

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

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**UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA – UNAD
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Diplomado de opción de grado presentado para optar el título
de INGENIERO DE TELECOMUNICACIONES

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NOTA DE ACEPTACIÓN

Firma del Presidente del Jurado

Firma del Jurado

Firma del Jurado

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A mi madre por el apoyo incondicional y moral para realizar y concluir el presente informe, a mi esposa e hija que han sido de inspiración para culminar los objetivos propuestos, al docente Gerardo Granados por las enseñanzas y acompañamiento brindado a lo largo del presente informe, a ellos mi más profunda gratitud.

El autor.

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GLOSARIO

RED: Es un conjunto de equipos informáticos y software conectados entre sí por medio de dispositivos físicos o inalámbricos que envían y reciben impulsos eléctricos, ondas electromagnéticas o cualquier otro medio para el transporte de datos, con la finalidad de compartir información, recursos y ofrecer servicios.

CCNP: Es el nivel intermedio de certificación de la compañía CISCO. Para obtener esta certificación, se han de superar varios exámenes, clasificados según la empresa en 3 módulos.

- Enrutamiento (Route)
- Conmutación (Switch)
- Resolución de Problemas (Tshoot)

ROUTER: Es un dispositivo que proporciona conectividad a nivel de red o nivel tres en el modelo OSI. Su función principal consiste en enviar o encaminar paquetes de datos de una red a otra, es decir, interconectar subredes.

SWTCH: Es el dispositivo digital lógico de interconexión de equipos que opera en la capa de enlace de datos del modelo OSI. Su función es interconectar dos o más host de manera similar a los puentes de red, pasando datos de un segmento a otro de acuerdo con la dirección MAC de destino de las tramas en la red y eliminando la conexión una vez finalizada ésta.

PROTOCOLO: Es un sistema de reglas que permiten que dos o más entidades de un sistema de comunicación se comuniquen entre ellas para transmitir información por medio de cualquier tipo de variación de una magnitud física.

OSPF: Es un protocolo de red para encaminamiento jerárquico de pasarela interior o Interior Gateway Protocol (IGP), que usa el algoritmo Dijkstra, para calcular la ruta más corta entre dos nodos.

EIGRP: Es un protocolo de encaminamiento de vector distancia, propiedad de Cisco Systems, que ofrece lo mejor de los algoritmos de vector de distancia. Se considera un protocolo avanzado que se basa en las características normalmente asociadas con los protocolos del estado de enlace.

VLAN: Es una red de área local que agrupa un conjunto de equipos de manera lógica y no física. Gracias a las redes virtuales (VLAN), es posible liberarse de las limitaciones de la arquitectura física, ya que se define una segmentación lógica basada en el agrupamiento de equipos según determinados criterios (direcciones MAC, puertos, protocolos, etc.).

RESUMEN

Este proyecto consiste en el proceso de conceptualización de los diversos temas del área de networking y seguridad, donde se profundizó en uso y beneficios de las VLANs, protocolos de enrutamiento como EIRP, OSPF, entre otros. De la misma forma, la aplicación práctica de los mismos sobre diversos esquemas topológicos de red para los módulos de CCNP ROUTE y SWITCH en ambientes de simulación lógica.

El objetivo principal es el enriquecimiento del estudiante en un área de profundización del área de telecomunicaciones que permita poseer una base práctica para el mejoramiento del pensamiento crítico y la capacidad de análisis proactivo sobre plataforma de red, el análisis de situaciones conflictivas que permitan al estudiante entender el funcionamiento de corta, mediana y gran envergadura.

Palabras clave: CISCO, CCNP, Redes, Router, Switch.

ABSTRACT

This project consists of the conceptualization process of the various topics in the area of networks and security, where the use and benefits of VLANs, routing protocols such as EIRP, OSPF, among others, are explored. In the same way, the practical application of the same on diverse network topological schemes for the CCNP ROUTE and SWITCH modules in logical simulation environments.

The main objective is the enrichment of the student in a deepening area of the telecommunications area that can have a practical basis for the improvement of critical thinking and the ability of proactive analysis on the network platform, the analysis of conflict situations that could at student understand the operation of short, medium and large wingspan.

Key words: CISCO, CCNP, Networks, Router, Switch.

INTRODUCCIÓN

Durante la realización del Diplomado de Profundización CCNP de CISCO se fortalecen las habilidades en networking y se adquiere conocimiento necesario que permita a futuros profesionales desempeñarse de manera satisfactoria en redes WAN, protocolos de enrutamiento, implementación de soluciones soportadas en enrutamiento avanzado, VLANs, entre otros.

En el siguiente documento se desarrollarán dos prácticas correspondientes a dos escenarios, uno que tiene que ver con el módulo CCNP ROUTE, y el otro con el módulo CCNP SWITCH. En el desarrollo de estos dos escenarios se identificará el grado de competencias y habilidades adquiridas a lo largo del curso. Estos escenarios se desarrollarán en el software Packet Tracer.

En el escenario 1 de CCNP ROUTE se abordarán temas como protocolos de enrutamiento EIGRP y OSPF. En el escenario 2 de CCNP SWITCH se abordarán temas como VLANs, Spanning-Tree, operaciones y puertos de switches.

A través de comandos como show, traceroute, ping, se verificará la correcta programación de routers y switches con los debidos protocolos establecidos.

Descripción de escenarios propuestos para la prueba de habilidades

Escenario 1:

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

Topología de Red

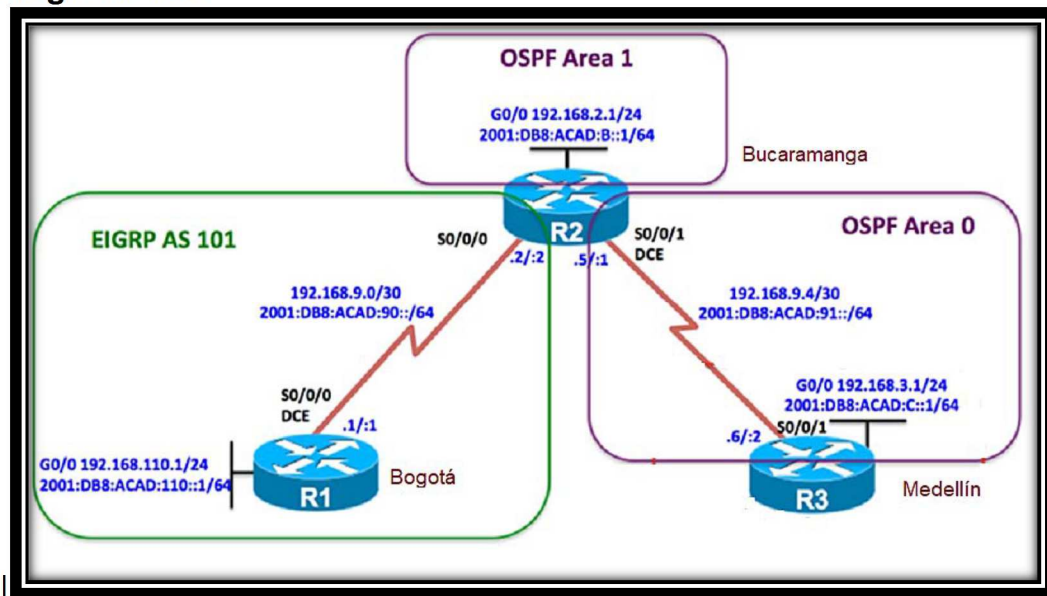


Figura 1. Topología de Red – Escenario 1

Configurar la topología de red, de acuerdo con las siguientes especificaciones:

Parte 1: Configuración del escenario propuesto

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

Router R1

no ip domain-lookup

```

hostname R1
ipv6 unicast-routing
line con 0
logging synchronous
exec-timeout 0 0
exit
interface g0/0
ip address 192.168.110.1 255.255.255.0
ipv6 address 2001:db8:acad:110::1/64
no shutdown
exit
interface s0/0/0
ip address 192.168.9.1 255.255.255.252
ipv6 address 2001:db8:acad:90::1/64
ipv6 address fe80::1 link-local
no shutdown
exit

```

The screenshot shows the IOS Command Line Interface for Router R1. The window title is 'R1' and it has tabs for 'physical', 'Config', and 'CLI'. The main content area displays the following text:

```

Router>en
Router#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no ip domain-lookup
Router(config)#hostname R1
R1(config)#ipv6 unicast-routing
R1(config)#line con 0
R1(config-line)#logging synchronous
R1(config-line)#exec-timeout 0 0
R1(config-line)#exit
R1(config)#interface g0/0
R1(config-if)#ip address 192.168.110.1 255.255.255.0
R1(config-if)#ipv6 address 2001:db8:acad:110::1/64
R1(config-if)#no shut

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed
state to up

R1(config-if)#exit
R1(config)#interface s0/0/0
R1(config-if)#ip address 192.168.9.1 255.255.255.252
R1(config-if)#ipv6 address 2001:db8:acad:90::1/64
R1(config-if)#ipv6 address fe80::1 link-local
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)#exit
R1(config)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

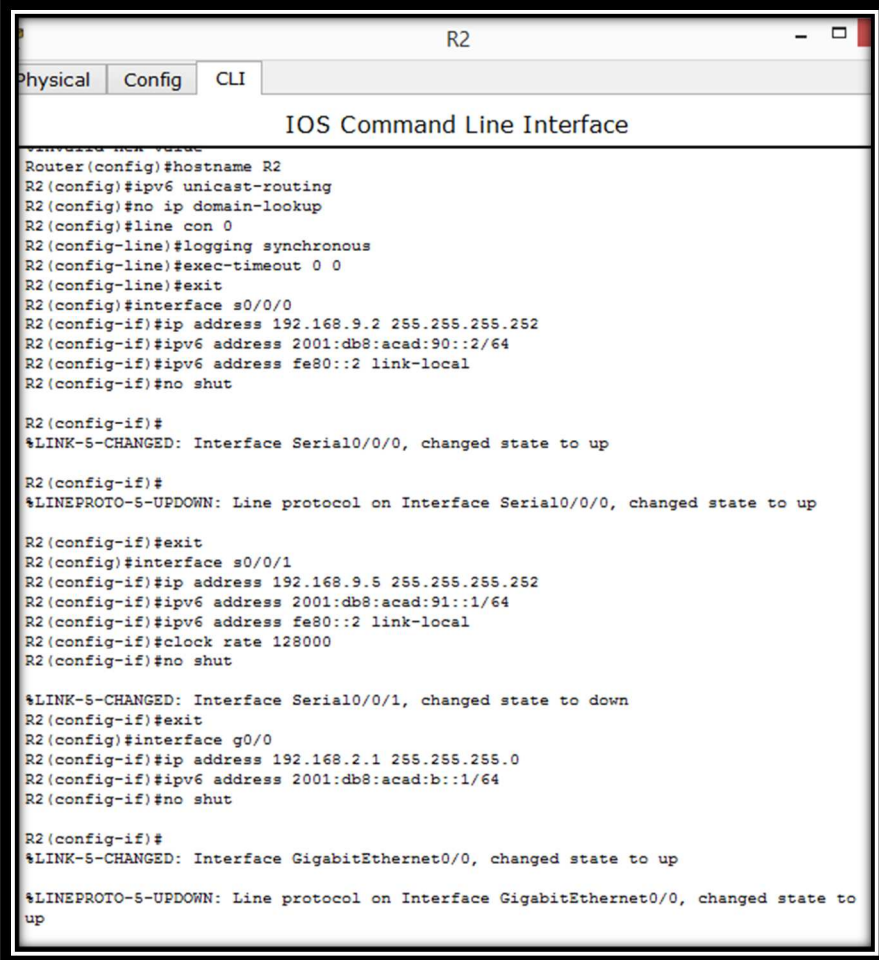
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

R1(config)#

```

Figura 2. Pantallazo configuración Router R1

Router R2



```
Router (config)#hostname R2
R2 (config)#ipv6 unicast-routing
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 s0/0/0
R2 (config-if)#ip address 192.168.9.2 255.255.255.252
R2 (config-if)#ipv6 address 2001:db8:acad:90::2/64
R2 (config-if)#ipv6 address fe80::2 link-local
R2 (config-if)#no shut

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

R2 (config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

R2 (config-if)#exit
R2 (config)#interface s0/0/1
R2 (config-if)#ip address 192.168.9.5 255.255.255.252
R2 (config-if)#ipv6 address 2001:db8:acad:91::1/64
R2 (config-if)#ipv6 address fe80::2 link-local
R2 (config-if)#clock rate 128000
R2 (config-if)#no shut

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
R2 (config-if)#exit
R2 (config)#interface g0/0
R2 (config-if)#ip address 192.168.2.1 255.255.255.0
R2 (config-if)#ipv6 address 2001:db8:acad:b::1/64
R2 (config-if)#no shut

R2 (config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

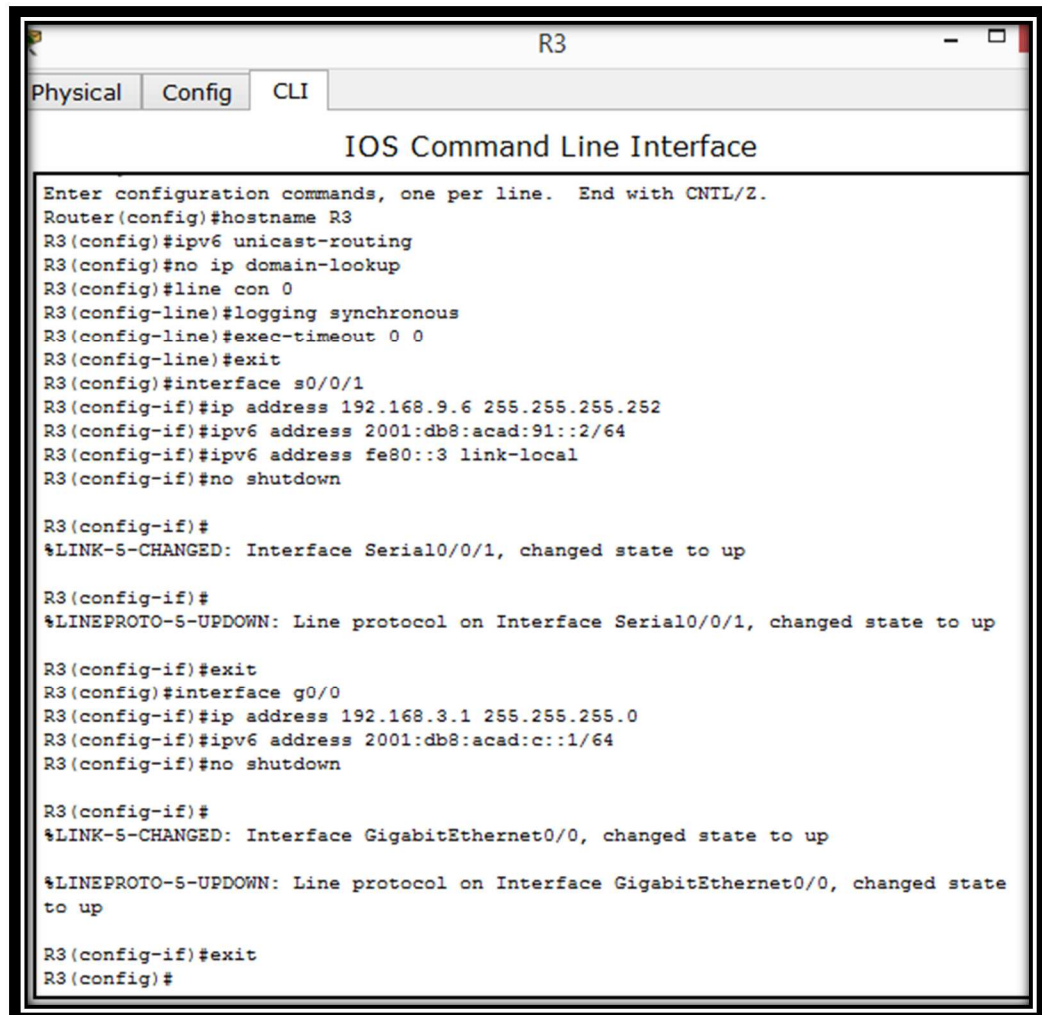
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
```

Figura 3. Pantallazo configuración Router R2

```
no ip domain-lookup
hostname R2
ipv6 unicast-routing
line con 0
logging synchronous
exec-timeout 0 0
exit
interface s0/0/0
ip address 192.168.9.2 255.255.255.252
ipv6 address 2001:db8:acad:90::2/64
ipv6 address fe80::2 link-local
no shutdown
exit
interface s0/0/1
```

```
ip address 192.168.9.5 255.255.255.252
ipv6 address 2001:db8:acad:91::1/64
ipv6 address fe80::2 link-local
clock rate 128000
no shutdown
exit
interface g0/0
ip address 192.168.2.1 255.255.255.0
ipv6 address 2001:db8:acad:b::1/64
no shutdown
exit
```

Router R3



```
R3
Physical Config CLI
IOS Command Line Interface
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R3
R3(config)#ipv6 unicast-routing
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 s0/0/1
R3(config-if)#ip address 192.168.9.6 255.255.255.252
R3(config-if)#ipv6 address 2001:db8:acad:91::2/64
R3(config-if)#ipv6 address fe80::3 link-local
R3(config-if)#no shutdown

R3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

R3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

R3(config-if)#exit
R3(config)#interface g0/0
R3(config-if)#ip address 192.168.3.1 255.255.255.0
R3(config-if)#ipv6 address 2001:db8:acad:c::1/64
R3(config-if)#no shutdown

R3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state
to up

R3(config-if)#exit
R3(config)#
```

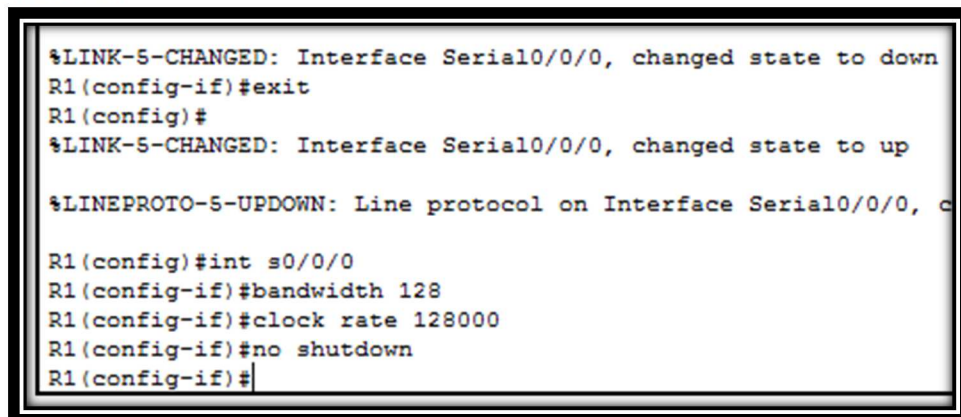
Figura 4. Pantallazo configuración Router R3

```
hostname R3
ipv6 unicast-routing
no ip domain-lookup
line con 0
logging synchronous
exec-timeout 0 0
exit
interface s0/0/1
ip address 192.168.9.6 255.255.255.252
ipv6 address 2001:db8:acad:91::2/64
ipv6 address fe80::3 link-local
no shutdown
exit
interface g0/0
ip address 192.168.3.1 255.255.255.0
ipv6 address 2001:db8:acad:c::1/64
no shutdown
exit
```

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

Router R1

```
int s0/0/0
bandwidth 128
clock rate 128000
no shutdown
```



```
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)#exit
R1(config)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, c

R1(config)#int s0/0/0
R1(config-if)#bandwidth 128
R1(config-if)#clock rate 128000
R1(config-if)#no shutdown
R1(config-if)#
```

Figura 5. Pantallazo conf. clock rate Router R1

Router R2

```
R2(Config)#
%LINK-5-CHANGED: Interface Serial0/0/1, change
%LINEPROTO-5-UPDOWN: Line protocol on Interfac

R2(config)#int s0/0/0
R2(config-if)#bandwidth 128
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#int s0/0/1
R2(config-if)#bandwidth 128
R2(config-if)#clock rate 128000
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#
```

Figura 6. Pantallazo conf. clock rate Router R2

```
int s0/0/0
bandwidth 128
no shutdown
exit
int s0/0/1
bandwidth 128
clock rate 128000
no shutdown
exit
```

Router R3

```
int s0/0/1
bandwidth 128
no shutdown
exit
```

```
R3(Config)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0,
%LINEPROTO-5-UPDOWN: Line protocol on Interface
to up

R3(config-if)#exit
R3(config)#int s0/0/1
R3(config-if)#bandwidth 128
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#
```

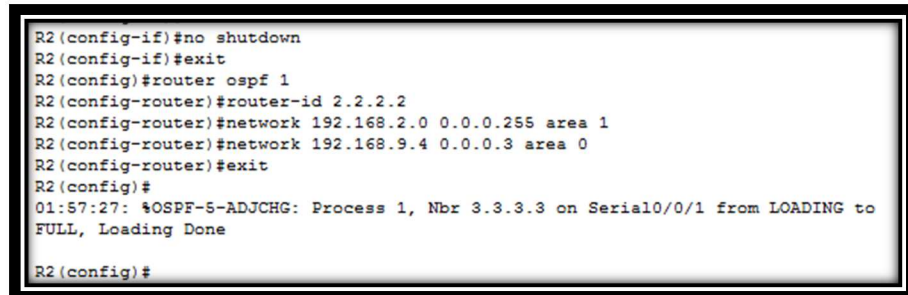
Figura 7. Pantallazo conf. clock rate Router R3

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

En vista que OSPFv3 es equivalente a OSPFv2 en el intercambio de prefijos IPv6, ya que en este caso la dirección de red se denomina prefijo, y la máscara de subred, longitud de prefijo.

Router R2

```
router ospf 1
log-adjacency-changes
router-id 2.2.2.2
network 192.168.2.0 0.0.0.255 area 1
network 192.168.9.4 0.0.0.3 area 0
exit
```

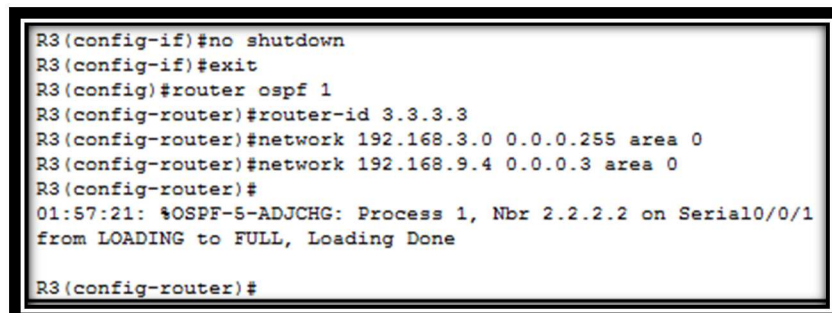


```
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#router ospf 1
R2(config-router)#router-id 2.2.2.2
R2(config-router)#network 192.168.2.0 0.0.0.255 area 1
R2(config-router)#network 192.168.9.4 0.0.0.3 area 0
R2(config-router)#exit
R2(config)#
01:57:27: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Serial0/0/1 from LOADING to FULL, Loading Done
R2(config)#
```

Figura 8. Pantallazo configuración OSPF Router R2

Router R3

```
router ospf 1
log-adjacency-changes
router-id 3.3.3.3
network 192.168.3.0 0.0.0.255 area 0
network 192.168.9.4 0.0.0.3 area 0
exit
```



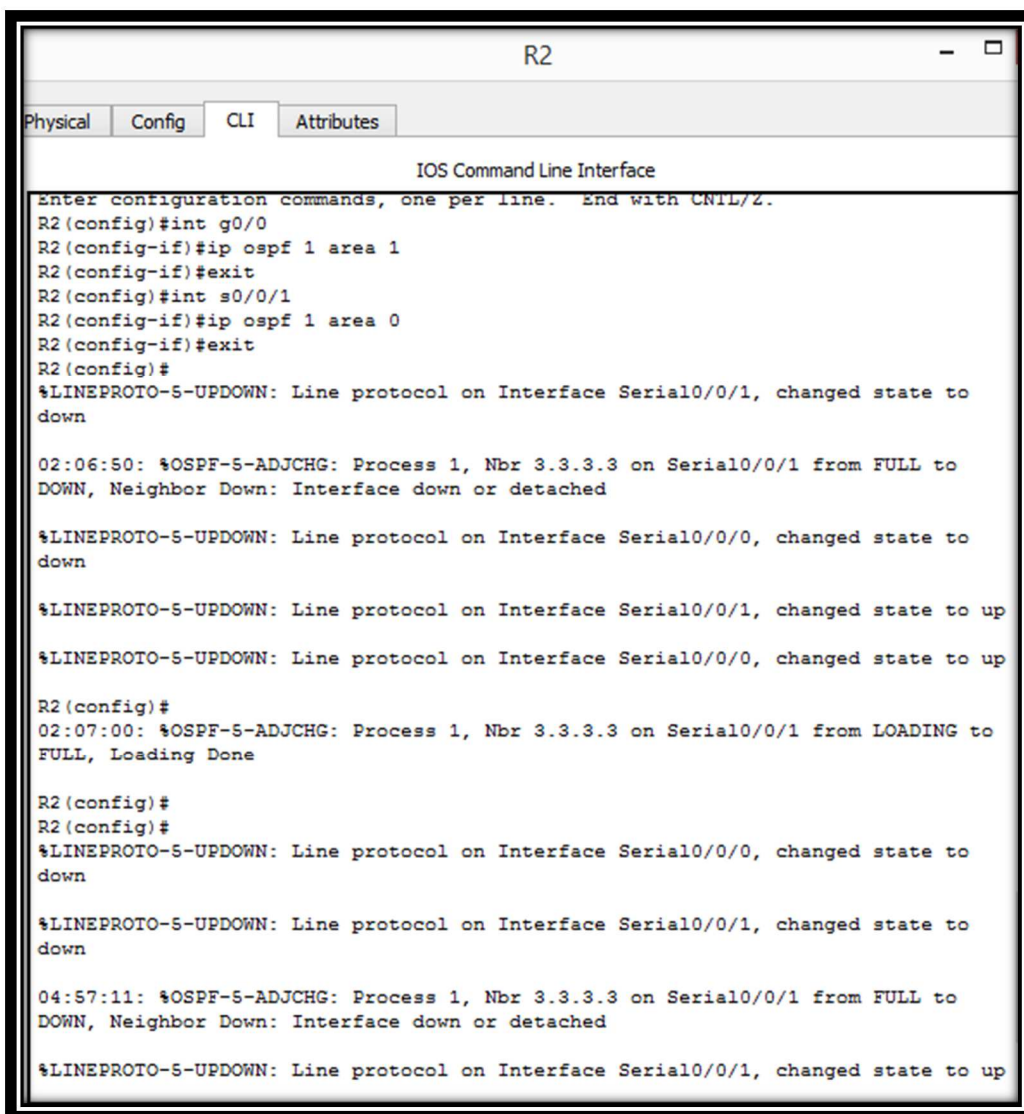
```
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#router ospf 1
R3(config-router)#router-id 3.3.3.3
R3(config-router)#network 192.168.3.0 0.0.0.255 area 0
R3(config-router)#network 192.168.9.4 0.0.0.3 area 0
R3(config-router)#
01:57:21: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial0/0/1 from LOADING to FULL, Loading Done
R3(config-router)#
```

Figura 9. Pantallazo configuración OSPF Router R3

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

Router R2

```
int g0/0
ip ospf 1 area 1
exit
int s0/0/1
ip ospf 1 area 0
exit
```



```
R2
Physical Config CLI Attributes
IOS Command Line Interface
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#int g0/0
R2(config-if)#ip ospf 1 area 1
R2(config-if)#exit
R2(config)#int s0/0/1
R2(config-if)#ip ospf 1 area 0
R2(config-if)#exit
R2(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to
down

02:06:50: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Serial0/0/1 from FULL to
DOWN, Neighbor Down: Interface down or detached

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

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

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

R2(config)#
02:07:00: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Serial0/0/1 from LOADING to
FULL, Loading Done

R2(config)#
R2(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to
down

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

04:57:11: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Serial0/0/1 from FULL to
DOWN, Neighbor Down: Interface down or detached

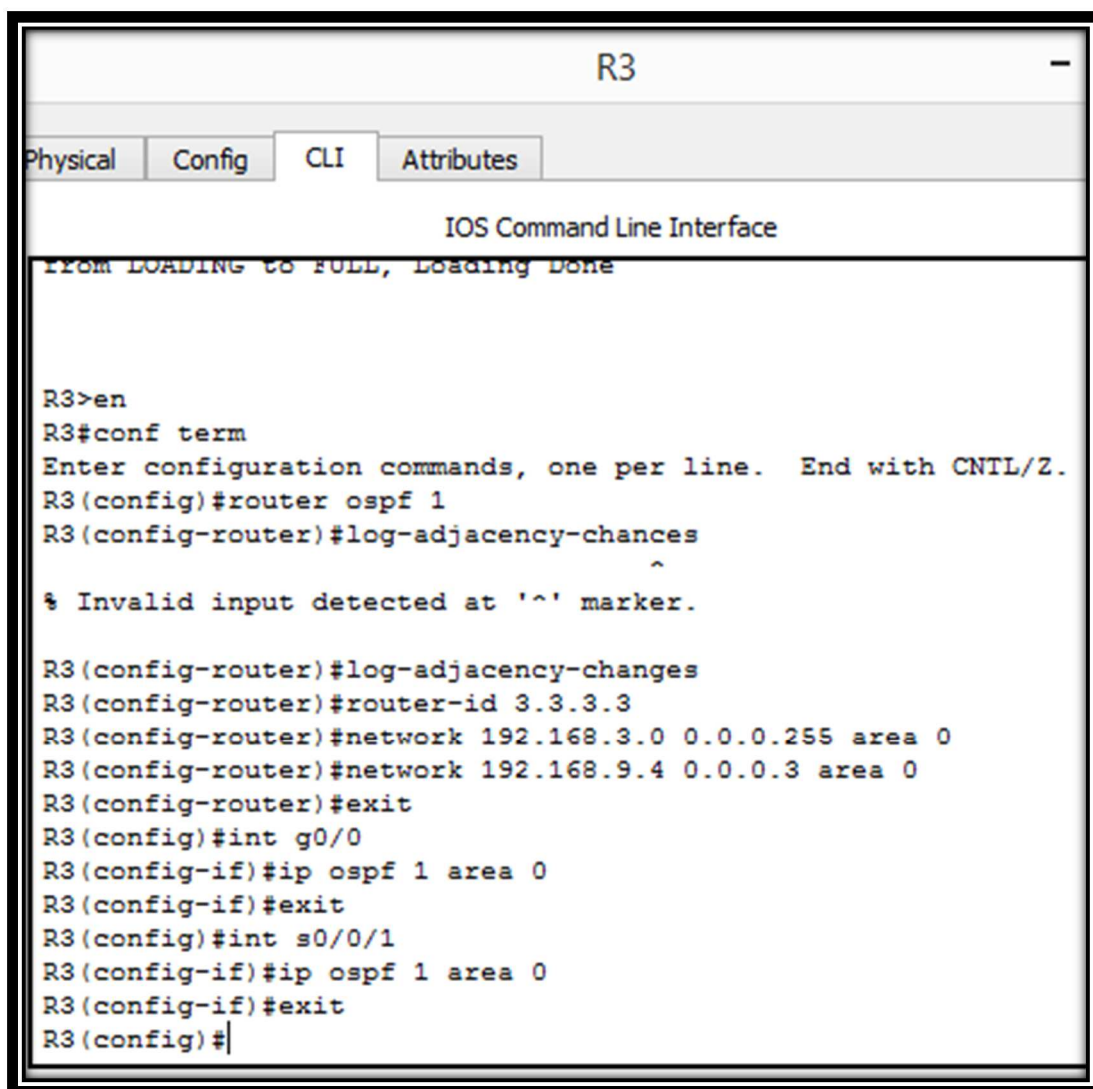
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up
```

Figura 10. Pantallazo conf. int g0/0 OSPF Router R2

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

Router R3

```
int g0/0
ip ospf 1 area 0
exit
int s0/0/1
ip ospf 1 area 0
exit
```



```
R3
Physical Config CLI Attributes
IOS Command Line Interface
From LOADING to FULL, Loading Done

R3>en
R3#conf term
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#log-adjacency-changes
^
% Invalid input detected at '^' marker.

R3(config-router)#log-adjacency-changes
R3(config-router)#router-id 3.3.3.3
R3(config-router)#network 192.168.3.0 0.0.0.255 area 0
R3(config-router)#network 192.168.9.4 0.0.0.3 area 0
R3(config-router)#exit
R3(config)#int g0/0
R3(config-if)#ip ospf 1 area 0
R3(config-if)#exit
R3(config)#int s0/0/1
R3(config-if)#ip ospf 1 area 0
R3(config-if)#exit
R3(config)#|
```

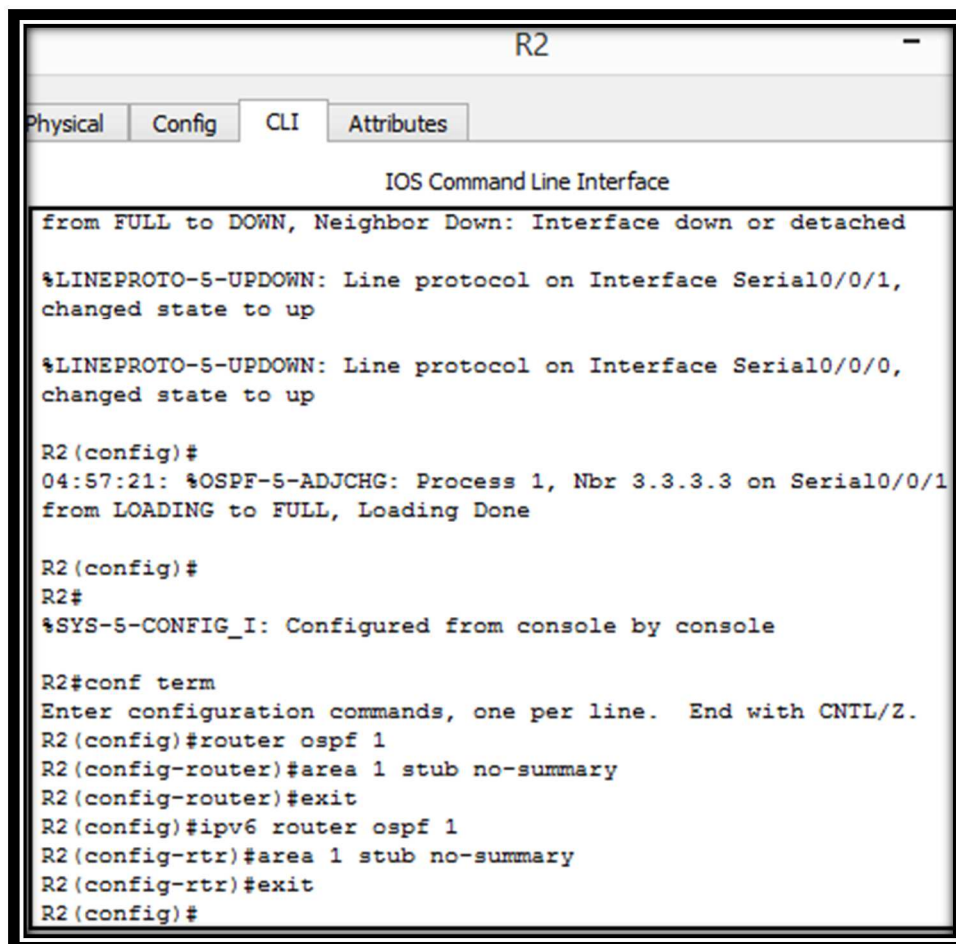
Figura 11. Pantallazo conf. int g0/0 OSPF Router R3

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

Esta área es propietaria de Cisco, esto quiere decir que no acepta rutas de otros tipos de sistemas externos o rutas sumarizadas desde otras áreas internas. Al igual que en las áreas Stub, los routers se encargan de enviar una ruta por defecto para todas las rutas externas y sumarizadas.

Router R2

```
router ospf 1
area 1 stub no-summary
exit
ipv6 router ospf 1
área 1 stub no-summary
exit
```



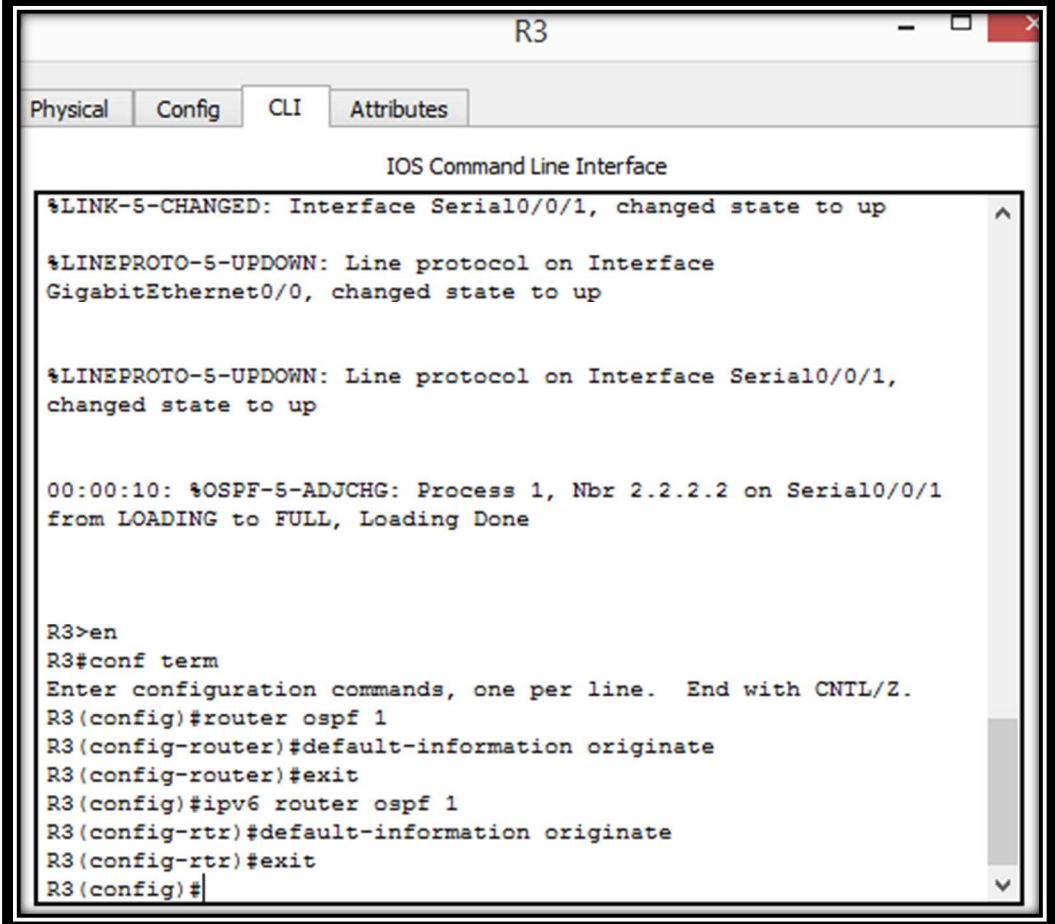
```
R2
Physical Config CLI Attributes
IOS Command Line Interface
from FULL to DOWN, Neighbor Down: Interface down or detached
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1,
changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up
R2(config)#
04:57:21: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Serial0/0/1
from LOADING to FULL, Loading Done
R2(config)#
R2#
%SYS-5-CONFIG_I: Configured from console by console
R2#conf term
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router ospf 1
R2(config-router)#area 1 stub no-summary
R2(config-router)#exit
R2(config)#ipv6 router ospf 1
R2(config-rtr)#area 1 stub no-summary
R2(config-rtr)#exit
R2(config)#
```

Figura 12. Pantallazo conf. Área Stubby Router R2

7. Propagar rutas por defecto de IPv4 e IPv6 en R3 al interior del dominio OSPFv3. Nota: Es importante tener en cuenta que una ruta por defecto es diferente a la definición de rutas estáticas.

Router R3

```
router ospf 1
default-information originate
exit
ipv6 router ospf 1
default-information originate
exit
```



The screenshot shows the IOS Command Line Interface for Router R3. The window title is 'R3'. The interface has tabs for 'Physical', 'Config', 'CLI', and 'Attributes', with 'CLI' selected. The main area displays the following text:

```
IOS Command Line Interface

%LINK-5-CHANGED: Interface Serial10/0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial10/0/1,
changed state to up

00:00:10: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Serial10/0/1
from LOADING to FULL, Loading Done

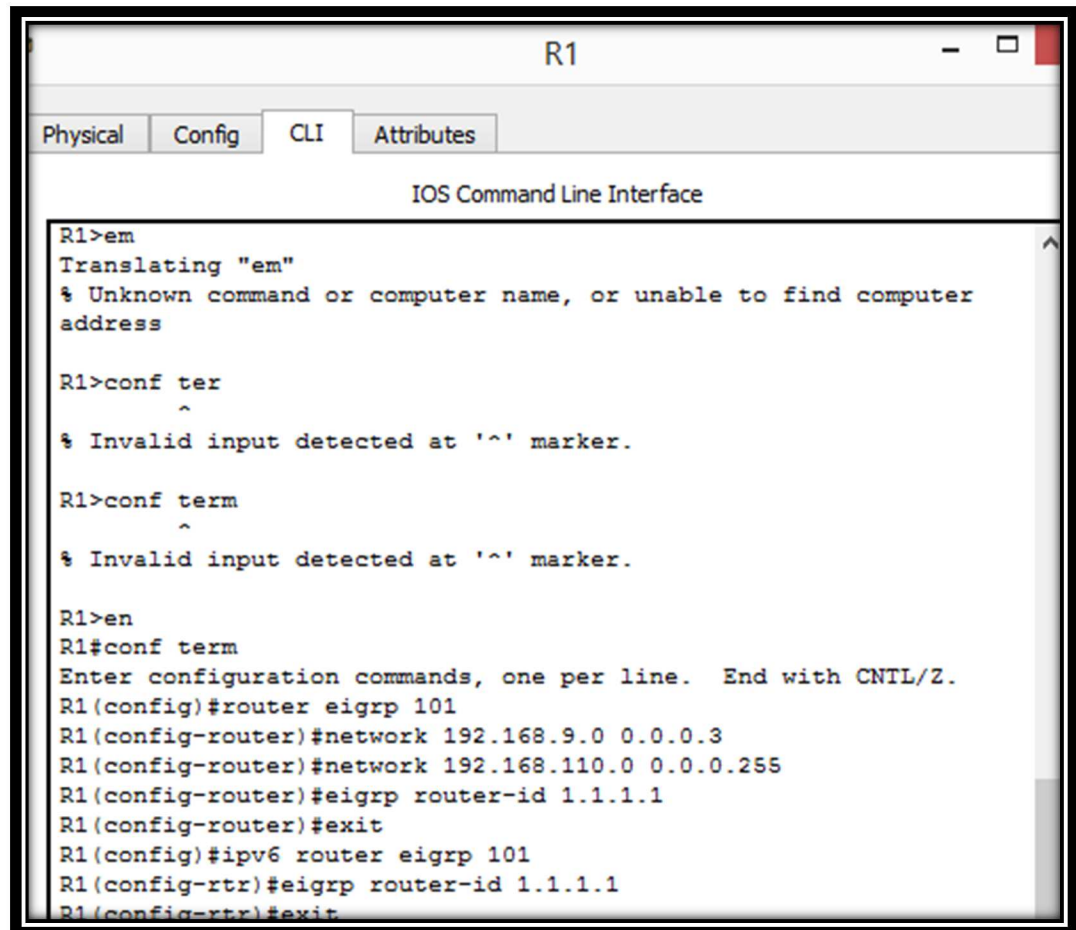
R3>en
R3#conf term
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#default-information originate
R3(config-router)#exit
R3(config)#ipv6 router ospf 1
R3(config-rtr)#default-information originate
R3(config-rtr)#exit
R3(config)#
```

Figura 13. Pantallazo conf. Ipv6 OSPF Router R3

- Realizar la configuración del protocolo EIGRP para IPv4 como IPv6. Configurar la interfaz G0/0 de R1 y la conexión entre R1 y R2 para EIGRP con el sistema autónomo 101. Asegúrese de que el resumen automático está desactivado.

Router R1

```
router eigrp 101
network 192.168.9.0 0.0.0.3
network 192.168.110.0 0.0.0.255
eigrp router-id 1.1.1.1
exit
ipv6 router eigrp 101
eigrp router-id 1.1.1.1
exit
```



```
R1
Physical Config CLI Attributes
IOS Command Line Interface
R1>em
Translating "em"
% Unknown command or computer name, or unable to find computer
address

R1>conf ter
^
% Invalid input detected at '^' marker.

R1>conf term
^
% Invalid input detected at '^' marker.

R1>en
R1#conf term
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router eigrp 101
R1(config-router)#network 192.168.9.0 0.0.0.3
R1(config-router)#network 192.168.110.0 0.0.0.255
R1(config-router)#eigrp router-id 1.1.1.1
R1(config-router)#exit
R1(config)#ipv6 router eigrp 101
R1(config-rtr)#eigrp router-id 1.1.1.1
R1(config-rtr)#exit
```

Figura 14. Pantallazo conf. EIGRP Router R1

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

Router R1

```
ipv6 router eigrp 101
passive-interface g0/0
exit
```

```
R1(config)#ipv6 router eigrp 101
R1(config-rtr)#passive interface g0/0
      ^
% Invalid input detected at '^' marker.

R1(config-rtr)#passive-interface g0/0
R1(config-rtr)#exit
R1(config)#
```

Figura 15. Pantallazo conf. EIGRP Pasivas Router R1

Router R2

```
ipv6 router eigrp 101
passive-interface g0/0
exit
```

```
R2#conf term
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ipv6 router eigrp 101
R2(config-rtr)#passive-interface g0/0
R2(config-rtr)#exit
R2(config)#
```

Figura 16. Pantallazo conf. EIGRP Pasivas Router R2

Router R3

```
ipv6 router eigrp 101
passive-interface g0/0
exit
```

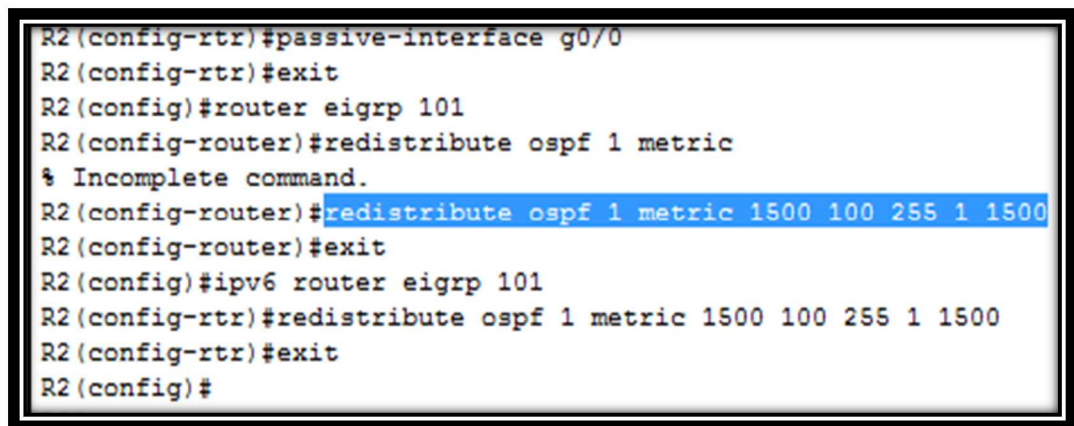
```
R3(config)#ipv6 router eigrp 101
R3(config-rtr)#passive-interface g0/0
R3(config-rtr)#exit
R3(config)#
```

Figura 17. Pantallazo conf. EIGRP Pasivas Router R3

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

Router R2

```
router eigrp 101
redistribute ospf 1 metric 1500 100 255 1 1500
exit
ipv6 router eigrp 101
redistribute ospf 1 metric 1500 100 255 1 1500
exit
```



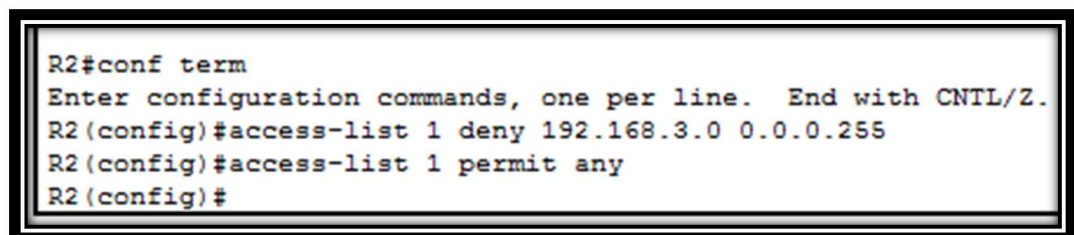
```
R2(config-rtr)#passive-interface g0/0
R2(config-rtr)#exit
R2(config)#router eigrp 101
R2(config-router)#redistribute ospf 1 metric
% Incomplete command.
R2(config-router)#redistribute ospf 1 metric 1500 100 255 1 1500
R2(config-router)#exit
R2(config)#ipv6 router eigrp 101
R2(config-rtr)#redistribute ospf 1 metric 1500 100 255 1 1500
R2(config-rtr)#exit
R2(config)#
```

Figura 18. Pantallazo conf. Redistribución OSPF EIGRP Router R2

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

Router R2

```
access-list 1 deny 192.168.3.0 0.0.0.255
access-list 1 permit any
```



```
R2#conf term
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#access-list 1 deny 192.168.3.0 0.0.0.255
R2(config)#access-list 1 permit any
R2(config)#
```

Figura 19. Pantallazo conf. ACL Router R2

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

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

Router R1

```
R1
-----
Physical  Config  CLI  Attributes
-----
IOS Command Line Interface

R1#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter ar
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EO
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-I
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     192.168.9.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.9.0/30 is directly connected, Serial0/0/0
L       192.168.9.1/32 is directly connected, Serial0/0/0
     192.168.110.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.110.0/24 is directly connected, GigabitEthernet0/0
L       192.168.110.1/32 is directly connected, GigabitEthernet0/0

R1#show ip protocols

Routing Protocol is "eigrp 101 "
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Default networks flagged in outgoing updates
  Default networks accepted from incoming updates
  Redistributing: eigrp 101
  EIGRP-IPv4 Protocol for AS(101)
    Metric weight K1=1, K2=0, K3=1, K4=0, K5=0
    NSF-aware route hold timer is 240
    Router-ID: 1.1.1.1
    Topology : 0 (base)
      Active Timer: 3 min
      Distance: internal 90 external 170
      Maximum path: 4
      Maximum hopcount 100
      Maximum metric variance 1
```

Figura 20. Pantallazo Tabla Enrutamiento Router R1

Router R2

```
R2
Physical Config CLI Attributes
IOS Command Line Interface
EIGRP-IPv4 Protocol for AS(101)
Metric weight K1=1, K2=0, K3=1, K4=0, K5=0
NSF-aware route hold timer is 240
Router-ID: 192.168.2.1
Topology : 0 (base)
Active Timer: 3 min
Distance: internal 90 external 170
Maximum path: 4
Maximum hopcount 100
Maximum metric variance 1

Automatic Summarization: disabled
Automatic address summarization:
Maximum path: 4
Routing for Networks:
Routing Information Sources:
Gateway      Distance      Last Update
Distance: internal 90 external 170

Routing Protocol is "ospf 1"
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Router ID 2.2.2.2
Number of areas in this router is 2. 1 normal 1 stub 0 nssa
Maximum path: 4
Routing for Networks:
 192.168.2.0 0.0.0.255 area 1
 192.168.9.4 0.0.0.3 area 0
 192.168.4.0 0.0.0.3 area 0
Routing Information Sources:
Gateway      Distance      Last Update
2.2.2.2      110           00:23:09
3.3.3.3      110           00:23:09
Distance: (default is 110)

R2#
```

Figura 21. Pantallazo Tabla Enrutamiento Router R2

Router R3

```
R3#show ip protocols

Routing Protocol is "ospf 1"
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Router ID 3.3.3.3
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Maximum path: 4
Routing for Networks:
 192.168.3.0 0.0.0.255 area 0
 192.168.9.4 0.0.0.3 area 0
Routing Information Sources:
Gateway      Distance      Last Update
2.2.2.2      110           00:27:35
3.3.3.3      110           00:27:35
Distance: (default is 110)
```

Figura 22. Pantallazo Tabla Enrutamiento Router R3

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

Router R1

```
R1#ping 192.168.9.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/12/54
ms

R1#ping 192.168.9.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/5/16
ms

R1#ping 192.168.2.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.2.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

R1#ping 192.168.9.5
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.5, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

R1#ping 192.168.9.6
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.9.6, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
```

Figura 23. Pantallazo Verificación Ping1 Router R1

```

R1#ping 192.168.3.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.3.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

R1#ping 2001:db8:acad:110::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:acad:110::1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/10/40 ms

R1#ping 2001:db8:acad:90::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:acad:90::1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/13/46 ms

R1#ping 2001:db8:acad:90::2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:acad:90::2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/8/40 ms

R1#ping 2001:db8:acad:91::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:acad:91::1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

R1#ping 2001:db8:acad:c::1

```

Figura 24. Pantallazo Verificación Ping2 Router R1

```

R1#ping 192.168.110.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.110.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms

R1#traceroute 192.168.110.1
Type escape sequence to abort.
Tracing the route to 192.168.110.1

  1  192.168.110.1  43 msec  2 msec  2 msec
R1#traceroute 192.168.9.2
Type escape sequence to abort.
Tracing the route to 192.168.9.2

  1  192.168.9.2  1 msec  0 msec  0 msec
R1#traceroute 192.168.9.1
Type escape sequence to abort.
Tracing the route to 192.168.9.1

  1  192.168.9.2  29 msec  0 msec  0 msec
  2  192.168.9.1  1 msec  1 msec  0 msec
R1#

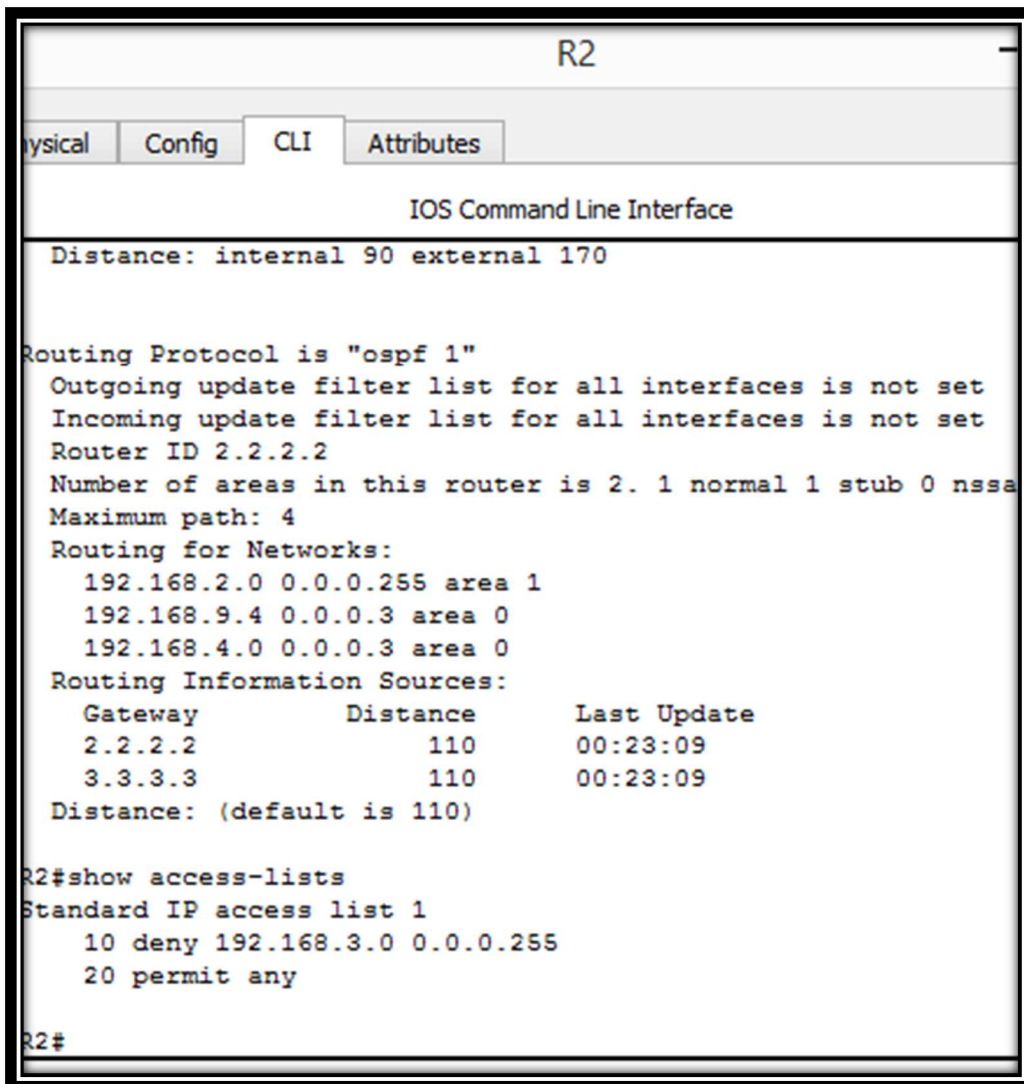
```

Figura 25. Pantallazo Verificación Traceroute Router R1

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

Router R2

show access-lists



```
R2
-----
Physical  Config  CLI  Attributes
-----
IOS Command Line Interface

Distance: internal 90 external 170

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 2.2.2.2
  Number of areas in this router is 2. 1 normal 1 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.2.0 0.0.0.255 area 1
    192.168.9.4 0.0.0.3 area 0
    192.168.4.0 0.0.0.3 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    2.2.2.2          110          00:23:09
    3.3.3.3          110          00:23:09
  Distance: (default is 110)

R2#show access-lists
Standard IP access list 1
  10 deny 192.168.3.0 0.0.0.255
  20 permit any

R2#
```

Figura 26. Pantallazo Verificación Rutas Filtradas Router R2

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

Escenario 2:

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

Topología de Red

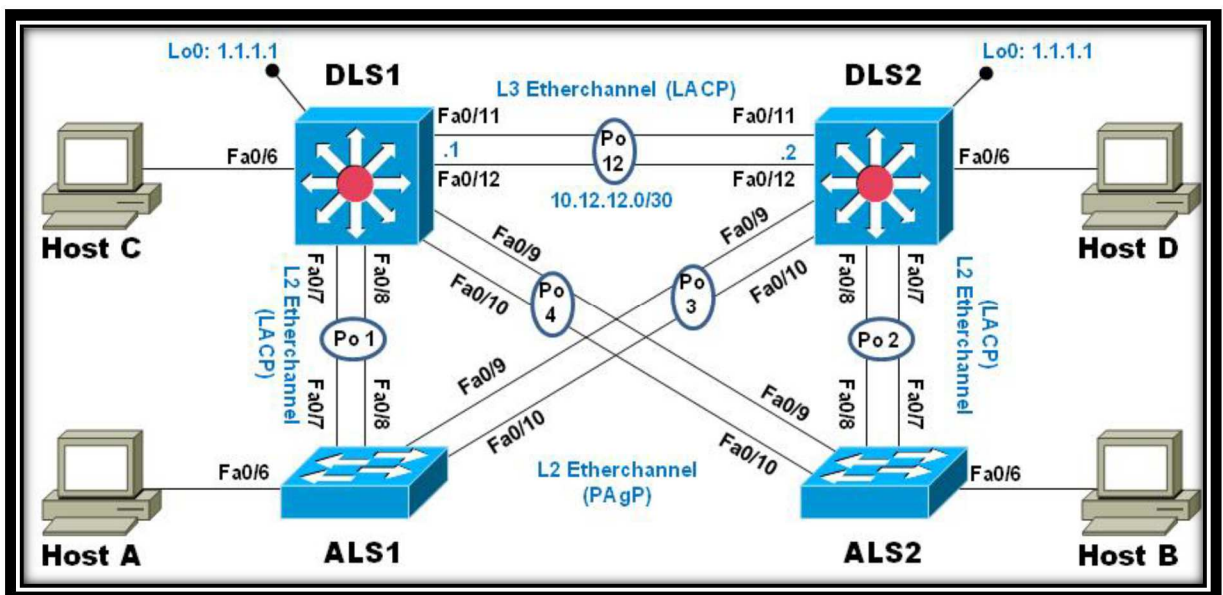


Figura 27. Topología de Red – Escenario 2

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

- Apagar todas las interfaces en cada switch

Switch DLS1

```
hostname DLS1
int range f0/1-24, g0/1-2
shutdown
exit
```

```
Switch>en
Switch#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname DLS1
DLS1(config)#int range f0/1-24, g0/1-2
DLS1(config-if-range)#shutdown

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to
administratively down

%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to
administratively down

%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to
administratively down

%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to
administratively down

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

Figura 28. *Pantallazo shutdown Switch DLS1*

Switch DLS2

```
hostname DLS2
int range f0/1-24, g0/1-2
shutdown
exit
```

```
Switch>en
Switch#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname DLS2
DLS2(config)#int range f0/1-24, g0/1-2
DLS2(config-if-range)#shutdown

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to
administratively down

%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to
administratively down

%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to
administratively down

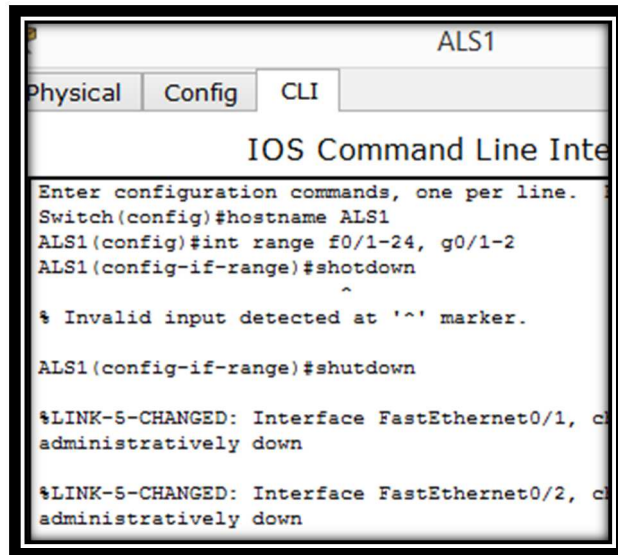
%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to
administratively down

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

Figura 29. *Pantallazo shutdown Switch DLS2*

Switch ALS1

```
hostname ALS1
int range f0/1-24, g0/1-2
shutdown
exit
```

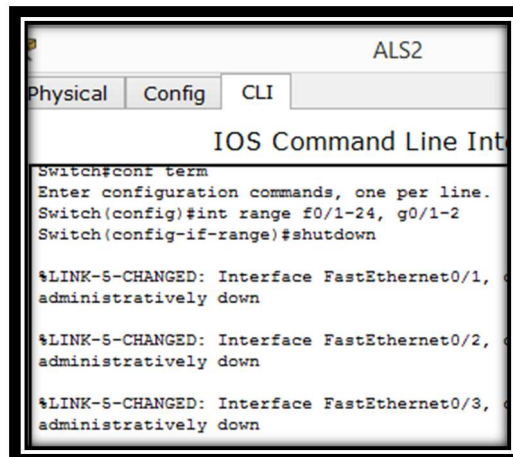


```
ALS1
Physical Config CLI
IOS Command Line Interface
Enter configuration commands, one per line.
Switch(config)#hostname ALS1
ALS1(config)#int range f0/1-24, g0/1-2
ALS1(config-if-range)#shutdown
^
% Invalid input detected at '^' marker.
ALS1(config-if-range)#shutdown
%LINK-5-CHANGED: Interface FastEthernet0/1, c
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/2, c
administratively down
```

Figura 30. Pantallazo shutdown Switch ALS1

Switch ALS2

```
hostname ALS2
int range f0/1-24, g0/1-2
shutdown
exit
```



```
ALS2
Physical Config CLI
IOS Command Line Interface
Switch#conf term
Enter configuration commands, one per line.
Switch(config)#int range f0/1-24, g0/1-2
Switch(config-if-range)#shutdown
%LINK-5-CHANGED: Interface FastEthernet0/1, c
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/2, c
administratively down
%LINK-5-CHANGED: Interface FastEthernet0/3, c
administratively down
```

Figura 31. Pantallazo shutdown Switch ALS2

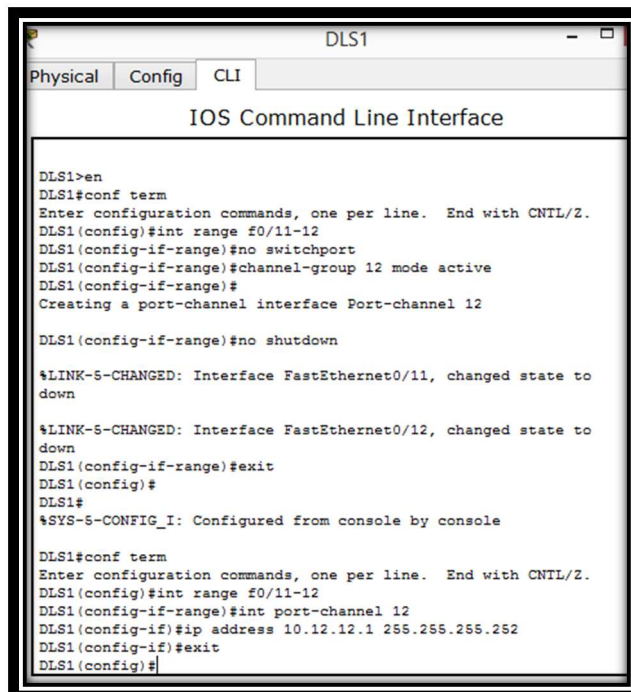
- b. Asignar un nombre a cada switch acorde al escenario establecido.

En la configuración anterior se estableció el nombre a cada switch

- 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.
 2. Los Port-channels en las interfaces Fa0/7 y Fa0/8 utilizarán LACP.
 3. Los Port-channels en las interfaces F0/9 y fa0/10 utilizará PAgP.
 4. Todos los puertos troncales serán asignados a la VLAN 800 como la VLAN nativa.

Switch DLS1

```
int range f0/11-12
no switchport
channel-group 12 mode active
no shutdown
interface port-channel 12
ip address 10.12.12.1 255.255.255.252
exit
```



```
DLS1
Physical Config CLI
IOS Command Line Interface

DLS1>en
DLS1#conf term
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#int range f0/11-12
DLS1(config-if-range)#no switchport
DLS1(config-if-range)#channel-group 12 mode active
DLS1(config-if-range)#
Creating a port-channel interface Port-channel 12

DLS1(config-if-range)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/11, changed state to
down
%LINK-5-CHANGED: Interface FastEthernet0/12, changed state to
down
DLS1(config-if-range)#exit
DLS1(config)#
DLS1#
%SYS-5-CONFIG_I: Configured from console by console

DLS1#conf term
Enter configuration commands, one per line. End with CNTL/Z.
DLS1(config)#int range f0/11-12
DLS1(config-if-range)#int port-channel 12
DLS1(config-if)#ip address 10.12.12.1 255.255.255.252
DLS1(config-if)#exit
DLS1(config)#
```

Figura 32. Pantallazo configuración1 Switch DLS1

```

int range f0/7-10
switchport trunk encapsulation dot1q
switchport trunk native vlan 800
switchport mode trunk
switchport nonegotiate
no shutdown
exit
int range f0/7-8
desc member of po1 to ALS1
channel-group 1 mode active
exit
int range f0/9-10
desc member of po4 to ALS2
channel-group 4 mode desirable
exit

```

The screenshot shows the CLI of switch DLS1 with the following configuration steps:

```

DLS1(config)#int range f0/7-10
DLS1(config-if-range)#switchport trunk encapsulation dot1q
DLS1(config-if-range)#switchport trunk native vlan 800
DLS1(config-if-range)#switchport mode trunk
DLS1(config-if-range)#switchport nonegotiate
DLS1(config-if-range)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to down
DLS1(config-if-range)#exit
DLS1(config)#int range f0/7-8
DLS1(config-if-range)#desc member of po1 to ALS1
DLS1(config-if-range)#channel group 1 mode active
% Ambiguous command: "channel group 1 mode active"
DLS1(config-if-range)#channel-group 1 mode active
DLS1(config-if-range)#
Creating a port-channel interface Port-channel 1

DLS1(config-if-range)#exit
DLS1(config)#int range f0/9-10
DLS1(config-if-range)#desc member of po4 to ALS2
DLS1(config-if-range)#channel-group 4 mode desirable
DLS1(config-if-range)#
Creating a port-channel interface Port-channel 4

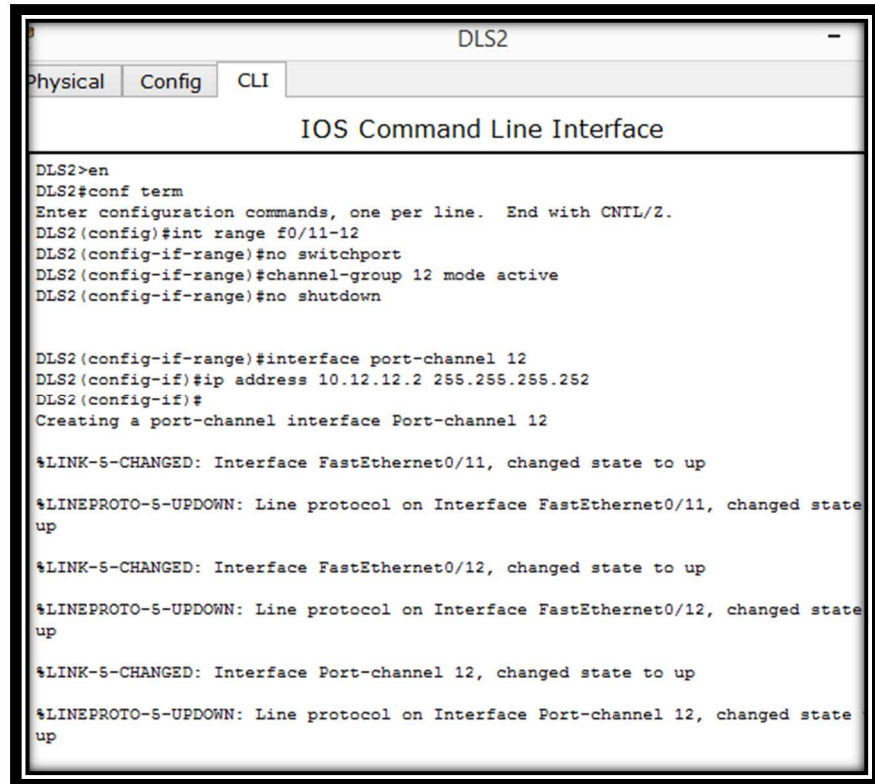
DLS1(config-if-range)#exit

```

Figura 33. Pantallazo configuración2 Switch DLS1

Switch DLS2

```
int range f0/11-12
no switchport
channel-group 12 mode active
no shutdown
interface port-channel 12
ip address 10.12.12.2 255.255.255.252
```



```
DLS2
Physical Config CLI
IOS Command Line Interface
DLS2>en
DLS2#conf term
Enter configuration commands, one per line. End with CNTL/Z.
DLS2 (config)#int range f0/11-12
DLS2 (config-if-range)#no switchport
DLS2 (config-if-range)#channel-group 12 mode active
DLS2 (config-if-range)#no shutdown

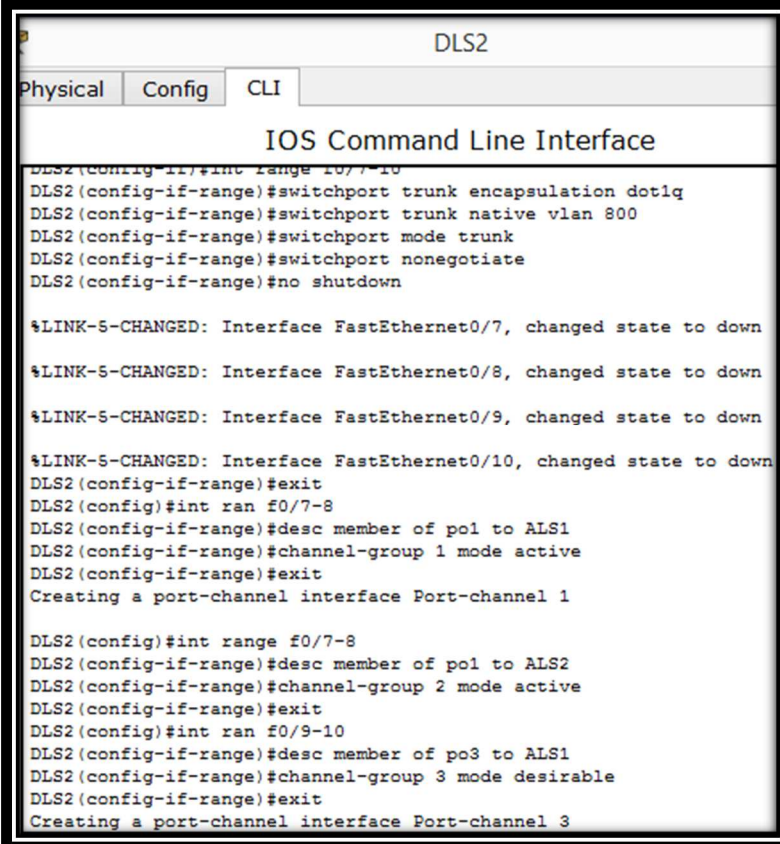
DLS2 (config-if-range)#interface port-channel 12
DLS2 (config-if)#ip address 10.12.12.2 255.255.255.252
DLS2 (config-if)#
Creating a port-channel interface Port-channel 12

%LINK-5-CHANGED: Interface FastEthernet0/11, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/11, changed state
up
%LINK-5-CHANGED: Interface FastEthernet0/12, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/12, changed state
up
%LINK-5-CHANGED: Interface Port-channel 12, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel 12, changed state
up
```

Figura 34. Pantallazo configuración1 Switch DLS2

```
int range f0/7-10
switchport trunk encapsulation dot1q
switchport trunk native vlan 800
switchport mode trunk
switchport nonegotiate
no shutdown
exit
int range f0/7-8
desc member of po1 to ALS2
channel-group 2 mode active
exit
```

```
int range f0/9-10
desc member of po3 to ALS1
channel-group 3 mode desirable
exit
```



```
DLS2
Physical Config CLI
IOS Command Line Interface
DLS2(config-if-range)#int range f0/7-10
DLS2(config-if-range)#switchport trunk encapsulation dot1q
DLS2(config-if-range)#switchport trunk native vlan 800
DLS2(config-if-range)#switchport mode trunk
DLS2(config-if-range)#switchport nonegotiate
DLS2(config-if-range)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to down
DLS2(config-if-range)#exit
DLS2(config)#int ran f0/7-8
DLS2(config-if-range)#desc member of po1 to ALS1
DLS2(config-if-range)#channel-group 1 mode active
DLS2(config-if-range)#exit
Creating a port-channel interface Port-channel 1

DLS2(config)#int range f0/7-8
DLS2(config-if-range)#desc member of po1 to ALS2
DLS2(config-if-range)#channel-group 2 mode active
DLS2(config-if-range)#exit
DLS2(config)#int ran f0/9-10
DLS2(config-if-range)#desc member of po3 to ALS1
DLS2(config-if-range)#channel-group 3 mode desirable
DLS2(config-if-range)#exit
Creating a port-channel interface Port-channel 3
```

Figura 35. Pantallazo configuración2 Switch DLS2

Switch ALS1

```
int range f0/7-10
switchport trunk native vlan 800
switchport mode trunk
switchport nonegotiate
no shutdown
exit
int range f0/7-8
desc member of po1 to DLS1
channel-group 1 mode active
no shutdown
exit
```

```

ALS1
-----
Physical  Config  CLI
-----
IOS Command Line Interface

ALS1(config)#int ran f0/7-10
ALS1(config-if-range)#switchport trunk native vlan 800
ALS1(config-if-range)#switchport mode trunk
ALS1(config-if-range)#switchport nonegotiate
ALS1(config-if-range)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to down

ALS1(config-if-range)#
%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/9, changed sta
up

%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/10, changed st
up

ALS1(config-if-range)#exit
ALS1(config)#int ran f0/7-8
ALS1(config-if-range)#desc member of po1 to DLS1
ALS1(config-if-range)#channel-group 1 mode active
ALS1(config-if-range)#switchport trunk allowed vlan 12,123,234,800,1010,1111
Command rejected: Bad VLAN list
Command rejected: Bad VLAN list
ALS1(config-if-range)#no shut
Creating a port-channel interface Port-channel 1

```

Figura 36. Pantallazo configuración1 Switch ALS1

```

int range f0/9-10
desc member of po 3 to DLS2
channel-group 3 mode desirable
no shutdown
exit

```

```

ALS1
-----
Physical  Config  CLI
-----
IOS Command Line Interface

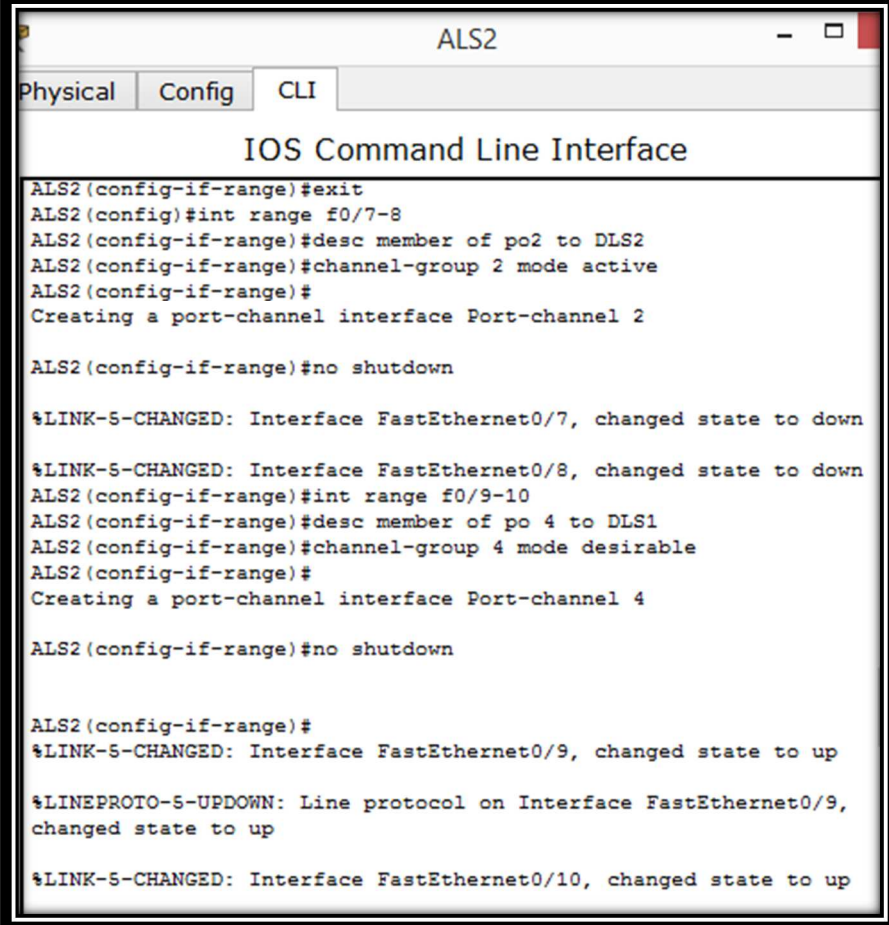
ALS1#conf term
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#
ALS1(config)#int range f0/9-10
ALS1(config-if-range)#desc member of po 3 to DLS2
ALS1(config-if-range)#channel-group 3 mode desirable
ALS1(config-if-range)#switchport trunk allowed vlan
12,123,234,800,1010,1111,3456
Command rejected: Bad VLAN list
Command rejected: Bad VLAN list
ALS1(config-if-range)#no shutdown
ALS1(config-if-range)#exit

```

Figura 37. Pantallazo configuración2 Switch ALS1

Switch ALS2

```
int range f0/7-10
switchport trunk native vlan 800
switchport mode trunk
switchport nonegotiate
exit
int range f0/7-8
desc member of po2 to DLS2
channel-group 2 mode active
no shutdown
exit
int range f0/9-10
desc member of po 4 to DLS1
channel-group 4 mode desirable
no shutdown
exit
```



The screenshot shows the CLI of Switch ALS2. The window title is 'ALS2'. The tabs are 'Physical', 'Config', and 'CLI'. The main title is 'IOS Command Line Interface'. The terminal output shows the following commands and responses:

```
ALS2(config-if-range)#exit
ALS2(config)#int range f0/7-8
ALS2(config-if-range)#desc member of po2 to DLS2
ALS2(config-if-range)#channel-group 2 mode active
ALS2(config-if-range)#
Creating a port-channel interface Port-channel 2

ALS2(config-if-range)#no shutdown

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

%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to down
ALS2(config-if-range)#int range f0/9-10
ALS2(config-if-range)#desc member of po 4 to DLS1
ALS2(config-if-range)#channel-group 4 mode desirable
ALS2(config-if-range)#
Creating a port-channel interface Port-channel 4

ALS2(config-if-range)#no shutdown

ALS2(config-if-range)#
%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/9,
changed state to up

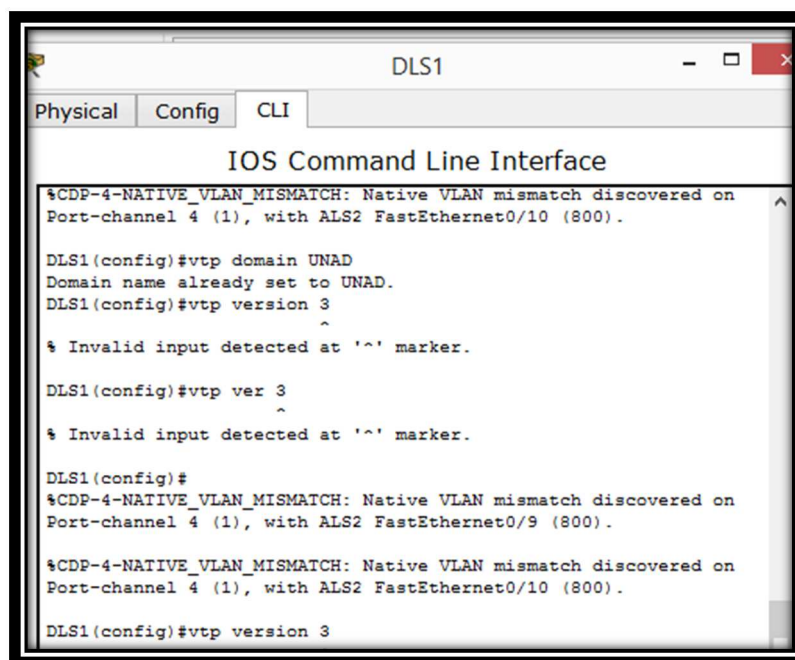
%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to up
```

Figura 38. Pantallazo configuración Switch ALS2

- d. Configurar DLS1, ALS1, y ALS2 para utilizar VTP versión 3
 1. Utilizar el nombre de dominio UNAD con la contraseña cisco123
 2. Configurar DLS1 como servidor principal para las VLAN
 3. Configurar ALS1 y ALS2 como clientes VTP

Switch DLS1

```
vtp domain UNAD  
vtp version 2  
vtp password cisco123  
vtp primary vlan
```



```
DLS1  
Physical Config CLI  
IOS Command Line Interface  
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on  
Port-channel 4 (1), with ALS2 FastEthernet0/10 (800).  
  
DLS1(config)#vtp domain UNAD  
Domain name already set to UNAD.  
DLS1(config)#vtp version 3  
^  
% Invalid input detected at '^' marker.  
  
DLS1(config)#vtp ver 3  
^  
% Invalid input detected at '^' marker.  
  
DLS1(config)#  
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on  
Port-channel 4 (1), with ALS2 FastEthernet0/9 (800).  
  
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on  
Port-channel 4 (1), with ALS2 FastEthernet0/10 (800).  
  
DLS1(config)#vtp version 3
```

Figura 39. Pantallazo configuración Dominio Switch DLS1

Switch ALS1

```
vtp domain UNAD  
vtp version 2  
vtp mode client  
vtp password cisco123
```



```
ALS1>en
ALS1#conf ter
Enter configuration commands, one per line. End with CNTL/Z.
ALS1(config)#vtp domain UNAD
Domain name already set to UNAD.
ALS1(config)#vtp version 2
ALS1(config)#mode client
^
% Invalid input detected at '^' marker.

ALS1(config)#vtp password cisco123
Setting device VLAN database password to cisco123
ALS1(config)#vtp mode client
Setting device to VTP CLIENT mode.
ALS1(config)#
```

Figura 40. Pantallazo configuración Dominio Switch ALS1

Switch ALS2

vtp domain UNAD
vtp version 2
vtp mode client
vtp password cisco123

```
ALS2
Physical Config CLI
IOS Command Line Interface
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Po
(1), with DLS2 FastEthernet0/7 (800).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Po
(1), with DLS2 FastEthernet0/8 (800).

ALS2>conf term
^
% Invalid input detected at '^' marker.

ALS2>
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Po
(1), with DLS1 FastEthernet0/9 (800).

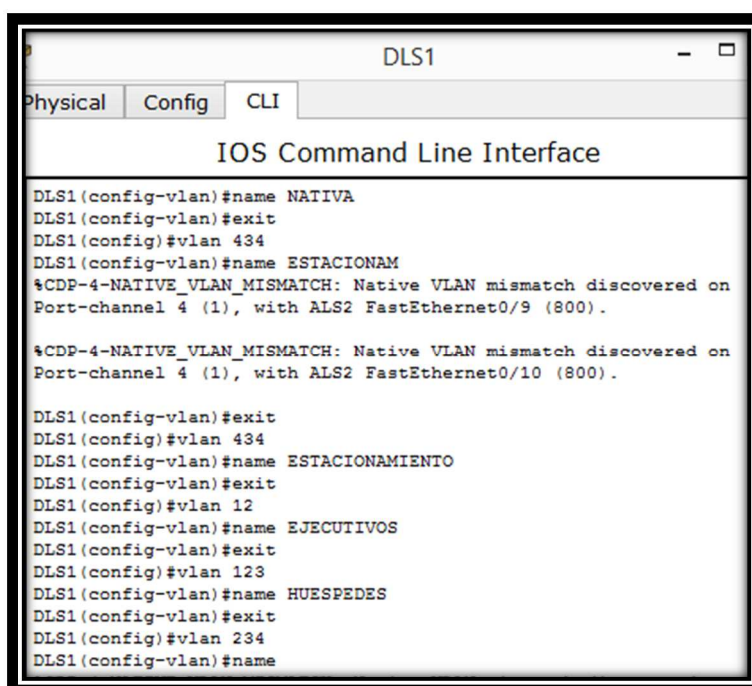
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Po
(1), with DLS1 FastEthernet0/10 (800).

ALS2>en
ALS2#conf term
Enter configuration commands, one per line. End with CNTL/Z.
ALS2(config)#vtp domain UNAD
Domain name already set to UNAD.
ALS2(config)#vtp version 2
VTP mode already in V2.
ALS2(config)#vtp mode client
Setting device to VTP CLIENT mode.
ALS2(config)#vtp password cisco123
Setting device VLAN database password to cisco123
ALS2(config)#
```

Figura 41. Pantallazo configuración Dominio Switch ALS2

e. Configurar en el servidor principal las siguientes VLAN:

```
vlan 800
name NATIVA
exit
vlan 434
name ESTACIONAMIENTO
exit
vlan 12
name EJECUTIVOS
exit
```



```
DLS1
Physical Config CLI
IOS Command Line Interface
DLS1(config-vlan)#name NATIVA
DLS1(config-vlan)#exit
DLS1(config)#vlan 434
DLS1(config-vlan)#name ESTACIONAM
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on
Port-channel 4 (1), with ALS2 FastEthernet0/9 (800).

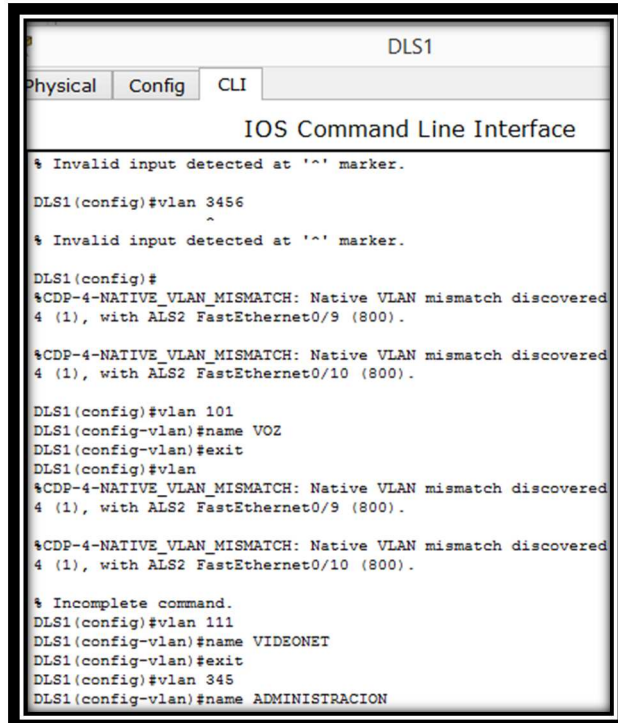
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on
Port-channel 4 (1), with ALS2 FastEthernet0/10 (800).

DLS1(config-vlan)#exit
DLS1(config)#vlan 434
DLS1(config-vlan)#name ESTACIONAMIENTO
DLS1(config-vlan)#exit
DLS1(config)#vlan 12
DLS1(config-vlan)#name EJECUTIVOS
DLS1(config-vlan)#exit
DLS1(config)#vlan 123
DLS1(config-vlan)#name HUESPEDES
DLS1(config-vlan)#exit
DLS1(config)#vlan 234
DLS1(config-vlan)#name
```

Figura 42. Pantallazo configuración1 VLANs Switch DLS1

```
vlan 123
name MANTENIMIENTO
exit
vlan 234
name HUESPEDES
exit
vlan 101
name VOZ
exit
vlan 111
```

```
name VIDEONET
exit
vlan 345
name ADMINISTRACION
```

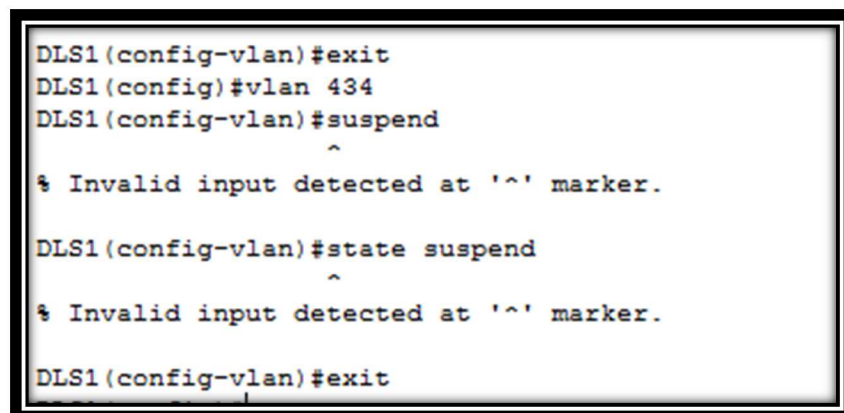


```
DLS1
Physical Config CLI
IOS Command Line Interface
% Invalid input detected at '^' marker.
DLS1(config)#vlan 3456
^
% Invalid input detected at '^' marker.
DLS1(config)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered
4 (1), with ALS2 FastEthernet0/9 (800).
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered
4 (1), with ALS2 FastEthernet0/10 (800).
DLS1(config)#vlan 101
DLS1(config-vlan)#name VOZ
DLS1(config-vlan)#exit
DLS1(config)#vlan
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered
4 (1), with ALS2 FastEthernet0/9 (800).
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered
4 (1), with ALS2 FastEthernet0/10 (800).
% Incomplete command.
DLS1(config)#vlan 111
DLS1(config-vlan)#name VIDEONET
DLS1(config-vlan)#exit
DLS1(config)#vlan 345
DLS1(config-vlan)#name ADMINISTRACION
```

Figura 43. Pantallazo configuración2 VLANs Switch DLS1

- f. En DSL1 suspender la VLAN 434.

```
vlan 434
state suspend
exit
```



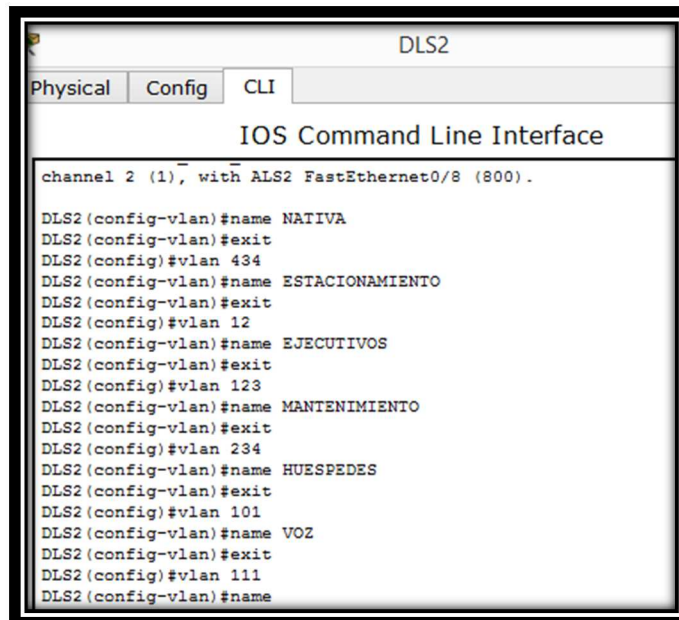
```
DLS1(config-vlan)#exit
DLS1(config)#vlan 434
DLS1(config-vlan)#suspend
^
% Invalid input detected at '^' marker.
DLS1(config-vlan)#state suspend
^
% Invalid input detected at '^' marker.
DLS1(config-vlan)#exit
```

Figura 44. Pantallazo suspensión VLAN Switch DLS1

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

Switch DLS2

```
vtp version 2
vtp mode transparent
vlan 800
name NATIVA
exit
vlan 434
name ESTACIONAMIENTO
exit
vlan 12
name EJECUTIVOS
exit
vlan 123
name MANTENIMIENTO
exit
vlan 234
name HUESPEDES
exit
vlan 101
name VOZ
exit
```



```
DLS2
Physical Config CLI
IOS Command Line Interface
channel 2 (1), with ALS2 FastEthernet0/8 (800).
DLS2 (config-vlan)#name NATIVA
DLS2 (config-vlan)#exit
DLS2 (config)#vlan 434
DLS2 (config-vlan)#name ESTACIONAMIENTO
DLS2 (config-vlan)#exit
DLS2 (config)#vlan 12
DLS2 (config-vlan)#name EJECUTIVOS
DLS2 (config-vlan)#exit
DLS2 (config)#vlan 123
DLS2 (config-vlan)#name MANTENIMIENTO
DLS2 (config-vlan)#exit
DLS2 (config)#vlan 234
DLS2 (config-vlan)#name HUESPEDES
DLS2 (config-vlan)#exit
DLS2 (config)#vlan 101
DLS2 (config-vlan)#name VOZ
DLS2 (config-vlan)#exit
DLS2 (config)#vlan 111
DLS2 (config-vlan)#name
```

Figura 45. Pantallazo configuración1 VLANs Switch DLS2

```
vlan 111
name VIDEONET
exit
vlan 345
name ADMINISTRACION
```

```
DLS2(config)#vlan 111
DLS2(config-vlan)#name
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch
channel 3 (1), with ALS1 FastEthernet0/9 (800).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch
channel 3 (1), with ALS1 FastEthernet0/10 (800).
V
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch
channel 2 (1), with ALS2 FastEthernet0/7 (800).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch
channel 2 (1), with ALS2 FastEthernet0/8 (800).
% Incomplete command.
DLS2(config-vlan)#name VIDEONET
DLS2(config-vlan)#exit
DLS2(config)#vlan 3456
^
% Invalid input detected at '^' marker.

DLS2(config)#vlan 345
DLS2(config-vlan)#name ADMINISTRACION
DLS2(config-vlan)#exit
```

Figura 46. Pantallazo configuración2 VLANs Switch DLS2

- h. Suspend VLAN 434 en DLS2

Switch DLS2

```
vlan 434
state suspend
exit
```

```
DLS2(config)#vlan 434
DLS2(config-vlan)#state suspend
^
% Invalid input detected at '^' marker.

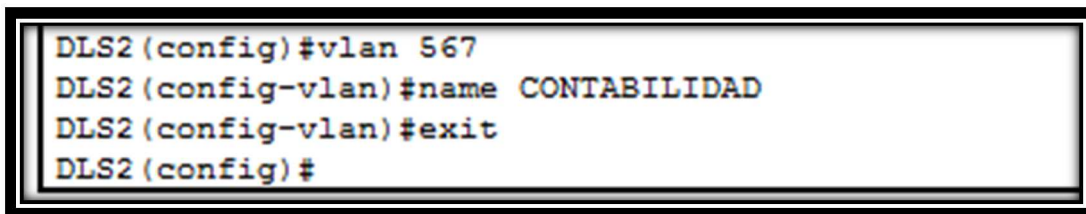
DLS2(config-vlan)#exit
DLS2(config)#
```

Figura 47. Pantallazo suspensión VLAN Switch DLS2

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

Switch DLS2

```
vlan 567  
name CONTABILIDAD  
exit
```



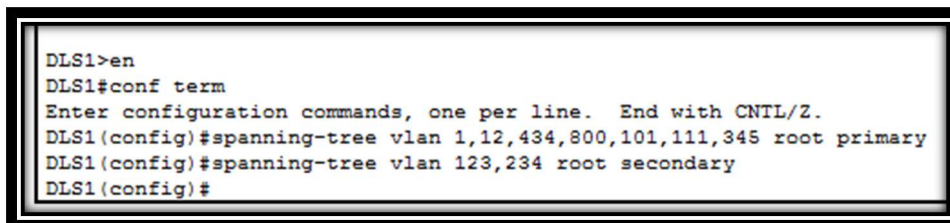
```
DLS2 (config)#vlan 567  
DLS2 (config-vlan)#name CONTABILIDAD  
DLS2 (config-vlan)#exit  
DLS2 (config)#
```

Figura 48. Pantallazo creación VLAN Switch DLS2

- j. Configurar DLS1 como Spanning tree root para las VLAN 1, 12, 434, 800, 101, 111 y 345 y como raíz secundaria para las VLAN 123 y 234.

Switch DLS1

```
spanning-tree vlan 1,12,434,800,101,111,345 root primary  
spanning-tree vlan 123,234 root secondary
```



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

Figura 49. Pantallazo conf. Spanning tree VLANs Switch DLS1

- k. Configurar DLS2 como Spanning tree root para las VLAN 123 y 234 y como una raíz secundaria para las VLAN 1, 12, 434, 800, 101, 111 y 345.

Switch DLS2

```
spanning-tree vlan 123,234 root primary  
spanning-tree vlan 1,12,434,800,101,111,345 root secondary
```

```

DLS2(config)#spanning-tree vlan 123,234 root primary
DLS2(config)#spanning-tree vlan 1,12 ,434,800,1010,3456 root secondary
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Port-channel 3
(1), with ALS1 FastEthernet0/9 (800).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Port-channel 3
(1), with ALS1 FastEthernet0/10 (800).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Port-channel 2
(1), with ALS2 FastEthernet0/7 (800).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Port-channel 2
(1), with ALS2 FastEthernet0/8 (800).
DLS2(config)#spanning-tree vlan 1,12,434,800,101,111,345 root secondary
DLS2(config)#

```

Figura 50. Pantallazo conf. Spanning tree VLANs Switch 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.

Switch DLS1

```

int port-channel 1
switchport trunk allowed vlan 12,123,234,800,101,111,345
exit
int port-channel 4
switchport trunk allowed vlan 12,123,234,800,101,111,345

```

```

DLS1(config)#int port-channel 1
DLS1(config-if)#switchport trunk allowed vlan
12,123,234,800,101,111,345
DLS1(config-if)#exit
DLS1(config)#int port-channel 4
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on
channel 4 (1), with ALS2 FastEthernet0/9 (800).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on
channel 4 (1), with ALS2 FastEthernet0/10 (800).

DLS1(config-if)#switchport trunk allowed vlan
12,123,234,800,101,111,345
DLS1(config-if)#

```

Figura 51. Pantallazo conf. Switchport trunk VLANs Switch DLS1

Switch DLS2

```

int port-channel 2
switchport trunk allowed vlan 12,123,234,800,101,111,345
int port-channel 3
switchport trunk allowed vlan 12,123,234,800,101,111,345

```

```
DLS2>en
DLS2#conf term
Enter configuration commands, one per line. End with CNTL/Z.
DLS2(config)#int port-channel 2
DLS2(config-if)#switchport trunk allowed vlan 12,123,234,800,101,111,345
DLS2(config-if)#int port-channel 3
DLS2(config-if)#switchport trunk allowed vlan 12,123,234,800,101,111,345
DLS2(config-if)#
```

Figura 52. Pantallazo conf. Switchport trunk VLANs Switch DLS2

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

Switch DLS1

```
int f0/6
switchport host
switchport access vlan 345
no shutdown
exit
int f0/15
switchport host
switchport access vlan 111
no shutdown
exit
```

```
DLS1(config)#int f0/6
DLS1(config-if)#switchport host
^
% Invalid input detected at '^' marker.

DLS1(config-if)#switchport access vlan 345
DLS1(config-if)#no shutdown

DLS1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6,
changed state to up
```

Figura 53. Pantallazo config1 Switchport access VLANs Switch DLS1

```
DLS1(config)#int f0/15
DLS1(config-if)#switchport host
^
% Invalid input detected at '^' marker.

DLS1(config-if)#switchport access vlan 111
DLS1(config-if)#no shutdown

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

Figura 54. Pantallazo config2 Switchport access VLANs Switch DLS1

Switch DLS2

```
int f0/6
switchport host
switchport access vlan 12
switchport voice vlan 101
no shutdown
exit
int f0/15
switchport host
switchport access vlan 111
no shutdown
exit
int range f0/16-18
switchport host
switchport access vlan 567
no shutdown
```

```
DLS2(config)#int f0/6
DLS2(config-if)#switchport host
^
% Invalid input detected at '^' marker.

DLS2(config-if)#switchport access vlan 12
DLS2(config-if)#switchport voice vlan 101
DLS2(config-if)#no shutdown

DLS2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up

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

DLS2(config-if)#exit
DLS2(config)#int f0/15
DLS2(config-if)#switchport host
^
% Invalid input detected at '^' marker.

DLS2(config-if)#switchport access vlan 111
DLS2(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to down
DLS2(config-if)#exit
```

Figura 55. Pantallazo config1 Switchport access VLANs Switch DLS2

```
DLS2(config)#int range f0/16-18
DLS2(config-if-range)#switchport host
^
% Invalid input detected at '^' marker.

DLS2(config-if-range)#switchport access vlan 567
DLS2(config-if-range)#no shutdown

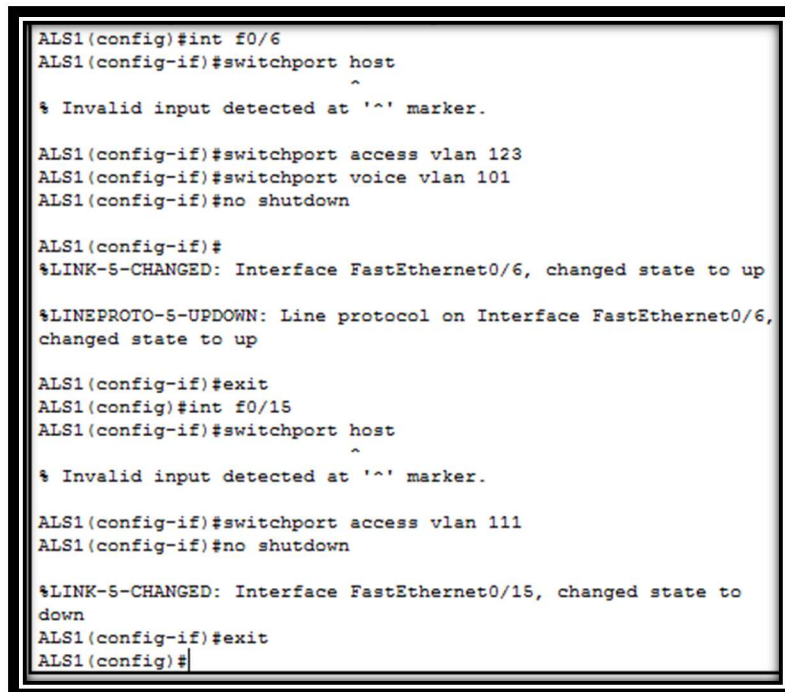
%LINK-5-CHANGED: Interface FastEthernet0/16, changed state to down

%LINK-5-CHANGED: Interface FastEthernet0/17, changed state to down
```

Figura 56. Pantallazo config2 Switchport access VLANs Switch DLS2

Switch ALS1

```
int f0/6
switchport host
switchport access vlan 123
switchport voice vlan 101
no shutdown
exit
int f0/15
switchport host
switchport access vlan 111
no shutdown
exit
```



```
ALS1(config)#int f0/6
ALS1(config-if)#switchport host
^
% Invalid input detected at '^' marker.

ALS1(config-if)#switchport access vlan 123
ALS1(config-if)#switchport voice vlan 101
ALS1(config-if)#no shutdown

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

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

ALS1(config-if)#exit
ALS1(config)#int f0/15
ALS1(config-if)#switchport host
^
% Invalid input detected at '^' marker.

ALS1(config-if)#switchport access vlan 111
ALS1(config-if)#no shutdown

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

ALS1(config-if)#exit
ALS1(config)#
```

Figura 57. Pantallazo config. Switchport access VLANs Switch ALS1

Switch ASL2

```
int f0/6
switchport host
switchport access vlan 234
no shutdown
```

```
exit
int f0/15
switchport host
switchport access vlan 111
no shutdown
exit
```

```
ALS2(config)#int f0/6
ALS2(config-if)#switchport host
^
% Invalid input detected at '^' marker.

ALS2(config-if)#switchport access vlan 234
ALS2(config-if)#no shutdown

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

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

ALS2(config-if)#exit
ALS2(config)#int f0/15
ALS2(config-if)#switchport host
^
% Invalid input detected at '^' marker.

ALS2(config-if)#switchport access vlan 111
ALS2(config-if)#no shutdown
ALS2(config-if)#exit
ALS2(config)#
```

Figura 58. *Pantallazo config. Switchport access VLANs Switch 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 DLS1

```
DLS1#show vlan brief

VLAN Name                Status    Ports
-----
1    default                active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                           Fa0/5, Fa0/7, Fa0/8, Fa0/13
                                           Fa0/14, Fa0/16, Fa0/17, Fa0/18
                                           Fa0/19, Fa0/20, Fa0/21, Fa0/22
                                           Fa0/23, Fa0/24, Gig0/1, Gig0/2
                                           Po1

12   EJECUTIVOS             active
101  VOZ                    active
111  VIDEONET              active    Fa0/15
123  MANTENIMIENTO        active
234  HUESPEDES            active
345  ADMINISTRACION        active    Fa0/6
434  ESTACIONAMIENTO      active
800  NATIVA                active
1002 fddi-default          active
1003 token-ring-default  active
1004 fddinet-default     active
1005 trnet-default      active
DLS1#
```

Figura 59. Pantallazo Verificación VLANs Switch DLS1

Switch DLS2

```
DLS2#show vlan brief

VLAN Name                Status    Ports
-----
1    default                active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                           Fa0/5, Fa0/13, Fa0/14, Fa0/19
                                           Fa0/20, Fa0/21, Fa0/22, Fa0/23
                                           Fa0/24, Gig0/1, Gig0/2, Po1

12   EJECUTIVOS             active    Fa0/6
101  VOZ                    active
111  VIDEONET              active    Fa0/15
123  MANTENIMIENTO        active
234  HUESPEDES            active
345  ADMINISTRACION        active
434  ESTACIONAMIENTO      active
567  CONTABILIDAD          active    Fa0/16, Fa0/17, Fa0/18
800  NATIVA                active
1002 fddi-default          active
1003 token-ring-default  active
1004 fddinet-default     active
1005 trnet-default      active
```

Figura 60. Pantallazo Verificación VLANs Switch DLS2

Switch ALS1

```
ALS1#show vlan brief

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

Figura 61. Pantallazo Verificación VLANs Switch ALS1

Switch ALS2

```
ALS2#show vlan brief

VLAN Name                Status    Ports
-----
1    default                active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                           Fa0/5, Fa0/11, Fa0/12, Fa0/13
                                           Fa0/14, Fa0/16, Fa0/17, Fa0/18
                                           Fa0/19, Fa0/20, Fa0/21, Fa0/22
                                           Fa0/23, Fa0/24, Gig0/1, Gig0/2
12   EJECUTIVOS            active
101  VOZ                     active
111  VIDEONET                active    Fa0/15
123  MANTENIMIENTO           active
234  HUESPEDES               active    Fa0/6
345  ADMINISTRACION           active
434  ESTACIONAMIENTO         active
800  NATIVA                   active
1002 fddi-default         active
1003 token-ring-default   active
1004 fddinet-default      active
1005 trnet-default        active
ALS2#
```

Figura 62. Pantallazo Verificación VLANs Switch ALS2

- b. Verificar que el EtherChannel entre DLS1 y ALS2 está configurado correctamente

Switch DLS1

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

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

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

Figura 63. Pantallazo Verificación Ethernet Switch DLS1

Switch ALS2

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

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

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

Figura 64. Pantallazo Verificación Ethernet Switch ALS2

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

Switch DLS1

```

DLS1#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    24577
             Address    0090.2B92.3192
             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    0090.2B92.3192
             Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
             Aging Time 20

Interface    Role Sts Cost      Prio.Nbr Type
-----
Po4          Desg BKN*9      128.29 Shr *PVID_Inc

VLAN0012
  Spanning tree enabled protocol ieee
  Root ID    Priority    24588
             Address    0090.2B92.3192
             This bridge is the root
             Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

  Bridge ID  Priority    24588 (priority 24576 sys-id-ext 12)
             Address    0090.2B92.3192
             Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
             Aging Time 20

Interface    Role Sts Cost      Prio.Nbr Type
-----
Fa0/9        Desg FWD 19      128.9   P2p
Fa0/10       Desg FWD 19      128.10 P2p
Po4          Desg FWD 9       128.29 Shr
  
```

Figura 65. Pantallazo Verificación1 Spanning Tree Switch DLS1

```

VLAN0101
  Spanning tree enabled protocol ieee
  Root ID    Priority    24677
             Address    0090.2B92.3192
             This bridge is the root
             Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

  Bridge ID  Priority    24677 (priority 24576 sys-id-ext 101)
             Address    0090.2B92.3192
             Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
             Aging Time 20

Interface    Role Sts Cost      Prio.Nbr Type
-----
Fa0/9        Desg FWD 19      128.9   P2p
Fa0/10       Desg FWD 19      128.10 P2p
Po4          Desg FWD 9       128.29 Shr

VLAN0111
  Spanning tree enabled protocol ieee
  Root ID    Priority    24687
             Address    0090.2B92.3192
             This bridge is the root
             Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

  Bridge ID  Priority    24687 (priority 24576 sys-id-ext 111)
             Address    0090.2B92.3192
             Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
             Aging Time 20

Interface    Role Sts Cost      Prio.Nbr Type
-----
Fa0/9        Desg FWD 19      128.9   P2p
Fa0/10       Desg FWD 19      128.10 P2p
Po4          Desg FWD 9       128.29 Shr

VLAN0123
  Spanning tree enabled protocol ieee
  Root ID    Priority    24699
  --More--
  
```

Figura 66. Pantallazo Verificación2 Spanning Tree Switch DLS1

Switch DLS2

```
DLS2#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    28673
            Address    0002.1671.4AD0
            This bridge is the root
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    28673 (priority 28672 sys-id-ext 1)
            Address    0002.1671.4AD0
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec
            Aging Time 20

Interface    Role Sts Cost      Prio.Nbr Type
-----
Po3          Desg FWD 9        128.30  Shr
Po2          Desg BKN*9 128.29  Shr *FVID_Inc

VLAN0012
  Spanning tree enabled protocol ieee
  Root ID    Priority    24888
            Address    0090.2B92.3192
            Cost        18
            Port        29(Port-channel 2)
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    28684 (priority 28672 sys-id-ext 12)
            Address    0002.1671.4AD0
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec
            Aging Time 20

Interface    Role Sts Cost      Prio.Nbr Type
-----
Po3          Desg FWD 9        128.30  Shr
Fa0/7       Desg FWD 19       128.7   P2p
Fa0/9       Desg FWD 19       128.9   P2p
Fa0/6       Desg FWD 19       128.6   P2p
Fa0/8       Desg FWD 19       128.8   P2p
Fa0/10      Desg FWD 19       128.10  P2p
Po2         Root FWD 9        128.29  Shr
```

Figura 67. Pantallazo Verificación1 Spanning Tree Switch DLS2

```
VLAN0101
  Spanning tree enabled protocol ieee
  Root ID    Priority    24677
            Address    0090.2B92.3192
            Cost        18
            Port        29(Port-channel 2)
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    28773 (priority 28672 sys-id-ext 101)
            Address    0002.1671.4AD0
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec
            Aging Time 20

Interface    Role Sts Cost      Prio.Nbr Type
-----
Po3          Desg FWD 9        128.30  Shr
Fa0/7       Desg FWD 19       128.7   P2p
Fa0/9       Desg FWD 19       128.9   P2p
Fa0/6       Desg FWD 19       128.6   P2p
Fa0/8       Desg FWD 19       128.8   P2p
Fa0/10      Desg FWD 19       128.10  P2p
Po2         Root FWD 9        128.29  Shr

VLAN0111
  Spanning tree enabled protocol ieee
  Root ID    Priority    24687
            Address    0090.2B92.3192
            Cost        18
            Port        29(Port-channel 2)
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    28783 (priority 28672 sys-id-ext 111)
            Address    0002.1671.4AD0
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec
            Aging Time 20

Interface    Role Sts Cost      Prio.Nbr Type
-----
Po3          Desg FWD 9        128.30  Shr
Fa0/7       Desg FWD 19       128.7   P2p
```

Figura 68. Pantallazo Verificación2 Spanning Tree Switch DLS2

CONCLUSIONES

El uso de protocolos de enrutamiento dinámico permite el aprendizaje de la topología de red que se esté trabajando y la cantidad de saltos posibles para alcanzar un destino.

Se debe tener cuidado al momento de implementar un esquema de red usando el protocolo VTP ya que al ser el aprendizaje de Vlan dinámico, la introducción de un nuevo Switch con un número de revisión más alto puede afectar el funcionamiento y generar indisponibilidad.

Como elemento de seguridad el uso de Vlan permite la segmentación adecuada de una red limitando el acceso a los recursos que sean absolutamente necesarios y logrando una división basada en departamentos, servicios o localidades.

En términos generales, se desarrollan los dos escenarios en Packet Tracer. Se introdujeron diversos comandos en routers y switches. Mediante los comandos **show** se verificó que los protocolos se han realizado correctamente y a través de los comandos **ping** que tengan conectividad entre los diferentes dispositivos.

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