

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

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA – UNAD  
ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA – ECBTI  
INGENIERÍA TELECOMUNICACIONES  
BOGOTÁ  
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Diplomado de opción de grado presentado para optar el  
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BOGOTÁ  
2020

NOTA DE ACEPTACIÓN

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Firma del presidente del Jurado

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Firma del Jurado

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Firma del Jurado

Bogotá, 20 de Noviembre de 2020

## **AGRADECIMIENTOS**

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## GLOSARIO

**SPANNING TREE PROTOCOL** Su función es la de gestionar la presencia de bucles en topologías de red debido a la existencia de enlaces redundantes

**EIGRP** es utilizado en redes TCP/IP y de Interconexión de Sistemas Abierto (OSI) como un protocolo de enrutamiento del tipo vector distancia avanzado, propiedad de Cisco, que ofrece las mejores características de los algoritmos vector distancia y de estado de enlace.

**OSPF** significa "Open Shortest Path First". Es el camino más corto que tiene el menor costo. OSPF utiliza una métrica para determinar la cantidad de sobrecarga que costaría enviar datos a través de una interfaz determinada. El algoritmo de enrutamiento utiliza esta medida para elegir el camino más eficiente entre el origen y el destino

**CONMUTACION** tienen la función de prestar servicio de conmutación para trasladar los datos de un nodo al otro hasta alcanzar el destino final. Este tipo de redes se denomina redes de comunicación conmutadas. L

**METRICA** Una métrica es un valor utilizado por los protocolos de enrutamiento para asignar costos a fin de alcanzar las redes remotas.

**ENLACES REDUNDANTES** consiste en asegurar la supervivencia de la red ante un fallo, proporcionándole rutas de datos alternativas cuando se produce un fallo de enlace.

**VLAN** es un método para crear redes lógicas independientes dentro de una misma red física.1 Varias VLAN pueden coexistir en un único conmutador físico o en una única red física.

**PUERTO TRONCAL** es una configuración de canal para puertos de switch que estén en una red Ethernet, que posibilita que se pueda pasar varias VLAN por un único link.

**SIMULADOR GNS3** es un simulador gráfico de red que permite diseñar topologías de red complejas y poner en marcha simulaciones sobre ellos.

## RESUMEN

En el presente documento se realizarán dos laboratorios de simulación, los cuales corresponden a dos escenarios con diferentes requerimientos e infraestructuras en cuanto a topología de la red. Para esta fase final del diplomado CCNP se empleará el software de simulación electrónica GNS3 previamente configurado con sus diferentes imágenes en cuanto a swiches CISCO. En la primera parte se realizará la configuración de algunos routers los cuales estarán destinados para crear una red conmutada entre EIGRP y OSPF como enrutamiento, cada enlace entre los routers tendrá su propia segmentación de redes IP. Por otra parte, el escenario 2 se plantea como una infraestructura en la cual se dará prioridad a la comunicación a través de VLAN, estas serán nombradas y establecidas en cada puerto troncal de cada switch.

Los comandos que se utilizarán son sencillos y de configuraciones básicas en los dispositivos con el objetivo de lograr una comunicación entre ellos y poder evidenciar con los comandos "show" que las tablas de enrutamiento, VLAN y puertos troncales

*Palabras Clave:* CISCO, CCNP, CONMUTACIÓN, ENRUTAMIENTO, REDES, ELECTRÓNICA.

## ABSTRACT

In this document, two simulation laboratories are carried out, which correspond to two scenarios with different needs and infrastructures in terms of network topology. For this final phase of the CCNP diploma, the previously established GNS3 simulation electronics software will be used with its different images in terms of CISCO switches. In the first part, the configuration of some routers will be carried out, which will be destined to create a switched network between EIGRP and OSPF which routing, each link between the routers will have its own segmentation of IP networks. On the other hand, scenario 2 is proposed as an infrastructure in which priority will be given to communication through VLANs, these will be named and established in each trunk port of each switch.

The commands that will be used are simple and have basic configurations in the devices in order to achieve communication between them and to be able to show with the "show" commands that the routing tables, VLAN and trunk ports

*Keywords:* CISCO, CCNP, Routing, Switching, Networking, Electronics.

## INTRODUCCIÓN

El diplomado CCNP fortalece las competencias en telecomunicaciones en el campo de las redes de comunicación, para cumplir con el objetivo de tener conocimientos sólidos y bases fuertes en la administración de redes, se realizarán a continuación la implementación de dos escenarios en los cuales se configurará la infraestructura tecnológica y se asignarán las debidas configuraciones para cumplir con lo solicitado en cada ejercicio.

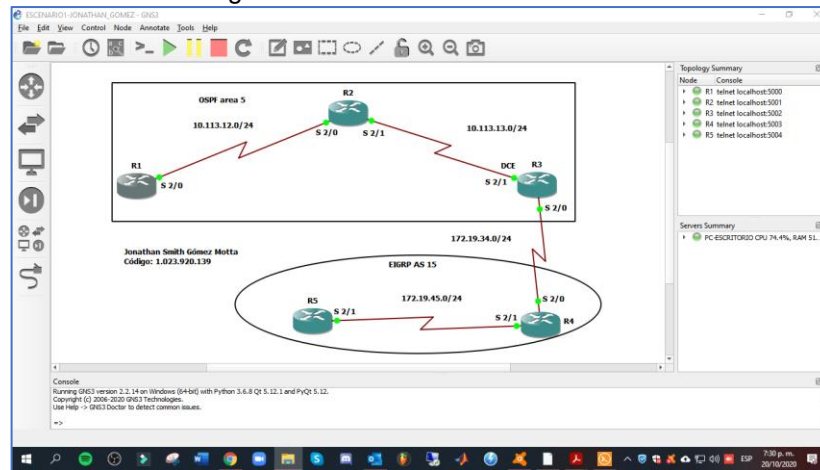
Para el escenario número uno se administrará el enrutamiento de la red, haciendo uso de protocolos OSP e EIGRP, esto con el fin de determinar la mejor ruta en la cual viajar la información, con el objetivo de solventar la carga en los enlaces y tener una mejor estabilidad.

En el escenario número dos se montará una red basada en dos switch capa 3 y dos switch capa dos, en cada uno de estos dispositivos estarán conectados un host, este ejercicio será para la implementación de vlan, recordando que la disponibilidad de ipv4 actualmente está agotada, las vlan permiten una administración optima de los segmentos en red y facilita la gestión de permisos en puertos específicos.

# DESARROLLO

## 1. ESCENARIO 1

Figura 1 - Simulación de escenario 1



Realizamos el montaje del escenario 1 en GNS3

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

Realizamos la configuración inicial en el router 1, usando el comando `no ip domain-lookup` desactivamos la traducción de nombres o DNS. El comando `logging synchronous` evita que los mensajes inesperados que aparecen en pantalla, nos desplacen los comandos que estamos escribiendo en el momento. También crearemos la interfaz lógica o loopback en el dispositivo. Luego asignaremos al enlace serial la dirección ip para terminar subiendo la misma interfaz.

### Configuración Router 1

```
R1#configure terminal
R1(config)#no ip domain-lookup
R1(config)#line con 0
R1(config-line)#logging synchronous
R1(config-line)#exec-timeout 0 0
R1(config-line)#exit
R1(config)#interface loopback 1
R1(config-if)#
```

```

*Oct 20 19:48:32.127: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1,
changed state to up
R1(config-if)#interface serial 2/0
R1(config-if)#ip address 10.113.12.2 255.255.255.0
R1(config-if)#clock rate 128000
R1(config-if)#no shutdown
R1(config-if)#
*Oct 20 19:49:09.295: %LINK-3-UPDOWN: Interface Serial2/0, changed state to up
R1(config-if)#
*Oct 20 19:49:10.303: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0,
changed state to up
R1(config-if)#exit

```

Figura 2 - Configuración Inicial Router 1

```

R1
*Oct 20 19:46:26.063: %LINK-5-CHANGED: Interface FastEthernet0/0, changed state
to administratively down
*Oct 20 19:46:26.075: %LINK-5-CHANGED: Interface GigabitEthernet1/0, changed sta
te to administratively down
*Oct 20 19:46:26.083: %LINK-5-CHANGED: Interface Serial2/0, changed state to adm
inistratively down
*Oct 20 19:46:26.095: %LINK-5-CHANGED: Interface Serial2/1, changed state to adm
inistratively down
*Oct 20 19:46:26.099: %LINK-5-CHANGED: Interface Serial2/2, changed state to adm
inistratively down
*Oct 20 19:46:26.099: %LINK-5-CHANGED: Interface Serial2/3, changed state to adm
inistratively down
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#no ip domain-lookup
R1(config)#line con 0
R1(config-line)#logging synchronous
R1(config-line)#exec-timeout 0 0
R1(config-line)#exit
R1(config)#interface loopback 1
R1(config-if)#
*Oct 20 19:48:32.127: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up
R1(config-if)#interface serial 2/0
R1(config-if)#ip address 10.113.12.2 255.255.255.0
R1(config-if)#clock rate 128000
R1(config-if)#no shutdown
R1(config-if)#
*Oct 20 19:49:09.295: %LINK-3-UPDOWN: Interface Serial2/0, changed state to up
R1(config-if)#
*Oct 20 19:49:10.303: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
R1(config-if)#exit
R1(config)#exit
R1#
*Oct 20 19:49:15.315: %SYS-5-CONFIG_I: Configured from console by console
R1#
R1#
*Oct 20 19:49:30.667: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down
R1#

```

Se realiza la configuración de enrutamiento en el router correspondiente al protocolo OSPF, creamos el router-id y asignamos el segmento a el área respectiva.

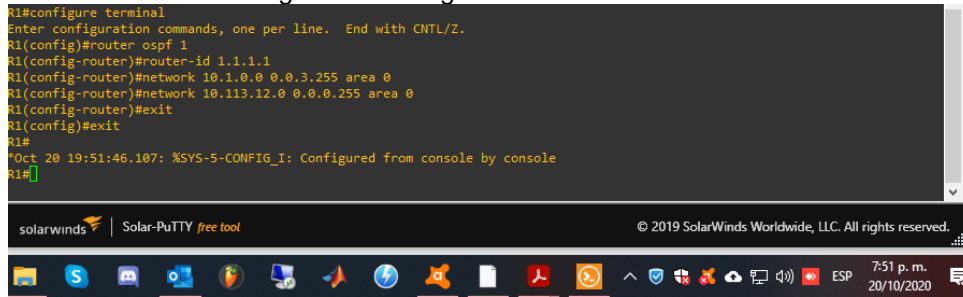
```

R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#router-id 1.1.1.1
R1(config-router)#network 10.1.0.0 0.0.3.255 area 0
R1(config-router)#network 10.113.12.0 0.0.0.255 area 0
R1(config-router)#exit
*Oct 20 19:51:46.107: %SYS-5-CONFIG_I: Configured from console by console

```

Figura 3 - Configuración inicial Router 1

```
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#router-id 1.1.1.1
R1(config-router)#network 10.1.0.0 0.0.3.255 area 0
R1(config-router)#network 10.113.12.0 0.0.0.255 area 0
R1(config-router)#exit
R1(config)#exit
R1#
R1#
*Oct 20 19:51:46.107: %SYS-5-CONFIG_I: Configured from console by console
R1#
```



Realizamos la configuración inicial en el router R2, usando el comando `no ip domain-lookup` desactivamos la traducción de nombres o DNS. El comando `logging synchronous` evita que los mensajes inesperados que aparecen en pantalla, nos desplacen los comandos que estamos escribiendo en el momento. También crearemos la interfaz lógica o loopback en el dispositivo. Luego asignaremos al enlace serial la dirección ip para terminar subiendo la misma interfaz.

## Configuración Router 2

```
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#no ip domain-lookup
R2(config)#line con 0
R2(config-line)#logging synchronous
R2(config-line)#exec-timeout 0 0
R2(config-line)#exit
R2(config)#interface loopback 2
R2(config-if)#
*Oct 20 19:58:08.071: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Loopback2, changed state to up
R2(config-if)#interface serial 2/0
R2(config-if)#ip address 10.113.12.1 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#
*Oct 20 19:59:13.943: %LINK-3-UPDOWN: Interface Serial2/0, changed state to up
R2(config-if)#
*Oct 20 19:59:14.951: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial2/0, changed state to up
R2(config-if)#interface serial 2/1
R2(config-if)#ip address 10.113.13.2 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#
```

```

*Oct 20 20:00:49.027: %LINK-3-UPDOWN: Interface Serial2/1, changed state to up
R2(config-if)#
*Oct 20 20:00:50.035: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial2/1, changed state to up
R2(config-if)#
*Oct 20 20:01:17.747: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial2/1, changed state to down

```

Figura 4 - Configuración inicial Router 2

```

changed state to down
*Oct 20 19:46:25.023: %LINK-5-CHANGED: Interface FastEthernet0/0, changed state
to administratively down
*Oct 20 19:46:25.035: %LINK-5-CHANGED: Interface GigabitEthernet1/0, changed sta
te to administratively down
*Oct 20 19:46:25.043: %LINK-5-CHANGED: Interface Serial2/0, changed state to adm
inistratively down
*Oct 20 19:46:25.059: %LINK-5-CHANGED: Interface Serial2/1, changed state to adm
inistratively down
*Oct 20 19:46:25.059: %LINK-5-CHANGED: Interface Serial2/2, changed state to adm
inistratively down
*Oct 20 19:46:25.063: %LINK-5-CHANGED: Interface Serial2/3, changed state to adm
inistratively down
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#no ip domain-lookup
R2(config)#line con 0
R2(config-line)#logging synchronous
R2(config-line)#exec-timeout 0 0
R2(config-line)#exit
R2(config)#interface loopback 2
R2(config-if)#
*Oct 20 19:50:08.071: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback2, changed state to up
R2(config-if)#interface serial 2/0
R2(config-if)#ip address 10.113.12.1 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#
*Oct 20 19:59:13.943: %LINK-3-UPDOWN: Interface Serial2/0, changed state to up
R2(config-if)#
*Oct 20 19:59:14.951: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
R2(config-if)#interface serial 2/1
R2(config-if)#ip address 10.113.13.2 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#
*Oct 20 20:00:49.027: %LINK-3-UPDOWN: Interface Serial2/1, changed state to up
R2(config-if)#
*Oct 20 20:00:50.035: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/1, changed state to up
R2(config-if)#
*Oct 20 20:01:17.747: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/1, changed state to down
R2(config-if)#
solarwinds | Solar-PuTTY free tool
© 2019 SolarWinds Worldwide, LLC. All rights reserved.

```

Se realiza la configuración de enrutamiento en el router R2 correspondiente al protocolo OSPF, creamos el router-id y asignamos el segmento a el área respectiva.

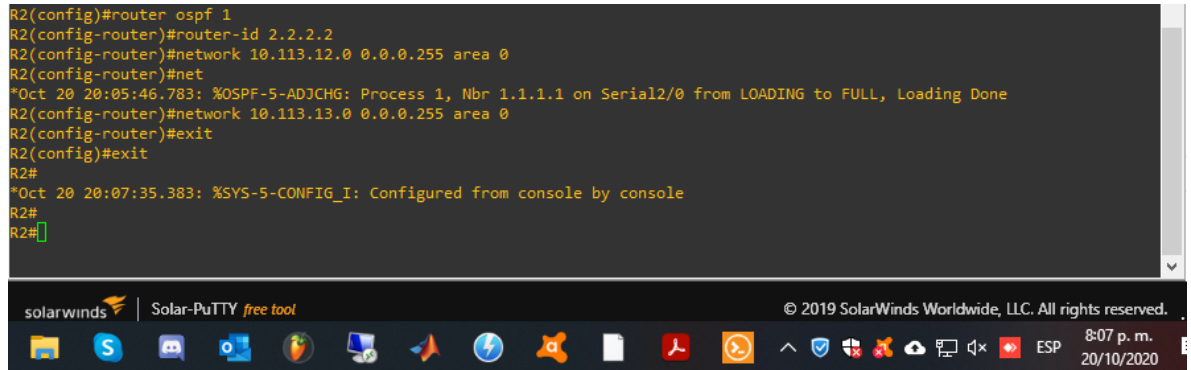
```

R2(config)#router ospf 1
R2(config-router)#router-id 2.2.2.2
R2(config-router)#network 10.113.12.0 0.0.0.255 area 0
*Oct 20 20:05:46.783: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial2/0
from LOADING to FULL, Loading Done
R2(config-router)#network 10.113.13.0 0.0.0.255 area 0
R2(config-router)#exit
R2(config)#exit
*Oct 20 20:07:35.383: %SYS-5-CONFIG_I: Configured from console by console
R2#

```

Figura 5 - Configuración inicial Router 2

```
R2(config)#router ospf 1
R2(config-router)#router-id 2.2.2.2
R2(config-router)#network 10.113.12.0 0.0.0.255 area 0
R2(config-router)#net
*Oct 20 20:05:46.783: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Serial2/0 from LOADING to FULL, Loading Done
R2(config-router)#network 10.113.13.0 0.0.0.255 area 0
R2(config-router)#exit
R2(config)#exit
R2#
*Oct 20 20:07:35.383: %SYS-5-CONFIG_I: Configured from console by console
R2#
R2#
```



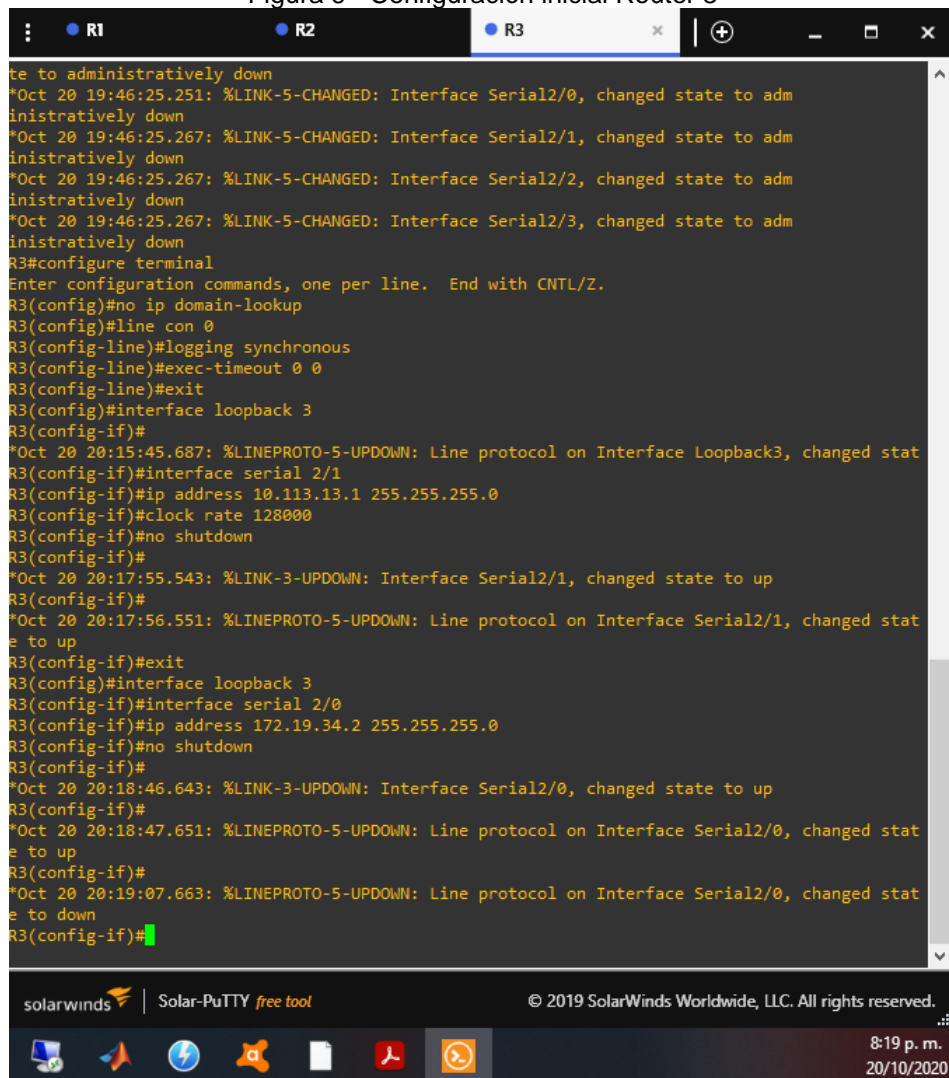
### Configuración del Router 3

Realizamos la configuración inicial en el router R3, usando el comando no ip domain-lookup desactivamos la traducción de nombres o DNS. El comando logging synchronous evita que los mensajes inesperados que aparecen en pantalla, nos desplacen los comandos que estamos escribiendo en el momento. También crearemos la interfaz lógica o loopback en el dispositivo. Luego asignaremos al enlace serial la dirección ip para terminar subiendo la misma interfaz.

```
R3#configure terminal
R3(config)#no ip domain-lookup
R3(config)#line con 0
R3(config-line)#logging synchronous
R3(config-line)#exec-timeout 0 0
R3(config-line)#exit
R3(config)#interface loopback 3
R3(config-if)#
*Oct 20 20:15:45.687: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Loopback3, changed stat
R3(config-if)#interface serial 2/1
R3(config-if)#ip address 10.113.13.1 255.255.255.0
R3(config-if)#clock rate 128000
R3(config-if)#no shutdown
R3(config-if)#
*Oct 20 20:17:55.543: %LINK-3-UPDOWN: Interface Serial2/1, changed state to up
R3(config-if)#
*Oct 20 20:17:56.551: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial2/1, changed state to up
R3(config-if)#exit
R3(config)#interface loopback 3
```

```
R3(config-if)#interface serial 2/0
R3(config-if)#ip address 172.19.34.2 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#
*Oct 20 20:18:46.643: %LINK-3-UPDOWN: Interface Serial2/0, changed state to up
R3(config-if)#
*Oct 20 20:18:47.651: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial2/0, changed state to up
```

Figura 6 - Configuración inicial Router 3

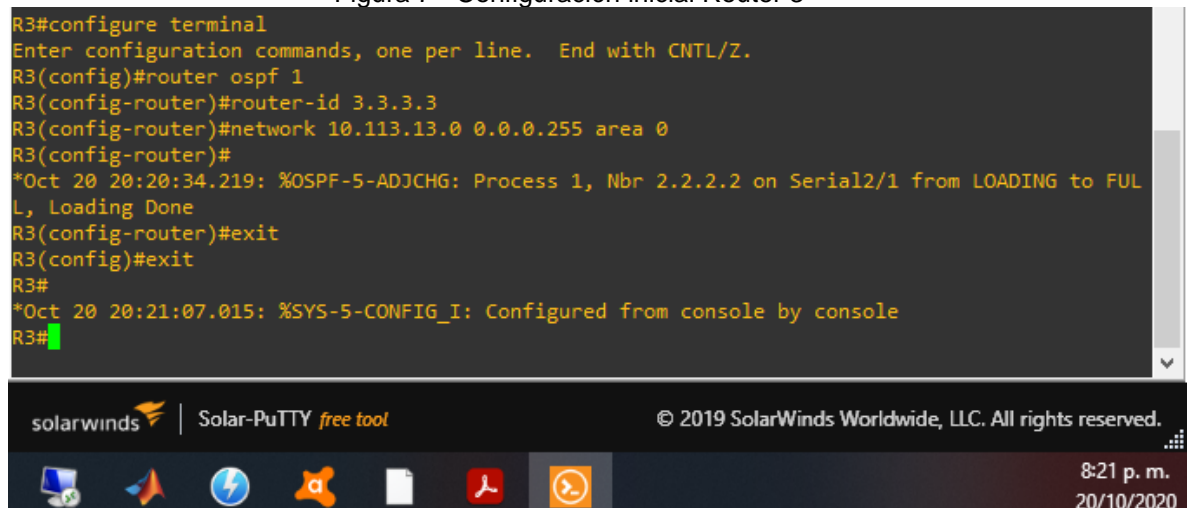


```
te to administratively down
*Oct 20 19:46:25.251: %LINK-5-CHANGED: Interface Serial2/0, changed state to adm
inistratively down
*Oct 20 19:46:25.267: %LINK-5-CHANGED: Interface Serial2/1, changed state to adm
inistratively down
*Oct 20 19:46:25.267: %LINK-5-CHANGED: Interface Serial2/2, changed state to adm
inistratively down
*Oct 20 19:46:25.267: %LINK-5-CHANGED: Interface Serial2/3, changed state to adm
inistratively down
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#no ip domain-lookup
R3(config)#line con 0
R3(config-line)#logging synchronous
R3(config-line)#exec-timeout 0 0
R3(config-line)#exit
R3(config)#interface loopback 3
R3(config-if)#
*Oct 20 20:15:45.687: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback3, changed stat
R3(config-if)#interface serial 2/1
R3(config-if)#ip address 10.113.13.1 255.255.255.0
R3(config-if)#clock rate 128000
R3(config-if)#no shutdown
R3(config-if)#
*Oct 20 20:17:55.543: %LINK-3-UPDOWN: Interface Serial2/1, changed state to up
R3(config-if)#
*Oct 20 20:17:56.551: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/1, changed stat
e to up
R3(config-if)#exit
R3(config)#interface loopback 3
R3(config-if)#interface serial 2/0
R3(config-if)#ip address 172.19.34.2 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#
*Oct 20 20:18:46.643: %LINK-3-UPDOWN: Interface Serial2/0, changed state to up
R3(config-if)#
*Oct 20 20:18:47.651: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed stat
e to up
R3(config-if)#
*Oct 20 20:19:07.663: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed stat
e to down
R3(config-if)#
```

Se realiza la configuración de enrutamiento en el router R3 correspondiente al protocolo OSPF, creamos el router-id y asignamos el segmento a el área respectiva.

```
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#router-id 3.3.3.3
R3(config-router)#network 10.113.13.0 0.0.0.255 area 0
R3(config-router)#
*Oct 20 20:20:34.219: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial2/1
from LOADING to FULL, Loading Done
R3(config-router)#exit
R3(config)#exit
R3#
*Oct 20 20:21:07.015: %SYS-5-CONFIG_I: Configured from console by console
R3#
```

Figura 7 - Configuración inicial Router 3



```
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#router-id 3.3.3.3
R3(config-router)#network 10.113.13.0 0.0.0.255 area 0
R3(config-router)#
*Oct 20 20:20:34.219: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial2/1
L, Loading Done
R3(config-router)#exit
R3(config)#exit
R3#
*Oct 20 20:21:07.015: %SYS-5-CONFIG_I: Configured from console by console
R3#
```

## Configuración router 4

Realizamos la configuración inicial en el router 4, usando el comando `no ip domain-lookup` desactivamos la traducción de nombres o DNS. El comando `logging synchronous` evita que los mensajes inesperados que aparecen en pantalla, nos desplacen los comandos que estamos escribiendo en el momento. También crearemos la interfaz lógica o loopback en el dispositivo. Luego asignaremos al enlace serial la dirección ip para terminar subiendo la misma interfaz.

```
R4#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R4(config)#no ip domain-lookup
R4(config)#line con 0
R4(config-line)#logging synchronous
R4(config-line)#exec-timeout 0 0
R4(config-line)#exit
R4(config)#interface loopback 4
*Oct 20 20:25:42.983: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Loopback4, changed state to up
R4(config-if)#interface serial 2/0
R4(config-if)#ip address 172.19.34.1 255.255.255.0
R4(config-if)#no shutdown
*Oct 20 20:26:12.895: %LINK-3-UPDOWN: Interface Serial2/0, changed state to up
R4(config-if)#
*Oct 20 20:26:13.903: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial2/0, changed state to up
R4(config-if)#
*Oct 20 20:26:12.895: %LINK-3-UPDOWN: Interface Serial2/0, changed state to up
R4(config-if)#
*Oct 20 20:26:13.903: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial2/0, changed state to up
R4(config-if)#interface serial 2/1
R4(config-if)#ip address 172.19.45.2 255.255.255.0
R4(config-if)#no shutdown
R4(config-if)#
*Oct 20 20:28:56.515: %LINK-3-UPDOWN: Interface Serial2/1, changed state to up
R4(config-if)#
*Oct 20 20:28:57.523: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial2/1, changed state to up
R4(config-if)#
*Oct 20 20:29:17.739: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial2/1, changed state to down
R4(config-if)#
```

Figura 8 - Configuración inicial Router 4

```
R4#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R4(config)#no ip domain-lookup
R4(config)#line con 0
R4(config-line)#logging synchronous
R4(config-line)#exec-timeout 0 0
R4(config-line)#exit
R4(config)#interface loopback 4
R4(config-if)#
*Oct 20 20:25:42.983: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback4, changed state to up
R4(config-if)#interface serial 2/0
R4(config-if)#ip address 172.19.34.1 255.255.255.0
R4(config-if)#no shutdown
R4(config-if)#
^
% Invalid input detected at '^' marker.

R4(config-if)#no shutdown
R4(config-if)#
*Oct 20 20:26:12.895: %LINK-3-UPDOWN: Interface Serial2/0, changed state to up
R4(config-if)#
*Oct 20 20:26:13.903: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
R4(config-if)#
```

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Figura 9 - Configuración inicial Router 4

```
R4(config-if)#no shutdown
R4(config-if)#
*Oct 20 20:26:12.895: %LINK-3-UPDOWN: Interface Serial2/0, changed state to up
R4(config-if)#
*Oct 20 20:26:13.903: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
R4(config-if)#interface serial 2/1
R4(config-if)#ip address 172.19.45.2 255.255.255.0
R4(config-if)#no shutdown
R4(config-if)#
*Oct 20 20:28:56.515: %LINK-3-UPDOWN: Interface Serial2/1, changed state to up
R4(config-if)#
*Oct 20 20:28:57.523: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/1, changed state to up
R4(config-if)#
*Oct 20 20:29:17.739: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/1, changed state to down
R4(config-if)#
R4#
*Oct 20 20:29:27.151: %SYS-5-CONFIG_I: Configured from console by console
R4#
```

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## Configuración router 5

Realizamos la configuración inicial en el router 4, usando el comando `no ip domain-lookup` desactivamos la traducción de nombres o DNS. El comando `logging synchronous` evita que los mensajes inesperados que aparecen en pantalla, nos desplacen los comandos que estamos escribiendo en el momento. También crearemos la interfaz lógica o loopback en el dispositivo. Luego asignaremos al enlace serial la dirección ip para terminar subiendo la misma interfaz.

```
R5#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R5(config)#no ip domain-lookup
R5(config)#line con 0
R5(config-line)#logging synchronous
R5(config-line)#exec-timeout 0 0
R5(config-line)#exit
R5(config)#interface loopback 5
R5(config-if)#
*Oct 20 20:32:40.655: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Loopback5, changed state to up
R5(config-if)#interface serial 2/1
R5(config-if)#ip address 172.19.45.1 255.255.255.0
R5(config-if)#clock rate 128000
R5(config-if)#no shutdown
R5(config-if)#
*Oct 20 20:33:28.267: %LINK-3-UPDOWN: Interface Serial2/1, changed state to up
*Oct 20 20:33:29.267: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Serial2/1, changed state to up
```

Figura 10 - Configuración inicial Router 5

```

R1 R2 R3 R4 R5
*Oct 20 19:46:24.775: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/3,
changed state to down
*Oct 20 19:46:26.127: %LINK-5-CHANGED: Interface FastEthernet0/0, changed state
to administratively down
*Oct 20 19:46:26.135: %LINK-5-CHANGED: Interface GigabitEthernet1/0, changed sta
te to administratively down
*Oct 20 19:46:26.147: %LINK-5-CHANGED: Interface Serial2/0, changed state to adm
inistratively down
*Oct 20 19:46:26.159: %LINK-5-CHANGED: Interface Serial2/1, changed state to adm
inistratively down
*Oct 20 19:46:26.159: %LINK-5-CHANGED: Interface Serial2/2, changed state to adm
inistratively down
*Oct 20 19:46:26.163: %LINK-5-CHANGED: Interface Serial2/3, changed state to adm
inistratively down
R5#
R5#
R5#
R5#
R5#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R5(config)#no ip domain-lookup
R5(config)#line con 0
R5(config-line)#logging synchronous
R5(config-line)#exec-timeout 0 0
R5(config-line)#exit
R5(config)#interface loopback 5
R5(config-if)#
*Oct 20 20:32:40.655: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback5, changed stat
e to up
R5(config-if)#interface serial 2/1
R5(config-if)#ip address 172.19.45.1 255.255.255.0
R5(config-if)#clock rate 128000
R5(config-if)#no shutdown
R5(config-if)#
*Oct 20 20:33:28.267: %LINK-3-UPDOWN: Interface Serial2/1, changed state to up
*Oct 20 20:33:29.267: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/1, changed stat
e to up
R5(config-if)#exit
R5(config)#exit
R5#
*Oct 20 20:33:35.099: %SYS-5-CONFIG_I: Configured from console by console
R5#
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8:33 p. m.
20/10/2020

```

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

Tabla 1 – interfaces loopback R1

Interfaces loopback en R1	
Loopback20	10.1.0.1/22
Loopback21	10.1.10.1/22
Loopback22	10.1.20.1/22
Loopback23	10.1.30.1/22

## Configuración de Loopbacks en R1

Ingresaremos al router R1 para configurar las interfaces loopback según la tabla anterior y también asignaremos el direccionamiento ip. Luego de crear las interfaces, configuramos el direccionamiento OSPF.

```
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface loopback20
R1(config-if)#
*Oct 20 20:36:09.295: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Loopback20, changed state to up
R1(config-if)#ip address 10.1.0.1 255.255.252.0
R1(config-if)#exit
R1(config)#interface loopback21
R1(config-if)#ip add
*Oct 20 20:37:25.139: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Loopback21, changed state to up
R1(config-if)#ip address 10.1.10.1 255.255.252.0
R1(config-if)#exit
R1(config)#interface loopback22
R1(config-if)#
*Oct 20 20:38:01.451: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Loopback22, changed state to up
R1(config-if)#ip address 10.1.20.1 255.255.252.0
R1(config-if)#exit
R1(config)#interface loopback23
R1(config-if)#
*Oct 20 20:38:59.355: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Loopback23, changed state to up
R1(config-if)#ip address 10.1.30.1 255.255.252.0
R1(config-if)#exit
R1(config)#router ospf 1
R1(config-router)#router-id 1.1.1.1
R1(config-router)#network 10.1.0.0 0.0.3.255 area 0
R1(config-router)#network 10.113.12.0
% Incomplete command.

R1(config-router)#exit
R1(config)#exit
R1#
*Oct 20 20:42:00.619: %SYS-5-CONFIG_I: Configured from console by console
R1#
```

Figura 11 - Configuración loopback Router 1

```
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface loopback20
R1(config-if)#
*Oct 20 20:36:09.295: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback20, changed state to up
R1(config-if)#ip address 10.1.0.1 255.255.252.0
R1(config-if)#exit
R1(config)#interface loopback21
R1(config-if)#ip add
*Oct 20 20:37:25.139: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback21, changed state to up
R1(config-if)#ip address 10.1.10.1 255.255.252.0
R1(config-if)#exit
R1(config)#interface loopback22
R1(config-if)#
*Oct 20 20:38:01.451: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback22, changed state to up
R1(config-if)#ip address 10.1.20.1 255.255.252.0
R1(config-if)#exit
R1(config)#interface loopback23
R1(config-if)#
*Oct 20 20:38:59.355: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback23, changed state to up
R1(config-if)#ip address 10.1.30.1 255.255.252.0
R1(config-if)#exit
R1(config)#router ospf 1
R1(config-router)#router-id 1.1.1.1
R1(config-router)#network 10.1.0.0 0.0.3.255 area 0
R1(config-router)#network 10.113.12.0
% Incomplete command.

R1(config-router)#exit
R1(config)#exit
R1#
*Oct 20 20:42:00.619: %SYS-5-CONFIG_I: Configured from console by console
R1#
```

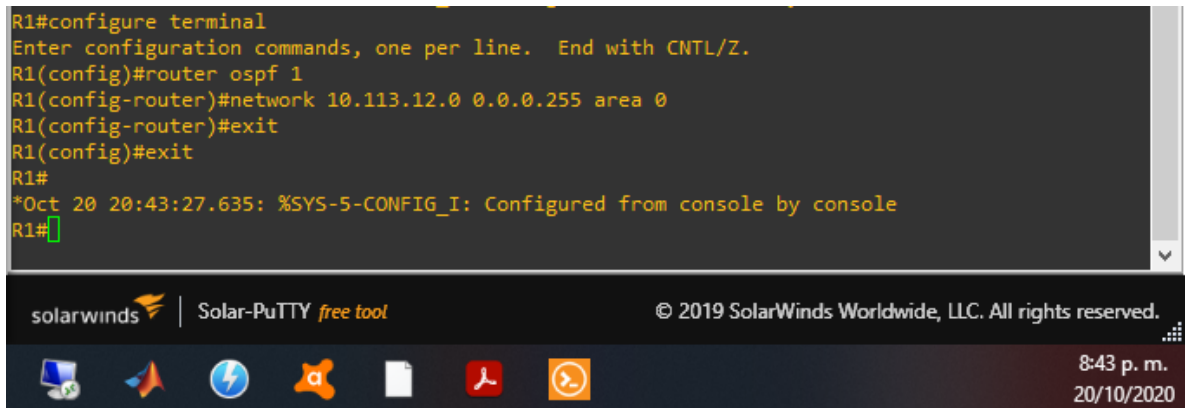
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Configuramos el enrutamiento por OSPF asignando el área y segmento de red ip.

```
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#network 10.113.12.0 0.0.0.255 area 0
R1(config-router)#exit
R1(config)#exit
R1#
*Oct 20 20:43:27.635: %SYS-5-CONFIG_I: Configured from console by console
```

Figura 12 - Configuración OSPF Router 1

```
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#network 10.113.12.0 0.0.0.255 area 0
R1(config-router)#exit
R1(config)#exit
R1#
*Oct 20 20:43:27.635: %SYS-5-CONFIG_I: Configured from console by console
R1#
```



Ingresamos a cada interfaz loopback y ponemos la interfaz en modo punto a punto para que los vecinos sean reconocidos a través de los vecinos más cercanos.

```
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface loopback20
R1(config-if)#ip ospf network point-to-point
R1(config-if)#exit
R1(config)#interface loopback21
R1(config-if)#ip ospf network point-to-point
R1(config-if)#exit
R1(config)#interface loopback22
R1(config-if)#ip ospf network point-to-point
R1(config-if)#exit
R1(config)#interface loopback23
R1(config-if)#ip ospf network point-to-point
R1(config-if)#exit
R1(config)#
R1#
*Oct 20 20:47:00.283: %SYS-5-CONFIG_I: Configured from console by console
R1#
```

Figura 13 - OPSF en router 1

```

R1#
R1#
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface loopback20
R1(config-if)#ip ospf network point-to-point
R1(config-if)#exit
R1(config)#interface loopback21
R1(config-if)#ip ospf network point-to-point
R1(config-if)#exit
R1(config)#interface loopback22
R1(config-if)#ip ospf network point-to-point
R1(config-if)#exit
R1(config)#interface loopback23
R1(config-if)#ip ospf network point-to-point
R1(config-if)#exit
R1(config)#
R1#
*Oct 20 20:47:00.283: %SYS-5-CONFIG_I: Configured from console by console
R1#
R1#

```

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

Tabla 2 – Interfaces loopback R5

Loopback 30	172.5.0.1
Loopback 31	172.5.10.1
Loopback 32	172.5.20.1
Loopback 33	172.5.30.1

Ingresamos a configurar en R5 para crear las interfaces loopback, luego asignaremos la ip junto con la mscara de 22

```

R5#configure terminal
R5(config)#interface loopback30
R5(config-if)#
*Oct 20 20:52:23.307: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Loopback30, changed state to up
R5(config-if)#ip address 172.5.0.1 255.255.252.0
R5(config-if)#exit
R5(config)#interface loopback31
R5(config-if)#ip

```

```

*Oct 20 20:52:57.643: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Loopback31, changed state to up
R5(config-if)#ip address 172.5.10.1 255.255.252.0
R5(config-if)#exit
R5(config)#interface loopback32
R5(config-if)#ip
*Oct 20 20:53:20.739: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Loopback32, changed state to up
R5(config-if)#ip address 172.5.20.1 255.255.252.0
R5(config-if)#exit
R5(config)#interface loopback33
R5(config-if)#
*Oct 20 20:54:09.579: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Loopback33, changed state to up
R5(config-if)#ip address 172.5.30.1 255.255.252.0
R5(config-if)#exit
R5(config)#

```

Figura 14 - Interfaces loopback R5

```

R5#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R5(config)#interface loopback30
R5(config-if)#
*Oct 20 20:52:23.307: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback30, changed sta
te to up
R5(config-if)#ip address 172.5.0.1 255.255.252.0
R5(config-if)#exit
R5(config)#interface loopback31
R5(config-if)#ip
*Oct 20 20:52:57.643: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback31, changed sta
te to up
R5(config-if)#ip address 172.5.10.1 255.255.252.0
R5(config-if)#exit
R5(config)#interface loopback32
R5(config-if)#ip
*Oct 20 20:53:20.739: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback32, changed sta
te to up
R5(config-if)#ip address 172.5.20.1 255.255.252.0
R5(config-if)#exit
R5(config)#interface loopback33
R5(config-if)#
*Oct 20 20:54:09.579: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback33, changed sta
te to up
R5(config-if)#ip address 172.5.30.1 255.255.252.0
R5(config-if)#exit
R5(config)#

```

Para este router se configurará el protocolo de vector distancia EIGRP indicando los segmentos 172.5.0.0 y 172.19.45.0

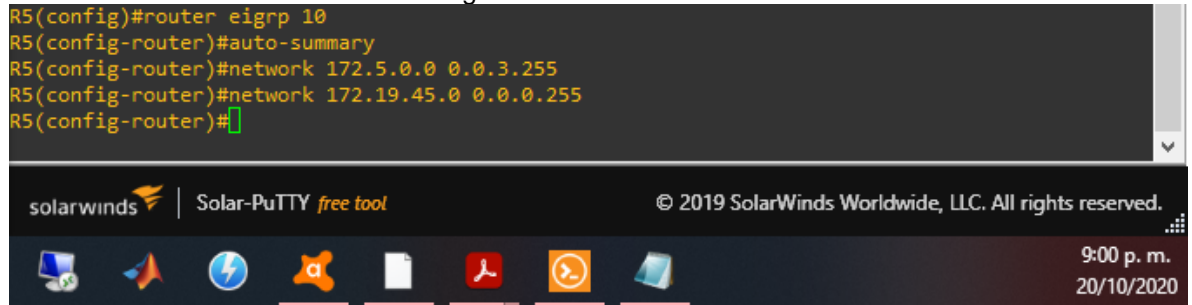
```

R5(config)#router eigrp 10
R5(config-router)#auto-summary
R5(config-router)#network 172.5.0.0 0.0.3.255
R5(config-router)#network 172.19.45.0 0.0.0.255
R5(config-router)#

```

Figura 15 - EIGRP R5

```
R5(config)#router eigrp 10
R5(config-router)#auto-summary
R5(config-router)#network 172.5.0.0 0.0.3.255
R5(config-router)#network 172.19.45.0 0.0.0.255
R5(config-router)#
```



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

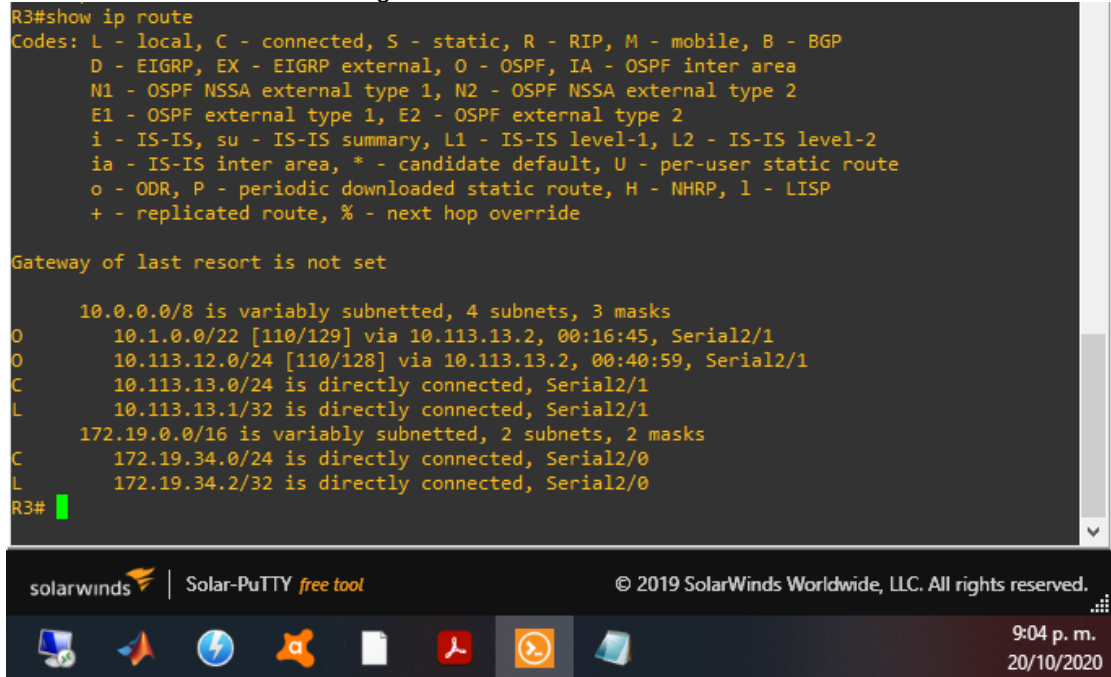
Con el comando show ip route podemos verificar que se están reflejando los dos segmentos de red cercanos a él con R2 y R4 junto con las interfaces loopback.

Figura 16 - Tabla Enrutamiento R3

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

Gateway of last resort is not set

 10.0.0.0/8 is variably subnetted, 4 subnets, 3 masks
O    10.1.0.0/22 [110/129] via 10.113.13.2, 00:16:45, Serial2/1
O    10.113.12.0/24 [110/128] via 10.113.13.2, 00:40:59, Serial2/1
C    10.113.13.0/24 is directly connected, Serial2/1
L    10.113.13.1/32 is directly connected, Serial2/1
 172.19.0.0/16 is variably subnetted, 2 subnets, 2 masks
C    172.19.34.0/24 is directly connected, Serial2/0
L    172.19.34.2/32 is directly connected, Serial2/0
R3#
```

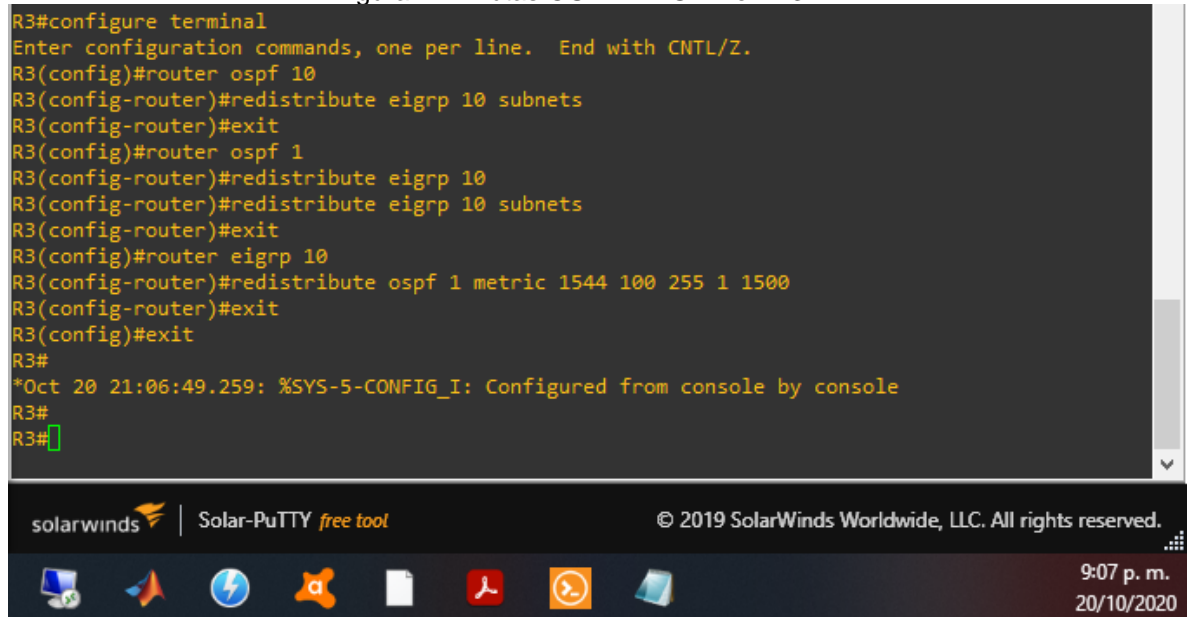


5. Configure R3 para redistribuir las rutas EIGRP en OSPF usando el costo de 50000 y luego redistribuya las rutas OSPF en EIGRP usando un ancho de banda T1 y 20,000 microsegundos de retardo.

Configuraremos en R3 el comando “redistribute” para traer de otras rutas EIGRP de otros routers y poder comunicarlal con OSPF, la metrica será de 50000

```
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 10
R3(config-router)#redistribute eigrp 10 subnets
R3(config-router)#exit
R3(config)#router ospf 1
R3(config-router)#redistribute eigrp 10
R3(config-router)#redistribute eigrp 10 subnets
R3(config-router)#exit
R3(config)#router eigrp 10
R3(config-router)#redistribute ospf 1 metric 1544 100 255 1 1500
R3(config-router)#exit
R3(config)#exit
R3#
*Oct 20 21:06:49.259: %SYS-5-CONFIG_I: Configured from console by console
```

Figura 17 - Rutas OSPF - EIGRP en R3



```
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 10
R3(config-router)#redistribute eigrp 10 subnets
R3(config-router)#exit
R3(config)#router ospf 1
R3(config-router)#redistribute eigrp 10
R3(config-router)#redistribute eigrp 10 subnets
R3(config-router)#exit
R3(config)#router eigrp 10
R3(config-router)#redistribute ospf 1 metric 1544 100 255 1 1500
R3(config-router)#exit
R3(config)#exit
R3#
*Oct 20 21:06:49.259: %SYS-5-CONFIG_I: Configured from console by console
R3#
R3#
```

R3#show ip route

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

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 4 subnets, 3 masks  
O 10.1.0.0/22 [110/129] via 10.113.13.2, 00:22:35, Serial2/1  
O 10.113.12.0/24 [110/128] via 10.113.13.2, 00:46:49, Serial2/1  
C 10.113.13.0/24 is directly connected, Serial2/1  
L 10.113.13.1/32 is directly connected, Serial2/1  
172.19.0.0/16 is variably subnetted, 2 subnets, 2 masks  
C 172.19.34.0/24 is directly connected, Serial2/0  
L 172.19.34.2/32 is directly connected, Serial 2/0

Figura 18 - Tabla de enrutamiento R3

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

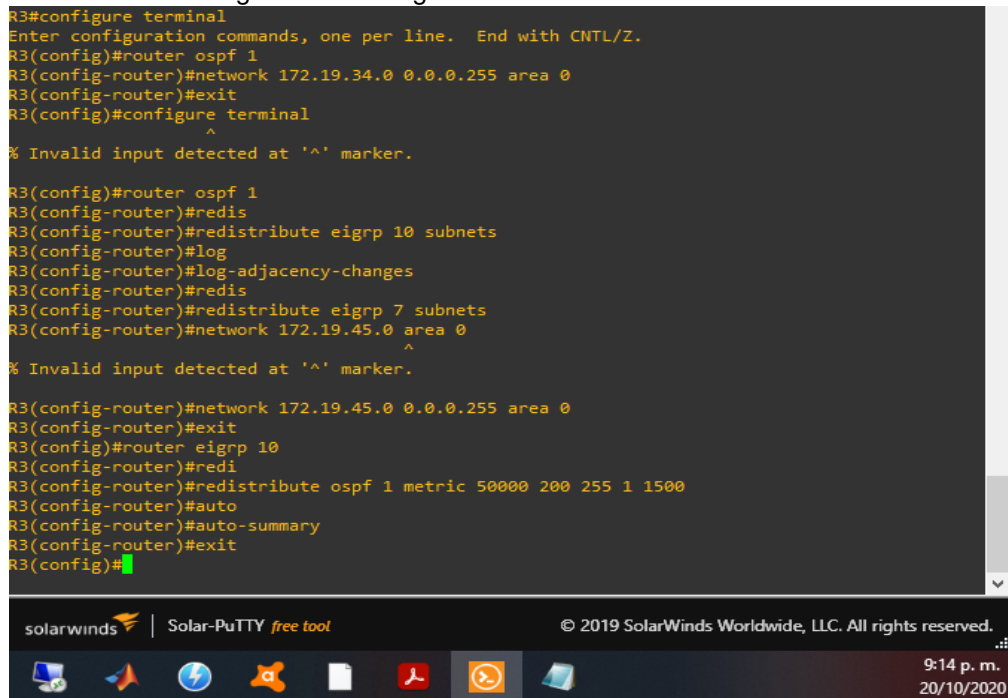
Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 4 subnets, 3 masks
O 10.1.0.0/22 [110/129] via 10.113.13.2, 00:22:35, Serial2/1
O 10.113.12.0/24 [110/128] via 10.113.13.2, 00:46:49, Serial2/1
C 10.113.13.0/24 is directly connected, Serial2/1
L 10.113.13.1/32 is directly connected, Serial2/1
172.19.0.0/16 is variably subnetted, 2 subnets, 2 masks
C 172.19.34.0/24 is directly connected, Serial2/0
L 172.19.34.2/32 is directly connected, Serial2/0
R3#
```

Configuraremos el comando redistribute en el protocolo OSPF del router con el fin de lograr comunicación con las rutas EIGRP

```
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#network 172.19.34.0 0.0.0.255 area 0
R3(config-router)#exit
R3(config)#configure terminal
R3(config)#router ospf 1
R3(config-router)#redis
R3(config-router)#redistribute eigrp 10 subnets
R3(config-router)#log
R3(config-router)#log-adjacency-changes
R3(config-router)#redis
R3(config-router)#redistribute eigrp 7 subnets
R3(config-router)#network 172.19.45.0 0.0.0.255 area 0
R3(config-router)#exit
R3(config)#router eigrp 10
R3(config-router)#redi
R3(config-router)#redistribute ospf 1 metric 50000 200 255 1 1500
R3(config-router)#auto
R3(config-router)#auto-summary
R3(config-router)#exit
```

Figura 19 - Configuración OSPF - EIGRP Router 3



```
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#network 172.19.34.0 0.0.0.255 area 0
R3(config-router)#exit
R3(config)#configure terminal
^
% Invalid input detected at '^' marker.

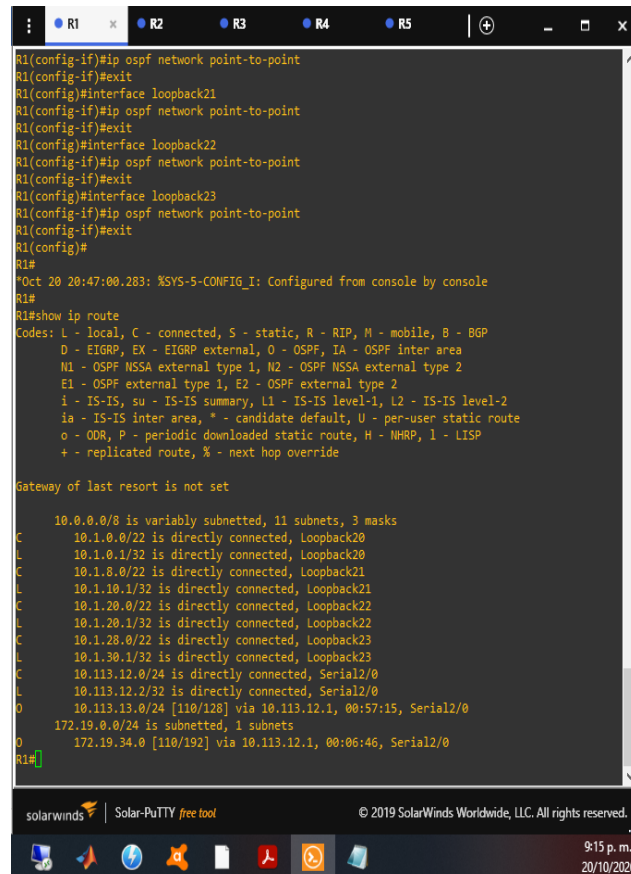
R3(config)#router ospf 1
R3(config-router)#redis
R3(config-router)#redistribute eigrp 10 subnets
R3(config-router)#log
R3(config-router)#log-adjacency-changes
R3(config-router)#redis
R3(config-router)#redistribute eigrp 7 subnets
R3(config-router)#network 172.19.45.0 area 0
^
% Invalid input detected at '^' marker.

R3(config-router)#network 172.19.45.0 0.0.0.255 area 0
R3(config-router)#exit
R3(config)#router eigrp 10
R3(config-router)#redi
R3(config-router)#redistribute ospf 1 metric 50000 200 255 1 1500
R3(config-router)#auto
R3(config-router)#auto-summary
R3(config-router)#exit
R3(config)#
```

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

Validaremos con comando show ip route que en R1 existan las interfaces loopback configuradas.

Figura 20 - Show ip route R1



```
R1(config-if)#ip ospf network point-to-point
R1(config-if)#exit
R1(config)#interface loopback21
R1(config-if)#ip ospf network point-to-point
R1(config-if)#exit
R1(config)#interface loopback22
R1(config-if)#ip ospf network point-to-point
R1(config-if)#exit
R1(config)#interface loopback23
R1(config-if)#ip ospf network point-to-point
R1(config-if)#exit
R1(config)#
R1#
*Oct 20 20:47:00.283: %SYS-5-CONFIG_I: Configured from console by console
R1#
R1#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
ia - IS-IS inter area, * - candidate default, U - per-user static route
o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
+ - replicated route, % - next hop override

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 11 subnets, 3 masks
C    10.1.0.0/22 is directly connected, Loopback20
L    10.1.0.1/32 is directly connected, Loopback20
C    10.1.8.0/22 is directly connected, Loopback21
L    10.1.10.1/32 is directly connected, Loopback21
C    10.1.20.0/22 is directly connected, Loopback22
L    10.1.20.1/32 is directly connected, Loopback22
C    10.1.28.0/22 is directly connected, Loopback23
L    10.1.30.1/32 is directly connected, Loopback23
C    10.113.12.0/24 is directly connected, Serial2/0
L    10.113.12.2/32 is directly connected, Serial2/0
O    10.113.13.0/24 [110/128] via 10.113.12.1, 00:57:15, Serial2/0
O    172.19.0.0/24 is subnetted, 1 subnets
O    172.19.34.0 [110/192] via 10.113.12.1, 00:06:46, Serial2/0
R1#
```

Validaremos con comando show ip route que en R1 existan las interfaces loopback configuradas.

Validaremos con comando show ip route que en R5 existan las interfaces loopback configuradas.

Figura 21 - show ip route R5

```
*Oct 20 21:16:06.003: %SYS-5-CONFIG_I: Configured from console by console
R5#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

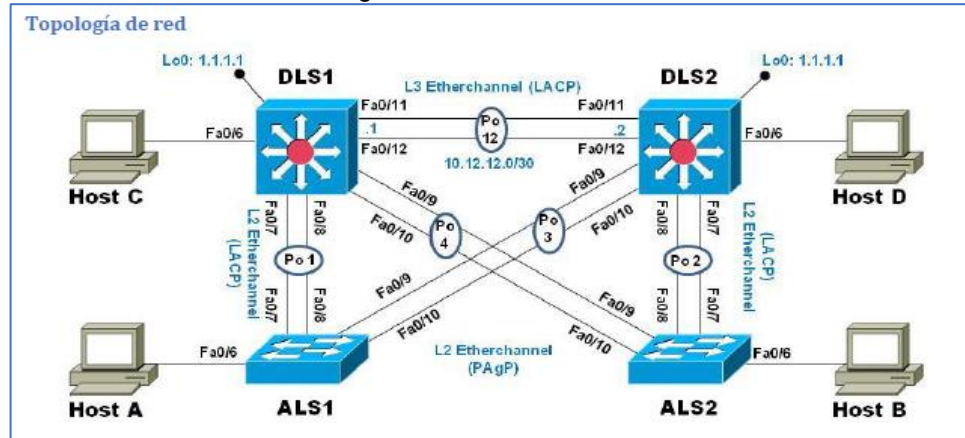
172.5.0.0/16 is variably subnetted, 9 subnets, 3 masks
D   172.5.0.0/16 is a summary, 00:15:58, Null0
C   172.5.0.0/22 is directly connected, Loopback30
L   172.5.0.1/32 is directly connected, Loopback30
C   172.5.8.0/22 is directly connected, Loopback31
L   172.5.10.1/32 is directly connected, Loopback31
C   172.5.20.0/22 is directly connected, Loopback32
L   172.5.20.1/32 is directly connected, Loopback32
C   172.5.28.0/22 is directly connected, Loopback33
L   172.5.30.1/32 is directly connected, Loopback33
172.19.0.0/16 is variably subnetted, 3 subnets, 3 masks
D   172.19.0.0/16 is a summary, 00:15:58, Null0
C   172.19.45.0/24 is directly connected, Serial2/1
L   172.19.45.1/32 is directly connected, Serial2/1
R5#
```

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9:16 p. m.  
20/10/2020

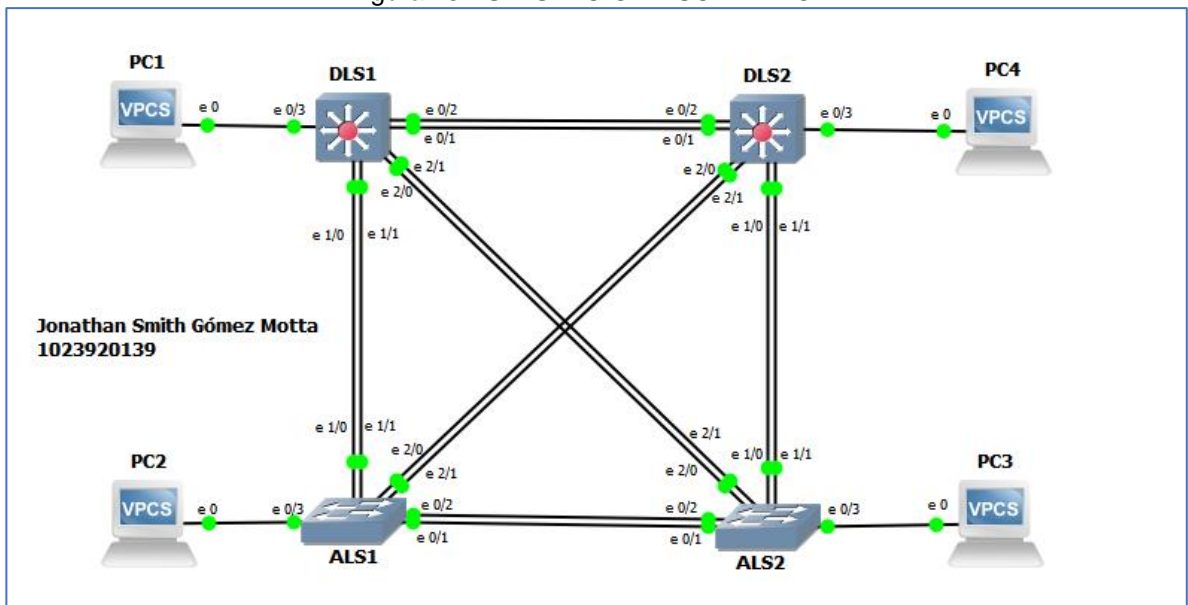
### 3. Escenario 2

Figura 22 - ESCENARIO 2



Se realizó el montaje de la simulación en el software GNS3, luego de cargar las imágenes de los switcho CISCO y etiquetar las interfaces respectivas se procederá a la configuración.

Figura 23 - SIMULACION ESCENARIO 2



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

a. Apagar todas las interfaces en cada switch.

Ingresamos al router DLS1, seleccionamos el rango de interfaces en este caso ethernet y las apagamos con shutdown.

Apagando las interfaces en DLS1

```
DLS1#conf t
```

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

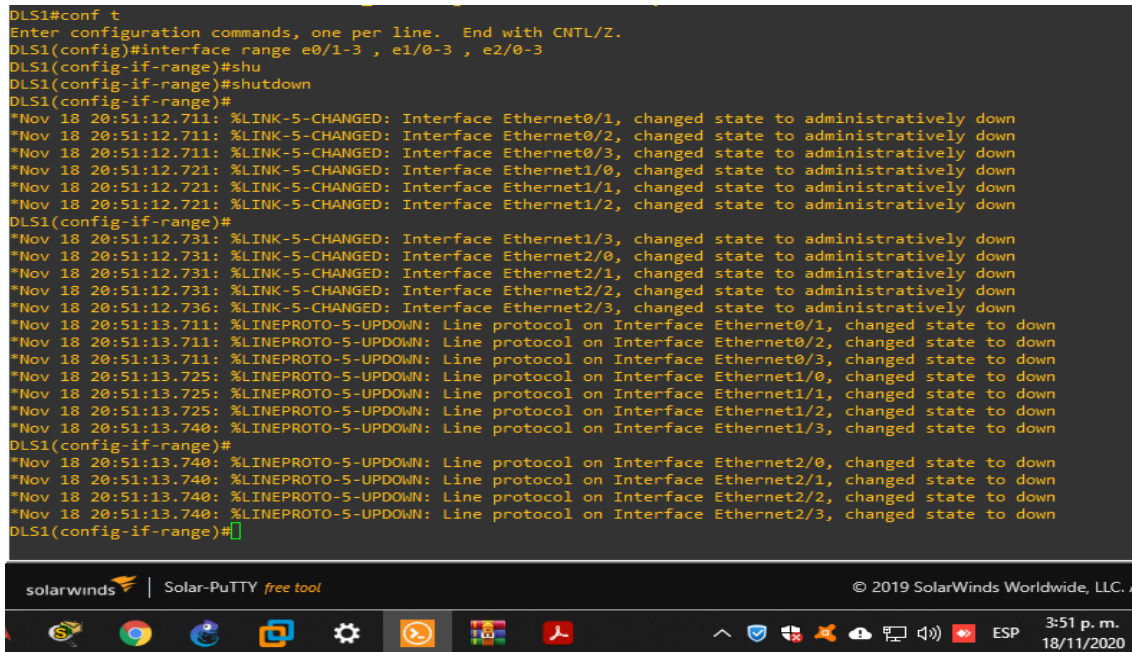
```
DLS1(config)#interface range e0/1-3 , e1/0-3 , e2/0-3
```

```
DLS1(config-if-range)#shu
```

```
DLS1(config-if-range)#shutdown
```

Figura 24 - Apagando interfaces DLS1

```
DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface range e0/1-3 , e1/0-3 , e2/0-3
DLS1(config-if-range)#shu
DLS1(config-if-range)#shutdown
DLS1(config-if-range)#
*Nov 18 20:51:12.711: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively down
*Nov 18 20:51:12.711: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to administratively down
*Nov 18 20:51:12.711: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to administratively down
*Nov 18 20:51:12.721: %LINK-5-CHANGED: Interface Ethernet1/0, changed state to administratively down
*Nov 18 20:51:12.721: %LINK-5-CHANGED: Interface Ethernet1/1, changed state to administratively down
*Nov 18 20:51:12.721: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to administratively down
DLS1(config-if-range)#
*Nov 18 20:51:12.731: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to administratively down
*Nov 18 20:51:12.731: %LINK-5-CHANGED: Interface Ethernet2/0, changed state to administratively down
*Nov 18 20:51:12.731: %LINK-5-CHANGED: Interface Ethernet2/1, changed state to administratively down
*Nov 18 20:51:12.731: %LINK-5-CHANGED: Interface Ethernet2/2, changed state to administratively down
*Nov 18 20:51:12.736: %LINK-5-CHANGED: Interface Ethernet2/3, changed state to administratively down
*Nov 18 20:51:13.711: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*Nov 18 20:51:13.711: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
*Nov 18 20:51:13.711: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to down
*Nov 18 20:51:13.725: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to down
*Nov 18 20:51:13.725: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
*Nov 18 20:51:13.725: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to down
*Nov 18 20:51:13.740: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/3, changed state to down
DLS1(config-if-range)#
*Nov 18 20:51:13.740: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to down
*Nov 18 20:51:13.740: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to down
*Nov 18 20:51:13.740: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to down
*Nov 18 20:51:13.740: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to down
DLS1(config-if-range)#
```



## Apagando las interfaces en DLS2

Ingresamos al router DLS2, seleccionamos el rango de interfaces en este caso ethernet y las apagamos con shutdown.

```
DLS2#conf t
```

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

```
DLS2(config)#inter
```

```
DLS2(config)#interface ra
```

```
DLS2(config)#interface range e0/1-3 , e1/0-3 , e2/0-3
```

```
DLS2(config-if-range)#shut
```

```
DLS2(config-if-range)#shutdown
DLS2(config-if-range)#
```

Figura 25 - Apagando interfaces en DLS2

```
DLS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#inter
DLS2(config)#interface ra
DLS2(config)#interface range e0/1-3 , e1/0-3 , e2/0-3
DLS2(config-if-range)#shut
DLS2(config-if-range)#shutdown
DLS2(config-if-range)#
*Nov 18 20:54:47.266: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively down
*Nov 18 20:54:47.266: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to administratively down
*Nov 18 20:54:47.266: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to administratively down
*Nov 18 20:54:47.266: %LINK-5-CHANGED: Interface Ethernet1/0, changed state to administratively down
*Nov 18 20:54:47.276: %LINK-5-CHANGED: Interface Ethernet1/1, changed state to administratively down
*Nov 18 20:54:47.276: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to administratively down
DLS2(config-if-range)#
*Nov 18 20:54:47.276: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to administratively down
*Nov 18 20:54:47.281: %LINK-5-CHANGED: Interface Ethernet2/0, changed state to administratively down
*Nov 18 20:54:47.281: %LINK-5-CHANGED: Interface Ethernet2/1, changed state to administratively down
*Nov 18 20:54:47.291: %LINK-5-CHANGED: Interface Ethernet2/2, changed state to administratively down
*Nov 18 20:54:47.291: %LINK-5-CHANGED: Interface Ethernet2/3, changed state to administratively down
*Nov 18 20:54:48.271: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*Nov 18 20:54:48.271: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
*Nov 18 20:54:48.271: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to down
*Nov 18 20:54:48.271: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to down
*Nov 18 20:54:48.281: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
*Nov 18 20:54:48.281: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to down
*Nov 18 20:54:48.281: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/3, changed state to down
DLS2(config-if-range)#
*Nov 18 20:54:48.281: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to down
*Nov 18 20:54:48.281: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to down
*Nov 18 20:54:48.291: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to down
*Nov 18 20:54:48.291: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to down
DLS2(config-if-range)#
```

Ingresamos al router ALS1, seleccionamos el rango de interfaces en este caso ethernet y las apagamos con shutdown.

Figura 26 - Apagando interfaces ALS1

```
ALS1(config)#inter
ALS1(config)#interface ran
ALS1(config)#interface range e0/1-3 , e1/0-3 , e2/0-3
ALS1(config-if-range)#shu
ALS1(config-if-range)#shutdown
ALS1(config-if-range)#
*Nov 19 00:28:04.133: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively down
*Nov 19 00:28:04.134: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to administratively down
*Nov 19 00:28:04.134: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to administratively down
*Nov 19 00:28:04.138: %LINK-5-CHANGED: Interface Ethernet1/0, changed state to administratively down
*Nov 19 00:28:04.148: %LINK-5-CHANGED: Interface Ethernet1/1, changed state to administratively down
*Nov 19 00:28:04.148: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to administratively down
ALS1(config-if-range)#
*Nov 19 00:28:04.148: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to administratively down
*Nov 19 00:28:04.148: %LINK-5-CHANGED: Interface Ethernet2/0, changed state to administratively down
*Nov 19 00:28:04.158: %LINK-5-CHANGED: Interface Ethernet2/1, changed state to administratively down
*Nov 19 00:28:04.158: %LINK-5-CHANGED: Interface Ethernet2/2, changed state to administratively down
*Nov 19 00:28:04.158: %LINK-5-CHANGED: Interface Ethernet2/3, changed state to administratively down
*Nov 19 00:28:05.138: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*Nov 19 00:28:05.138: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
*Nov 19 00:28:05.138: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to down
*Nov 19 00:28:05.138: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to down
*Nov 19 00:28:05.149: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
*Nov 19 00:28:05.149: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to down
*Nov 19 00:28:05.149: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/3, changed state to down
ALS1(config-if-range)#
*Nov 19 00:28:05.149: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to down
*Nov 19 00:28:05.164: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to down
*Nov 19 00:28:05.164: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to down
*Nov 19 00:28:05.164: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to down
ALS1(config-if-range)#
```

Ingresamos al router ALS2, seleccionamos el rango de interfaces en este caso ethernet y las apagamos con shutdown.

Figura 27 - Apagando interfaces ALS2

```
ALS2(config)#interf
ALS2(config)#interface ra
ALS2(config)#interface range e0/1-3 , e1/0-3 , e2/0-3
ALS2(config-if-range)#shu
ALS2(config-if-range)#shutdown
ALS2(config-if-range)#
*Nov 19 00:41:07.924: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively down
*Nov 19 00:41:07.929: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to administratively down
*Nov 19 00:41:07.929: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to administratively down
*Nov 19 00:41:07.939: %LINK-5-CHANGED: Interface Ethernet1/0, changed state to administratively down
*Nov 19 00:41:07.939: %LINK-5-CHANGED: Interface Ethernet1/1, changed state to administratively down
*Nov 19 00:41:07.939: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to administratively down
ALS2(config-if-range)#
*Nov 19 00:41:07.939: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to administratively down
*Nov 19 00:41:07.949: %LINK-5-CHANGED: Interface Ethernet2/0, changed state to administratively down
*Nov 19 00:41:07.949: %LINK-5-CHANGED: Interface Ethernet2/1, changed state to administratively down
*Nov 19 00:41:07.949: %LINK-5-CHANGED: Interface Ethernet2/2, changed state to administratively down
*Nov 19 00:41:07.959: %LINK-5-CHANGED: Interface Ethernet2/3, changed state to administratively down
*Nov 19 00:41:08.929: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*Nov 19 00:41:08.929: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
*Nov 19 00:41:08.929: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to down
*Nov 19 00:41:08.939: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to down
*Nov 19 00:41:08.939: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
*Nov 19 00:41:08.939: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to down
*Nov 19 00:41:08.939: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/3, changed state to down
ALS2(config-if-range)#
*Nov 19 00:41:08.949: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to down
*Nov 19 00:41:08.949: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to down
*Nov 19 00:41:08.949: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to down
*Nov 19 00:41:08.964: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to down
ALS2(config-if-range)#
```

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

Nombramos cada dispositivo, se usaron los siguientes comando en cada uno de los switch para nombrarlos.

```
DLS1#hostname DLS1
```

```
DLS1#hostname DLS1
```

```
DLS2#hostname DLS2
```

```
DLS2#hostname DLS2
```

```
ALS1#hostname ALS1
```

```
ALS1#hostname ALS1
```

```
ALS2#hostname ALS2
```

```
ALS2#hostname ALS2
```

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

1) La conexión entre DLS1 y DLS2 será un EtherChannel capa-3 utilizando LACP. Para DLS1 se utilizará la dirección IP 10.12.12.1/30 y para DLS2 utilizará 10.12.12.2/30

Ingresaremos a DLS1 para configurar el modo port-channel para poder agrupar lógicamente los enlaces físicos ethernet asignandos. LACP lo configuraremos para lograr la comunicación entre mismas interfaces asignando las ip indicadas. El comando channel-group nos permitirá asignar y configurar la interfaz física.

**SWICHTH DLS1**

```
DLS1(config)#interface port-channel 12
```

```
DLS1(config-if)#no switchport
```

```
DLS1(config-if)#ip address 10.12.12.1 2
```

```
*Nov 19 03:26:29.597: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel12, changed state to up
```

```
DLS1(config-if)#ip address 10.12.12.1 255.255.255.252
```

```
DLS1(config-if)#exit
```

```
DLS1(config)#interface range e0/1-2
```

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

```
DLS1(config-if-range)#channel-group
```

```
% Incomplete command.
```

```
DLS1(config-if-range)#channel-group 12 mode active
```

```
DLS1(config-if-range)#exit
```

Figura 28 - Configurando puertos troncales en DLS1

```
DLS1(config-if-range)#exit
DLS1(config)#inter
DLS1(config)#interface por
DLS1(config)#interface port-c
DLS1(config)#interface port-channel 12
DLS1(config-if)#no sw
DLS1(config-if)#no switchport
DLS1(config-if)#ip add
DLS1(config-if)#ip address 10.12.12.1 2
*Nov 19 03:26:29.597: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel12, changed state to up
DLS1(config-if)#ip address 10.12.12.1 255.255.255.252
DLS1(config-if)#exit
DLS1(config)#inter
DLS1(config)#interface ran
DLS1(config)#interface range e0/1-2
DLS1(config-if-range)#no sw
DLS1(config-if-range)#no switchport
DLS1(config-if-range)#cha
DLS1(config-if-range)#channel-gro
DLS1(config-if-range)#channel-group
% Incomplete command.

DLS1(config-if-range)#channel-group 12 mode active
DLS1(config-if-range)#exit
```

Ingresaremos a DLS2 para configurar el modo port-channel para poder agrupar lógicamente los enlaces físicos ethernet asignados. LACP lo configuraremos para lograr la comunicación entre mismas interfaces asignando las ip indicadas. El comando channel-group nos permitirá asignar y configurar la interfaz física.

### SWICTH DLS2

```
DLS2(config)#interfa
DLS2(config)#interface por
DLS2(config)#interface port-c
DLS2(config)#interface port-channel 12
DLS2(config-if)#no sw
DLS2(config-if)#no switchport
DLS2(config-if)#ip add
DLS2(config-if)#ip address 10.12.12.2
*Nov 19 03:37:32.499: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-
channel12, changed state to up
DLS2(config-if)#ip address 10.12.12.2 255.255.255.252
DLS2(config-if)#exit
DLS2(config)#inter ran
DLS2(config)#inter range e0/1-2
DLS2(config-if-range)#no sw
DLS2(config-if-range)#no switchport
DLS2(config-if-range)#chann
DLS2(config-if-range)#channel-gr
DLS2(config-if-range)#channel-group 12 mode ac
DLS2(config-if-range)#channel-group 12 mode active
DLS2(config-if-range)#exit
```

Figura 29 - Configurando puertos troncales en DLS2

```
DLS2(config)#interfa
DLS2(config)#interface por
DLS2(config)#interface port-c
DLS2(config)#interface port-channel 12
DLS2(config-if)#no sw
DLS2(config-if)#no switchport
DLS2(config-if)#ip add
DLS2(config-if)#ip address 10.12.12.2
*Nov 19 03:37:32.499: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel12, changed state to up
DLS2(config-if)#ip address 10.12.12.2 255.255.255.252
DLS2(config-if)#exit
DLS2(config)#inter ran
DLS2(config)#inter range e0/1-2
DLS2(config-if-range)#no sw
DLS2(config-if-range)#no switchport
DLS2(config-if-range)#chann
DLS2(config-if-range)#channel-gr
DLS2(config-if-range)#channel-group 12 mode ac
DLS2(config-if-range)#channel-group 12 mode active
DLS2(config-if-range)#exit
DLS2(config)#
```

Validamos con el comando Show etherchannel summary el cual nos muestra el estado de los puertos troncales entre DLS1 y DLS2, también podemos ver que LACP se encuentra activo.

Figura 30 - Show etherchannel summary

```
DLS2
ALS2
DLS1
ALS1

*Nov 19 03:38:43.679: %SYS-5-CONFIG_I: Configured from console by console
DLS1>ena
DLS1#show eth
DLS1#show etherc
DLS1#show etherchannel su
DLS1#show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone s - suspended
       H - Hot-standby (LACP only)
       R - Layer3        S - Layer2
       U - in use        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        Et2/2(P)  Et2/3(P)
12     Po12(RD)        LACP        Et0/1(D)  Et0/2(D)

DLS1#
```

Figura 31 - Show ethernchannel summary

```

w - waiting to be aggregated
d - default port

A - formed by Auto LAG

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

Group Port-channel Protocol Ports
-----
12 Po12(RD) LACP Et0/1(D) Et0/2(D)

DLS2#?
DLS2#show ethernchannel 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: 1
Number of aggregators: 1

Group Port-channel Protocol Ports
-----
12 Po12(RD) LACP Et0/1(D) Et0/2(D)

DLS2#
  
```

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

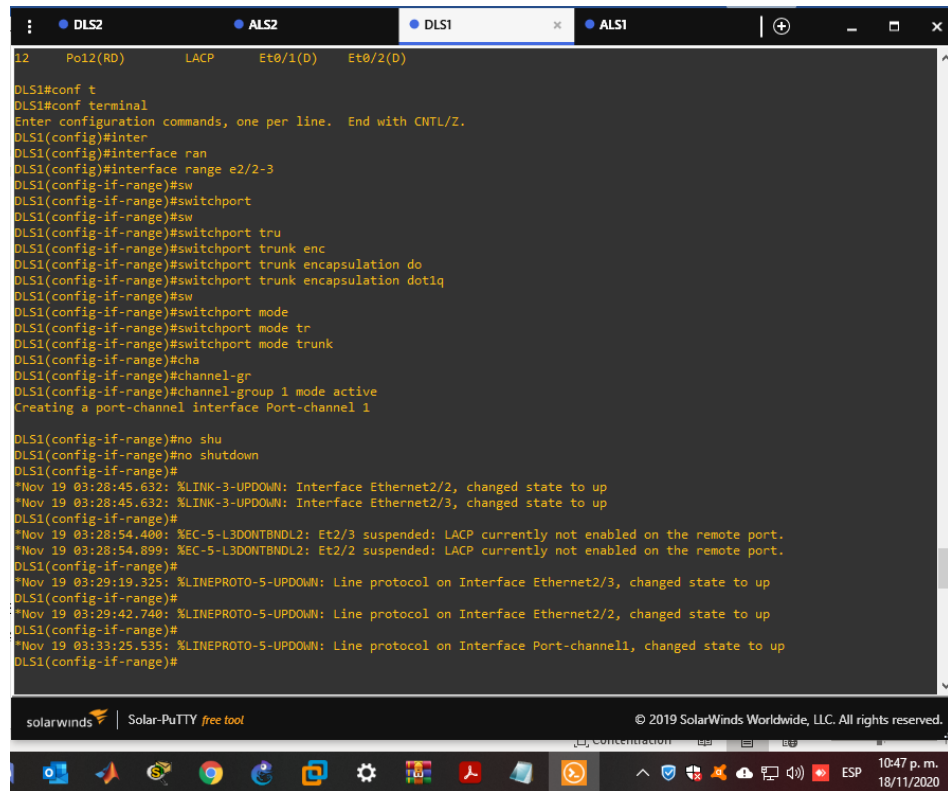
Configuramos los puertos troncales en DLS1 Y DLS2 para comunicación con ALS1 y ALS2, en estos swiches también se configurará igual que en el punto anterior. Activamos el modo switchport y encapsulamos, para después activar el modo troncal y subir la interfaz.

### SWITCH DLS1

```

DLS1(config)#interface ran
DLS1(config)#interface range e2/2-3
DLS1(config-if-range)#switchport trunk encapsulation dot1q
DLS1(config-if-range)#switchport mode trunk
DLS1(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1
DLS1(config-if-range)#no shutdown
*Nov 19 03:28:45.632: %LINK-3-UPDOWN: Interface Ethernet2/2, changed state to up
*Nov 19 03:28:45.632: %LINK-3-UPDOWN: Interface Ethernet2/3, changed state to up
  
```

Figura 32 - Puertos troncales en DLS1



```
DLS1#conf t
DLS1#conf terminal
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#inter
DLS1(config)#interface ran
DLS1(config)#interface range e2/2-3
DLS1(config-if-range)#sw
DLS1(config-if-range)#switchport
DLS1(config-if-range)#sw
DLS1(config-if-range)#switchport tru
DLS1(config-if-range)#switchport trunk enc
DLS1(config-if-range)#switchport trunk encapsulation do
DLS1(config-if-range)#switchport trunk encapsulation dot1q
DLS1(config-if-range)#sw
DLS1(config-if-range)#switchport mode
DLS1(config-if-range)#switchport mode tr
DLS1(config-if-range)#switchport mode trunk
DLS1(config-if-range)#cha
DLS1(config-if-range)#channel-gr
DLS1(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1

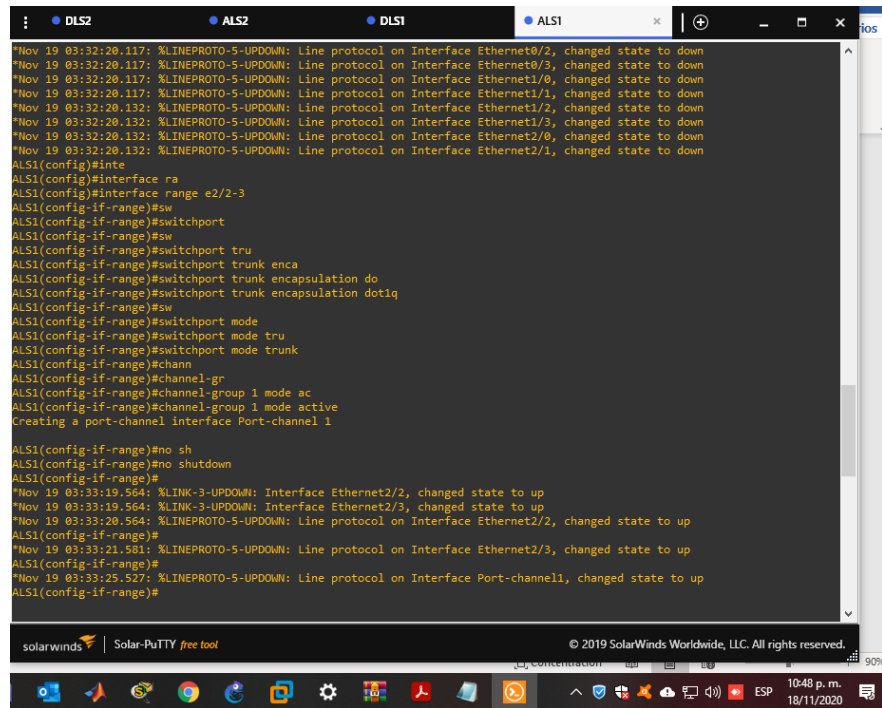
DLS1(config-if-range)#no shu
DLS1(config-if-range)#no shutdown
DLS1(config-if-range)#
*Nov 19 03:28:45.632: %LINK-3-UPDOWN: Interface Ethernet2/2, changed state to up
*Nov 19 03:28:45.632: %LINK-3-UPDOWN: Interface Ethernet2/3, changed state to up
DLS1(config-if-range)#
*Nov 19 03:28:54.400: %EC-5-L3DONTBNDL2: Et2/3 suspended: LACP currently not enabled on the remote port.
*Nov 19 03:28:54.899: %EC-5-L3DONTBNDL2: Et2/2 suspended: LACP currently not enabled on the remote port.
DLS1(config-if-range)#
*Nov 19 03:29:19.325: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to up
DLS1(config-if-range)#
*Nov 19 03:29:42.740: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to up
DLS1(config-if-range)#
*Nov 19 03:33:25.535: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel1, changed state to up
DLS1(config-if-range)#
```

## SWITCH ASL1

Configuramos los puertos troncales en DLS1 Y DLS2 para comunicación con ALS1 y ALS2. Activamos el modo switchport y encapsulamos, para después activar el modo troncal y subir la interfaz.

```
ALS1(config)#interface range e2/2-3
ALS1(config-if-range)#switchport trunk encapsulation dot1q
ALS1(config-if-range)#switchport mode trunk
ALS1(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1
ALS1(config-if-range)#no shutdown
ALS1(config-if-range)#
*Nov 19 03:33:19.564: %LINK-3-UPDOWN: Interface Ethernet2/2, changed state to up
*Nov 19 03:33:19.564: %LINK-3-UPDOWN: Interface Ethernet2/3, changed state to up
*Nov 19 03:33:20.564: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to up
```

Figura 33 - Puertos troncales ALS1



```
Nov 19 03:32:20.117: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
Nov 19 03:32:20.117: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to down
Nov 19 03:32:20.117: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to down
Nov 19 03:32:20.117: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
Nov 19 03:32:20.132: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to down
Nov 19 03:32:20.132: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/3, changed state to down
Nov 19 03:32:20.132: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to down
Nov 19 03:32:20.132: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to down
ALS1(config)#inte
ALS1(config)#interface ra
ALS1(config)#interface range e2/2-3
ALS1(config-if-range)#sw
ALS1(config-if-range)#switchport
ALS1(config-if-range)#sw
ALS1(config-if-range)#switchport tru
ALS1(config-if-range)#switchport trunk enca
ALS1(config-if-range)#switchport trunk encapsulation do
ALS1(config-if-range)#switchport trunk encapsulation dot1q
ALS1(config-if-range)#sw
ALS1(config-if-range)#switchport mode
ALS1(config-if-range)#switchport mode tru
ALS1(config-if-range)#switchport mode trunk
ALS1(config-if-range)#chann
ALS1(config-if-range)#channel-gr
ALS1(config-if-range)#channel-group 1 mode ac
ALS1(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1
ALS1(config-if-range)#no sh
ALS1(config-if-range)#no shutdown
ALS1(config-if-range)#
Nov 19 03:33:19.564: %LINK-3-UPDOWN: Interface Ethernet2/2, changed state to up
Nov 19 03:33:19.564: %LINK-3-UPDOWN: Interface Ethernet2/3, changed state to up
Nov 19 03:33:20.564: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to up
ALS1(config-if-range)#
Nov 19 03:33:21.581: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to up
ALS1(config-if-range)#
Nov 19 03:33:25.527: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel1, changed state to up
ALS1(config-if-range)#
```

### SWITCH DLS2

Configuramos los puertos troncales en DLS1 Y DLS2 para comunicación con ALS1 y ALS2. Activamos el modo switchport y encapsulamos, para después activar el modo troncal y subir la interfaz.

### DLS2#CONF T

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

```
DLS2(config)#interface range e1/0-1
DLS2(config-if-range)#switchport
DLS2(config-if-range)#switchport trunk encapsulation dot1q
DLS2(config-if-range)#switchport mode trunk
DLS2(config-if-range)#channel-group 2 mode active
Creating a port-channel interface Port-channel 2
DLS2(config-if-range)#no shutdown
DLS2(config-if-range)#exit
```

Figura 34 - Puertos troncales en DLS2

```

Group  Port-channel  Protocol  Ports
-----
12    Po12(RD)        LACP      Et0/1(D)  Et0/2(D)

DLS2#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#inter
DLS2(config)#interface rang
DLS2(config)#interface range e1/0-1
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport trun
DLS2(config-if-range)#switchport trunk en
DLS2(config-if-range)#switchport trunk encapsulation do
DLS2(config-if-range)#switchport trunk encapsulation dot1q
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport mode tr
DLS2(config-if-range)#switchport mode trunk
DLS2(config-if-range)#cha
DLS2(config-if-range)#channel-gr
DLS2(config-if-range)#channel-group 2 mode ac
DLS2(config-if-range)#channel-group 2 mode active
Creating a port-channel interface Port-channel 2

DLS2(config-if-range)#no shu
DLS2(config-if-range)#no shutdown
DLS2(config-if-range)#exit
DLS2(config)#
*Nov 19 03:50:45.945: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Nov 19 03:50:45.945: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
*Nov 19 03:50:46.954: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
*Nov 19 03:50:46.954: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
DLS2(config)#
*Nov 19 03:50:51.758: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel2, changed state to up
DLS2(config)#
DLS2#
*Nov 19 03:50:58.040: %SYS-5-CONFIG_I: Configured from console by console
DLS2#

```

### SWICTH ALS2

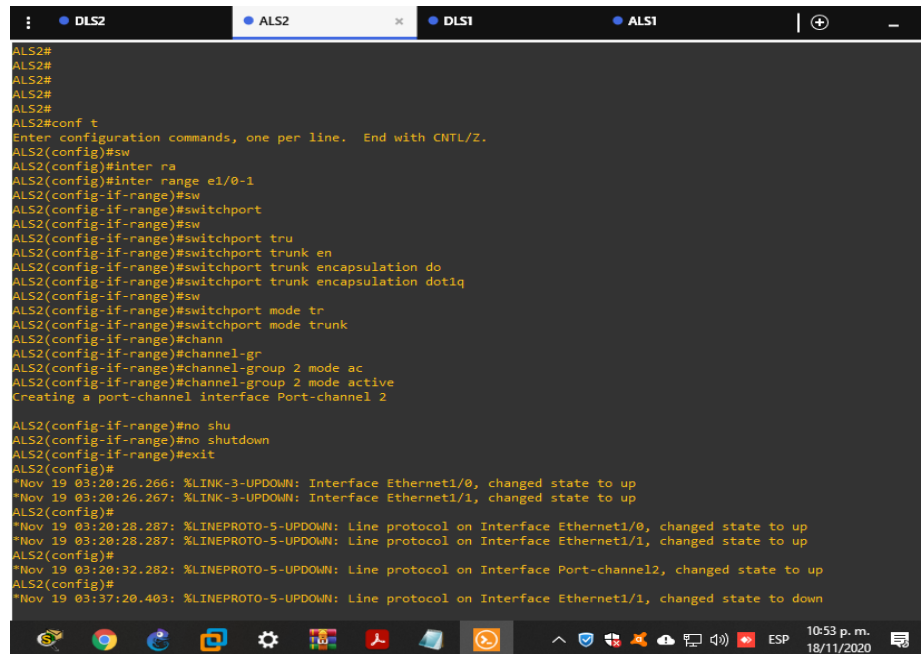
Configuramos los puertos troncales en DLS1 Y DLS2 para comunicación con ALS1 y ALS2. Activamos el modo switchport y encapsulamos, para después activar el modo troncal y subir la interfaz.

```

ALS2(config)#inter range e1/0-1
ALS2(config-if-range)#switchport
ALS2(config-if-range)#switchport trunk encapsulation dot1q
ALS2(config-if-range)#switchport mode trunk
ALS2(config-if-range)#channel-group 2 mode active
Creating a port-channel interface Port-channel 2
ALS2(config-if-range)#no shutdown
ALS2(config-if-range)#exit
*Nov 19 03:20:26.266: %LINK-3-UPDOWN: Interface Ethernet1/0, changed
state to up
*Nov 19 03:20:26.267: %LINK-3-UPDOWN: Interface Ethernet1/1, changed
state to up
ALS2(config)#
*Nov 19 03:20:28.287: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet1/0, changed state to up
*Nov 19 03:20:28.287: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet1/1, changed state to up

```

Figura 35 - puertos troncales en ALS2



```
ALS2#
ALS2#
ALS2#
ALS2#
ALS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#sw
ALS2(config)#inter ra
ALS2(config)#inter range e1/0-1
ALS2(config-if-range)#sw
ALS2(config-if-range)#switchport
ALS2(config-if-range)#sw
ALS2(config-if-range)#switchport tru
ALS2(config-if-range)#switchport trunk en
ALS2(config-if-range)#switchport trunk encapsulation do
ALS2(config-if-range)#switchport trunk encapsulation dot1q
ALS2(config-if-range)#sw
ALS2(config-if-range)#switchport mode tr
ALS2(config-if-range)#switchport mode trunk
ALS2(config-if-range)#chann
ALS2(config-if-range)#channel-gr
ALS2(config-if-range)#channel-group 2 mode ac
ALS2(config-if-range)#channel-group 2 mode active
Creating a port-channel interface Port-channel 2

ALS2(config-if-range)#no shu
ALS2(config-if-range)#no shutdown
ALS2(config-if-range)#exit
ALS2(config)#
*Nov 19 03:20:26.266: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Nov 19 03:20:26.267: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
ALS2(config)#
*Nov 19 03:20:28.287: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
*Nov 19 03:20:28.287: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
ALS2(config)#
*Nov 19 03:20:32.282: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel2, changed state to up
ALS2(config)#
*Nov 19 03:37:20.403: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
```

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

Los puertos troncales que conectaran DLS1-ALS2 y DLS2-ALS1 se configurarán en modo PAgP, recordando que PAgP puede unir hasta 8 interfaces del mismo tipo. No se pueden mezclar interfaces de diferentes velocidades. PAgP envía mensajes de control cada 30 segundos. Para esto usaremos el comando channel-group 4 mode desirable antes de subir la interfaz. Esta configuración se hace en el rango de ambas interfaces, activando el modo switchport, luego el encapsulamiento. Activamos el modo troncal y luego subimos la interfaz. Esto se realizará para los 4 swiches en el rango de interfaces que los interconectan DLS1-ALS2 y DLS2-ALS1.

**SWITCH DLS1**

```
DLS1>ena
DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface range e2/0-1
DLS1(config-if-range)#switchport
DLS1(config-if-range)#switchport trunk encapsulation dot1q
DLS1(config-if-range)#switchport mode trunk
DLS1(config-if-range)#channel-group 4 mode desirable
Creating a port-channel interface Port-channel 4
DLS1(config-if-range)#no shutdown
DLS1(config-if-range)#exit
```

```

*Nov 20 00:20:19.024: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet2/1, changed state to up
*Nov 20 00:20:19.590: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet2/0, changed state to up
DLS1(config)#

```

Figura 36 - Pág DLS1

```

DLS1>ena
DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface range e2/0-1
DLS1(config-if-range)#sw
DLS1(config-if-range)#switchport
DLS1(config-if-range)#sw
DLS1(config-if-range)#switchport tru
DLS1(config-if-range)#switchport trunk enc
DLS1(config-if-range)#switchport trunk encapsulation do
DLS1(config-if-range)#switchport trunk encapsulation dot1q
DLS1(config-if-range)#sw
DLS1(config-if-range)#switchport mode trunk
DLS1(config-if-range)#channel-group 4 mode desirable
Creating a port-channel interface Port-channel 4

DLS1(config-if-range)#no shutdown
DLS1(config-if-range)#exit
DLS1(config)#
*Nov 20 00:20:08.165: %LINK-3-UPDOWN: Interface Ethernet2/0, changed state to up
*Nov 20 00:20:08.165: %LINK-3-UPDOWN: Interface Ethernet2/1, changed state to up
DLS1(config)#
*Nov 20 00:20:19.024: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to up
*Nov 20 00:20:19.590: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to up

```

## SWITCH ALS2

```

ALS2#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#interface range e2/0-1
ALS2(config-if-range)#switchport
ALS2(config-if-range)#switchport trunk encapsulation dot1q
ALS2(config-if-range)#switchport mode trunk
ALS2(config-if-range)#channel-group 4 mode desirable
Creating a port-channel interface Port-channel 4
ALS2(config-if-range)#no shutdown
*Nov 20 00:54:24.853: %LINK-3-UPDOWN: Interface Ethernet2/0, changed
state to up
*Nov 20 00:54:24.853: %LINK-3-UPDOWN: Interface Ethernet2/1, changed
state to up
*Nov 20 00:54:25.858: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet2/0, changed state to up
*Nov 20 00:54:25.858: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet2/1, changed state to up
ALS2(config-if-range)#

```

\*Nov 20 00:54:31.469: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel4, changed state to up  
 ALS2(config-if-range)#

Figura 37 - Port channel en ALS2

```

ALS2#
ALS2#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#interface range e2/0-1
ALS2(config-if-range)#sw
ALS2(config-if-range)#switchport
ALS2(config-if-range)#swi
ALS2(config-if-range)#switchport tru
ALS2(config-if-range)#switchport trunk enc
ALS2(config-if-range)#switchport trunk encapsulation do
ALS2(config-if-range)#switchport trunk encapsulation dot1q
ALS2(config-if-range)#sw
ALS2(config-if-range)#switchport mode trunk
ALS2(config-if-range)#chann
ALS2(config-if-range)#channel-gr
ALS2(config-if-range)#channel-group 4 mode des
ALS2(config-if-range)#channel-group 4 mode desirable
Creating a port-channel interface Port-channel 4

ALS2(config-if-range)#no shu
ALS2(config-if-range)#no shutdown
ALS2(config-if-range)#
*Nov 20 00:54:24.853: %LINK-3-UPDOWN: Interface Ethernet2/0, changed state to up
*Nov 20 00:54:24.853: %LINK-3-UPDOWN: Interface Ethernet2/1, changed state to up
*Nov 20 00:54:25.858: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to up
*Nov 20 00:54:25.858: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to up
ALS2(config-if-range)#
*Nov 20 00:54:31.469: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel4, changed state to up
ALS2(config-if-range)#
  
```

Verificamos con el comando Show etherchannel summary que efectivamente se ve que está activo el modo PAgP en el swich DLS1 y ALS2.

Figura 38 - Show etherchannel summary DLS1

```

Press RETURN to get started.

*Nov 20 00:30:09.273: %SYS-5-CONFIG_I: Configured from console by console
*Nov 20 00:54:31.466: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel4, changed state to up
DLS1>
DLS1>
DLS1>ena
DLS1#show eth
DLS1#show etherc
DLS1#show etherchannel sum
DLS1#show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone  s - suspended
       H - Hot-standby (LACP only)
       R - Layer3       S - Layer2
       U - in use       N - not in use, no aggregation
       f - failed to allocate aggregator

       N - not in use, minimum links not met
       n - 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: 3
Number of aggregators:          3

Group  Port-channel  Protocol    Ports
-----
1      Po1(SU)           LACP       Et2/2(P)  Et2/3(P)
4      Po4(SU)           PAgP       Et2/0(P)  Et2/1(P)
12     Po12(RD)          LACP       Et0/1(D)  Et0/2(D)
  
```

Figura 39 - Show etherchannel summary ALS2

```

DLS2 ALS2 DLS1 ALS1
*Nov 20 00:54:24.853: %LINK-3-UPDOWN: Interface Ethernet2/0, changed state to up
*Nov 20 00:54:24.853: %LINK-3-UPDOWN: Interface Ethernet2/1, changed state to up
*Nov 20 00:54:25.858: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to up
*Nov 20 00:54:25.858: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to up
ALS2(config-if-range)#
*Nov 20 00:54:31.469: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel4, changed state to up
ALS2(config-if-range)#^Z
ALS2#
*Nov 20 01:21:29.943: %SYS-5-CONFIG_I: Configured from console by console
ALS2#show eth
ALS2#show etherc
ALS2#show etherchannel summ
ALS2#show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone  s - suspended
       H - Hot-standby (LACP only)
       R - Layer3      S - Layer2
       U - in use      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
-----+-----+-----+-----
2      Po2(SU)         LACP        Et1/0(P)  Et1/1(P)
4      Po4(SU)         PAgP        Et2/0(P)  Et2/1(P)
ALS2#

```

Realizamos la misma configuración en DLS2 Y ALS1 para los puertos troncales como en DLS1 y ALS2.

**SWITCH DLS2**

```

DLS2(config)#interface range e2/0-1
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport
DLS2(config-if-range)#switchport trunk encapsulation dot1q
DLS2(config-if-range)#switchport mode trunk
DLS2(config-if-range)#channel-group 3 mode desirable
Creating a port-channel interface Port-channel 3
DLS2(config-if-range)#no shutdown
DLS2(config-if-range)#exit
DLS2(config)#
*Nov 20 01:26:24.571: %LINK-3-UPDOWN: Interface Ethernet2/0, changed state to up
*Nov 20 01:26:24.571: %LINK-3-UPDOWN: Interface Ethernet2/1, changed state to up

```

Figura 40 - Port Channel en DLS2

```
DLS2
ALS2
DLS1
ALS1

DLS2(config)#interf
DLS2(config)#interface ran
DLS2(config)#interface range 2/0-1
^
% Invalid input detected at '^' marker.

DLS2(config)#interface range e2/0-1
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport trunk
DLS2(config-if-range)#switchport trunk enca
DLS2(config-if-range)#switchport trunk encapsulation do
DLS2(config-if-range)#switchport trunk encapsulation dot1q
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport mode
DLS2(config-if-range)#switchport mode tru
DLS2(config-if-range)#switchport mode trunk
DLS2(config-if-range)#chann
DLS2(config-if-range)#channel-gr
DLS2(config-if-range)#channel-group 3 mode
DLS2(config-if-range)#channel-group 3 mode des
DLS2(config-if-range)#channel-group 3 mode desirable
Creating a port-channel interface Port-channel 3

DLS2(config-if-range)#no s
DLS2(config-if-range)#no s
% Ambiguous command: "no s"
DLS2(config-if-range)#no sh
DLS2(config-if-range)#no shutdown
DLS2(config-if-range)#exit
DLS2(config)#
*Nov 20 01:26:24.571: %LINK-3-UPDOWN: Interface Ethernet2/0, changed state to up
*Nov 20 01:26:24.571: %LINK-3-UPDOWN: Interface Ethernet2/1, changed state to up
DLS2(config)#
*Nov 20 01:26:36.099: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to up
*Nov 20 01:26:36.455: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to up
DLS2(config)#
```

```
ALS1#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#interface range e2/0-1
ALS1(config-if-range)#switchport
ALS1(config-if-range)#switchport trunk encapsulation dot1q
ALS1(config-if-range)#switchport mode trunk
ALS1(config-if-range)#channel-group 3 mode desirable
Creating a port-channel interface Port-channel 3
ALS1(config-if-range)#no shutdown
```

Figura 41 - Port channel ALS1

```

ALS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#
ALS1(config)#inter
ALS1(config)#interface ran
ALS1(config)#interface range e2/0-1
ALS1(config-if-range)#sw
ALS1(config-if-range)#switchport
ALS1(config-if-range)#sw
ALS1(config-if-range)#switchport tru
ALS1(config-if-range)#switchport trunk enc
ALS1(config-if-range)#switchport trunk encapsulation do
ALS1(config-if-range)#switchport trunk encapsulation dot1q
ALS1(config-if-range)#sw
ALS1(config-if-range)#switchport mode tr
ALS1(config-if-range)#switchport mode trunk
ALS1(config-if-range)#chann
ALS1(config-if-range)#channel-gro
ALS1(config-if-range)#channel-group 3 mode desirable
Creating a port-channel interface Port-channel 3

ALS1(config-if-range)#no shu
ALS1(config-if-range)#no shutdown
ALS1(config-if-range)#
*Nov 20 01:28:49.494: %LINK-3-UPDOWN: Interface Ethernet2/0, changed state to up
*Nov 20 01:28:49.494: %LINK-3-UPDOWN: Interface Ethernet2/1, changed state to up
*Nov 20 01:28:50.501: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to up
*Nov 20 01:28:50.501: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to up
ALS1(config-if-range)#
*Nov 20 01:28:56.245: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel3, changed state to up
ALS1(config-if-range)#

```

Verificamos con el comando Show etherchannel summary que efectivamente se ve que está activo el modo PAgP en el switch DLS2 y ALS1.

Figura 42 - Show etherchannel summary DLS2

```

DLS2#show etherchannel summ
DLS2#show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone  S - suspended
       H - Hot-standby (LACP only)
       R - Layer3       S - Layer2
       U - in use       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: 3
Number of aggregators:          3

Group  Port-channel  Protocol    Ports
-----
2      Po2(SU)          LACP       Et1/0(P)  Et1/1(P)
3      Po3(SU)          PAgP       Et2/0(P)  Et2/1(P)
12     Po12(RD)         LACP       Et0/1(D)  Et0/2(D)
DLS2#

```

Figura 43 - Show etherchannel ALS1

```

Nov 20 01:28:50.501: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to up
Nov 20 01:28:50.501: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to up
ALS1(config-if-range)#
Nov 20 01:28:56.245: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel3, changed state to up
ALS1(config-if-range)#^Z
ALS1#^Z
ALS1#show
ALS1#show
Nov 20 01:31:54.940: %SYS-5-CONFIG_I: Configured from console by console
ALS1#show ether
ALS1#show etherc
ALS1#show etherchannel summ
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        Et2/2(P)  Et2/3(P)
3      Po3(SU)        PAgP        Et2/0(P)  Et2/1(P)
ALS1#

```

4) Todos los puertos troncales serán asignados a la VLAN 500 como la VLAN nativa.  
Switch DLS1

Para configurar la ID de VLAN nativa para la interfaz Ethernet virtual, usamos el comando switchport trunk native vlan. Con el comando switchport nonegotiate se fuerza siempre al puerto a permanecer en modo troncal, pero no envía tramas DTP. Los vecinos deberán establecer el modo troncal en el enlace de forma manual. Luego de esto procedemos a colocar el modo troncal y subimos la interfaz. Esta configuración se realizará en los cuatro swiches asignando los puertos troncales de cada dispositivo a la vlan 500 como vlan nativa.

**SWITCH DLS1**

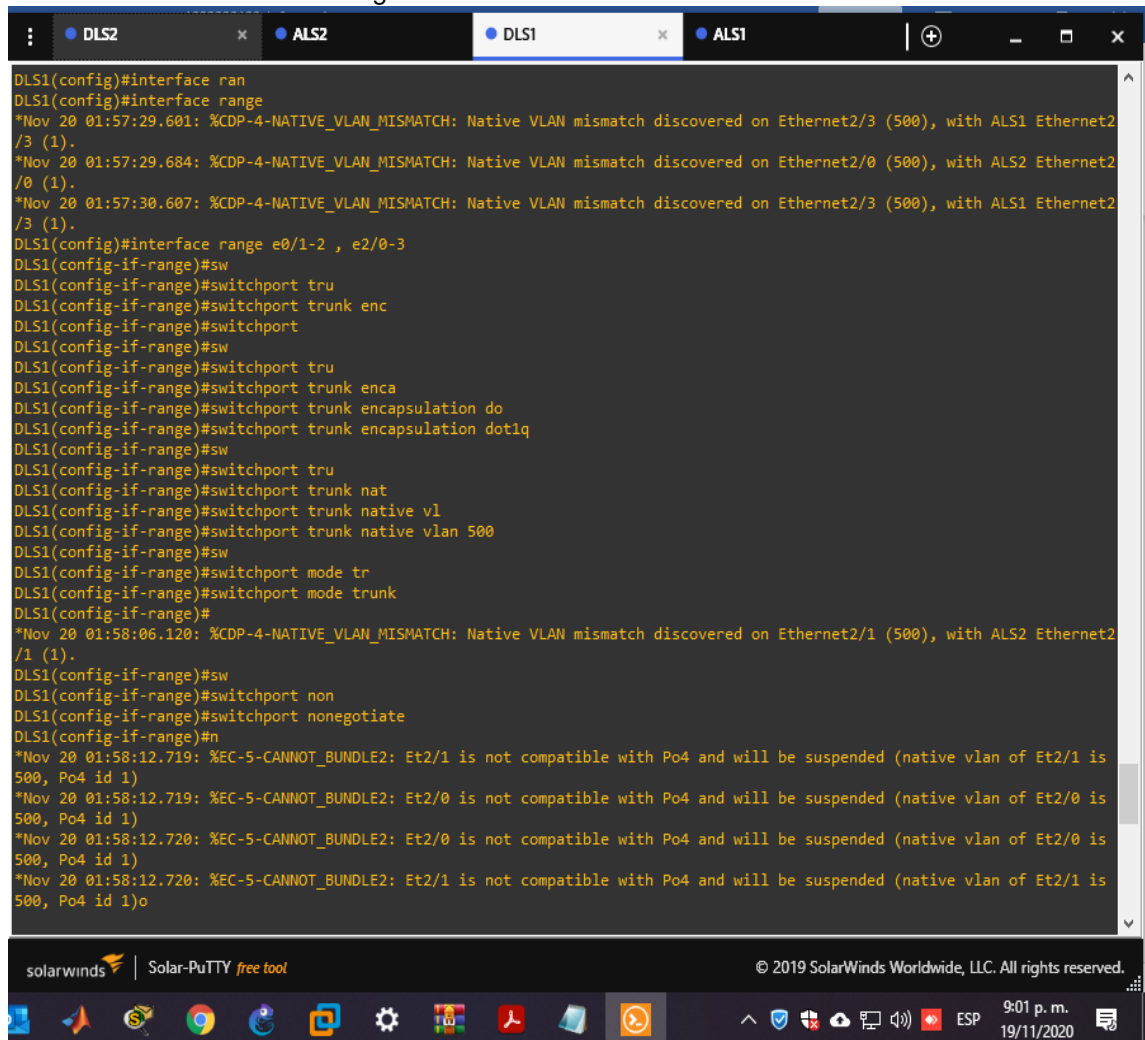
```

DLS1(config)#interface range e0/1-2 , e2/0-3
DLS1(config-if-range)#switchport
DLS1(config-if-range)#switchport trunk encapsulation dot1q
DLS1(config-if-range)#switchport trunk native vlan 500
DLS1(config-if-range)#switchport mode trunk
DLS1(config-if-range)#switchport nonegotiate
DLS1(config-if-range)#no shutdown
DLS1(config-if-range)#exit

```

DLS1(config)#

Figura 44 - Puertos troncales en DLS1



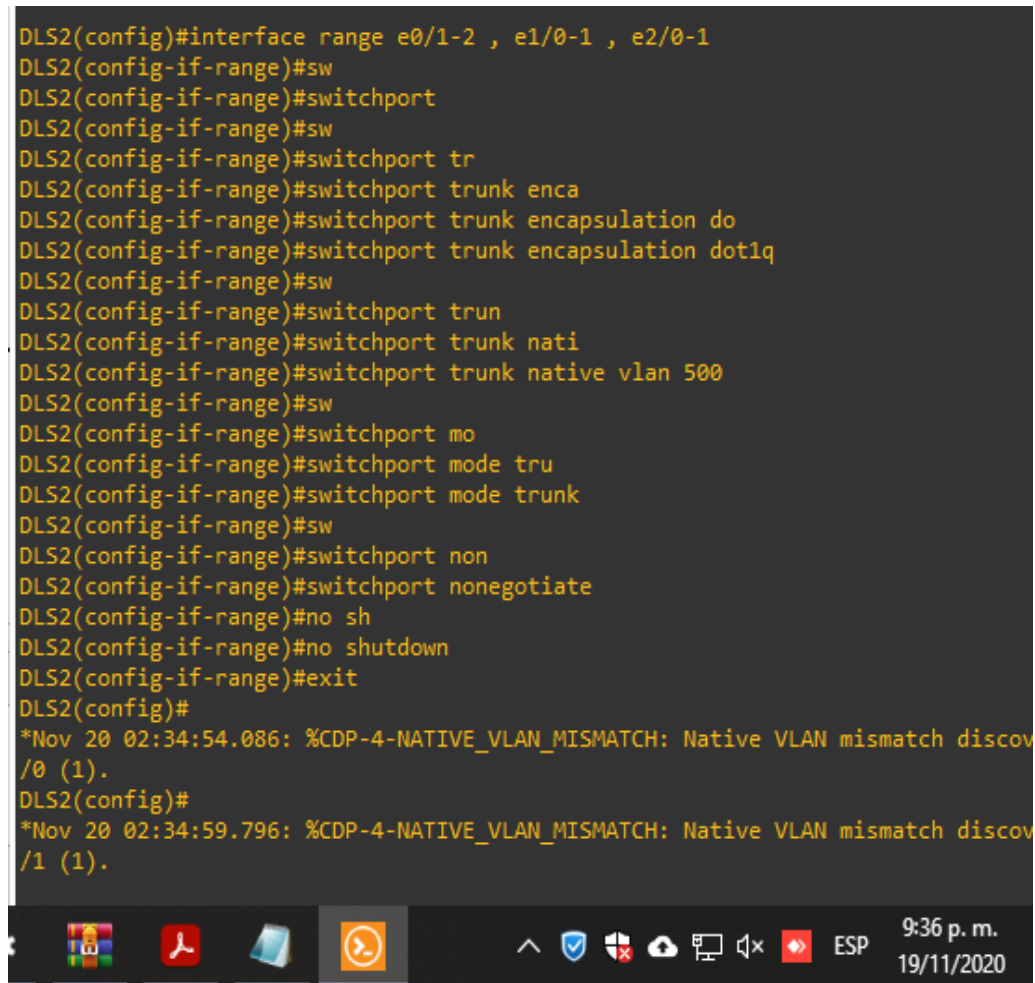
```
DLS1(config)#interface ran
DLS1(config)#interface range
*Nov 20 01:57:29.601: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/3 (500), with ALS1 Ethernet2
/3 (1).
*Nov 20 01:57:29.684: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/0 (500), with ALS2 Ethernet2
/0 (1).
*Nov 20 01:57:30.607: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/3 (500), with ALS1 Ethernet2
/3 (1).
DLS1(config)#interface range e0/1-2 , e2/0-3
DLS1(config-if-range)#sw
DLS1(config-if-range)#switchport tru
DLS1(config-if-range)#switchport trunk enc
DLS1(config-if-range)#switchport
DLS1(config-if-range)#sw
DLS1(config-if-range)#switchport tru
DLS1(config-if-range)#switchport trunk enca
DLS1(config-if-range)#switchport trunk encapsulation do
DLS1(config-if-range)#switchport trunk encapsulation dot1q
DLS1(config-if-range)#sw
DLS1(config-if-range)#switchport tru
DLS1(config-if-range)#switchport trunk nat
DLS1(config-if-range)#switchport trunk native vl
DLS1(config-if-range)#switchport trunk native vlan 500
DLS1(config-if-range)#sw
DLS1(config-if-range)#switchport mode tr
DLS1(config-if-range)#switchport mode trunk
DLS1(config-if-range)#
*Nov 20 01:58:06.120: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/1 (500), with ALS2 Ethernet2
/1 (1).
DLS1(config-if-range)#sw
DLS1(config-if-range)#switchport non
DLS1(config-if-range)#switchport nonegotiate
DLS1(config-if-range)#n
*Nov 20 01:58:12.719: %EC-5-CANNOT_BUNDLE2: Et2/1 is not compatible with Po4 and will be suspended (native vlan of Et2/1 is
500, Po4 id 1)
*Nov 20 01:58:12.719: %EC-5-CANNOT_BUNDLE2: Et2/0 is not compatible with Po4 and will be suspended (native vlan of Et2/0 is
500, Po4 id 1)
*Nov 20 01:58:12.720: %EC-5-CANNOT_BUNDLE2: Et2/0 is not compatible with Po4 and will be suspended (native vlan of Et2/0 is
500, Po4 id 1)
*Nov 20 01:58:12.720: %EC-5-CANNOT_BUNDLE2: Et2/1 is not compatible with Po4 and will be suspended (native vlan of Et2/1 is
500, Po4 id 1)
o
```

## Switch DLS2

```
DLS2(config)#interface range e0/1-2 , e1/0-1 , e2/0-1
DLS2(config-if-range)#switchport
DLS2(config-if-range)#switchport trunk encapsulation dot1q
DLS2(config-if-range)#switchport trunk native vlan 500
DLS2(config-if-range)#switchport mode trunk
DLS2(config-if-range)#switchport nonegotiate
DLS2(config-if-range)#no shutdown
DLS2(config-if-range)#exit
```

Figura 45 - Puertos troncales en DLS2

```
DLS2(config)#interface range e0/1-2 , e1/0-1 , e2/0-1
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport tr
DLS2(config-if-range)#switchport trunk enca
DLS2(config-if-range)#switchport trunk encapsulation do
DLS2(config-if-range)#switchport trunk encapsulation dot1q
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport trun
DLS2(config-if-range)#switchport trunk nati
DLS2(config-if-range)#switchport trunk native vlan 500
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport mo
DLS2(config-if-range)#switchport mode tru
DLS2(config-if-range)#switchport mode trunk
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport non
DLS2(config-if-range)#switchport nonegotiate
DLS2(config-if-range)#no sh
DLS2(config-if-range)#no shutdown
DLS2(config-if-range)#exit
DLS2(config)#
*Nov 20 02:34:54.086: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/0 (1), with DLS2 Ethernet2/0 (500).
DLS2(config)#
*Nov 20 02:34:59.796: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/1 (1), with DLS2 Ethernet2/1 (500).
```



### SWITCH ASL1

```
ALS1(config)#
*Nov 20 02:42:07.800: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/0 (1), with DLS2 Ethernet2/0 (500).
ALS1(config)#inter
ALS1(config)#interface po1
ALS1(config-if)#switchport trunk na
*Nov 20 02:43:01.433: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/0 (1), with DLS2 Ethernet2/0 (500).
ALS1(config-if)#switchport trunk native vlan 500
ALS1(config-if)#exit
ALS1(config)#interface po3
ALS1(config-if)#switchport trunk native vlan 500
```

Figura 46 - puertos troncales en ALS1

```
ALS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#
*Nov 20 02:42:07.800: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/0 (1), with DLS2 Ethernet2/0
(500).
ALS1(config)#inter
ALS1(config)#interface po1
ALS1(config-if)#sw
ALS1(config-if)#switchport trun
ALS1(config-if)#switchport trunk na
*Nov 20 02:43:01.433: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/0 (1), with DLS2 Ethernet2/0
(500).
ALS1(config-if)#switchport trunk nati
ALS1(config-if)#switchport trunk native vla
ALS1(config-if)#switchport trunk native vlan 500
ALS1(config-if)#exit
ALS1(config)#inter
ALS1(config)#interface po3
ALS1(config-if)#sw
ALS1(config-if)#switchport trun
ALS1(config-if)#switchport trunk na
ALS1(config-if)#switchport trunk native vl
ALS1(config-if)#switchport trunk native vlan 500
ALS1(config-if)#
*Nov 20 02:43:16.359: %EC-5-CANNOT_BUNDLE2: Et2/0 is not compatible with Po3 and will be suspended (native vlan of Et2/0 is
1, Po3 id 500)
*Nov 20 02:43:16.359: %EC-5-COMPATIBLE: Et2/1 is compatible with port-channel members
ALS1(config-if)#
```

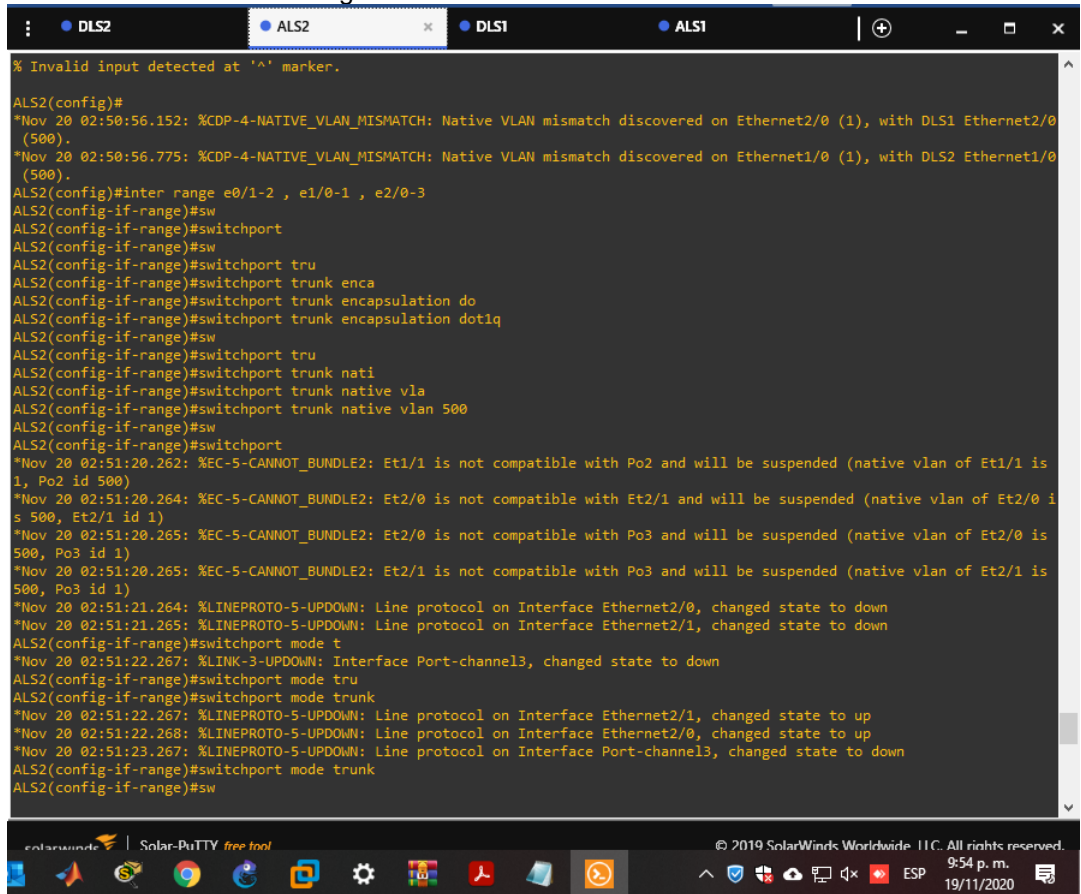
solarwinds | Solar-PuTTY free tool © 2019 SolarWinds Worldwide, LLC. All rights reserved.

9:43 p. m. 19/11/2020

## SWICTH ALS2

```
ALS2(config)#conf t
ALS2(config)#inter range e0/1-2 , e1/0-1 , e2/0-3
ALS2(config-if-range)#switchport
ALS2(config-if-range)#switchport trunk encapsulation dot1q
ALS2(config-if-range)#switchport trunk native vlan 500
ALS2(config-if-range)#switchport mode trunk
ALS2(config-if-range)#switchport nonegotiate
ALS2(config-if-range)#no shutdown
ALS2(config-if-range)#exit
ALS2(config)#
```

Figura 47 - Puertos troncales en ALS2



```
% Invalid input detected at '^' marker.
ALS2(config)#
*Nov 20 02:50:56.152: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/0 (500).
*Nov 20 02:50:56.775: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet1/0 (500).
ALS2(config)#inter range e0/1-2 , e1/0-1 , e2/0-3
ALS2(config-if-range)#sw
ALS2(config-if-range)#switchport
ALS2(config-if-range)#sw
ALS2(config-if-range)#switchport tru
ALS2(config-if-range)#switchport trunk enca
ALS2(config-if-range)#switchport trunk encapsulation do
ALS2(config-if-range)#switchport trunk encapsulation dot1q
ALS2(config-if-range)#sw
ALS2(config-if-range)#switchport tru
ALS2(config-if-range)#switchport trunk nati
ALS2(config-if-range)#switchport trunk native vla
ALS2(config-if-range)#switchport trunk native vlan 500
ALS2(config-if-range)#sw
ALS2(config-if-range)#switchport
*Nov 20 02:51:20.262: %EC-5-CANNOT_BUNDLE2: Et1/1 is not compatible with Po2 and will be suspended (native vlan of Et1/1 is 1, Po2 id 500)
*Nov 20 02:51:20.264: %EC-5-CANNOT_BUNDLE2: Et2/0 is not compatible with Et2/1 and will be suspended (native vlan of Et2/0 is 500, Et2/1 id 1)
*Nov 20 02:51:20.265: %EC-5-CANNOT_BUNDLE2: Et2/0 is not compatible with Po3 and will be suspended (native vlan of Et2/0 is 500, Po3 id 1)
*Nov 20 02:51:20.265: %EC-5-CANNOT_BUNDLE2: Et2/1 is not compatible with Po3 and will be suspended (native vlan of Et2/1 is 500, Po3 id 1)
*Nov 20 02:51:21.264: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to down
*Nov 20 02:51:21.265: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to down
ALS2(config-if-range)#switchport mode t
*Nov 20 02:51:22.267: %LINK-3-UPDOWN: Interface Port-channel3, changed state to down
ALS2(config-if-range)#switchport mode tru
ALS2(config-if-range)#switchport mode trunk
*Nov 20 02:51:22.267: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to up
*Nov 20 02:51:22.268: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to up
*Nov 20 02:51:23.267: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel3, changed state to down
ALS2(config-if-range)#switchport mode trunk
ALS2(config-if-range)#sw
```

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

Procederemos a activar el protocolo VLAN trunk el cual nos permitirá reducir la administración en un switch. Al configurar una VLAN nueva en un servidor VTP, se distribuye la VLAN a través de todos los switches del dominio. Esto reduce la necesidad de configurar la misma VLAN en todas partes.

Primero asignaremos el nombre de dominio de la VTP “CISCO” y luego colocaremos el password “CCNP321” Esto se realizará en cada swich.

**Swich DLS1**

DLS1>ena

DLS1#conf t

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

DLS1(config)#vt

DLS1(config)#vtp doma

```

DLS1(config)#vtp domain CISCO
Changing VTP domain name from NULL to CISCO
DLS1(config)#
*Nov 20 02:56:07.567: %SW_VLAN-6-VTP_DOMAIN_NAME_CHG: VTP domain
name changed to CISCO.
DLS1(config)#vtp pass
DLS1(config)#vtp password ccnp321
Setting device VTP password to ccnp321
DLS1(config)#end
DLS1#
*Nov 20 02:56:32.098: %SYS-5-CONFIG_I: Configured from console by console
DLS1#

```

Figura 48 - Creación user y password DLS1

```

DLS1>ena
DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#vt
DLS1(config)#vtp doma
DLS1(config)#vtp domain CISCO
Changing VTP domain name from NULL to CISCO
DLS1(config)#
*Nov 20 02:56:07.567: %SW_VLAN-6-VTP_DOMAIN_NAME_CHG: VTP domain name changed to CISCO.
DLS1(config)#vtp pass
DLS1(config)#vtp password ccnp321
Setting device VTP password to ccnp321
DLS1(config)#end
DLS1#
*Nov 20 02:56:32.098: %SYS-5-CONFIG_I: Configured from console by console
DLS1#

```

## SWITCH DLS2

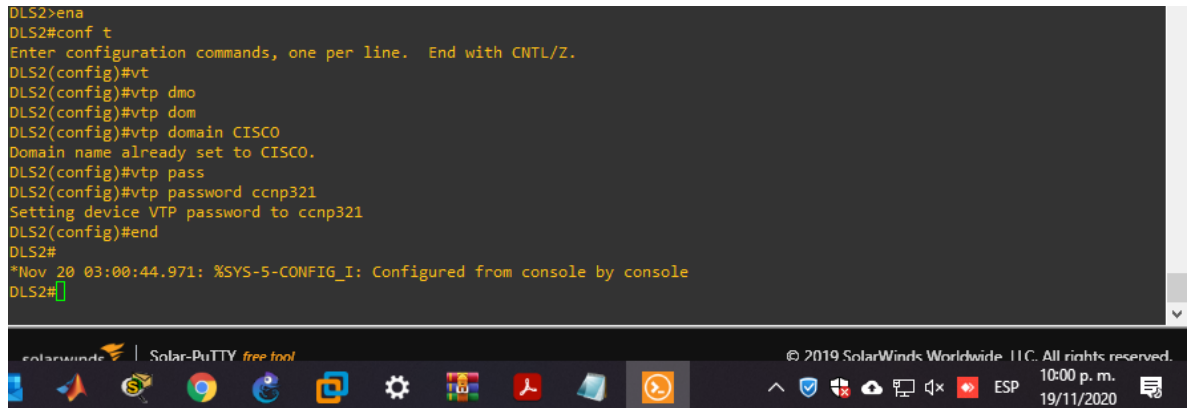
```

DLS2>ena
DLS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#vt
DLS2(config)#vtp dmo
DLS2(config)#vtp dom
DLS2(config)#vtp domain CISCO
Domain name already set to CISCO.
DLS2(config)#vtp pass
DLS2(config)#vtp password ccnp321
Setting device VTP password to ccnp321
DLS2(config)#end
DLS2#
*Nov 20 03:00:44.971: %SYS-5-CONFIG_I: Configured from console by console
DLS2#

```

Figura 49 - Creación user y password DLS2

```
DLS2>ena
DLS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#vt
DLS2(config)#vtp dmo
DLS2(config)#vtp dom
DLS2(config)#vtp domain CISCO
Domain name already set to CISCO.
DLS2(config)#vtp pass
DLS2(config)#vtp password ccnp321
Setting device VTP password to ccnp321
DLS2(config)#end
DLS2#
*Nov 20 03:00:44.971: %SYS-5-CONFIG_I: Configured from console by console
DLS2#
```

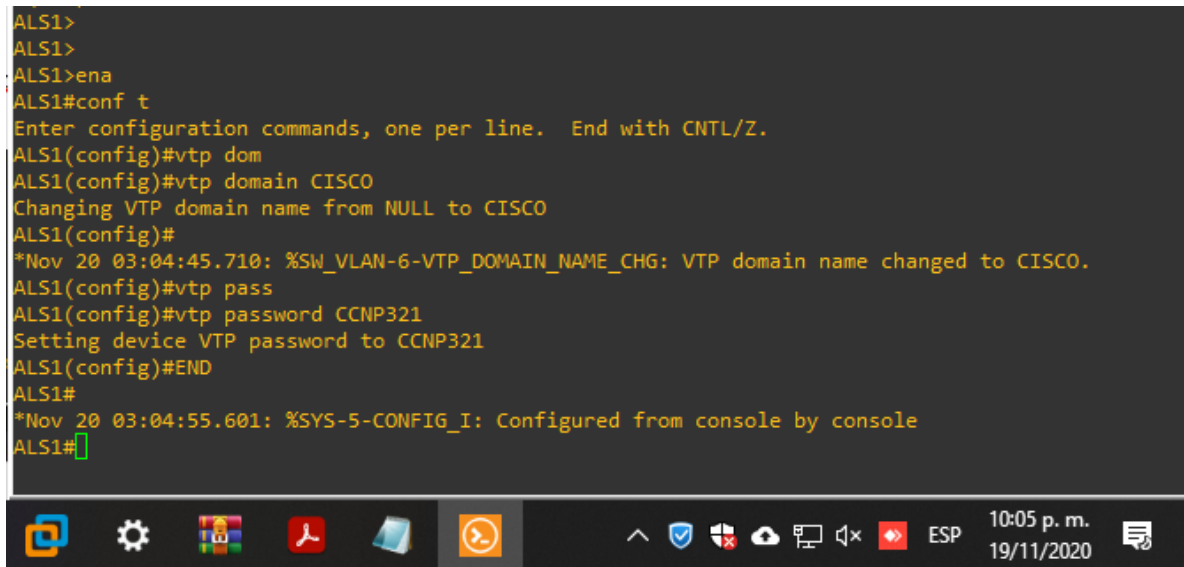


## SWICHTH ALS1

```
ALS1>ena
ALS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#vtp dom
ALS1(config)#vtp domain CISCO
Changing VTP domain name from NULL to CISCO
ALS1(config)#
*Nov 20 03:04:45.710: %SW_VLAN-6-VTP_DOMAIN_NAME_CHG: VTP domain
name changed to CISCO.
ALS1(config)#vtp pass
ALS1(config)#vtp password CCNP321
Setting device VTP password to CCNP321
ALS1(config)#END
ALS1#
*Nov 20 03:04:55.601: %SYS-5-CONFIG_I: Configured from console by console
ALS1#
```

Figura 50 - Creación user y password ALS1

```
ALS1>
ALS1>
ALS1>ena
ALS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#vtp dom
ALS1(config)#vtp domain CISCO
Changing VTP domain name from NULL to CISCO
ALS1(config)#
*Nov 20 03:04:45.710: %SW_VLAN-6-VTP_DOMAIN_NAME_CHG: VTP domain name changed to CISCO.
ALS1(config)#vtp pass
ALS1(config)#vtp password CCNP321
Setting device VTP password to CCNP321
ALS1(config)#END
ALS1#
*Nov 20 03:04:55.601: %SYS-5-CONFIG_I: Configured from console by console
ALS1#
```



## SWICTH ALS2

```
ALS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#vtp d
ALS2(config)#vtp domain CISCO
Domain name already set to CISCO.
ALS2(config)#vtp pass
ALS2(config)#vtp password ccnp321
Setting device VTP password to ccnp321
ALS2(config)#end
ALS2#
*Nov 20 03:07:33.844: %SYS-5-CONFIG_I: Configured from console by console
ALS2#
```

Figura 51 - Creación user y password ALS2

```
ALS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#vtp d
ALS2(config)#vtp domain CISCO
Domain name already set to CISCO.
ALS2(config)#vtp pass
ALS2(config)#vtp password ccnp321
Setting device VTP password to ccnp321
ALS2(config)#end
ALS2#
*Nov 20 03:07:33.844: %SYS-5-CONFIG_I: Configured from console by console
ALS2#
```

2) Configurar DLS1 como servidor principal para las VLAN.

Ingresaremos a configurar DLS1 y asignaremos la VTP como modo servidor ya que requerimos un servidor primario que creará la configuración de MST. Luego lo configuramos en modo primario.

### Swicth DLS1

```
DLS1>ena
```

```
DLS1#conf t
```

```
DLS1(config)#vtp version 3
```

```
*Nov 20 03:09:47.860: %SW_VLAN-6-OLD_CONFIG_FILE_READ: Old version 2 VLAN configuration file detected and read OK. Version 3
```

```
DLS1(config)#vtp mode server mst
```

```
Setting device to VTP Server mode for MST.
```

```
DLS1(config)#end
```

```
DLS1#vtp primary mst
```

```
This system is becoming primary server for feature mst
```

```
No conflicting VTP3 devices found.
```

```
Do you want to continue? [confirm]
```

Figura 52 - DLS1 como server

```
DLS1>
DLS1>
DLS1>
DLS1>ena
DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#vtp ver
DLS1(config)#vtp version 3
DLS1(config)#vrt
*Nov 20 03:09:47.860: %SW_VLAN-6-OLD_CONFIG_FILE_READ: Old version 2 VLAN configuration file detected and read OK. Version 3
files will be written in the future.
DLS1(config)#vt
DLS1(config)#vtp mode
DLS1(config)#vtp mode ser
DLS1(config)#vtp mode server mst
Setting device to VTP Server mode for MST.
DLS1(config)#end
DLS1#vt
DLS1#vtp
*Nov 20 03:09:57.024: %SYS-5-CONFIG_I: Configured from console by console
DLS1#vtp pr
DLS1#vtp pri
DLS1#vtp primary mst
This system is becoming primary server for feature mst
```

### 3) Configurar ALS1 y ALS2 como clientes VTP.

Procedemos a ingresar en ALS1 y ALS2 para configurar el modo mst de spanning-tree con el fin de tener una topología lógica sin bucles en la red.

#### Switc ASL1

```
ALS1(config)#sp
ALS1(config)#spanning-tree mo
ALS1(config)#spanning-tree mode mst
ALS1(config)#vp
ALS1(config)#vt
ALS1(config)#vtp version 3
ALS1(config)#end
ALS1#
*Nov 20 03:18:22.668: %SW_VLAN-6-OLD_CONFIG_FILE_READ: Old version 2 VLAN
configuration file detected and read OK. Version 3
files will be written in the future.
ALS1#
*Nov 20 03:18:24.284: %SYS-5-CONFIG_I: Configured from console by console
ALS1#
*Nov 20 03:18:38.075: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch
discovered on Ethernet2/0 (1), with DLS2 Ethernet2/0 (500).
ALS1#
*Nov 20 03:19:30.546: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch
discovered on Ethernet2/0 (1), with DLS2 Ethernet2/0 (500).
ALS1#
```

Figura 53 - ALS1 como VTP

```
ALS1(config)#s
ALS1(config)#sp
ALS1(config)#spanning-tree mo
ALS1(config)#spanning-tree mode mst
ALS1(config)#vp
ALS1(config)#vt
ALS1(config)#vtp version 3
ALS1(config)#end
ALS1#
*Nov 20 03:18:22.668: %SW_VLAN-6-OLD_CONFIG_FILE_READ: Old version 2 VLAN configuration file detected and read OK. Version
3
files will be written in the future.
ALS1#
*Nov 20 03:18:24.284: %SYS-5-CONFIG_I: Configured from console by console
ALS1#
```

### Switch ASL2

ALS2#conf t

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

ALS2(config)#spa

ALS2(config)#spanning-tree mode mst

ALS2(config)#vtp versi

ALS2(config)#vtp version 3

ALS2(config)#vtp mode client mst

Setting device to VTP Client mode for MST.

ALS2(config)#end

ALS2#

\*Nov 20 03:19:20.980: %SYS-5-CONFIG\_I: Configured from console by console

ALS2#

Figura 54 - ALS2 como VTP

```
ALS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#spa
ALS2(config)#spanning-tree mode mst
ALS2(config)#vtp versi
ALS2(config)#vtp version 3
ALS2(config)#vtp mode client mst
Setting device to VTP Client mode for MST.
ALS2(config)#end
ALS2#
*Nov 20 03:19:20.980: %SYS-5-CONFIG_I: Configured from console by console
ALS2#
```

e. Configurar en el servidor principal las siguientes VLAN:

Tabla 3 – Crear las vlan

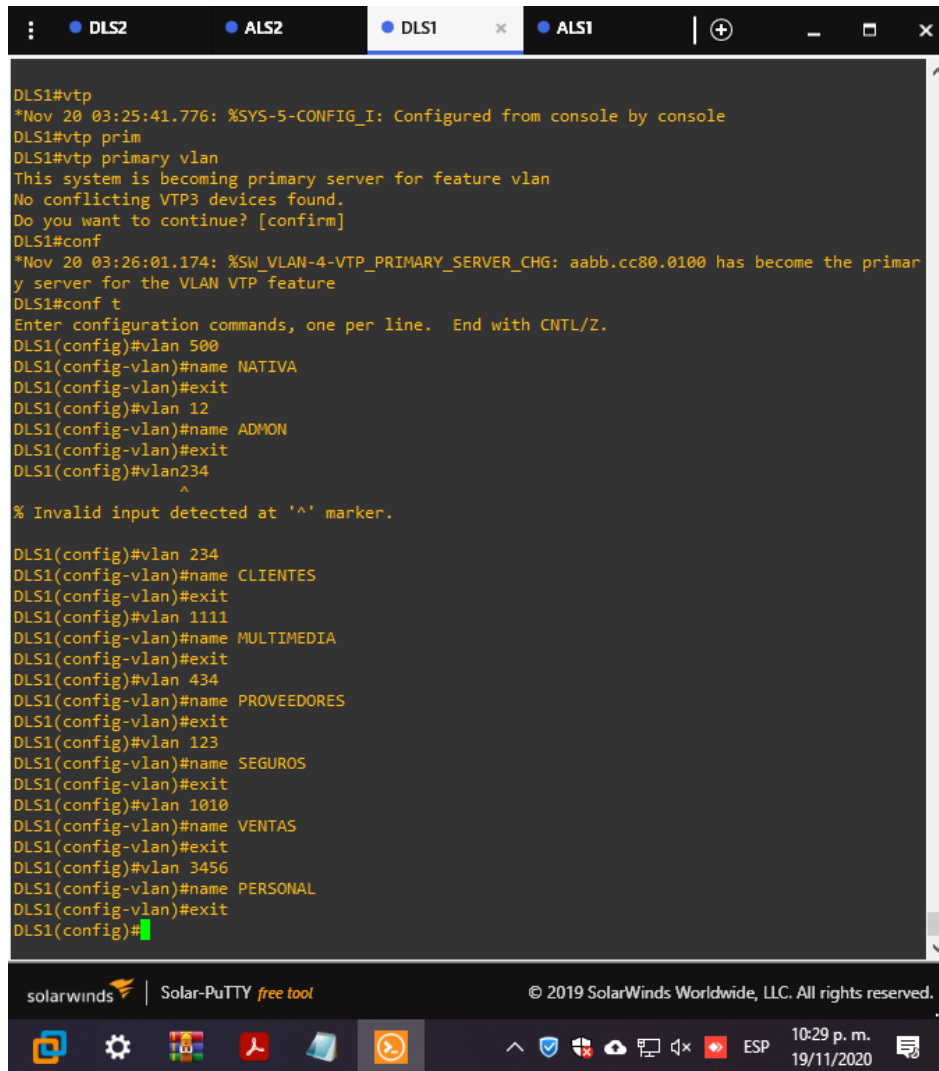
Número de VLAN	Nombre de VLAN	Número de VLAN	Nombre de VLAN
500	NATIVA	434	PROVEEDORES
12	ADMON	123	SEGUROS
234	CLIENTES	1010	VENTAS
1111	MULTIMEDIA	3456	PERSONAL

Recordemos que configuramos como servidor principal el swich DLS1, por lo cual la configuración se realizará en este. Ingresamos el número de vlan y luego su respectivo nombre como lo indica la tabla.

### Swich DLS1

```
DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#vlan 500
DLS1(config-vlan)#name NATIVA
DLS1(config-vlan)#exit
DLS1(config)#vlan 12
DLS1(config-vlan)#name ADMON
DLS1(config-vlan)#exit
DLS1(config)#vlan 234
DLS1(config-vlan)#name CLIENTES
DLS1(config-vlan)#exit
DLS1(config)#vlan 1111
DLS1(config-vlan)#name MULTIMEDIA
DLS1(config-vlan)#exit
DLS1(config)#vlan 434
DLS1(config-vlan)#name PROVEEDORES
DLS1(config-vlan)#exit
DLS1(config)#vlan 123
DLS1(config-vlan)#name SEGUROS
DLS1(config-vlan)#exit
DLS1(config)#vlan 1010
DLS1(config-vlan)#name VENTAS
DLS1(config-vlan)#exit
DLS1(config)#vlan 3456
DLS1(config-vlan)#name PERSONAL
DLS1(config-vlan)#exit
```

Figura 55 - Creando VLAN en DLS1



```
DLS1#vtp
*Nov 20 03:25:41.776: %SYS-5-CONFIG_I: Configured from console by console
DLS1#vtp prim
DLS1#vtp primary vlan
This system is becoming primary server for feature vlan
No conflicting VTP3 devices found.
Do you want to continue? [confirm]
DLS1#conf
*Nov 20 03:26:01.174: %SW_VLAN-4-VTP_PRIMARY_SERVER_CHG: aabb.cc00.0100 has become the primary server for the VLAN VTP feature
DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#vlan 500
DLS1(config-vlan)#name NATIVA
DLS1(config-vlan)#exit
DLS1(config)#vlan 12
DLS1(config-vlan)#name ADMON
DLS1(config-vlan)#exit
DLS1(config)#vlan234
DLS1(config)#vlan
^
% Invalid input detected at '^' marker.

DLS1(config)#vlan 234
DLS1(config-vlan)#name CLIENTES
DLS1(config-vlan)#exit
DLS1(config)#vlan 1111
DLS1(config-vlan)#name MULTIMEDIA
DLS1(config-vlan)#exit
DLS1(config)#vlan 434
DLS1(config-vlan)#name PROVEEDORES
DLS1(config-vlan)#exit
DLS1(config)#vlan 123
DLS1(config-vlan)#name SEGUROS
DLS1(config-vlan)#exit
DLS1(config)#vlan 1010
DLS1(config-vlan)#name VENTAS
DLS1(config-vlan)#exit
DLS1(config)#vlan 3456
DLS1(config-vlan)#name PERSONAL
DLS1(config-vlan)#exit
DLS1(config)#
```

**f. En DLS1, suspender la VLAN 434.**

Ingresamos a la vlan 434, buscamos el nombre PROVEEDORES el cual corresponde a esta y ponemos su estado en suspendido.

```
DLS1(config)#vlan 434
DLS1(config-vlan)#name PROVEEDORES
DLS1(config-vlan)#state suspend
DLS1(config-vlan)#exit
DLS1(config)#
```

Figura 56 - Suspendiendo VLAN PROVEEDORES DLS11

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

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

Debemos configurar el modo vtp versión 2 en el switch DLS2, luego de esto configurar el modo transparente, este es el modo en el cual el switch está aislado de cualquier dominio VTP aunque propaga los anuncios. Permite crear, borrar y modificar VLANs que solo funcionan localmente, no se propagan. Para finalizar este punto configuraremos las mismas VLAN que creamos en el servidor principal DLS1.

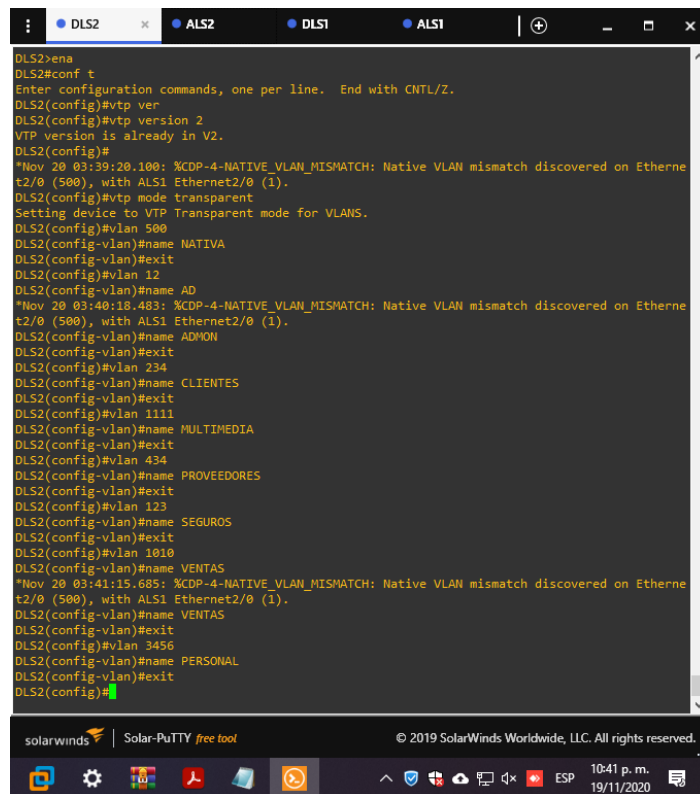
Tabla 4 – Vlans y número

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

```
DLS2>ena
DLS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#vtp ver
DLS2(config)#vtp version 2
VTP version is already in V2.
DLS2(config)#vtp mode transparent
Setting device to VTP Transparent mode for VLANs.
DLS2(config)#vlan 500
DLS2(config-vlan)#name NATIVA
DLS2(config-vlan)#exit
DLS2(config)#vlan 12
DLS2(config-vlan)#name ADMON
DLS2(config-vlan)#exit
```

```
DLS2(config)#vlan 234
DLS2(config-vlan)#name CLIENTES
DLS2(config-vlan)#exit
DLS2(config)#vlan 1111
DLS2(config-vlan)#name MULTIMEDIA
DLS2(config-vlan)#exit
DLS2(config)#vlan 434
DLS2(config-vlan)#name PROVEEDORES
DLS2(config-vlan)#exit
DLS2(config)#vlan 123
DLS2(config-vlan)#name SEGUROS
DLS2(config-vlan)#exit
DLS2(config)#vlan 1010
DLS2(config-vlan)#name VENTAS
DLS2(config-vlan)#exit
DLS2(config)#vlan 3456
DLS2(config-vlan)#name PERSONAL
DLS2(config-vlan)#exit
DLS2(config)#
```

Figura 57 - Creando Vlan en DLS2



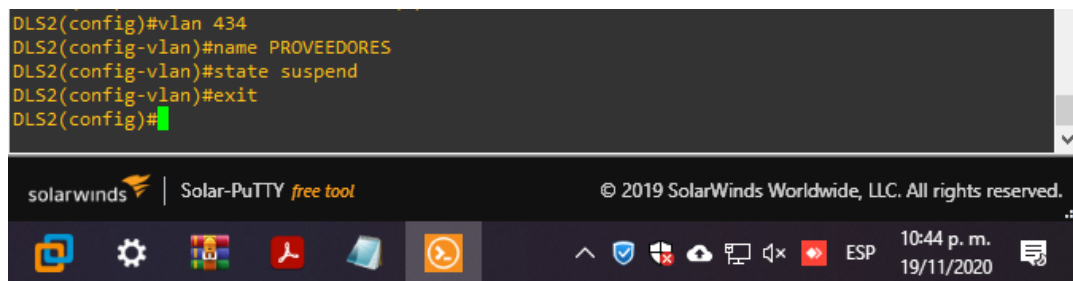
```
DLS2>ena
DLS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#vtp ver
DLS2(config)#vtp version 2
VTP version is already in V2.
DLS2(config)#
*Nov 20 03:39:20.100: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/0 (500), with ALS1 Ethernet2/0 (1).
DLS2(config)#vtp mode transparent
Setting device to VTP Transparent mode for VLANs.
DLS2(config)#vlan 500
DLS2(config-vlan)#name NATIVA
DLS2(config-vlan)#exit
DLS2(config)#vlan 12
DLS2(config-vlan)#name AD
*Nov 20 03:40:18.483: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/0 (500), with ALS1 Ethernet2/0 (1).
DLS2(config-vlan)#name ADMON
DLS2(config-vlan)#exit
DLS2(config)#vlan 234
DLS2(config-vlan)#name CLIENTES
DLS2(config-vlan)#exit
DLS2(config)#vlan 1111
DLS2(config-vlan)#name MULTIMEDIA
DLS2(config-vlan)#exit
DLS2(config)#vlan 434
DLS2(config-vlan)#name PROVEEDORES
DLS2(config-vlan)#exit
DLS2(config)#vlan 123
DLS2(config-vlan)#name SEGUROS
DLS2(config-vlan)#exit
DLS2(config)#vlan 1010
DLS2(config-vlan)#name VENTAS
*Nov 20 03:41:15.685: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/0 (500), with ALS1 Ethernet2/0 (1).
DLS2(config-vlan)#name VENTAS
DLS2(config-vlan)#exit
DLS2(config)#vlan 3456
DLS2(config-vlan)#name PERSONAL
DLS2(config-vlan)#exit
DLS2(config)#
```

h. Suspende VLAN 434 en DLS2.

Ingresamos a DLS2 a la vlan 434 y suspendemos la vlan PROVEEDORES con el comando state suspend.

```
DLS2(config)#vlan 434
DLS2(config-vlan)#name PROVEEDORES
DLS2(config-vlan)#state suspend
DLS2(config-vlan)#exit
DLS2(config)#
```

Figura 58 - Suspendiendo VLAN PROVEEDORES DLS2

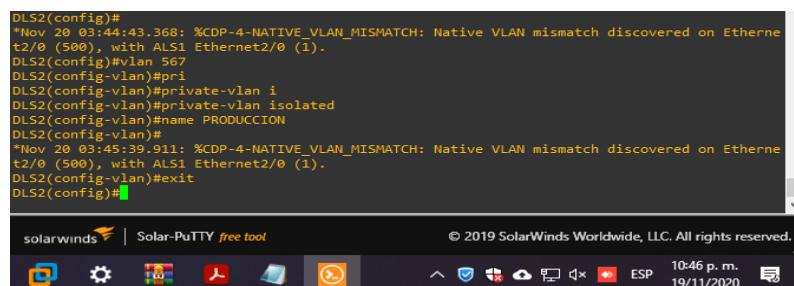


i. En DLS2, crear VLAN 567 con el nombre de PRODUCCION. La VLAN de PRODUCCION no podrá estar disponible en cualquier otro Switch de la red.

Ingresamos a la configuración de DLS2 para crear la vlan 567, con el comando private-vlan isolated colocamos la vlan en modo privado, de esta forma solo estará disponible para el switch DLS2, luego asignamos el nombre PRODUCCION.

```
DLS2(config)#vlan 567
DLS2(config-vlan)#private-vlan isolated
DLS2(config-vlan)#name PRODUCCION
DLS2(config-vlan)#
DLS2(config-vlan)#exit
DLS2(config)#
```

Figura 59 - Creación VLAN PRODUCCION DLS2



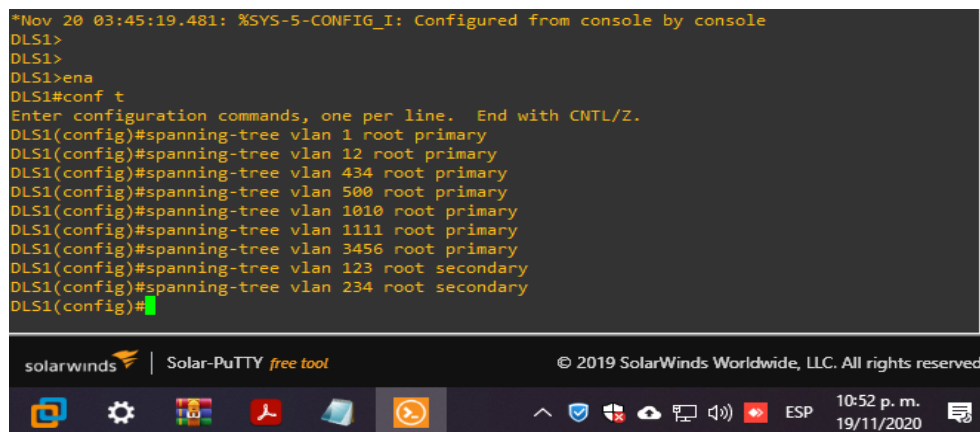
j. Configurar DLS1 como Spanning tree root para las VLAN 1, 12, 434, 500, 1010, 1111 y 3456 y como raíz secundaria para las VLAN 123 y 234.

Ingresando a la configuración de DLS1 configuraremos para cada vlan creada el comando Spanning tree root para asegurarse de que en el switch se tenga el valor de prioridad de puente más bajo.

```
spanning-tree vlan vlan-id root primary
```

```
DLS1>ena
DLS1#conf t
Enter configuration commands, one per line
DLS1(config)#spanning-tree vlan 1 root primary
DLS1(config)#spanning-tree vlan 12 root primary
DLS1(config)#spanning-tree vlan 434 root primary
DLS1(config)#spanning-tree vlan 500 root primary
DLS1(config)#spanning-tree vlan 1010 root primary
DLS1(config)#spanning-tree vlan 1111 root primary
DLS1(config)#spanning-tree vlan 3456 root primary
DLS1(config)#spanning-tree vlan 123 root secondary
DLS1(config)#spanning-tree vlan 234 root secondary
DLS1(config)#
```

Figura 60 - Spanning tree root DLS1



```
*Nov 20 03:45:19.481: %SYS-5-CONFIG_I: Configured from console by console
DLS1>
DLS1>
DLS1>ena
DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#spanning-tree vlan 1 root primary
DLS1(config)#spanning-tree vlan 12 root primary
DLS1(config)#spanning-tree vlan 434 root primary
DLS1(config)#spanning-tree vlan 500 root primary
DLS1(config)#spanning-tree vlan 1010 root primary
DLS1(config)#spanning-tree vlan 1111 root primary
DLS1(config)#spanning-tree vlan 3456 root primary
DLS1(config)#spanning-tree vlan 123 root secondary
DLS1(config)#spanning-tree vlan 234 root secondary
DLS1(config)#
```

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

Ahora ingresamos a la configuración en DLS2 donde también están creadas las vlan, para configurar el puente secundario en caso de que el principal falle. Esto asegura que el conmutador alternativo se convierta en el puente raíz si falla el puente raíz principal.

```
secundario spanning-tree vlan vlan-id root
```

```

DLS2(config)#spanning-tree vlan 123 root primary
DLS2(config)#spanning-tree vlan 234 root primary
DLS2(config)#spanning-tree vlan 12 root secondary
DLS2(config)#spanning-tree vlan 434 root secondary
DLS2(config)#spanning-tree vlan 500 root secondary
DLS2(config)#spanning-tree vlan 1010 root secondary
DLS2(config)#spanning-tree vlan 1111 root secondary
DLS2(config)#spanning-tree vlan 3456 root secondary
DLS2(config)#exit

```

Figura 61 - Spanning tree root DLS2

```

*Nov 20 03:53:29.201: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/0 (500), with ALS1 Ethernet2/0 (1).
DLS2(config)#spanning-tree vlan 123 root primary
DLS2(config)#spanning-tree vlan 234 root primary
DLS2(config)#spanning-tree vlan 12 root secondary
DLS2(config)#spanning-tree vlan 434 root secondary
DLS2(config)#spanning-tree vlan 500 root secondary
DLS2(config)#spanning-tree vlan 1010 root secondary
DLS2(config)#spanning-tree vlan 1111 root secondary
DLS2(config)#spanning-tree vlan 3456 root secondary
DLS2(config)#exit
DLS2#
*Nov 20 03:54:06.415: %SYS-5-CONFIG_I: Configured from console by console
DLS2#

```

I. 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.

Se realizará la configuración en el rango de interfaces de cada swich con el fin que estas interfaces tengan comunicación a través de la vlan 500. Para esto haremos uso del comando switchport trunkl native vlan 500 en el cual estableceremos que la vlan será el puerto troncal en el swich. Esto se realizará para los cuatros switches.

### SWITCH DLS1

```

DLS1(config)#interface range e0/1-2 , e2/0-3
DLS1(config-if-range)#switchport
DLS1(config-if-range)#switchport trunk encapsulation dot1q
DLS1(config-if-range)#switchport trunk native vlan 500
DLS1(config-if-range)#switchport mode trunk
DLS1(config-if-range)#exit

```

Figura 62 - Configuración puertos troncales DLS1 para conexión

```
DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interfa
DLS1(config)#interface rang
DLS1(config)#interface range e0/1-2 , e2/0-3
DLS1(config-if-range)#sw
DLS1(config-if-range)#switchport
DLS1(config-if-range)#sw
DLS1(config-if-range)#switchport trunk
DLS1(config-if-range)#switchport trunk ecn
DLS1(config-if-range)#switchport trunk enc
DLS1(config-if-range)#switchport trunk encapsulation do
DLS1(config-if-range)#switchport trunk encapsulation dot1q
DLS1(config-if-range)#sw
DLS1(config-if-range)#switchport trunk
DLS1(config-if-range)#switchport trunk nati
DLS1(config-if-range)#switchport trunk native vla
DLS1(config-if-range)#switchport trunk native vlan 500
DLS1(config-if-range)#sw
DLS1(config-if-range)#switchport mode trun
DLS1(config-if-range)#switchport mode trunk
DLS1(config-if-range)#exit
DLS1(config)#
```

### SWITCH DLS2

```
DLS2(config)#inter range e0/1-2 , e1/0-1 , e2/0-1
DLS2(config-if-range)#switchport
DLS2(config-if-range)#switchport trunk encapsulation dot1q
DLS2(config-if-range)#switchport trunk native vlan 500
DLS2(config-if-range)#switchport mode trunk
DLS2(config-if-range)#exit
```

Figura 63 - Puertos troncales para permitir la conexión en DLS2

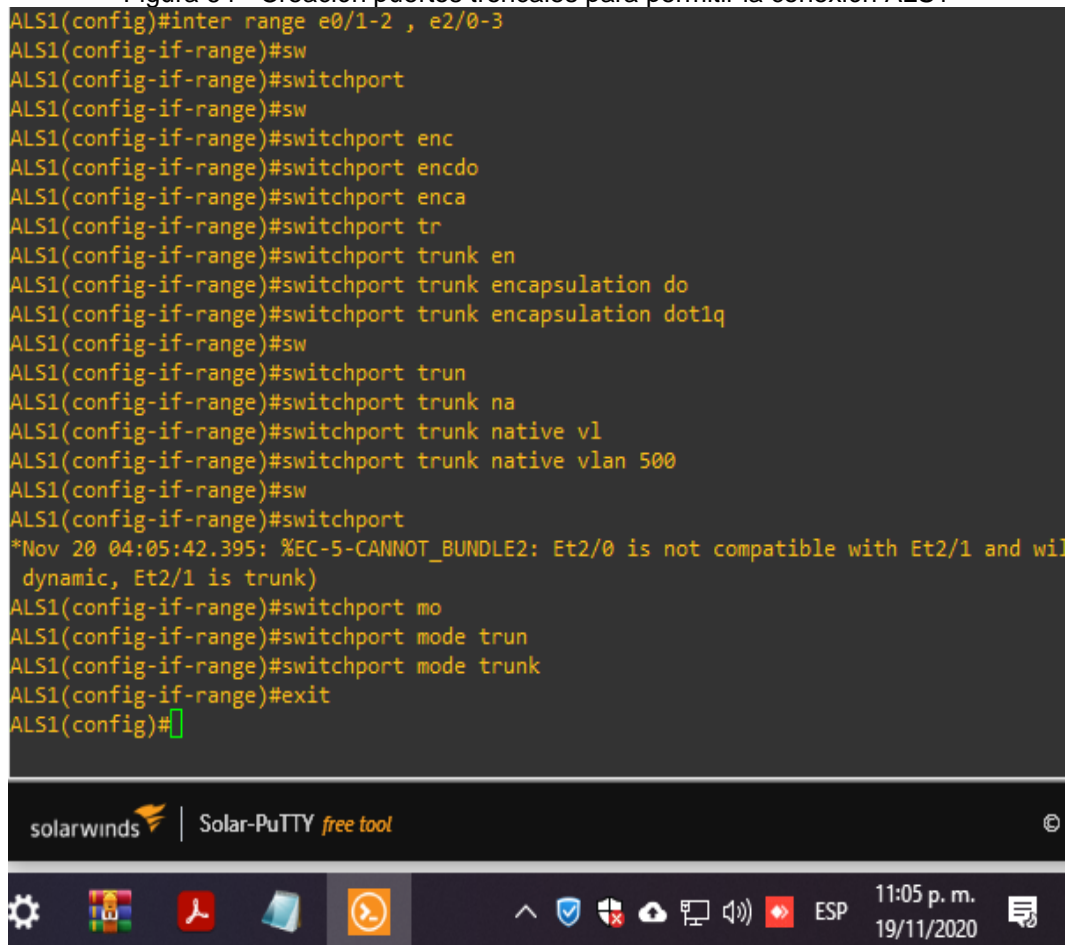
```
DLS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#inter ra
DLS2(config)#inter range e0/1-2 , e1/0-1
*Nov 20 04:01:49.292: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on E
/0 (1).
DLS2(config)#inter range e0/1-2 , e1/0-1 , e2/0-1
DLS2(config-if-range)#sw
*Nov 20 04:02:38.586: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on E
/0 (1).
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport tru
DLS2(config-if-range)#switchport trunk enca
DLS2(config-if-range)#switchport trunk encapsulation do
DLS2(config-if-range)#switchport trunk encapsulation dot1q
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport tru
DLS2(config-if-range)#switchport trunk nati
DLS2(config-if-range)#switchport trunk native vla
DLS2(config-if-range)#switchport trunk native vlan 500
*Nov 20 04:03:27.739: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on E
/0 (1).
DLS2(config-if-range)#
*Nov 20 04:04:17.596: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on E
/0 (1).
DLS2(config-if-range)#sw
DLS2(config-if-range)#switchport mode tr
DLS2(config-if-range)#switchport mode trunk
DLS2(config-if-range)#exit
DLS2(config)#
```

## SWITCH ALS1

```
ALS1#conf t
ALS1(config)#inter range e0/1-2 , e2/0-3
ALS1(config-if-range)#switchport
ALS1(config-if-range)#switchport trunk encapsulation dot1q
ALS1(config-if-range)#switchport trunk native vlan 500
ALS1(config-if-range)#switchport mode trunk
ALS1(config-if-range)#exit
```

Figura 64 - Creación puertos troncales para permitir la conexión ALS1

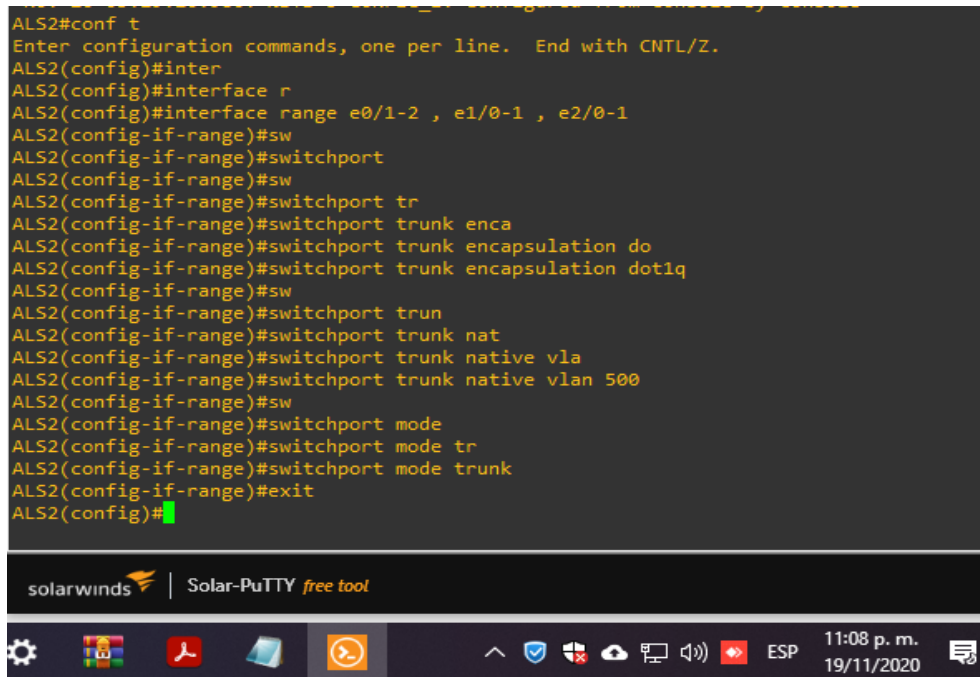
```
ALS1(config)#inter range e0/1-2 , e2/0-3
ALS1(config-if-range)#sw
ALS1(config-if-range)#switchport
ALS1(config-if-range)#sw
ALS1(config-if-range)#switchport enc
ALS1(config-if-range)#switchport encdo
ALS1(config-if-range)#switchport enca
ALS1(config-if-range)#switchport tr
ALS1(config-if-range)#switchport trunk en
ALS1(config-if-range)#switchport trunk encapsulation do
ALS1(config-if-range)#switchport trunk encapsulation dot1q
ALS1(config-if-range)#sw
ALS1(config-if-range)#switchport trun
ALS1(config-if-range)#switchport trunk na
ALS1(config-if-range)#switchport trunk native vl
ALS1(config-if-range)#switchport trunk native vlan 500
ALS1(config-if-range)#sw
ALS1(config-if-range)#switchport
*Nov 20 04:05:42.395: %EC-5-CANNOT_BUNDLE2: Et2/0 is not compatible with Et2/1 and wi
dynamic, Et2/1 is trunk)
ALS1(config-if-range)#switchport mo
ALS1(config-if-range)#switchport mode trun
ALS1(config-if-range)#switchport mode trunk
ALS1(config-if-range)#exit
ALS1(config)#
```



## SWITCH ALS2

```
ALS2(config)#spanning-tree mode mst
ALS2(config)#vtp version 3
ALS2(config)#vtp mode client mst
Setting device to VTP Client mode for MST.
ALS2(config)#end
ALS2(config)#interface range e0/1-2 , e1/0-1 , e2/0-1
ALS2(config-if-range)#switchport
ALS2(config-if-range)#switchport trunk encapsulation dot1q
ALS2(config-if-range)#switchport trunk native vlan 500
ALS2(config-if-range)#switchport mode trunk
ALS2(config-if-range)#exit
```

Figura 65 - Creación puertos troncales para permitir conexión en ALS2



```
ALS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#inter
ALS2(config)#interface r
ALS2(config)#interface range e0/1-2 , e1/0-1 , e2/0-1
ALS2(config-if-range)#sw
ALS2(config-if-range)#switchport
ALS2(config-if-range)#sw
ALS2(config-if-range)#switchport tr
ALS2(config-if-range)#switchport trunk enca
ALS2(config-if-range)#switchport trunk encapsulation do
ALS2(config-if-range)#switchport trunk encapsulation dot1q
ALS2(config-if-range)#sw
ALS2(config-if-range)#switchport trun
ALS2(config-if-range)#switchport trunk nat
ALS2(config-if-range)#switchport trunk native vla
ALS2(config-if-range)#switchport trunk native vlan 500
ALS2(config-if-range)#sw
ALS2(config-if-range)#switchport mode
ALS2(config-if-range)#switchport mode tr
ALS2(config-if-range)#switchport mode trunk
ALS2(config-if-range)#exit
ALS2(config)#
```

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

Ingresaremos a las interfaces relacionadas en la tabla para configurar las vlan solicitadas, esto se hará en cada switch, podemos observar que la interfaz 0/6 la cual corresponde a la que va conectada a los host en cada switch debe tener un vlan especifica en cada dispositivo. Igualmente para las otras dos interfaces donde la segunda se crea la misma vlan 1111 y la tercera interfaz solo se configura en el DLS2.

Tabla 5 - Interfaces como puertos de acceso

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

### SWITCH DLS1

```
DLS1>ena
DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#interface e0/3
DLS1(config-if)#switchport access vlan 3456
DLS1(config-if)#no shutdown
DLS1(config-if)#end
```

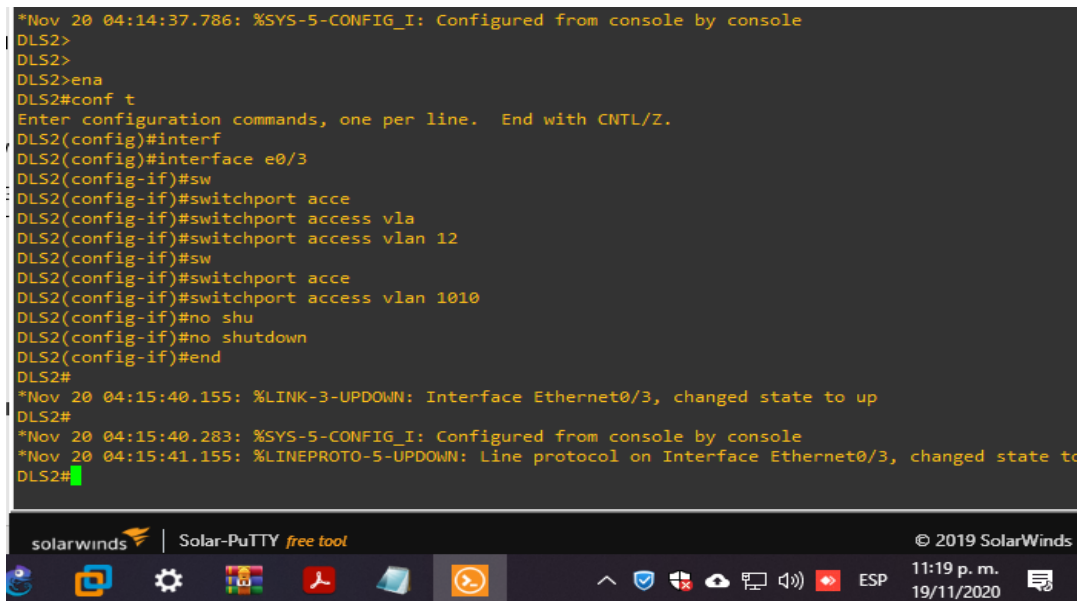
Figura 66 - Configurando interfaces para puertos de acceso

```
DLS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#inter
DLS1(config)#interface e
DLS1(config)#interface e0/3
DLS1(config-if)#sw
DLS1(config-if)#switchport acc
DLS1(config-if)#switchport access vlan 3456
DLS1(config-if)#no sh
DLS1(config-if)#no shutdown
DLS1(config-if)#end
DLS1#inter
DLS1#inter
*Nov 20 04:12:17.086: %SYS-5-CONFIG_I: Configured from console by console
DLS1#inter
*Nov 20 04:12:18.035: %LINK-3-UPDOWN: Interface Ethernet0/3, changed state to up
*Nov 20 04:12:19.042: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to up
DLS1#inter e0/15
```

## SWITCH DLS2

```
DLS2>ena
DLS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#interface e0/3
DLS2(config-if)#switchport access vlan 12
DLS2(config-if)#switchport access vlan 1010
DLS2(config-if)#no shutdown
DLS2(config-if)#end
```

Figura 67 - Configurando interfaces para puertos de acc en DLS2



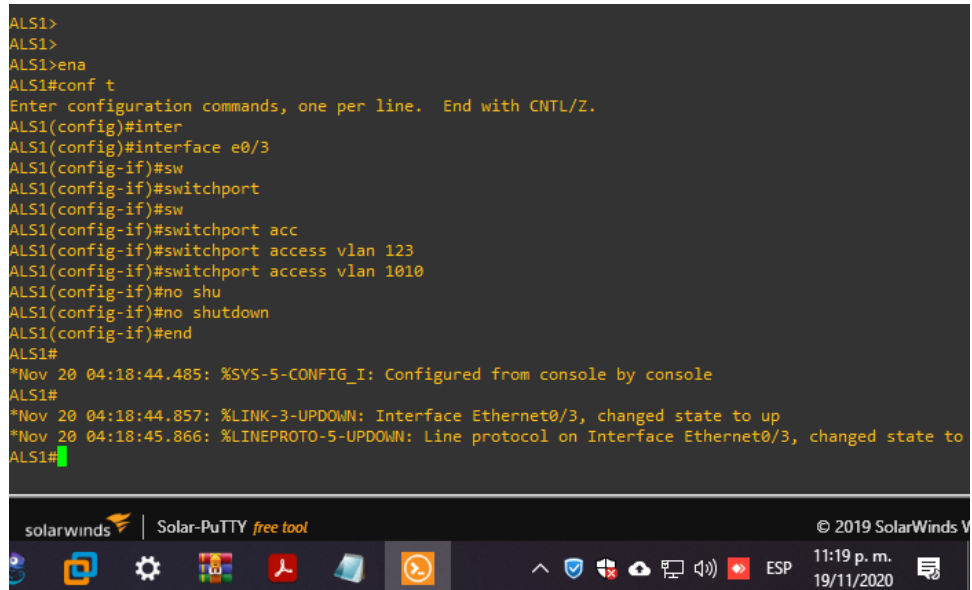
```
*Nov 20 04:14:37.786: %SYS-5-CONFIG_I: Configured from console by console
DLS2>
DLS2>
DLS2>ena
DLS2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#interf
DLS2(config)#interface e0/3
DLS2(config-if)#sw
DLS2(config-if)#switchport acce
DLS2(config-if)#switchport access v1a
DLS2(config-if)#switchport access vlan 12
DLS2(config-if)#sw
DLS2(config-if)#switchport acce
DLS2(config-if)#switchport access vlan 1010
DLS2(config-if)#no shu
DLS2(config-if)#no shutdown
DLS2(config-if)#end
DLS2#
*Nov 20 04:15:40.155: %LINK-3-UPDOWN: Interface Ethernet0/3, changed state to up
DLS2#
*Nov 20 04:15:40.283: %SYS-5-CONFIG_I: Configured from console by console
*Nov 20 04:15:41.155: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to
DLS2#
```

## SWITCH ALS1

```
ALS1>ena
ALS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#interface e0/3
ALS1(config-if)#switchport
ALS1(config-if)#switchport access vlan 123
ALS1(config-if)#switchport access vlan 1010
ALS1(config-if)#no shutdown
ALS1(config-if)#end
ALS1#
*Nov 20 04:18:44.485: %SYS-5-CONFIG_I: Configured from console by console
ALS1#
*Nov 20 04:18:44.857: %LINK-3-UPDOWN: Interface Ethernet0/3, changed state to up
*Nov 20 04:18:45.866: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3,
changed state to up
```

Figura 68 - Configurando interfaces para puertos en ALS1

```
ALS1>
ALS1>
ALS1>ena
ALS1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#inter
ALS1(config)#interface e0/3
ALS1(config-if)#sw
ALS1(config-if)#switchport
ALS1(config-if)#sw
ALS1(config-if)#switchport acc
ALS1(config-if)#switchport access vlan 123
ALS1(config-if)#switchport access vlan 1010
ALS1(config-if)#no shu
ALS1(config-if)#no shutdown
ALS1(config-if)#end
ALS1#
*Nov 20 04:18:44.485: %SYS-5-CONFIG_I: Configured from console by console
ALS1#
*Nov 20 04:18:44.857: %LINK-3-UPDOWN: Interface Ethernet0/3, changed state to up
*Nov 20 04:18:45.866: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to up
ALS1#
```



## SWICHTH ALS2

```
ALS2(config)#inter e0/3
ALS2(config-if)#switchport
ALS2(config-if)#switchport access vlan 234
ALS2(config-if)#no shutdown
ALS2(config-if)#end
ALS2#
*Nov 20 04:19:54.781: %SYS-5-CONFIG_I: Configured from console by console
ALS2#
*Nov 20 04:19:55.779: %LINK-3-UPDOWN: Interface Ethernet0/3, changed state to up
*Nov 20 04:19:56.779: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3,
changed state to up
ALS2#
```

Figura 69 - Configurando interfaces para puertos en ALS2

```

enter configuration commands, one per line. End with CTRL-Z.
ALS2(config)#inter e0/3
ALS2(config-if)#sw
ALS2(config-if)#switchport
ALS2(config-if)#switchport acc
ALS2(config-if)#switchport access 234
^
% Invalid input detected at '^' marker.
ALS2(config-if)#switchport access vlan 234
ALS2(config-if)#no shu
ALS2(config-if)#no shutdown
ALS2(config-if)#end
ALS2#
*Nov 20 04:19:54.781: %SYS-5-CONFIG_I: Configured from console by console
ALS2#
*Nov 20 04:19:55.779: %LINK-3-UPDOWN: Interface Ethernet0/3, changed state to up
*Nov 20 04:19:56.779: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to up
ALS2#

```

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

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

**SWITCH DLS2**

Figura 70 - comprobando vlans en DLS2

```

DLS2>show vlan
VLAN Name                Status    Ports
-----
1    default                 active    Et0/0, Et3/0, Et3/1, Et3/2
12   ADHON                   active    Et3/3
123  SEGUROS                 active
234  CLIENTES                active
434  PROVEEDORES            suspended
500  NATIVA                  active
567  PRODUCCION             active
1002 fddi-default            act/unsup
1003 trcrf-default          act/unsup
1004 fddinet-default        act/unsup
1005 trbrf-default        act/unsup
1010 VENTAS                  active    Et0/3
1111 MULTIMEDIA           active
3456 PERSONAL             active

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

VLAN Type  SAID      MTU   Parent  RingNo  BridgeNo  Stp  BrdgMode  Trans1  Trans2
-----
123  enet   100123    1500  -       -        -     -         0       0
234  enet   100234    1500  -       -        -     -         0       0
434  enet   100434    1500  -       -        -     -         0       0
500  enet   100500    1500  -       -        -     -         0       0
567  enet   100567    1500  -       -        -     -         0       0
1002 fddi   101002    1500  -       -        -     -         0       0
1003 trcrf  101003    4472  1005   3276    -     -     srb       0       0
1004 fdnet  101004    4472  -       -        -     -         0       0
1005 trbrf 101005    4472  -       -        15    -     ibm       0       0
1010 enet   101010    1500  -       -        -     -         0       0
1111 enet   101111    1500  -       -        -     -         0       0
3456 enet   103456    1500  -       -        -     -         0       0

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

```

# SWITCH DLS1

Figura 71 - Verificando vlans en DLS1

```
DLS1>show vlan
```

VLAN	Name	Status	Ports
1	default	active	Et0/0, Et1/0, Et1/1, Et1/2 Et1/3, Et3/0, Et3/1, Et3/2 Et3/3, Et4/0, Et4/1, Et4/2 Et4/3, Et5/0, Et5/1, Et5/2 Et5/3, Et6/0, Et6/1, Et6/2 Et6/3, Et7/0, Et7/1, Et7/2 Et7/3, Et8/0, Et8/1, Et8/2 Et8/3, Et9/0, Et9/1, Et9/2 Et9/3, Et10/0, Et10/1, Et10/2 Et10/3, Et11/0, Et11/1, Et11/2 Et11/3, Et12/0, Et12/1, Et12/2 Et12/3, Et13/0, Et13/1, Et13/2 Et13/3, Et14/0, Et14/1, Et14/2 Et14/3, Et15/0, Et15/1, Et15/2 Et15/3
12	ADMON	active	
123	SEGUROS	active	
234	CLIENTES	active	
434	PROVEEDORES	suspended	
500	NATIVA	active	

VLAN	Name	Status	Ports
1002	fddi-default	act/unsup	
1003	trcrf-default	act/unsup	
1004	fddinet-default	act/unsup	
1005	trbrf-default	act/unsup	
1010	VENTAS	active	
1111	MULTIMEDIA	active	
3456	PERSONAL	active	Et0/3

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
434	enet	100434	1500	-	-	-	-	-	0	0
500	enet	100500	1500	-	-	-	-	-	0	0
1002	fddi	101002	1500	-	-	-	-	-	0	0

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

Observamos los puertos troncales con el protocolo LACP y PAgP

Figura 72 - Verificando ethernetChannel entre DLS1 y ALS1

```
DLS2#show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone   s - suspended
       H - Hot-standby (LACP only)
       R - Layer3        S - Layer2
       U - in use        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: 3
Number of aggregators:          3

Group  Port-channel  Protocol    Ports
-----
 2     Po2(SD)        LACP        Et1/0(s)  Et1/1(s)
 3     Po3(SD)        PAgP        Et2/0(s)  Et2/1(s)
12     Po12(RD)       -
```

Observamos los puertos troncales con el protocolo LACP y PAgP

Figura 73 - Verificando ethernetChannel entre DLS1 y ALS1

```
DLS1#show eth
DLS1#show etherc
DLS1#show etherchannel summ
DLS1#show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone   s - suspended
       H - Hot-standby (LACP only)
       R - Layer3        S - Layer2
       U - in use        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: 3
Number of aggregators:          3

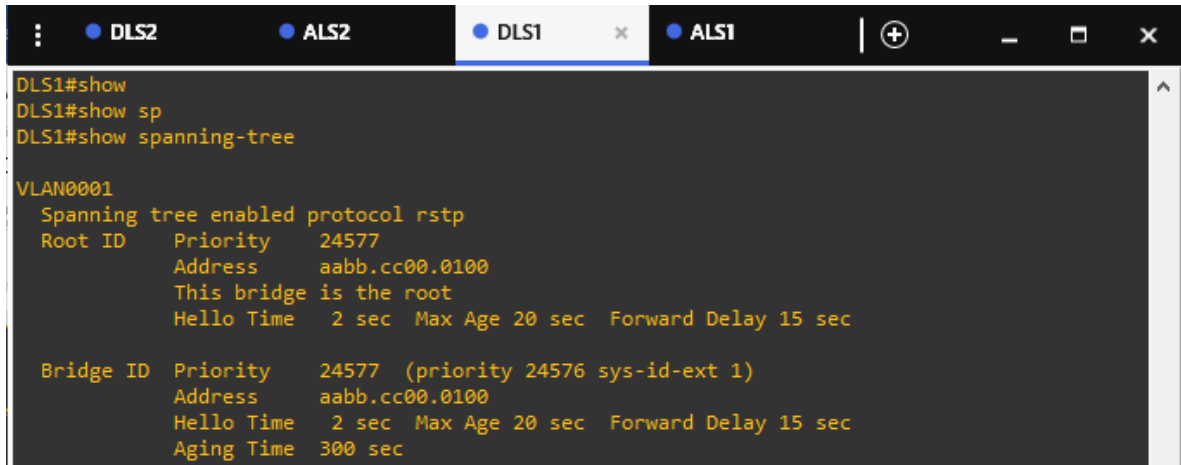
Group  Port-channel  Protocol    Ports
-----
 1     Po1(SD)        LACP        Et2/2(s)  Et2/3(s)
 4     Po4(SD)        PAgP        Et2/0(I)  Et2/1(I)
12     Po12(RD)       -
```

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

Con el comando show spanning-tree podemos verificar que el protocolo está habilitado, también observamos que en DLS1 está el puente como servidor.

### SWITCH DLS1

Figura 74 - Spanning tree en DLS1



```
DLS1#show
DLS1#show sp
DLS1#show spanning-tree

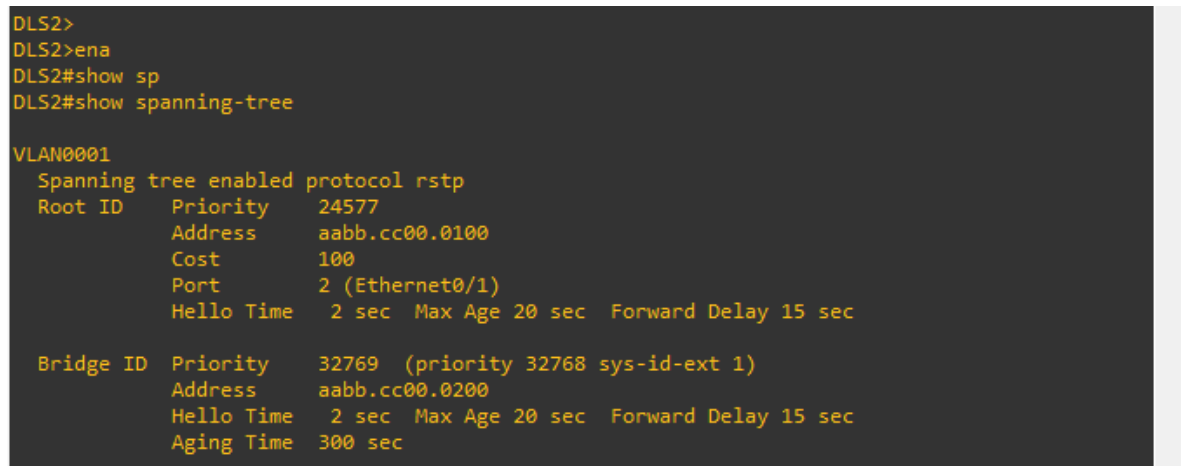
VLAN0001
Spanning tree enabled protocol rstp
Root ID    Priority    24577
           Address     aabb.cc00.0100
           This bridge is the root
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

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
```

Switch DLS2

Para el caso de DLS2 el protocolo también se encuentra activo.

Figura 75 - Spanning tree en DLS2



```
DLS2>
DLS2>ena
DLS2#show sp
DLS2#show spanning-tree

VLAN0001
Spanning tree enabled protocol rstp
Root ID    Priority    32769
           Address     aabb.cc00.0200
           Cost        100
           Port        2 (Ethernet0/1)
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID  Priority    32769 (priority 32768 sys-id-ext 1)
           Address     aabb.cc00.0200
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
           Aging Time 300 sec
```

## CONCLUSIONES

La configuración de cada uno de los dispositivos fue un excelente ejercicio para poner a prueba los conocimientos y la habilidad para resolver los diferentes problemas que se presentaran en el desarrollo de los laboratorios, como por ejemplo cuando no funcionaba el ping a una ip, se lograba resolver verificando el paso a paso y utilizando los comandos show para verificar si hacia falta algo.

El simulador GNS3 el cual fue la herramienta principal para desarrollar los escenarios de red ha sido un software muy versátil y con claridad para poder crear las imágenes virtuales de los swich CISCO, en especial para el escenario 2 donde se solicitaba swich de capa 3.

Con OSPF, puede dividir un sistema autónomo (AS) en áreas y mantenerlas separadas para disminuir el tráfico de direccionamiento de OSPF, calculando el mejor camino por el cual debe viajar la información, esto ayuda a evitar que haya sobrecarga en los enlaces.

EIGRP escala e incluye en varias topologías, esto puede proporcionar tiempos de convergencia rápidos con un mínimo tráfico de red.

Con la configuración del spanning tree nivelamos la carga que puedan generarse por el tráfico en los enlaces redundantes, esto facilita la transmisión de la información y evita la caída de enlaces.

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