

DIPLOMADO DE PROFUNDIZACIÓN CISCO
PRUEBA DE HABILIDADES PRÁCTICAS CCNP

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA –UNAD
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INGENIERÍA DE TELECOMUNICACIONES
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GLOSARIO

DNS: La sigla DNS proviene de la expresión inglesa Domain Name System: es decir, Sistema de Nombres de Dominio. Se trata de un método de denominación empleado para nombrar a los dispositivos que se conectan a una red a través del IP (Internet Protocol o Protocolo de Internet).

PREFIJO IP: Es una forma particular de expresar las direcciones de red y sus máscaras a partir de identificar solamente la cantidad de bits que se encuentran en uno en la máscara de subred.

MÁSCARA DE SUBRED: La máscara de subred es particularmente necesaria al momento de señalar la dirección de red correspondiente a cada subred, y que es la que se encuentra referenciada en la tabla de enrutamiento.

PROTOSCOLOS DE RED: Los protocolos de red son un conjunto de reglas que gobiernan la comunicación entre dispositivos que están conectados a una red. Dichas reglas se constituyen de instrucciones que permiten a los dispositivos identificarse y conectarse entre sí, además de aplicar reglas de formateo, para que los mensajes viajen de la forma adecuada de principio a fin. Dichas reglas de formateo determinan si los datos son recibidos correctamente o si son rechazados o ha habido algún tipo de problema en la transferencia de la información.

ROUTER: Dispositivo hardware o software de interconexión de redes de computadores que opera en la capa tres (nivel de red) del modelo OSI. Este dispositivo interconecta segmentos de red o redes enteras.

INTERFAZ: Se denomina interfaz a cualquier medio que permita la interconexión de dos procesos diferenciados con un único propósito común. Se conoce como Interfaz Física a los medios utilizados para la conexión de un computador con el medio de transporte de la red.

RESUMEN

La evaluación denominada “Prueba de habilidades prácticas”, forma parte de las actividades evaluativas del Diplomado de Profundización CCNP, y busca identificar el grado de desarrollo de competencias y habilidades que fueron adquiridas a lo largo del diplomado. Lo esencial es poner a prueba los niveles de comprensión y solución de problemas relacionados con diversos aspectos de Networking.

En este escenario se configuran los dispositivos de una red pequeña. Debe configurar un router, un switch y equipos que admitan tanto la conectividad IPv4 como IPv6 para los hosts soportados. El router y el switch también deben administrarse de forma segura. Configuraré el enrutamiento entre VLAN, DHCP, Etherchannel y port-security.

PALABRAS CLAVE: CISCO, Conmutación, Enrutamiento, Redes, Sistemas.

ABSTRACT

The evaluation called "Practical skills test" is part of the evaluation activities of the CCNP Deepening Diploma, and seeks to identify the degree of development of skills and abilities that were acquired throughout the diploma. The essential thing is to test the levels of understanding and solution of problems related to various aspects of Networking.

In this scenario, the devices of a small network are configured. You must configure a router, switch, and equipment that support both IPv4 and IPv6 connectivity for the supported hosts. The router and switch must also be managed securely. You will configure routing between VLANs, DHCP, Etherchannel, and port-security.

KEY WORDS: CISCO, Switching, Routing, Networks, Systems

1. INTRODUCCIÓN

Para el desarrollo de esta prueba de habilidades, se completa la configuración de una red tiene disponibilidad de conexión de extremo a extremo, partiendo desde la configuración inicial del dispositivo, la creación de VLANs, la configuración de las interfaces de acuerdo a un direccionamiento y que permite asegurar la conexión entre los dispositivos que hacen parte de su red.

Además, se realiza la configuración de servicios DHCP que permiten generar direccionamientos dinámicos de acuerdo a los parámetros definidos, las direcciones excluidas, la puerta de enlace predeterminada y la red LAN que satisface la topología propuesta.

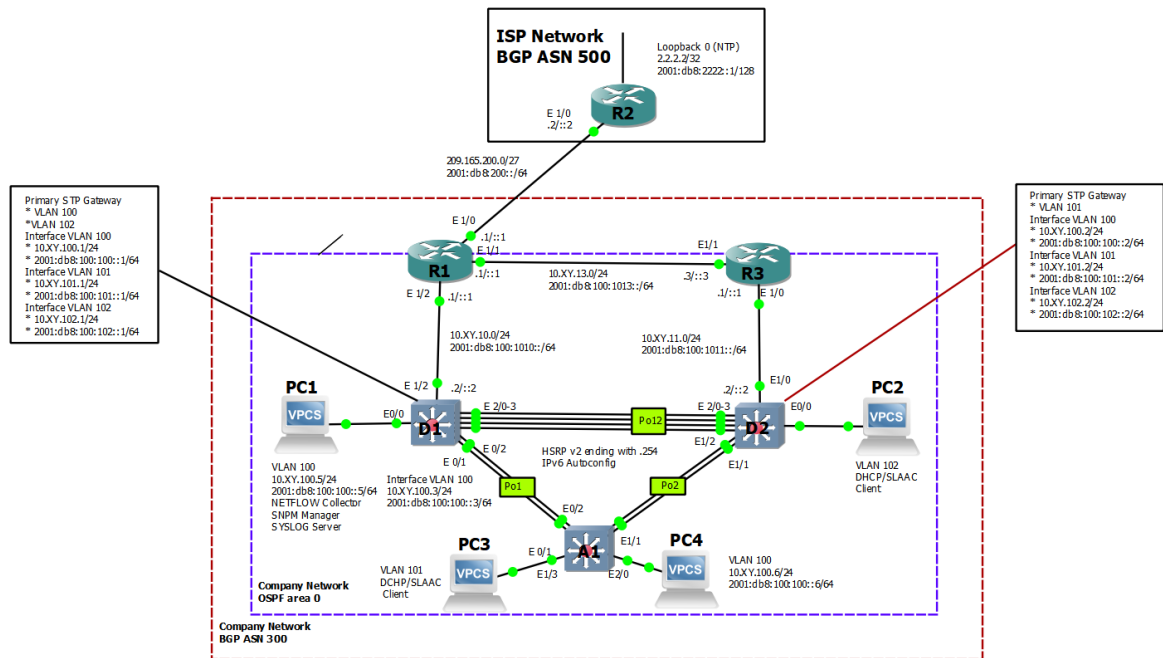
Finalmente, se realiza la implementación de protocolos de red de capa 2 como Spanning Tree, esto permite gestionar la presencia de bucles en la topología de acuerdo a la asignación de la raíz primaria y las raíces secundarias, esto está acompañado también de la gestión de LACP Etherchannels de acuerdo a los Portchannels definidos en la topología, permitiendo apropiar conocimientos que contribuyen en mejorar el aprendizaje y demostrar lo adquirido en el transcurso del diplomado.

2. DESARROLLO DEL PROYECTO

2.1. Escenario 1

Topology

Figura 1. Topología del escenario 1



Fuente: Autor del documento.

Addressing Table

Tabla 1. Tabla de direcciones

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

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
	E1/2	10.56.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	E1/1	10.56.13.1/24	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
	Loopback 0	2.2.2.2/32	2001:db8:2222::1/128	fe80::2:3
R3	E1/0	10.56.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
	E1/1	10.56.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	E1/2	10.56.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
	VLAN 100	10.56.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10.56.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
	VLAN 102	10.56.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	E1/0	10.56.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10.56.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
	VLAN 101	10.56.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10.56.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.56.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.56.100.5/24	2001:db8:100:100::5/64	EUI-64
PC2	NIC	DHCP	SLAAC	EUI-64

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
PC3	NIC	DHCP	SLAAC	EUI-64
PC4	NIC	10.56.100.6/24	2001:db8:100:100::6/64	EUI-64

Fuente: Autor del documento.

Objectives

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

Part 2: Configure the Layer 2 Network and Host Support

Part 3: Configure Routing Protocols

Part 4: Configure First-Hop Redundancy

Background / Scenario

In this skills assessment, you are responsible for completing the configuration of the network so there is full end-to-end reachability, so the hosts have reliable default gateway support, and so that management protocols are operational within the “Company Network” part of the topology. Be careful to verify that your configurations meet the provided specifications and that the devices perform as required.

Note: The routers used with CCNP hands-on labs are Cisco 7200 routers. The switches used in the labs are Cisco Catalyst L2 switches. Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from what is shown in the labs.

Note: Make sure that the switches have been erased and have no startup configurations. If you are unsure, contact your instructor.

Note: The letters "X, Y" represent the last two digits of your ID number (cédula).

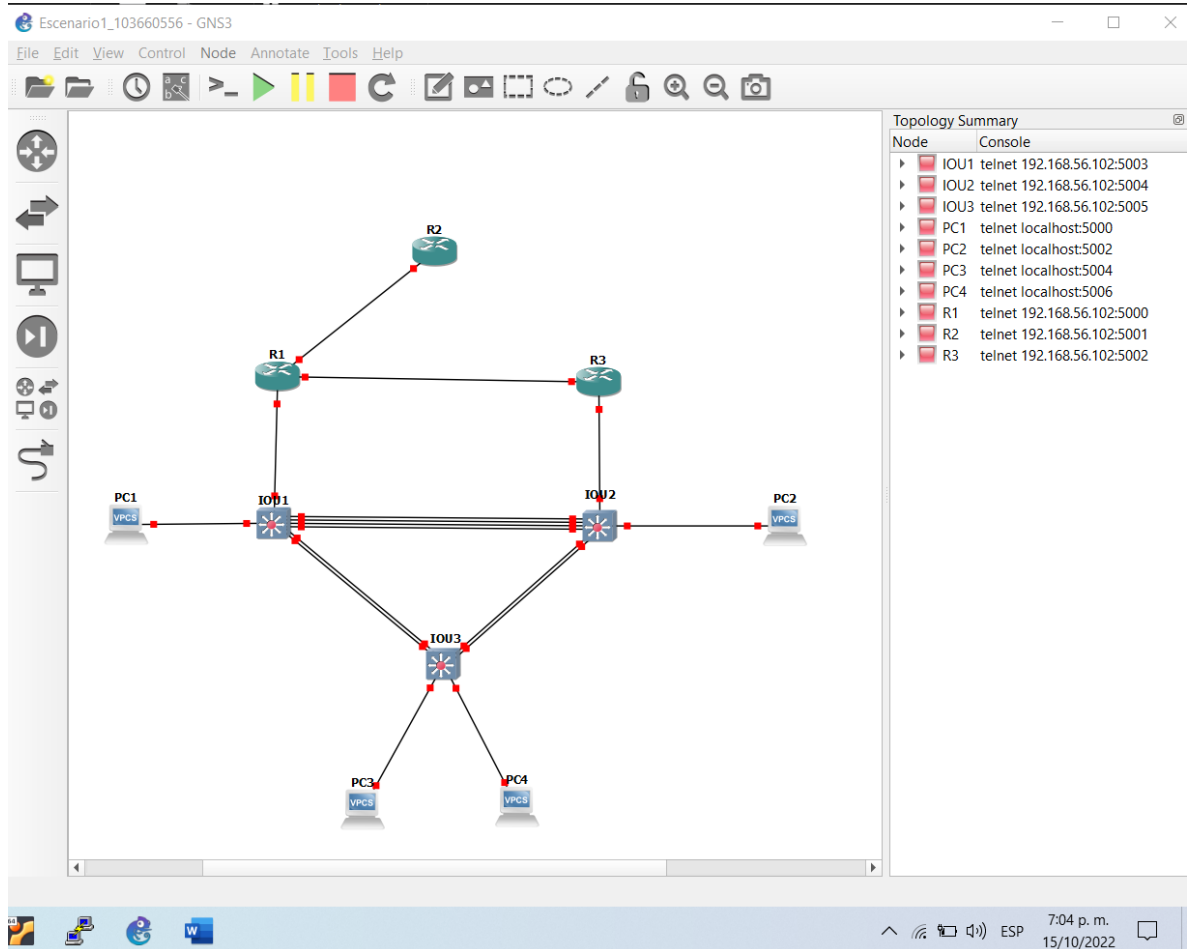
2.1.1. Part 1: Build the Network and Configure Basic Device Settings and Interface Addressing

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.

Figura 2. Topología del escenario 1 en GNS3.



Fuente: Autor del documento.

Step 2. Configure basic settings for each device.

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

Router R1

```
hostname R1
dispositivo
ipv6 unicast-routing
de direcciones IPv6
```

//Se configura el nombre del dispositivo
//Se habilita el enrutamiento

```

no ip domain lookup //Se desactiva la búsqueda
DNS
banner motd # R1, ENCOR Skills Assessment# //Se configura un banner
line con 0
  exec-timeout 0 0 //Se configura el tiempo de
  salida exec //Se habilita el inicio de
  logging synchronous //Se habilita el inicio de
  sesión sincrónico
  exit
interface e1/0 //Se accede a la interfaz
  ip address 209.165.200.225 255.255.255.224 //Se configura el
  direccionamiento IPv4
  ipv6 address fe80::1:1 link-local //Se configura el
  direccionamiento para el enlace local
  ipv6 address 2001:db8:200::1/64 //Se configura el
  direccionamiento IPv6
  no shutdown //Se enciende la interfaz
  exit
interface e1/2 //Se accede a la interfaz
  ip address 10.56.10.1 255.255.255.0 //Se configura el
  direccionamiento IPv4
  ipv6 address fe80::1:2 link-local //Se configura el
  direccionamiento para el enlace local
  ipv6 address 2001:db8:100:1010::1/64 //Se configura el
  direccionamiento IPv6
  no shutdown //Se enciende la interfaz
  exit
interface e1/1 //Se accede a la interfaz
  ip address 10.56.13.1 255.255.255.0 //Se configura el
  direccionamiento IPv4
  ipv6 address fe80::1:3 link-local //Se configura el
  direccionamiento para el enlace local
  ipv6 address 2001:db8:100:1013::1/64 //Se configura el
  direccionamiento IPv6
  no shutdown //Se accede a la interfaz
  exit

```

Router R2

```

hostname R2 //Se configura el nombre del
dispositivo
ipv6 unicast-routing //Se habilita el enrutamiento
de direcciones IPv6
no ip domain lookup //Se desactiva la búsqueda
DNS

```

```

banner motd # R2, ENCOR Skills Assessment# //Se configura un banner
line con 0
  exec-timeout 0 0 //Se configura el tiempo de
  salida exec //Se habilita el inicio de
  logging synchronous //Se habilita el inicio de
  sesión sincrónico
  exit
interface e1/0 //Se accede a la interfaz
  ip address 209.165.200.226 255.255.255.224 //Se configura el
  direccionamiento IPv4 //Se configura el
  ipv6 address fe80::2:1 link-local //Se configura el
  direccionamiento para el enlace local //Se configura el
  ipv6 address 2001:db8:200::2/64 //Se configura el
  direccionamiento IPv6 //Se enciende la interfaz
  no shutdown //Se enciende la interfaz
  exit
interface Loopback 0 //Se accede a la interfaz
  ip address 2.2.2.2 255.255.255.255 //Se configura el
  direccionamiento IPv4 //Se configura el
  ipv6 address fe80::2:3 link-local //Se configura el
  direccionamiento para el enlace local //Se configura el
  ipv6 address 2001:db8:2222::1/128 //Se configura el
  direccionamiento IPv6 //Se enciende la interfaz
  no shutdown //Se enciende la interfaz
  exit

```

Router R3

```

hostname R3 //Se configura el nombre del
dispositivo //Se habilita el enrutamiento
ipv6 unicast-routing //Se habilita el enrutamiento
de direcciones IPv6 //Se desactiva la búsqueda
no ip domain lookup //Se desactiva la búsqueda
DNS //Se configura un banner
banner motd # R3, ENCOR Skills Assessment# //Se configura un banner
line con 0 //Se configura el tiempo de
  exec-timeout 0 0 //Se configura el tiempo de
  salida exec //Se habilita el inicio de
  logging synchronous //Se habilita el inicio de
  sesión sincrónico //Se habilita el inicio de
  exit //Se habilita el inicio de
interface e1/0 //Se accede a la interfaz
  ip address 10.56.11.1 255.255.255.0 //Se configura el
  direccionamiento IPv4 //Se configura el

```



```

    ipv6 address fe80::3:2 link-local //Se configura el
    direccionamiento para el enlace local
    ipv6 address 2001:db8:100:1011::1/64 //Se configura el
    direccionamiento IPv6
    no shutdown //Se enciende la interfaz
    exit
interface e1/1 //Se accede a la interfaz
    ip address 10.56.13.3 255.255.255.0 //Se configura el
    direccionamiento IPv4
    ipv6 address fe80::3:3 link-local //Se configura el
    direccionamiento para el enlace local
    ipv6 address 2001:db8:100:1010::2/64 //Se configura el
    direccionamiento IPv6
    no shutdown //Se enciende la interfaz
    exit

Switch D1

hostname D1 //Se configura el nombre del
dispositivo
ip routing //Se configura el
enrutamiento de direcciones IPv4
ipv6 unicast-routing //Se habilita el enrutamiento
de direcciones IPv6
no ip domain lookup //Se desactiva la búsqueda
DNS
banner motd # D1, ENCOR Skills Assessment# //Se configura un banner
line con 0
    exec-timeout 0 0 //Se configura el tiempo de
    salida exec
    logging synchronous //Se habilita el inicio de
    sesión sincrónico
    exit
vlan 100 //Se configura la vlan
    name Management //Se asigna un nombre de
vlan
    exit
vlan 101 //Se configura la vlan
    name UserGroupA //Se asigna un nombre de
vlan
    exit
vlan 102 //Se configura la vlan
    name UserGroupB //Se asigna un nombre de
vlan
    exit

```

```

vlan 999 //Se configura la vlan
  name NATIVE //Se asigna un nombre de
vlan
  exit
interface e1/2 //Se accede a la interfaz
  no switchport //Se desactiva el switchport
  ip address 10.56.10.2 255.255.255.0 //Se configura el
  direccionamiento IPv4
  ipv6 address fe80::d1:1 link-local //Se configura el
  direccionamiento para el enlace local
  ipv6 address 2001:db8:100:1010::2/64 //Se configura el
  direccionamiento IPv6
  no shutdown //Se enciende la interfaz
  exit
interface vlan 100 //Se accede a la interfaz
  ip address 10.56.100.1 255.255.255.0 //Se configura el
  direccionamiento IPv4
  ipv6 address fe80::d1:2 link-local //Se configura el
  direccionamiento para el enlace local
  ipv6 address 2001:db8:100:100::1/64 //Se configura el
  direccionamiento IPv6
  no shutdown //Se accede a la interfaz
  exit
interface vlan 101 //Se accede a la interfaz
  ip address 10.56.101.1 255.255.255.0 //Se configura el
  direccionamiento IPv4
  ipv6 address fe80::d1:3 link-local //Se configura el
  direccionamiento para el enlace local
  ipv6 address 2001:db8:100:101::1/64 //Se configura el
  direccionamiento IPv6
  no shutdown //Se enciende la interfaz
  exit
interface vlan 102 //Se accede a la interfaz
  ip address 10.56.102.1 255.255.255.0 //Se configura el
  direccionamiento IPv4
  ipv6 address fe80::d1:4 link-local //Se configura el
  direccionamiento para el enlace local
  ipv6 address 2001:db8:100:102::1/64 //Se configura el
  direccionamiento IPv6
  no shutdown //Se enciende la interfaz
  exit
ip dhcp excluded-address 10.56.101.1 10.56.101.109 //Se excluyen las
  direcciones para el servidor DHCP
ip dhcp excluded-address 10.56.101.141 10.56.101.254 //Se excluyen las
  direcciones para el servidor DHCP

```

```

ip dhcp excluded-address 10.56.102.1 10.56.102.109 //Se excluyen las
direcciones para el servidor DHCP
ip dhcp excluded-address 10.56.102.141 10.56.102.254 //Se excluyen las
direcciones para el servidor DHCP
ip dhcp pool VLAN-101 //Se configura un pool DHCP
network 10.56.101.0 255.255.255.0 //Se define la red del pool de
direcciones DHCP
default-router 10.56.101.254 //Se configura la puerta
predeterminada de enlace para el pool de direcciones DHCP
exit
ip dhcp pool VLAN-102 //Se configura un pool DHCP
network 10.56.102.0 255.255.255.0 //Se define la red del pool de
direcciones DHCP
default-router 10.56.102.254 //Se configura la puerta
predeterminada de enlace para el pool de direcciones DHCP
exit
interface range e0/0-3,e1/0-1,e1/3,e2/0-3,e3/0-3 //Se accede a un rango de
direcciones
shutdown //Se apagan las interfaces
exit

```

Switch D2

```

hostname D2 //Se configura el nombre del
dispositivo
ip routing //Se configura el
enrutamiento de direcciones IPv4
ipv6 unicast-routing //Se habilita el enrutamiento
de direcciones IPv6
no ip domain lookup //Se desactiva la búsqueda
DNS
banner motd # D2, ENCOR Skills Assessment# //Se configura un banner
line con 0
exec-timeout 0 0 //Se configura el tiempo de
salida exec
logging synchronous //Se habilita el inicio de
sesión sincrónico
exit
vlan 100 //Se configura la vlan
name Management //Se asigna un nombre de
vlan
exit
vlan 101 //Se configura la vlan
name UserGroupA //Se asigna un nombre de
vlan

```

```

exit
vlan 102 //Se configura la vlan
name UserGroupB //Se asigna un nombre de
vlan
exit
vlan 999 //Se configura la vlan
name NATIVE //Se asigna un nombre de
vlan
exit
interface e1/0 //Se accede a la interfaz
no switchport //Se desactiva el switchport
ip address 10.56.11.2 255.255.255.0 //Se configura el
direccionamiento IPv4
ipv6 address fe80::d1:1 link-local //Se configura el
direccionamiento para el enlace local
ipv6 address 2001:db8:100:1011::2/64 //Se configura el
direccionamiento IPv6
no shutdown //Se enciende la interfaz
exit
interface vlan 100 //Se accede a la interfaz
ip address 10.56.100.2 255.255.255.0 //Se configura el
direccionamiento IPv4
ipv6 address fe80::d2:2 link-local //Se configura el
direccionamiento para el enlace local
ipv6 address 2001:db8:100:100::2/64 //Se configura el
direccionamiento IPv6
no shutdown
exit
interface vlan 101 //Se accede a la interfaz
ip address 10.56.101.2 255.255.255.0 //Se configura el
direccionamiento IPv4
ipv6 address fe80::d2:3 link-local //Se configura el
direccionamiento para el enlace local
ipv6 address 2001:db8:100:101::2/64 //Se configura el
direccionamiento IPv6
no shutdown
exit
interface vlan 102 //Se accede a la interfaz
ip address 10.56.102.2 255.255.255.0 //Se configura el
direccionamiento IPv4
ipv6 address fe80::d2:4 link-local //Se configura el
direccionamiento para el enlace local
ipv6 address 2001:db8:100:102::2/64 //Se configura el
direccionamiento IPv6
no shutdown

```

```

exit
ip dhcp excluded-address 10.56.101.1 10.56.101.209 //Se excluyen las
direcciones para el servidor DHCP
ip dhcp excluded-address 10.56.101.241 10.56.101.254 //Se excluyen las
direcciones para el servidor DHCP
ip dhcp excluded-address 10.56.102.1 10.56.102.209 //Se excluyen las
direcciones para el servidor DHCP
ip dhcp excluded-address 10.56.102.241 10.56.102.254 //Se excluyen las
direcciones para el servidor DHCP
ip dhcp pool VLAN-101 //Se configura un pool DHCP
network 10.56.101.0 255.255.255.0 //Se define la red del pool de
direcciones DHCP
default-router 56.0.101.254 //Se configura la puerta
predeterminada de enlace para el pool de direcciones DHCP
exit
ip dhcp pool VLAN-102 //Se configura un pool DHCP
network 10.56.102.0 255.255.255.0 //Se define la red del pool de
direcciones DHCP
default-router 10.56.102.254 //Se configura la puerta
predeterminada de enlace para el pool de direcciones DHCP
exit
interface range e0/0-3,e1/1-3,e2/0-3,e3/0-3 //Se accede a un rango de
direcciones
shutdown //Se apagan las interfaces
exit

Switch A1

hostname A1 //Se configura el nombre del
dispositivo
no ip domain lookup //Se desactiva la búsqueda
DNS
banner motd # A1, ENCOR Skills Assessment# //Se configura un banner
line con 0
exec-timeout 0 0 //Se configura el tiempo de
salida exec
logging synchronous //Se habilita el inicio de
sesión sincrónico
exit
vlan 100 //Se configura la vlan
name Management //Se asigna un nombre de
vlan
exit
vlan 101 //Se configura la vlan

```

```

name UserGroupA //Se asigna un nombre de
vlan
exit
vlan 102 //Se configura la vlan
name UserGroupB //Se asigna un nombre de
vlan
exit
vlan 999 //Se configura la vlan
name NATIVE //Se asigna un nombre de
vlan
exit
interface vlan 100 //Se accede a la interfaz
ip address 10.56.100.3 255.255.255.0 //Se configura el
direccionamiento IPv4
ipv6 address fe80::a1:1 link-local //Se configura el
direccionamiento para el enlace local
ipv6 address 2001:db8:100:100::3/64 //Se configura el
direccionamiento IPv6
no shutdown //Se enciende la interfaz
exit
interface range e0/0,e0/3,e1/0,e2/1-3,e3/0-3 //Se accede a un rango de
interfaces
shutdown //Se apagan las interfaces
exit

```

b. Save the running configuration to startup-config on all devices.

```

R1# copy running-config startup-config //Se guarda la configuracion
del dispositivo

```

```

R2#copy running-config startup-config //Se guarda la configuracion
del dispositivo

```

```

R3#copy running-config startup-config //Se guarda la configuracion
del dispositivo

```

```

D1#copy running-config startup-config //Se guarda la configuracion
del dispositivo

```

```

D2#copy running-config startup-config //Se guarda la configuracion
del dispositivo

```

```

A1#copy running-config startup-config //Se guarda la configuracion
del dispositivo

```

- c. Configure PC 1 and PC 4 host addressing as shown in the addressing table. Assign a default gateway address of 10.56.100.254 which will be the HSRP virtual IP address used in Part 4.

```
PC1> ip 10.56.100.5 255.255.255.0 10.56.100.254 //Se configura el
direccionamiento IPv4 del equipo
PC1> ip 2001:db8:100:100::5/64 eui-64 //Se configura el
direccionamiento IPv6 del equipo
```

```
PC4> ip 10.56.100.6 255.255.255.0 10.56.100.254 //Se configura el
direccionamiento IPv4 del equipo
PC4> ip 2001:db8:100:100::6/64 eui-64 //Se configura el
direccionamiento IPv6 del equipo
```

2.1.2. 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. Tabla de tareas a realizar en la 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: <ul style="list-style-type: none"> • 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	Configure D1 and D2 as root for the appropriate VLANs	2

Task#	Task	Specification	Points
	based on the information in the topology diagram. D1 and D2 must provide backup in case of root bridge failure.	with mutually supporting priorities in case of switch failure.	
2.5	On all switches, create LACP EtherChannels as shown in the topology diagram.	Use the following channel numbers: <ul style="list-style-type: none"> • 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
2.8	Verify local LAN connectivity.	PC1 should successfully ping: <ul style="list-style-type: none"> • D1: 10.56.100.1 • D2: 10.56.100.2 • PC4: 10.56.100.6 PC2 should successfully ping: <ul style="list-style-type: none"> • D1: 10.56.102.1 • D2: 10.56.102.2 PC3 should successfully ping: <ul style="list-style-type: none"> • D1: 10.56.101.1 • D2: 10.56.101.2 PC4 should successfully ping:	1

Task#	Task	Specification	Points
		<ul style="list-style-type: none"> • D1: 10.56.100.1 • D2: 10.56.100.2 • PC1: 10.56.100.5 	

Fuente: Autor del documento.

Configuración en switch D1.

```

D1#configure terminal
D1(config)#interface range e2/0-3 //Se accede a las interfaces
D1(config-if-range)# switchport trunk encapsulation dot1q //Se habilita la
encapsulación para el enlace troncal
D1(config-if-range)# switchport mode trunk //Se configuran las interfaces
como enlaces troncales
D1(config-if-range)# switchport trunk native vlan 999 //Se configura la vlan
como nativa
D1(config-if-range)# channel-group 12 mode active //Se habilita el LACP
de grupo 12
D1(config-if-range)# no shutdown //Se enciende las interfaces
D1(config-if-range)# exit
D1(config)#interface range e0/1-2 //Se accede a las interfaces
D1(config-if-range)# switchport trunk encapsulation dot1q //Se habilita la
encapsulación para el enlace troncal
D1(config-if-range)# switchport mode trunk //Se configuran las interfaces
como enlaces troncales
D1(config-if-range)# switchport trunk native vlan 999 //Se configura la vlan
como nativa
D1(config-if-range)# channel-group 1 mode active //Se habilita el LACP
de grupo 1
D1(config-if-range)# no shutdown //Se enciende las interfaces
D1(config-if-range)# exit
D1(config)#spanning-tree mode rapid-pvst //Se habilita el modo rapid-
pvst
D1(config)#spanning-tree vlan 100,102 root primary //Se configuran las
vlans como raices primarias de spanning-tree
D1(config)#spanning-tree vlan 101 root secondary //Se configuran las
vlans como raices secundarias de spanning-tree
D1(config)#interface e0/0 //Se accede a la interface
D1(config-if)# switchport mode access //Se configura en modo de
acceso
D1(config-if)# switchport access vlan 100 //Se configura la vlan en el
puerto de acceso

```

```

D1(config-if)# spanning-tree portfast //Se configura el spanning-
tree en modo portfast
D1(config-if)# no shutdown //Se enciende las interfaces
D1(config-if)# exit
D1(config)#end

```

Configuración en switch D2.

```

D2#configure terminal
D2(config)#interface range e2/0-3 //Se accede a las interfaces
D2(config-if-range)# switchport trunk encapsulation dot1q //Se habilita la
encapsulación para el enlace troncal
D2(config-if-range)# switchport mode trunk //Se configuran las interfaces
como enlaces troncales
D2(config-if-range)# switchport trunk native vlan 999 //Se configura la vlan
como nativa
D2(config-if-range)# channel-group 12 mode active //Se habilita el LACP
de grupo 12
D2(config-if-range)# no shutdown //Se enciende la interface
D2(config-if-range)# exit
D2(config)#interface range e1/1-2 //Se accede a las interfaces
D2(config-if-range)# switchport trunk encapsulation dot1q //Se habilita la
encapsulación para el enlace troncal
D2(config-if-range)# switchport mode trunk //Se configuran las interfaces
como enlaces troncales
D2(config-if-range)# switchport trunk native vlan 999 //Se configura la vlan
como nativa
D2(config-if-range)# channel-group 2 mode active //Se habilita el LACP
de grupo 2
D2(config-if-range)# no shutdown //Se enciende las interfaces
D2(config-if-range)# exit
D2(config)#spanning-tree mode rapid-pvst //Se habilita el modo rapid-
pvst
D2(config)#spanning-tree vlan 101 root primary //Se configuran las vlans
como raíces primarias de spanning-tree
D2(config)#spanning-tree vlan 100,102 root secondary //Se configuran las
vlans como raíces secundarias de spanning-tree
D2(config)#interface e0/0 //Se accede a la interface
D2(config-if)# switchport mode access //Se configura en modo de
acceso
D2(config-if)# switchport access vlan 102 //Se configura la vlan en el
puerto de acceso
D2(config-if)# spanning-tree portfast //Se configura el spanning-
tree en modo portfast
D2(config-if)# no shutdown //Se enciende las interfaces

```

```
D2(config-if)# exit
D2(config)#end
```

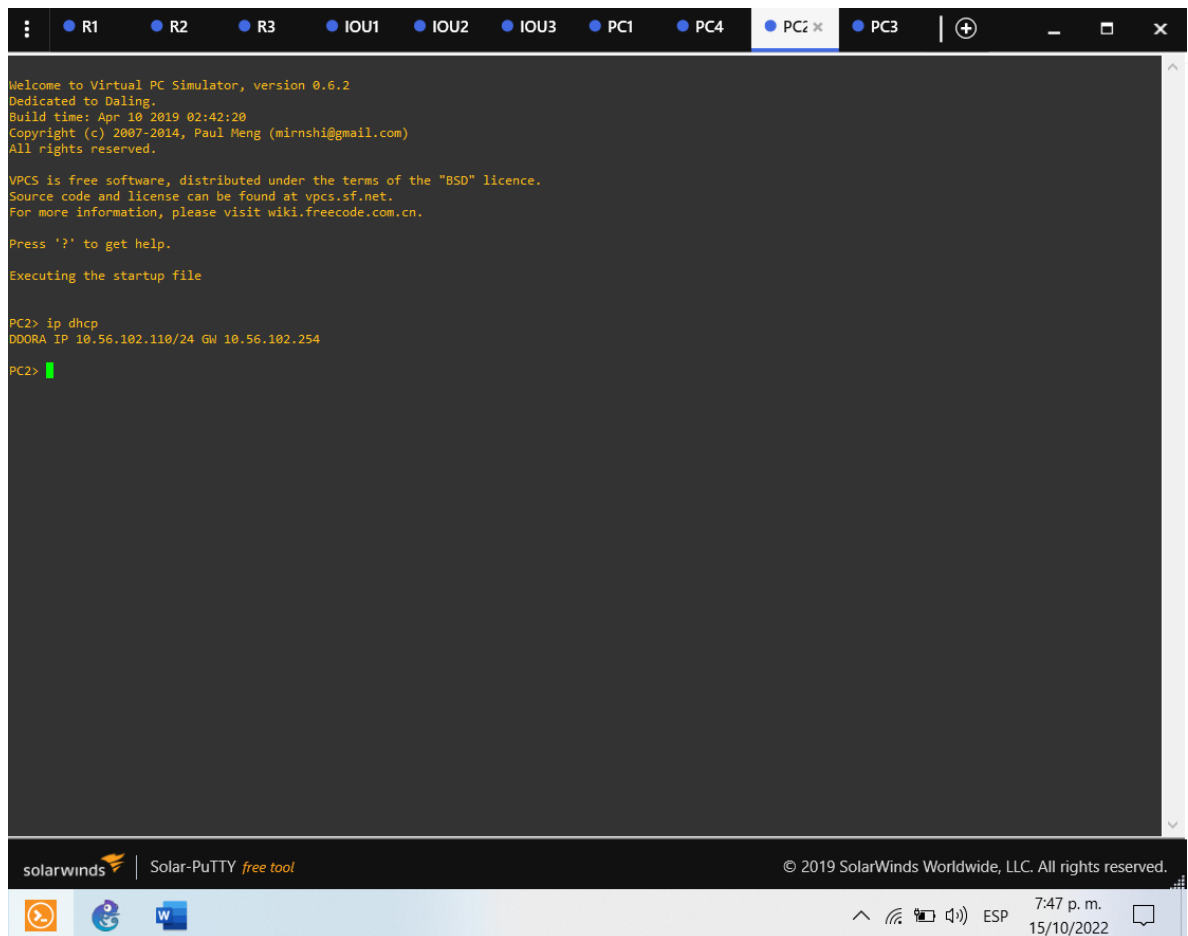
Configuración en switch A1.

```
A1#configure terminal
A1(config)#spanning-tree mode rapid-pvst //Se habilita el modo rapid-
pvst
A1(config)#interface range e0/1-2 //Se accede a las interfaces
A1(config-if-range)# switchport trunk encapsulation dot1q //Se habilita la
encapsulación para el enlace troncal
A1(config-if-range)# switchport mode trunk //Se configuran las interfaces
como enlaces troncales
A1(config-if-range)# switchport trunk native vlan 999 //Se configura la vlan
como nativa
A1(config-if-range)# channel-group 1 mode active //Se habilita el LACP
de grupo 1
A1(config-if-range)# no shutdown //Se enciende las interfaces
A1(config-if-range)# exit
A1(config)#interface range e1/1-2 //Se accede a las interfaces
A1(config-if-range)# switchport trunk encapsulation dot1q //Se habilita la
encapsulación para el enlace troncal
A1(config-if-range)# switchport mode trunk //Se configuran las interfaces
como enlaces troncales
A1(config-if-range)# switchport trunk native vlan 999 //Se configura la vlan
como nativa
A1(config-if-range)# channel-group 2 mode active //Se habilita el LACP
de grupo 2
A1(config-if-range)# no shutdown //Se enciende las interfaces
A1(config-if-range)# exit
A1(config)#interface e1/3 //Se accede a la interface
A1(config-if)# switchport mode access //Se configura en modo de
acceso
A1(config-if)# switchport access vlan 101 //Se configura la vlan en el
puerto de acceso
A1(config-if)# spanning-tree portfast //Se configura el spanning-
tree en modo portfast
A1(config-if)# no shutdown //Se enciende las interfaces
A1(config-if)# exit
A1(config)#interface e2/0 //Se accede a la interface
A1(config-if)# switchport mode access //Se configura en modo de
acceso
A1(config-if)# switchport access vlan 100 //Se configura la vlan en el
puerto de acceso
```

```
A1(config-if)# spanning-tree portfast //Se configura el spanning-  
tree en modo portfast  
A1(config-if)# no shutdown //Se enciende las interfaces  
A1(config-if)# exit  
A1(config)#end
```

Ahora, se procede a verificar los servicios DHCP IPv4 en los equipos PC2 y PC3.

Figura 3. Verificación de los servicios DHCP en PC2.



The screenshot shows a terminal window titled 'Virtual PC Simulator, version 0.6.2'. The terminal output includes the following text:

```
Welcome to Virtual PC Simulator, version 0.6.2  
Dedicated to Daling.  
Build time: Apr 10 2019 02:42:20  
Copyright (c) 2007-2014, Paul Meng (mirnshi@gmail.com)  
All rights reserved.  
  
VPCS is free software, distributed under the terms of the "BSD" licence.  
Source code and license can be found at vpcs.sf.net.  
For more information, please visit wiki.freecode.com.cn.  
  
Press '?' to get help.  
Executing the startup file  
  
PC2> ip dhcp  
DDORA IP 10.56.102.110/24 GW 10.56.102.254  
PC2> █
```

The terminal window is part of a SolarWinds Solar-PuTTY application. The taskbar at the bottom shows the time as 7:47 p.m. on 15/10/2022.

Fuente: Autor del documento.

Figura 4. Verificación de los servicios DHCP en PC3.



```
Welcome to Virtual PC Simulator, version 0.6.2
Dedicated to Dalling.
Build time: Apr 10 2019 02:42:20
Copyright (c) 2007-2014, Paul Meng (mirnshi@gmail.com)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.

Executing the startup file

PC3> ip dhcp
DDO
Can't find dhcp server

PC3> ip dhcp
DDO
Can't find dhcp server

PC3> ip dhcp
DDO
Can't find dhcp server

PC3> ip dhcp
DDO
Can't find dhcp server

PC3> ip dhcp
DDO
Can't find dhcp server

PC3> ip dhcp
DDO
Can't find dhcp server

PC3> ip dhcp
DDORA IP 10.56.101.110/24 GW 10.56.101.254

PC3> █
```

Fuente: Autor del documento.

Finalmente, se procede a realizar los pings de verificación de comunicación entre los PCs.

Figura 5. Prueba de conectividad desde PC1 a D1,D2 y PC4.

```
Welcome to Virtual PC Simulator, version 0.6.2
Dedicated to Dalling.
Build time: Apr 10 2019 02:42:20
Copyright (c) 2007-2014, Paul Meng (mirnshi@gmail.com)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.
Press '?' to get help.

Executing the startup file

PC1> ip 10.56.100.5 255.255.255.0 10.56.100.254
Checking for duplicate address...
PC1 : 10.56.100.5 255.255.255.0 gateway 10.56.100.254

PC1> ip 2001:db8:100:100::5/64 eui-64
PC1 : 2001:db8:100:100:2050:79ff:fe66:6800/64 eui-64

PC1> ping 10.56.100.1
84 bytes from 10.56.100.1 icmp_seq=1 ttl=255 time=0.711 ms
84 bytes from 10.56.100.1 icmp_seq=2 ttl=255 time=0.660 ms
84 bytes from 10.56.100.1 icmp_seq=3 ttl=255 time=0.824 ms
84 bytes from 10.56.100.1 icmp_seq=4 ttl=255 time=0.766 ms
84 bytes from 10.56.100.1 icmp_seq=5 ttl=255 time=0.899 ms
PC1>
PC1> ping 10.56.100.2
84 bytes from 10.56.100.2 icmp_seq=1 ttl=255 time=0.888 ms
84 bytes from 10.56.100.2 icmp_seq=2 ttl=255 time=2.061 ms
84 bytes from 10.56.100.2 icmp_seq=3 ttl=255 time=1.247 ms
84 bytes from 10.56.100.2 icmp_seq=4 ttl=255 time=1.029 ms
84 bytes from 10.56.100.2 icmp_seq=5 ttl=255 time=1.094 ms
PC1>
PC1> ping 10.56.100.6
84 bytes from 10.56.100.6 icmp_seq=1 ttl=64 time=1.538 ms
84 bytes from 10.56.100.6 icmp_seq=2 ttl=64 time=1.703 ms
84 bytes from 10.56.100.6 icmp_seq=3 ttl=64 time=1.636 ms
84 bytes from 10.56.100.6 icmp_seq=4 ttl=64 time=1.503 ms
84 bytes from 10.56.100.6 icmp_seq=5 ttl=64 time=1.695 ms
PC1> █
```

Fuente: Autor del documento.

Figura 6. Prueba de conectividad desde PC1 a D1,D2 y PC4.

```
Welcome to Virtual PC Simulator, version 0.6.2
Dedicated to Dalling.
Build time: Apr 10 2019 02:42:20
Copyright (c) 2007-2014, Paul Meng (mirnshi@gmail.com)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.
Press '?' to get help.

Executing the startup file

PC2> ip dhcp
DDORA IP 10.56.102.110/24 GW 10.56.102.254

PC2> ping 10.56.102.1
84 bytes from 10.56.102.1 icmp_seq=1 ttl=255 time=1.431 ms
84 bytes from 10.56.102.1 icmp_seq=2 ttl=255 time=1.024 ms
84 bytes from 10.56.102.1 icmp_seq=3 ttl=255 time=1.009 ms
84 bytes from 10.56.102.1 icmp_seq=4 ttl=255 time=1.094 ms
84 bytes from 10.56.102.1 icmp_seq=5 ttl=255 time=1.086 ms
PC2>
PC2> ping 10.56.102.2
84 bytes from 10.56.102.2 icmp_seq=1 ttl=255 time=0.766 ms
84 bytes from 10.56.102.2 icmp_seq=2 ttl=255 time=0.796 ms
84 bytes from 10.56.102.2 icmp_seq=3 ttl=255 time=0.862 ms
84 bytes from 10.56.102.2 icmp_seq=4 ttl=255 time=0.925 ms
84 bytes from 10.56.102.2 icmp_seq=5 ttl=255 time=0.959 ms
PC2> █
```

Fuente: Autor del documento.

Figura 7. Prueba de conectividad desde PC3 a D1 y D2.

```
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Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.

Executing the startup file

PC3> ip dhcp
000
Can't find dhcp server

PC3> ip dhcp
000
Can't find dhcp server

PC3> ip dhcp
000
Can't find dhcp server

PC3> ip dhcp
000
Can't find dhcp server

PC3> ip dhcp
000
Can't find dhcp server

PC3> ip dhcp
000
Can't find dhcp server

PC3> ip dhcp
000
Can't find dhcp server

PC3> ip dhcp
000A IP 10.56.101.110/24 GW 10.56.101.254

PC3> ping 10.56.101.1
84 bytes from 10.56.101.1 icmp_seq=1 ttl=255 time=0.775 ms
84 bytes from 10.56.101.1 icmp_seq=2 ttl=255 time=1.208 ms
84 bytes from 10.56.101.1 icmp_seq=3 ttl=255 time=1.238 ms
84 bytes from 10.56.101.1 icmp_seq=4 ttl=255 time=1.411 ms
84 bytes from 10.56.101.1 icmp_seq=5 ttl=255 time=1.138 ms

PC3> ping 10.56.101.2
84 bytes from 10.56.101.2 icmp_seq=1 ttl=255 time=1.058 ms
84 bytes from 10.56.101.2 icmp_seq=2 ttl=255 time=1.091 ms
84 bytes from 10.56.101.2 icmp_seq=3 ttl=255 time=0.979 ms
84 bytes from 10.56.101.2 icmp_seq=4 ttl=255 time=1.010 ms
84 bytes from 10.56.101.2 icmp_seq=5 ttl=255 time=0.992 ms

PC3>
```

Fuente: Autor del documento.

Figura 8. Prueba de conectividad desde PC4 a D1, D2 y PC1.

```
VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.

Executing the startup file

PC4> ip 10.0.100.6 255.255.255.0 10.56.100.254
not same subnet

PC4> ip 10.56.100.6 255.255.255.0 10.56.100.254
Checking for duplicate address...
PC1 : 10.56.100.6 255.255.255.0 gateway 10.56.100.254

PC4> ip PC1> ip 10.56.100.5 255.255.255.0 10.56.100.254
Invalid options

PC4> 0:5/64 eui-64
Bad command: "0:5/64 eui-64". Use ? for help.

PC4> ip 2001:db8:100:100::6/64 eui-64
PC1 : 2001:db8:100:100::2050:79ff:fe66:6803/64 eui-64

PC4> ping 10.56.100.1
84 bytes from 10.56.100.1 icmp_seq=1 ttl=255 time=0.964 ms
84 bytes from 10.56.100.1 icmp_seq=2 ttl=255 time=1.044 ms
84 bytes from 10.56.100.1 icmp_seq=3 ttl=255 time=1.145 ms
84 bytes from 10.56.100.1 icmp_seq=4 ttl=255 time=0.909 ms
84 bytes from 10.56.100.1 icmp_seq=5 ttl=255 time=1.032 ms

PC4> ping 10.56.100.2
84 bytes from 10.56.100.2 icmp_seq=1 ttl=255 time=1.262 ms
84 bytes from 10.56.100.2 icmp_seq=2 ttl=255 time=1.234 ms
84 bytes from 10.56.100.2 icmp_seq=3 ttl=255 time=1.567 ms
84 bytes from 10.56.100.2 icmp_seq=4 ttl=255 time=1.216 ms
84 bytes from 10.56.100.2 icmp_seq=5 ttl=255 time=1.222 ms

PC4> ping 10.56.100.5
84 bytes from 10.56.100.5 icmp_seq=1 ttl=64 time=1.175 ms
84 bytes from 10.56.100.5 icmp_seq=2 ttl=64 time=1.765 ms
84 bytes from 10.56.100.5 icmp_seq=3 ttl=64 time=1.954 ms
84 bytes from 10.56.100.5 icmp_seq=4 ttl=64 time=1.600 ms
84 bytes from 10.56.100.5 icmp_seq=5 ttl=64 time=1.916 ms

PC4>
```

Fuente: Autor del documento.

2.1.3. 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. Tabla de tareas a realizar en la parte 3.

Task#	Task	Specification
3.1	On the “Company Network” (i.e., R1, R3, D1, and D2), configure single-area OSPFv2 in area 0.	<p>Use OSPF Process ID 4 and assign the following router-IDs:</p> <ul style="list-style-type: none"> • R1: 0.0.4.1 • R3: 0.0.4.3 • D1: 0.0.4.131 • D2: 0.0.4.132 <p>On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0.</p> <ul style="list-style-type: none"> • 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. <p>Disable OSPFv2 advertisements on:</p> <ul style="list-style-type: none"> • D1: All interfaces except E1/2 • D2: All interfaces except E1/0
3.2	On the “Company Network” (i.e., R1, R3, D1, and D2), configure classic single-area OSPFv3 in area 0.	<p>Use OSPF Process ID 6 and assign the following router-IDs:</p> <ul style="list-style-type: none"> • R1: 0.0.6.1 • R3: 0.0.6.3 • D1: 0.0.6.131 • D2: 0.0.6.132 <p>On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0.</p> <ul style="list-style-type: none"> • 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. <p>Disable OSPFv3 advertisements on:</p> <ul style="list-style-type: none"> • D1: All interfaces except E1/2

Task#	Task	Specification
		<ul style="list-style-type: none"> • D2: All interfaces except E1/0
3.3	On R2 in the “ISP Network”, configure MP-BGP.	<p>Configure two default static routes via interface Loopback 0:</p> <ul style="list-style-type: none"> • An IPv4 default static route. • An IPv6 default static route. <p>Configure R2 in BGP ASN 500 and use the router-id 2.2.2.2.</p> <p>Configure and enable an IPv4 and IPv6 neighbor relationship with R1 in ASN 300.</p> <p>In IPv4 address family, advertise:</p> <ul style="list-style-type: none"> • The Loopback 0 IPv4 network (/32). • The default route (0.0.0.0/0). <p>In IPv6 address family, advertise:</p> <ul style="list-style-type: none"> • The Loopback 0 IPv4 network (/128). • The default route (::/0).
3.4	On R1 in the “ISP Network”, configure MP-BGP.	<p>Configure two static summary routes to interface Null 0:</p> <ul style="list-style-type: none"> • A summary IPv4 route for 10.56.0.0/8. • A summary IPv6 route for 2001:db8:100::/48. <p>Configure R1 in BGP ASN 300 and use the router-id 1.1.1.1.</p> <p>Configure an IPv4 and IPv6 neighbor relationship with R2 in ASN 500.</p> <p>In IPv4 address family:</p> <ul style="list-style-type: none"> • Disable the IPv6 neighbor relationship. • Enable the IPv4 neighbor relationship. • Advertise the 10.56.0.0/8 network. <p>In IPv6 address family:</p> <ul style="list-style-type: none"> • Disable the IPv4 neighbor relationship. • Enable the IPv6 neighbor relationship. • Advertise the 2001:db8:100::/48 network.

Fuente: Autor del documento.

Configuración en R1

```
R1#configure terminal
R1(config)#router ospf 4 //Se configura OSPF IPv4
R1(config-router)# router-id 0.0.4.1 //Se asigna el id OSPF
R1(config-router)# network 10.56.10.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
R1(config-router)# network 10.56.13.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
R1(config-router)# default-information originate //Se desactiva el
anuncio en R1
R1(config-router)# exit
R1(config)#ipv6 router ospf 6 //Se configura OSPF IPv6
R1(config-rtr)# router-id 0.0.6.1 //Se asigna el id OSPF
R1(config-rtr)# default-information originate //Se desactiva la
propagación en R1
R1(config-rtr)# exit
R1(config)#interface e1/2 //Se accede a la interface
R1(config-if)# ipv6 ospf 6 area 0 //se configura el
enrutamiento ospf ipv6 en el área 0
R1(config-if)# exit
R1(config)#interface e1/1 //Se accede a la interface
R1(config-if)# ipv6 ospf 6 area 0 //se configura el
enrutamiento ospf ipv6 en el área 0
R1(config-if)# exit
R1(config)#ip route 10.0.0.0 255.0.0.0 null0 //Se propaga una ruta
estatica por defecto
R1(config)#ipv6 route 2001:db8:100::/48 null0 //se propaga una ruta
estatica IPv6 por defecto
R1(config)#router bgp 300 //Se configura BGP con ASN
300
R1(config-router)# bgp router-id 1.1.1.1 //Se configura el id BGP
R1(config-router)# neighbor 209.165.200.226 remote-as 500 //Se configura
la relación IPv4 con R2 con ASN 500
R1(config-router)# neighbor 2001:db8:200::2 remote-as 500 //Se configura
la relación IPv6 con R2 con ASN 500
R1(config-router)# address-family ipv4 unicast //Se configura la familia de
direcciones IPv4
R1(config-router-af)# neighbor 209.165.200.226 activate //Se activa la
relación IPv4
R1(config-router-af)# no neighbor 2001:db8:200::2 activate //Se desactiva
la relación IPv6
R1(config-router-af)# network 10.0.0.0 mask 255.0.0.0 //Se configura
la dirección y la máscara de red
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 //Se desactiva
la relación IPv4
R1(config-router-af)# neighbor 2001:db8:200::2 activate //Se activa la
relación IPv6
R1(config-router-af)# network 2001:db8:100::/48 //Se configura la
dirección
R1(config-router-af)# exit-address-family
R1(config-router)#

```

Configuración en R2

```

R2#configure terminal
R2(config)#ip route 0.0.0.0 0.0.0.0 loopback 0 //Se configura una ruta
estatica por defecto IPv4 vía Loopback 0
R2(config)#ipv6 route ::/0 loopback 0 //Se configura una ruta
estatica por defecto IPv6 vía Loopback 0
R2(config)#router bgp 500 //Se configura BGP con ASN
500
R2(config-router)# bgp router-id 2.2.2.2 //Se configura el id BGP
R2(config-router)# neighbor 209.165.200.225 remote-as 300 //Se configura
la relación IPv4 con R1 con ASN 300
R2(config-router)# neighbor 2001:db8:200::1 remote-as 300 //Se configura
la relación IPv6 con R1 con ASN 300
R2(config-router)# address-family ipv4
R2(config-router-af)# neighbor 209.165.200.225 activate //Se anuncia la
red IPv4 de R1
R2(config-router-af)# no neighbor 2001:db8:200::1 activate //No se anuncia
la red IPv6 de R1
R2(config-router-af)# network 2.2.2.2 mask 255.255.255.255 //Se anuncia la
red IPv4 de la Loopback 0
R2(config-router-af)# network 0.0.0.0 //Se anuncia la ruta por
defecto
R2(config-router-af)# exit-address-family
R2(config-router)# address-family ipv6
R2(config-router-af)# no neighbor 209.165.200.225 activate //No se anuncia
la red IPv4 de R1
R2(config-router-af)# neighbor 2001:db8:200::1 activate //Se anuncia la
red IPv6 de R1
R2(config-router-af)# network 2001:db8:2222::/128 //Se anuncia la
red IPv4 de la Loopback 0 /128
R2(config-router-af)# network ::/0 //Se anuncia la ruta por
defecto
R2(config-router-af)# exit-address-family
R2(config-router)#

```

Configuración en R3

```
R3#configure terminal
R3(config)#router ospf 4 //Se configura OSPF IPv4
R3(config-router)# router-id 0.0.4.3 //Se asigna el id OSPF
R3(config-router)# network 10.56.11.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
R3(config-router)# network 10.56.13.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
R3(config-router)# exit
R3(config)#ipv6 router ospf 6 //Se configura OSPF IPv6
R3(config-rtr)# router-id 0.0.6.3 //Se asigna el id OSPF
R3(config-rtr)# exit
R3(config)#interface e1/0 //Se accede a la interface
R3(config-if)# ipv6 ospf 6 area 0 //se configura el
enrutamiento ospf ipv6 en el área 0
R3(config-if)# exit
R3(config)#interface e1/1 //Se accede a la interface
R3(config-if)# ipv6 ospf 6 area 0 //se configura el
enrutamiento ospf ipv6 en el área 0
R3(config-if)# exit
R3(config)#end
```

Configuración en D1

```
D1#configure terminal
D1(config)#router ospf 4 //Se configura OSPF IPv4
D1(config-router)# router-id 0.0.4.131 //Se asigna el id OSPF
D1(config-router)# network 10.56.100.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D1(config-router)# network 10.56.101.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D1(config-router)# network 10.56.102.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D1(config-router)# network 10.56.10.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D1(config-router)# passive-interface default //Se desactiva los anuncios
en todas las interfaces
D1(config-router)# no passive-interface e1/2 //Se activa el anuncio en la
interface
D1(config-router)# exit
D1(config)#ipv6 router ospf 6 //Se configura OSPF IPv6
D1(config-rtr)# router-id 0.0.6.131 //Se asigna el id OSPF
D1(config-rtr)# passive-interface default //Se desactiva los anuncios
en todas las interfaces
```

```

D1(config-rtr)# no passive-interface e1/2 //Se activa el anuncio en la
interface
D1(config-rtr)# exit
D1(config)#interface e1/2 //Se accede a la interface
D1(config-if)# ipv6 ospf 6 area 0 //se configura el
enrutamiento ospf ipv6 en el área 0
D1(config-if)# exit
D1(config)#interface vlan 100 //Se accede a la interface
D1(config-if)# ipv6 ospf 6 area 0 //se configura el
enrutamiento ospf ipv6 en el área 0
D1(config-if)# exit
D1(config)#interface vlan 101 //Se accede a la interface
D1(config-if)# ipv6 ospf 6 area 0 //se configura el
enrutamiento ospf ipv6 en el área 0
D1(config-if)# exit
D1(config)#interface vlan 102 //Se accede a la interface
D1(config-if)# ipv6 ospf 6 area 0 //se configura el
enrutamiento ospf ipv6 en el área 0
D1(config-if)# exit
D1(config)#end

```

Configuración en D2

```

D2#configure terminal
D2(config)#router ospf 4 //Se configura OSPF IPv4
D2(config-router)# router-id 0.0.4.132 //Se asigna el id OSPF
D2(config-router)# network 10.56.100.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D2(config-router)# network 10.56.101.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D2(config-router)# network 10.56.102.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D2(config-router)# network 10.56.11.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D2(config-router)# passive-interface default //Se desactiva los anuncios
en todas las interfaces
D2(config-router)# no passive-interface e1/0 //Se activa el anuncio en la
interface
D2(config-router)# exit
D2(config)#ipv6 router ospf 6 //Se configura OSPF IPv6
D2(config-rtr)# router-id 0.0.6.132 //Se asigna el id OSPF
D2(config-rtr)# passive-interface default //Se desactiva los anuncios
en todas las interfaces
D2(config-rtr)# no passive-interface e1/0 //Se activa el anuncio en la
interface

```

```

D2(config-rtr)# exit
D2(config)#interface e1/0 //Se accede a la interface
D2(config-if)# ipv6 ospf 6 area 0 //se configura el
enrutamiento ospf ipv6 en el área 0
D2(config-if)# exit
D2(config)#interface vlan 100 //Se accede a la interface
D2(config-if)# ipv6 ospf 6 area 0 //se configura el
enrutamiento ospf ipv6 en el área 0
D2(config-if)# exit
D2(config)#interface vlan 101 //Se accede a la interface
D2(config-if)# ipv6 ospf 6 area 0 //se configura el
enrutamiento ospf ipv6 en el área 0
D2(config-if)# exit
D2(config)#interface vlan 102 //Se accede a la interface
D2(config-if)# ipv6 ospf 6 area 0 //se configura el
enrutamiento ospf ipv6 en el área 0
D2(config-if)# exit
D2(config)#end

```

Figura 9. Validación de configuración OSPF en R1.

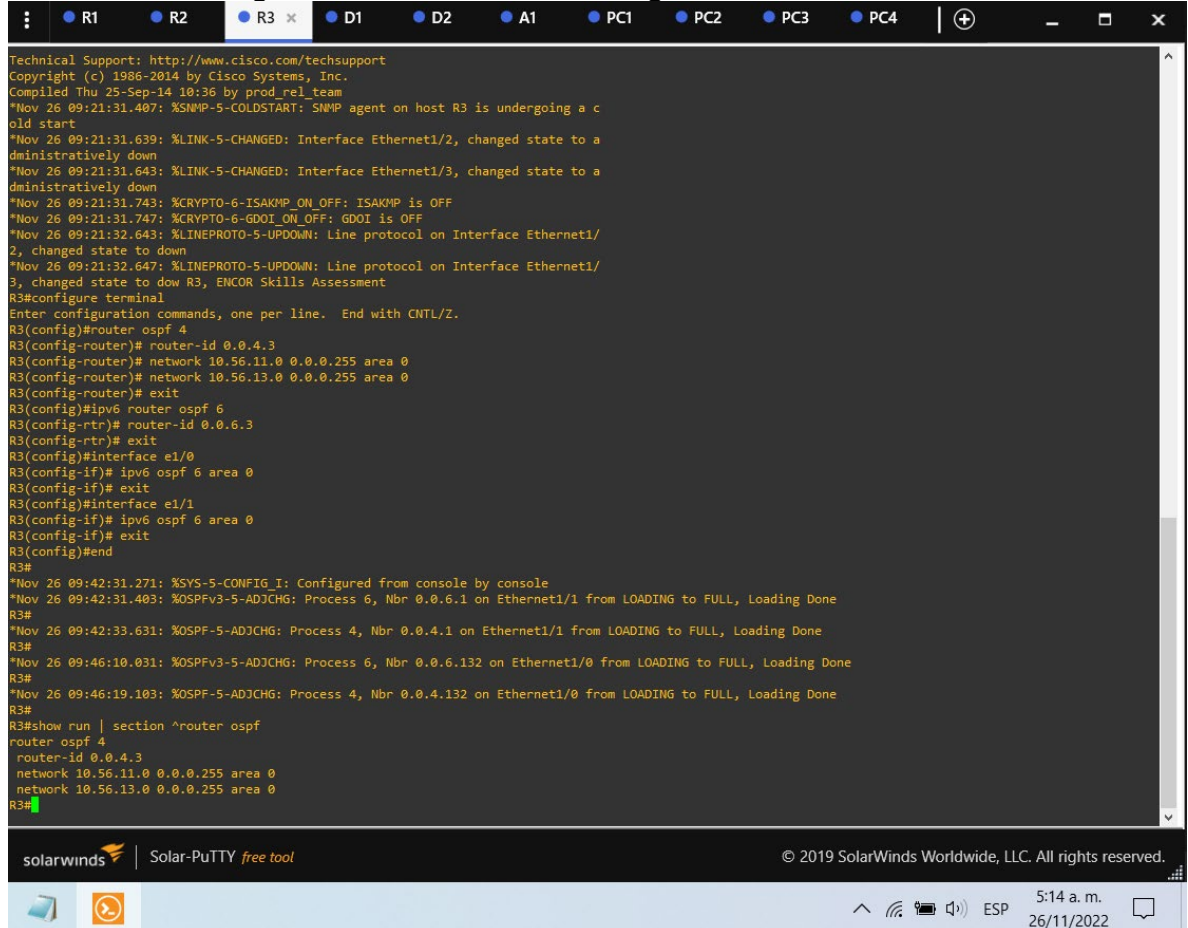
```

R1(config-rtr)# router-id 0.0.6.1
R1(config-rtr)# default-information originate
R1(config-rtr)# exit
R1(config)#interface e1/2
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 10.0.0.0 255.0.0.0 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 10.0.0.0 mask 255.0.0.0
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)#
*Nov 26 09:44:30.995: %BGP-5-ADJCHANGE: neighbor 209.165.200.226 Up
R1(config-router)#
*Nov 26 09:54:01.627: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config-router)#
*Nov 26 09:54:03.863: %OSPFv3-5-ADJCHG: Process 4, Nbr 0.0.4.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config-router)#
*Nov 26 09:56:41.755: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config-router)#
*Nov 26 09:56:46.299: %OSPFv3-5-ADJCHG: Process 4, Nbr 0.0.4.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config-router)#end
R1#
*Nov 26 10:07:56.415: %SYS-5-CONFIG_I: Configured from console by console
R1#show run | section ^router ospf
router ospf 4
  router-id 0.0.4.1
  network 10.56.10.0 0.0.0.255 area 0
  network 10.56.13.0 0.0.0.255 area 0
  default-information originate
R1#

```

Fuente: Autor.

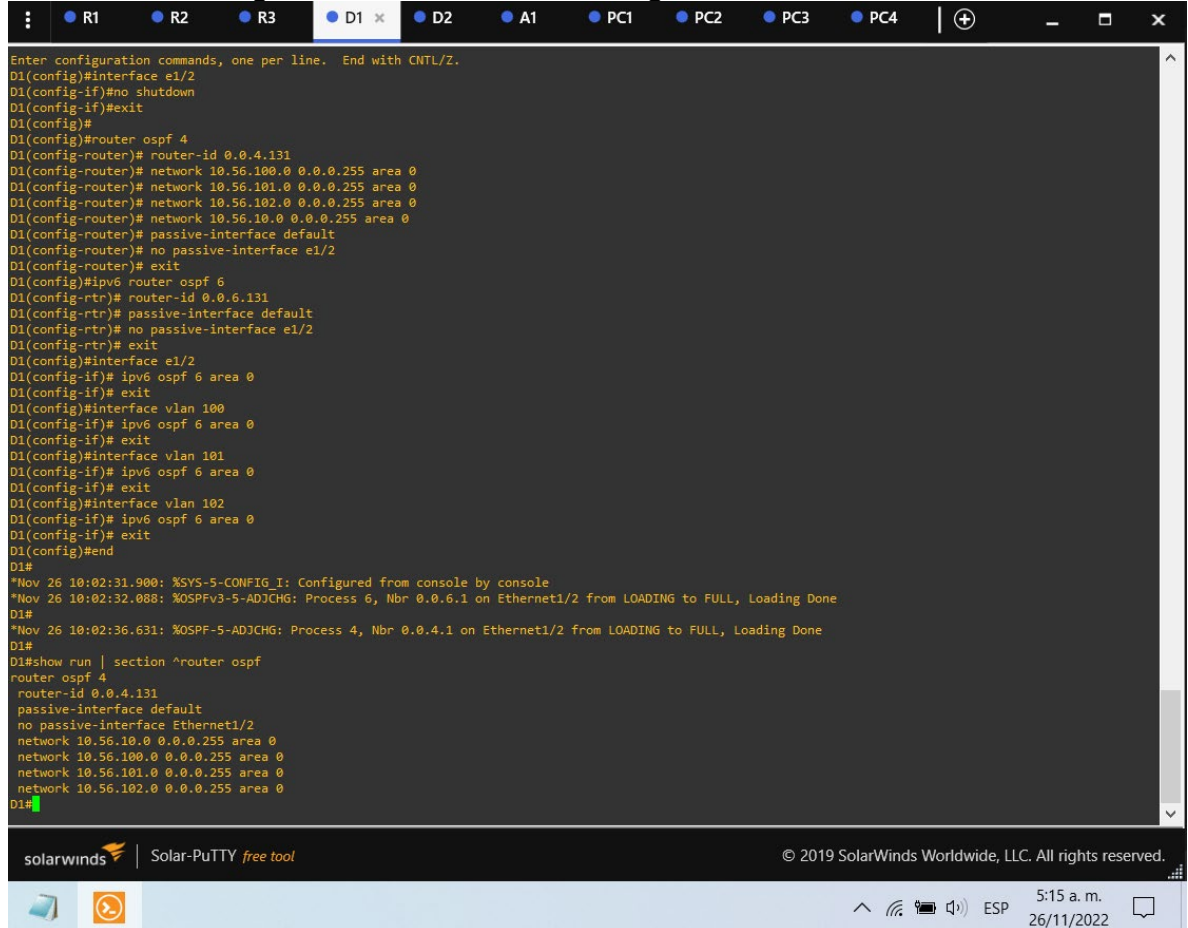
Figura 10. Validación de configuración OSPF en R3.



```
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Thu 25-Sep-14 10:36 by prod_rel_team
*Nov 26 09:21:31.407: %SNMP-5-COLDSTART: SNMP agent on host R3 is undergoing a c
old start
*Nov 26 09:21:31.639: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to a
dministratively down
*Nov 26 09:21:31.643: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to a
dministratively down
*Nov 26 09:21:31.743: %CRYPTO-6-ISAKMP_ON_OFF: ISAKMP is OFF
*Nov 26 09:21:31.747: %CRYPTO-6-GDOI_ON_OFF: GDOI is OFF
*Nov 26 09:21:32.643: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
2, changed state to down
*Nov 26 09:21:32.647: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
3, changed state to dow R3, ENCOR Skills Assessment
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 4
R3(config-router)# router-id 0.0.4.3
R3(config-router)# network 10.56.11.0 0.0.0.255 area 0
R3(config-router)# network 10.56.13.0 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
R3#
*Nov 26 09:42:31.271: %SYS-5-CONFIG I: Configured from console by console
*Nov 26 09:42:31.403: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 26 09:42:33.631: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 26 09:46:10.031: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#
*Nov 26 09:46:19.103: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#
R3#show run | section ^router ospf
router ospf 4
 router-id 0.0.4.3
 network 10.56.11.0 0.0.0.255 area 0
 network 10.56.13.0 0.0.0.255 area 0
R3#
```

Fuente: Autor

Figura 11. Validación de configuración OSPF en D1.



```
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#interface e1/2
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#
D1(config)#router ospf 4
D1(config-router)# router-id 0.0.4.131
D1(config-router)# network 10.56.100.0 0.0.0.255 area 0
D1(config-router)# network 10.56.101.0 0.0.0.255 area 0
D1(config-router)# network 10.56.102.0 0.0.0.255 area 0
D1(config-router)# network 10.56.10.0 0.0.0.255 area 0
D1(config-router)# passive-interface default
D1(config-router)# no passive-interface e1/2
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 e1/2
D1(config-rtr)# exit
D1(config)#interface e1/2
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
D1#
*Nov 26 10:02:31.900: %SYS-5-CONFIG_I: Configured from console by console
*Nov 26 10:02:32.088: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/2 from LOADING to FULL, Loading Done
D1#
*Nov 26 10:02:36.631: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/2 from LOADING to FULL, Loading Done
D1#
D1#show run | section ^router ospf
router ospf 4
router-id 0.0.4.131
passive-interface default
no passive-interface Ethernet1/2
network 10.56.10.0 0.0.0.255 area 0
network 10.56.100.0 0.0.0.255 area 0
network 10.56.101.0 0.0.0.255 area 0
network 10.56.102.0 0.0.0.255 area 0
D1#
```

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5:15 a. m. 26/11/2022

Fuente: Autor.

Figura 12. Validación de configuración OSPF en D2.

```
*Nov 26 09:31:22.309: %IPV6_ND-4-DUPLICATE: Duplicate address 2001:DB8:100:101::2 on Vlan101
D2#
D2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#router ospf 4
D2(config-router)# router-id 0.0.4.132
D2(config-router)# network 10.56.100.0 0.0.0.255 area 0
D2(config-router)# network 10.56.101.0 0.0.0.255 area 0
D2(config-router)# network 10.56.102.0 0.0.0.255 area 0
D2(config-router)# network 10.56.11.0 0.0.0.255 area 0
D2(config-router)# passive-interface default
D2(config-router)# no passive-interface e1/0
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 e1/0
D2(config-rtr)# exit
D2(config)#interface e1/0
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
D2#
*Nov 26 10:03:30.416: %SYS-5-CONFIG_I: Configured from console by console
*Nov 26 10:03:30.609: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on Ethernet1/0 from LOADING to FULL, Loading Done
D2#
*Nov 26 10:03:39.679: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.3 on Ethernet1/0 from LOADING to FULL, Loading Done
D2#
D2#
D2#show run | section ^router ospf
router ospf 4
router-id 0.0.4.132
passive-interface default
no passive-interface Ethernet1/0
network 10.56.11.0 0.0.0.255 area 0
network 10.56.100.0 0.0.0.255 area 0
network 10.56.101.0 0.0.0.255 area 0
network 10.56.102.0 0.0.0.255 area 0
D2#
```

Fuente: Autor.

Figura 13. Validación de configuración OSPF IPv6 en R1.

```

R1(config)#ip route 10.0.0.0 255.0.0.0 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 10.0.0.0 mask 255.0.0.0
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)#
*Nov 26 09:44:30.995: %BGP-5-ADJCHANGE: neighbor 209.165.200.226 Up
R1(config-router)#
*Nov 26 09:44:35.083: %BGP-5-ADJCHANGE: neighbor 2001:DB8:200::2 Up
R1(config-router)#
*Nov 26 09:54:01.627: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config-router)#
*Nov 26 09:54:03.863: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config-router)#
*Nov 26 09:56:41.755: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config-router)#
*Nov 26 09:56:46.299: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config-router)#end
R1#
R1#
*Nov 26 10:07:56.415: %SYS-5-CONFIG_I: Configured from console by console
R1#show run | section ^router ospf
router ospf 4
  router-id 0.0.4.1
  network 10.56.10.0 0.0.0.255 area 0
  network 10.56.13.0 0.0.0.255 area 0
  default-information originate
R1#show run | section ^ipv6 route
ipv6 route 2001:DB8:100::/48 Null0
ipv6 router ospf 6
  router-id 0.0.6.1
  default-information originate
R1#show ipv6 ospf interface brief

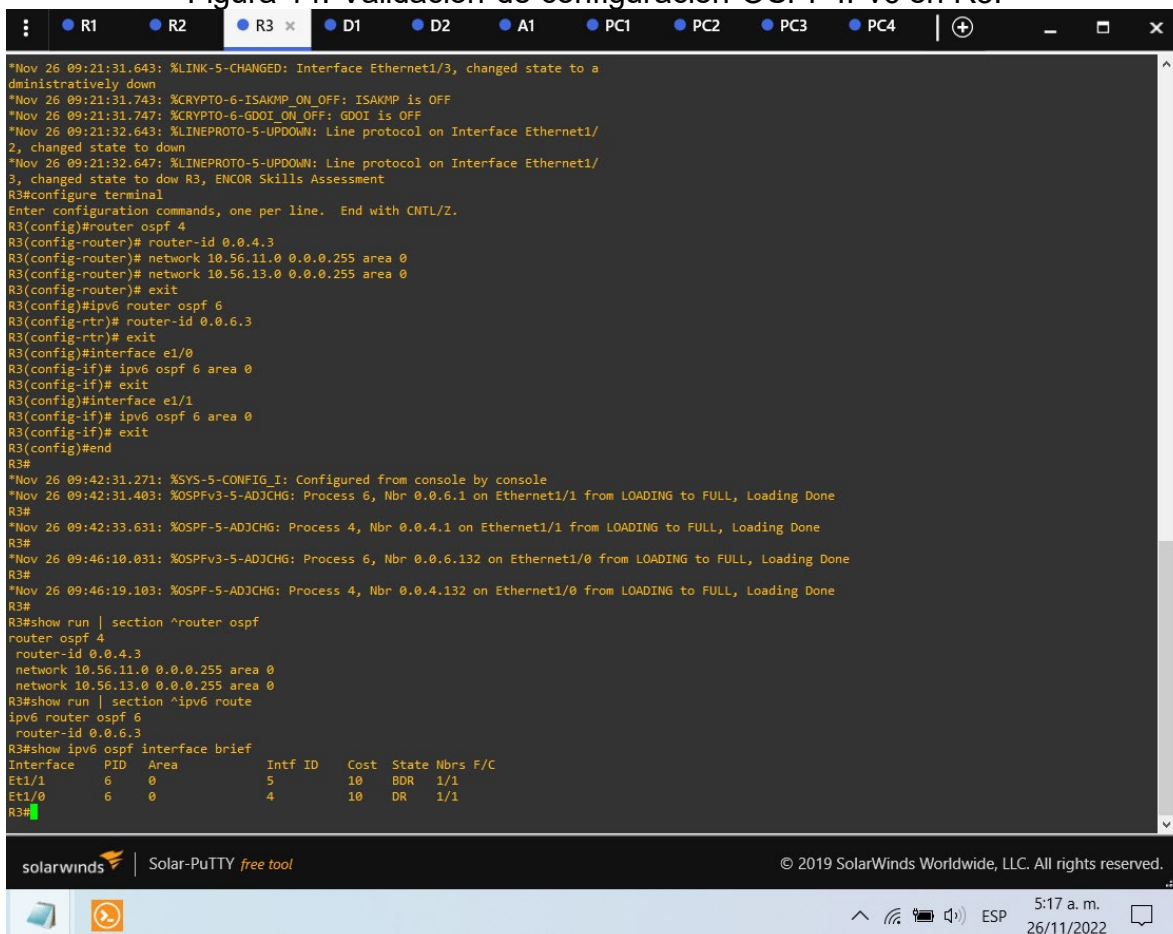
```

Interface	PID	Area	Intf ID	Cost	State	Nbrs	F/C
Et1/1	6	0	5	10	DR	1/1	
Et1/2	6	0	6	10	DR	1/1	

R1#

Fuente: Autor.

Figura 14. Validación de configuración OSPF IPv6 en R3.



```
*Nov 26 09:21:31.643: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to a
administratively down
*Nov 26 09:21:31.743: %CRYPTO-6-ISAKMP_ON_OFF: ISAKMP is OFF
*Nov 26 09:21:31.747: %CRYPTO-6-GDOI_ON_OFF: GDOI is OFF
*Nov 26 09:21:32.643: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
2, changed state to down
*Nov 26 09:21:32.647: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
3, changed state to dow R3, ENCOR Skills Assessment
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 4
R3(config-router)# router-id 0.0.4.3
R3(config-router)# network 10.56.11.0 0.0.0.255 area 0
R3(config-router)# network 10.56.13.0 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
R3#
*Nov 26 09:42:31.271: %SYS-5-CONFIG_I: Configured from console by console
*Nov 26 09:42:31.403: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 26 09:42:33.631: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 26 09:46:10.031: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#
*Nov 26 09:46:19.103: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#
R3#show run | section ^router ospf
router ospf 4
router-id 0.0.4.3
network 10.56.11.0 0.0.0.255 area 0
network 10.56.13.0 0.0.0.255 area 0
R3#show run | section ^ipv6 route
ipv6 router ospf 6
router-id 0.0.6.3
R3#show ip ospf interface brief
Interface PID Area Intf ID Cost State Nbrs F/C
Et1/1 6 0 5 10 BDR 1/1
Et1/0 6 0 4 10 DR 1/1
R3#
```

Fuente: Autor.

Figura 15. Validación de configuración OSPF IPv6 en D1.

```
D1(config-router)# passive-interface default
D1(config-router)# no passive-interface e1/2
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 e1/2
D1(config-rtr)# exit
D1(config)#interface e1/2
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
D1#
*Nov 26 10:02:31.900: %SYS-5-CONFIG_I: Configured from console by console
*Nov 26 10:02:32.088: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/2 from LOADING to FULL, Loading Done
D1#
*Nov 26 10:02:36.631: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/2 from LOADING to FULL, Loading Done
D1#
D1#show run | section ^router ospf
router ospf 4
  router-id 0.0.4.131
  passive-interface default
  no passive-interface Ethernet1/2
  network 10.56.10.0 0.0.0.255 area 0
  network 10.56.100.0 0.0.0.255 area 0
  network 10.56.101.0 0.0.0.255 area 0
  network 10.56.102.0 0.0.0.255 area 0
D1#show run | section ^ipv6 route
ipv6 router ospf 6
  router-id 0.0.6.131
  passive-interface default
  no passive-interface Ethernet1/2
D1#show ipv6 ospf interface brief

```

Interface	PID	Area	Intf ID	Cost	State	Nbrs	F/C
V1102	6	0	25	1	DR	0/0	
V1101	6	0	24	1	DR	0/0	
V1100	6	0	23	1	DR	0/0	
E1/2	6	0	21	10	BDR	1/1	

D1#

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Fuente: Autor.

Figura 16. Validación de configuración OSPF IPv6 en D2.

```
D2(config-router)# no passive-interface e1/0
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 e1/0
D2(config-rtr)# exit
D2(config)#interface e1/0
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
D2#
*Nov 26 10:03:30.416: %SYS-5-CONFIG I: Configured from console by console
*Nov 26 10:03:30.609: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on Ethernet1/0 from LOADING to FULL, Loading Done
D2#
*Nov 26 10:03:39.679: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.3 on Ethernet1/0 from LOADING to FULL, Loading Done
D2#
D2#
D2#show run | section ^router ospf
router ospf 4
router-id 0.0.4.132
passive-interface default
no passive-interface Ethernet1/0
network 10.56.11.0 0.0.0.255 area 0
network 10.56.100.0 0.0.0.255 area 0
network 10.56.101.0 0.0.0.255 area 0
network 10.56.102.0 0.0.0.255 area 0
D2#show run | section ^ipv6 route
ipv6 router ospf 6
router-id 0.0.6.132
passive-interface default
no passive-interface Ethernet1/0
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 BDR 1/1
D2#
```

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Fuente: Autor.

Figura 17. Validación de configuración BGP y rutas estáticas en R2.



```
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)#
*Nov 26 09:37:30.883: %BGP-5-ADJCHANGE: neighbor 209.165.200.225 Up
R2(config-router)#
*Nov 26 09:37:34.963: %BGP-5-ADJCHANGE: neighbor 2001:DB8:200::1 Up
R2(config-router)#end
R2#
*Nov 26 10:04:45.587: %SYS-5-CONFIG_I: Configured from console by console
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::/128
    neighbor 2001:DB8:200::1 activate
  exit-address-family
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#
```

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Fuente: Autor.

Figura 18. Validación de configuración BGP en R1.



```
*Nov 26 09:44:30.995: %BGP-5-ADJCHANGE: neighbor 209.165.200.226 Up
R1(config-router)#
*Nov 26 09:44:35.083: %BGP-5-ADJCHANGE: neighbor 2001:DB8:200::2 Up
R1(config-router)#
*Nov 26 09:54:01.627: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config-router)#
*Nov 26 09:54:03.863: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config-router)#
*Nov 26 09:56:41.755: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config-router)#
*Nov 26 09:56:46.299: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config-router)#end
R1#
R1#
*Nov 26 10:07:56.415: %SYS-5-CONFIG_I: Configured from console by console
R1#show run | section ^router ospf
router ospf 4
router-id 0.0.4.1
network 10.56.10.0 0.0.0.255 area 0
network 10.56.13.0 0.0.0.255 area 0
default-information originate
R1#show run | section ^ipv6 route
ipv6 route 2001:DB8:100::/48 Null0
ipv6 router ospf 6
router-id 0.0.6.1
default-information originate
R1#show ipv6 ospf interface brief
Interface PID Area Intf ID Cost State Nbrs F/C
Et1/1 6 0 5 10 DR 1/1
Et1/2 6 0 6 10 DR 1/1
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
network 10.0.0.0
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#
```

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Fuente: Autor.

Figura 19. Validación de rutas ip BGP y OSPF en R1.



```
R1#
R1#
*Nov 26 10:07:56.415: %SYS-5-CONFIG_I: Configured from console by console
R1#show run | section ^router ospf
router ospf 4
  router-id 0.0.4.1
  network 10.56.10.0 0.0.0.255 area 0
  network 10.56.13.0 0.0.0.255 area 0
  default-information originate
R1#show run | section ^ipv6 route
ipv6 route 2001:DB8:100::/48 Null0
ipv6 router ospf 6
  router-id 0.0.6.1
  default-information originate
R1#show ipv6 ospf interface brief

```

Interface	PID	Area	Intf ID	Cost	State	Nbrs	F/C
E1/1	6	0	5	10	DR	1/1	
E1/2	6	0	6	10	DR	1/1	

```
R1#show run | section bgp
router bgp 300
  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
    network 10.0.0.0
    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#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, I - LISp
B* 0.0.0.0 [20/0] via 209.165.200.226, 00:27:46
B  2.2.2.2 [20/0] via 209.165.200.226, 00:27:46
O  10.56.11.0/24 [110/20] via 10.56.13.3, 00:18:09, Ethernet1/1
O  10.56.100.0/24 [110/11] via 10.56.10.2, 00:15:27, Ethernet1/2
O  10.56.101.0/24 [110/11] via 10.56.10.2, 00:15:27, Ethernet1/2
O  10.56.102.0/24 [110/11] via 10.56.10.2, 00:15:27, Ethernet1/2
R1#
```

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Fuente: Autor.

Figura 20. Validación de rutas IPv6 en R1.

```
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, 00:27:46
B 2.2.2.2 [20/0] via 209.165.200.226, 00:27:46
O 10.56.11.0/24 [110/20] via 10.56.13.3, 00:18:09, Ethernet1/1
O 10.56.100.0/24 [110/11] via 10.56.10.2, 00:15:27, Ethernet1/2
O 10.56.101.0/24 [110/11] via 10.56.10.2, 00:15:27, Ethernet1/2
O 10.56.102.0/24 [110/11] via 10.56.10.2, 00:15:27, Ethernet1/2
R1#show ipv6 route
IPv6 Routing Table - default - 13 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
B ::0 [20/0]
S via FE80::2:1, Ethernet1/0
S 2001:DB8:100::/48 [1/0]
O via Null0, directly connected
O 2001:DB8:100:100::/64 [110/11]
O via FE80::D1:1, Ethernet1/2
O 2001:DB8:100:101::/64 [110/11]
O via FE80::D1:1, Ethernet1/2
O 2001:DB8:100:102::/64 [110/11]
O via FE80::D1:1, Ethernet1/2
C 2001:DB8:100:1010::/64 [0/0]
O via Ethernet1/2, directly connected
L 2001:DB8:100:1010:1/128 [0/0]
O via Ethernet1/2, receive
O 2001:DB8:100:1011::/64 [110/20]
O via FE80::3:3, Ethernet1/1
C 2001:DB8:100:1013::/64 [0/0]
O via Ethernet1/1, directly connected
L 2001:DB8:100:1013:1/128 [0/0]
O via Ethernet1/1, receive
C 2001:DB8:200::/64 [0/0]
O via Ethernet1/0, directly connected
L 2001:DB8:200:1/128 [0/0]
O via Ethernet1/0, receive
L FF00::/8 [0/0]
O via Null0, receive
R1#
R1#
```

Fuente: Autor.

Figura 21. Validación de rutas IPv4 OSPF comenzando en Gateway en R3.



```
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 4
R3(config-router)# router-id 0.0.4.3
R3(config-router)# network 10.56.11.0 0.0.0.255 area 0
R3(config-router)# network 10.56.13.0 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
R3#
*Nov 26 09:42:31.271: %SYS-5-CONFIG_I: Configured from console by console
*Nov 26 09:42:31.403: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 26 09:42:33.631: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 26 09:46:10.031: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#
*Nov 26 09:46:19.103: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#
R3#show run | section ^router ospf
router ospf 4
  router-id 0.0.4.3
  network 10.56.11.0 0.0.0.255 area 0
  network 10.56.13.0 0.0.0.255 area 0
R3#show run | section ^ipv6 route
ipv6 router ospf 6
  router-id 0.0.6.3
R3#show ipv6 ospf interface brief
Interface  PID  Area      Intf ID  Cost  State  Nbrs  F/C
Et1/1     6   0         5        10   BDR    1/1
Et1/0     6   0         4        10   DR     1/1
R3#show ip route ospf | begin Gateway
Gateway of last resort is 10.56.13.1 to network 0.0.0.0

O*E2  0.0.0.0/0 [110/1] via 10.56.13.1, 00:18:38, Ethernet1/1
      10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
O     10.56.10.0/24 [110/20] via 10.56.13.1, 00:18:38, Ethernet1/1
O     10.56.100.0/24 [110/11] via 10.56.11.2, 00:14:51, Ethernet1/0
O     10.56.101.0/24 [110/11] via 10.56.11.2, 00:14:51, Ethernet1/0
O     10.56.102.0/24 [110/11] via 10.56.11.2, 00:14:51, Ethernet1/0
R3#
```

Fuente: Autor.

Figura 22. Validación de rutas IPv6 OSPF en R3.

```

R3#
*Nov 26 09:42:33.631: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 26 09:46:10.031: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#
*Nov 26 09:46:19.103: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#
R3#show run | section ^router ospf
router ospf 4
  router-id 0.0.4.3
  network 10.56.11.0 0.0.0.255 area 0
  network 10.56.13.0 0.0.0.255 area 0
R3#show run | section ^ipv6 route
ipv6 router ospf 6
  router-id 0.0.6.3
R3#show ipv6 ospf interface brief
Interface  PID  Area          Intf ID  Cost  State  Nbrs  F/C
Et1/1     6   0             5        10   BDR    1/1
Et1/0     6   0             4        10   DR     1/1
R3#show ip route ospf | begin Gateway
Gateway of last resort is 10.56.13.1 to network 0.0.0.0

O*E2  0.0.0.0/0 [110/1] via 10.56.13.1, 00:18:38, Ethernet1/1
      10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
O      10.56.10.0/24 [110/20] via 10.56.13.1, 00:18:38, Ethernet1/1
O      10.56.100.0/24 [110/11] via 10.56.11.2, 00:14:51, Ethernet1/0
O      10.56.101.0/24 [110/11] via 10.56.11.2, 00:14:51, Ethernet1/0
O      10.56.102.0/24 [110/11] via 10.56.11.2, 00:14:51, Ethernet1/0
R3#show ipv6 route ospf
IPv6 Routing Table - default - 10 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, O - EIGRP, EX - EIGRP external, NW - 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, 1 - LISP
OE2 ::/0 [110/1], tag 6
      via FE80::1:3, Ethernet1/1
O  2001:DB8:100:100::/64 [110/11]
      via FE80::D1:1, Ethernet1/0
O  2001:DB8:100:101::/64 [110/21]
      via FE80::1:3, Ethernet1/1
O  2001:DB8:100:102::/64 [110/11]
      via FE80::D1:1, Ethernet1/0
O  2001:DB8:100:1013::/64 [110/10]
      via Ethernet1/1, directly connected
R3#

```

Fuente: Autor.

2.1.4. 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. Tabla de tareas a realizar en la parte 4.

Task#	Task	Specification
4.1	On D1, create IP SLAs that test the	Create two IP SLAs. <ul style="list-style-type: none"> • Use SLA number 4 for IPv4. • Use SLA number 6 for IPv6.

Task#	Task	Specification
	reachability of R1 interface E1/2.	<p>The IP SLAs will test availability of R1 E1/2 interface every 5 seconds.</p> <p>Schedule the SLA for immediate implementation with no end time.</p> <p>Create an IP SLA object for IP SLA 4 and one for IP SLA 6.</p> <ul style="list-style-type: none"> • Use track number 4 for IP SLA 4. • Use track number 6 for IP SLA 6. <p>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.</p>
4.2	On D2, create IP SLAs that test the reachability of R3 interface E1/0.	<p>Create two IP SLAs.</p> <ul style="list-style-type: none"> • Use SLA number 4 for IPv4. • Use SLA number 6 for IPv6. <p>The IP SLAs will test availability of R3 E1/0 interface every 5 seconds.</p> <p>Schedule the SLA for immediate implementation with no end time.</p> <p>Create an IP SLA object for IP SLA 4 and one for IP SLA 6.</p> <ul style="list-style-type: none"> • Use track number 4 for IP SLA 4. • Use track number 6 for IP SLA 6. <p>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.</p>
4.3	On D1, configure HSRPv2.	<p>D1 is the primary router for VLANs 100 and 102; therefore, their priority will also be changed to 150.</p> <p>Configure HSRP version 2.</p> <p>Configure IPv4 HSRP group 104 for VLAN 100:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.56.100.254. • Set the group priority to 150. • Enable preemption. • Track object 4 and decrement by 60. <p>Configure IPv4 HSRP group 114 for VLAN 101:</p>

Task#	Task	Specification
		<ul style="list-style-type: none"> • Assign the virtual IP address 10.56.101.254. • Enable preemption. • Track object 4 to decrement by 60. Configure IPv4 HSRP group 124 for VLAN 102: <ul style="list-style-type: none"> • Assign the virtual IP address 10.56.102.254. • Set the group priority to 150. • Enable preemption. • Track object 4 to decrement by 60. Configure IPv6 HSRP group 106 for VLAN 100: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Assign the virtual IP address 10.56.100.254. • Enable preemption. • Track object 4 and decrement by 60. Configure IPv4 HSRP group 114 for VLAN 101: <ul style="list-style-type: none"> • Assign the virtual IP address 10.56.101.254. • Set the group priority to 150. • Enable preemption. • Track object 4 to decrement by 60. Configure IPv4 HSRP group 124 for VLAN 102: <ul style="list-style-type: none"> • Assign the virtual IP address 10.56.102.254. • Enable preemption. • Track object 4 to decrement by 60.

Task#	Task	Specification
		Configure IPv6 HSRP group 106 for VLAN 100: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Enable preemption. • Track object 6 and decrement by 60.

Fuente: Autor del documento.

Configuración en D1

```

D1#configure terminal
D1(config)#ip sla 4 //Se configura SLA con
numero 4 para IPv4
D1(config-ip-sla)# icmp-echo 10.56.10.1 //Se configura la interfaz de
prueba
D1(config-ip-sla-echo)# frequency 5 //Se configura la frecuencia
de la prueba
D1(config-ip-sla-echo)# exit
D1(config)#ip sla 6 //Se configura SLA con
numero 6 para IPv6
D1(config-ip-sla)# icmp-echo 2001:db8:100:1010::1 //Se configura la interfaz de
prueba
D1(config-ip-sla-echo)# frequency 5 //Se configura la frecuencia
de la prueba
D1(config-ip-sla-echo)# exit
D1(config)#ip sla schedule 4 life forever start-time now //Se programa SLA
para implementacion inmediata sin tiempo de finalización
D1(config)#ip sla schedule 6 life forever start-time now //Se programa SLA
para implementacion inmediata sin tiempo de finalización
D1(config)#track 4 ip sla 4 //Se configura una pista con
id 4

```

```

D1(config-track)# delay down 10 up 15 //Se configuran los tiempo
de notificación de abajo a arriba después de 10 sg o de arriba abajo después de
15 sg
D1(config-track)# exit
D1(config)#track 6 ip sla 6 //Se configura una pista con
id 6
D1(config-track)# delay down 10 up 15 //Se configuran los tiempo
de notificación de abajo a arriba después de 10 sg o de arriba abajo después de
15 sg
D1(config-track)# exit
D1(config)#interface vlan 100 //Se accede a la interfaz
D1(config-if)# standby version 2 //Se configura HSRP version
2
D1(config-if)# standby 104 ip 10.56.100.254 //Se asigna una dirección ip
virtual
D1(config-if)# standby 104 priority 150 //Se configura la prioridad de
grupo
D1(config-if)# standby 104 preempt //Se habilita preferencia
D1(config-if)# standby 104 track 4 decrement 60 //Se configura una pista con
decremento de 60
D1(config-if)# standby 106 ipv6 autoconfig //Se asigna una dirección ip
virtual autoconfigurable
D1(config-if)# standby 106 priority 150 //Se configura la prioridad de
grupo
D1(config-if)# standby 106 preempt //Se habilita preferencia
D1(config-if)# standby 106 track 6 decrement 60 //Se configura una pista con
decremento de 60
D1(config-if)# exit
D1(config)#interface vlan 101 //Se accede a la interfaz
D1(config-if)# standby version 2 //Se configura HSRP version
2
D1(config-if)# standby 114 ip 10.56.101.254 //Se asigna una dirección ip
virtual
D1(config-if)# standby 114 preempt //Se habilita preferencia
D1(config-if)# standby 114 track 4 decrement 60 //Se configura una pista con
decremento de 60
D1(config-if)# standby 116 ipv6 autoconfig //Se asigna una dirección ip
virtual autoconfigurable
D1(config-if)# standby 116 preempt //Se habilita preferencia
D1(config-if)# standby 116 track 6 decrement 60 //Se configura una pista con
decremento de 60
D1(config-if)# exit
D1(config)#interface vlan 102 //Se accede a la interfaz
D1(config-if)# standby version 2 //Se configura HSRP version
2

```

```

D1(config-if)# standby 124 ip 10.56.102.254 //Se asigna una dirección ip
virtual
D1(config-if)# standby 124 priority 150 //Se configura la prioridad de
grupo
D1(config-if)# standby 124 preempt //Se habilita preferencia
D1(config-if)# standby 124 track 4 decrement 60 //Se configura una pista con
decremento de 60
D1(config-if)# standby 126 ipv6 autoconfig //Se asigna una dirección ip
virtual autoconfigurable
D1(config-if)# standby 126 priority 150 //Se configura la prioridad de
grupo
D1(config-if)# standby 126 preempt //Se habilita preferencia
D1(config-if)# standby 126 track 6 decrement 60 //Se configura una pista con
decremento de 60
D1(config-if)# exit
D1(config)#end

```

Configuración en D2

```

D2#configure terminal
D2(config)#ip sla 4 //Se configura SLA con
numero 4 para IPv4
D2(config-ip-sla)# icmp-echo 10.56.11.1 //Se configura la interfaz de
prueba
D2(config-ip-sla-echo)# frequency 5 //Se configura la frecuencia
de la prueba
D2(config-ip-sla-echo)#exit
D2(config)#ip sla 6 //Se configura SLA con
numero 6 para IPv6
D2(config-ip-sla)# icmp-echo 2001:db8:100:1011::1 //Se configura la interfaz de
prueba
D2(config-ip-sla-echo)# frequency 5 //Se configura la frecuencia
de la prueba
D2(config-ip-sla-echo)#exit
D2(config)#ip sla schedule 4 life forever start-time now //Se programa SLA
para implementacion inmediata sin tiempo de finalización
D2(config)#ip sla schedule 6 life forever start-time now //Se programa SLA
para implementacion inmediata sin tiempo de finalización
D2(config)#track 4 ip sla 4 //Se configura una pista con
id 4
D2(config-track)# delay down 10 up 15 //Se configuran los tiempo
de notificación de abajo a arriba después de 10 sg o de arriba abajo después de
15 sg
D2(config-track)# exit

```



```

D2(config)#track 6 ip sla 6 //Se configura una pista con
id 6
D2(config-track)# delay down 10 up 15 //Se configuran los tiempo
de notificación de abajo a arriba después de 10 sg o de arriba abajo después de
15 sg
D2(config-track)# exit
D2(config)#interface vlan 100 //Se accede a la interfaz
D2(config-if)# standby version 2 //Se configura HSRP version
2
D2(config-if)# standby 104 ip 10.56.100.254 //Se asigna una dirección ip
virtual
D2(config-if)# standby 104 preempt //Se habilita preferencia
D2(config-if)# standby 104 track 4 decrement 60 //Se configura una pista con
decremento de 60
D2(config-if)# standby 106 ipv6 autoconfig //Se asigna una dirección ip
virtual autoconfigurable
D2(config-if)# standby 106 preempt //Se habilita preferencia
D2(config-if)# standby 106 track 6 decrement 60 //Se configura una pista con
decremento de 60
D2(config-if)# exit
D2(config)#interface vlan 101 //Se accede a la interfaz
D2(config-if)# standby version 2 //Se configura HSRP version
2
D2(config-if)# standby 114 ip 10.56.101.254 //Se asigna una dirección ip
virtual
D2(config-if)# standby 114 priority 150 //Se configura la prioridad de
grupo
D2(config-if)# standby 114 preempt //Se habilita preferencia
D2(config-if)# standby 114 track 4 decrement 60 //Se configura una pista con
decremento de 60
D2(config-if)# standby 116 ipv6 autoconfig //Se asigna una dirección ip
virtual autoconfigurable
D2(config-if)# standby 116 priority 150 //Se configura la prioridad de
grupo
D2(config-if)# standby 116 preempt //Se habilita preferencia
D2(config-if)# standby 116 track 6 decrement 60 //Se configura una pista con
decremento de 60
D2(config-if)# exit
D2(config)#interface vlan 102 //Se accede a la interfaz
D2(config-if)# standby version 2 //Se configura HSRP version
2
D2(config-if)# standby 124 ip 10.56.102.254 //Se asigna una dirección ip
virtual
D2(config-if)# standby 124 preempt //Se habilita preferencia

```

```

D2(config-if)# standby 124 track 4 decrement 60 //Se configura una pista con
decremento de 60
D2(config-if)# standby 126 ipv6 autoconfig //Se asigna una dirección ip
virtual autoconfigurable
D2(config-if)# standby 126 preempt //Se habilita preferencia
D2(config-if)# standby 126 track 6 decrement 60 //Se configura una pista con
decremento de 60
D2(config-if)# exit
D2(config)#end

```

Figura 23. Validación de la configuración IP SLA en D1.

```

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 10.56.102.254
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#
*Nov 26 10:21:18.220: %SYS-5-CONFIG_I: Configured from console by console
D1#
*Nov 26 10:21:40.417: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Standby -> Active
*Nov 26 10:21:40.843: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Standby -> Active
*Nov 26 10:21:41.164: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Standby -> Active
*Nov 26 10:21:41.270: %HSRP-5-STATECHANGE: Vlan102 Grp 124 state Standby -> Active
D1#
*Nov 26 10:21:41.788: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Standby -> Active
D1#
*Nov 26 10:21:53.244: %HSRP-5-STATECHANGE: Vlan100 Grp 104 state Standby -> Active
D1#
*Nov 26 10:22:22.714: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Active -> Speak
*Nov 26 10:22:23.026: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Active -> Speak
D1#
*Nov 26 10:22:33.684: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Speak -> Standby
*Nov 26 10:22:34.633: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Speak -> Standby
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 10.56.10.1
  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: Autor.

Figura 24. Validación del standby en D1.

```

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#
*Nov 26 10:21:18.220: %SYS-5-CONFIG_I: Configured from console by console
D1#
*Nov 26 10:21:40.417: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Standby -> Active
*Nov 26 10:21:40.843: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Standby -> Active
*Nov 26 10:21:41.164: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Standby -> Active
*Nov 26 10:21:41.270: %HSRP-5-STATECHANGE: Vlan102 Grp 124 state Standby -> Active
D1#
*Nov 26 10:21:41.788: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Standby -> Active
D1#
*Nov 26 10:21:53.244: %HSRP-5-STATECHANGE: Vlan100 Grp 104 state Standby -> Active
D1#
*Nov 26 10:22:22.714: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Active -> Speak
*Nov 26 10:22:23.026: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Active -> Speak
D1#
*Nov 26 10:22:33.684: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Speak -> Standby
*Nov 26 10:22:34.633: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Speak -> Standby
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 10.56.10.1
  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#show standby brief
          P indicates configured to preempt.
Interface  Grp  Pri  P State  Active      Standby      Virtual IP
Vl100      104  150  P Active local      10.56.100.2  10.56.100.254
Vl100      106  150  P Active local      FE80::D2:2  FE80::5:73FF:FEA0:6A
Vl101      114  100  P Standby 10.56.101.2 local        10.56.101.254
Vl101      116  100  P Standby FE80::D2:3 local        FE80::5:73FF:FEA0:74
Vl102      124  150  P Active local      10.56.102.2  10.56.102.254
Vl102      126  150  P Active local      FE80::D2:4  FE80::5:73FF:FEA0:7E
D1#
  
```

Fuente: Autor.

Figura 25. Validación de la configuración IP SLA en D2.

```
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 10.56.101.254
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 10.56.102.254
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#
*Nov 26 10:22:02.510: %SYS-5-CONFIG_I: Configured from console by console
D2#
*Nov 26 10:22:22.713: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Speak -> Active
*Nov 26 10:22:23.025: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Speak -> Active
D2#
*Nov 26 10:22:26.060: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Speak -> Standby
*Nov 26 10:22:26.264: %HSRP-5-STATECHANGE: Vlan100 Grp 104 state Speak -> Standby
*Nov 26 10:22:26.369: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Speak -> Standby
*Nov 26 10:22:26.969: %HSRP-5-STATECHANGE: Vlan102 Grp 124 state Speak -> Standby
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 10.56.11.1
 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#
```

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5:44 a. m. 26/11/2022

Fuente: Autor.

CONCLUSIONES

Con el desarrollo de esta prueba se comprende la mayoría de los conceptos vistos en el transcurso del curso del diplomado de profundización cisco y ayuda a desenvolverse teniendo como base estos escenarios que son asociados a problemas en la vida cotidiana

El estudiante utiliza herramientas de simulación y laboratorios de acceso remoto con el fin de establecer escenarios LAN/WAN que permitan realizar un análisis sobre el comportamiento de diversos protocolos y métricas de enrutamiento

Se identifica las herramientas de supervisión y protocolos de administración de red disponibles en el IOS para resolver los problemas de las redes de datos, evaluando el desempeño de routers y switches.

Finalmente, durante la evaluación, se probó y registró la red mediante los comandos comunes de CLI.

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