DIPLOMADO DE PROFUNDIZACIÓN CISCO – PRUEBA DE HABILIDADES PRÁCTICAS CCNP

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INGENIERIA TELECOMUNICACIONES

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Diplomado de opción de grado presentado para optar el

título de INGENIERO DE TELECOMUNCACIONES

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CONTENIDO

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GLOSARIO

BGP (Border Gateway Protocol) protocolo de puerta de enlace de frontera, permite intercambiar información de encaminamiento entre sistemas autonomos.

DHCP (Dynamic Host Configuration Protocol) es un protocolo de red que utiliza una arquitectura cliente-servidor. Se cuenta con varios clientes y servidores que se comunicaran entre ellos correctamente para que el servidor DHCP brinde la información.

IP SLA (Ruta estática condicionada) permite analizar niveles de servicios de aplicaciones y servicios IP.

IPV4 (Internet Protocol version4) 4 version del protocolo de internet asigna un numero a cada equipo conectado a la red, denominado direccion de internet o IP. Sirve para identificar a cada maquina dentro de la red y no puede haber dos equipos con la misma. Tiene una longitud de 32 bits fija para identificar cada ordenador.

IPV6 (Internet Protocol version 6) 6 version del protocolo de internet que hace posible la conexión de dispositivos en internet identificandolos con una direccion unívoca. Se manejan paquetes de manera mas eficiente, mejorar el rendimiento y aumentar la seguridad.

LACP es un protocolo abierto definido por el estandar 802.3ad, utiliza la dirección MAC 0180:c200:0002 para intercambiar sus mensajes. Al intercambiar los paquetes LACP se compara la información de su vecino con la información local, al final se valida la compatibilidad para levantar el etherchannel.

OSPF (Open Shortest Path First) es un protocolo de enrutamiento dinamico interior (IGP-Internal Gateway Protocol) usa un algoritmo de tipo estado de enlace, desarrollado para las redes IP.

RSTP es el protocolo que previene loops en una red de switches, suplanta al su antecesor el protocolo STP.

STP (Spanning Tree Protocol) definido por el estandar IEEE 802.1d protocolo de arbol de expansión, que funciona en el nivel de capa 2 del modelo OSI y su principal objetivo es controlar los enlaces redudantes, asegurando el rendimiento de una red.

VLAN (Virtual LAN) conocidas como redes de area local virtuales, es una tecnologia de redes que nos permite crear redes lógicas independientes dentro de la misma red física, haciendo uso de switches gestionables que soportan VLANs para segmentar adecuadamente la red.

RESUMEN

El diplomado de profundización de Cisco como opción de grado para la Ingeniería de Telecomunicaciones, presenta para el estudiante el fortalecimiento de competencias y habilidades que le permita ser un excelente profesional, dando aplicabilidad a los diferentes protocolos que permitan la comunicación entre los equipos de una topología de red.

Palabras claves: CISCO, CCNP, Redes, Telecomunicaciones.

ABSTRACT

The Cisco in-depth diploma as a degree option for Telecommunications Engineering, presents the student with the strengthening of skills and abilities that allow him to be an excellent professional, giving applicability to the different protocols that allow communication between the teams of a topology. Red.

Keywords: CISCO, CCNP, Networks, Telecommunications.

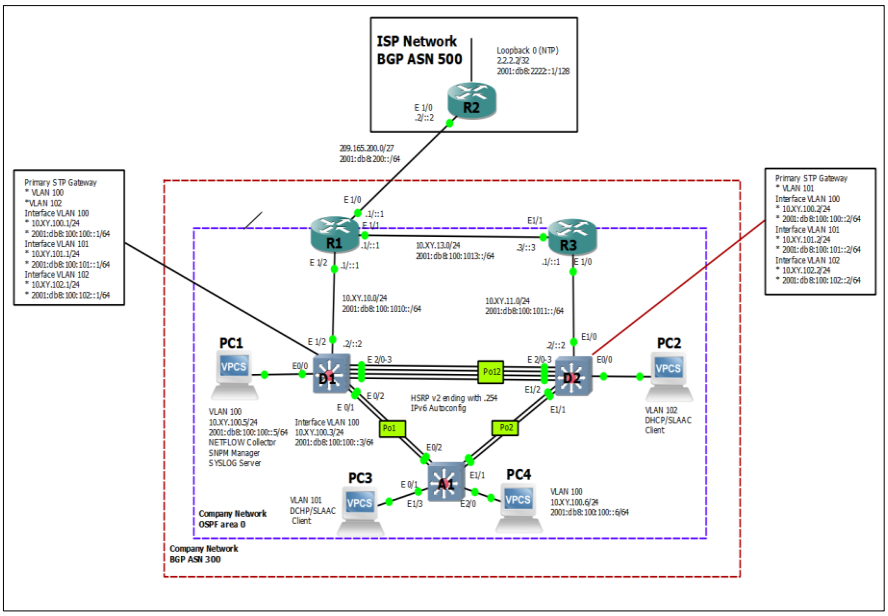
INTRODUCCION

En este diplomado para optar por el título de Ingeniería en Telecomunicaciones se pondrá en práctica las habilidades que tendrá el futuro egresado de la universidad que lo prepare para su vida laboral.

En el presente trabajo que es la primera parte del mismo se realizará la configuración de una topología de red mediante el uso de protocolos STP, enrutamiento IP, configuraciones de VLANs, usando el programa de simulación GNS3, el cual nos permitirá realizar la comunicación de un punto a otro, en su segunda parte se realizara las configuraciones de enrutamiento de IPv4 e IPv6, rutas estáticas, BGP, OSPF versión 3, relación de vecinos y HSRP versión 2, lo que permitirá que los equipos se conecten a la interfaz loopback convirtiendo la red convergente.

DESARROLLO DE LA ACTIVIDAD

Figura 1. Topología en GNS3 propuesta por la universidad



Fuente. Topología en GNS3 propuesta por la universidad

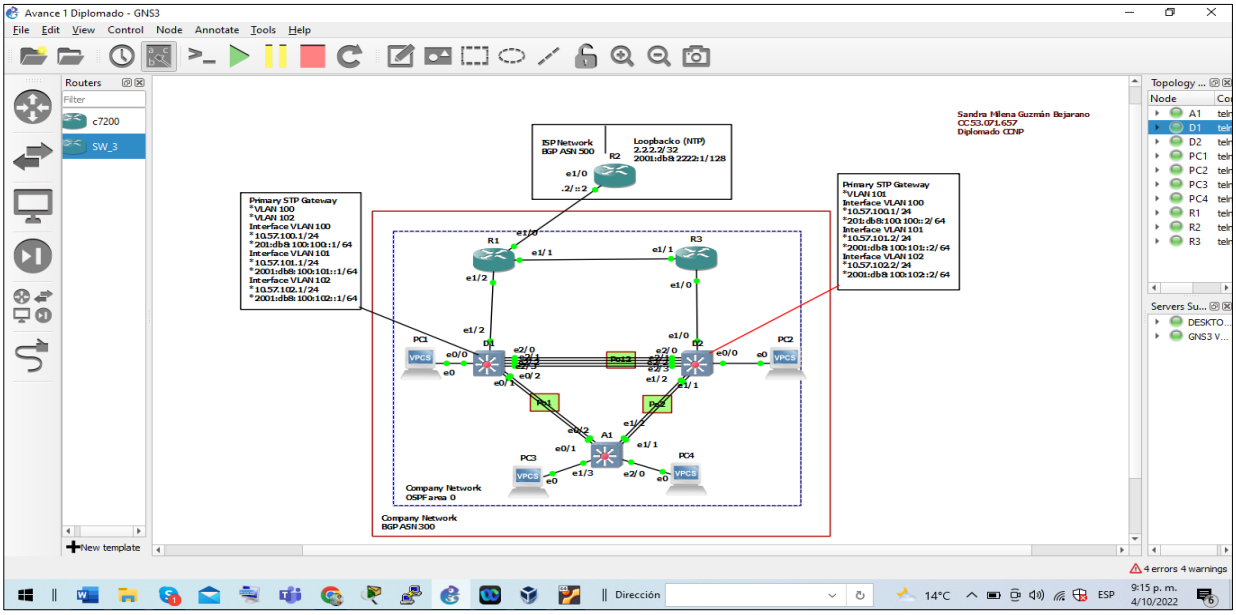
Tabla 1. Tabla de direccionamiento

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	E1/0	209.165.200.225/27	2001:db8:200::1/64	fe80::1:1
	E1/2	10.57.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	E1/1	10. 57.13.1/24	2001:db8:100:1013::1/64	fe80::1:3
R2	E1/0	209.165.200.226/27	2001:db8:200::2/64	fe80::2:1
	Loopback0	2.2.2.2/32	2001:db8:2222::1/128	fe80::2:3

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R3	E1/0	10. 57.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
	E1/1	10. 57.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	E1/2	10. 57.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
	VLAN 100	10. 57.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10. 57.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
	VLAN 102	10. 57.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	E1/0	10. 57.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10. 57.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
	VLAN 101	10. 57.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10. 57.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10. 57.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10. 57.100.5/24	2001:db8:100:100::5/64	EUI-64
PC2	NIC	DHCP	SLAAC	EUI-64
PC3	NIC	DHCP	SLAAC	EUI-64
PC4	NIC	10.57.100.6/24	2001:db8:100:100::6/64	EUI-64

Fuente. Tabla de direccionamiento dada por la universidad

Figura 2. Topología en GNS3 Fuente: documento guía escenario 1



Fuente. Fuente propia

Part 1: Build the Network and Configure Basic Device Settings and Interface Addressing

In Part 1, you will set up the network topology and configure basic settings and interface addressing.

Step 1: Cable the network as shown in the topology.

Attach the devices as shown in the topology diagram, and cable as necessary.

Step 2: Configure basic settings for each device.

a. Console into each device, enter global configuration mode, and apply the basic settings. The startup configurations for each device are provided below.

Configuración de los equipos

Router R1

```
R1#Enable
R1#Configure terminal
R1(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)#exec-timeout 0 0
R1(config-line)#logging synchronous
R1(config-line)#exit

R1(config)#interface e1/0
R1(config-if)#ip address 209.165.200.225 255.255.255.224
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 e1/2
R1(config-if)#ip address 10.57.10.1 255.255.255.0
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)# exit

R1(config)#interface e1/1
```

R1(config-if)# ip address 10.57.13.1 255.255.255.0

R1(config-if)# ipv6 address fe80::1:3 link-local

R1(config-if)# ipv6 address 2001:db8:100:1013::1/64

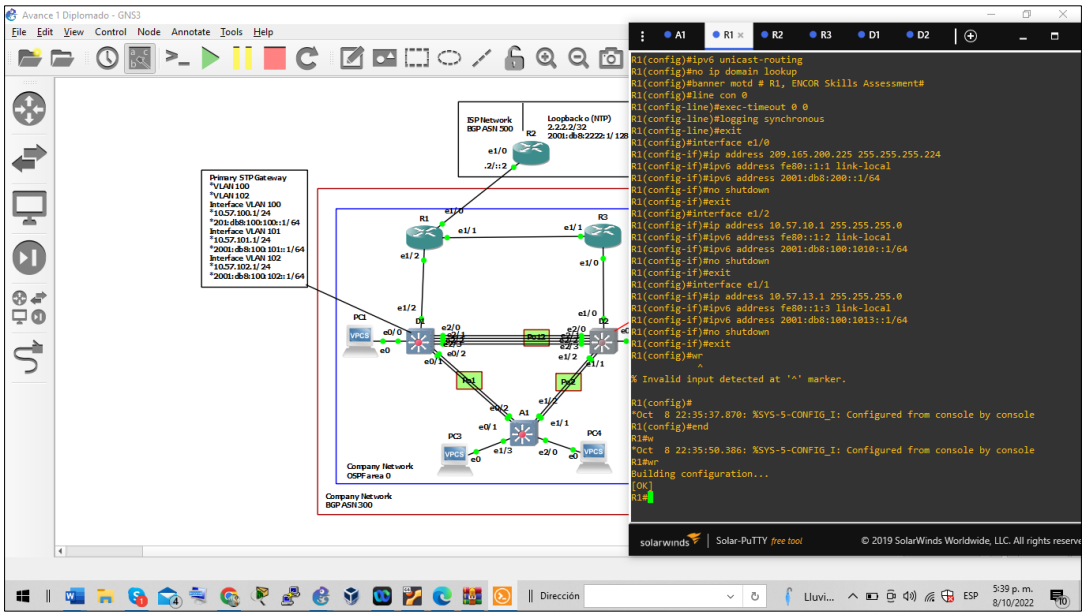
R1(config-if)# no shutdown

R1(config-if)# exit

R1(config)#end

R1#wr

Figura 3. Configuración guardada R1



Fuente. Fuente propia

Router R2

R2#enable

R2#configure terminal

R2(config)#hostname R2

R2(config)#ipv6 unicast-routing

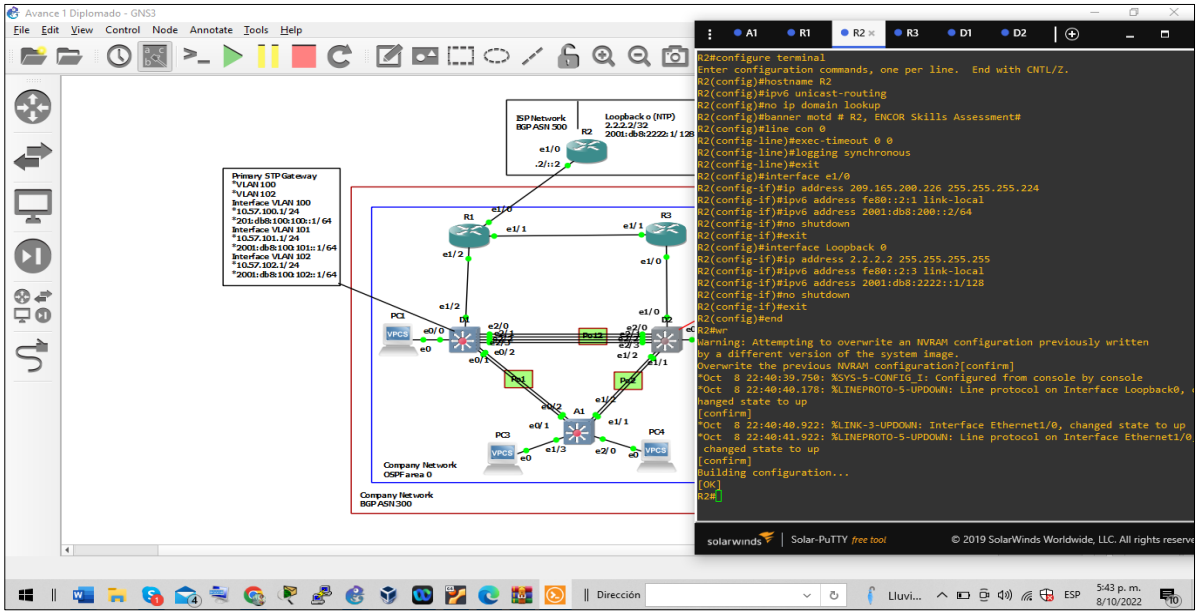
R2(config)#no ip domain lookup

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 e1/0
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)#exit
R2(config)#interface Loopback 0
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
R2(config)#end
```

R2#wr

Figura 4. Configuración guardada R2



Fuente. Fuente propia

Router R3

R3#enable

R3#configure terminal

R3(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 e1/0

R3(config-if)#ip address 10.57.11.1 255.255.255.0

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)#exit

R3(config)#interface e1/1

R3(config-if)#ip address 10.57.13.3 255.255.255.0

R3(config-if)#ipv6 address fe80::3:3 link-local

R3(config-if)#ipv6 address 2001:db8:100:1013::2/64

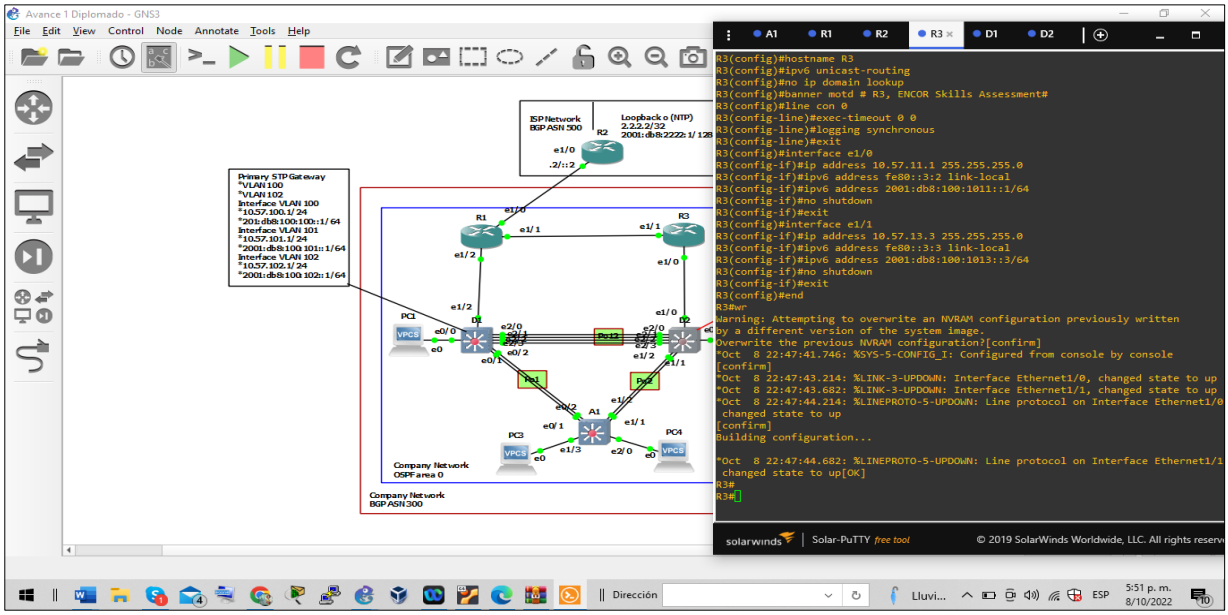
R3(config-if)#no shutdown

R3(config-if)#exit

R3(config)#end

R3#wr

Figura 5. Configuración guardada R3



Fuente. Fuente propia

Switch D1

D1#enable

```
D1#configure terminal
D1(config)#hostname D1
D1(config)#ip routing
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 UserGroupB
D1(config-vlan)#exit
D1(config)#vlan 999
D1(config-vlan)#name NATIVE
D1(config-vlan)#exit
D1(config)#interface e1/2
D1(config-if)# no switchport
D1(config-if)#ip address 10.57.10.2 255.255.255.0
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)#ip address 10.57.100.1 255.255.255.0
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)#ip address 10.57.101.1 255.255.255.0
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)#ip address 10.57.102.1 255.255.255.0
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 10.57.101.1 10.57.101.109
D1(config)#ip dhcp excluded-address 10.57.101.141 10.57.101.254
D1(config)#ip dhcp excluded-address 10.57.102.1 10.57.102.109
D1(config)#ip dhcp excluded-address 10.57.102.141 10.57.102.254
D1(config)#ip dhcp pool VLAN-101
```

D1(dchp-config)#network 10.57.101.0 255.255.255.0

D1(dchp-config)#default-router 10.57.101.254

D1(dchp-config)#exit

D1(config)#ip dhcp pool VLAN-102

D1(dchp-config)#network 10.57.102.0 255.255.255.0

D1(dchp-config)#default-router 10.57.102.254

D1(dchp-config)#exit

D1(config)#interface range e0/0-3,e1/0-1,e1/3,e2/0-3,e3/0-3

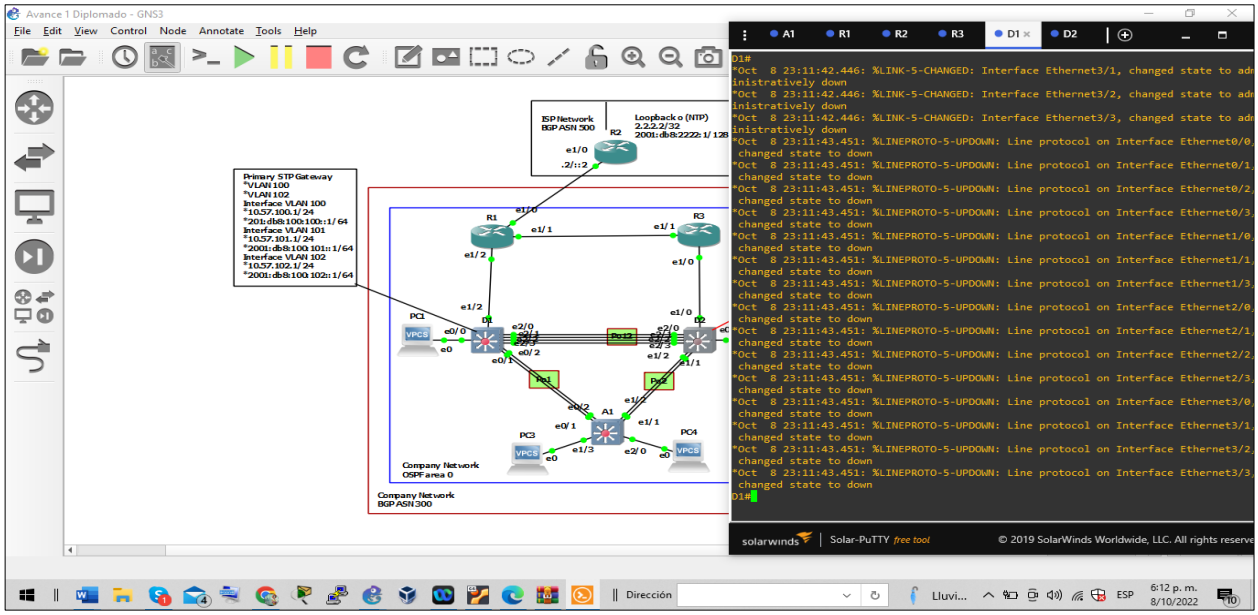
D1(config-if-range)#shutdown

D1(config-if-range)#exit

D1(config)#end

D1#wr

Figura 6. Configuración guardada D1



Fuente. Fuente propia

Switch D2

D2#enable

```
D2#configure terminal
D2(config)#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 e1/0
D2(config-if)#no switchport
D2(config-if)#ip address 10.57.11.2 255.255.255.0
D2(config-if)#ipv6 address fe80::d2:1 link-local
```

```
D2(config-if)#ipv6 address 2001:db8:100:1011::2/64
D2(config-if)#no shutdown
D2(config-if)#exit
D2(config)#interface vlan 100
D2(config-if)#ip address 10.57.100.2 255.255.255.0
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 10.57.101.2 255.255.255.0
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 10.57.102.2 255.255.255.0
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 10.57.101.1 10.57.101.209
D2(config)#ip dhcp excluded-address 10.57.101.241 10.57.101.254
D2(config)#ip dhcp excluded-address 10.57.102.1 10.57.102.209
D2(config)#ip dhcp excluded-address 10.57.102.241 10.57.102.254
D2(config)#ip dhcp pool VLAN-101
```

D2(dhcp-config)#network 10.57.101.0 255.255.255.0

D2(dhcp-config)#default-router 57.0.101.254

D2(dhcp-config)#exit

D2(config)#ip dhcp pool VLAN-102

D2(dhcp-config)#network 10.57.102.0 255.255.255.0

D2(dhcp-config)#default-router 10.57.102.254

D2(dhcp-config)#exit

D2(config)#interface range e0/0-3,e1/1-3,e2/0-3,e3/0-3

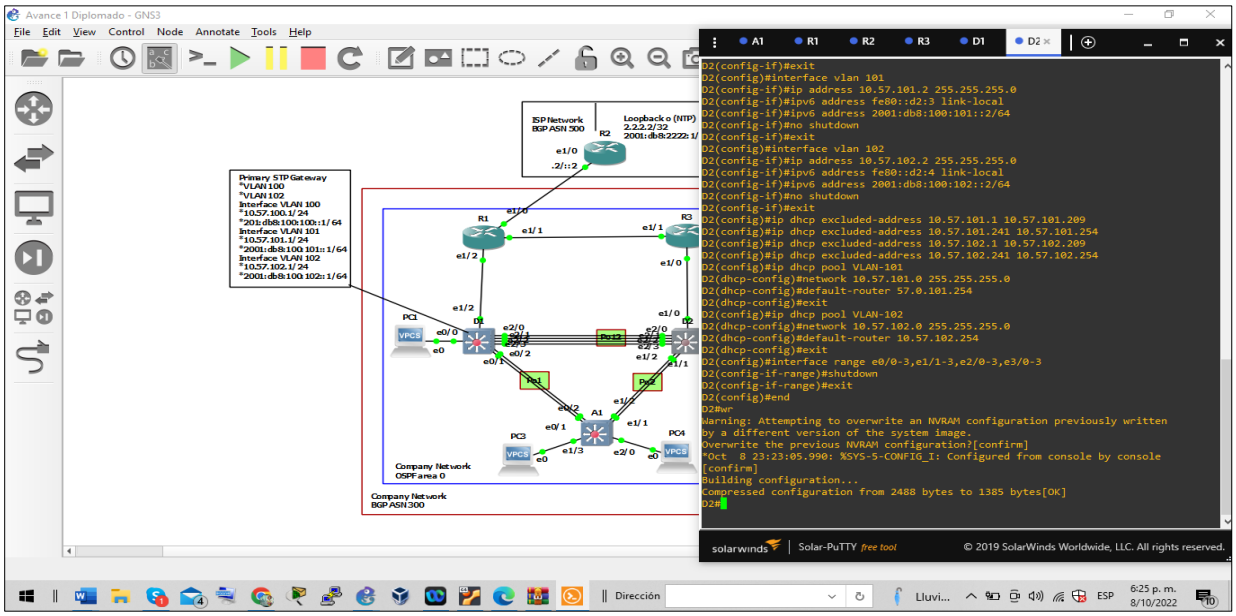
D2(config-if-range)#shutdown

D2(config)#exit

D2(config)#end

D2#wr

Figura 7. Configuración guardada D2



Fuente. Fuente propia

Switch A1

A1#enable

```
A1#configure terminal
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 10.57.100.3 255.255.254.0
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 e0/0,e0/3,e1/0,e2/1-3,e3/0-3

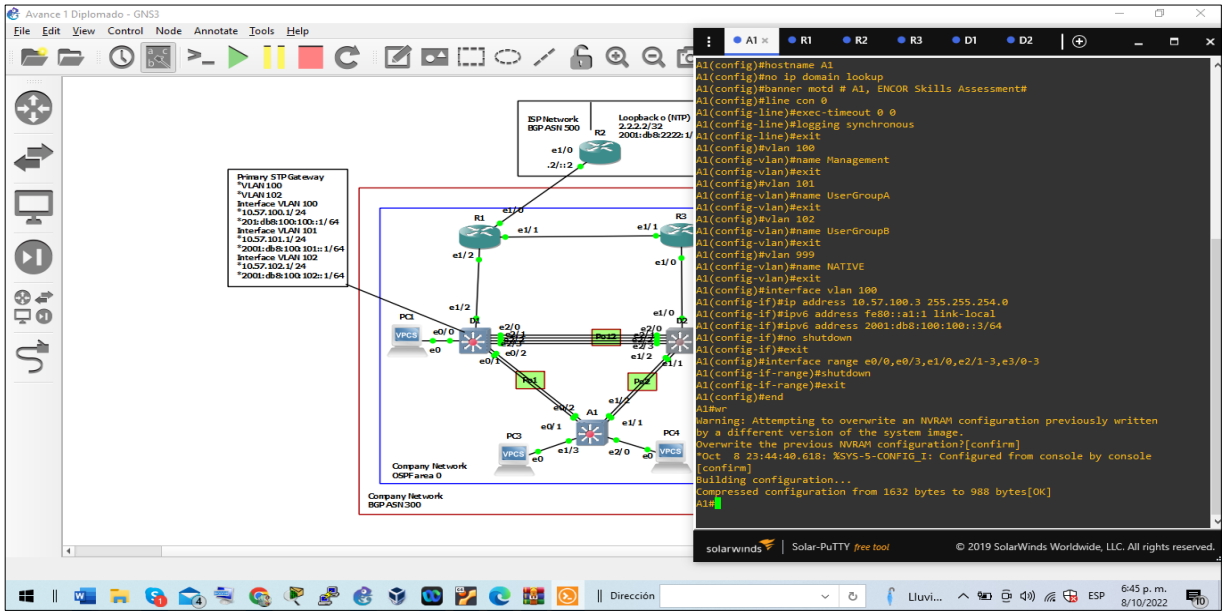
A1(config-if-range)#shutdown

A1(config-if-range)#exit

A1(config)#end

A1#wr

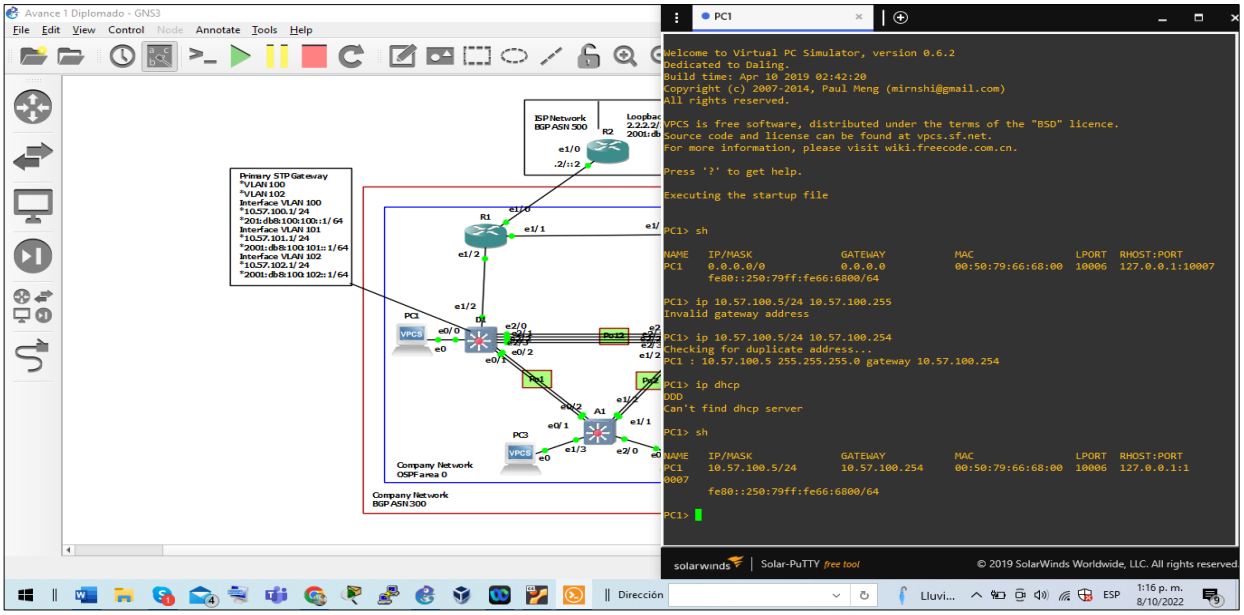
Figura 8. Configuración guardada A1



Fuente. Fuente propia

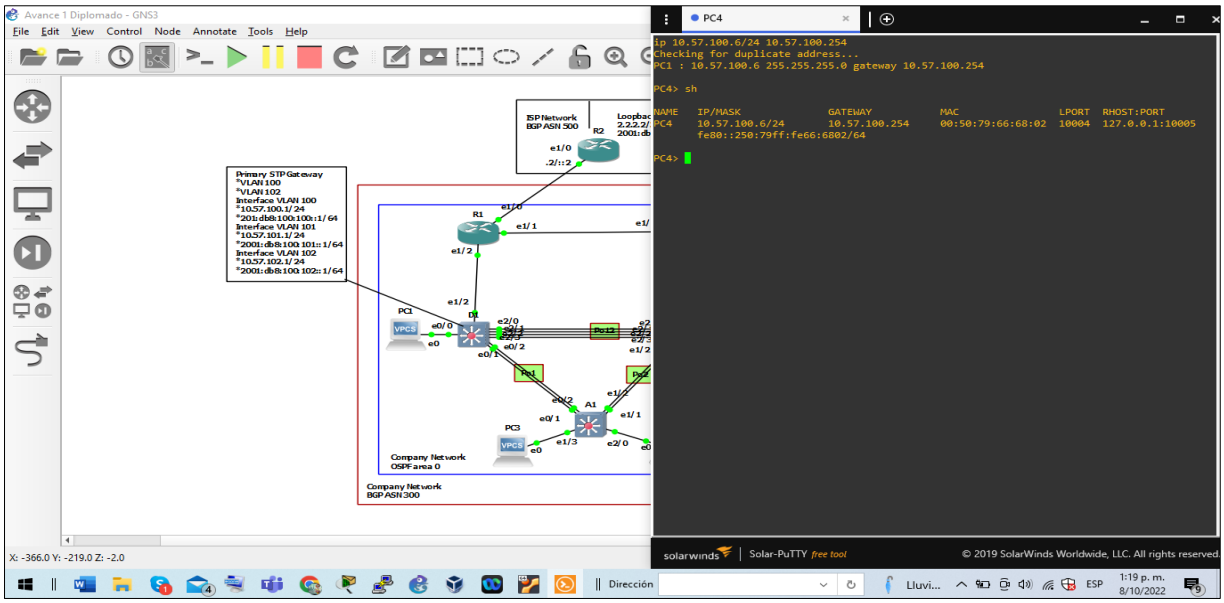
b. Configure PC 1 and PC 4 host addressing as shown in the addressing table.

Figura 9. Configuración PC 1



Fuente. Fuente propia

Figura 10. Configuración PC 4



Fuente. Fuente propia

Part 2: Configure the Layer 2 Network and Host Support

In this part of the Skills Assessment, you will complete the Layer 2 network configuration and set up basic host support. At the end of this part, all the switches should be able to communicate. PC2 and PC3 should receive addressing from DHCP and SLAAC.

Your configuration tasks are as follows:

Tabla 2. Lista de tareas parte 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

Task#	Task	Specification	Points
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
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

Task#	Task	Specification	Points
2.8	Verify local LAN connectivity.	PC1 should successfully ping: • D1: 10.57.100.1 • D2: 10. 57.100.2 • PC4: 10. 57.100.6 PC2 should successfully ping: • D1: 10. 57.102.1 • D2: 10. 57.102.2 PC3 should successfully ping: • D1: 10. 57.101.1 • D2: 10. 57.101.2 PC4 should successfully ping: • D1: 10. 57.100.1 • D2: 10. 57.100.2 • PC1: 10. 57.100.5	1

Fuente. Universidad

Configuración de equipos (se realiza la configuración de la parte 2 completa en cada equipo con el fin de ser más dinámica)

Switch D1

```
D1#enable
D1#configure terminal
D1(config)# interface range e2/0-3
D1(config-if-range)#switchport trunk encapsulation dot1
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 e0/1-2
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 range e0/0
D1(config-if-range)#switchport mode access
D1(config-if-range)#switchport access vlan 100
D1(config-if-range)#spanning-tree portfast
D1(config-if-range)#no shutdown
```

D1(config-if-range)#exit

D1(config)#end

D1#wr

Switch D2

D2#enable

D2#configure terminal

D2(config)#interface range e2/0-3

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 e1/1-2

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 range e0/0

D2(config-if-range)#switchport mode access

D2(config-if-range)#switchport access vlan 102

D2(config-if-range)#spanning-tree portfast

D2(config-if-range)#no shutdown

D2(config-if-range)#exit

D2(config)#end

D2#wr

A1

A1#enable

A1#configure terminal

A1(config)#spanning-tree mode rapid-pvst

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 e1/1-2

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 2 mode active

A1 (config-if-range)#no shutdown

A1 (config-if-range)#exit

A1(config)#Interface range e1/3

A1 (config-if-range)#switchport mode access

A1 (config-if-range)#switchport access vlan 101

A1 (config-if-range)#spanning-tree portfast

A1 (config-if-range)#no shutdown

A1 (config-if-range)#exit

A1(config)#interface range e2/0

A1 (config-if-range)#switchport mode access

A1 (config-if-range)#switchport access vlan 100

A1 (config-if-range)#spanning-tree portfast

A1 (config-if-range)#no shutdown

A1 (config-if-range)#exit

A1 (config)#end

A1 (config)#spanning-tree mode rapid-pvst

A1 (config)#spanning-tree vlan 100,102 root primary

A1 (config)#spanning-tree vlan 101 root secondary

A1 (config)#interface range e0/0

A1 (config-if-range)#switchport mode access

A1 (config-if-range)#switchport access vlan 100

A1 (config-if-range)#spanning-tree portfast

A1 (config-if-range)#no shutdown

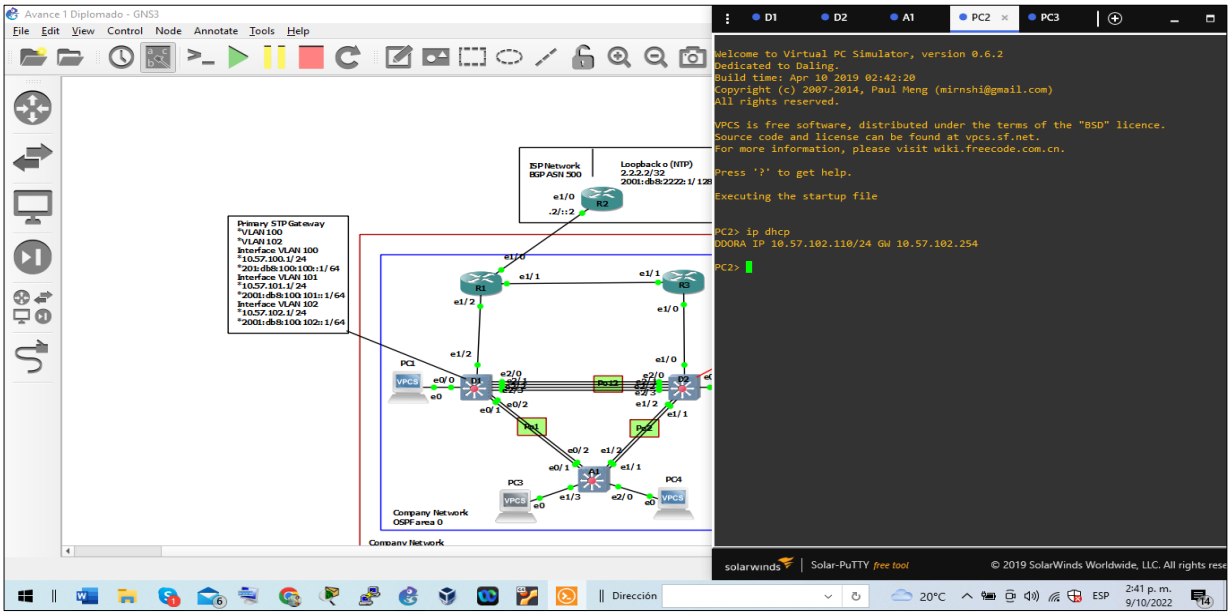
A1 (config-if-range)#exit

A1 (config)#end

A1 #wr

Verify IPv4 DHCP services.

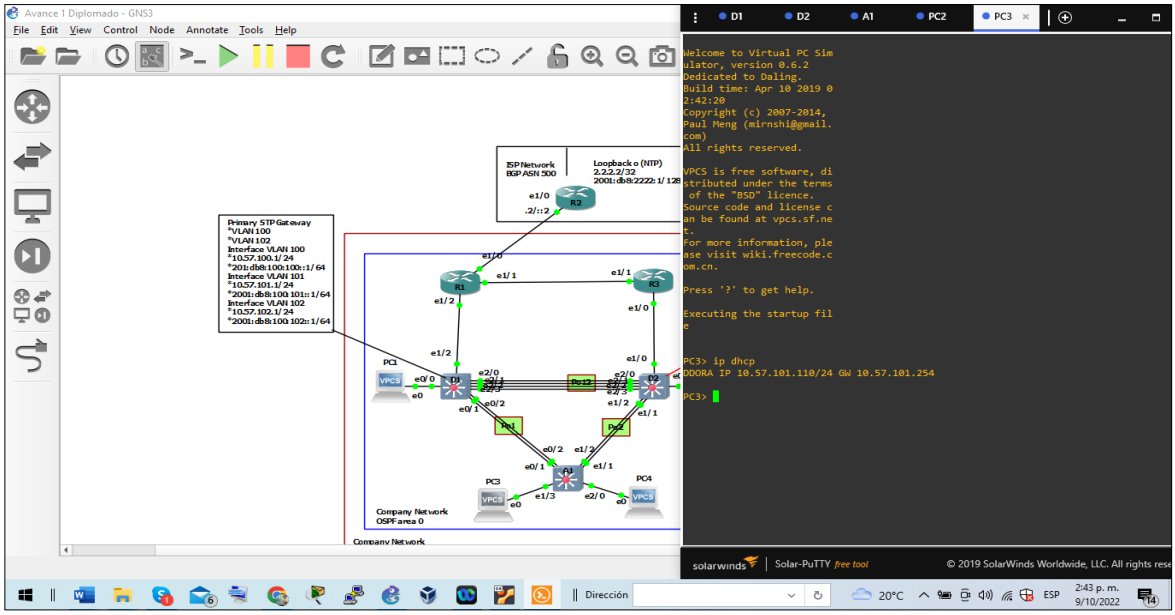
Figura 11. Direccionamiento DHCP PC 2



Fuente. Fuente propia

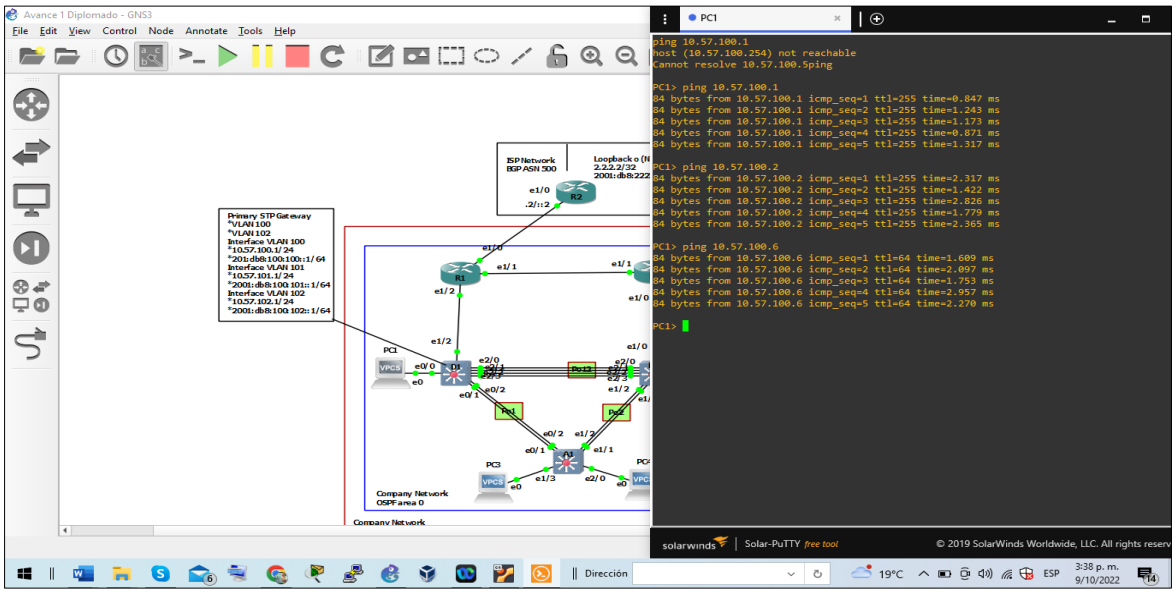
Verify local LAN connectivity.

Figura 12. Direccionamiento DHCP PC 3



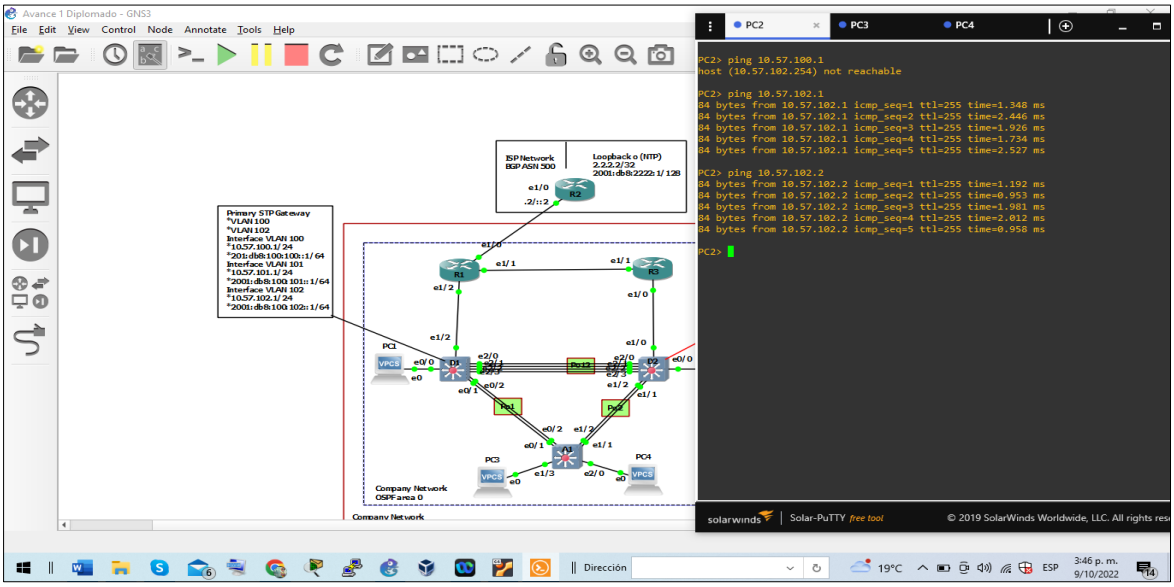
Fuente. Fuente propia

Figura 13. Conectividad PC1



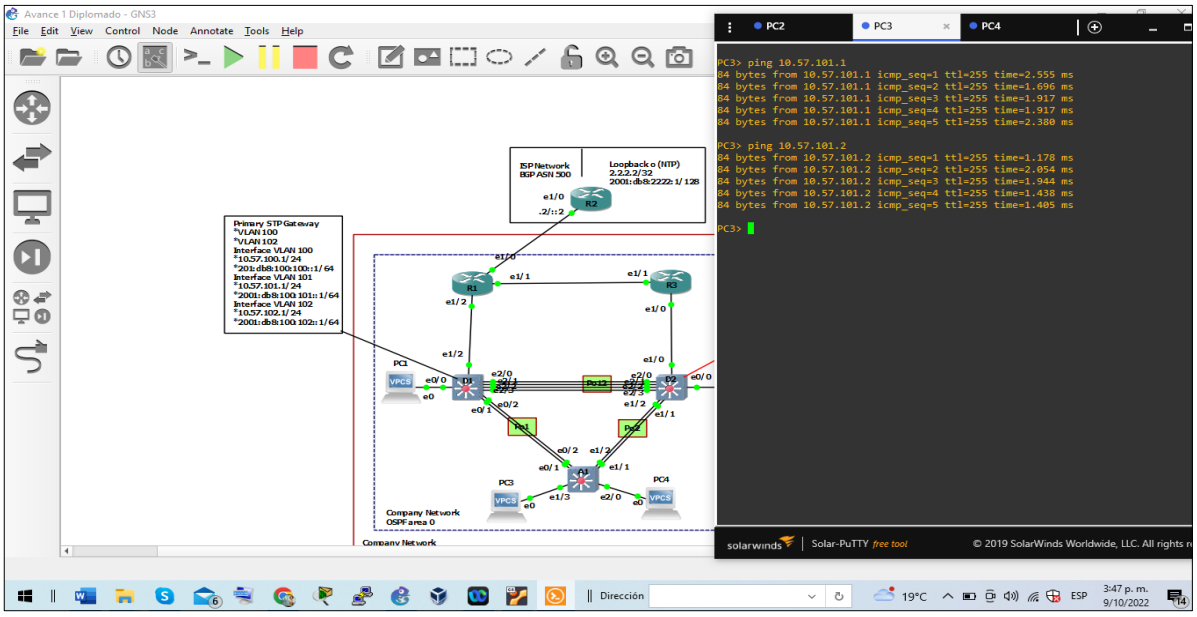
Fuente. Fuente propia

Figura 14. Conectividad PC2



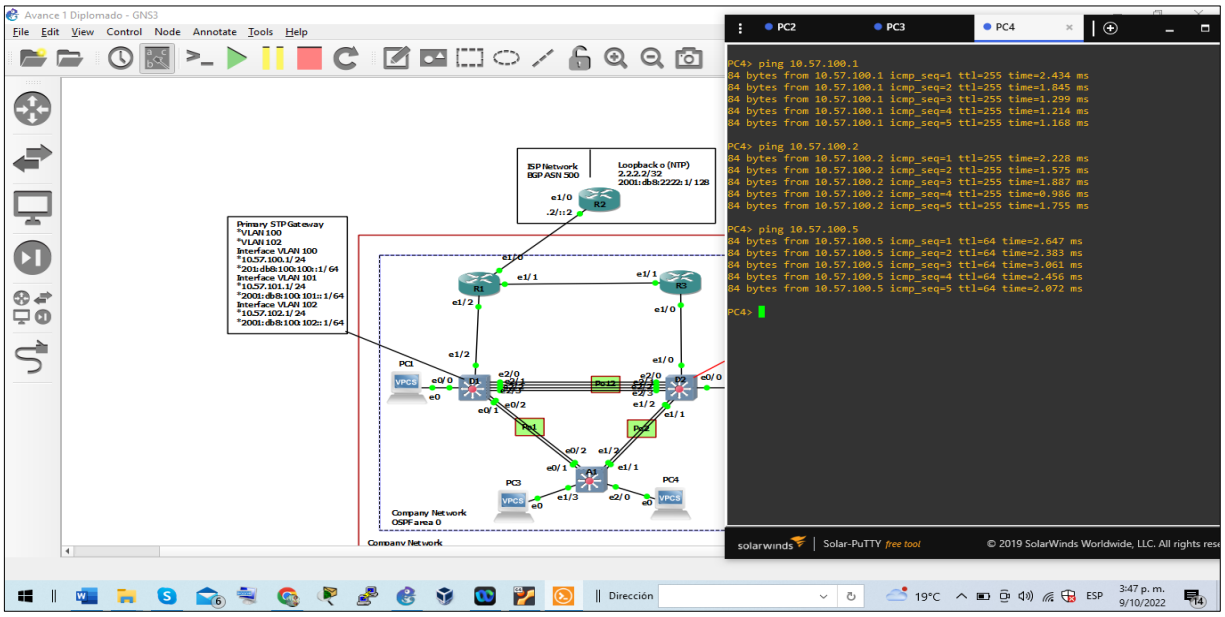
Fuente. Fuente propia

Figura 15. Conectividad PC3



Fuente. Fuente propia

Figura 16. Conectividad PC4



Fuente. Fuente propia

Part 3: Configure Routing Protocols

In this part, you will configure IPv4 and IPv6 routing protocols. At the end of this part, the network should be fully converged. IPv4 and IPv6 pings to the Loopback 0 interface from D1 and D2 should be successful.

Note: Pings from the hosts will not be successful because their default gateways are pointing to the HSRP address which will be enabled in Part 4.

Your configuration tasks are as follows:

Tabla 3. Lista de tareas parte 3

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

Fuente. Universidad

Configuración de equipos

Router 1

R1#enable

R1#configure terminal

```
R1(config)#router ospf 4
R1(config-router)#router-id 0.0.4.1
R1(config-router)#network 10.57.10.0 0.0.0.255 area 0
R1(config-router)#network 10.57.13.0 0.0.0.255 area 0
R1(config-router)#default-information originate
R1(config-router)#exit
R1(config)#router ospf 6
R1(config-router)#router-id 0.0.6.1
R1(config-router)#default-information originate
R1(config-router)#exit
R1(config)#interface Ethernet1/2
R1(config-if)#ipv6 ospf 6 area 0
R1(config-if)#exit
R1(config)#interface Ethernet1/1
R1(config-if)#ipv6 ospf 6 area 0
R1(config-if)#exit
R1(config)#ip route 10.57.0.0 255.255.0.0 null0
R1(config)#ipv6 route 2001:db8:100::/48 null0
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 10.57.0.0 mask 255.255.0.0

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

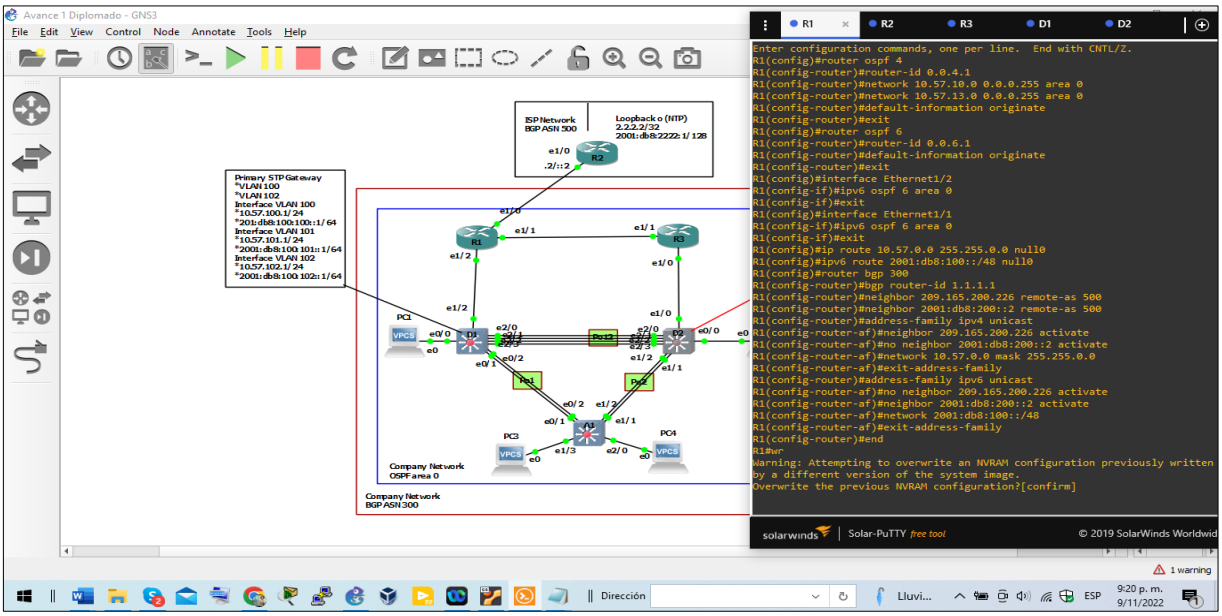
R1(config-router-af)#network 2001:db8:100::/48

R1(config-router-af)#exit-address-family

R1(config-router)#end

R1#wr

Figura 17. Configuración guardada en R1



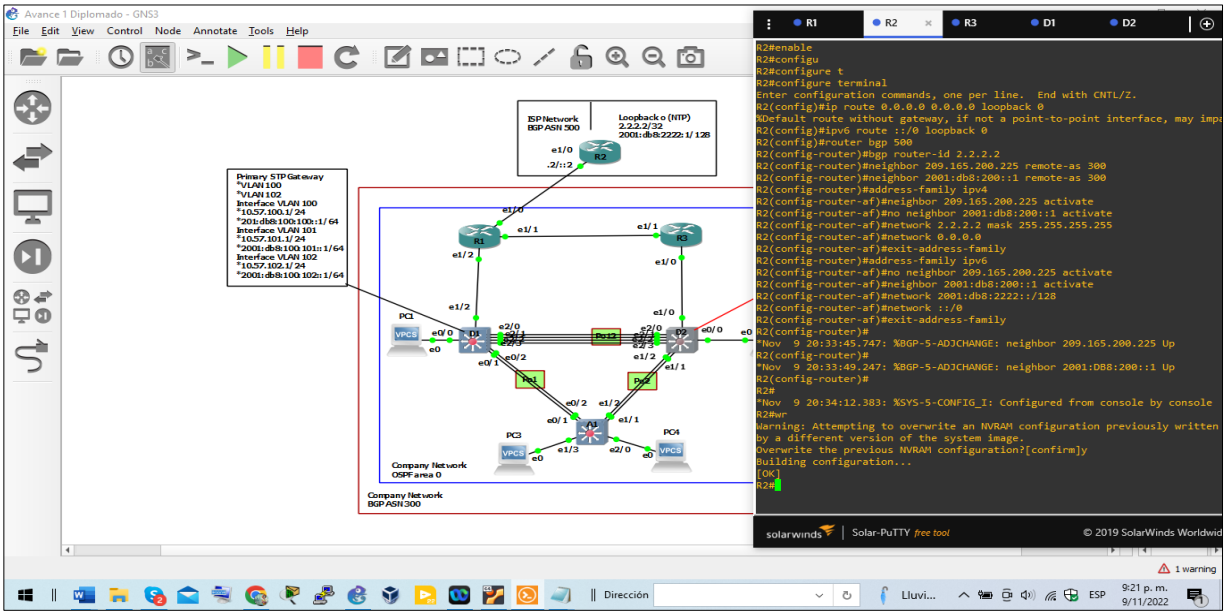
Fuente. Fuente propia

Router R2

```
R2#enable
R2#configure terminal
R2(config)#ip route 0.0.0.0 0.0.0.0 loopback 0
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
R2(config-router)#
```

R2#wr

Figura 18. Configuración guardada en R2



Fuente. Fuente propia

Router R3

R3#enable

R3#configure terminal

R3(config)#router ospf 4

R3(config-router)#router-id 0.0.4.3

R3(config-router)#network 10.57.11.0 0.0.0.255 area 0

R3(config-router)#network 10.57.13.0 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 Ethernet1/1

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

R3(config-if)#exit

R3(config)#interface Ethernet1/0

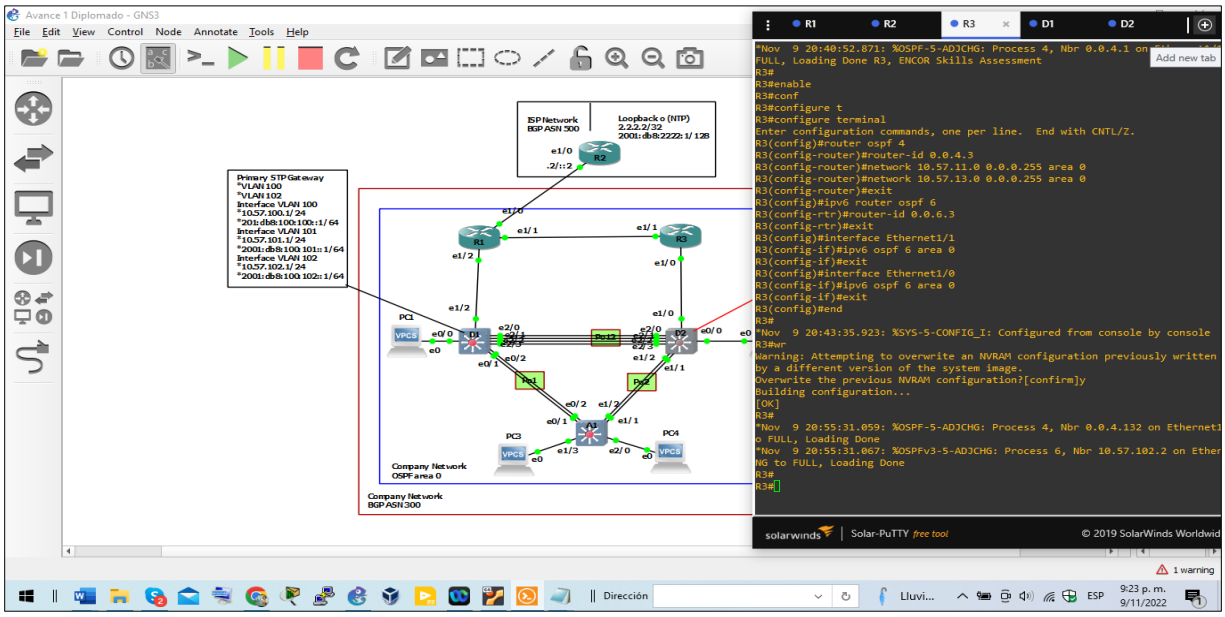
R3(config-if)#ipv6 ospf 6 area 0

R3(config-if)#exit

R3(config)#end

R3#wr

Figura 19. Configuración guardada en R3



Fuente. Fuente propia

Switch D1

D1#enable

D1#configure terminal

```
D1(config)#router ospf 4
D1(config-router)#router-id 0.0.4.131
D1(config-router)#network 10.57.100.0 0.0.0.255 area 0
D1(config-router)#network 10.57.101.0 0.0.0.255 area 0
D1(config-router)#network 10.57.102.0 0.0.0.255 area 0
D1(config-router)#network 10.57.10.0 0.0.0.255 area 0
D1(config-router)#passive-interface default
D1(config-router)#no passive-interface Ethernet1/2
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 Ethernet1/2
D1(config-rtr)#exit
D1(config)#interface Ethernet1/2
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#exit
D1(config)#interface Vlan100
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#exit
D1(config)#interface Vlan101
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#exit
```

D1(config)#interface Vlan102

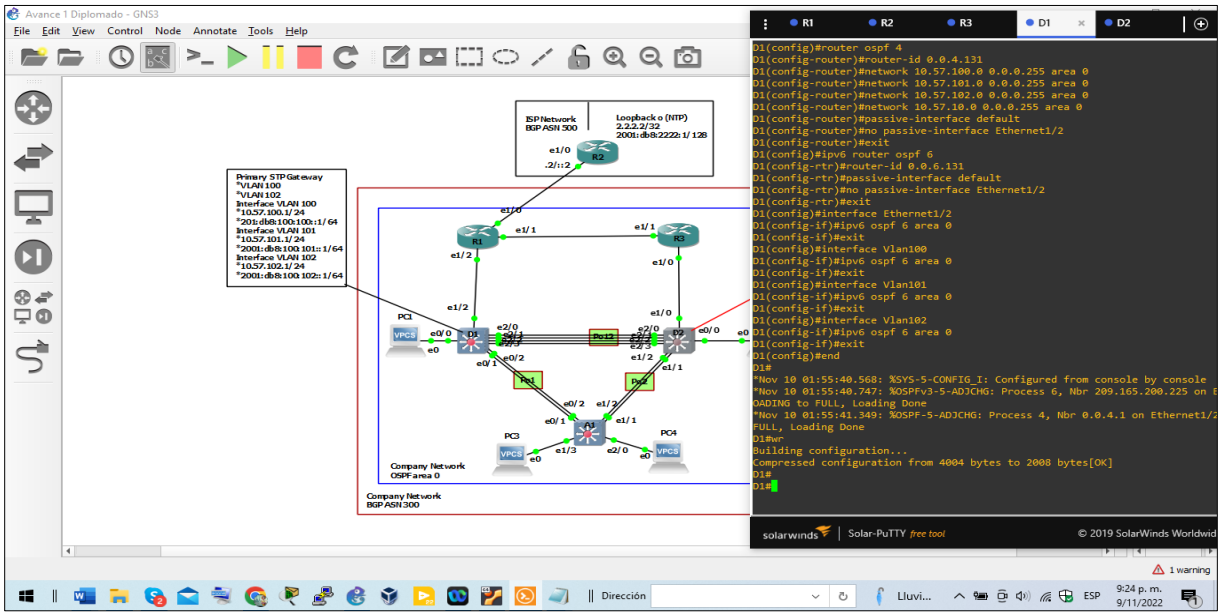
D1(config-if)#ipv6 ospf 6 area 0

D1(config-if)#exit

D1(config)#end

D1#wr

Figura 20. Configuración guardada en D1



Fuente. Fuente propia

Switch D2

D2#enable

D2#configure terminal

D2(config)#router ospf 4

D2(config-router)#router-id 0.0.4.132

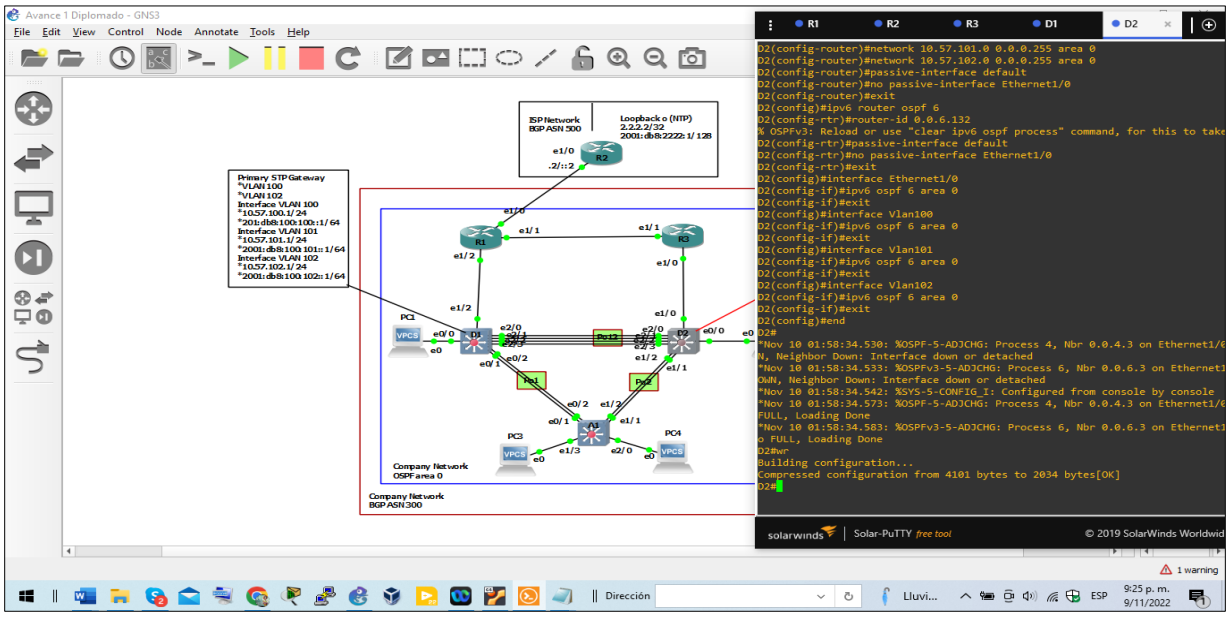
D2(config-router)#network 10.57.11.0 0.0.0.255 area 0

D2(config-router)#network 10.57.100.0 0.0.0.255 area 0

D2(config-router)#network 10.57.101.0 0.0.0.255 area 0

```
D2(config-router)#network 10.57.102.0 0.0.0.255 area 0
D2(config-router)#passive-interface default
D2(config-router)#no passive-interface Ethernet1/0
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 Ethernet1/0
D2(config-rtr)#exit
D2(config)#interface Ethernet1/0
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit
D2(config)#interface Vlan100
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit
D2(config)#interface Vlan101
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit
D2(config)#interface Vlan102
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit
D2(config)#end
D2#wr
```

Figura 21. Configuración guardada en D2



Fuente. Fuente propia

Part 4: Configure First Hop Redundancy

In this part, you will configure HSRP version 2 to provide first-hop redundancy for hosts in the “Company Network”.

Your configuration tasks are as follows:

Tabla 4. Lista de tareas parte 4

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.	2

Task#	Task	Specification	Points
		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.	
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	2

Task#	Task	Specification	Points
		up after 10 seconds, or from up to down after 15 seconds.	
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.	8

Task#	Task	Specification	Points
		• 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: • 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.	

Task#	Task	Specification	Points
		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.	

Task#	Task	Specification	Points
		• 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**. • 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.	

Fuente. Universidad

Configuración de equipos

Switch D1

D1#enable

D1#configure terminal

D1(config)#ip sla 4

D1(config-ip-sla)#icmp-echo 10.57.10.1

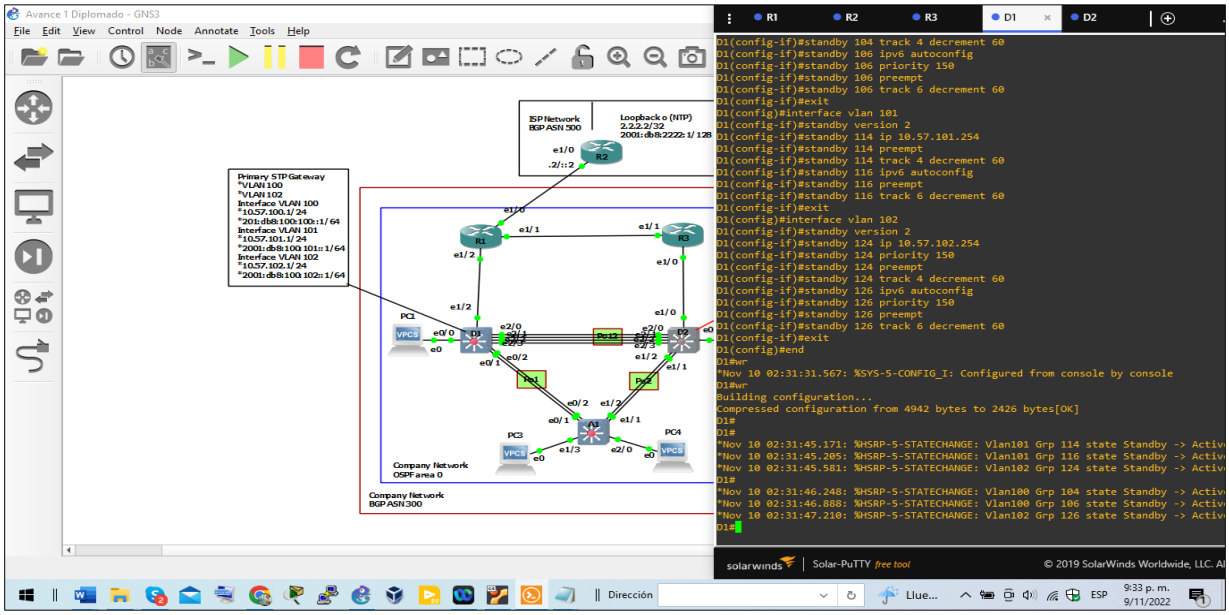
D1(config-ip-sla-echo)#frequency 5

D1(config-ip-sla-echo)#exit

```
D1(config)#ip sla 6
D1(config-ip-sla)#icmp-echo 2001:db8:100:1010::1
D1(config-ip-sla-echo)#frequency 5
D1(config-ip-sla-echo)#exit
D1(config)#ip sla schedule 4 life forever start-time now
D1(config)#ip sla schedule 6 life forever start-time now
D1(config)#track 4 ip sla 4
D1(config-track)#delay down 10 up 15
D1(config-track)#exit
D1(config)#track 6 ip sla 6
D1(config-track)#delay down 10 up 15
D1(config-track)#exit
D1(config)#interface vlan 100
D1(config-if)#standby version 2
D1(config-if)#standby 104 ip 10.57.100.254
D1(config-if)#standby 104 priority 150
D1(config-if)#standby 104 preempt
D1(config-if)#standby 104 track 4 decrement 60
D1(config-if)#standby 106 ipv6 autoconfig
D1(config-if)#standby 106 priority 150
D1(config-if)#standby 106 preempt
D1(config-if)#standby 106 track 6 decrement 60
D1(config-if)#exit
```

```
D1(config)#interface vlan 101
D1(config-if)#standby version 2
D1(config-if)#standby 114 ip 10.57.101.254
D1(config-if)#standby 114 preempt
D1(config-if)#standby 114 track 4 decrement 60
D1(config-if)#standby 116 ipv6 autoconfig
D1(config-if)#standby 116 preempt
D1(config-if)#standby 116 track 6 decrement 60
D1(config-if)#exit
D1(config)#interface vlan 102
D1(config-if)#standby version 2
D1(config-if)#standby 124 ip 10.57.102.254
D1(config-if)#standby 124 priority 150
D1(config-if)#standby 124 preempt
D1(config-if)#standby 124 track 4 decrement 60
D1(config-if)#standby 126 ipv6 autoconfig
D1(config-if)#standby 126 priority 150
D1(config-if)#standby 126 preempt
D1(config-if)#standby 126 track 6 decrement 60
D1(config-if)#exit
D1(config)#end
D1#wr
```

Figura 22. Configuración guardada en D1



Fuente. Fuente propia

Switch D2

D2#enable

D2#configure terminal

D2(config)#ip sla 4

D2(config-ip-sla)#icmp-echo 10.57.11.1

D2(config-ip-sla-echo)#frequency 5

D2(config-ip-sla-echo)#exit

D2(config)#ip sla 6

D2(config-ip-sla)#icmp-echo 2001:db8:100:1011::1

D2(config-ip-sla-echo)#frequency 5

D2(config-ip-sla-echo)#exit

D2(config)#ip sla schedule 4 life forever start-time now

```
D2(config)#ip sla schedule 6 life forever start-time now
D2(config)#track 4 ip sla 4
D2(config-track)#delay down 10 up 15
D2(config-track)#exit
D2(config)#track 6 ip sla 6
D2(config-track)#delay down 10 up 15
D2(config-track)#exit
D2(config)#interface vlan 100
D2(config-if)#standby version 2
D2(config-if)#standby 104 ip 10.57.100.254
D2(config-if)#standby 104 preempt
D2(config-if)#standby 104 track 4 decrement 60
D2(config-if)#standby 106 ipv6 autoconfig
D2(config-if)#standby 106 preempt
D2(config-if)#standby 106 track 6 decrement 60
D2(config-if)#exit
D2(config)#interface vlan 101
D2(config-if)#standby version 2
D2(config-if)#standby 114 ip 10.57.101.254
D2(config-if)#standby 114 priority 150
D2(config-if)#standby 114 preempt
D2(config-if)#standby 114 track 4 decrement 60
D2(config-if)#standby 116 ipv6 autoconfig
```

D2(config-if)#standby 116 priority 150

D2(config-if)#standby 116 preempt

D2(config-if)#standby 116 track 6 decrement 60

D2(config-if)#exit

D2(config)#interface vlan 102

D2(config-if)#standby version 2

D2(config-if)#standby 124 ip 10.57.102.254

D2(config-if)#standby 124 preempt

D2(config-if)#standby 124 track 4 decrement 60

D2(config-if)#standby 126 ipv6 autoconfig

D2(config-if)#standby 126 preempt

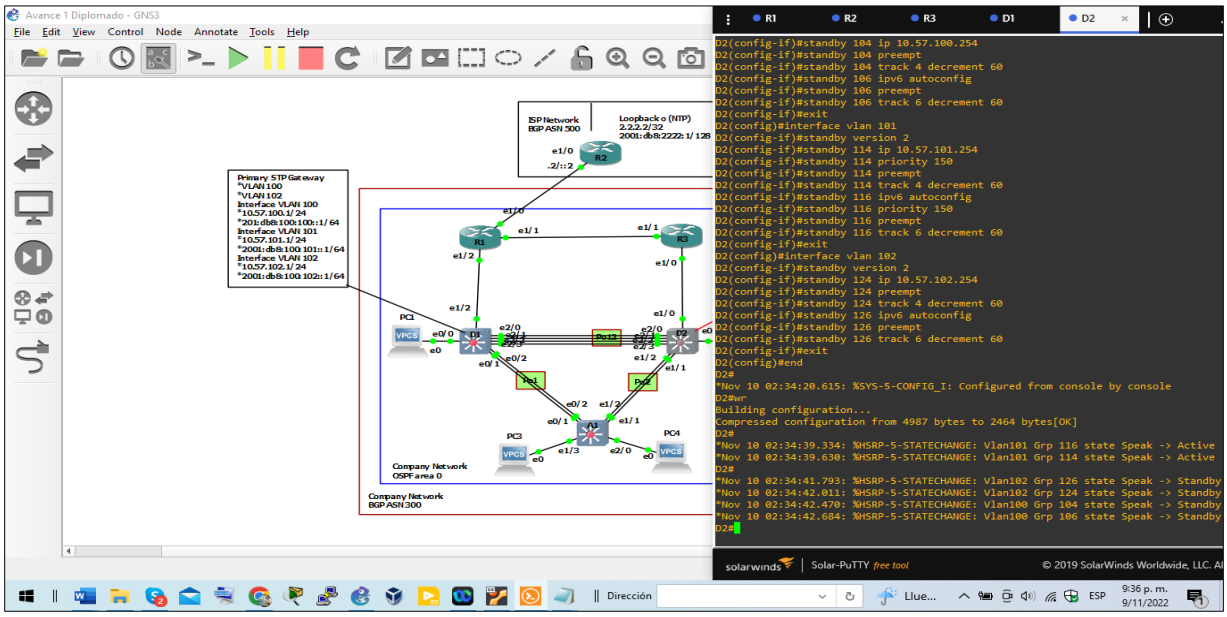
D2(config-if)#standby 126 track 6 decrement 60

D2(config-if)#exit

D2(config)#end

D2#wr

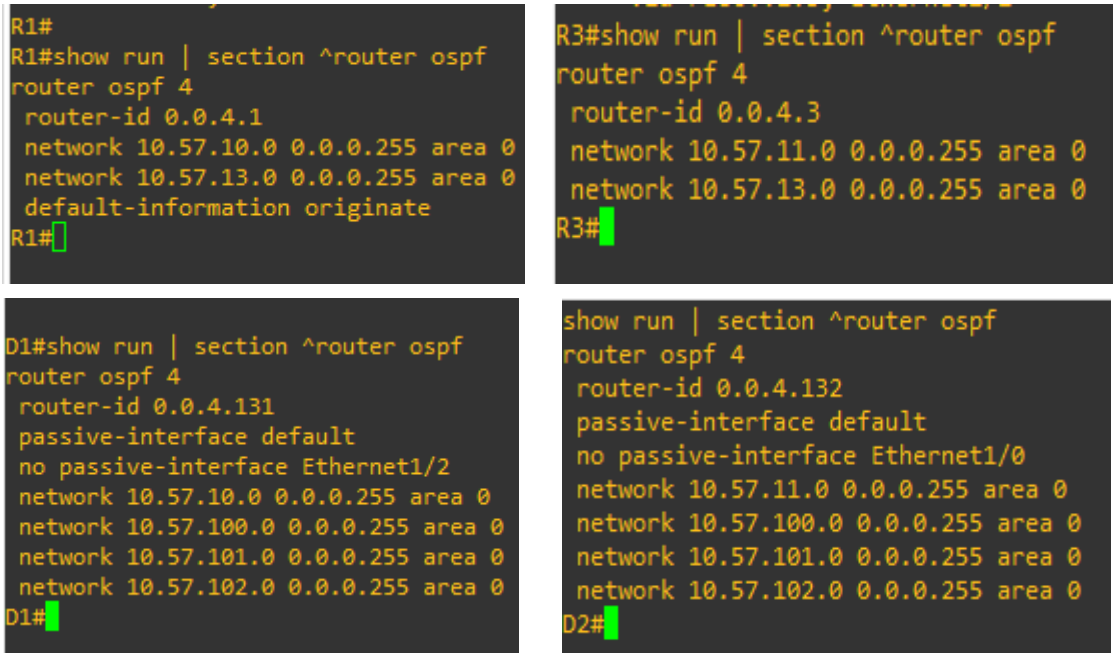
Figura 23. Configuración guardada en D2



Fuente. Fuente propia

VERIFICACIONES PARTE 3 Y 4

Figura 24. Verificación OSPF R1, R3, D1 y D2

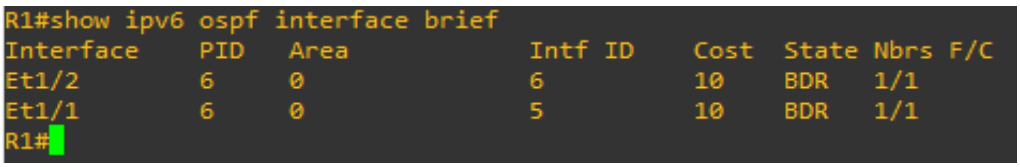


Fuente. Fuente propia

Figura 25. Verificación IPV6 R1, R3, D1 y D2

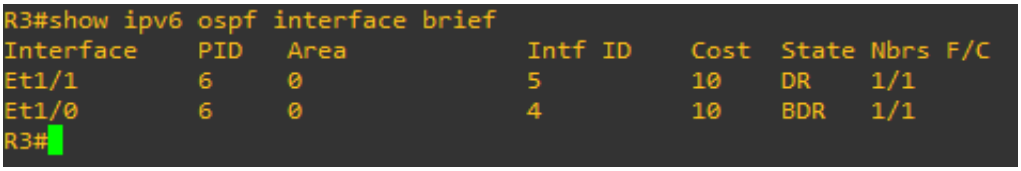
Fuente. Fuente propia

Figura 26. Verificación BGP R1



Fuente. Fuente propia

Figura 27. Verificación BGP R3



Fuente. Fuente propia

Figura 28. Verificación BGP D1

```
D1#show ipv6 ospf interface brief
Interface    PID   Area            Intf ID    Cost  State Nbrs F/C
Vl102        6     0               25         1     DR    0/0
Vl101        6     0               24         1     DR    0/0
Vl100        6     0               23         1     DR    0/0
Et1/2        6     0               21         10    DR    1/1
D1#
```

Fuente. Fuente propia

Figura 29. Verificación BGP D2

```
D2#show ipv6 ospf interface brief
Interface    PID   Area            Intf ID    Cost  State Nbrs F/C
Vl102        6     0               25         1     DR    0/0
Vl101        6     0               24         1     DR    0/0
Vl100        6     0               23         1     DR    0/0
Et1/0        6     0               21         10    DR    1/1
D2#
```

Fuente. Fuente propia

Figura 30. Verificación BGP R2

```
R2#show run | section bgp
router bgp 500
 bgp router-id 2.2.2.2
 bgp log-neighbor-changes
 neighbor 2001:DB8:200::1 remote-as 300
 neighbor 209.165.200.225 remote-as 300
 !
 address-family ipv4
  network 0.0.0.0
  network 2.2.2.2 mask 255.255.255.255
  no neighbor 2001:DB8:200::1 activate
  neighbor 209.165.200.225 activate
 exit-address-family
 !
 address-family ipv6
  network ::/0
  network 2001:DB8:2222::1/128
  neighbor 2001:DB8:200::1 activate
 exit-address-family
```

Fuente. Fuente propia

Figura 31. Verificación interfaz Loopback R2

```
R2#show run | include route
router bgp 500
 bgp router-id 2.2.2.2
ip route 0.0.0.0 0.0.0.0 Loopback0
ipv6 route ::/0 Loopback0
R2#
```

Fuente. Fuente propia

Figura 32. Verificación BGP R1

```
R1#show run | section bgp
router bgp 300
 bgp router-id 1.1.1.1
 bgp log-neighbor-changes
 neighbor 2001:DB8:200::2 remote-as 500
 neighbor 209.165.200.226 remote-as 500
 !
 address-family ipv4
  no neighbor 2001:DB8:200::2 activate
  neighbor 209.165.200.226 activate
 exit-address-family
 !
 address-family ipv6
  network 2001:DB8:100::/48
  neighbor 2001:DB8:200::2 activate
 exit-address-family
R1#
```

Fuente. Fuente propia

Figura 33. Verificación interfaces R1

```
R1#show ip route | include O|B
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
B*    0.0.0.0/0 [20/0] via 209.165.200.226, 00:17:59
B        2.2.2.2 [20/0] via 209.165.200.226, 00:17:59
O        10.57.11.0/24 [110/20] via 10.57.13.3, 00:18:12, Ethernet1/1
O        10.57.100.0/24 [110/11] via 10.57.10.2, 00:18:56, Ethernet1/2
O        10.57.102.0/24 [110/21] via 10.57.13.3, 00:18:12, Ethernet1/1
R1#
```

Fuente. Fuente propia

Figura 34. Verificación tabla IPv6 R3

```
R3#show ipv6 route ospf
IPv6 Routing Table - default - 9 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, HA - Home Agent, MR - Mobile Router, R - RIP
       H - NHRP, I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea
       IS - ISIS summary, D - EIGRP, EX - EIGRP external, NM - NEMO
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, l - LISP
OE2 ::/0 [110/1], tag 6
     via FE80::1:3, Ethernet1/1
O   2001:DB8:100:100::/64 [110/21]
     via FE80::1:3, Ethernet1/1
O   2001:DB8:100:102::/64 [110/11]
     via FE80::D2:1, Ethernet1/0
O   2001:DB8:100:1010::/64 [110/20]
     via FE80::1:3, Ethernet1/1
R3#
```

Fuente. Fuente propia

Figura 35. Verificación configuración IP SLA D1

```
D1#show run | section ip sla
track 4 ip sla 4
 delay down 10 up 15
track 6 ip sla 6
 delay down 10 up 15
ip sla 4
 icmp-echo 10.57.10.1
 frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
 icmp-echo 2001:DB8:100:1010::1
 frequency 5
ip sla schedule 6 life forever start-time now
D1#
```

Fuente. Fuente propia

Figura 36. Verificación configuración IP SLA D2

```
D2#show run | section ip sla
track 4 ip sla 4
 delay down 10 up 15
track 6 ip sla 6
 delay down 10 up 15
ip sla 4
 icmp-echo 10.57.11.1
 frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
 icmp-echo 2001:DB8:100:1011::1
 frequency 5
ip sla schedule 6 life forever start-time now
D2#
```

Fuente. Fuente propia

Figura 37. Verificación configuración HSRP D1

```
D1#show standby brief
                     P indicates configured to preempt.
                     |
Interface   Grp  Pri P State   Active          Standby         Virtual IP
Vl100       104  150 P Active  local           unknown         10.57.100.254
Vl100       106  150 P Active  local           unknown         FE80::5:73FF:FEA0:6A
Vl101       114  100 P Init    unknown         unknown         10.57.101.254
Vl101       116  100 P Init    unknown         unknown         FE80::5:73FF:FEA0:74
Vl102       124  150 P Init    unknown         unknown         10.57.102.254
Vl102       126  150 P Init    unknown         unknown         FE80::5:73FF:FEA0:7E
D1#
```

Fuente. Fuente propia

Figura 38. Verificación configuración HSRP D2

```
D2#show standby brief
                     P indicates configured to preempt.
                     |
Interface   Grp  Pri P State   Active          Standby         Virtual IP
Vl100       104  100 P Init    unknown         unknown         10.57.100.254
Vl100       106  100 P Init    unknown         unknown         FE80::5:73FF:FEA0:6A
Vl101       114  150 P Init    unknown         unknown         10.57.101.254
Vl101       116  150 P Init    unknown         unknown         FE80::5:73FF:FEA0:74
Vl102       124  100 P Active  local           unknown         10.57.102.254
Vl102       126  100 P Active  local           unknown         FE80::5:73FF:FEA0:7E
D2#
```

Fuente. Fuente propia

CONCLUSIONES

Para la configuración de la topología propuesta por la universidad se tiene presente muchos conceptos de protocolos que permitan establecer la comunicación de los diferentes equipos que integran la misma, en este sentido, uno de ellos es el protocolo OSPF, el cual facilitó la comunicación por el camino más corto, garantizando el costo menor para la red, la cual vimos en la primera parte del presente trabajo.

Para la parte final la configuración se baso en los protocolos de enrutamiento IPv4 e IPv6 con el fin de que la red se volviera más convergente. Se propago la comunicación por una ruta predeterminada mediante el protocolo BGP.

Se realizo la configuración en los equipos D1 y D2 del protocolo IP SLA (Ruta estática condicionada), permitiendo analizar los niveles de servicios de aplicaciones y servicios IP, de igual forma otorgando un tiempo para implementacion de la misma.

Por ultimo, a pesar de que la simulación se realiza en un ambiente virtual, al momento de verificar algunos de los ping entre equipos y loopback, no se pudo realizar al 100%, pero con la verificación de comandos se pudo determinar que las configuraciones fueron acertadas, de acuerdo a lo arrojado por el programa en cada equipo, siendo un reto para el estudiante verificara su progreso.

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