DIPLOMADO DE PROFUNDIZACION CISCO
PRUEBA DE HABILIDADES PRÁCTICAS CCNP

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA - UNAD
ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA - ECBTI
INGENIERÍA TELECOMUNICACIONES
BOGOTA
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Diplomado de opción de grado presentado para optar el
título de INGENIERO TELECOMUNICACIONES

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2022

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Jurado

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BOGOTA, 1 de noviembre 2022

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GLOSARIO

CCNP: Cisco Network Professional aprueba la habilidad de planificar, implementar, verificar y resolver problemas de redes locales.

PROTOCOLOS DE ENRUTAMIENTO: Son aquellas normas que deben cumplir los enrutadores para establecer una comunicación entre sí, además de seleccionar las mejores rutas de distribución en una red informática.

REDES LOCALES: Es un grupo de equipos (Computadoras), las cuales permiten la comunicación e intercambio de datos entre diferentes dispositivos en una red pequeña.

ROUTER: Es una herramienta fundamental, la cual se encarga de permitir la conexión entre redes locales y a internet por medio de protocolos.

TOPOLOGÍA: Son aquellas que nos permiten organizar una red, teniendo en cuenta las necesidades de los clientes.

RESUMEN

El diplomado de profundización cisco CCNP implica el conjunto de habilidades aprendidas durante un proceso de formación; teniendo en cuenta la aplicación del pensum académico para luego ser ejecutado por los estudiantes que consideran un mayor crecimiento en el aprendizaje de las redes CISCO CCNA, es una base fundamental para el adecuado desarrollo del diplomado expuesto en este documento.

Para la ejecución de los diferentes laboratorios y actividades expuestas en esta formación, se tienen en cuenta conceptos básicos como CCNP, protocolos de enrutamiento, redes locales, Routers, topologías, VLAN entre otros conceptos más avanzados. Todo esto fue ejecutado dentro del software de PAKECT TRACER o por medio de máquinas virtuales soportadas con GNS3.

Dicho laboratorio tenía la finalidad de diseñar una red donde se permitiera la conexión de diferentes dispositivos; teniendo en cuenta las versiones establecidas en la guía de los Switch y los Routers, para luego construir la red y configurar cada dispositivo con un direccionamiento de las interfaces y el soporte en los Host; para finalmente configurar los protocolos de enrutamiento.

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

ABSTRACT

The Cisco CCNP in-depth diploma involves the set of skills learned during a training rotoco; Taking into account the application of the academic curriculum to be later executed by the students who, considering a greater growth in the learning of the CISCO CCNA networks, is a fundamental base for the adequate development of the diploma exposed in this.

For the execution of the different laboratories and activities exposed in this training, basic concepts such as CCNP, rotoco, local networks, routers, topologies, VLANs among other more advanced concepts are taken into account. All of this was executed within the PAKECT TRACER software or via GNS3 supported virtual machines.

Said laboratory had the purpose of designing a network where the connection of different devices was allowed; taking into account the versions established in the guide for Switches and Routers, to then build the network and configure each device with an protocol of the interfaces and support in the Hosts; to finally configure the protocol.

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

INTRODUCCIÓN

El “DOCUMENTO FINAL”; forma parte de las actividades evaluativas del Diplomado de Profundización CCNP, el cual busca identificar el grado de desarrollo de habilidades y competencias que se adquieren a lo largo del diplomado. Lo primordial es colocar a prueba los niveles de compresión y solución de problemas relacionados con aspectos de Networking.

Para esta actividad, el estudiante debe realizar las actividades asignadas en el escenario propuesto, acompañado de documentación, correspondientes al registro de configuración en cada uno de los equipos, la descripción del paso a paso de cada una de las etapas realizadas durante el proceso de formación, el registro de los procesos de verificación de conectividad mediante los comandos de ping, Show ip interface brief, entre otros

Inicialmente se configura el direccionamiento IP en todos los dispositivos tanto en IPV4 como en IPV6, luego se implementan 2 switches que se encargan de la conmutación, Se configura el OSPFv2 para IPV4 y OSPFv2 para IPv6 de LAN esta primera parte asegura la interconexión de los equipos dando respuesta sin ninguna novedad.

El segundo escenario es la parte de autenticación, listas de control, HSRP versión 2, el cual brinda redundancia al host y funciona como mecanismo de seguridad en las redes y sus dispositivos.

PARTE 1: CONSTRUIR LA RED Y CONFIGURAR LOS PARÁMETROS BÁSICOS DE LOS DISPOSITIVOS Y EL DIRECCIONAMIENTO DE LAS INTERFACES

Paso 1: Cablear la red como se muestra en la topología.

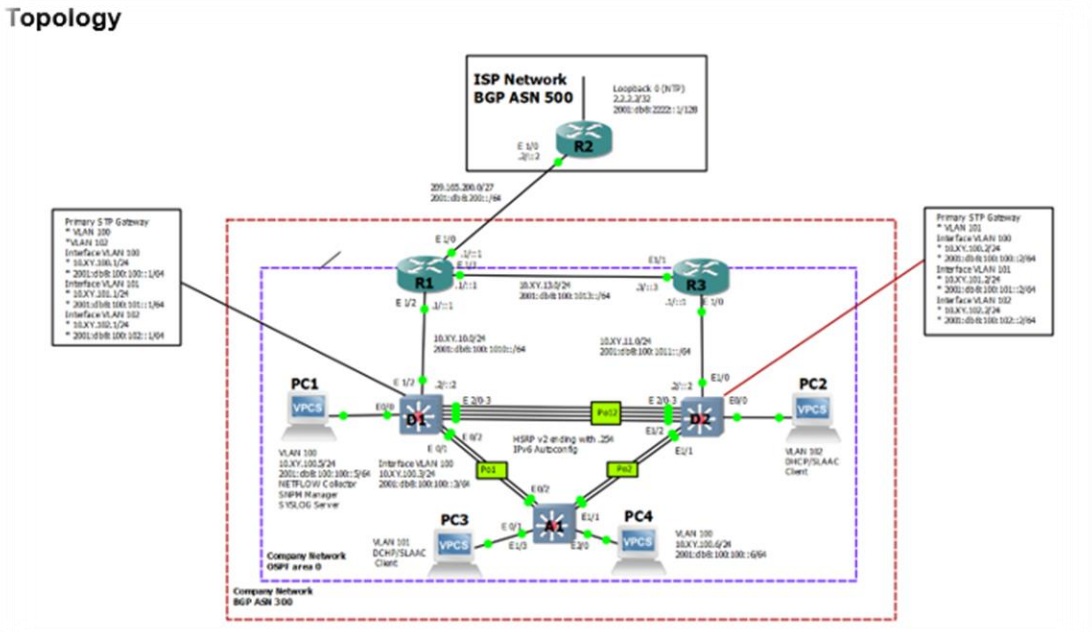

Figura 1. Montaje del escenario propuesto

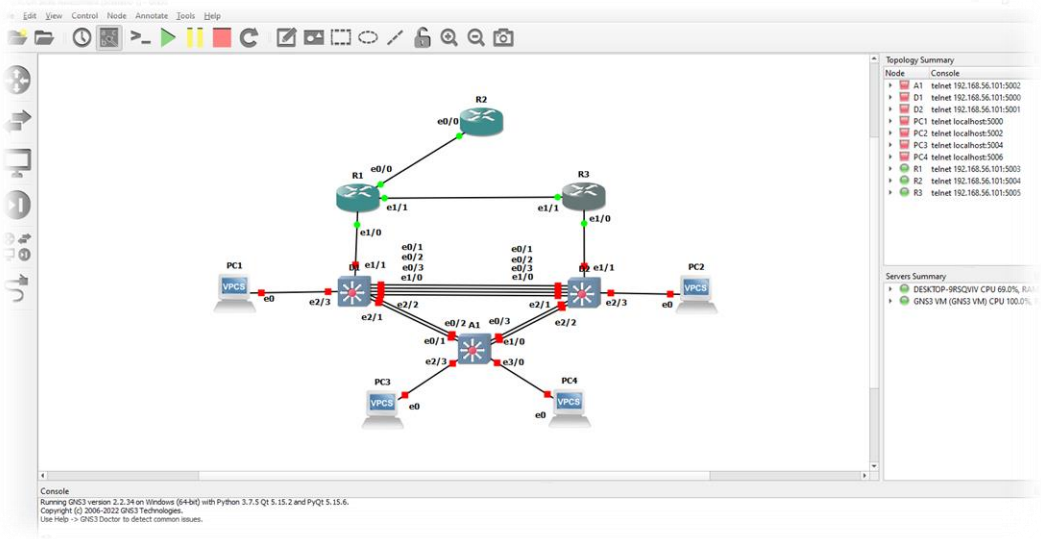

Figura 2. Simulación de escenario

Tabla 1. Table de direccionamiento

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	E0/0	209.165.200.225/27	2001:db8:200::1/64	fe80::1:1
	E1/0	10.78.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	E1/1	10. 78.13.1/24	2001:db8:100:1013::1/64	fe80::1:3
R2	E0/0	209.165.200.226/27	2001:db8:200::2/64	fe80::2:1
	Loopback 0	2.2.2.2/32	2001:db8:2222::1/128	fe80::2:3
R3	E1/0	10. 78.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
	E1/1	10. 78.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	E1/1	10. 78.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
	VLAN 100	10.78.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10.78.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
	VLAN 102	10.78.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	E1/1	10.78.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10.78.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
	VLAN 101	10.78.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10.78.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.78.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.78.100.5/24	2001:db8:100:100::5/64	EUI-64
PC2	NIC	DHCP	SLAAC	EUI-64
PC3	NIC	DHCP	SLAAC	EUI-64
PC4	NIC	10.78.100.6/24	2001:db8:100:100::6/64	EUI-64

Paso 2: Configurar los parámetros básicos para cada dispositivo

Se configura los parámetros básicos de los dispositivos como los nombres, textos de para cada equipo, específicamente las IP de cada interfaz tanto en IPV4 como en IPV6 de cada uno de los router, en el caso de los switches la creación de las VLAN con sus nombres, las direcciones IP, y se crea un pool DHCP con sus respectivas exclusiones.

Router 1:

```
Router>en
Router#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R1
R1(config)#ipv6 unicast-routing
R1(config)#no ip domain lookup
R1(config)#banner motd # R1, ENCOR Skills Assessment#
R1(config)#line con 0
R1(config-line)#excet-timeout 0 0
R1(config-line)#exec-timeout 0 0
R1(config-line)#logging synchronous
R1(config-line)#interface g0/0/0
R1(config-if)#ip address 109.165.200.255 255.255.255.224
Bad mask /27 for address 109.165.200.255
R1(config-if)#ipv6 address fe80::1:1 link-local
R1(config-if)#ipv6 address 2001:db8:200::1/64
R1(config-if)#no shutdown
R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up
R1(config-if)#exit
R1(config)#interface g0/0/1
R1(config-if)#ip address 10.63.10.1 255.255.255.0
R1(config-if)#ipv6 address fe80::1:2 link-local
R1(config-if)#ipv6 address 2001:db8:100:1010::1/64
R1(config-if)#no shutdown
R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up
R1(config-if)#exit
R1(config)#interface g0/0/0
R1(config-if)#ip address 209.165.200.255 255.255.255.224
R1(config-if)#ipv6 address fe80::1:1 link-local
R1(config-if)#ipv6 address 2001:db8:200::1/64
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#interface s0/1/0
R1(config-if)#ip address 10.63.13.1 255.255.255.0
R1(config-if)#ipv6 address fe80::1:3 link-local
R1(config-if)#ipv6 address 2001:db8:100:1013::1/64
```

R1(config-if)#no shutdown

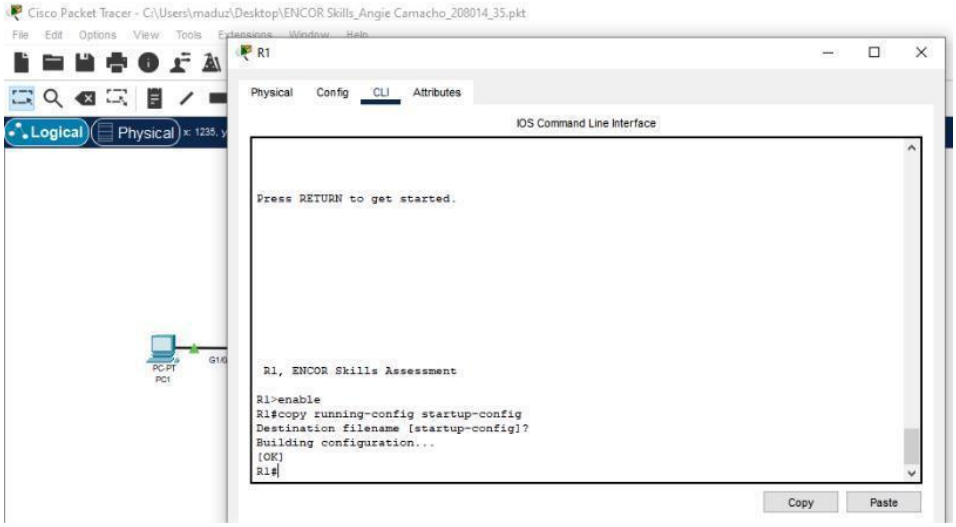

Figura 3. Configuración del router 1

Router 2:
Router>ena
Router#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R2
R2(config)#ipv6 unicast-routing
R2(config)#no ip domain lookup
R2(config)#banner motd # R2, ENCOR skills Assessment #
R2(config)#line con 0
R2(config-line)#exec-timeout 0 0
R2(config-line)#logging synchronous
R2(config-line)#exit
R2(config)#interface g0/0/0
R2(config-if)#ip address 209.165.200.226 255.255.255.224
R2(config-if)#ipv6 address fe80::2:1 link-local
R2(config-if)#ipv6 address 2001:db8:200::2/64
R2(config-if)#no shutdown
R2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up
R2(config-if)#exit
R2(config)#interface loopback 0
R2(config-if)#

%LINK-5-CHANGED: Interface Loopback0, changed state to up
R2(config-if)#ip address 2.2.2.2 255.255.255.255
R2(config-if)#ipv6 address fe80::2:3 link-local
R2(config-if)#ipv6 address 2001:db8:2222::1/128
R2(config-if)#no shutdown
R2(config-if)#exit

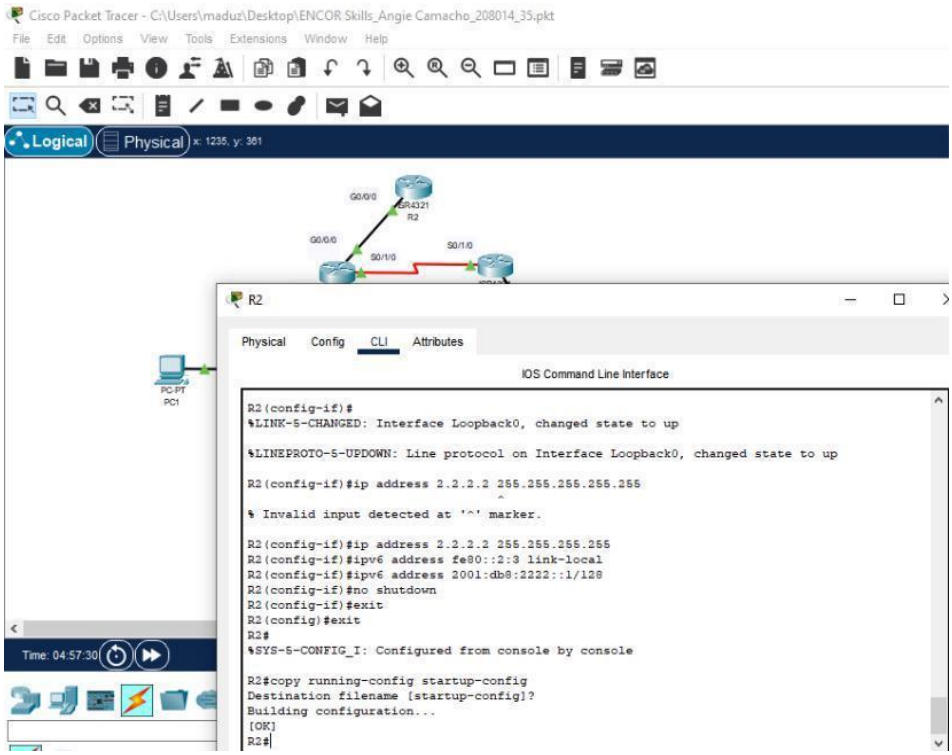

Figura 4. Configuración del roter 2

Router 3:
Router>en
Router#config term
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)#banner motd # R3, ENCOR Skills Assessment#
R3(config)#line con 0

```
R3(config-line)#exec-timeout 0 0
R3(config-line)#logging synchronous
R3(config-line)#exit
R3(config)#interface g0/0/0
R3(config-if)#ip address 10.63.11.1 255.255.255.0
R3(config-if)#ipv6 address fe80::3:2 link-local
R3(config-if)#ipv6 address 2001:db8:100:1011::1/64
R3(config-if)#no shutdown
R3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up
R3(config-if)#interface s0/1/0
R3(config-if)#ip address 10.63.13.3 255.255.255.0
R3(config-if)#ipv6 address fe80::3:3 link-local
R3(config-if)#ipv6 address 2001:db8:100:1010::2/64
R3(config-if)#no shutdown
R3(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
```

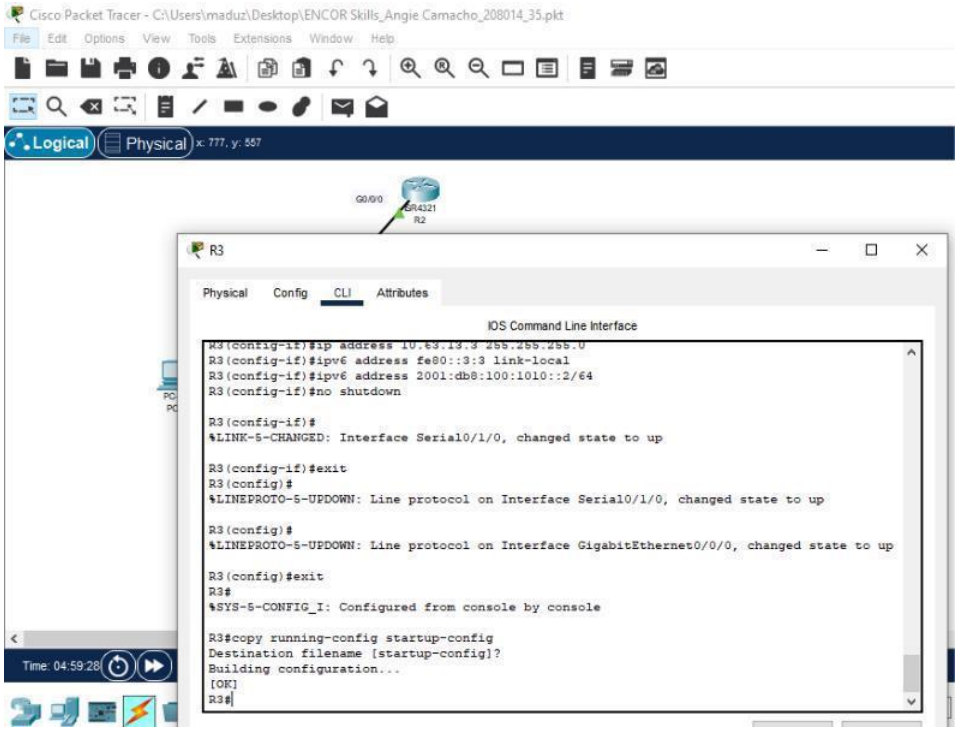

Figura 5. Configuración del router 3

Switch D1:

Switch>en
Switch#conf term
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname D1
D1(config)#ip rotoco
D1(config)#ipv6 unicast-routing
D1(config)#no ip domain lookup
D1(config)#banner motd # D1, ENCOR Skills Assessment#
D1(config)#line con 0
D1(config-line)#exec-timeout 0 0
D1(config-line)#logging synchronous
D1(config-line)#exit
D1(config)#Vlan 100
D1(config-vlan)#name Management
D1(config-vlan)#exit
D1(config)#Vlan 101

```
D1(config-vlan)#name UserGroupA
D1(config-vlan)#exit
D1(config)#Vlan 102
D1(config-vlan)#name UserGrouoB
D1(config-vlan)#exit
D1(config)#Vlan 999
D1(config-vlan)#name NATIVE
D1(config-vlan)#exit
D1(config)#interface g1/0/1
D1(config-if)#no switchport
D1(config-if)#
D1(config-if)#ip address 10.63.10.2 255.255.255.0
D1(config-if)#ipv6 address fe80::d1:1 link- local
D1(config-if)#ipv6 address fe80::d1:1 link-local
D1(config-if)#ipv6 address 2001:db8:100:1010::2/64
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#interface Vlan 100
D1(config-if)#
%LINK-5-CHANGED: Interface Vlan100, changed state to up
D1(config-if)#ip address 10.63.100.1 255.255.255.0
D1(config-if)#ipv6 address fe80::d1:2 link-local
D1(config-if)#ipv6 address 2001:db8:100:100::1/64
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#interface Vlan 101
D1(config-if)#
%LINK-5-CHANGED: Interface Vlan101, changed state to up
D1(config-if)#ip address 10.63.101.1 255.255.255.0
D1(config-if)#ipv6 address fe80::d1:3 link-local
D1(config-if)#ipv6 address 2001:db8:100:101::1/64
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#interface Vlan 102
D1(config-if)#
%LINK-5-CHANGED: Interface Vlan102, changed state to up
D1(config-if)#ip address 10.63.102.1 255.255.255.0
D1(config-if)#ipv6 address fe80::d1:4 link-local
D1(config-if)#ipv6 address 2001:db8:100:102::1/64
```

```
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#ip dhcp excluded-address 10.63.101.1 10.63.101.109
D1(config)#ip dhcp excluded-address 10.63.101.141 10.63.101.254
D1(config)#ip dhcp excluded-address 10.63.102.1 10.63.102.109
D1(config)#ip dhcp excluded-address 10.63.102.141 10.63.102.254
D1(config)#ip dhcp pool VLAN-101
D1(dhcp-config)#network 10.63.101.0 255.255.255.0
D1(dhcp-config)#default-router 10.63.101.254
D1(dhcp-config)#exit
D1(config)#ip dhcp pol
D1(config)#ip dhcp pool VLAN-102
D1(dhcp-config)#network 10.63.102.0255.255.255.0
D1(dhcp-config)#default-router 10.63.102.254
D1(dhcp-config)#exit
D1(config)#interface range g1/0/2,g1/0/3,g1/0/4,G1/0/5
D1(config-if-range)#shutdown
%LINK-5-CHANGED: Interface GigabitEthernet1/0/2, changed state to
administratively down
%LINK-5-CHANGED: Interface GigabitEthernet1/0/3, changed state to
administratively down
%LINK-5-CHANGED: Interface GigabitEthernet1/0/4, changed state to
administratively down
%LINK-5-CHANGED: Interface GigabitEthernet1/0/5, changed state to
administratively down
D1(config-if-range)#exit
D1(config)#
```

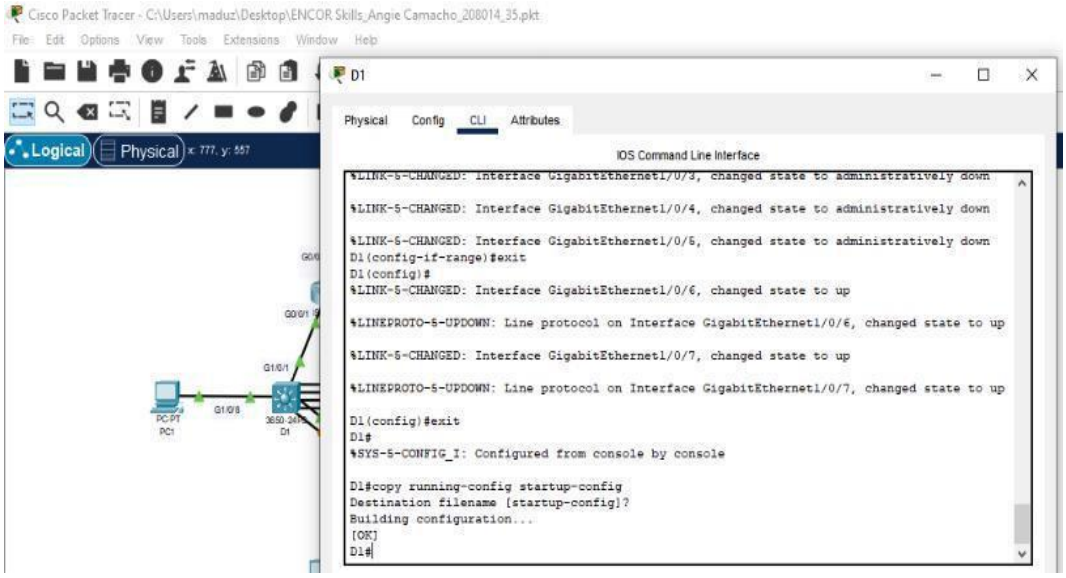

Figura 6. Configuración del Switch D1

Switch D2:

```
D2(config-if)#hostname D2
D2(config)#ip routing
D2(config)#ipv6 unicast-routing
D2(config)#no ip domain lookup
D2(config)#banner motd # D2, ENCOR Skills Assessment#
D2(config)#line con 0
D2(config-line)# exec-timeout 0 0
D2(config-line)# logging synchronous
D2(config-line)# exit
D2(config)#vlan 100
D2(config-vlan)# name Management
D2(config-vlan)# exit
D2(config)#vlan 101
D2(config-vlan)# name UserGroupA
D2(config-vlan)# exit
D2(config)#vlan 102
D2(config-vlan)# name UserGroupB
D2(config-vlan)# exit
D2(config)#vlan 999
D2(config-vlan)# name NATIVE
D2(config-vlan)# exit
D2(config)#interface e1/1
```

```
D2(config-if)# no switchport
D2(config-if)# ip address 10.63.11.2 255.255.255.0
D2(config-if)# ipv6 address fe80::d1:1 link-local
D2(config-if)# ipv6 address 2001:db8:100:1011::2/64
%Ethernet1/1: Informational: 2001:DB8:100:1011::2/64 is in use on shutdown Ethernet1/0
D2(config-if)# no shutdown
%Ethernet1/1: Informational: 2001:DB8:100:1011::/64 is in use on shutdown Ethernet1/0
%Ethernet1/1: Informational: 2001:DB8:100:1011::2/64 is in use on shutdown Ethernet1/0
D2(config-if)# exit
D2(config)#interface vlan 100
D2(config-if)# ip address 10.63.100.2 255.255.255.0
D2(config-if)# ipv6 address fe80::d2:2 link-local
D2(config-if)# ipv6 address 2001:db8:100:100::2/64
D2(config-if)# no shutdown
D2(config-if)# exit
D2(config)#interface vlan 101
D2(config-if)# ip address 10.63.101.2 255.255.255.0
D2(config-if)# ipv6 address fe80::d2:3 link-local
D2(config-if)# ipv6 address 2001:db8:100:101::2/64
D2(config-if)# no shutdown
D2(config-if)# exit
D2(config)#interface vlan 102
D2(config-if)# ip address 10.63.102.2 255.255.255.0
D2(config-if)# ipv6 address fe80::d2:4 link-local
D2(config-if)# ipv6 address 2001:db8:100:102::2/64
D2(config-if)# no shutdown
D2(config-if)# exit
D2(config)#ip dhcp excluded-address 10.63.101.1 10.78.101.209
D2(config)#ip dhcp excluded-address 10.63.101.241 10.78.101.254
D2(config)#ip dhcp excluded-address 10.63.102.1 10.78.102.209
D2(config)#ip dhcp excluded-address 10.63.102.241 10.78.102.254
D2(config)#ip dhcp pool VLAN-101
D2(dhcp-config)# network 10.63.101.0 255.255.255.0
D2(dhcp-config)# default-router 10.78.101.254
D2(dhcp-config)# exit
D2(config)#ip dhcp pool VLAN-102
```

D2(dhcp-config)# network 10.63.102.0 255.255.255.0
D2(dhcp-config)# default-router 10.78.102.254
D2(dhcp-config)# exit
D2(config)#interface range e0/0-3,e1/0,e1/3,e2/0-3,e3/0-3
D2(config-if-range)# shutdown
D2(config-if-range)# exit

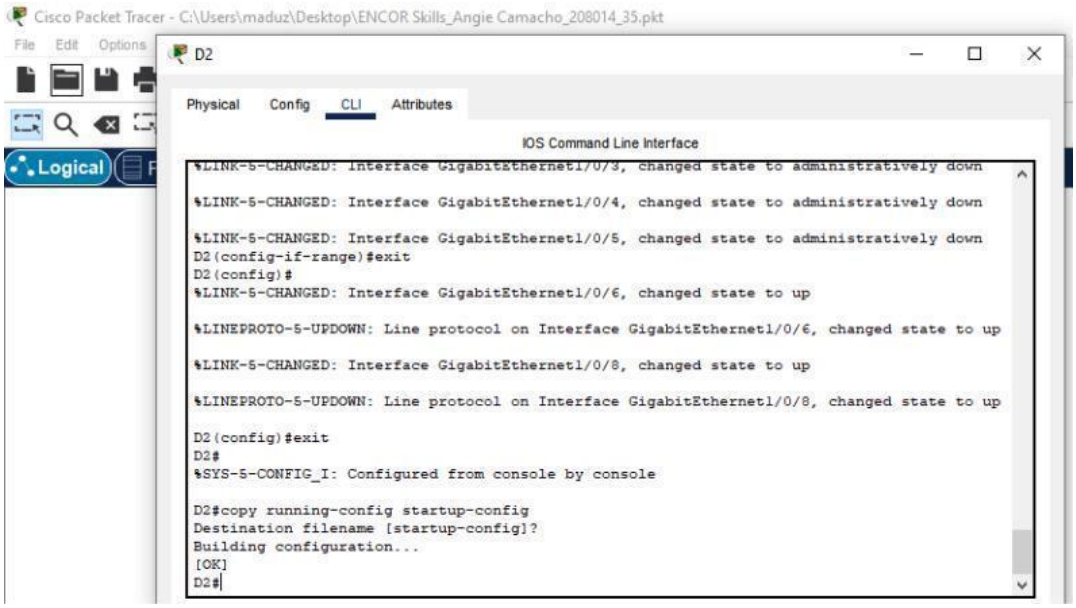

Figura 7. Configuración del Switch D2

Switch A1:
A1(config)#hostname A1
A1(config)#no ip domain lookup
A1(config)#banner motd # A1, ENCOR Skills Assessment#
A1(config)#line con 0
A1(config-line)# exec-timeout 0 0
A1(config-line)# logging synchronous
A1(config-line)# exit
A1(config)#vlan 100
A1(config-vlan)# name Management
A1(config-vlan)# exit
A1(config)#vlan 101
A1(config-vlan)# name UserGroupA
A1(config-vlan)# exit
A1(config)#vlan 102
A1(config-vlan)# name UserGroupB

A1(config-vlan)# exit
A1(config)#vlan 999
A1(config-vlan)# name NATIVE
A1(config-vlan)# exit
A1(config)#interface vlan 100
A1(config-if)# ip address 10.63.100.3 255.255.255.0
A1(config-if)# ipv6 address fe80::a1:1 link-local
A1(config-if)# ipv6 address 2001:db8:100:100::3/64
A1(config-if)# no shutdown
A1(config-if)# exit
A1(config)# interface range g1/0/8,g1/0/7,g0/0/0,g1/0/2,g1/0/3,g1/0/4,g1/0/5
A1(config-if-range)# shutdown
A1(config-if-range)# exit

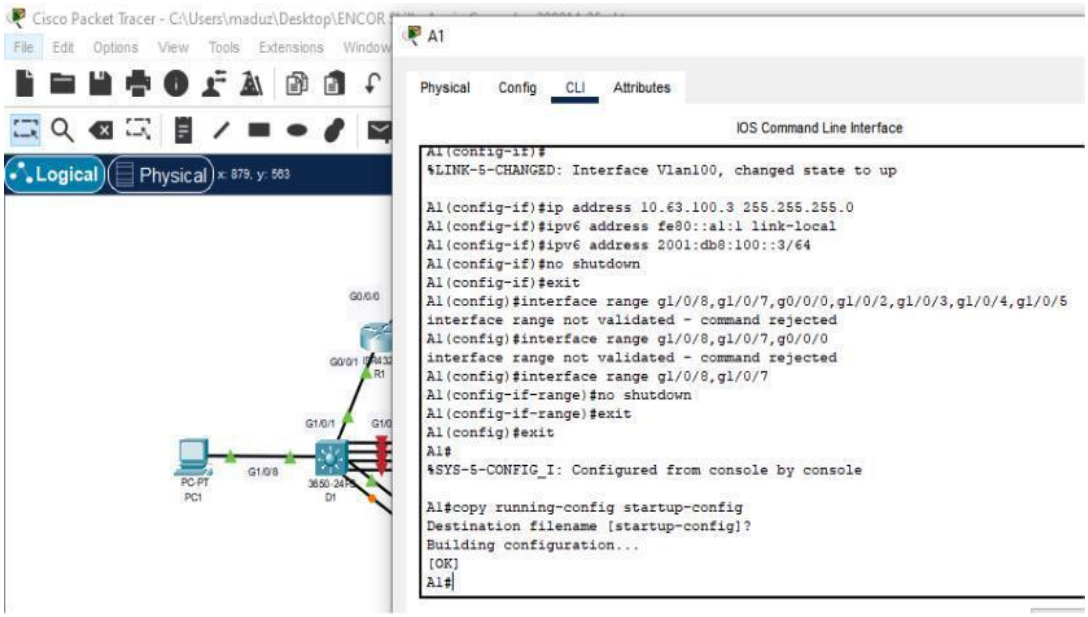

Figura 8. Configuración de Switch A1

Guarda la configuración en ejecución en startup-config en todos los dispositivos.

D1#copy running-config startup-config

Se configura el host PC1 y PC4, como se muestra en la tabla de direccionamiento de prueba de enlace 10.63.100.254, que será la dirección IP virtual de HSRP utilizada en la Parte 4.

Se asigna la siguiente IP

PC1: Ip 10.63.100.5/24 10.63.100.254

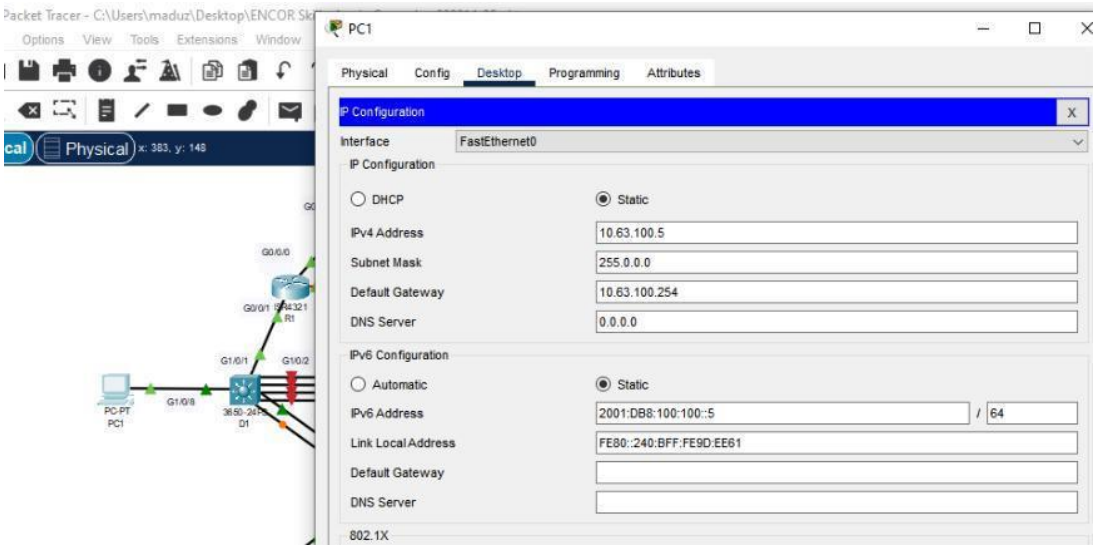

Figura 9. Asignación de ip al PC1

PC4: ip 10.63.100.6/24 10.63.100.254

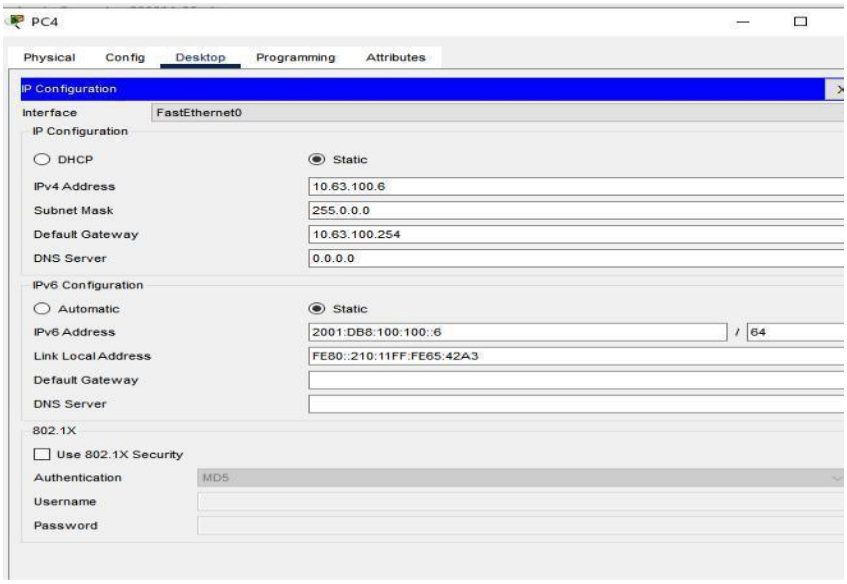

Figura 10. Asignación de ip al PC2

PARTE 2: CONFIGURAR LA CAPA 2 DE LA RED Y EL SOPORTE DE HOST

Tabla 2. Configuración de las capas 2

Task#	Task	Specification	Points
2.1	On all switches, configure IEEE 802.1Q trunk interfaces on interconnecting switch links	Enable 802.1Q trunk links between: • D1 and D2 • D1 and A1 • D2 and A1	6
2.2	On all switches, change the native VLAN on trunk links.	Use VLAN 999 as the native VLAN.	6
2.3	On all switches, enable the Rapid Spanning-Tree Protocol.	Use Rapid Spanning Tree.	3
2.4	On D1 and D2, configure the appropriate RSTP root bridges based on the information in the topology diagram. D1 and D2 must provide backup in case of root bridge failure.	Configure D1 and D2 as root for the appropriate VLANs with mutually supporting priorities in case of switch failure.	2
2.5	On all switches, create LACP EtherChannels as shown in the topology diagram.	Use the following channel numbers: • D1 to D2 – Port channel 12 • D1 to A1 – Port channel 1 • D2 to A1 – Port channel 2	3

Task#	Task	Specification	Points
2.6	On all switches, configure host access ports connecting to PC1, PC2, PC3, and PC4.	Configure access ports with appropriate VLAN settings as shown in the topology diagram. Host ports should transition immediately to forwarding state.	4
2.7	Verify IPv4 DHCP services.	PC2 and PC3 are DHCP clients and should be receiving valid IPv4 addresses.	1
2.8	Verify local LAN connectivity.	PC1 should successfully ping: • D1: 10.XY.100.1 • D2: 10.XY.100.2 • PC4: 10.XY.100.6 PC2 should successfully ping: • D1: 10.XY.102.1 • D2: 10.XY.102.2 PC3 should successfully ping: • D1: 10.XY.101.1 • D2: 10.XY.101.2 PC4 should successfully ping: • D1: 10.XY.100.1 • D2: 10.XY.100.2 • PC1: 10.XY.100.5	1

Paso 2.1: Configurar las interfaces troncales

Switch D1:

interface range e0/1-3,e1/0 --- configura un grupo de interfaces

switchport trunk encapsulation dot1q ---- establece la encapsulación en el estándar IEEE 802.1Q

switchport mode trunk ---- configura la interfaz truncal

interface range e2/1-2

switchport trunk encapsulation dot1q

switchport mode trunk

Switch D2:

interface range ethernet1/0/1-4

switchport mode trunk

interface range ethernet1/0/5-6

switchport mode trunk

Switch A1:

Interface range ethernet0/1-2

switchport mode trunk

interface range ethernet0/3-4

switchport mode trunk

Paso 2.2: Configurar la VLAN 99 como nativa

Switch D1:

interface range ethernet1/0/1-4

switchport mode trunk

switchport trunk native vlan 999

interface range ethernet1/0/5-6

switchport mode trunk

switchport trunk native vlan 999

Switch D2

interface range ethernet1/0/1-4

switchport mode trunk

switchport trunk native vlan 999

interface range ethernet1/0/5-6

switchport mode trunk

switchport trunk native vlan 999

Switch A1

interfacerange ethernet0/1-2

switchport mode trunk

switchport trunk native vlan 999

interface range ethernet0/3-4

switchport mode trunk

switchport trunk native vlan 999

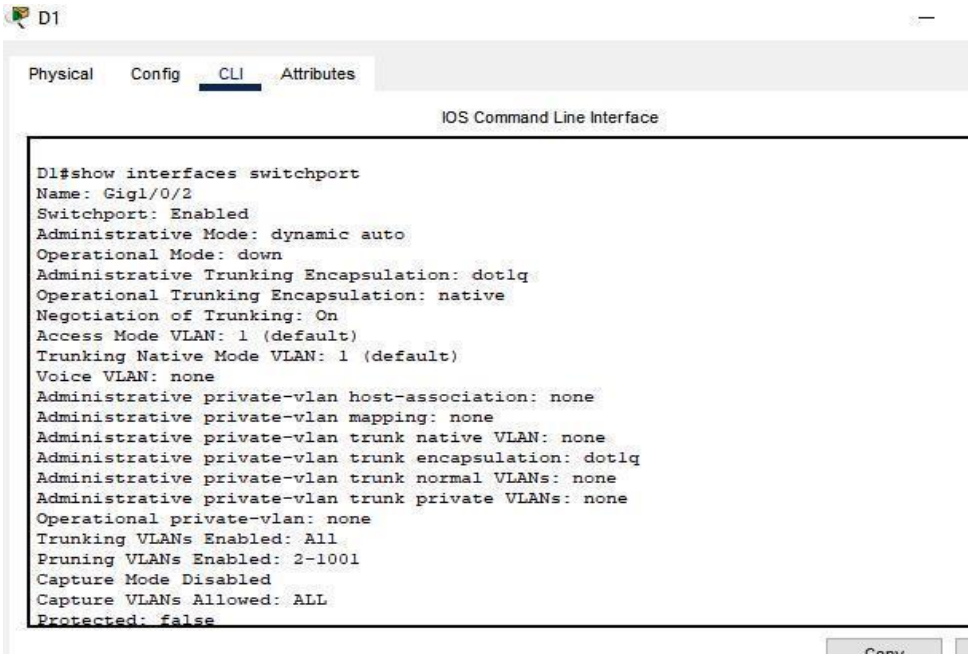

Figura 13. Verificación de los enlaces troncales Switch D1

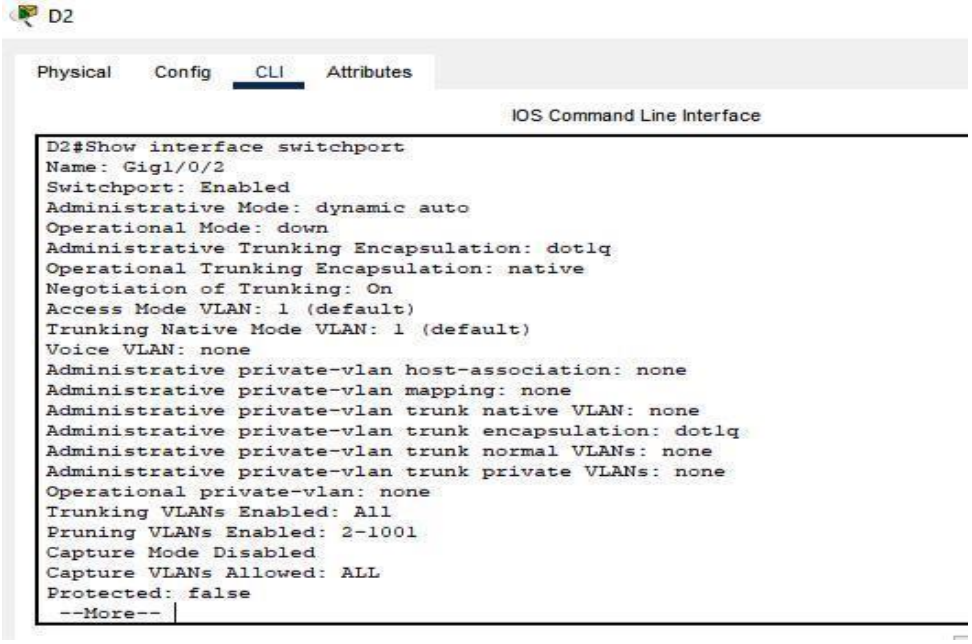

Figura 14. Verificación de los enlaces troncales Switch D2

Figura 15. Verificación de los enlaces troncales Switch A1

Paso 2.3: Habilitar protocolo Rapid Spanning-Tree (RSTP)

Switch D1:

Switch D1: spanning-tree mode rapid-pvst

Switch D2: spanning-tree mode rapid-pvst

Switch A1: spanning-tree mode rapid-pvst

Paso 2.4: Configurar los puentes raíz (root bridges)

Switch D1:

spanning-tree vlan 100,102 root primary

spanning-tree vlan 101 root secondary

Switch D2:

spanning-tree vlan 101 root primary

spanning-tree vlan 100,102 root secondary

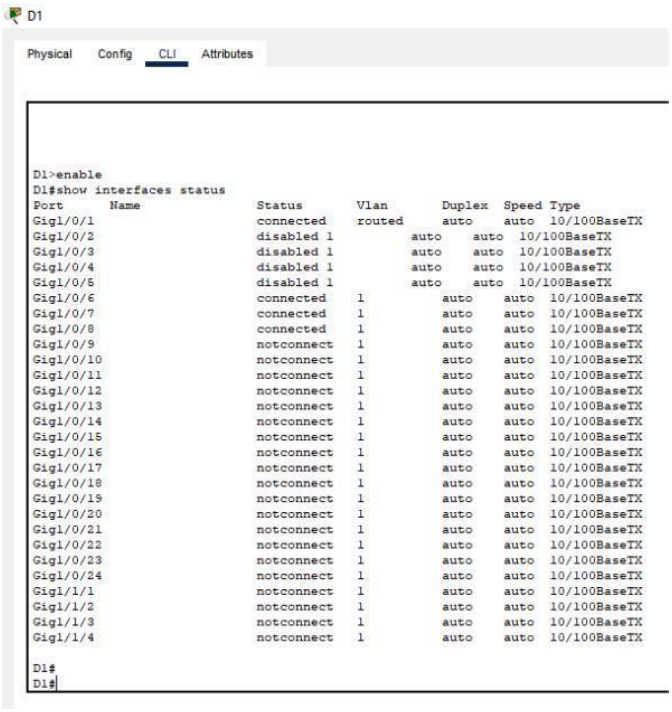

Figura 15. Verificación de spanning-tree

Paso 2.5: crear los LACP

Switch D1:

D1(config)#interface range e0/1-3,e1/0

D1(config-if-range)# switchport trunk encapsulation dot1q

D1(config-if-range)# switchport mode trunk

D1(config-if-range)# switchport trunk native vlan 999

D1(config-if-range)# channel-group 12 mode active

D1(config-if-range)# no shutdown

D1(config-if-range)# exit

D1(config)#interface range e2/1-2

```
D1(config-if-range)# switchport trunk encapsulation dot1q
D1(config-if-range)# switchport mode trunk
D1(config-if-range)# switchport trunk native vlan 999
D1(config-if-range)# channel-group 1 mode active
D1(config-if-range)# no shutdown
D1(config-if-range)# exit
D1(config)#spanning-tree mode rapid-pvst
D1(config)#spanning-tree vlan 100,102 root primary
D1(config)#spanning-tree vlan 101 root secondary
D1(config)#interface e2/3
D1(config-if)# switchport mode access
D1(config-if)# switchport access vlan 100
D1(config-if)# spanning-tree portfast
D1(config-if)# no shutdown
D1(config-if)# exit
D1(config)#end
```

switch D2

```
D2(config)#interface range e0/1-3,e1/0
D2(config-if-range)# switchport trunk encapsulation dot1q
D2(config-if-range)# switchport mode trunk
D2(config-if-range)# switchport trunk native vlan 999
D2(config-if-range)# channel-group 12 mode active
D2(config-if-range)# no shutdown
D2(config-if-range)# exit
D2(config)#interface range e2/1-2
D2(config-if-range)# switchport trunk encapsulation dot1q
D2(config-if-range)# switchport mode trunk
```

```
D2(config-if-range)# switchport trunk native vlan 999
D2(config-if-range)# channel-group 2 mode active
D2(config-if-range)# no shutdown
D2(config-if-range)# exit
D2(config)#spanning-tree mode rapid-pvst
D2(config)#spanning-tree vlan 101 root primary
D2(config)#spanning-tree vlan 100,102 root secondary
D2(config)#interface e2/3
D2(config-if)# switchport mode access
D2(config-if)# switchport access vlan 102
D2(config-if)# spanning-tree portfast
D2(config-if)# no shutdown
D2(config-if)# exit
D2(config)#end
```

switch A1

```
A1(config)#interface range e0/1-2
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#switchport mode trunk
A1(config-if-range)#switchport trunk native vlan 999
A1(config-if-range)#channel-group 1 mode active
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
A1(config)#interface range e0/3,e1/0
A1(config-if-range)#switchport trunk encapsulation dot1q
```

```
A1(config-if-range)#switchport mode trunk
A1(config-if-range)#switchport trunk native vlan 999
A1(config-if-range)#channel-group 2 mode active
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
A1(config)#interface e2/3
A1(config-if)#switchport mode access
A1(config-if)#switchport access vlan 101
A1(config-if)#spanning-tree portfast
A1(config-if)#no shutdown
A1(config-if)#exit
A1(config)#interface e3/0
A1(config-if)#switchport mode access
A1(config-if)#switchport access vlan 100
A1(config-if)#spanning-tree portfast
A1(config-if)#no shutdown
A1(config-if)#exit
A1(config)#end
```

Paso 2.6: Configurar los puertos de acceso a los PC

Switch D1

interface e2/3

switchport mode access

switchport access vlan 100

spanning-tree portfast

no shutdown

Switch D2

interface e2/3

switchport mode access

switchport access vlan 102

spanning-tree portfast

no shutdown

exit

Switch A1

interface e2/3

switchport mode access

switchport access vlan 101

spanning-tree portfast

no shutdown

exit

Paso 2.7: Verificar los PC en DHCP:

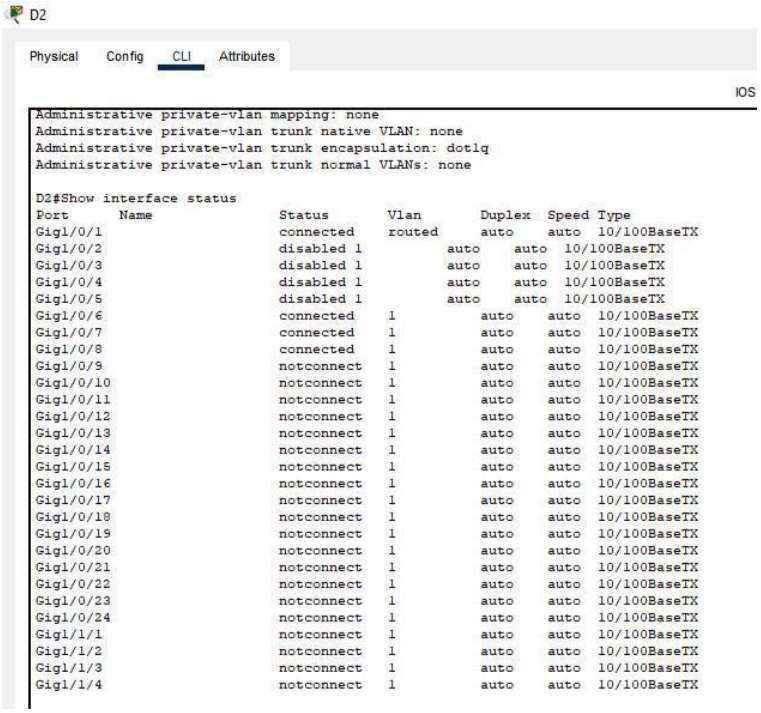

Figura 17. Verificación servicios DHCP

Figura 18. Verificación servicios DHCP en PC3

Paso 2.8: Verificación de la conectividad de la LAN local

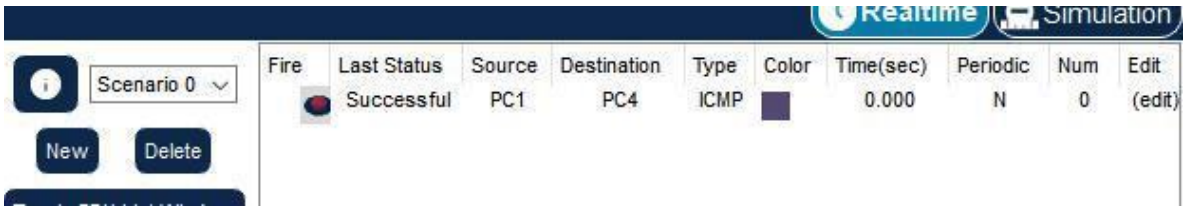

Figura 19. Verificación conectividad LAN en PC1

Figura 20. Verificación conectividad LAN en PC4

Figura 21. Verificación conectividad LAN en PC2

Figura 22. Verificación conectividad LAN en PC3

PARTE 3: CONFIGURAR LOS PROTOCOLOS DE ENRUTAMIENTO

En esta parte, debe configurar los protocolos de enrutamiento IPv4 e IPv6. Al final de esta parte, la red debería estar completamente convergente. Los pings de IPv4 e IPv6 a la interfaz Loopback 0 desde D1 y D2 deberían ser exitosos.

Nota: Los pings desde los hosts no tendrán éxito porque sus puertas de enlace predeterminadas apuntan a la dirección HSRP que se habilitará en la Parte 4.

Tabla 3. Configurar protocolos de enrutamiento 1

Task#	Task	Specification	Points
3.1	On the “Company Network” (i.e., R1, R3, D1, and D2), configure single-area OSPFv2 in area 0.	Use OSPF Process ID **4** and assign the following router-IDs: • R1: 0.0.4.1 • R3: 0.0.4.3 • D1: 0.0.4.131 • D2: 0.0.4.132 On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0. • On R1, do not advertise the R1 – R2 network. • On R1, propagate a default route. Note that the default route will be provided by BGP. Disable OSPFv2 advertisements on: • D1: All interfaces except E1/2 • D2: All interfaces except E1/0	8

Task#	Task	Specification	Points
3.2	On the “Company Network” (i.e., R1, R3, D1, and D2), configure classic single-area OSPFv3 in area 0.	Use OSPF Process ID **6** and assign the following router-IDs: • R1: 0.0.6.1 • R3: 0.0.6.3 • D1: 0.0.6.131 • D2: 0.0.6.132 On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0. • On R1, do not advertise the R1 – R2 network. • On R1, propagate a default route. Note that the default route will be provided by BGP. Disable OSPFv3 advertisements on: • D1: All interfaces except E1/2 • D2: All interfaces except E1/0	8

Task#	Task	Specification	Points
3.3	On R2 in the “ISP Network”, configure MP-BGP.	Configure two default static routes via interface Loopback 0: • An IPv4 default static route. • An IPv6 default static route. Configure R2 in BGP ASN **500** and use the router-id 2.2.2.2. Configure and enable an IPv4 and IPv6 neighbor relationship with R1 in ASN 300. In IPv4 address family, advertise: • The Loopback 0 IPv4 network (/32). • The default route (0.0.0.0/0). In IPv6 address family, advertise: • The Loopback 0 IPv4 network (/128). • The default route (::/0).	4

Task#	Task	Specification	Points
3.4	On R1 in the “ISP Network”, configure MP-BGP.	Configure two static summary routes to interface Null 0: • A summary IPv4 route for 10.XY.0.0/8. • A summary IPv6 route for 2001:db8:100::/48. Configure R1 in BGP ASN **300** and use the router-id 1.1.1.1. Configure an IPv4 and IPv6 neighbor relationship with R2 in ASN 500. In IPv4 address family: • Disable the IPv6 neighbor relationship. • Enable the IPv4 neighbor relationship. • Advertise the 10.XY.0.0/8 network. In IPv6 address family: • Disable the IPv4 neighbor relationship. • Enable the IPv6 neighbor relationship. • Advertise the 2001:db8:100::/48 network.	4

Paso 3.1: Configuración OSPFv2

Router 1
router ospf 4
router-id 0.04.1
network 10.63.10.0 0.0.0.255 area 0
network 10.63.13.0 0.0.0.255 area 0
default-information originate

Router 3
router ospf 4
router-id 0.0.4.3
network 10.78.11.0 0.0.0.255 area 0
network 10.78.13.0 0.0.0.255 area 0

Switch D1
router ospf 4
router-id 0.0.4.131
network 10.63.100.0 0.0.0.255 area 0
network 10.63.101.0 0.0.0.255 area 0
network 10.63.102.0 0.0.0.255 area 0
network 10.63.10.0 0.0.0.255 area 0
passive-interface default
no passive-interface e1/0/11

Switch D2
router ospf 4
router-id 0.0.4.132
network 10.78.100.0 0.0.0.255 area 0
network 10.78.101.0 0.0.0.255 area 0
network 10.78.102.0 0.0.0.255 area 0
network 10.78.11.0 0.0.0.255 area 0
passive-interface default
no passive-interface e1/0/11

Paso 3.2: Configuración de OSPFv3

Router 1
ipv6 router ospf 6
router-id 0.0.6.1
default-information originate
exitinterface e0/0/1
ipv6 ospf 6 area 0
exit
interface s0/1/0
ipv6 ospf 6 area 0
exit

Router 2
ipv6 router ospf 6
router-id 0.0.6.3
exit
interface e0/0/1
ipv6 ospf 6 area 0
exit
interface s0/1/0
ipv6 ospf 6 area 0
exit
end

Switch D1
passive-interface default
no passive-interface e1/0/11

interface e1/0/11
ipv6 ospf 6 area 0
exit
interface vlan 100
ipv6 ospf 6 area 0
exit
interface vlan 101
ipv6 ospf 6 area 0
exit
interface vlan 102
ipv6 ospf 6 area 0
exit

Switch D2
passive-interface default
no passive-interface e1/0/11

interface e1/0/11
ipv6 ospf 6 area 0
exit
interface vlan 100
ipv6 ospf 6 vlan 0

exit
interface vlan 100
ipv6 ospf 6 area 0
exit
interface vlan 101
ipv6 ospf 6 area 0
exit
interface vlan 102
ipv6 ospf 6 area 0
exit
end

Paso 3.3: Configuración MP-BGP en la red ISP R2

Router 2
ip router 0.0.0.0 0.0.0.0 loopback 0
ipv6 router::/o loopback 0
router bgp 500
bgp router-id 2.2.2.2
neighbor 209.165.200.225 remote-as 300
neighbor 2001:db8:200::1 remote-as 300
address-family ipv4
neighbor 209.165.200.225 activate
no neighbor 2001:db8:200::1 activate
network 2.2.2.2 mask 255.255.255.255
network 0.0.0.0
exit-address-family
address-family ipv6
no neighbor 209.165.200.225 activate
neighbor 2001:db8:200::1 activate
network 2001:db8:2222::/128
network ::/0
exit-address-family

Paso 3.4: Configuración MP-BGP en la red ISP R1

Router 1
ip router 10.63.0.0 255.0.0.0 null0
ipv6 router 2001.db8:100::/48 null0

```
router bgp 300
bgp router-id 1.1.1.1
neighbor 209.165.200.226 remote-as 500
neighbor 2001:db8:200::2 remote-as 500
address-family ipv4 unicast
neighbor 209.165.200.226 activate
no neighbor 2001:db8:200::2 activate
network 10.63.0.0 mask 255.0.0.0
exit-address-family
address-family ipv6 unicast
no neighbor 209.165.200.226 activate
neighbor 2001:db8:200::2 activate
network 2001:db8:100::/48
exit-address-family
```

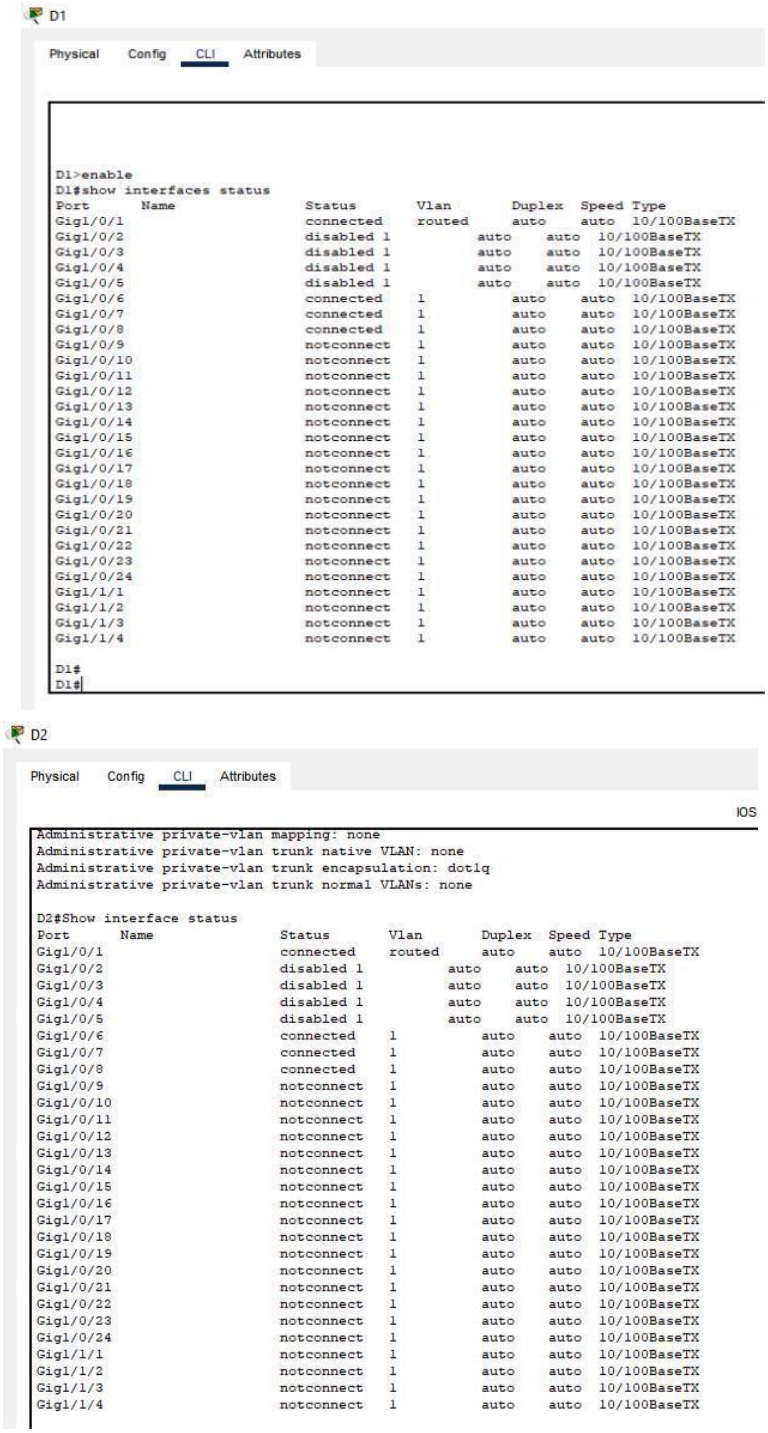

Figura 23. Verificacion de la table IPV4 en Switch D1 y D2

Paso 3.5: Verificación del MP-BGP con Ping

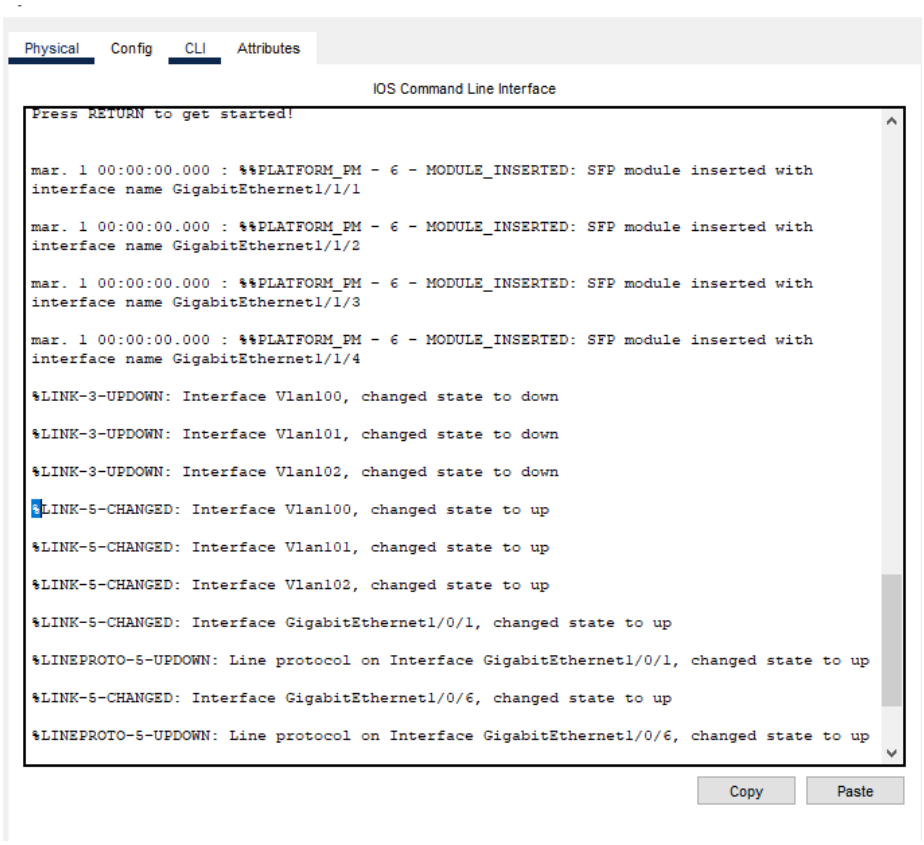

Figura 24. Ping D1 y D2 hacia Loopback 0

Router 1

R1(config-router)#router ospf 4

R1(config-router)#router-id 0.0.4.1

R1(config-router)#network 10.63.10.0 0.0.0.255 area 0

R1(config-router)#network 10.63.13.0 0.0.0.255 area 0

R1(config-router)#default-information originate

R1(config-router)#exit

R1(config)#ipv6 router ospf 6

R1(config-rtr)#router-id 0.0.6.1

R1(config-rtr)#default-information originate

R1(config-rtr)#exit

R1(config)#interface e1/0

R1(config-if)#ipv6 ospf 6 area 0

R1(config-if)#exit

R1(config)#interface e1/1

R1(config-if)#ipv6 ospf 6 area 0

R1(config-if)#exit

R1(config)#ip route 10.78.0.0 255.0.0.0 null0

%Inconsistent address and mask

R1(config)#ipv6 route 2001:db8:100::/48 null0

R1(config)#

R1(config)#router bgp 300

R1(config-router)#bgp router-id 1.1.1.1

R1(config-router)#neighbor 209.165.200.226 remote-as 500

```
R1(config-router)#neighbor 2001:db8:200::2 remote-as 500
R1(config-router)#address-family ipv4 unicast
R1(config-router-af)#neighbor 209.165.200.226 activate
R1(config-router-af)#no neighbor 2001:db8:200::2 activate
R1(config-router-af)#network 10.63.0.0 mask 255.0.0.0
% BGP: Incorrect network or mask/prefix-length configured
R1(config-router-af)#exit-address-family
R1(config-router)#address-family ipv6 unicast
R1(config-router-af)#no neighbor 209.165.200.226 activate
R1(config-router-af)#neighbor 2001:db8:200::2 activate
R1(config-router-af)#network 2001:db8:100::/48
R1(config-router-af)#exit-address-family
```

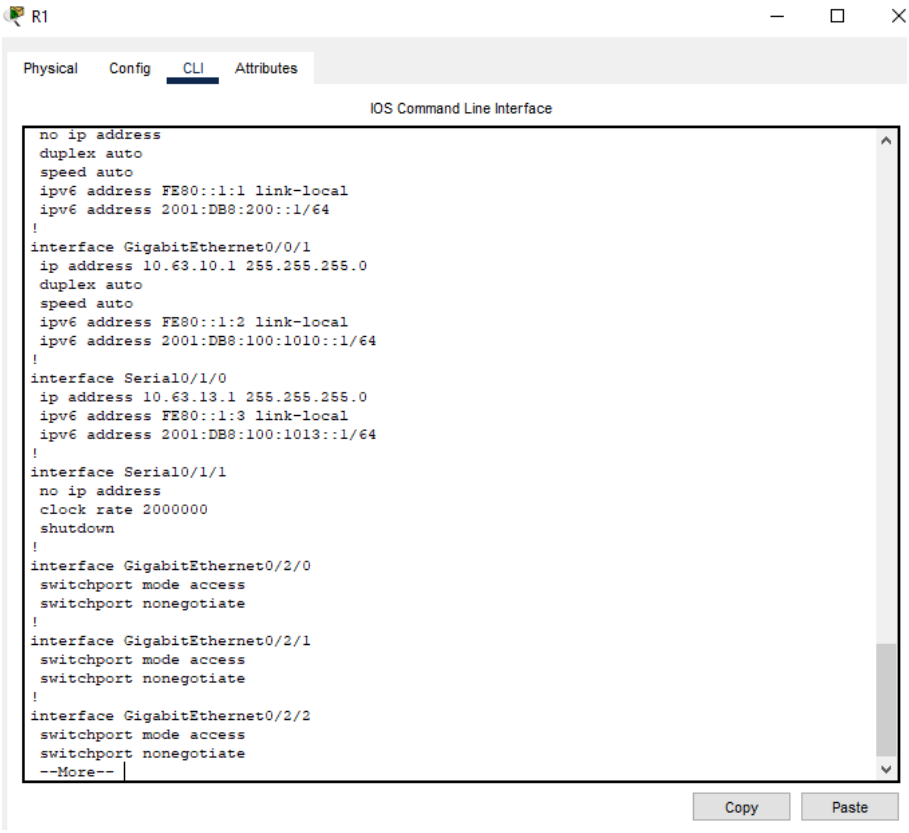

Figura 25. verificacion de vecinos router 1

Router 2

R2(config-router)#ip route 0.0.0.0 0.0.0.0 loopback 0

%Default route without gateway, if not a point-to-point interface, may impact performance

R2(config)#ipv6 route ::/0 loopback 0

R2(config)#router bgp 500

R2(config-router)#bgp router-id 2.2.2.2

R2(config-router)#neighbor 209.165.200.225 remote-as 300

R2(config-router)#neighbor 2001:db8:200::1 remote-as 300

R2(config-router)#address-family ipv4

R2(config-router-af)#neighbor 209.165.200.225 activate

R2(config-router-af)#no neighbor 2001:db8:200::1 activate

R2(config-router-af)#network 2.2.2.2 mask 255.255.255.255

R2(config-router-af)#network 0.0.0.0

R2(config-router-af)#exit-address-family

R2(config-router)#address-family ipv6

R2(config-router-af)#no neighbor 209.165.200.225 activate

R2(config-router-af)#neighbor 2001:db8:200::1 activate

R2(config-router-af)#network 2001:db8:2222::/128

R2(config-router-af)#network ::/0

R2(config-router-af)#exit-address-family

Router 3

R3(config)#router ospf 4

R3(config-router)#router-id 0.0.4.3

R3(config-router)#network 10.63.11.0 0.0.0.255 area 0

R3(config-router)#network 10.63.13.0 0.0.0.255 area 0

R3(config-router)#exit

R3(config)#ipv6 router ospf 6

R3(config-rtr)#router-id 0.0.6.3

R3(config-rtr)#exit

R3(config)#interface e1/0

R3(config-if)#ipv6 ospf 6 area 0

R3(config-if)#exit

R3(config)#interface e1/1

R3(config-if)#ipv6 ospf 6 area 0

R3(config-if)#exit

R3(config)#end

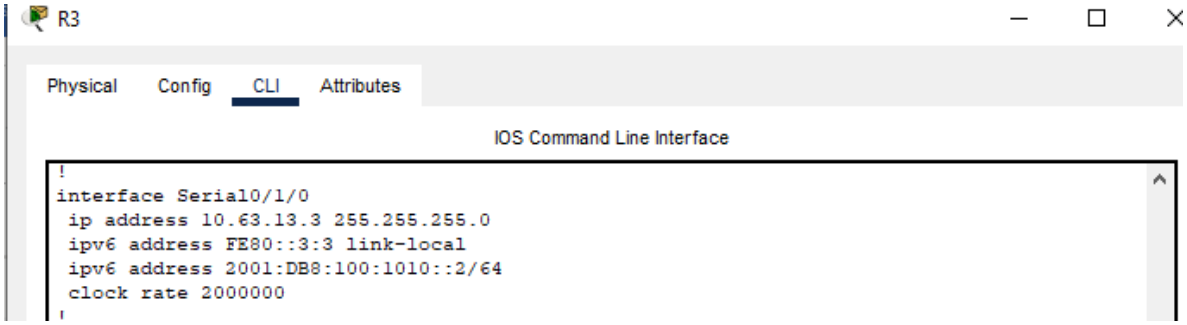

Figura 26. verificacion de vecinos router 3

Switch D1

D1#conf t

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

D1(config)#router ospf 4

D1(config-router)#router-id 0.0.4.131

D1(config-router)#network 10.63.100.0 0.0.0.255 area 0

D1(config-router)#network 10.63.101.0 0.0.0.255 area 0

D1(config-router)#network 10.63.102.0 0.0.0.255 area 0

D1(config-router)#network 10.63.10.0 0.0.0.255 area 0

D1(config-router)#passive-interface default

D1(config-router)#no passive-interface e1/1

D1(config-router)#exit

D1(config)#ipv6 router ospf 6

```
D1(config-rtr)#router-id 0.0.6.131
D1(config-rtr)#passive-interface default
D1(config-rtr)#no passive-interface e1/1
D1(config-rtr)#exit
D1(config)#interface e1/1
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#exit
D1(config)#interface vlan 100
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#exit
D1(config)#interface vlan 101
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#exit
D1(config)#interface vlan 102
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#exit
D1(config)#end
```

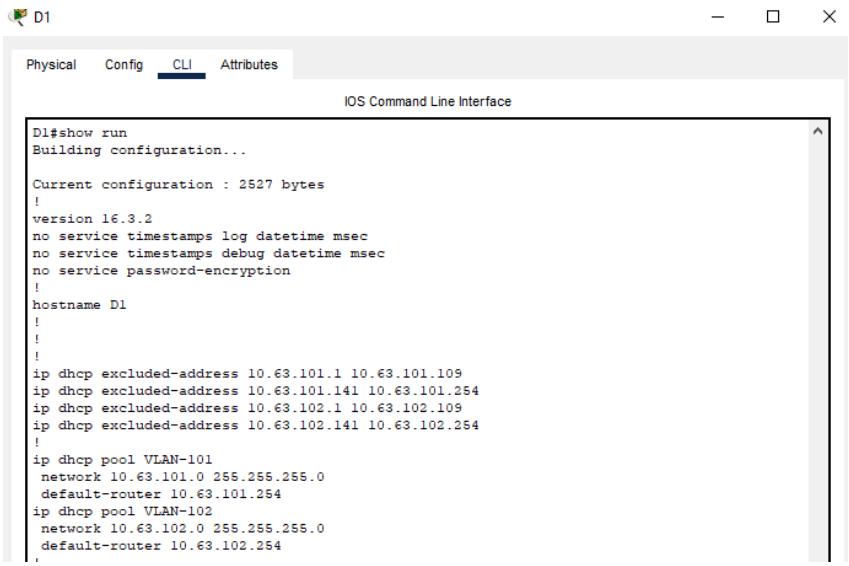

Figura 27. verificacion de vecinos switch D1

Switch D2

D2(config)#router ospf 4

D2(config-router)#router-id 0.0.4.132

D2(config-router)#network 10.63.100.0 0.0.0.255 area 0

D2(config-router)#network 10.63.101.0 0.0.0.255 area 0

D2(config-router)#network 10.63.102.0 0.0.0.255 area 0

D2(config-router)#network 10.63.11.0 0.0.0.255 area 0

D2(config-router)#passive-interface default

D2(config-router)#no passive-interface e1/1

D2(config-router)#exit

D2(config)#ipv6 router ospf 6

D2(config-rtr)#router-id 0.0.6.132

D2(config-rtr)#passive-interface default

D2(config-rtr)#no passive-interface e1/1

```
D2(config-rtr)#exit
D2(config)#interface e1/1
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit
D2(config)#interface vlan 100
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit
D2(config)#interface vlan 101
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit
D2(config)#interface vlan 102
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit
D2(config)#end
```

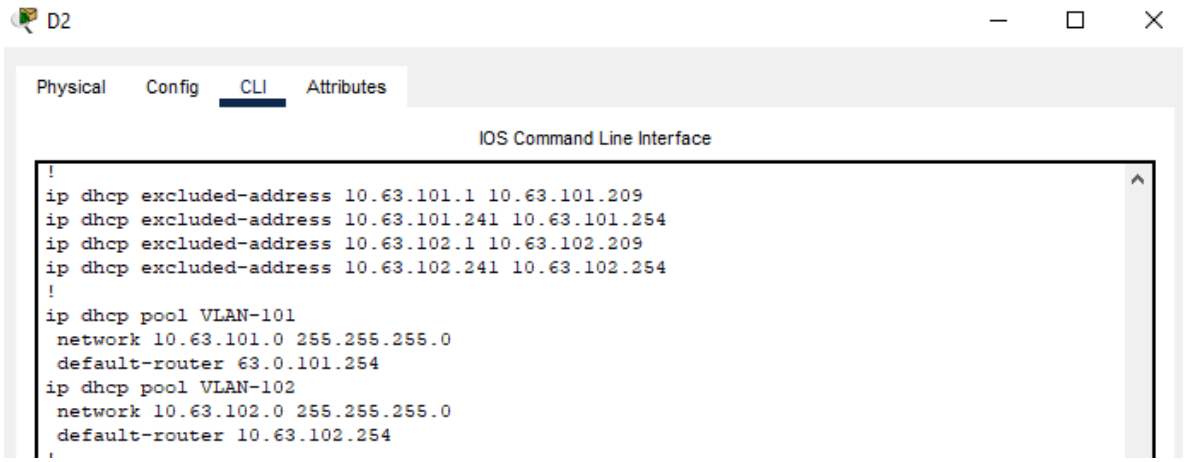

Figura 28. verificacion de vecinos switch D2

PARTE 4: CONFIGURAR LA REDUNDANCIA DEL PRIMER SALTO (FIRST HOP REDUNDANCY)

En esta parte, configurará HSRP versión 2 para proporcionar redundancia de primer salto para hosts en la "red de la empresa".

Sus tareas de configuración son las siguientes:

Tabla 4. Configurar protocolos de enrutamiento 2

Task#	Task	Specification	Points
4.1	On D1, create IP SLAs that test the reachability of R1 interface G0/0/1.	Create two IP SLAs. • Use SLA number **4** for IPv4. • Use SLA number **6** for IPv6. The IP SLAs will test availability of R1 E1/2 interface every 5 seconds. Schedule the SLA for immediate implementation with no end time. Create an IP SLA object for IP SLA 4 and one for IP SLA 6. • Use track number **4** for IP SLA 4. • Use track number **6** for IP SLA 6. The tracked objects should notify D1 if the IP SLA state changes from down to up after 10 seconds, or from up to down after 15 seconds.	2

Task#	Task	Specification	Points
4.2	On D2, create IP SLAs that test the reachability of R3 interface G0/0/1.	Create two IP SLAs. • Use SLA number **4** for IPv4. • Use SLA number **6** for IPv6. The IP SLAs will test availability of R3 E1/0 interface every 5 seconds. Schedule the SLA for immediate implementation with no end time. Create an IP SLA object for IP SLA 4 and one for IP SLA 6. • Use track number **4** for IP SLA 4. • Use track number **6** for IP SLA 6. The tracked objects should notify D1 if the IP SLA state changes from down to up after 10 seconds, or from up to down after 15 seconds.	2

4.3	On D1, configure HSRPv2.	D1 is the primary router for VLANs 100 and 102; therefore, their priority will also be changed to 150. Configure HSRP version 2. Configure IPv4 HSRP group **104** for VLAN 100: • Assign the virtual IP address **10.XY.100.254**. • Set the group priority to **150**. • Enable preemption. • Track object 4 and decrement by 60. Configure IPv4 HSRP group **114** for VLAN 101: • Assign the virtual IP address **10.XY.101.254**. • Enable preemption. • Track object 4 to decrement by 60. Configure IPv4 HSRP group **124** for VLAN 102: • Assign the virtual IP address **10.XY.102.254**. • Set the group priority to **150**. • Enable preemption. • Track object 4 to decrement by 60. Configure IPv6 HSRP group **106** for VLAN 100: • Assign the virtual IP address using **ipv6 autoconfig**. • Set the group priority to **150**. • Enable preemption. • Track object 6 and decrement by 60. Configure IPv6 HSRP group **116** for VLAN 101:	8

Task#	Task	Specification	Points
		• Assign the virtual IP address using **ipv6 autoconfig**. • Enable preemption. • Track object 6 and decrement by 60. Configure IPv6 HSRP group **126** for VLAN 102: • Assign the virtual IP address using **ipv6 autoconfig**. • Set the group priority to **150**. • Enable preemption. • Track object 6 and decrement by 60.	

	On D2, configure HSRPv2.	D2 is the primary router for VLAN 101; therefore, the priority will also be changed to 150. Configure HSRP version 2. Configure IPv4 HSRP group **104** for VLAN 100: • Assign the virtual IP address **10.XY.100.254**. • Enable preemption. • Track object 4 and decrement by 60. Configure IPv4 HSRP group **114** for VLAN 101: • Assign the virtual IP address **10.XY.101.254**. • Set the group priority to **150**. • Enable preemption. • Track object 4 to decrement by 60. Configure IPv4 HSRP group **124** for VLAN 102: • Assign the virtual IP address **10.XY.102.254**. • Enable preemption. • Track object 4 to decrement by 60. Configure IPv6 HSRP group **106** for VLAN 100: • Assign the virtual IP address using **ipv6 autoconfig**. • Enable preemption. • Track object 6 and decrement by 60. Configure IPv6 HSRP group **116** for VLAN 101: • Assign the virtual IP address using **ipv6 autoconfig**. • Set the group priority to **150**.	

Task#	Task	Specification	Points
		• Enable preemption. • Track object 6 and decrement by 60. Configure IPv6 HSRP group **126** for VLAN 102: • Assign the virtual IP address using ipv6 autoconfig. • Enable preemption. • Track object 6 and decrement by 60.	

Paso 4.1: En D1, cree IP SLAs que prueben la accesibilidad de la interfaz R1 G1/0

switch D1
ip sla 4 - Crea el SLA
icmp-echo 10.63.10.1 - define el destino y la fuente
frequency 5 - define cada cuanto segundo
exit
ip sla 6 - Crea el SLA
icmp-echo 2001:db8:100:1010::1
frequency 5
exit
ip sla schedule 4 life forever start-time now
ip sla schedule 6 life forever start-time now
track 4 ip sla 4 - crea el objeto para saber si down o up
delay down 10 up 15 - se dan los retardos solicitados
exit
track 6 ip sla 6
delay down 10 up 15
exit

Paso 4.2: En D2, cree IP SLAs que prueben la accesibilidad de la interfaz R3 G1/0

switch D2

ip sla 4
icmp-echo 10.63.11.1
frequency
exit
ip sla 6
icmp-echo 2001:db8:100::1011::1
frequency
exit
ip sla schedule 4 life forever start-time now
ip sla schedule 6 life forever start-time now
track 4 ip sla 4
delay down 10 up 15
exit
track 6 ip sla 6
delay down 10 up 15
exit

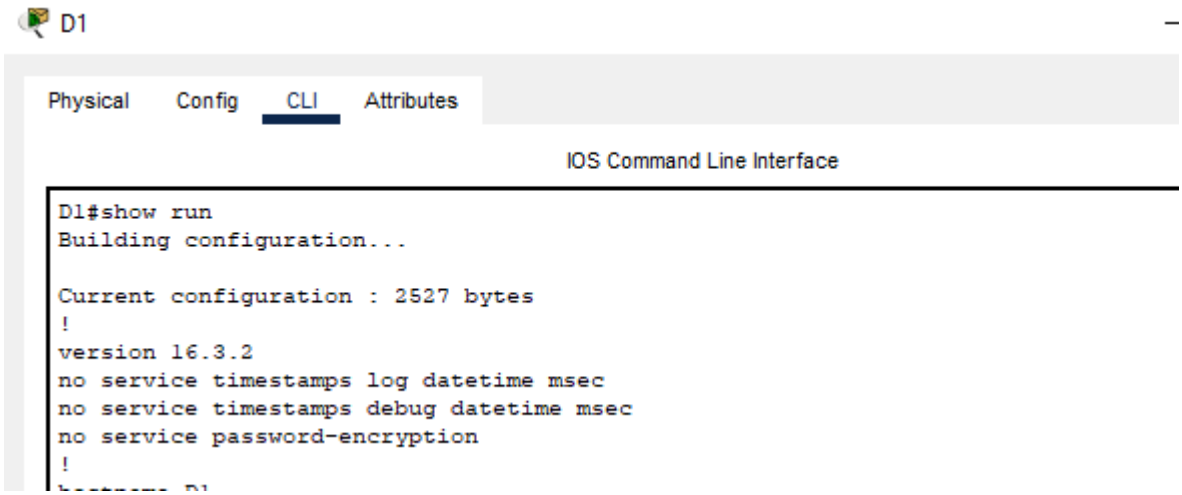

Figura 29. Verificación de los SLAS

Paso 4.3: En D1 configure HSRPv2

Switch D1:
interface vlan 100
standby version 2 - active la version 2 para ipv6
standby 104 ip 10.63.100.254 - crea el grupo con la ip virtual

standby 104 priority 150 - se cambia la prioridad defecto de 100
standby 104 preempt - sera el equipo principal
standby 104 track 4 decrement 60 - /rastrea el objeto 4
standby 106 ipv6 auticonfig
standby 106 priority 150
standby 106 preempt
standby 106 track 6 decrement 60
exit
interface vlan 101
standby version 2
standby 114 ip 10.78.101.254
standby 114 preempt
standby 114 track 4 decrement 60
standby 116 ipv6 auticonfig
standby 116 preempt
standby 116 track 6 decrement 60
exit
interface vlan 102
standby version 2
standby 124 ip 10.78.102.254
standby 124 priority 150
standby 124 preempt
standby 124 track 4 decrement 60
standby 126 ipv6 auticonfig
standby 126 priority 150
standby 126 preempt
standby 126 track 6 decrement 60
exit
end

Paso 4.4: En D2 configure HSRPv2

Switch D2:
interface vlan 100
standby version 2
standby 104 ip 10.63.100.254

```
standby 104 preempt
standby 104 track 4 decrement 60
standby 106 ipv6 autoconfig
standby 106 preempt
standby 106 track 6 decrement 60
exit
interface vlan 101
standby version 2
standby 114 ip 10.78.101.254
standby 114 priority 150
standby 114 preempt
standby 114 track 4 decrement 60
standby 116 ipv6 autoconfig
standby 116 priority 150
standby 116 preempt
standby 116 track 6 decrement 60
exit
interface vlan 102
standby version 2
standby 124 ip 10.78.102.254
standby 124 preempt
standby 124 track 4 decrement 60
standby 126 ipv6 autoconfig
standby 126 preempt
standby 126 track 6 decrement 60
exit
end
```

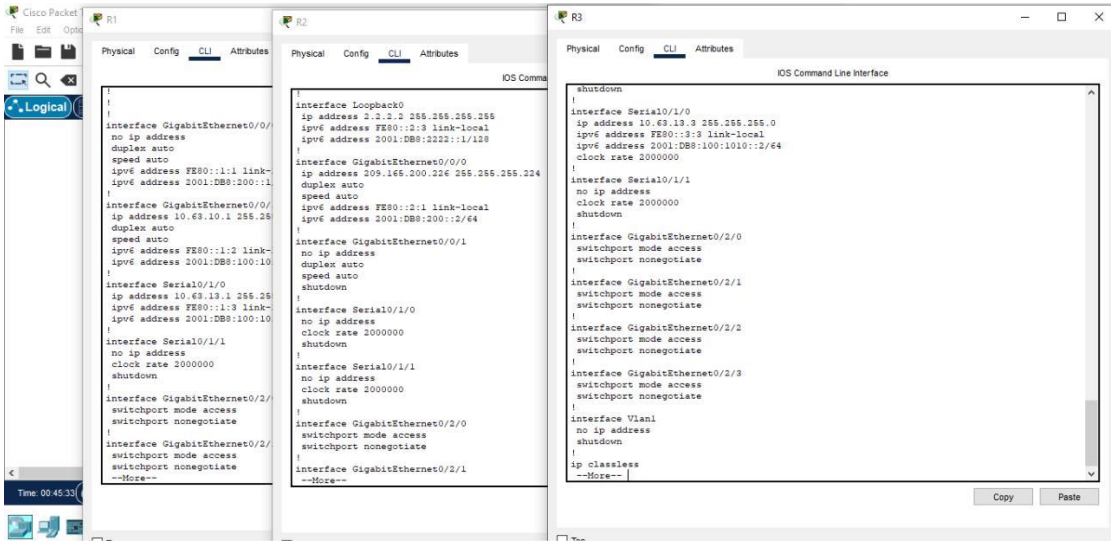

Figura 30. Verificación del standby

D1

Physical Config CLI Attributes

IOS Command Line Interface

```
D1#show run
Building configuration...

Current configuration : 2527 bytes
!
version 16.3.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname D1
!
!
!
ip dhcp excluded-address 10.63.101.1 10.63.101.109
ip dhcp excluded-address 10.63.101.141 10.63.101.254
ip dhcp excluded-address 10.63.102.1 10.63.102.109
ip dhcp excluded-address 10.63.102.141 10.63.102.254
!
```

Figura 31. Configuración del standby switch D1

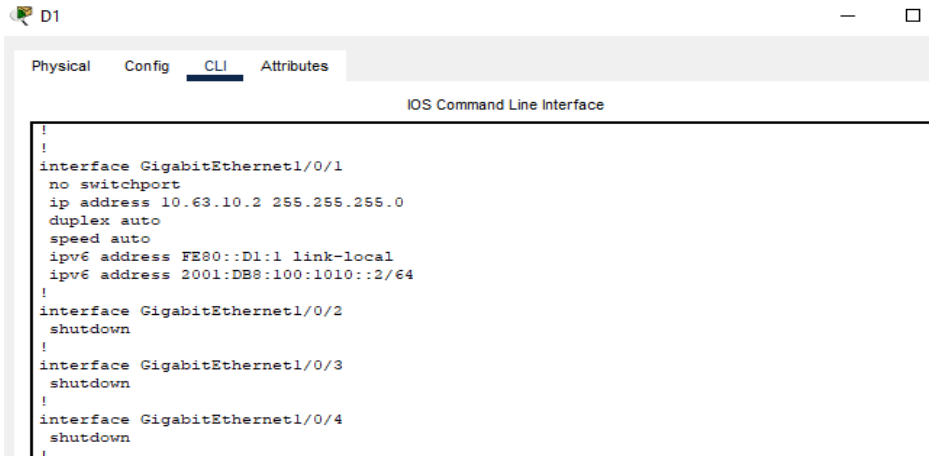

Figura 32. Verificación interfaces y vlan switch D1

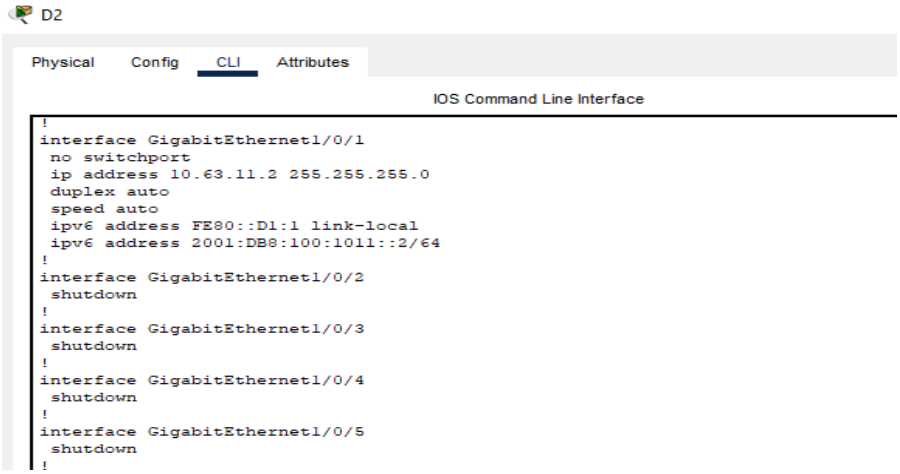

Figura 33. Configuración del standby switch D2

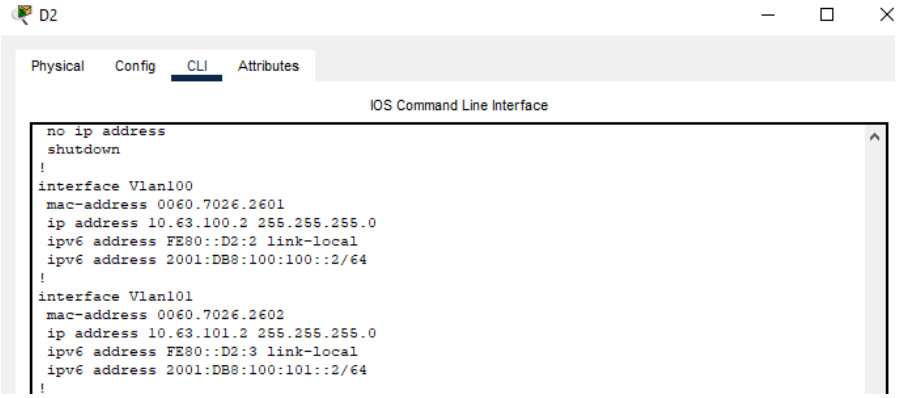

Figura 34. Verificación interfaces y vlan switch D2

CONCLUSIONES

Por medio de este documento se describe como utilizar Cisco Packet Tracer; para generar la configuración básica de un router, un switch en sus diferentes topologías.

Por medio de esta actividad se pudo concluir que; para configurar un puerto de un switch de un enlace troncal; se utiliza el comando de Switchport mode trunk, por medio de este comando la interfaz cambia a un estado de modo de enlace troncal permanente, es el único método que se utiliza para la configuración de enlaces troncales.

Se implemento la configuración del protocolo OSPF, cada direccionador o sistema del área genera una base de datos gracias al LSA, es un paquete con información el cual calcula una extensión de vía más corta, siendo esta la raíz, utilizando el algoritmo SPF.

Por último, reconozco que, a pesar de los inconvenientes presentados en esta actividad, se tuvo un acompañamiento asertivo por parte de los diferentes tutores; para así lograr los mejores resultados durante lo largo del proceso.

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