EVALUACIÓN FINAL

PRUEBA DE HABILIDADES PRÁCTICAS CISCO CCNP

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EVALUACIÓN PRUEBA DE HABILIDADES PRACTICAS CCNP

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Diplomado de profundización cisco CCNP prueba de
Habilidades prácticas

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NOTA DE ACEPTACIÓN:

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Presidente del Jurado

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Jurado

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Jurado

Yopal, 12 de diciembre de 2019

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CONTENIDO

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GLOSARIO

CCNP: Cisco Certified Network Professional.

GNS3: Es un simulador gráfico de red, que permite diseñar topologías de red complejas, permitiendo la combinación de dispositivos tanto reales como virtuales.

NETWORKING: Implica, básicamente, aumentar tu red de contactos profesionales.

EIGRP: Protocolo de enrutamiento de puerta de enlace interior mejorado, el cual usa como parámetro la distancia y calidad del canal.

PROTOCOLO DE RED: Designa el conjunto de reglas que rigen el intercambio de información a través de una red de computadoras.

OSPF: Protocolo de enrutamiento que proporciona la ruta más corta.

VLAN: Grupos redes de computadoras que se comportan como si estuviesen conectados al mismo computador.

ETHERCHANNEL: Permite la agrupación lógica de varios enlaces físicos Ethernet, y así obtener un enlace troncal de alta velocidad.

DHCP: Protocolo de configuración de host dinámico, utilizado en redes donde asigna automáticamente una dirección IP

RESUMEN

En el siguiente informe se muestra el paso a paso de la evaluación denominada "Prueba de habilidades prácticas", con las actividades evaluativas del Diplomado de Profundización CCNP, consiste en el proceso de conceptualización de los diversos temas del área de networking y seguridad los cuales se apreciaron durante el desarrollo del diplomado, a su vez la aplicación práctica de los mismos sobre diversos esquemas topológicos de red para los módulos de CCNP ROUTE y CCNA SWITCH en ambientes de simulación lógica. El objetivo principal es el enriquecimiento del estudiante en un área de profundización del área de telecomunicaciones que permita poseer una base práctica para el mejoramiento del pensamiento crítico y la capacidad de análisis proactivo sobre plataforma de red, el análisis de situaciones conflictivas que permitan al estudiante entender el funcionamiento de corta mediana y gran envergadura.

Palabras Claves: Networking, CCNP, CCNA, Swich, Route, Redes, Enrutamiento, Seguridad, Topología.

ABSTRACT

The following report shows the step-by-step evaluation called "Practical skills test", with the evaluation activities of the CCNP Deepening Diploma, it consists of the process of conceptualization of the various topics of the area of networking and security which are they appreciated during the development of the diploma, in turn the practical application of them on various network topological schemes for CCNP ROUTE and CCNA SWITCH modules in logical simulation environments. The main objective is the enrichment of the student in an area of deepening of the telecommunications area that allows to have a practical basis for the improvement of critical thinking and the ability of proactive analysis on a network platform, the analysis of conflict situations that allow the student to understand The operation of short medium and large wingspan.

Keywords: Networking, CCNP, CCNA, Swich, Route, Networks, Routing, Security, Topology.

INTRODUCCIÓN

Durante esta actividad practica se desarrollaron dos escenarios, uno con router y el otro con switch, que permitían la configuración de diversos escenarios trabajados durante el diplomado, entre estos se encuentran las configuraciones básicas para ambos dispositivos asignación de nombres, cableado, asignación de IP tanto IPv4 como IPv6, entre otros, así como la configuración de protocolos como Ethernet, OSPF, EIGRP y VTP.

En este documento encontrará los comandos necesarios para realizar dichas configuraciones, seguidas de la imagen que implementa, está en un software de diseño GNS3.

La importancia principal de esta actividad, es relacionar los comandos de acuerdo a una solicitud y necesidad específica, que permita la configuración avanzada tanto de routers como de switchs, dando solución a un incidente que se puede presentar en nuestro ambiente laboral.

En concordancia con lo anterior a continuación, este informe contiene las evidencias de configuración de los dispositivos para los escenarios planteados.

DESARROLLO

1.   ESCENARIO 1

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

Figura 1. Topología escenario 1
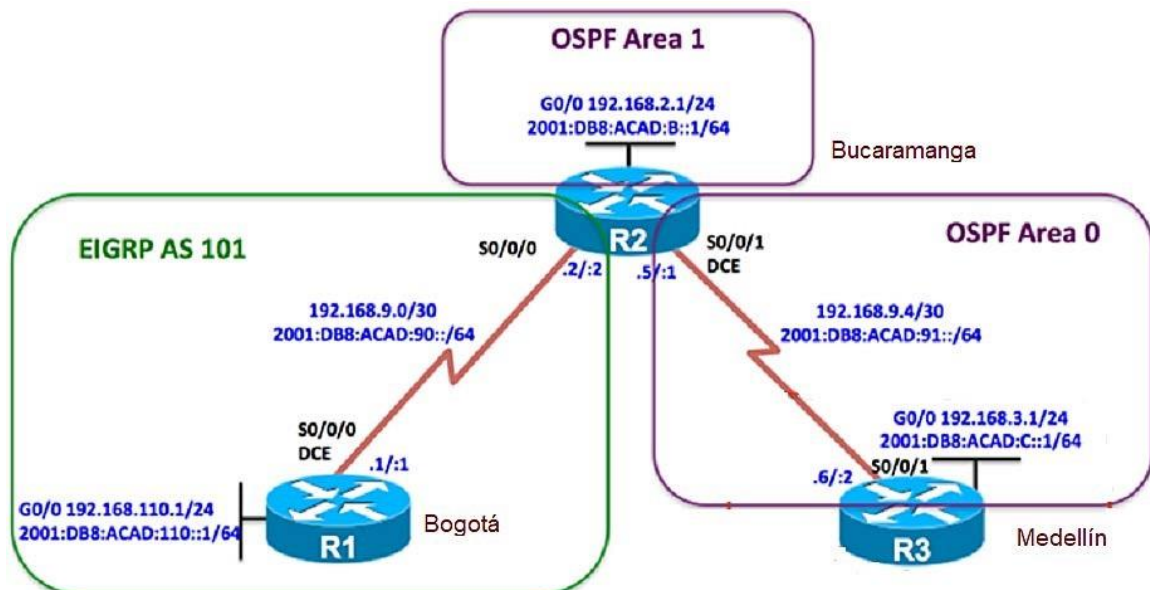
Configurar la topología de red, de acuerdo con las siguientes especificaciones.

1.1.   Parte 1: Configuración del escenario propuesto.

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

Se adjunta código y pantallazos con veracidad del código.

Figura 2. Simulación de escenario 1
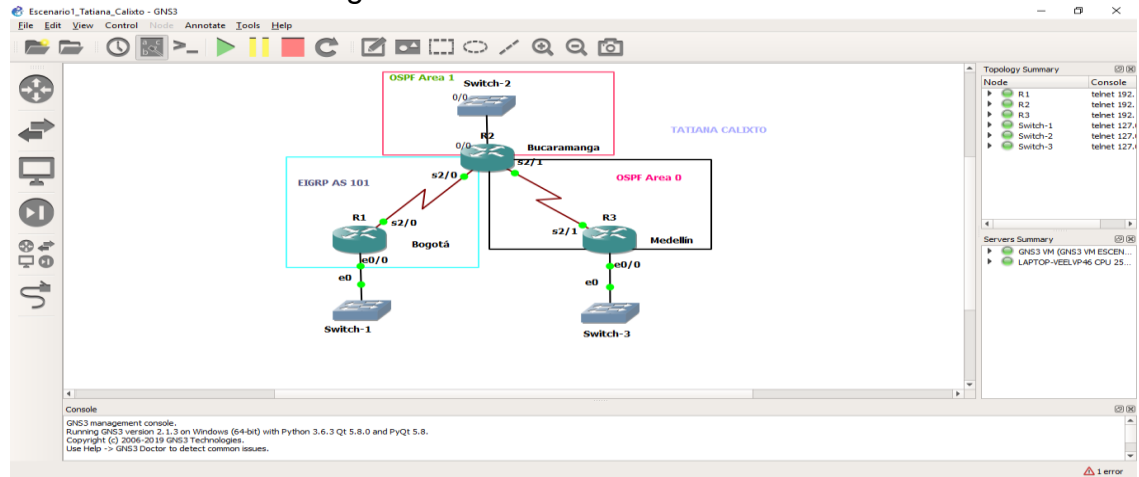
R1

R1#configure ter
R1(config)#hostname R1
R1(config)#ipv6 unicast-routing
R1(config)#interface e0/0
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)#interface s2/0
R1(config-if)#ip address 192.168.9.1 255.255.255.0
R1(config-if)#ipv6 address 2001:db8:acad:90::1/64

Figura 3. Aplicando código R1

R2

R2# conf ter
R2(config)#hostname R2
R2(config)#ipv6 unicast-routing
R2(config)#interface e0/0
R2(config-if)# ip address 192.168.2.1 255.255.255.0
R2(config-if)# ipv6 address 2001:db8:acad:b::1/64
R2(config-if)# no shutdown
R2(config-if)# interface s2/0
R2(config-if)# ip address 192.168.9.2 255.255.255.0
R2(config-if)# ipv6 address 2001:db8:acad:90::2/64
R2(config-if)# bandwidth 128
R2(config-if)# no shutdown
R2(config-if)# interface s2/1
R2(config-if)# interface s2/1
R2(config-if)# ip address 192.168.9.5 255.255.255.0
R2(config-if)# ipv6 address 2001:db8:acad:91::1/64

Figura 4. Aplicando código R2

R3

R3# conf ter
R3(config)# hostname R3
R3(config)# ipv6 unicast-routing

R3(config)# interface e0/0
R3(config-if)# ip address 192.168.3.1 255.255.255.0
R3(config-if)# ipv6 address 2001:db8:acad:c::1/64
R3(config-if)# no shutdown
R3(config-if)# interface s2/1
R3(config-if)# ip address 192.168.9.6 255.255.255.0
R3(config-if)# ipv6 address 2001:db8:acad:91::2/64

Figura 5. Aplicando código R3

```
R3# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)# hostname R3
R3(config)# ipv6 unicast-routing
R3(config)# interface FastEther0/0
                        ^
% Invalid input detected at '^' marker.

R3(config)# interface e0/0
R3(config-if)# ip address 192.168.3.1 255.255.255.0
R3(config-if)# ipv6 address 2001:db8:acad:c::1/64
R3(config-if)#no shutdown
R3(config-if)#
*Dec  7 19:59:34.439: %LINK-3-UPDOWN: Interface Ethernet0/0, changed state to up
*Dec  7 19:59:35.447: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0,
R3(config-if)# interface s2/1
R3(config-if)# ip address 192.168.9.6 255.255.255.0
R3(config-if)# ipv6 address 2001:db8:acad:91::2/64
R3(config-if)#
```

1.3.   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.

R1

R1(config)# int s2/0
R1(config-if)# bandwidth 128
R1(config-if)# clock rate 128000
R1(config-if)# exit

Figura 6. Ajustar ancho de banda en R1

```
R1(config)#int s2/0
R1(config-if)#bandwidth 128
R1(config-if)# clock rate 128000
                              ^
% Invalid input detected at '^' marker.

R1(config-if)# exit
R1(config)#
```

R2

R2(config-if)#bandwidth 128
R2(config-if)#clock rate 128000
R2(config-if)#exit

Figura 7. Ajustar ancho de banda en R2

R3

R3(configb if)# bandwidth 128
R3(config-if)#exit

Figura 8. Ajustar ancho de banda en R3

1.4.　En R2 y R3 configurar las familias de direcciones OSPF para IPv4. Utilice el identificador de enrutamiento 2.2.2.2 en R2 y 3.3.3.3 en R3 para ambas familias de direcciones.

R2

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

Figura 9. Configuración OSPFV3 en R2

```
R2# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)# router ospfv3 1
R2(config-router)# address-family ipv4 unicast
R2(config-router-af)# router-id 2.2.2.2
R2(config-router-af)# exit-address-family
R2(config-router)# address-family ipv6 unicast
R2(config-router-af)# router-id 2.2.2.2
R2(config-router-af)# exit-address-family
R2(config-router)#
```

R3

R3# conf ter
R3(config-if)# router ospfv3 1
R3(config-router)# address-family ipv4 unicast
R3(config-router-af)# router-id 3.3.3.3
R3(config-router-af)# passive-interface e0/0
R3(config-router-af)# exit-address-family
R3(config-router)# address-family ipv6 unicast
R3(config-router-af)# router-id 3.3.3.3
R3(config-router-af)# passive-interface e0/0
R3(config-router-af)# exit-address-family

Figura 10. Configuración OSPFV3 en R3

```
R3# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)# router ospfv3 1
R3(config-router)# address-family ipv4 unicast
R3(config-router-af)# router-id 3.3.3.3
R3(config-router-af)# passive-interface e0/0
R3(config-router-af)# exit-address-family
R3(config-router)# address-family ipv6 unicas
R3(config-router-af)# router-id 3.3.3.3
R3(config-router-af)# passive-interface e0/0
R3(config-router-af)# exit-address-family
R3(config-router)#
```

1.5. En R2, configurar la interfaz G0/0 en el área 1 de OSPF y la conexión serial entre R2 y R3 en OSPF área 0.

R2

R2(config)# inter e0/0
R2(config-if)# ospfv3 1 ipv4 area 1
R2(config-if)#ospfv3 1 ipv6 area 1
R2(config-if)#interface s2/1
R2(config-if)#ospfv3 1 ipv4 area 0
R2(config-if)#ospfv3 1 ipv6 area 0

Figura 11. Configuración interfaz en el área 1 OSPFV3 en R2

1.6.   En R3, configurar la interfaz G0/0 y la conexión serial entre R2 y R3 en OSPF área 0.

R3

R3(config)#inter e0/0
R3(config-if)#ospfv3 1 ipv4 area 0
R3(config-if)#ospfv3 1 ipv6 area 0
R3(config-if)#interface s2/1
R3(config-if)#ospfv3 1 ipv4 area 0
R3(config-if)#ospfv3 1 ipv6 area 0

Figura 12. Configuración interfaz en el área 0 OSPFV3 en R3

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

R2

R2(config)# router ospfv3 1
R2(config-router)# address-family ipv4 unicast
R2(config-router-af)# area 1 stub no-summary
R2(config-router-af)# exit-address-family
R2(config-router)# address-family ipv6 unicast
R2(config-router-af)# area 1 stub no-summary
R2(config-router-af)# exit-address-family
R2(config-router)# exit

Figura 13. Configuración área totalmente Stubby en R2

1.8.   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

R3# conf ter
R3(config)# router ospfv3 1
R3(config-router)# address-family ipv4 unicast
R3(config-router-af) #default-information originate always
R3(config-router-af)# exit-address-family
R3(config-router)# address-family ipv6 unicast
R3(config-router-af)# default-information originate always
R3(config-router-af)# exit-address-family

Figura 14. Propagación rutas por defecto en R3

```
R3(config)# router ospfv3 1
R3(config-router)# address-family ipv4 unicast
R3(config-router-af)# default-information originate always
R3(config-router-af)# exit-address-family
R3(config-router)# address-family ipv6 unicast
R3(config-router-af)# default-information originate always
R3(config-router-af)# exit-address-family
R3(config-router)# exit
R3(config)#
```

1.9. 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.

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

R1

R1# conf ter
R1(config)# router eigrp DUAL-STACK
R1(config-router)# address-family ipv4 unicast autonomous-system 4
R1(config-router-af)# af-interface e0/0
R1(config-router-af-interface)#passive-interface
R1(config-router-af-interface)# exit-af-interface
R1(config-router-af)# topology base
R1(config-router-af-topology)# exit-af-topology
R1(config-router-af)# network 192.168.9.0 0.0.0.3
R1(config-router-af)# network 192.168.110.0 0.0.0.3
R1(config-router-af)# eigrp router-id 1.1.1.1
R1(config-router-af)# exit-address-family
R1(config-router)# address-family ipv6 unicast autonomous-system 6
R1(config-router-af)# af-interface e0/0
R1(config-router-af-interface)# passive-interface
R1(config-router-af-interface)# exit-af-interface
R1(config-router-af)# topology base
R1(config-router-af-topology)# exit-af-topology
R1(config-router-af)# eigrp router-id 1.1.1.1
R1(config-router-af)# exit-address-family

Figura 15. Configuración EIGRP en R1

```
R1# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)# router eigrp DUAL-STACK
R1(config-router)# address-family ipv4 unicast autonomous-system 4
R1(config-router-af)# af-interface e0/0
R1(config-router-af-interface)# passive-interface
R1(config-router-af-interface)# exit-af-interface
R1(config-router-af)# topology base
R1(config-router-af-topology)# exit-af-topology
R1(config-router-af)# network 192.168.9.0 0.0.0.3
R1(config-router-af)# network 192.168.110.0 0.0.0.3
R1(config-router-af)# eigrp router-id 1.1.1.1
R1(config-router-af)# exit-address-family
R1(config-router)# address-family ipv6 unicast autonomous-system 6
R1(config-router-af)# af-interface e0/0
R1(config-router-af-interface)# passive-interface
R1(config-router-af-interface)# exit-af-interface
R1(config-router-af)# topology base
R1(config-router-af-topology)# exit-af-topology
R1(config-router-af)# eigrp router-id 1.1.1.1
R1(config-router-af)# exit-address-family
R1(config-router)# exit
R1(config)#
```

R2

```
R2(config)# router eigrp DUAL-STACK
R2(config-router)# address-family ipv4 unicast autonomous-system 4
R2(config-router-af)#network 192.168.9.0 0.0.0.3
R2(config-router-af)#eigrp router-id 2.2.2.2
R2(config-router-af)#exit-address-family
R2(config-router-af)#exit-address-family
R2(config-router)#address-family ipv6 unicast autonomous-system 6
R2(config-router-af)# af-interface e0/0
R2(config-router-af-interface)#shutdown
R2(config-router-af-interface)#exit-af-interface
R2(config-router-af)#af-interface s2/1
R2(config-router-af-interface)#shutdown
R2(config-router-af-interface)#exit-af-interface
R2(config-router-af-interface)#exit-af-interface
R2(config-router-af)#eigrp router-id 2.2.2.2
R2(config-router-af)#exit-address-family
```

Figura 16. Configuración EIGRP en R2

```
R2# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)# router ospfv3 1
R2(config-router)# address-family ipv4 unicast
R2(config-router-af)# area 1 stub no-summary
R2(config-router-af)# exit-address-family
R2(config-router)# address-family ipv6 unicast
R2(config-router-af)# area 1 stub no-summary
R2(config-router-af)# exit-address-family
R2(config-router)#exit
R2(config)# router eigrp DUAL-STACK
R2(config-router)# address-family ipv4 unicast autonomous-system 4
R2(config-router-af)#network 192.168.9.0 0.0.0.3
R2(config-router-af)# eigrp router-id 2.2.2.2
R2(config-router-af)# exit-address-family
R2(config-router)# address-family ipv6 unicast autonomous-system 6
R2(config-router-af)# af-interface e0/0
R2(config-router-af-interface)# shutdown
R2(config-router-af-interface)# exit-af-interface
R2(config-router-af)# af-interface s2/1
R2(config-router-af-interface)# shutdown
R2(config-router-af-interface)# exit-af-interface
R2(config-router-af)# eigrp router-id 2.2.2.2
R2(config-router-af)#exit-address-family
R2(config-router)#exit
R2(config)#
```

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

R2

R2(config)# router eigrp DUAL-STACK
R2(config-router)#address-family ipv4 unicast autonomous-system 4
R2(config-router-af)#topology base
R2(config)#distribute-list R3-to-R1 out
R2(config-router-af-topology)#redistribute ospfv3 1 metric 10000 100 255 1 1500
R2(config-router-af-topology)#exit-af-topology
R2(config-router)#address-family ipv6 unicast autonomous-system 6
R2(config-router-af)#topology base
R2(config-router-af-topology)#redistribute ospf 1 metric 10000 100 255 1 1500
R2(config-router-af-topology)#exit-af-topology

Figura 17. Redistribución mutua entre OSPF y EIGRP para IPv4 e IPv6 en R2

```
R2(config)# router eigrp DUAL-STACK
R2(config-router)# address-family ipv4 unicast autonomous-system 4
R2(config-router-af)# topology base
R2(config-router-af-topology)#  distribute-list R3-to-R1 out
R2(config-router-af-topology)#$te ospfv3 1 metric 10000 100 255 1 1500
R2(config-router-af-topology)#
R2(config-router-af-topology)# exit-af-topology
R2(config-router-af)# address-family ipv6 unicast autonomous-system 6
R2(config-router-af)# topology base
R2(config-router-af-topology)#$te ospf 1 metric 10000 100 255 1 1500
R2(config-router-af-topology)# exit-af-topology
R2(config-router-af)#
```

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

R2

R2(config-router)# ip access-list standard R3-to-R1
R2(config-std-nacl)# remark ACL to filter 192.168.3.0/24
R2(config-std-nacl)# deny 192.168.3.0 0.0.0.255
R2(config-std-nacl)# permit any
R2(config)# router ospfv3 1
R2(config-router)# address-family ipv4 unicast
R2(config-router-af)# redistribute eigrp 4
R2(config-router-af)# address-family ipv6 unicast
R2(config-router-af)# redistribute eigrp 6
R2(config-router-af)# exit-address-family

Figura 18. Una lista de distribución y ACL en R2

```
R2(config-router)# ip access-list standard R3-to-R1
R2(config-std-nacl)# remark ACL to filter 192.168.3.0/24
R2(config-std-nacl)# deny 192.168.3.0 0.0.0.255
R2(config-std-nacl)# permit any
R2(config-std-nacl)#
```

```
R2(config)# router ospfv3 1
R2(config-router)# address-family ipv4 unicast
R2(config-router-af)# redistribute eigrp 4
R2(config-router-af)# address-family ipv6 unicast
R2(config-router-af)# redistribute eigrp 6
R2(config-router-af)# exit-address-family
R2(config-router)# exit
R2(config)#
```

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

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

R1# show ip route

Figura 19. Comando show ip route en R1

```
R1# show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       a - application route
       + - replicated route, % - next hop override

Gateway of last resort is not set

      192.168.110.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.110.0/24 is directly connected, Ethernet0/0
L        192.168.110.1/32 is directly connected, Ethernet0/0
R1#
```

R1# show ipv6 route

Figura 20. Comando show ipV6 route en R1

```
R1# show ipv6 route
IPv6 Routing Table - default - 3 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, HA - Home Agent, MR - Mobile Router, R - RIP
       H - NHRP, I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea
       IS - ISIS summary, D - EIGRP, EX - EIGRP external, NM - NEMO
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, la - LISP alt
       lr - LISP site-registrations, ld - LISP dyn-eid, a - Application
C   2001:DB8:ACAD:110::/64 [0/0]
     via Ethernet0/0, directly connected
L   2001:DB8:ACAD:110::1/128 [0/0]
     via Ethernet0/0, receive
L   FF00::/8 [0/0]
     via Null0, receive
R1#
```

R2# show ip route

Figura 21. Comando show ip route en R2

```
R2#
*Dec  7 22:11:36.643: %SYS-5-CONFIG_I: Configured from console by console
R2# show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       a - application route
       + - replicated route, % - next hop override

Gateway of last resort is not set

      192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C         192.168.2.0/24 is directly connected, Ethernet0/0
L         192.168.2.1/32 is directly connected, Ethernet0/0
R2#
```

R2# show ipv6 route

Figura 22. Comando show ipv6 route en R2

```
R2# show ipv6 route
IPv6 Routing Table - default - 3 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, HA - Home Agent, MR - Mobile Router, R - RIP
       H - NHRP, I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea
       IS - ISIS summary, D - EIGRP, EX - EIGRP external, NM - NEMO
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, la - LISP alt
       lr - LISP site-registrations, ld - LISP dyn-eid, a - Application
C   2001:DB8:ACAD:B::/64 [0/0]
     via Ethernet0/0, directly connected
L   2001:DB8:ACAD:B::1/128 [0/0]
     via Ethernet0/0, receive
L   FF00::/8 [0/0]
     via Null0, receive
```

R2# show ipv6 ospf

Figura 23. Comando show ipv6 ospf en R2


```
R2
Retransmission pacing timer 66 msecs
Retransmission limit dc 24 non-dc 24
Number of external LSA 0. Checksum Sum 0x000000
Number of areas in this router is 2. 1 normal 1 stub 0 nssa
Graceful restart helper support enabled
Reference bandwidth unit is 100 mbps
RFC1583 compatibility enabled
    Area BACKBONE(0) (Inactive)
        Number of interfaces in this area is 1
        SPF algorithm executed 3 times
        Number of LSA 1. Checksum Sum 0x00B252
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
        Flood list length 0
    Area 1
        Number of interfaces in this area is 1
        It is a stub area
        SPF algorithm executed 3 times
        Number of LSA 3. Checksum Sum 0x00F433
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
        Flood list length 0
```

R3# show ip route

Figura 24. Comando show ip route en R3


```
R3#
*Dec  7 22:14:12.628: %SYS-5-CONFIG_I: Configured from console by console
R3# show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       a - application route
       + - replicated route, % - next hop override

Gateway of last resort is not set

      192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.3.0/24 is directly connected, Ethernet0/0
L        192.168.3.1/32 is directly connected, Ethernet0/0
R3#
```

27

R3# show ipv6 route

Figura 25. Comando show ipv6 route en R3

```
R3# show ipv6 route
IPv6 Routing Table - default - 3 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, HA - Home Agent, MR - Mobile Router, R - RIP
       H - NHRP, I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea
       IS - ISIS summary, D - EIGRP, EX - EIGRP external, NM - NEMO
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, la - LISP alt
       lr - LISP site-registrations, ld - LISP dyn-eid, a - Application
C   2001:DB8:ACAD:C::/64 [0/0]
     via Ethernet0/0, directly connected
L   2001:DB8:ACAD:C::1/128 [0/0]
     via Ethernet0/0, receive
L   FF00::/8 [0/0]
     via Null0, receive
```

R3# show ipv6 ospf

Figura 26. Comando show ipv6 ospf en R3

```
R3# show ipv6 ospf
 Routing Process "ospfv3 1" with ID 3.3.3.3
 Supports NSSA (compatible with RFC 3101)
 Supports Database Exchange Summary List Optimization (RFC 5243)
 Event-log enabled, Maximum number of events: 1000, Mode: cyclic
 It is an autonomous system boundary router
 Originate Default Route with always
 Router is not originating router-LSAs with maximum metric
 Initial SPF schedule delay 5000 msecs
 Minimum hold time between two consecutive SPFs 10000 msecs
 Maximum wait time between two consecutive SPFs 10000 msecs
 Minimum LSA interval 5 secs
 Minimum LSA arrival 1000 msecs
 LSA group pacing timer 240 secs
 Interface flood pacing timer 33 msecs
 Retransmission pacing timer 66 msecs
 Retransmission limit dc 24 non-dc 24
 Number of external LSA 1. Checksum Sum 0x00788C
 Number of areas in this router is 1. 1 normal 0 stub 0 nssa
 Graceful restart helper support enabled
 Reference bandwidth unit is 100 mbps
 RFC1583 compatibility enabled
```

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

R1# Ping 192.168.110.1

Figura 27. Ping 192.168.110.1 en R1

```
R1# Ping 192.168.110.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.110.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 5/5/6 ms
```

R2# Ping 192.168.2.1

Figura 28. Ping 192.168.2.1 en R2

```
R2# ping 192.168.2.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.2.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 5/5/5 ms
R2#
```

R3# Ping 192.168.3.1

Figura 29. Ping 192.168.3.1 en R3

```
R3# ping 192.168.3.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.3.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 5/5/5 ms
R3#
```

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

Nota: Puede ser que Una o más direcciones no serán accesibles desde todos los routers después de la configuración final debido a la utilización de listas de distribución para filtrar rutas y el uso de IPv4 e IPv6 en la misma red.

R1# show run

Figura 30. Verificar las rutas filtradas no presentes en R1

R2# show run

Figura 31. Verificar las rutas filtradas no presentes en R2

R3# show run

Figura 32. Verificar las rutas filtradas no presentes en R3

```
R3                                          R3
interface Ethernet0/0                       !
 ip address 192.168.3.1 255.255.255.0       interface Serial3/0
 ipv6 address 2001:DB8:ACAD:C::1/64          no ip address
 ospfv3 1 ipv6 area 0                        shutdown
 ospfv3 1 ipv4 area 0                        serial restart-delay 0
!                                           !
interface Ethernet0/1                       interface Serial3/1
 no ip address                               no ip address
 shutdown                                    shutdown
!                                            serial restart-delay 0
interface Ethernet0/2                       !
 no ip address                              interface Serial3/2
 shutdown                                    no ip address
!                                            shutdown
interface Ethernet0/3                        serial restart-delay 0
 no ip address                              !
 shutdown                                   interface Serial3/3
!                                            no ip address
interface Ethernet1/0                        shutdown
 no ip address                               serial restart-delay 0
 shutdown                                   !
!                                           router ospfv3 1
interface Ethernet1/1                        !
 no ip address                               address-family ipv4 unicast
 shutdown                                     passive-interface Ethernet0/0
!                                             default-information originate always
interface Ethernet1/2                         router-id 3.3.3.3
 no ip address                              exit-address-family
 shutdown                                    !
!                                            address-family ipv6 unicast
interface Ethernet1/3                         passive-interface Ethernet0/0
 no ip address                               default-information originate always
 shutdown                                     router-id 3.3.3.3
!                                            exit-address-family
interface Serial2/0                          !
 no ip address                              ip forward-protocol nd
 shutdown                                    !
 serial restart-delay 0                     !
!                                           no ip http server
interface Serial2/1                         no ip http secure-server
 bandwidth 128                              !
 ip address 192.168.9.6 255.255.255.0       !
 ipv6 address 2001:DB8:ACAD:91::2/64
 ospfv3 1 ipv6 area 0
```

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 33. Topología escenario 2
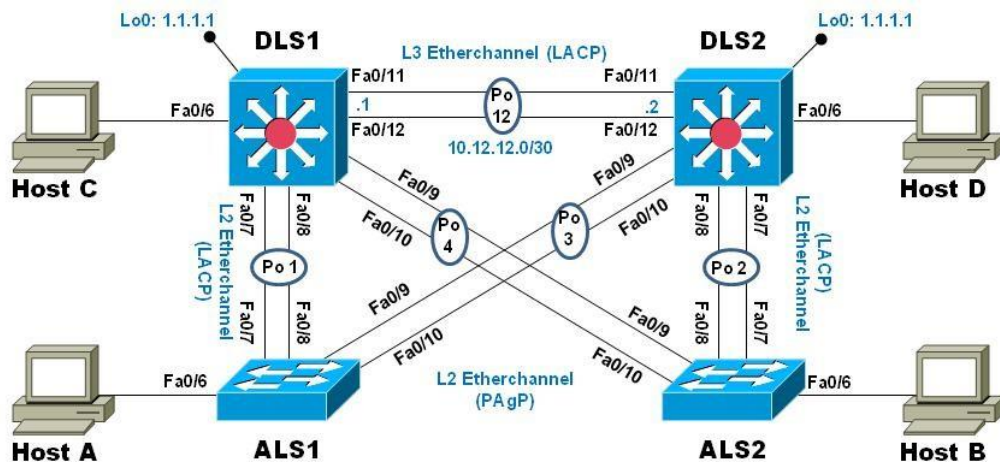
2.1. Parte 1: Configurar la red de acuerdo con las especificaciones.

Figura 34. Simulación de escenario 2
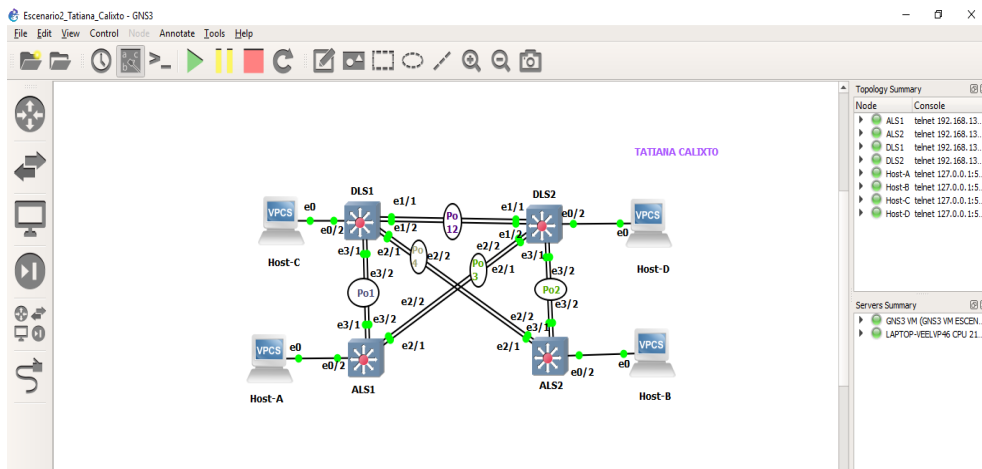
2.2. Apagar todas las interfaces en cada switch

DLS1

DLS1# conf ter
DLS1(config)# interface range e0/1-2
DLS1(config-if-range)# shutdown

Figura 35. Apagar interfaces DLS1


```
DLS1# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
DLS1(config)# interface range e0-3/1-2
                              ^
% Invalid input detected at '^' marker.

DLS1(config)# interface range e0/1-2
DLS1(config-if-range)# shutdown
DLS1(config-if-range)#
*Dec  6 20:25:44.865: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to adm
*Dec  6 20:25:44.875: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to adm
*Dec  6 20:25:45.870: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1,
DLS1(config-if-range)#
*Dec  6 20:25:45.877: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2,
DLS1(config-if-range)#
```

DLS2

DLS2# conf ter
DLS2(config)# interface range e0/1-2
DLS2(config-if-range)# shutdown

Figura 36. Apagar interfaces DLS2


```
DLS2# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
DLS2(config)# interface range e0/1-2
DLS2(config-if-range)# shutdown
DLS2(config-if-range)#
*Dec  6 20:25:25.426: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively down
*Dec  6 20:25:25.437: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to administratively down
*Dec  6 20:25:26.433: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*Dec  6 20:25:26.443: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
DLS2(config-if-range)#
```

ALS1

ALS1# conf ter
ALS1(config)# interface range e0/1-2
ALS1(config-if-range)# shutdown

Figura 37. Apagar interfaces ALS1

```
ALS1# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
ALS1(config)# interface range e0/1-2
ALS1(config-if-range)# shutdown
ALS1(config-if-range)#
*Dec  6 20:23:55.486: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively down
*Dec  6 20:23:55.496: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to administratively down
*Dec  6 20:23:56.491: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*Dec  6 20:23:56.502: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
ALS1(config-if-range)#
```

ALS2

ALS2# conf ter
ALS2(config)# interface range e0/1-2
ALS2(config-if-range)# shutdown

Figura 38. Apagar interfaces ALS2

```
ALS2# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
ALS2(config)# interface range e0/1-2
ALS2(config-if-range)# shutdown
ALS2(config-if-range)#
*Dec  6 21:19:07.535: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively down
*Dec  6 21:19:07.535: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to administratively down
*Dec  6 21:19:08.544: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to dow
*Dec  6 21:19:08.544: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to dow
ALS2(config-if-range)#
```

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

Switch# conf ter
Switch(config)# hostname DLS1, DLS2, ALS1, ALS2

Figura 39. Asignación nombres dispositivos

```
DLS1(config)# hostname DLS1
```
```
DLS2(config-if-range)# exit
DLS2(config)# hostname DLS2
```
```
ALS1(config)# hostname ALS1
```
```
ALS2(config-if-range)# exit
ALS2(config)# hostname ALS2
```

2.4. Configurar los puertos troncales y Port-channels tal como se muestra en el diagrama.

2.4.1. 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

DLS1# conf ter
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 e1/1-2
DLS1(config-if-range)# no switchport
DLS1(config-if-range)# channel-group 12 mode active
DLS1(config-if-range)# exit
DLS1(config)# exit

DLS2

DLS2# conf ter
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 e1/1-2
DLS2(config-if-range)#no switchport
DLS2(config-if-range)#channel-group 12 mode active
DLS2(config-if-range)#exit

Figura 40. Conexión entre DLS1 y DLS2 será un EtherChannel capa-3 utilizando LACP

```
DLS1(config)# interface port-channel 12
DLS1(config-if)# no switchport
DLS1(config-if)#
*Dec  6 21:23:20.230: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-cha
DLS1(config-if)# ip address 10.12.12.1 255.255.255.252
DLS1(config-if)# exit
DLS1(config)# interface range fa0/11-12
                            ^
% Invalid input detected at '^' marker.

DLS1(config)# interface range e1/1-2
DLS1(config-if-range)# no switchport
DLS1(config-if-range)#
*Dec  6 21:26:12.123: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to
*Dec  6 21:26:12.138: %LINK-3-UPDOWN: Interface Ethernet1/2, changed state to
*Dec  6 21:26:13.126: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet
DLS1(config-if-range)#
*Dec  6 21:26:13.146: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet
DLS1(config-if-range)# channel-group 12 mode active
DLS1(config-if-range)#exit
DLS2(config)# interface port-channel 12
DLS2(config-if)# no switchport
DLS2(config-if)#
*Dec  6 21:27:05.686: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel
DLS2(config-if)# ip address 10.12.12.2 255.255.255.252
DLS2(config-if)# exit
DLS2(config)# interface range e1/1-2
DLS2(config-if-range)# no switchport
DLS2(config-if-range)#
*Dec  6 21:27:52.287: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
*Dec  6 21:27:52.297: %LINK-3-UPDOWN: Interface Ethernet1/2, changed state to up
*Dec  6 21:27:53.290: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1,
*Dec  6 21:27:53.305: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2,
DLS2(config-if-range)# channel-group 12 mode active
DLS2(config-if-range)# exit
DLS2(config)#
```

Validando el estado del Etherchannel usamos el comando: show etherchannel Summary en cada uno de los swich.

DLS1# show etherchannel Summary

Figura 41. Comando show etherchannel summary en DLS1 y DLS2

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

DLS1

DLS1#conf ter
DLS1(config)#int ran e3/1-2
DLS1(config-if-range)#switchport trunk encapsulation dot1q
DLS1(config-if-range)#switchport mode trunk
DLS1(config-if-range)#channel-group 1 mode active
DLS1(config-if-range)#no shutdow

Figura 42. Port channel 1 DSL1

ALS1

ALS1(config)# int ran e3/1-2
ALS1(config-if-range)#switchport trunk encapsulation dot1q
ALS1(config-if-range)#switchport mode trunk
ALS1(config-if-range)#channel-group 1 mode active
ALS1(config-if-range)#no shutdown

Figura 43. Port channel 1 ALS1

DLS2

DLS2(config)#int ran e3/1-2
DLS2(config-if-range)#switchport trunk encapsulation dot1q
DLS2(config-if-range)#switchport mode trunk
DLS2(config-if-range)#channel-group 2 mode active
DLS2(config-if-range)#no shutdown

Figura 44. Port channel 2 DSL2

ALS2

ALS2(config)#int ran e3/1-2
ALS2(config-if-range)#switchport trunk encapsulation dot1q
ALS2(config-if-range)#switchport mode trunk
ALS2(config-if-range)#channel-group 2 mode active
ALS2(config-if-range)#no shutdown

Figura 45. Portchannel 2 ALS2

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

DLS1

DLS1(config)#int ran e2/1-2
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)#no shutdown

Figura 46. Port channel 4 DSL1

```
DLS1# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
DLS1(config)# int ran e2/1-2
DLS1(config-if-range)# switchport trunk encapsulation dotlq
DLS1(config-if-range)# switchport mode trunk
DLS1(config-if-range)# channel-group 4 mode desirable
Creating a port-channel interface Port-channel 4

DLS1(config-if-range)#
*Dec  6 21:52:26.851: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ether
DLS1(config-if-range)#
*Dec  6 21:52:32.787: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ether
DLS1(config-if-range)# no shutdown
DLS1(config-if-range)#
*Dec  6 21:54:54.614: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-
DLS1(config-if-range)# exit



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

Group  Port-channel  Protocol    Ports
------+------------+-----------+-----------------------------
1      Po1(SU)         LACP       Et3/1(P)    Et3/2(P)
4      Po4(SU)         PAgP       Et2/1(P)    Et2/2(P)
12     Po12(RU)        LACP       Et1/1(P)    Et1/2(P)

DLS1#
```

ALS2

ALS2(config)#int ran e2/1-2
ALS2(config-if-range)# switchport trunk encapsulation dot1q
ALS2(config-if-range)# switchport mode trunk
ALS2(config-if-range)#channel-group 4 mode desirable
ALS2(config-if-range)#no shutdown

Figura 47. Port channel 4 ALS2

```
ALS2# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
ALS2(config)# int ran e2/1-2
ALS2(config-if-range)# switchport trunk encapsulation dotlq
ALS2(config-if-range)#switchport mode trunk
ALS2(config-if-range)# channel-group 4 mode desirable
ALS2(config-if-range)# no shutdown
ALS2(config-if-range)# exit
ALS2(config)#exit
Number of channel-groups in use: 2
Number of aggregators:            2

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------
2       Po2(SU)        LACP        Et3/1(P)      Et3/2(P)
4       Po4(SU)        PAgP        Et2/1(P)      Et2/2(P)

ALS2#
```

DLS1

DLS1(config)#int ran e2/1-2
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)#no shutdown

Figura 48 Port channel 4 DSL1

```
DLS1# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
DLS1(config)# int ran e2/1-2
DLS1(config-if-range)# switchport trunk encapsulation dotlq
DLS1(config-if-range)# switchport mode trunk
DLS1(config-if-range)# channel-group 4 mode desirable
Creating a port-channel interface Port-channel 4

DLS1(config-if-range)#
*Dec  6 21:52:26.851: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2
DLS1(config-if-range)#
*Dec  6 21:52:32.787: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2

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

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------
1       Po1(SU)        LACP        Et3/1(P)      Et3/2(P)
4       Po4(SU)        PAgP        Et2/1(P)      Et2/2(P)
12      Po12(RU)       LACP        Et1/1(P)      Et1/2(P)

DLS1#
```

ALS2

ALS2(config)#int ran e2/1-2
ALS2(config-if-range)# switchport trunk encapsulation dot1q
ALS2(config-if-range)# switchport mode trunk
ALS2(config-if-range)#channel-group 4 mode desirable
ALS2(config-if-range)#no shutdown

Figura 49. Port channel 4 ALS2

DLS2

DLS2(config)#int ran e2/1-2
DLS2(config-if-range)# switchport trunk encapsulation dot1q
DLS2(config-if-range)# switchport mode trunk
DLS2(config-if-range)#channel-group 3 mode desirable
DLS2(config-if-range)#no shutdown

Figura 50. Port channel 3 DSL2

```
DLS2# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
DLS2(config)# int ran e2/1-2
DLS2(config-if-range)# switchport trunk encapsulation dotlq
DLS2(config-if-range)#switchport mode trunk
DLS2(config-if-range)# channel-group 3 mode desirable
Creating a port-channel interface Port-channel 3

DLS2(config-if-range)#
*Dec  6 22:13:41.195: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1,
DLS2(config-if-range)#
*Dec  6 22:13:42.504: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1,
DLS2(config-if-range)# no shutdown

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

Group  Port-channel  Protocol    Ports
------+-------------+----------+-------------------------------
2       Po2(SU)       LACP       Et3/1(P)     Et3/2(P)
3       Po3(SU)       PAgP       Et2/1(P)     Et2/2(P)
12      Po12(RU)      LACP       Et1/1(P)     Et1/2(P)

DLS2#
```

ALS1

ALS1(config)#int ran e2/1-2
ALS1(config-if-range)# switchport trunk encapsulation dot1q
ALS1(config-if-range)# switchport mode trunk
ALS1(config-if-range)#channel-group 3 mode desirable
ALS1(config-if-range)#no shutdown

Figura 51. Portchannel 3 ALS1

```
ALS1# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
ALS1(config)# int ran e2/1-2
ALS1(config-if-range)# switchport trunk encapsulation dotlq
ALS1(config-if-range)# switchport mode trunk
ALS1(config-if-range)# channel-group 3 mode desirable
Creating a port-channel interface Port-channel 3

ALS1(config-if-range)#

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

Group  Port-channel  Protocol    Ports
------+-------------+----------+-------------------------------
1       Po1(SU)       LACP       Et3/1(P)     Et3/2(P)
3       Po3(SU)       PAgP       Et2/1(P)     Et2/2(P)

ALS1#
```

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

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

DLS1#show interfaces trunk

Figura 52 Verificación puertos Trunk DLS1


```
DLS1#} show interfaces trunk
*Dec  6 22:28:22.368: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet3/1 (800), wi
ALS1 Ethernet3/1 (1).
DLS1# show interfaces trunk

Port        Mode            Encapsulation  Status        Native vlan
Po1         on              802.1q         trunking      800
Po4         on              802.1q         trunking      1

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

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

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

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

DLS1

DLS1#conf ter
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

Figura 53. Configuración vlan 800 como vlan nativa DLS1

```
DLS1# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
DLS1(config)#
*Dec  6 22:31:46.940: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch
ALS1 Ethernet3/1 (1).
DLS1(config)# interface Po1
DLS1(config-if)# switchport trunk native vlan 800
VLAN id 800 not found in current VLAN configuration
DLS1(config-if)# exit
DLS1(config)# interface Po4
DLS1(config-if)#
*Dec  6 22:32:32.333: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch
ALS1 Ethernet3/2 (1).
DLS1(config-if)#
*Dec  6 22:32:38.137: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch
ALS1 Ethernet3/1 (1).
DLS1(config-if)# switchport trunk native vlan 800
VLAN id 800 not found in current VLAN configuration
VLAN id 800 not found in current VLAN database
DLS1(config-if)# exit
DLS1# show interface trunk

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

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

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

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

DLS2

DLS2(config)#interface Po2
DLS2(config-if)#switchport trunk native vlan 800
DLS2(config-if)#exit
DLS2(config-if)#interface Po3
DLS2(config-if)#switchport trunk native vlan 800
DLS2(config-if)#exit

Figura 54. Configuración vlan 800 como vlan nativa DLS2

```
DLS2# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
DLS2(config)# interface Po2
DLS2(config-if)# switchport trunk native vlan 800
VLAN id 800 not found in current VLAN configuration
VLAN id 800 not found in current VLAN database
DLS2(config-if)#
*Dec  6 22:39:37.432: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch di
ALS2 Ethernet3/1 (1).
DLS2(config-if)# exit
DLS2(config)# interface Po3
DLS2(config-if)# switchport trunk native vlan 800
VLAN id 800 not found in current VLAN configuration
VLAN id 800 not found in current VLAN database
DLS2(config-if)# exit
DLS2(config)# exit
DLS2#
DLS2# show interface trunk

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

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

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

Port        Vlans in spanning tree forwarding state and not pruned
Po2         none
Po3         1
DLS2#
*Dec  6 22:41:11 811: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered
```

ALS1

ALS1(config-if)#interface Po1
ALS1(config-if)#switchport trunk native vlan 800
ALS1(config-if)#exit
ALS1(config)#interface Po3
ALS1(config-if)#switchport trunk native vlan 800

Figura 55. Configuración vlan 800 como vlan nativa ALS1

```
ALS1(config)# interface Po1
ALS1(config-if)#
*Dec  6 22:43:43.644: %CDP-4-NATIVE_VLAN_MISMATCH: Native VI
S1 Ethernet3/1 (800).
ALS1(config-if)#switchport trunk native vlan 800
VLAN id 800 not found in current VLAN configuration
VLAN id 800 not found in current VLAN database
ALS1(config-if)# exit
ALS1(config)# interface Po3
ALS1(config-if)#
*Dec  6 22:44:19.152: %CDP-4-NATIVE_VLAN_MISMATCH: Native VI
S2 Ethernet2/1 (800).
ALS1(config-if)#
*Dec  6 22:44:26.126: %CDP-4-NATIVE_VLAN_MISMATCH: Native VI
S2 Ethernet2/2 (800).
ALS1(config-if)# switchport trunk native vlan 800
VLAN id 800 not found in current VLAN configuration
VLAN id 800 not found in current VLAN database
ALS1(config-if)#exit
ALS1(config)#
```

```
ALS1# show interface trunk

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

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

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

Port        Vlans in spanning tree forwarding state and not pruned
Po1         1
Po3         1
ALS1#
```

ALS2

ALS2(config)#interface Po2
ALS2(config-if)#switchport trunk native vlan 800
ALS2(config-if)#interface Po4
ALS2 (config-if)#switchport trunk native vlan 800

Figura 56. Configuración vlan 800 como vlan nativa ALS2

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

2.5.1. Utilizar el nombre de dominio UNAD con la contraseña cisco123

DLS1

DLS1(config)#vtp domain UNAD
DLS1(config)#vtp pass cisco123
DLS1(config)#vtp version 2
DLS1# exit

Figura 57. Configuración DLS1 para utilizar VTP versión 2

ALS1

ALS1# conf ter
ALS1(config)# vtp domain UNAD
ALS1(config)# vtp pass cisco123
ALS1(config)# vtp version 2
ALS1# exit

Figura 58. Configuración ALS1 para utilizar VTP versión 2

ALS2

ALS2(config)#vtp domain UNAD
ALS2(config)#vtp pass cisco123
ALS2(config)#vtp version 2

Figura 59. Configuración ALS2 para utilizar VTP versión 2

2.5.2. Configurar DLS1 como servidor principal para las VLAN.

DLS1

DLS1# conf ter
DLS1(config)# vtp mode server

Figura 60. Configurar DLS1 como servidor

```
DLS1# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
DLS1(config)# vtp mode server
Device mode already VTP Server for VLANS.
DLS1# show vtp status
VTP Version capable             : 1 to 3
VTP version running             : 2
VTP Domain Name                 : UNAD
VTP Pruning Mode                : Disabled
VTP Traps Generation            : Disabled
Device ID                       : aabb.cc80.0100
Configuration last modified by 10.12.12.1 at 12-6-19 22:52:32
Local updater ID is 10.12.12.1 on interface Po12 (first layer3 interface found

Feature VLAN:
--------------
VTP Operating Mode              : Server
Maximum VLANs supported locally : 1005
Number of existing VLANs        : 5
Configuration Revision          : 1
MD5 digest                      : 0x74 0x38 0x1B 0x2E 0x93 0x1B 0x0C 0x1F
                                  0xF5 0x0C 0xB7 0x2B 0xB8 0x02 0x2F 0xD1
*** MD5 digest checksum mismatch on trunk: Po1 ***
*** MD5 digest checksum mismatch on trunk: Po4 ***
```

2.5.3. Configurar ALS1 y ALS2 como clientes VTP

ALS1

ALS1# conf ter
ALS1(config)# vtp mode client
ALS1(config)# exit

Figura 61. Configurar ALS1 como cliente

```
ALS1# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
ALS1(config)# vtp mode client
Setting device to VTP Client mode for VLANS.
ALS1(config)# exit
ALS1#
*Dec  6 23:04:18.579: %SYS-5-CONFIG_I: Configured from console by console
ALS1# show vtp status
VTP Version capable             : 1 to 3
VTP version running             : 2
VTP Domain Name                 : UNAD
VTP Pruning Mode                : Disabled
VTP Traps Generation            : Disabled
Device ID                       : aabb.cc80.0300
Configuration last modified by 0.0.0.0 at 12-6-19 22:54:44

Feature VLAN:
--------------
VTP Operating Mode              : Client
Maximum VLANs supported locally : 1005
Number of existing VLANs        : 5
Configuration Revision          : 1
MD5 digest                      : 0x4D 0xA1 0x6D 0x0F 0x56 0x8B 0xC0 0xF1
                                  0xBE 0x43 0x9F 0x1A 0x8D 0xCC 0xDA 0x2A
*** MD5 digest checksum mismatch on trunk: Po1 ***
ALS1#
```

ALS2

ALS2# conf ter
ALS2(config)# vtp mode client
ALS2(config)# exit

Figura 62. Configurar ALS2 como cliente

```
ALS2# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
ALS2(config)#
ALS2(config)#vtp mode client
Setting device to VTP Client mode for VLANS.
ALS2(config)# exit
ALS2#
*Dec  6 23:07:46.518: %SYS-5-CONFIG_I: Configured from console by console
ALS2# show vtp status
VTP Version capable             : 1 to 3
VTP version running             : 2
VTP Domain Name                 : UNAD
VTP Pruning Mode                : Disabled
VTP Traps Generation            : Disabled
Device ID                       : aabb.cc80.0400
Configuration last modified by 0.0.0.0 at 12-6-19 22:56:49

Feature VLAN:
--------------
VTP Operating Mode              : Client
Maximum VLANs supported locally : 1005
Number of existing VLANs        : 5
Configuration Revision          : 1
MD5 digest                      : 0x4D 0xA1 0x6D 0x0F 0x56 0x8B 0xC0 0xF1
                                  0xBE 0x43 0x9F 0x1A 0x8D 0xCC 0xDA 0x2A
*** MD5 digest checksum mismatch on trunk: Po4 ***
```

2.6. Configurar en el servidor principal las siguientes VLAN:

Tabla 1. Configurar las vlan en DLS1

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#conf ter
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
DLS1(config-vlan)# name VIDEONET
DLS1(config-vlan)# vlan 434
DLS1(config-vlan)# name ESTACIONAMIENTO
DLS1(config-vlan)# vlan 123
DLS1(config-vlan)# name MANTENIMIENTO
DLS1(config-vlan)# vlan 1010
DLS1(config-vlan)# name VOZ
DLS1(config-vlan)# vlan 3456
DLS1(config-vlan)# name ADMINISTRACION
DLS1(config-vlan)# exit
```

Figura 63. Configuración Vlan en DLS1

2.7.   En DLS1, suspender la VLAN 434.

DLS1

DLS1# conf ter
DLS1(config)# vlan 434
DLS1(config-vlan)# state suspend
DLS1(config-vlan)# exit

Figura 64. Evidencia comando state suspend

```
DLS1# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
DLS1(config)# vlan 434
DLS1(config-vlan)# state suspend
DLS1(config-vlan)# exit
DLS1(config)# exit
DLS1#sho
*Dec  6 23:29:48.528: %SYS-5-CONFIG_I: Configured from console by console
DLS1#show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Et0/0, Et0/1, Et0/2, Et0/3
                                                Et1/0, Et1/3, Et2/0, Et2/3
                                                Et3/0, Et3/3
12   EJECUTIVOS                       active
123  MANTENIMIENTO                    active
234  HUESPEDES                        active
434  ESTACIONAMIENTO                  suspended
800  NATIVA                           active
1002 fddi-default                     act/unsup
1003 trcrf-default                    act/unsup
1004 fddinet-default                  act/unsup
1005 trbrf-default                    act/unsup
1010 VOZ                              active
1111 VIDEONET                         active
3456 ADMINISTRACION                   active
```

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

DLS2

DLS2#conf ter
DLS2(config)# vtp mode transparent
DLS2(config) vtp version 2
DLS2(config)# vlan 800
DLS2(config-vlan)# name NATIVA
DLS2(config-vlan)# vlan 12
DLS2(config-vlan)# name EJECUTIVOS
DLS2(config-vlan)# vlan 234
DLS2(config-vlan)# name HUESPEDES
DLS2(config-vlan)# vlan 1111
DLS(config-vlan)# name VIDEONET
DLS2(config-vlan)# vlan 434
DLS2(config-vlan)# name ESTACIONAMIENTO
DLS2(config-vlan)# vlan 123

DLS2(config-vlan)# name MANTENIMIENTO
DLS2(config-vlan)# vlan 1010
DLS2(config-vlan)# name VOZ
DLS2(config-vlan)# vlan 3456
DLS2(config-vlan)# name ADMINISTRACION
DLS2(config-vlan)# exit

Figura 65. Configuración mode transparent para Vlan en DLS2

```
DLS2# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
DLS2(config)# vtp mode transparent
Setting device to VTP Transparent mode for VLANS.
DLS2(config)# vtp version 2
DLS2(config)# vlan 800
DLS2(config-vlan)# name NATIVA
DLS2(config-vlan)# vlan 12
DLS2(config-vlan)# name EJECUTIVOS
DLS2(config-vlan)# vlan 234
DLS2(config-vlan)# name HUESPEDES
DLS2(config-vlan)# vlan 1111
DLS2(config-vlan)# name VIDEONET
DLS2(config-vlan)# vlan 434
DLS2(config-vlan)# name ESTACIONAMIENTO
DLS2(config-vlan)# vlan 123
DLS2(config-vlan)# name MANTENIMIENTO
DLS2(config-vlan)# vlan 1010
DLS2(config-vlan)# name VOZ
DLS2(config-vlan)# vlan 3456
DLS2(config-vlan)# name ADMINISTRACION
DLS2(config-vlan)# exit
DLS2(config)# exit
DLS2# show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Et0/0, Et0/1, Et0/2, Et0/3
                                                 Et1/0, Et1/3, Et2/0, Et2/3
                                                 Et3/0, Et3/3
12   EJECUTIVOS                       active
123  MANTENIMIENTO                    active
234  HUESPEDES                        active
434  ESTACIONAMIENTO                  active
800  NATIVA                           active
1002 fddi-default                     act/unsup
1003 trcrf-default                    act/unsup
1004 fddinet-default                  act/unsup
1005 trbrf-default                    act/unsup
1010 VOZ                              active
1111 VIDEONET                         active
3456 ADMINISTRACION                   active

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

2.9.   Suspender VLAN 434 en DLS2.

DLS2

DLS2# conf ter
DLS2(config)# vlan 434
DLS2(config-vlan)# state suspend
DLS2(config-vlan)# exit

Figura 66. Evidencia comando state suspend

2.10. 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

DLS2#conf ter
DLS2(config)# vlan 567
DLS2(config-vlan)# name CONTABILIDAD
DLS2(config-vlan)# exit
DLS2(config)# interface port-channel 2
DLS2(config-if)#switchport trunk allowed vlan except 567
DLS2(config-if)#interface port-channel 3
DLS2(config-if)#switchport trunk allowed vlan except 567
DLS2(config-if)# exit

Figura 67. Configuración vlan 567 en DLS2

2.11. 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

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

Figura 68. Configuración spanning-tree en DLS1

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

2.12. 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.

DLS2

DLS2(config)# spanning-tree vlan 123,234 root primary
DLS2(config)# spanning-tree vlan 1,12,434,800,1010,1111,3456 root secondary
DLS1(config)# exit

Figura 69. Configuración spanning-tree en DLS2

```
DLS2# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
DLS2(config)# spanning-tree vlan 123,234 root primary
DLS2(config)# spanning-tree vlan 1,12,434,800,1010,1111,3456 root secondary
DLS2(config)#exit
```

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

DLS1

DLS1# conf ter
DLS1(config)# interface range e0/1-2
DLS1(config-if-range)# switchport trunk native vlan 800
DLS1(config-if-range)# switchport trunk encap dot1q
DLS1(config-if-range)# switchport mode trunk
DLS1(config-if-range)#exit

Figura 70. Configuración puertos troncales en DLS1

```
DLS1# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
DLS1(config)# interface range e0/1-2
DLS1(config-if-range)# switchport trunk native vlan 800
DLS1(config-if-range)# switchport trunk encap dot1q
DLS1(config-if-range)# switchport mode trunk DLS1
                                                  ^
% Invalid input detected at '^' marker.

DLS1(config-if-range)# switchport mode trunk
DLS1(config-if-range)#
*Dec  7 01:25:42.723: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*Dec  7 01:25:42.724: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
DLS1(config-if-range)#
```

DLS2

DLS2# conf ter
DLS2(config)# interface range e0/1-2
DLS1(config-if-range)# switchport trunk native vlan 800
DLS1(config-if-range)# switchport trunk encap dot1q
DLS1(config-if-range)# switchport mode trunk
DLS1(config-if-range)#exit

Figura 71. Configuración puertos troncales en DLS2

```
DLS2# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
DLS2(config)# interface range e0/1-2
DLS2(config-if-range)# switchport trunk native vlan 800
DLS2(config-if-range)# switchport trunk encap dot1q
DLS2(config-if-range)# switchport mode trunk
DLS2(config-if-range)# exi
*Dec  7 01:35:11.548: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*Dec  7 01:35:11.557: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
DLS2(config-if-range)# exit
DLS2(config)#
*Dec  7 01:35:14.566: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to up
*Dec  7 01:35:14.567: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to up
```

ALS1

ALS1# conf ter
ALS1(config)# int ran e0/1-2
ALS1(config-if-range)# switchport trunk native vlan 800
ALS1(config-if-range)# switchport trunk encap dot1q
ALS1(config-if-range)# switchport mode trunk
ALS1(config-if-range)# exit

Figura 72. Configuración puertos troncales en ALS1

```
ALS1# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
ALS1(config)# int ran e0/1-2
ALS1(config-if-range)# switchport trunk native vlan 800
ALS1(config-if-range)# switchport trunk encap dotlq
                                                ^
% Invalid input detected at '^' marker.

ALS1(config-if-range)# switchport trunk encap dotlq
                                                ^
% Invalid input detected at '^' marker.

ALS1(config-if-range)#
ALS1(config-if-range)#
ALS1(config-if-range)# switchport trunk encap dotlq
ALS1(config-if-range)# switchport mode trunk
ALS1(config-if-range)# exit
ALS1(config)#
*Dec  7 01:41:39.832: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to
*Dec  7 01:41:39.833: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to
ALS1(config)#
*Dec  7 01:41:42.835: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to
*Dec  7 01:41:42.840: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to
ALS1(config)#
```

ALS2

ALS2# conf ter
ALS2(config)# interface range e0/1-2
ALS2(config-if-range)# switchport trunk native vlan 800
ALS2(config-if-range)# switchport trunk encap dot1q
ALS2(config-if-range)# switchport mode trunk
ALS2(config-if-range)#exit

Figura 73. Configuración puertos troncales en ALS2

```
ALS2# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
ALS2(config)# interf range e0/1-2
ALS2(config-if-range)# switchport trunk native vlan 800
ALS2(config-if-range)# switchport trunk encap dotlq
ALS2(config-if-range)# switchport mode trunk
ALS2(config-if-range)#
*Dec  7 01:43:01.736: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*Dec  7 01:43:01.739: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
ALS2(config-if-range)#
*Dec  7 01:43:04.748: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to up
*Dec  7 01:43:04.751: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to up
ALS2(config-if-range)#  exit
ALS2(config)#
```

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

Tabla 2. Interfaces como puertos de acceso, asignados a las VLAN

Interfaz	DLS 1	DLS2	ALS1	ALS2
Interfaz Fa0/6	345 6	12 , 1010	123, 1010	234
Interfaz Fa0/15	111 1	1111	1111	1111
Interfaces F0 /16-18		567		

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

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

DLS1

DLS1# conf ter
DLS1(config)# interface e0/2
DLS1(config-if)# switchport access vlan 3456
DLS1(config-if)# switchport mode acces
DLS1(config-if)# switchport nonegotiate
DLS1(config-if)# spanning-tree portfast
DLS1(config-if)#no shutdown

Figura 74. Asignación de interface como puertos de acceso

DLS2

DLS2# conf ter
DLS2(config)# interface e0/2
DLS2(config-if)# switchport mode acces
DLS2(config-if)# switchport access vlan 12
DLS2(config-if)# switchport nonegotiate
DLS2(config-if)# spanning-tree portfast
DLS2(config-if)# no shutdown
DLS2(config)# interface e0/2
DLS2(config-if)# switchport access vlan 1010
DLS2(config-if)# switchport nonegotiate
DLS2(config-if)# spanning-tree portfast
DLS2(config-if)# no shutdown

Figura 75. Asignación de interface como puertos de acceso

ALS1

ALS1# conf ter
ALS1(config)# interface e0/2
ALS1(config-if)# switchport access vlan 123
ALS1(config-if)# switchport mode acces
ALS1(config-if)# switchport nonegotiate
ALS1(config-if)# spanning-tree portfast
ALS1(config-if)# no shutdown
ALS1(config)# interface e0/2

ALS1(config-if)# switchport mode acces
ALS1(config-if)# switchport access vlan 1010
ALS1(config-if)# switchport nonegotiate
ALS1(config-if)# spanning-tree portfast
ALS1(config-if)# no shutdown

Figura 76. Asignación de interface como puertos de acceso


```
ALS1(config)# interface e0/2
ALS1(config-if)# e acces
                      ^
% Invalid input detected at '^' marker.

ALS1(config-if)# switchport access vlan 123
ALS1(config-if)# switchport mode acces
ALS1(config-if)# switchport nonegotiate
ALS1(config-if)# spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single
 host. Connecting hubs, concentrators, switches, bridges, etc... to this
 interface  when portfast is enabled, can cause temporary bridging loops.
 Use with CAUTION

%Portfast has been configured on Ethernet0/2 but will only
 have effect when the interface is in a non-trunking mode.
ALS1(config-if)# no shutdown
```

```
ALS1# conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
ALS1(config)# interface e0/2
ALS1(config-if)# switchport mode access
ALS1(config-if)# switchport access vlan 1010
ALS1(config-if)# switchport nonegotiate
ALS1(config-if)# spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single
 host. Connecting hubs, concentrators, switches, bridges, etc... to this
 interface  when portfast is enabled, can cause temporary bridging loops.
 Use with CAUTION

%Portfast has been configured on Ethernet0/2 but will only
 have effect when the interface is in a non-trunking mode.
ALS1(config-if)# no shutdown
```

ALS2

ALS2# conf ter
ALS2(config)# interface e0/2
ALS2(config-if)# switchport access vlan 234
ALS2(config-if)# switchport mode acces
ALS2(config-if)# switchport nonegotiate
ALS2(config-if)# spanning-tree portfast
ALS2(config-if)# no shutdown

Figura 77. Asignación de interface como puertos de acceso


```
ALS2(config)# interface e0/2
ALS2(config-if)# switchport access vlan 234
ALS2(config-if)# switchport mode acces
ALS2(config-if)# switchport nonegotiate
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 Ethernet0/2 but will only
 have effect when the interface is in a non-trunking mode.
ALS2(config-if)# no shutdown
ALS2(config-if)#
```

2.15. Part 2: conectividad de red de prueba y las opciones configuradas.

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

DLS1# show vlan

Figura 78. Verificación Vlan en DLS1


```
DLS1# show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Et0/0, Et0/1, Et0/2, Et0/3
                                                Et1/0, Et1/1, Et1/2, Et1/3
                                                Et2/0, Et2/1, Et2/2, Et2/3
                                                Et3/0, Et3/1, Et3/2, Et3/3
12   EJECUTIVOS                       active
123  MANTENIMIENTO                    active
234  HUESPEDES                        active
345  VLAN0345                         active
434  ESTACIONAMIENTO                  suspended
800  NATIVA                           active
1002 fddi-default                     act/unsup
1003 trcrf-default                    act/unsup
1004 fddinet-default                  act/unsup
1005 trbrf-default                    act/unsup

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001     1500  -      -      -        -    -        0      0
12   enet  100012     1500  -      -      -        -    -        0      0
123  enet  100123     1500  -      -      -        -    -        0      0

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
234  enet  100234     1500  -      -      -        -    -        0      0
345  enet  100345     1500  -      -      -        -    -        0      0
434  enet  100434     1500  -      -      -        -    -        0      0
800  enet  100800     1500  -      -      -        -    -        0      0
1002 fddi  101002     1500  -      -      -        -    -        0      0
1003 trcrf 101003     4472  1005   3276   -        -    srb      0      0
1004 fdnet 101004     1500  -      -      -        ieee -        0      0
1005 trbrf 101005     4472  -      -      15       ibm  -        0      0

VLAN AREHops STEHops Backup CRF
---- ------- ------- ----------
1003 7       7       off
```

DLS1# show ip interface brief

Figura 79. Verificacion interface brief en DLS1

```
DLS1# show ip interface brief
Interface          IP-Address     OK? Method Status                Protocol
Ethernet0/0        unassigned     YES unset  up                    up
Ethernet0/1        unassigned     YES unset  up                    up
Ethernet0/2        unassigned     YES unset  up                    up
Ethernet0/3        unassigned     YES unset  up                    up
Ethernet1/0        unassigned     YES unset  up                    up
Ethernet1/1        unassigned     YES unset  up                    up
Ethernet1/2        unassigned     YES unset  up                    up
Ethernet1/3        unassigned     YES unset  up                    up
Ethernet2/0        unassigned     YES unset  up                    up
Ethernet2/1        unassigned     YES unset  up                    up
Ethernet2/2        unassigned     YES unset  up                    up
Ethernet2/3        unassigned     YES unset  up                    up
Ethernet3/0        unassigned     YES unset  up                    up
Ethernet3/1        unassigned     YES unset  up                    up
Ethernet3/2        unassigned     YES unset  up                    up
Ethernet3/3        unassigned     YES unset  up                    up
Vlan1              unassigned     YES unset  administratively down down
DLS1#
```

DLS1# show vtp status

Figura 80. Verificación vtp status en DLS1

```
DLS1# show vtp status
VTP Version capable              : 1 to 3
VTP version running              : 2
VTP Domain Name                  : UNAD
VTP Pruning Mode                 : Disabled
VTP Traps Generation             : Disabled
Device ID                        : aabb.cc80.0100
Configuration last modified by 0.0.0.0 at 12-7-19 02:15:02
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         : 11
Configuration Revision           : 8
MD5 digest                       : 0x59 0x23 0x09 0x3B 0xC8 0xEF 0xC0 0x99
                                   0x8D 0x76 0xA8 0x0A 0xEC 0x2C 0x15 0xF2

DLS1#
```

DLS2# show vlan

Figura 81. Verificación Vlan en DLS2

```
DLS2# show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Et0/0, Et0/1, Et0/3, Et1/0
                                                Et1/1, Et1/2, Et1/3, Et2/0
                                                Et2/1, Et2/2, Et2/3, Et3/0
                                                Et3/1, Et3/2, Et3/3
12   EJECUTIVOS                       active
123  MANTENIMIENTO                    active
234  HUESPEDES                        active
434  ESTACIONAMIENTO                  suspended
567  CONTABILIDAD                     active
800  NATIVA                           active
1002 fddi-default                     act/unsup
1003 trcrf-default                    act/unsup
1004 fddinet-default                  act/unsup
1005 trbrf-default                    act/unsup
1010 VLAN1010                         active    Et0/2

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

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Transl Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
123  enet  100123     1500  -      -      -        -    -        0      0
234  enet  100234     1500  -      -      -        -    -        0      0
434  enet  100434     1500  -      -      -        -    -        0      0
567  enet  100567     1500  -      -      -        -    -        0      0
800  enet  100800     1500  -      -      -        -    -        0      0
1002 fddi  101002     1500  -      -      -        -    -        0      0
1003 trcrf 101003     4472  1005   3276   -        -    srb      0      0
1004 fdnet 101004     1500  -      -      -        ieee -        0      0
1005 trbrf 101005     4472  -      -      15       ibm  -        0      0
1010 enet  101010     1500  -      -      -        -    -        0      0


VLAN AREHops STEHops Backup CRF
---- ------- ------- ----------
1003 7       7       off
```

DLS2# show ip interface brief

Figura 82. Verificación interface brief en DLS2

```
DLS2# show ip interface brief
Interface    IP-Address  OK? Method Status                Protocol
Ethernet0/0  unassigned  YES unset  up                    up
Ethernet0/1  unassigned  YES unset  up                    up
Ethernet0/2  unassigned  YES unset  up                    up
Ethernet0/3  unassigned  YES unset  up                    up
Ethernet1/0  unassigned  YES unset  up                    up
Ethernet1/1  unassigned  YES unset  up                    up
Ethernet1/2  unassigned  YES unset  up                    up
Ethernet1/3  unassigned  YES unset  up                    up
Ethernet2/0  unassigned  YES unset  up                    up
Ethernet2/1  unassigned  YES unset  up                    up
Ethernet2/2  unassigned  YES unset  up                    up
Ethernet2/3  unassigned  YES unset  up                    up
Ethernet3/0  unassigned  YES unset  up                    up
Ethernet3/1  unassigned  YES unset  up                    up
Ethernet3/2  unassigned  YES unset  up                    up
Ethernet3/3  unassigned  YES unset  up                    up
Vlan1        unassigned  YES unset  administratively down down
DLS2#
```

DLS2# show vtp status

Figura 83. Verificación vtp status en DLS2


```
DLS2# show vtp status
VTP Version capable              : 1 to 3
VTP version running              : 2
VTP Domain Name                  :
VTP Pruning Mode                 : Disabled
VTP Traps Generation             : Disabled
Device ID                        : aabb.cc80.0200
Configuration last modified by 0.0.0.0 at 0-0-00 00:00:00

Feature VLAN:
--------------
VTP Operating Mode               : Transparent
Maximum VLANs supported locally  : 1005
Number of existing VLANs         : 11
Configuration Revision           : 0
MD5 digest                       : 0xC8 0x02 0x9E 0xE1 0x24 0x37 0x53 0xF6
                                   0xE9 0xD5 0x65 0xBD 0x83 0xF4 0xCF 0xCC
DLS2#
```

ALS1# show vlan

Figura 84. Verificación vlan en ALS1


```
ALS1# show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Et0/0, Et0/1, Et0/3, Et1/0
                                                Et1/1, Et1/2, Et1/3, Et2/0
                                                Et2/1, Et2/2, Et2/3, Et3/0
                                                Et3/1, Et3/2, Et3/3
12   EJECUTIVOS                       active
123  MANTENIMIENTO                    active
234  HUESPEDES                        active
434  ESTACIONAMIENTO                  suspended
800  NATIVA                           active
1002 fddi-default                     act/unsup
1003 trcrf-default                    act/unsup
1004 fddinet-default                  act/unsup
1005 trbrf-default                    act/unsup

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Transl Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001     1500  -      -      -        -    -        0      0
12   enet  100012     1500  -      -      -        -    -        0      0
123  enet  100123     1500  -      -      -        -    -        0      0
234  enet  100234     1500  -      -      -        -    -        0      0

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Transl Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
434  enet  100434     1500  -      -      -        -    -        0      0
800  enet  100800     1500  -      -      -        -    -        0      0
1002 fddi  101002     1500  -      -      -        -    -        0      0
1003 trcrf 101003     4472  1005   3276   -        -    srb      0      0
1004 fdnet 101004     1500  -      -      -        ieee -        0      0
1005 trbrf 101005     4472  -      -      15       ibm  -        0      0

VLAN AREHops STEHops Backup CRF
---- ------- ------- ----------
1003 7       7       off

Remote SPAN VLANs
```

66

ALS1# show ip interface brief

Figura 85. Verificación interface brief en ALS1

```
ALS1# show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
Ethernet0/0            unassigned      YES unset  up                    up
Ethernet0/1            unassigned      YES unset  up                    up
Ethernet0/2            unassigned      YES unset  up                    up
Ethernet0/3            unassigned      YES unset  up                    up
Ethernet1/0            unassigned      YES unset  up                    up
Ethernet1/1            unassigned      YES unset  up                    up
Ethernet1/2            unassigned      YES unset  up                    up
Ethernet1/3            unassigned      YES unset  up                    up
Ethernet2/0            unassigned      YES unset  up                    up
Ethernet2/1            unassigned      YES unset  up                    up
Ethernet2/2            unassigned      YES unset  up                    up
Ethernet2/3            unassigned      YES unset  up                    up
Ethernet3/0            unassigned      YES unset  up                    up
Ethernet3/1            unassigned      YES unset  up                    up
Ethernet3/2            unassigned      YES unset  up                    up
Ethernet3/3            unassigned      YES unset  up                    up
Vlan1                  unassigned      YES unset  administratively down down
ALS1#
```

ALS1# show vtp status

Figura 86. Verificación vtp status en ALS1

```
ALS1# show vtp status
VTP Version capable             : 1 to 3
VTP version running             : 2
VTP Domain Name                 : UNAD
VTP Pruning Mode                : Disabled
VTP Traps Generation            : Disabled
Device ID                       : aabb.cc80.0300
Configuration last modified by 10.12.12.1 at 12-6-19 23:29:37

Feature VLAN:
--------------
VTP Operating Mode              : Client
Maximum VLANs supported locally : 1005
Number of existing VLANs        : 10
Configuration Revision          : 7
MD5 digest                      : 0xAF 0x12 0x3D 0x37 0xF2 0x95 0xD6 0xAB
                                  0xFC 0x72 0x0C 0x6D 0xFB 0xCD 0x1D 0xB4
ALS1#
```

ALS2# show vlan

Figura 87. Verificación vlan en ALS2

```
ALS2# show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Et0/0, Et0/1, Et0/2, Et0/3
                                                Et1/0, Et1/1, Et1/2, Et1/3
                                                Et2/0, Et2/1, Et2/2, Et2/3
                                                Et3/0, Et3/1, Et3/2, Et3/3
12   EJECUTIVOS                       active
123  MANTENIMIENTO                    active
234  HUESPEDES                        active
434  ESTACIONAMIENTO                  suspended
800  NATIVA                           active
1002 fddi-default                     act/unsup
1003 trcrf-default                    act/unsup
1004 fddinet-default                  act/unsup
1005 trbrf-default                    act/unsup

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001     1500  -      -      -        -    -        0      0
12   enet  100012     1500  -      -      -        -    -        0      0
123  enet  100123     1500  -      -      -        -    -        0      0
234  enet  100234     1500  -      -      -        -    -        0      0

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
434  enet  100434     1500  -      -      -        -    -        0      0
800  enet  100800     1500  -      -      -        -    -        0      0
1002 fddi  101002     1500  -      -      -        -    -        0      0
1003 trcrf 101003     4472  1005   3276   -        -    srb      0      0
1004 fdnet 101004     1500  -      -      -        ieee -        0      0
1005 trbrf 101005     4472  -      -      15       ibm  -        0      0


VLAN AREHops STEHops Backup CRF
---- ------- ------- ----------
1003 7       7       off
```

ALS2# show ip interface brief

Figura 88. Verificación interface brief en ALS2

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

ALS2# show vtp status

Figura 89. Verificación vtp status en ALS2

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

DLS1# show etherchannel summary

Figura 90. Verificación Etherhannel DLS1

ALS1# show etherchannel summary

Figura 91. Verificación Etherhannel ALS1

```
ALS1# show etherchannel summary
Flags:  D - down          P - bundled in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3       S - Layer2
        U - in use       N - not in use, no aggregation
        f - failed to allocate aggregator

        M - not in use, minimum links not met
        m - not in use, port not aggregated due to minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port

        A - formed by Auto LAG

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

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------
1      Po1(SU)         LACP        Et3/1(P)      Et3/2(P)
3      Po3(SU)         PAgP        Et2/1(P)      Et2/2(P)

ALS1#
```

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

DLS1# show spanning-tree

Figura 92. Verificación spanning-tree DSL1

```
DLS1# show spanning-tree

VLAN0001
  Spanning tree enabled protocol rstp
  Root ID    Priority    24577
             Address     aabb.cc00.0100
             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     aabb.cc00.0100
             Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  300 sec

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Et0/0            Desg FWD 100       128.1    Shr
Et0/1            Desg FWD 100       128.2    Shr
Et0/2            Desg FWD 100       128.3    Shr
Et0/3            Desg FWD 100       128.4    Shr
Et1/0            Desg FWD 100       128.5    Shr
Et1/1            Desg FWD 100       128.6    Shr
Et1/2            Desg FWD 100       128.7    Shr
Et1/3            Desg FWD 100       128.8    Shr

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------

Et2/0            Desg FWD 100       128.9    Shr
Et2/1            Desg FWD 100       128.10   Shr
Et2/2            Desg FWD 100       128.11   Shr
Et2/3            Desg FWD 100       128.12   Shr
Et3/0            Desg FWD 100       128.13   Shr
Et3/1            Desg FWD 100       128.14   Shr
Et3/2            Desg FWD 100       128.15   Shr
Et3/3            Desg FWD 100       128.16   Shr
```

DLS2# show spanning-tree

Figura 93. Verificación spanning-tree DSL2

```
DLS2# show spanning-tree

VLAN0001
  Spanning tree enabled protocol rstp
  Root ID     Priority    24577
              Address     aabb.cc00.0100
              Cost        100
              Port        6 (Ethernet1/1)
              Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    28673  (priority 28672 sys-id-ext 1)
              Address     aabb.cc00.0200
              Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  300 sec

Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- -----------------------
Et0/0               Desg FWD 100       128.1    Shr
Et0/1               Desg FWD 100       128.2    Shr
Et0/3               Desg FWD 100       128.4    Shr
Et1/0               Desg FWD 100       128.5    Shr
Et1/1               Root FWD 100       128.6    Shr
Et1/2               Altn BLK 100       128.7    Shr
Et1/3               Desg FWD 100       128.8    Shr
Et2/0               Desg FWD 100       128.9    Shr
Et2/1               Desg FWD 100       128.10   Shr
Et2/2               Desg FWD 100       128.11   Shr
Et2/3               Desg FWD 100       128.12   Shr
Et3/0               Desg FWD 100       128.13   Shr
Et3/1               Desg FWD 100       128.14   Shr
Et3/2               Desg FWD 100       128.15   Shr
Et3/3               Desg FWD 100       128.16   Shr

VLAN1010
  Spanning tree enabled protocol rstp
  Root ID     Priority    29682
              Address     aabb.cc00.0200
              This bridge is the root
              Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    29682  (priority 28672 sys-id-ext 1010)
              Address     aabb.cc00.0200
              Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  300 sec

Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- -----------------------
Et0/2               Desg FWD 100       128.3    Shr Edge

DLS2#
```

ALS1# show spanning-tree

Figura 94. Verificación spanning-tree ASL1

```
ALS1# show spanning-tree

VLAN0001
  Spanning tree enabled protocol rstp
  Root ID    Priority    24577
             Address     aabb.cc00.0100
             Cost        100
             Port        14 (Ethernet3/1)
             Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32769  (priority 32768 sys-id-ext 1)
             Address     aabb.cc00.0300
             Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  300 sec

Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- -----------------------
Et0/0               Desg FWD 100       128.1    Shr
Et0/1               Desg FWD 100       128.2    Shr
Et0/3               Desg FWD 100       128.4    Shr
Et1/0               Desg FWD 100       128.5    Shr
Et1/1               Desg FWD 100       128.6    Shr
Et1/2               Desg FWD 100       128.7    Shr
Et1/3               Desg FWD 100       128.8    Shr

Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- -----------------------

Et2/0               Desg FWD 100       128.9    Shr
Et2/1               Altn BLK 100       128.10   Shr
Et2/2               Altn BLK 100       128.11   Shr
Et2/3               Desg FWD 100       128.12   Shr
Et3/0               Desg FWD 100       128.13   Shr
Et3/1               Root FWD 100       128.14   Shr
Et3/2               Altn BLK 100       128.15   Shr
Et3/3               Desg FWD 100       128.16   Shr
```

ALS2# show spanning-tree

Figura 95. Verificación spanning-tree ALS2

```
ALS2# show spanning-tree

VLAN0001
  Spanning tree enabled protocol rstp
  Root ID    Priority    24577
             Address     aabb.cc00.0100
             Cost        100
             Port        10 (Ethernet2/1)
             Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32769  (priority 32768 sys-id-ext 1)
             Address     aabb.cc00.0400
             Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  300 sec

Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- --------------------
Et0/0               Desg FWD 100        128.1    Shr
Et0/1               Desg FWD 100        128.2    Shr
Et0/2               Desg FWD 100        128.3    Shr
Et0/3               Desg FWD 100        128.4    Shr
Et1/0               Desg FWD 100        128.5    Shr
Et1/1               Desg FWD 100        128.6    Shr
Et1/2               Desg FWD 100        128.7    Shr
Et1/3               Desg FWD 100        128.8    Shr
Et2/0               Desg FWD 100        128.9    Shr
Et2/1               Root FWD 100        128.10   Shr
Et2/2               Altn BLK 100        128.11   Shr
Et2/3               Desg FWD 100        128.12   Shr
Et3/0               Desg FWD 100        128.13   Shr
Et3/1               Altn BLK 100        128.14   Shr
Et3/2               Altn BLK 100        128.15   Shr
Et3/3               Desg FWD 100        128.16   Shr
```

CONCLUSIONES

Se utilizaron conocimientos de configuración de dispositivos activos router y switch tanto básicos como de mayor complejidad aprendidos durante los estudios del CCNA y CCNP de CISCO, para la solución de los problemas planteados.

Para evitar que un Router ajeno, sea introducido de manera clandestina a la red, es necesario la implementación de una autenticación de los mensajes de actualización de las rutas, para el protocolo usado en nuestros enrutadores.

Las configuraciones básicas en los dispositivos de comunicación cisco permiten al estudiante bases para la configuración de redes locales y llevarlas a topologías más grandes.

Se pudo lograr la comprobación de la conectividad de los equipos y encontrar los datos faltantes. También se logró la implementación de las claves de seguridad y la encriptación de las mismas.

Se realizó la configuración y enrutamiento de datos a través de routers, por medio de protocolos EIGRP, OSPF y áreas de forma que se segmento la red de forma exitosa

Se establecio la funcionalidad de los comandos 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.

Puse a prueba las habilidades adquiridas en networking, frente a la solución de problemas de configuración de equipo activos de red, logrando la implementación de redes sugeridas y la solución de problemas encontrados durante su desarrollo

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