1(config-if)#
```

Figura 45. Interfaces Puertos Acceso ALS2



```
ALS2
Physical Config CLI Attributes
IOS Command Line Interface
ALS2(config)#interface fast0/6
ALS2(config-if)# switchport access vlan 234
ALS2(config-if)# spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a
single
host. Connecting hubs, concentrators, switches, bridges, etc... to
this
interface when portfast is enabled, can cause temporary bridging
loops.
Use with CAUTION

%Portfast has been configured on FastEthernet0/6 but will only
have effect when the interface is in a non-trunking mode.
ALS2(config-if)#no shut

ALS2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6,
changed state to up

ALS2(config-if)# exit
ALS2(config)# interface fast0/15
ALS2(config-if)# switchport access vlan 111
ALS2(config-if)#spanning-tree portfast
```

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

Figura 46. Verificar la Existencia - VLANs

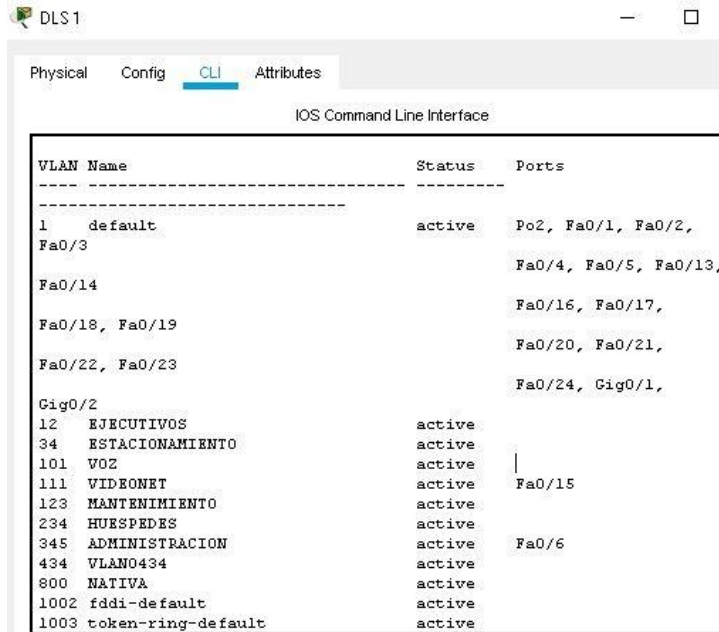


Figura 47. Verificar la Existencia - VLANs ALS1

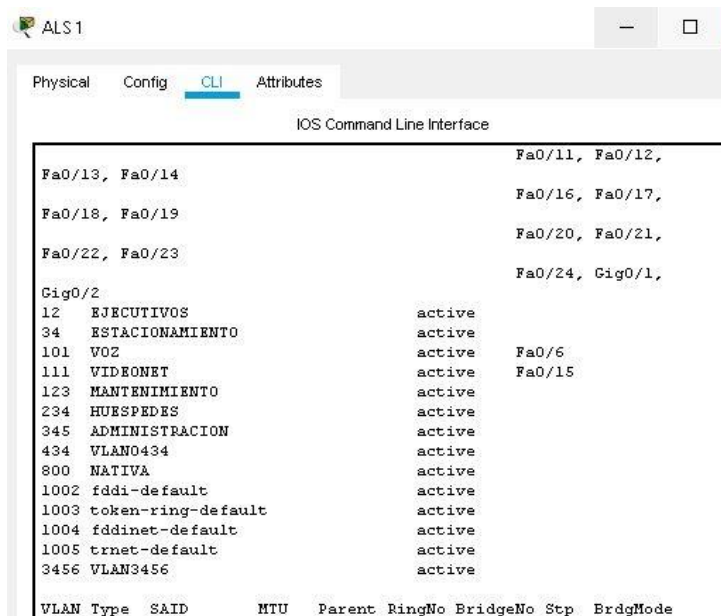


Figura 48. VLANs Correctas

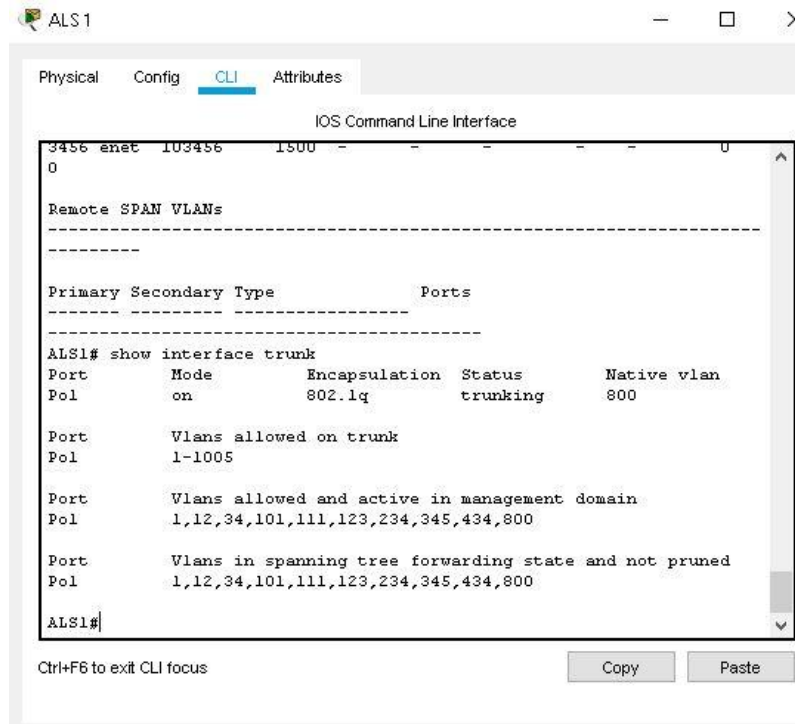


Figura 49. Verificar VLANs Correctas

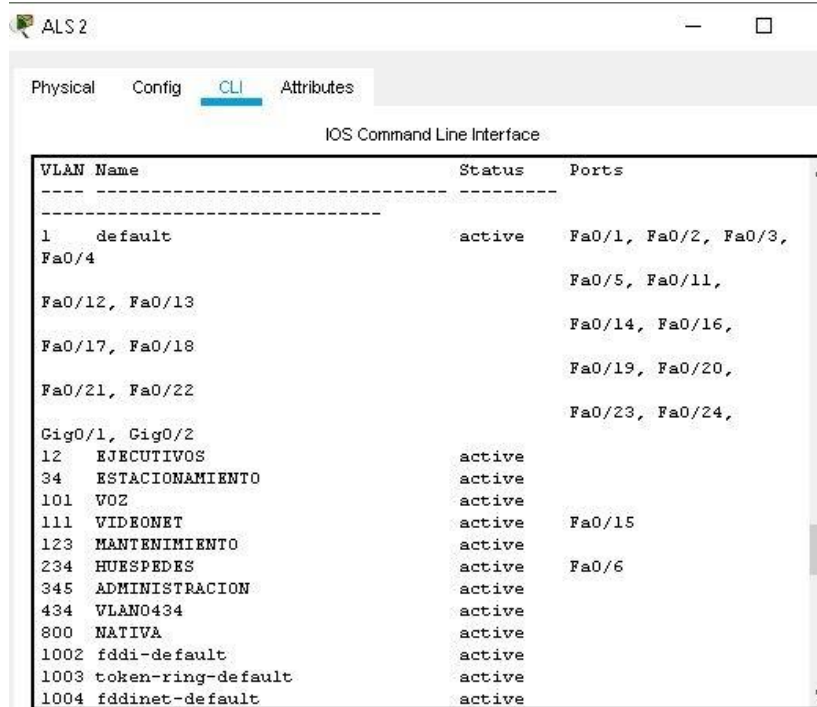
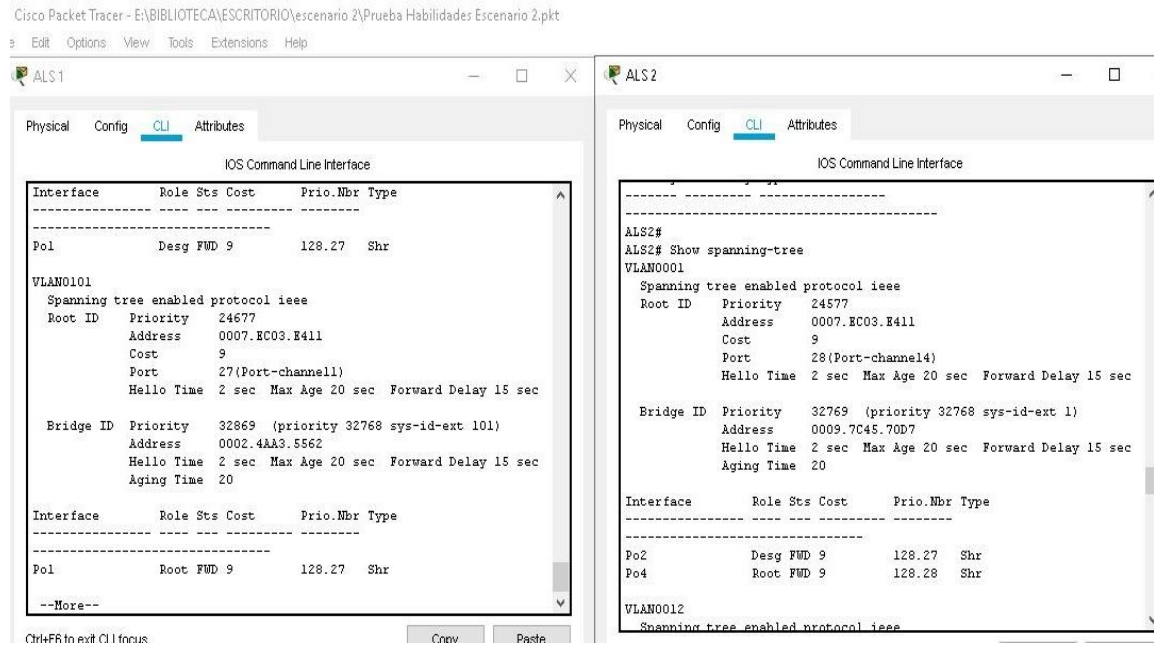
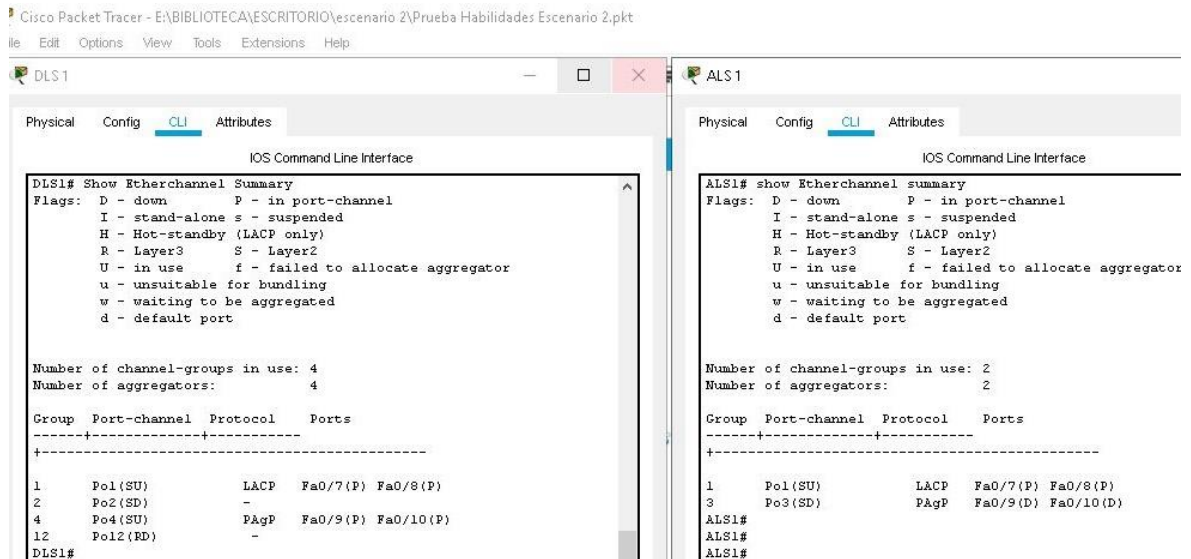


Figura 50. VLANs Correctas – Puertos Troncales - Acceso



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

Figura 51. EtherChannel DLS1 y ALS1 - Correcto



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

Figura 52. Configuración Spanning tree DLS1 y DLS2

The figure shows two screenshots of the Cisco Packet Tracer CLI interface for devices DLS1 and DLS2. Both devices have Spanning Tree Protocol (STP) enabled for VLAN0012 and VLAN0034. The configuration for DLS1 shows it as the root for both VLANs, while DLS2 is a secondary bridge.

DLS1 Configuration:

```

VLAN0012
Spanning tree enabled protocol ieee
Root ID Priority 24588
Address 0007.EC03.E411
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 24588 (priority 24576 sys-id-ext 12)
Address 0007.EC03.E411
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

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

VLAN0034
Spanning tree enabled protocol ieee
Root ID Priority 32802
Address 0002.4AA3.5562
Cost 9
Port 27 (Port-channel1)
  
```

DLS2 Configuration:

```

DLS2>enable
DLS2#show spanning-tree
VLAN0001
Spanning tree enabled protocol ieee
Root ID Priority 24577
Address 0007.EC03.E411
Cost 18
Port 27 (Port-channel2)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 28673 (priority 28672 sys-id-ext 1)
Address 000C.CF81.BCC2
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20

Interface Role Sts Cost Prio.Mbr Type
-----
Po2 Root FWD 9 128.27 Shr

VLAN0012
Spanning tree enabled protocol ieee
Root ID Priority 24588
Address 0007.EC03.E411
Cost 18
  
```

Figura 53. Verificación final

The figure shows a network topology in Cisco Packet Tracer. It features two switches, DLS1 and DLS2, connected to each other and to four hosts (PC-PT HOST A, B, C, D). The switches are also connected to two access switches, ALS1 and ALS2. The Event List window is open, showing a series of STP events occurring between the devices.

Event List:

Vis.	Time(sec)	Last Device	At Device	Type
	0.287	DLS 2	ALS 2	STP
	0.287	ALS 2	DLS 1	STP
	0.292	ALS 2	DLS 2	STP
	0.295	DLS 1	ALS 2	STP
	0.310	ALS 1	DLS 1	STP
	0.311	DLS 1	ALS 2	STP
	0.312	ALS 2	DLS 2	STP
	0.314	ALS 1	DLS 1	STP
	0.314	ALS 1	DLS 1	STP

The Event List window also includes a 'Reset Simulation' button, a 'Constant Delay' checkbox, and 'Play Controls' (play, stop, and back buttons). The 'Event List Filters' section shows 'Visible Events' and 'Edit Filters' and 'Show All/None' buttons.

CONCLUSIONES

La prueba de habilidades CCNP fue importante en el uso de comandos IOS de configuración avanzada en routers (con direccionamiento IPv4 e IPv6) para protocolos de enrutamiento como: RIPng, OSPFv3, EIGRP y BGP, en entornos de direccionamiento sin clase, con lo que se logró diseñar e implementar soluciones de red escalables, mediante el uso de los principios de enrutamiento y conmutación de paquetes en ambientes LAN y WAN.

Con la configuración adecuada de plataformas de conmutación basadas en switches, mediante el uso de protocolos como STP y la configuración de VLANs en escenarios de red corporativos, se comprende el modo de operación de las subredes y los beneficios de administrar dominios de broadcast independientes, en múltiples escenarios al interior de una red jerárquica convergente.

Con el desarrollo de los escenarios propuestos en la prueba de habilidades CCNP se logra profundizar en situaciones problemáticas asociadas con aspectos de conmutación y enrutamiento, mediante el uso eficiente de estrategias basadas en comandos IOS y estadísticas de tráfico en las interfaces, resolviendo conflictos de configuración y conectividad en contextos de redes LAN y WAN; como también se logra configurar y administrar dispositivos de Networking en diseños de redes y de conmutación, poniendo en práctica los conocimientos adquiridos durante el curso de profundización y estableciendo niveles de seguridad básicos en una red.

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[NT1InMfy2rhPZHwEoWx](https://1drv.ms/b/s!AmIJYei-NT1InMfy2rhPZHwEoWx)

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