

DIPLOMADO DE PROFUNDIZACIÓN CISCO
PRUEBA DE HABILIDADES PRÁCTICAS CCNP

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA –UNAD
ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA
INGENIERÍA ELECTRÓNICA
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GLOSARIO

BGP: Protocolo de puerta de enlace fronteriza. Protocolo de enrutamiento entre dominios que reemplaza a EGP. BGP intercambia información de accesibilidad con otros sistemas BGP. Está definido por RFC 1163.

HSRP: Protocolo de enrutador Hot Standby. Proporciona una alta disponibilidad de red y cambios transparentes en la topología de la red. HSRP crea un grupo de enrutadores de reserva activa con un enrutador principal que atiende todos los paquetes enviados a la dirección de reserva activa. El enrutador principal es monitoreado por otros enrutadores del grupo. Si falla, uno de los enrutadores en espera hereda tanto la posición principal como la dirección de reserva activa.

NTP: Network Time Protocol es un protocolo de Internet para sincronizar los relojes de los sistemas informáticos a través del enrutamiento de paquetes en redes con latencia variable. NTP utiliza UDP como su capa de transporte, usando el puerto 123. Está diseñado para resistir los efectos de la latencia variable.

OSPF: Primero, abra el camino más corto. Algoritmo de enrutamiento IGP jerárquico de estado de enlace propuesto como sucesor de RIP en la comunidad de Internet. Las características de OSPF incluyen enrutamiento de menor costo, enrutamiento de múltiples rutas y equilibrio de carga. OSPF se derivó de una versión anterior del protocolo IS-IS.

STP: Es un protocolo de red de capa 2 del modelo OSI (capa de enlace de datos). Su función es la de gestionar la presencia de bucles en topologías de red debido a la existencia de enlaces redundantes (necesarios en muchos casos para garantizar la disponibilidad de las conexiones). El protocolo permite a los dispositivos de interconexión activar o desactivar automáticamente los enlaces de conexión, de forma que se garantice la eliminación de bucles. STP es transparente a las estaciones de usuario.

VLAN: LAN virtual. Grupo de dispositivos en una o más LAN que están configurados (usando software de administración) para que puedan comunicarse como si estuvieran conectados al mismo cable, cuando en realidad están ubicados en varios segmentos de LAN diferentes.

RESUMEN

Para esta actividad, se realizan las tareas asignadas en el escenario propuesto, acompañado de los respectivos procesos de documentación de la solución, correspondientes al registro de la configuración de cada uno de los dispositivos, la descripción detallada del paso a paso de cada una de las etapas realizadas durante su desarrollo, el registro de los procesos de verificación de conectividad mediante el uso de comandos ping, traceroute, show ip route, entre otros.

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

ABSTRACT

For this activity, the tasks assigned in the proposed scenario are carried out, accompanied by the respective documentation processes of the solution, corresponding to the registration of the configuration of each of the devices, the detailed description of the step by step of each of the stages carried out during its development, the registration of the connectivity verification processes through the use of ping, traceroute, and show ip route commands, among others.

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

1. INTRODUCCIÓN

En el desarrollo de esta actividad se ponen a prueba una serie de retos que ponen a prueba los conceptos aprendidos durante el transcurso del diplomado de profundización y que a través de ellos se deban realizar los lineamientos estipulados para realizar la topología de red propuesta, estos pasos consisten en realizar implementaciones de la configuración en cada uno de los dispositivos que hacen parte de la red y estas van desde de seguridad hasta la aplicación de funciones de administración de red.

Se realiza la adecuación de los puertos de acceso con la configuración de VLAN adecuada, como se muestra en el diagrama de topología. Los puertos de host deben pasar inmediatamente al estado de reenvío (forwarding). Cada uno de los dispositivos está configurado previamente por su protocolo de enrutamiento OSPF en el área 0, se realiza la implementación de rutas predeterminadas y además, se configuran los switches para habilitar el enlace trunk 802.1Q entre ellos.

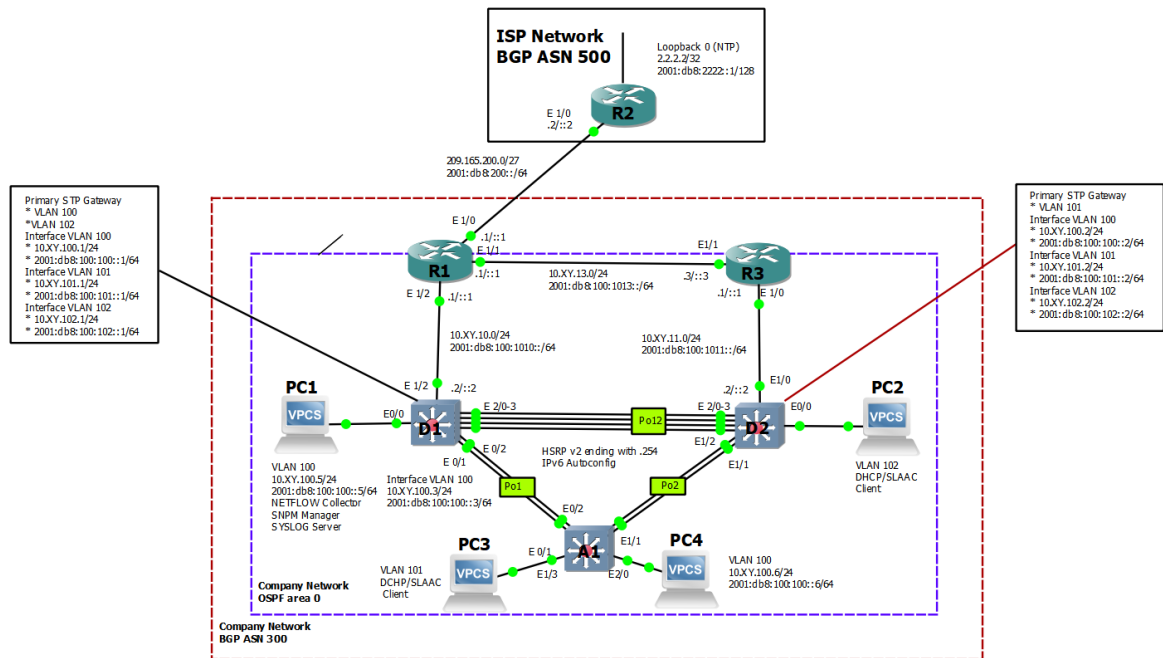
Al final de esta parte, todos los switches deben poder comunicarse. PC2 y PC3 deben recibir direccionamiento de DHCP y SLAAC. En todos los switches se habilita el protocolo Rapid Spanning-Tree y se realiza la configuración de D1 y D2 como raíz para las VLAN apropiadas, con prioridades de apoyo mutuo en caso de falla del switch. En todos los switches, se configura los puertos de acceso del host que se conectan a PC1, PC2, PC3 y PC4. En la Red de la Compañía se configura single-área OSPFv2 en área 0 con la observación de que la ruta por defecto deberá ser provista por BGP.

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	10.9.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	E1/1	10.9.13.1/24	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	10.9.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
	E1/1	10.9.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	E1/2	10.9.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
	VLAN 100	10.9.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10.9.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
	VLAN 102	10.9.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	E1/0	10.9.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10.9.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
	VLAN 101	10.9.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10.9.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.9.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.9.100.5/24	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	10.9.100.6/24	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).

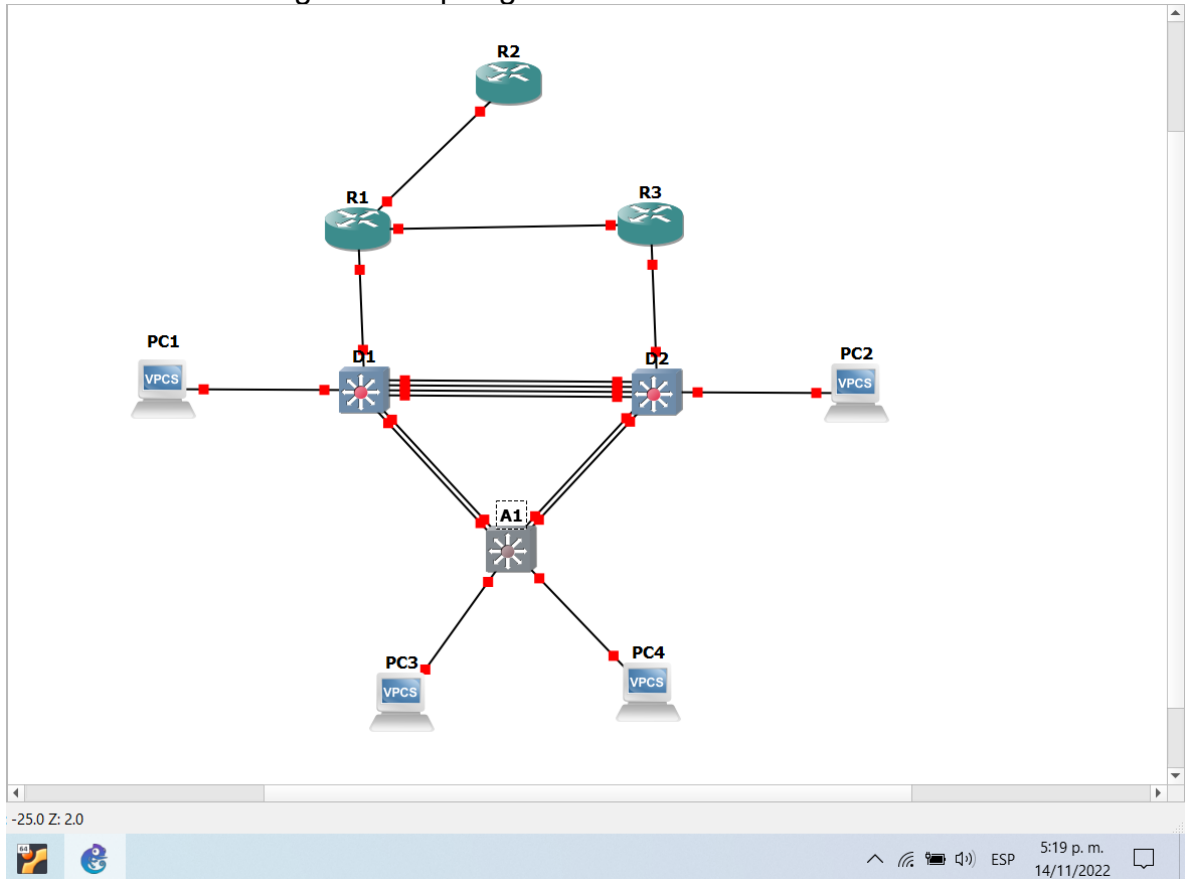
2.1.1. Part 1: Build the Network and Configure Basic Device Settings and Interface Addressing

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

```
R1#configure terminal
R1(config)#hostname R1 //Se configura el nombre del
dispositivo
R1(config)#ipv6 unicast-routing //Se habilita el enrutamiento
de direcciones IPv6
```

```

R1(config)#no ip domain lookup //Se desactiva la búsqueda
DNS
R1(config)#banner motd # R1, ENCOR Skills Assessment# //Se configura un
banner
R1(config)#line con 0
R1(config-line)# exec-timeout 0 0 //Se configura el tiempo de
salida exec
R1(config-line)# logging synchronous //Se habilita el inicio de
sesión sincrónico
R1(config-line)# exit
R1(config)#interface e1/0 //Se accede a la interfaz
R1(config-if)# ip address 209.165.200.225 255.255.255.224 //Se configura el
direccionamiento IPv4
R1(config-if)# ipv6 address fe80::1:1 link-local //Se configura el
direccionamiento para el enlace local
R1(config-if)# ipv6 address 2001:db8:200::1/64 //Se configura el
direccionamiento IPv6
R1(config-if)# no shutdown //Se enciende la interfaz
R1(config-if)# exit
R1(config)#interface e1/2 //Se accede a la interfaz
R1(config-if)# ip address 10.9.10.1 255.255.255.0 //Se configura el
direccionamiento IPv4
R1(config-if)# ipv6 address fe80::1:2 link-local //Se configura el
direccionamiento para el enlace local
R1(config-if)# ipv6 address 2001:db8:100:1010::1/64 //Se configura el
direccionamiento IPv6
R1(config-if)# no shutdown //Se enciende la interfaz
R1(config-if)# exit
R1(config)#interface e1/1 //Se accede a la interfaz
R1(config-if)# ip address 10.9.13.1 255.255.255.0 //Se configura el
direccionamiento IPv4
R1(config-if)# ipv6 address fe80::1:3 link-local //Se configura el
direccionamiento para el enlace local
R1(config-if)# ipv6 address 2001:db8:100:1013::1/64 //Se configura el
direccionamiento IPv6
R1(config-if)# no shutdown //Se enciende la interfaz
R1(config-if)# exit
R1(config)#

```

Router R2

```

R2#configure terminal
R2(config)#hostname R2 //Se configura el nombre del
dispositivo

```

```

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

```

Router R3

```

R3#configure terminal
R3(config)#hostname R3 //Se configura el nombre del
dispositivo
R3(config)#ipv6 unicast-routing //Se habilita el enrutamiento
de direcciones IPv6
R3(config)#no ip domain lookup //Se desactiva la búsqueda
DNS
R3(config)#banner motd # R3, ENCOR Skills Assessment# //Se configura un
banner
R3(config)#line con 0

```



```

R3(config-line)# exec-timeout 0 0 //Se configura el tiempo de
salida exec
R3(config-line)# logging synchronous //Se habilita el inicio de
sesión sincrónico
R3(config-line)# exit
R3(config)#interface e1/0 //Se accede a la interfaz
R3(config-if)# ip address 10.9.11.1 255.255.255.0 //Se configura el
direccionamiento IPv4
R3(config-if)# ipv6 address fe80::3:2 link-local //Se configura el
direccionamiento para el enlace local
R3(config-if)# ipv6 address 2001:db8:100:1011::1/64 //Se configura el
direccionamiento IPv6
R3(config-if)# no shutdown //Se enciende la interfaz
R3(config-if)# exit
R3(config)#interface e1/1 //Se accede a la interfaz
R3(config-if)# ip address 10.9.13.3 255.255.255.0 //Se configura el
direccionamiento IPv4
R3(config-if)# ipv6 address fe80::3:3 link-local //Se configura el
direccionamiento para el enlace local
R3(config-if)# ipv6 address 2001:db8:100:1010::2/64 //Se configura el
direccionamiento IPv6
R3(config-if)# no shutdown //Se enciende la interfaz
R3(config-if)# exit
R3(config)#

```

Switch D1

```

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

```

```

D1(config-vlan)# name Management //Se asigna un nombre de
vlan
D1(config-vlan)# exit
D1(config)#vlan 101 //Se configura la vlan
D1(config-vlan)# name UserGroupA //Se asigna un nombre de
vlan
D1(config-vlan)# exit
D1(config)#vlan 102 //Se configura la vlan
D1(config-vlan)# name UserGroupB //Se asigna un nombre de
vlan
D1(config-vlan)# exit
D1(config)#vlan 999 //Se configura la vlan
D1(config-vlan)# name NATIVE //Se asigna un nombre de
vlan
D1(config-vlan)# exit
D1(config)#interface e1/2 //Se accede a la interfaz
D1(config-if)# no switchport //Se desactiva el switchport
D1(config-if)# ip address 10.9.10.2 255.255.255.0 //Se configura el
direccionamiento IPv4
D1(config-if)# ipv6 address fe80::d1:1 link-local //Se configura el
direccionamiento para el enlace local
D1(config-if)# ipv6 address 2001:db8:100:1010::2/64 //Se configura el
direccionamiento IPv6
D1(config-if)# no shutdown //Se enciende la interfaz
D1(config-if)# exit
D1(config)#interface vlan 100 //Se accede a la interfaz
D1(config-if)# ip address 10.9.100.1 255.255.255.0 //Se configura el
direccionamiento IPv4
D1(config-if)# ipv6 address fe80::d1:2 link-local //Se configura el
direccionamiento para el enlace local
D1(config-if)# ipv6 address 2001:db8:100:100::1/64 //Se configura el
direccionamiento IPv6
D1(config-if)# no shutdown //Se enciende la interfaz
D1(config-if)# exit
D1(config)#interface vlan 101 //Se accede a la interfaz
D1(config-if)# ip address 10.9.101.1 255.255.255.0 //Se configura el
direccionamiento IPv4
D1(config-if)# ipv6 address fe80::d1:3 link-local //Se configura el
direccionamiento para el enlace local
D1(config-if)# ipv6 address 2001:db8:100:101::1/64 //Se configura el
direccionamiento IPv6
D1(config-if)# no shutdown //Se enciende la interfaz
D1(config-if)# exit
D1(config)#interface vlan 102 //Se accede a la interfaz

```

```

D1(config-if)# ip address 10.9.102.1 255.255.255.0 //Se configura el
direccionamiento IPv4
D1(config-if)# ipv6 address fe80::d1:4 link-local //Se configura el
direccionamiento para el enlace local
D1(config-if)# ipv6 address 2001:db8:100:102::1/64 //Se configura el
direccionamiento IPv6
D1(config-if)# no shutdown //Se enciende la interfaz
D1(config-if)# exit
D1(config)#ip dhcp excluded-address 10.9.101.1 10.9.101.109 //Se excluyen
las direcciones para el servidor DHCP
D1(config)#ip dhcp excluded-address 10.9.101.141 10.9.101.254 //Se excluyen
las direcciones para el servidor DHCP
D1(config)#ip dhcp excluded-address 10.9.102.1 10.9.102.109 //Se excluyen
las direcciones para el servidor DHCP
D1(config)#ip dhcp excluded-address 10.9.102.141 10.9.102.254 //Se excluyen
las direcciones para el servidor DHCP
D1(config)#ip dhcp pool VLAN-101 //Se configura un pool DHCP
D1(dhcp-config)# network 10.9.101.0 255.255.255.0 //Se define la red del pool de
direcciones DHCP
D1(dhcp-config)# default-router 10.9.101.254 //Se configura la puerta
predeterminada de enlace para el pool de direcciones DHCP
D1(dhcp-config)# exit
D1(config)#ip dhcp pool VLAN-102 //Se configura un pool DHCP
D1(dhcp-config)# network 10.9.102.0 255.255.255.0 //Se define la red del pool de
direcciones DHCP
D1(dhcp-config)# default-router 10.9.102.254 //Se configura la puerta
predeterminada de enlace para el pool de direcciones DHCP
D1(dhcp-config)# exit
D1(config)#interface range e0/0-3,e1/0-1,e1/3,e2/0-3,e3/0-3 //Se accede a un
rango de direcciones
D1(config-if-range)# shutdown //Se apagan las interfaces
D1(config-if-range)# exit
D1(config)#

```

Switch D2

```

D2#configure terminal
D2(config)#hostname D2 //Se configura el nombre del
dispositivo
D2(config)#ip routing //Se configura el
enrutamiento de direcciones IPv4
D2(config)#ipv6 unicast-routing //Se habilita el enrutamiento
de direcciones IPv6
D2(config)#no ip domain lookup //Se desactiva la búsqueda
DNS

```

```

D2(config)#banner motd # D2, ENCOR Skills Assessment# //Se configura un
banner
D2(config)#line con 0
D2(config-line)# exec-timeout 0 0 //Se configura el tiempo de
salida exec
D2(config-line)# logging synchronous //Se habilita el inicio de
sesión sincrónico
D2(config-line)# exit
D2(config)#vlan 100 //Se configura la vlan
D2(config-vlan)# name Management //Se asigna un nombre de
vlan
D2(config-vlan)# exit
D2(config)#vlan 101 //Se configura la vlan
D2(config-vlan)# name UserGroupA //Se asigna un nombre de
vlan
D2(config-vlan)# exit
D2(config)#vlan 102 //Se configura la vlan
D2(config-vlan)# name UserGroupB //Se asigna un nombre de
vlan
D2(config-vlan)# exit
D2(config)#vlan 999 //Se configura la vlan
D2(config-vlan)# name NATIVE //Se asigna un nombre de
vlan
D2(config-vlan)# exit
D2(config)#interface e1/0 //Se accede a la interfaz
D2(config-if)# no switchport //Se desactiva el switchport
D2(config-if)# ip address 10.9.11.2 255.255.255.0 //Se configura el
direccionamiento IPv4
D2(config-if)# ipv6 address fe80::d1:1 link-local //Se configura el
direccionamiento para el enlace local
D2(config-if)# ipv6 address 2001:db8:100:1011::2/64 //Se configura el
direccionamiento IPv6
D2(config-if)# no shutdown //Se enciende la interfaz
D2(config-if)# exit
D2(config)#interface vlan 100 //Se accede a la interfaz
D2(config-if)# ip address 10.9.100.2 255.255.255.0 //Se configura el
direccionamiento IPv4
D2(config-if)# ipv6 address fe80::d2:2 link-local //Se configura el
direccionamiento para el enlace local
D2(config-if)# ipv6 address 2001:db8:100:100::2/64 //Se configura el
direccionamiento IPv6
D2(config-if)# no shutdown //Se enciende la interfaz
D2(config-if)# exit
D2(config)#interface vlan 101 //Se accede a la interfaz

```

```

D2(config-if)# ip address 10.9.101.2 255.255.255.0 //Se configura el
direccionamiento IPv4
D2(config-if)# ipv6 address fe80::d2:3 link-local //Se configura el
direccionamiento para el enlace local
D2(config-if)# ipv6 address 2001:db8:100:101::2/64 //Se configura el
direccionamiento IPv6
D2(config-if)# no shutdown //Se enciende la interfaz
D2(config-if)# exit
D2(config)#interface vlan 102 //Se accede a la interfaz
D2(config-if)# ip address 10.9.102.2 255.255.255.0 //Se configura el
direccionamiento IPv4
D2(config-if)# ipv6 address fe80::d2:4 link-local //Se configura el
direccionamiento para el enlace local
D2(config-if)# ipv6 address 2001:db8:100:102::2/64 //Se configura el
direccionamiento IPv6
D2(config-if)# no shutdown //Se enciende la interfaz
D2(config-if)# exit
D2(config)#ip dhcp excluded-address 10.9.101.1 10.9.101.209 //Se excluyen
las direcciones para el servidor DHCP
D2(config)#ip dhcp excluded-address 10.9.101.241 10.9.101.254 //Se excluyen
las direcciones para el servidor DHCP
D2(config)#ip dhcp excluded-address 10.9.102.1 10.9.102.209 //Se excluyen
las direcciones para el servidor DHCP
D2(config)#ip dhcp excluded-address 10.9.102.241 10.9.102.254 //Se excluyen
las direcciones para el servidor DHCP
D2(config)#ip dhcp pool VLAN-101 //Se configura un pool DHCP
D2(dhcp-config)# network 10.9.101.0 255.255.255.0 //Se define la red del pool de
direcciones DHCP
D2(dhcp-config)# default-router 10.9.101.254 //Se configura la puerta
predeterminada de enlace para el pool de direcciones DHCP
D2(dhcp-config)# exit
D2(config)#ip dhcp pool VLAN-102 //Se configura un pool DHCP
D2(dhcp-config)# network 10.9.102.0 255.255.255.0 //Se define la red del pool de
direcciones DHCP
D2(dhcp-config)# default-router 10.9.102.254 //Se configura la puerta
predeterminada de enlace para el pool de direcciones DHCP
D2(dhcp-config)# exit
D2(config)#interface range e0/0-3,e1/1-3,e2/0-3,e3/0-3 //Se accede a un
rango de direcciones
D2(config-if-range)# shutdown //Se apagan las interfaces
D2(config-if-range)# exit
D2(config)#

```

Switch A1

```

A1#configure terminal
A1(config)#hostname A1 //Se configura el nombre del
dispositivo
A1(config)#no ip domain lookup //Se desactiva la búsqueda
DNS
A1(config)#banner motd # A1, ENCOR Skills Assessment# //Se configura un
banner
A1(config)#line con 0
A1(config-line)# exec-timeout 0 0 //Se configura el tiempo de
salida exec
A1(config-line)# logging synchronous //Se habilita el inicio de
sesión sincrónico
A1(config-line)# exit
A1(config)#vlan 100 //Se configura la vlan
A1(config-vlan)# name Management //Se asigna un nombre de
vlan
A1(config-vlan)# exit
A1(config)#vlan 101 //Se configura la vlan
A1(config-vlan)# name UserGroupA //Se asigna un nombre de
vlan
A1(config-vlan)# exit
A1(config)#vlan 102 //Se configura la vlan
A1(config-vlan)# name UserGroupB //Se asigna un nombre de
vlan
A1(config-vlan)# exit
A1(config)#vlan 999 //Se configura la vlan
A1(config-vlan)# name NATIVE //Se asigna un nombre de
vlan
A1(config-vlan)# exit
A1(config)#interface vlan 100 //Se accede a la interfaz
A1(config-if)# ip address 10.9.100.3 255.255.255.0 //Se configura el
direccionamiento IPv4
A1(config-if)# ipv6 address fe80::a1:1 link-local //Se configura el
direccionamiento para el enlace local
A1(config-if)# ipv6 address 2001:db8:100:100::3/64 //Se configura el
direccionamiento IPv6
A1(config-if)# no shutdown //Se enciende la interfaz
A1(config-if)# exit
A1(config)#interface range e0/0,e0/3,e1/0,e2/1-3,e3/0-3 //Se accede a un
rango de interfaces
A1(config-if-range)# shutdown //Se apagan las interfaces
A1(config-if-range)# exit
A1(config)#

```

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

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

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

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

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

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

A1#copy running-config startup-config //Se guarda la configuración 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 10.9.100.5 255.255.255.0 10.9.100.254 //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 10.9.100.6 255.255.255.0 10.9.100.254 //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
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
2.2	On all switches, change the native VLAN on trunk links.	Use VLAN 999 as the native VLAN.
2.3	On all switches, enable the Rapid Spanning-Tree Protocol.	Use Rapid Spanning Tree.
2.4	On D1 and D2, configure the appropriate RSTP root bridges based on the information in the topology diagram. D1 and D2 must provide backup in case of root bridge failure.	Configure D1 and D2 as root for the appropriate VLANs with mutually supporting priorities in case of switch failure.
2.5	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
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.
2.7	Verify IPv4 DHCP services.	PC2 and PC3 are DHCP clients and should be receiving valid IPv4 addresses.
2.8	Verify local LAN connectivity.	PC1 should successfully ping: <ul style="list-style-type: none"> • D1: 10.9.100.1 • D2: 10.9.100.2 • PC4: 10.9.100.6

Task#	Task	Specification
		PC2 should successfully ping: <ul style="list-style-type: none"> • D1: 10.9.102.1 • D2: 10.9.102.2 PC3 should successfully ping: <ul style="list-style-type: none"> • D1: 10.9.101.1 • D2: 10.9.101.2 PC4 should successfully ping: <ul style="list-style-type: none"> • D1: 10.9.100.1 • D2: 10.9.100.2 • PC1: 10.9.100.5

Fuente: Autor del documento.

Switch D1

```

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

```

Switch D2

```

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 raices primarias de spanning-tree
D2(config)#spanning-tree vlan 100,102 root secondary //Se configuran las
vlans como raices 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

```

Switch A1

```

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 las interfaces
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 las interfaces
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 el direccionamiento DHCP obtenido en los PC2 y PC3 sean los correctos.

Figura 3. Verificación del protocolo DHCP en PC2.

```

Welcome to Virtual PC Simulator, version 0.8.2
Dedicated to Daling.
Build time: Aug 23 2021 11:15:00
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Press '?' to get help.
Executing the startup file

PC2> ip dhcp
DHCPA IP 10.9.102.110/24 GW 10.9.102.254


PC2> ip auto
GLOBAL SCOPE : 2001:db8:100:1010:2050:79ff:fe66:6801/64
ROUTER LINK-LAYER : ca:01:04:0a:00:1e

PC2>

```

Fuente: Autor del documento.

Figura 4. Verificación del protocolo DHCP en PC3.



```

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Press '?' to get help.

Executing the startup file

PC3> ip dhcp
DORA IP 10.9.101.210/24 GW 9.0.101.254

PC3> ip auto
GLOBAL SCOPE      : 2001:db8:100:1010:2050:79ff:fe66:6802/64
ROUTER LINK-LAYER : ca:01:04:0a:00:1e

PC3> ip dhcp
DORA IP 10.9.101.210/24 GW 10.9.101.254

PC3> █

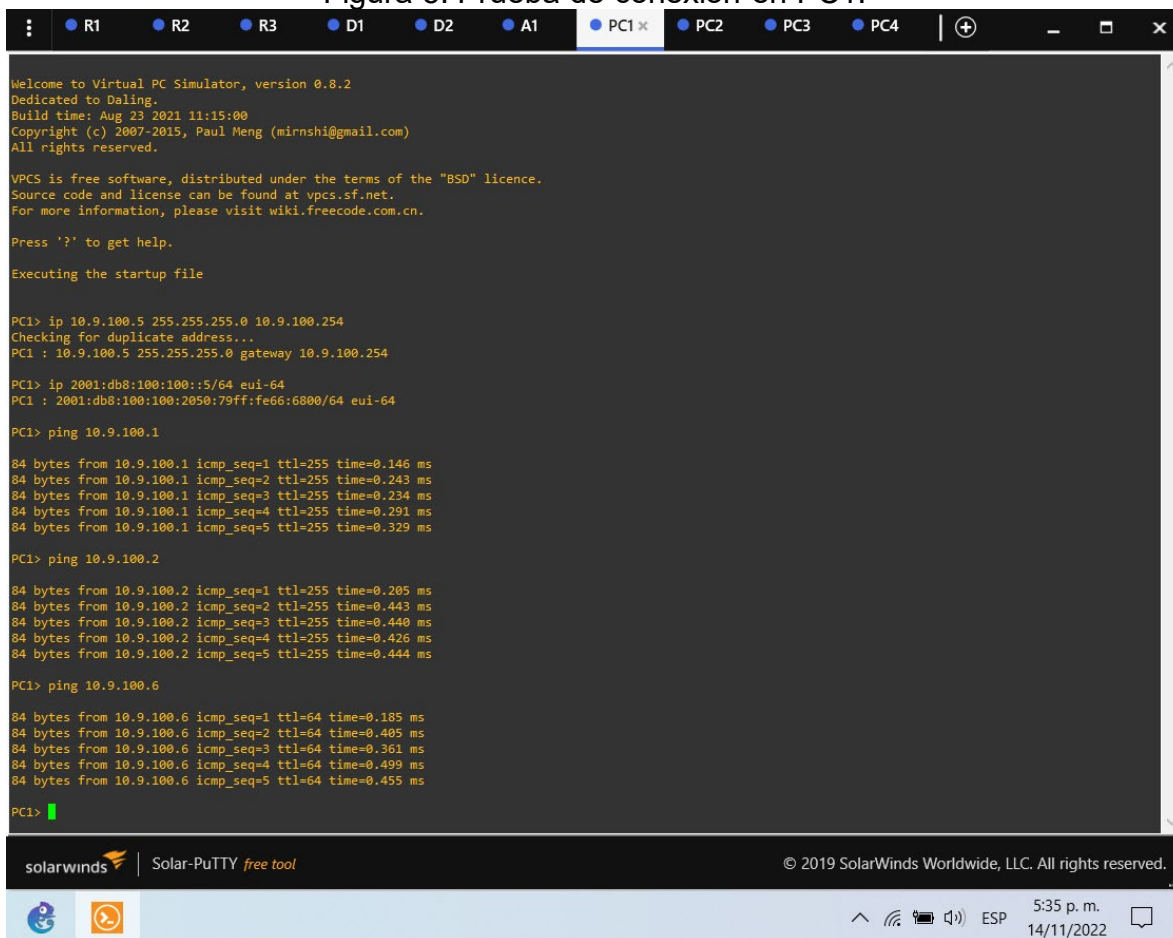
```

The screenshot shows a SolarWinds Solar-PuTTY terminal window with a dark background. The terminal output displays the startup sequence of a Virtual PC Simulator, including version information and license details. It then shows the execution of DHCP configuration commands on PC3. The first command is 'ip dhcp', which sets the DHCP server (DORA) to IP 10.9.101.210/24 and the gateway (GW) to 9.0.101.254. The second command is 'ip auto', which configures the global IPv6 scope to 2001:db8:100:1010:2050:79ff:fe66:6802/64 and the router link-layer to ca:01:04:0a:00:1e. The third command is another 'ip dhcp' command, which sets the DORA to 10.9.101.210/24 and the GW to 10.9.101.254. The terminal ends with a green cursor on a new line. The window title bar shows tabs for R1, R2, R3, D1, D2, A1, PC1, PC2, PC3, and PC4. The bottom status bar shows the SolarWinds logo, 'Solar-PuTTY free tool', copyright information for SolarWinds Worldwide, LLC, and system icons for network, battery, and volume, along with the time 5:33 p.m. and date 14/11/2022.

Fuente: Autor del documento.

Ahora, se procede a realizar los pings de verificación, para garantizar que los PCs tengan conexión.

Figura 5. Prueba de conexión en PC1.



```
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For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.

Executing the startup file

PC1> ip 10.9.100.5 255.255.255.0 10.9.100.254
Checking for duplicate address...
PC1 : 10.9.100.5 255.255.255.0 gateway 10.9.100.254

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

PC1> ping 10.9.100.1

84 bytes from 10.9.100.1 icmp_seq=1 ttl=255 time=0.146 ms
84 bytes from 10.9.100.1 icmp_seq=2 ttl=255 time=0.243 ms
84 bytes from 10.9.100.1 icmp_seq=3 ttl=255 time=0.234 ms
84 bytes from 10.9.100.1 icmp_seq=4 ttl=255 time=0.291 ms
84 bytes from 10.9.100.1 icmp_seq=5 ttl=255 time=0.329 ms

PC1> ping 10.9.100.2

84 bytes from 10.9.100.2 icmp_seq=1 ttl=255 time=0.205 ms
84 bytes from 10.9.100.2 icmp_seq=2 ttl=255 time=0.443 ms
84 bytes from 10.9.100.2 icmp_seq=3 ttl=255 time=0.440 ms
84 bytes from 10.9.100.2 icmp_seq=4 ttl=255 time=0.426 ms
84 bytes from 10.9.100.2 icmp_seq=5 ttl=255 time=0.444 ms

PC1> ping 10.9.100.6

84 bytes from 10.9.100.6 icmp_seq=1 ttl=64 time=0.185 ms
84 bytes from 10.9.100.6 icmp_seq=2 ttl=64 time=0.405 ms
84 bytes from 10.9.100.6 icmp_seq=3 ttl=64 time=0.361 ms
84 bytes from 10.9.100.6 icmp_seq=4 ttl=64 time=0.499 ms
84 bytes from 10.9.100.6 icmp_seq=5 ttl=64 time=0.455 ms

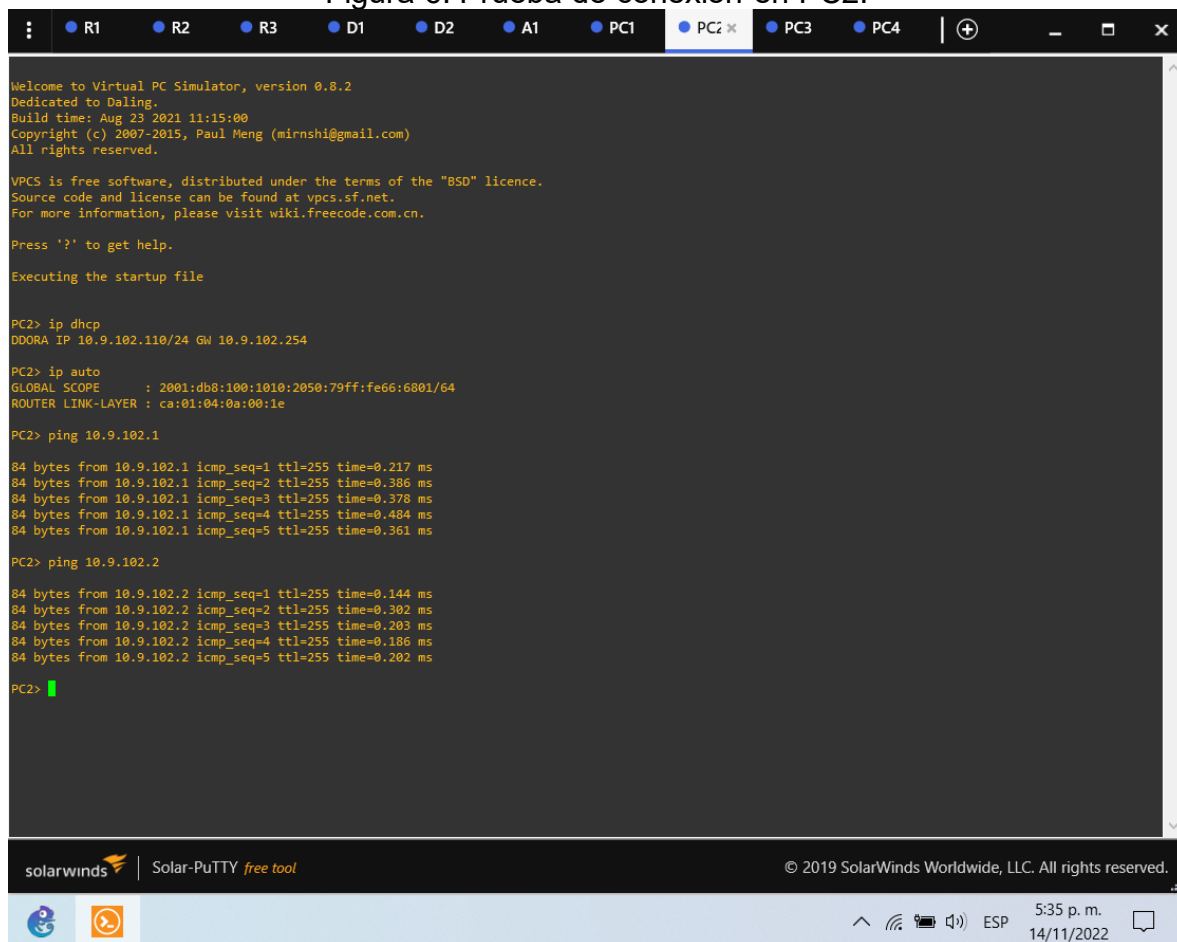
PC1> █
```

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5:35 p. m. 14/11/2022

Fuente: Autor del documento.

Figura 6. Prueba de conexión en PC2.



```

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For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.

Executing the startup file

PC2> ip dhcp
DDORA IP 10.9.102.110/24 GW 10.9.102.254

PC2> ip auto
GLOBAL SCOPE      : 2001:db8:100:1010:2050:79ff:fe66:6801/64
ROUTER LINK-LAYER : ca:01:04:0a:00:1e

PC2> ping 10.9.102.1

84 bytes from 10.9.102.1 icmp_seq=1 ttl=255 time=0.217 ms
84 bytes from 10.9.102.1 icmp_seq=2 ttl=255 time=0.386 ms
84 bytes from 10.9.102.1 icmp_seq=3 ttl=255 time=0.378 ms
84 bytes from 10.9.102.1 icmp_seq=4 ttl=255 time=0.484 ms
84 bytes from 10.9.102.1 icmp_seq=5 ttl=255 time=0.361 ms

PC2> ping 10.9.102.2

84 bytes from 10.9.102.2 icmp_seq=1 ttl=255 time=0.144 ms
84 bytes from 10.9.102.2 icmp_seq=2 ttl=255 time=0.302 ms
84 bytes from 10.9.102.2 icmp_seq=3 ttl=255 time=0.203 ms
84 bytes from 10.9.102.2 icmp_seq=4 ttl=255 time=0.186 ms
84 bytes from 10.9.102.2 icmp_seq=5 ttl=255 time=0.202 ms

PC2> █

```

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5:35 p. m. 14/11/2022

Fuente: Autor del documento.

Figura 7. Prueba de conexión en PC3.



```
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For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.

Executing the startup file

PC3> ip dhcp
DDORA IP 10.9.101.210/24 GW 9.0.101.254

PC3> ip auto
GLOBAL SCOPE      : 2001:db8:100:1010:2050:79ff:fe66:6802/64
ROUTER LINK-LAYER : ca:01:04:0a:00:1e

PC3> ip dhcp
DORA IP 10.9.101.210/24 GW 10.9.101.254

PC3> ping 10.9.101.1

84 bytes from 10.9.101.1 icmp_seq=1 ttl=255 time=0.368 ms
84 bytes from 10.9.101.1 icmp_seq=2 ttl=255 time=0.430 ms
84 bytes from 10.9.101.1 icmp_seq=3 ttl=255 time=0.628 ms
84 bytes from 10.9.101.1 icmp_seq=4 ttl=255 time=0.626 ms
84 bytes from 10.9.101.1 icmp_seq=5 ttl=255 time=0.726 ms

PC3> ping 10.9.101.2

84 bytes from 10.9.101.2 icmp_seq=1 ttl=255 time=0.198 ms
84 bytes from 10.9.101.2 icmp_seq=2 ttl=255 time=0.357 ms
84 bytes from 10.9.101.2 icmp_seq=3 ttl=255 time=0.401 ms
84 bytes from 10.9.101.2 icmp_seq=4 ttl=255 time=0.807 ms
84 bytes from 10.9.101.2 icmp_seq=5 ttl=255 time=0.428 ms

PC3> █
```

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5:36 p. m. 14/11/2022

Fuente: Autor del documento.

Figura 8. Prueba de conexión en PC4.



```
Dedicated to Daling.
Build time: Aug 23 2021 11:15:00
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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 10.9.100.6 255.255.255.0 10.9.100.254
Checking for duplicate address...
PC4 : 10.9.100.6 255.255.255.0 gateway 10.9.100.254

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

PC4>
PC4>
PC4> ping 10.9.100.1

84 bytes from 10.9.100.1 icmp_seq=1 ttl=255 time=0.277 ms
84 bytes from 10.9.100.1 icmp_seq=2 ttl=255 time=0.392 ms
84 bytes from 10.9.100.1 icmp_seq=3 ttl=255 time=0.374 ms
84 bytes from 10.9.100.1 icmp_seq=4 ttl=255 time=0.478 ms
84 bytes from 10.9.100.1 icmp_seq=5 ttl=255 time=0.411 ms

PC4> ping 10.9.100.2

84 bytes from 10.9.100.2 icmp_seq=1 ttl=255 time=0.286 ms
84 bytes from 10.9.100.2 icmp_seq=2 ttl=255 time=0.482 ms
84 bytes from 10.9.100.2 icmp_seq=3 ttl=255 time=0.526 ms
84 bytes from 10.9.100.2 icmp_seq=4 ttl=255 time=0.515 ms
84 bytes from 10.9.100.2 icmp_seq=5 ttl=255 time=0.476 ms

PC4> ping 10.9.100.5

84 bytes from 10.9.100.5 icmp_seq=1 ttl=64 time=0.355 ms
84 bytes from 10.9.100.5 icmp_seq=2 ttl=64 time=0.339 ms
84 bytes from 10.9.100.5 icmp_seq=3 ttl=64 time=0.440 ms
84 bytes from 10.9.100.5 icmp_seq=4 ttl=64 time=0.368 ms
84 bytes from 10.9.100.5 icmp_seq=5 ttl=64 time=0.395 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 • 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>

Task#	Task	Specification
		<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 10.9.0.0/8. • 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 10.9.0.0/8 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.

Router 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 10.9.10.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
R1(config-router)# network 10.9.13.0 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 interfaz
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 interfaz
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 IPv4 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)#

```

Router R2

```

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)#
Router R3

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 10.9.11.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
R3(config-router)# network 10.9.13.0 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

```

Switch D1

```

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 10.9.100.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D1(config-router)# network 10.9.101.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D1(config-router)# network 10.9.102.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D1(config-router)# network 10.9.10.0 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
D1#

```

Switch 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 10.9.100.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D2(config-router)# network 10.9.101.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D2(config-router)# network 10.9.102.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D2(config-router)# network 10.9.11.0 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

```

A continuación, se anexan soporte de la configuración realizada.

Figura 9. Presentación de los comandos OSPF en R1.

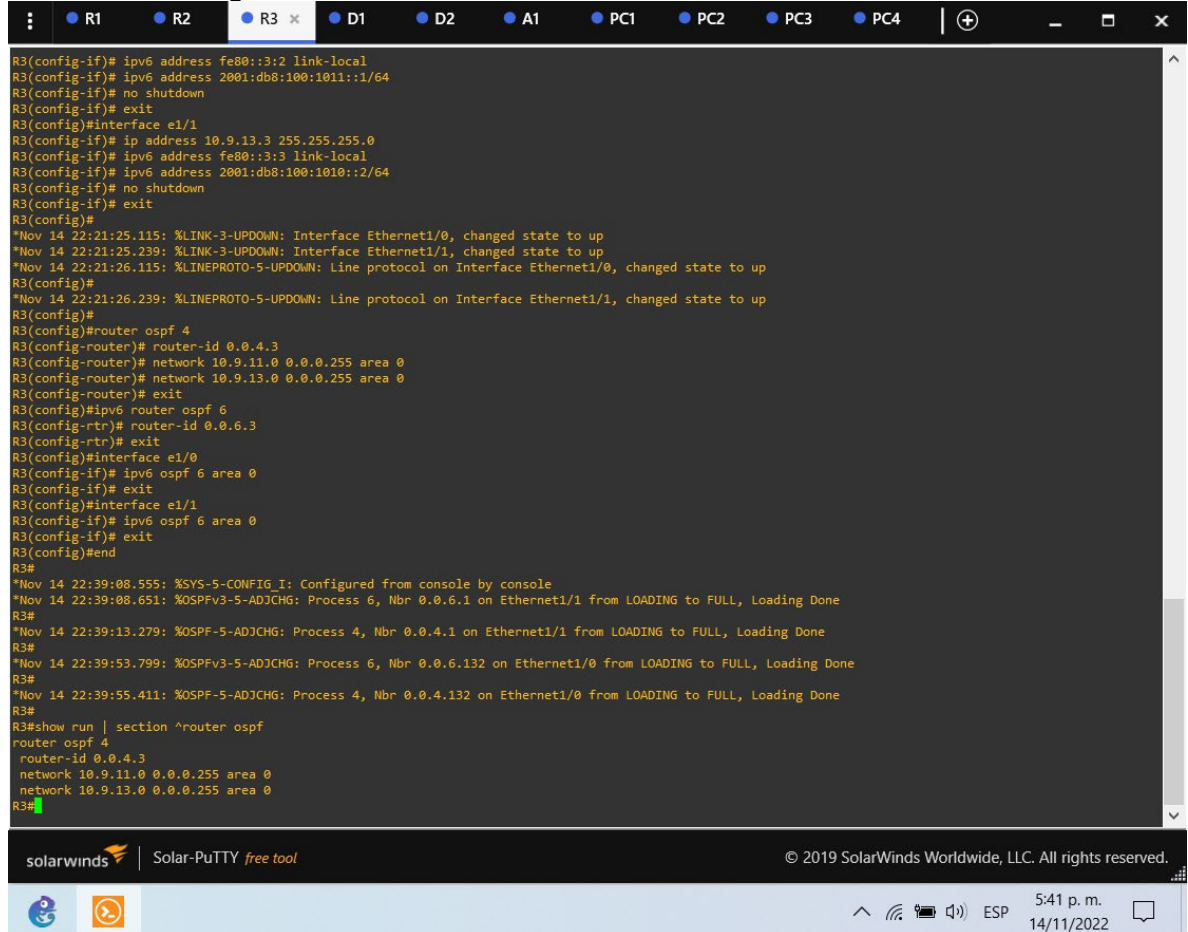
```

R1#
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)#!
R1(config)#ip route 10.0.0.0 255.0.0.0 null0
R1(config)#ipv6 route 2001:db8:100::/48 null0
R1(config)#!
R1(config)#router bgp 300
R1(config-router)# bgp router-id 1.1.1.1
R1(config-router)# neighbor 209.165.200.226 remote-as 500
R1(config-router)# neighbor 2001:db8:200::2 remote-as 500
R1(config-router)# address-family ipv4 unicast
R1(config-router-af)# neighbor 209.165.200.226 activate
R1(config-router-af)# no neighbor 2001:db8:200::2 activate
R1(config-router-af)# network 10.0.0.0 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)#exit
R1(config)#
*Nov 14 22:39:13.315: %BGP-5-ADJCHANGE: neighbor 2001:DB8:200::2 Up
R1(config)#
*Nov 14 22:39:17.431: %BGP-5-ADJCHANGE: neighbor 209.165.200.226 Up
R1(config)#
*Nov 14 22:39:38.531: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config)#
*Nov 14 22:39:43.159: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config)#
*Nov 14 22:39:58.719: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config)#
*Nov 14 22:40:00.335: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config)#end
R1#
R1#
*Nov 14 22:41:06.879: %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 10.9.10.0 0.0.0.255 area 0
network 10.9.13.0 0.0.0.255 area 0
default-information originate
R1#

```

Fuente: Autor del documento.

Figura 10. Presentación de los comandos OSPF en R3.



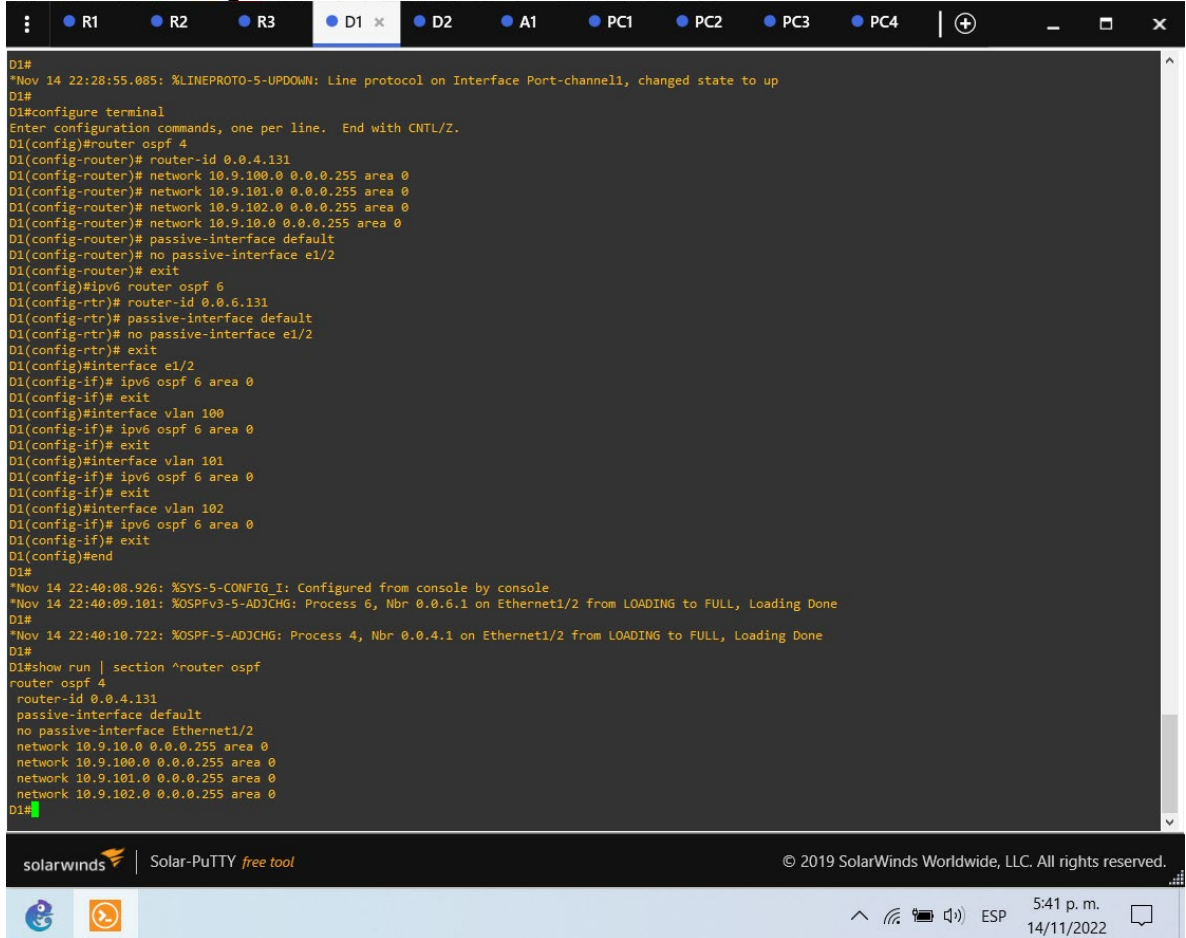
```
R1 R2 R3 x D1 D2 A1 PC1 PC2 PC3 PC4 + - □ ×
R3(config-if)# ipv6 address fe80::3:2 link-local
R3(config-if)# ipv6 address 2001:db8:100:1011::1/64
R3(config-if)# no shutdown
R3(config-if)# exit
R3(config)#interface e1/1
R3(config-if)# ip address 10.9.13.3 255.255.255.0
R3(config-if)# ipv6 address fe80::3:3 link-local
R3(config-if)# ipv6 address 2001:db8:100:1010::2/64
R3(config-if)# no shutdown
R3(config-if)# exit
R3(config)#
*Nov 14 22:21:25.115: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Nov 14 22:21:25.239: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
*Nov 14 22:21:26.115: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
R3(config)#
*Nov 14 22:21:26.239: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
R3(config)#
R3(config)#router ospf 4
R3(config-router)# router-id 0.0.4.3
R3(config-router)# network 10.9.11.0 0.0.0.255 area 0
R3(config-router)# network 10.9.13.0 0.0.0.255 area 0
R3(config-router)# exit
R3(config)#ipv6 router ospf 6
R3(config-rttr)# router-id 0.0.6.3
R3(config-rttr)# 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 14 22:39:08.555: %SYS-5-CONFIG_I: Configured from console by console
*Nov 14 22:39:08.651: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 14 22:39:13.279: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 14 22:39:53.799: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#
*Nov 14 22:39:55.411: %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 10.9.11.0 0.0.0.255 area 0
  network 10.9.13.0 0.0.0.255 area 0
R3#
```

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5:41 p. m. 14/11/2022

Fuente: Autor del documento.

Figura 11. Presentación de los comandos OSPF en D1.



```
D1#
*Nov 14 22:28:55.085: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel1, changed state to up
D1#
D1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#router ospf 4
D1(config-router)# router-id 0.0.4.131
D1(config-router)# network 10.9.100.0 0.0.0.255 area 0
D1(config-router)# network 10.9.101.0 0.0.0.255 area 0
D1(config-router)# network 10.9.102.0 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 14 22:40:08.926: %SYS-5-CONFIG_I: Configured from console by console
*Nov 14 22:40:09.101: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/2 from LOADING to FULL, Loading Done
D1#
*Nov 14 22:40:10.722: %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 10.9.100.0 0.0.0.255 area 0
network 10.9.101.0 0.0.0.255 area 0
network 10.9.102.0 0.0.0.255 area 0
D1#
```

Fuente: Autor del documento.

Figura 12. Presentación de los comandos OSPF en D2.

```
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#ip dhcp pool VLAN-101
D2(dhcp-config)# default-router 10.9.101.254
D2(dhcp-config)#exit
D2(config)#
D2(config)#router ospf 4
D2(config-router)# router-id 0.0.4.132
D2(config-router)# network 10.9.100.0 0.0.0.255 area 0
D2(config-router)# network 10.9.101.0 0.0.0.255 area 0
D2(config-router)# network 10.9.102.0 0.0.0.255 area 0
D2(config-router)# network 10.9.11.0 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 14 22:40:33.904: %SYS-5-CONFIG_I: Configured from console by console
*Nov 14 22:40:34.073: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on Ethernet1/0 from LOADING to FULL, Loading Done
D2#
*Nov 14 22:40:35.682: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.3 on Ethernet1/0 from LOADING to FULL, Loading Done
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 10.9.11.0 0.0.0.255 area 0
network 10.9.100.0 0.0.0.255 area 0
network 10.9.101.0 0.0.0.255 area 0
network 10.9.102.0 0.0.0.255 area 0
D2#
```

Fuente: Autor del documento.

Figura 13. Presentación de los comandos OSPF IPv6 en R1.



```
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)#exit
R1(config)#
*Nov 14 22:39:13.315: %BGP-5-ADJCHANGE: neighbor 2001:DB8:200::2 Up
R1(config)#
*Nov 14 22:39:17.431: %BGP-5-ADJCHANGE: neighbor 209.165.200.226 Up
R1(config)#
*Nov 14 22:39:38.531: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config)#
*Nov 14 22:39:43.159: %OSPFv3-5-ADJCHG: Process 4, Nbr 0.0.4.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config)#
*Nov 14 22:39:58.719: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config)#
*Nov 14 22:40:00.335: %OSPFv3-5-ADJCHG: Process 4, Nbr 0.0.4.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config)#end
R1#
R1#
*Nov 14 22:41:06.879: %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 10.9.10.0 0.0.0.255 area 0
network 10.9.13.0 0.0.0.255 area 0
default-information originate
R1#
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#
R1#show ipv6 ospf interface brief
Interface  PID  Area          Intf ID  Cost  State  Nbrs  F/C
Et1/1     6   0             6        10   DR     1/1
Et1/2     6   0             7        10   DR     1/1
R1#
```

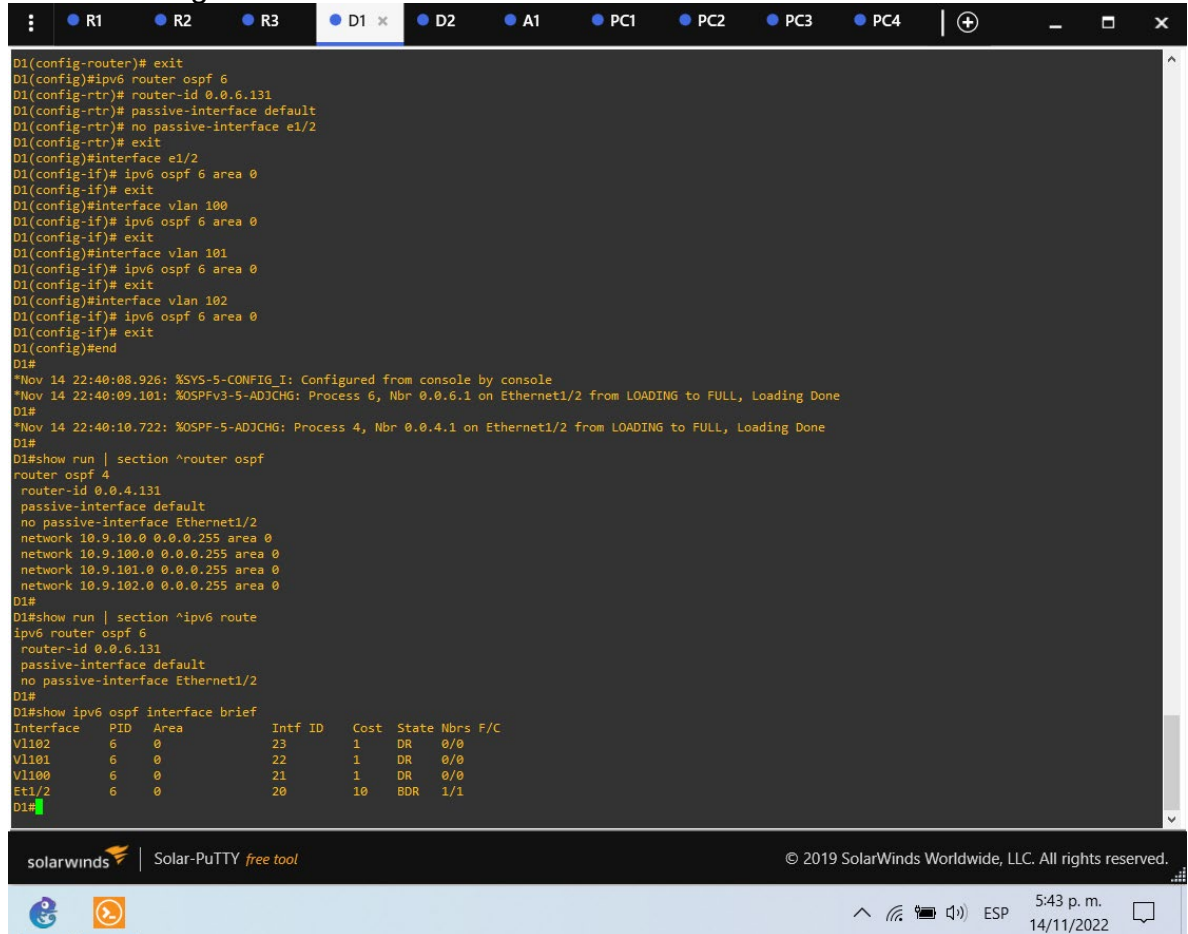
Fuente: Autor del documento.

Figura 14. Presentación de los comandos OSPF IPv6 en R3.

```
R3(config-if)# exit
R3(config)#
*Nov 14 22:21:25.115: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Nov 14 22:21:25.239: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
*Nov 14 22:21:26.115: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
R3(config)#
*Nov 14 22:21:26.239: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
R3(config)#
R3(config)#router ospf 4
R3(config-router)# router-id 0.0.4.3
R3(config-router)# network 10.9.11.0 0.0.0.255 area 0
R3(config-router)# network 10.9.13.0 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 14 22:39:08.555: %SYS-5-CONFIG_I: Configured from console by console
*Nov 14 22:39:08.651: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 14 22:39:13.279: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 14 22:39:53.799: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#
*Nov 14 22:39:55.411: %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 10.9.11.0 0.0.0.255 area 0
  network 10.9.13.0 0.0.0.255 area 0
R3#
R3#show run | section ^ipv6 route
ipv6 router ospf 6
  router-id 0.0.6.3
R3#
R3#show ipv6 ospf interface brief
Interface  PID  Area          Intf ID  Cost  State  Nbrs  F/C
Et1/1     6   0             6        10   BDR    1/1
Et1/0     6   0             5        10   DR     1/1
R3#
```

Fuente: Autor del documento.

Figura 15. Presentación de los comandos OSPF IPv6 en D1.



```
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 14 22:40:08.926: %SYS-5-CONFIG I: Configured from console by console
*Nov 14 22:40:09.101: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/2 from LOADING to FULL, Loading Done
D1#
*Nov 14 22:40:10.722: %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 10.9.10.0 0.0.0.255 area 0
network 10.9.100.0 0.0.0.255 area 0
network 10.9.101.0 0.0.0.255 area 0
network 10.9.102.0 0.0.0.255 area 0
D1#
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#
D1#show ipv6 ospf interface brief
Interface PID Area Intf ID Cost State Nbrs F/C
Vl102 6 0 23 1 DR 0/0
Vl101 6 0 22 1 DR 0/0
Vl100 6 0 21 1 DR 0/0
Et1/2 6 0 20 10 BDR 1/1
D1#
```

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Fuente: Autor del documento.

Figura 16. Presentación de los comandos OSPF IPv6 en D2.



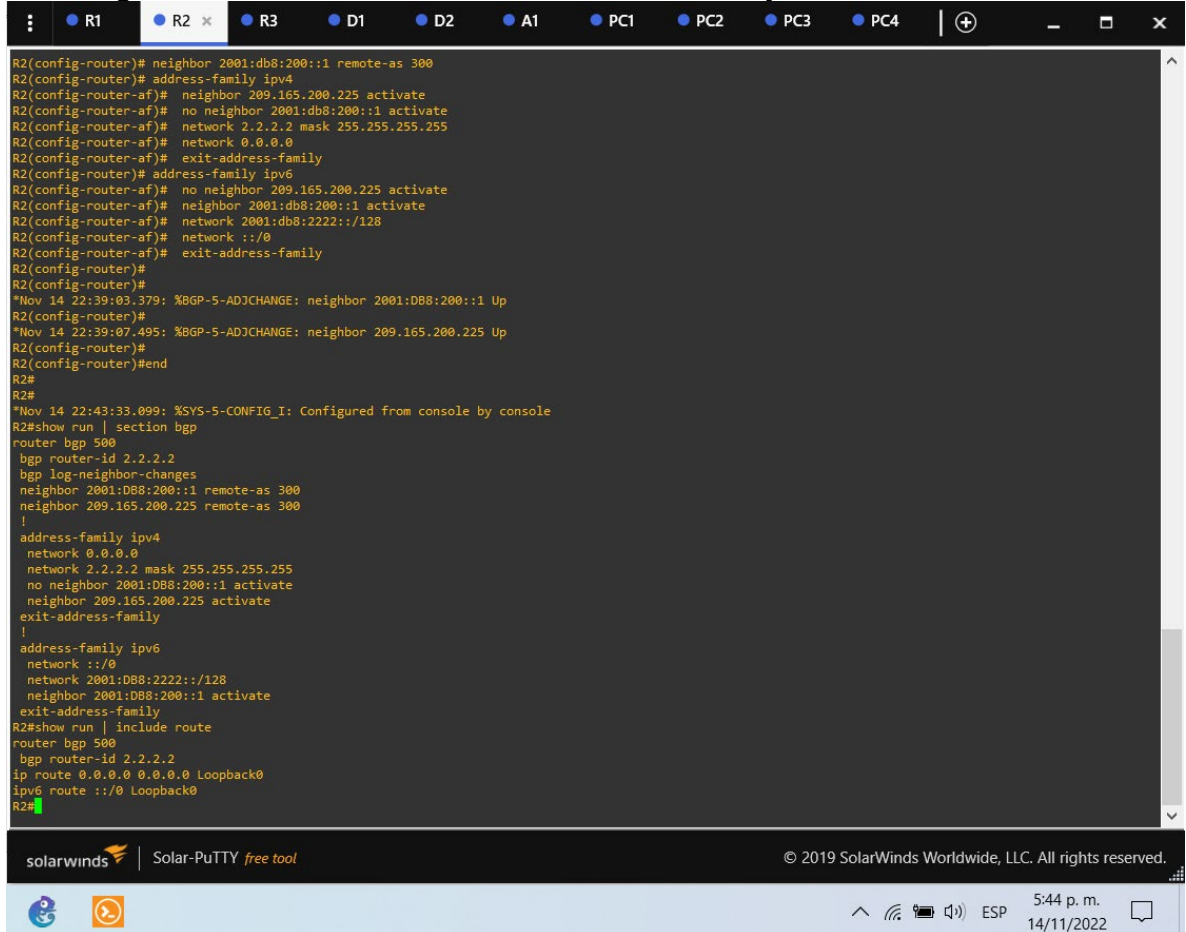
```
D2(config-router)# exit
D2(config)#ipv6 router ospf 6
D2(config-rtr)# router-id 0.0.6.132
D2(config-rtr)# passive-interface default
D2(config-rtr)# no passive-interface e1/0
D2(config-rtr)# exit
D2(config)#interface e1/0
D2(config-if)# ipv6 ospf 6 area 0
D2(config-if)# exit
D2(config)#interface vlan 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 14 22:40:33.904: %SYS-5-CONFIG_I: Configured from console by console
*Nov 14 22:40:34.073: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on Ethernet1/0 from LOADING to FULL, Loading Done
D2#
*Nov 14 22:40:35.682: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.3 on Ethernet1/0 from LOADING to FULL, Loading Done
D2#
D2#show run | section ^router ospf
router ospf 6
  router-id 0.0.4.132
  passive-interface default
  no passive-interface Ethernet1/0
  network 10.9.11.0 0.0.0.255 area 0
  network 10.9.100.0 0.0.0.255 area 0
  network 10.9.101.0 0.0.0.255 area 0
  network 10.9.102.0 0.0.0.255 area 0
D2#
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#
D2#show ipv6 ospf interface brief
Interface  PID  Area  Intf ID  Cost  State  Nbrs  F/C
Vl102    6    0     23      1    DR    0/0
Vl101    6    0     22      1    DR    0/0
Vl100    6    0     21      1    DR    0/0
Et1/0    6    0     20     10   BDR   1/1
D2#
```

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Fuente: Autor del documento.

Figura 17. Presentación de los comandos BGP y rutas estáticas en R2.



```
R2(config-router)# neighbor 2001:db8:200::1 remote-as 300
R2(config-router)# address-family ipv4
R2(config-router-af)# neighbor 209.165.200.225 activate
R2(config-router-af)# no neighbor 2001:db8:200::1 activate
R2(config-router-af)# network 2.2.2.2 mask 255.255.255.255
R2(config-router-af)# network 0.0.0.0
R2(config-router-af)# exit-address-family
R2(config-router)# address-family ipv6
R2(config-router-af)# no neighbor 209.165.200.225 activate
R2(config-router-af)# neighbor 2001:db8:200::1 activate
R2(config-router-af)# network 2001:db8:2222::/128
R2(config-router-af)# network ::/0
R2(config-router-af)# exit-address-family
R2(config-router)#
R2(config-router)#
*Nov 14 22:39:03.379: %BGP-5-ADJCHANGE: neighbor 2001:DB8:200::1 Up
R2(config-router)#
*Nov 14 22:39:07.495: %BGP-5-ADJCHANGE: neighbor 209.165.200.225 Up
R2(config-router)#
R2(config-router)#end
R2#
R2#
*Nov 14 22:43:33.099: %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 del documento.

Figura 18. Presentación de los comandos BGP en R1.



The screenshot shows a Solar-PuTTY terminal window with a tab for 'R1'. The terminal displays the following configuration and status messages:

```
R1(config)#
*Nov 14 22:39:38.531: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config)#
*Nov 14 22:39:43.159: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config)#
*Nov 14 22:39:58.719: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config)#
*Nov 14 22:40:00.335: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config)#end
R1#
R1#
*Nov 14 22:41:06.879: %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 10.9.10.0 0.0.0.255 area 0
  network 10.9.13.0 0.0.0.255 area 0
  default-information originate
R1#
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#
R1#show ipv6 ospf interface brief
Interface  PID  Area  Intf ID  Cost  State  Nbrs  F/C
Et1/1      6   0     6        10   DR    1/1
Et1/2      6   0     7        10   DR    1/1
R1#
R1#show run | section bgp
router bgp 300
  bgp router-id 1.1.1.1
  bgp log-neighbor-changes
  neighbor 2001:DB8:200::2 remote-as 500
  neighbor 209.165.200.226 remote-as 500
  !
  address-family ipv4
    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#
```

The terminal window footer shows 'solarwinds Solar-PuTTY free tool' and '© 2019 SolarWinds Worldwide, LLC. All rights reserved.' The system tray at the bottom indicates the time as 5:44 p.m. on 14/11/2022.

Fuente: Autor del documento.

Figura 19. Presentación de los comandos BGP y tabla de enrutamiento en R1.

```

R1#show run | section ^router ospf
router ospf 4
router-id 0.0.4.1
network 10.9.10.0 0.0.0.255 area 0
network 10.9.13.0 0.0.0.255 area 0
default-information originate
R1#
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#
R1#show ipv6 ospf interface brief
Interface  PID  Area          Intf ID  Cost  State  Nbrs  F/C
Et1/1     6   0             6        10   DR    1/1
Et1/2     6   0             7        10   DR    1/1
R1#
R1#show run | section bgp
router bgp 300
bgp router-id 1.1.1.1
bgp log-neighbor-changes
neighbor 2001:DB8:200::2 remote-as 500
neighbor 209.165.200.226 remote-as 500
!
address-family ipv4
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#
R1#show ip route | include O[B
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
B
2.2.2.2 [20/0] via 209.165.200.226, 00:04:21
O
10.9.11.0/24 [110/20] via 10.9.13.3, 00:04:43, Ethernet1/1
O
10.9.100.0/24 [110/11] via 10.9.10.2, 00:04:26, Ethernet1/2
O
10.9.101.0/24 [110/11] via 10.9.10.2, 00:04:26, Ethernet1/2
O
10.9.102.0/24 [110/11] via 10.9.10.2, 00:04:26, Ethernet1/2
R1#

```

Fuente: Autor del documento.

Figura 20. Verificación de la tabla de enrutamiento IPv6 en R1.

```
R1#show ip route | include 0|8
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       2.2.2.2 [20/0] via 209.165.200.226, 00:04:21
O       10.9.11.0/24 [110/20] via 10.9.13.3, 00:04:43, Ethernet1/1
O       10.9.100.0/24 [110/11] via 10.9.10.2, 00:04:26, Ethernet1/2
O       10.9.101.0/24 [110/11] via 10.9.10.2, 00:04:26, Ethernet1/2
O       10.9.102.0/24 [110/11] via 10.9.10.2, 00:04:26, Ethernet1/2
R1#
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]
       via FE80::2:1, Ethernet1/0
S       2001:DB8:100::/48 [1/0]
       via Null0, directly connected
O       2001:DB8:100:100::/64 [110/11]
       via FE80::D1:1, Ethernet1/2
O       2001:DB8:100:101::/64 [110/11]
       via FE80::D1:1, Ethernet1/2
O       2001:DB8:100:102::/64 [110/11]
       via FE80::D1:1, Ethernet1/2
C       2001:DB8:100:1010::/64 [0/0]
       via Ethernet1/2, directly connected
L       2001:DB8:100:1010::1/128 [0/0]
       via Ethernet1/2, receive
O       2001:DB8:100:1011::/64 [110/20]
       via FE80::3:3, Ethernet1/1
C       2001:DB8:100:1013::/64 [0/0]
       via Ethernet1/1, directly connected
L       2001:DB8:100:1013::1/128 [0/0]
       via Ethernet1/1, receive
C       2001:DB8:200::/64 [0/0]
       via Ethernet1/0, directly connected
L       2001:DB8:200::1/128 [0/0]
       via Ethernet1/0, receive
L       FF00::/8 [0/0]
       via Null0, receive
R1#
```

Fuente: Autor del documento.

Figura 21. Verificación de la tabla de enrutamiento IPv4 en OSPF en R3.

```

R3#
R3(config-router)# network 10.9.11.0 0.0.0.255 area 0
R3(config-router)# network 10.9.13.0 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 14 22:39:08.555: %SYS-5-CONFIG_I: Configured from console by console
*Nov 14 22:39:08.651: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 14 22:39:13.279: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 14 22:39:53.799: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#
*Nov 14 22:39:55.411: %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 10.9.11.0 0.0.0.255 area 0
  network 10.9.13.0 0.0.0.255 area 0
R3#
R3#show run | section ^ipv6 route
ipv6 router ospf 6
  router-id 0.0.6.3
R3#
R3#show ipv6 ospf interface brief
Interface  PID  Area      Intf ID  Cost  State  Nbrs  F/C
Et1/1     6   0         6        10   BDR   1/1
Et1/0     6   0         5        10   DR    1/1
R3#
R3#show ip route ospf | begin Gateway
Gateway of last resort is 10.9.13.1 to network 0.0.0.0

O*E2  0.0.0.0/8 [110/1] via 10.9.13.1, 00:04:51, Ethernet1/1
      10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
O     10.9.10.0/24 [110/20] via 10.9.13.1, 00:05:18, Ethernet1/1
O     10.9.100.0/24 [110/11] via 10.9.11.2, 00:04:32, Ethernet1/0
O     10.9.101.0/24 [110/11] via 10.9.11.2, 00:04:32, Ethernet1/0
O     10.9.102.0/24 [110/11] via 10.9.11.2, 00:04:32, Ethernet1/0
R3#

```

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Fuente: Autor del documento.

Figura 22. Verificación de la tabla de enrutamiento IPv6 en OSPF en R3.

```

R3#
*Nov 14 22:39:55.411: %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 10.9.11.0 0.0.0.255 area 0
  network 10.9.13.0 0.0.0.255 area 0
R3#
R3#show run | section ^ipv6 route
ipv6 router ospf 6
  router-id 0.0.6.3
R3#
R3#show ipv6 ospf interface brief
Interface  PID  Area  Intf ID  Cost  State  Nbrs  F/C
Et1/1     6   0     6        10  BDR   1/1
Et1/0     6   0     5        10  DR    1/1
R3#
R3#show ip route ospf | begin Gateway
Gateway of last resort is 10.9.13.1 to network 0.0.0.0

O*E2 0.0.0.0/0 [110/1] via 10.9.13.1, 00:04:51, Ethernet1/1
    10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
O    10.9.10.0/24 [110/20] via 10.9.13.1, 00:05:18, Ethernet1/1
O    10.9.100.0/24 [110/11] via 10.9.11.2, 00:04:32, Ethernet1/0
O    10.9.101.0/24 [110/11] via 10.9.11.2, 00:04:32, Ethernet1/0
O    10.9.102.0/24 [110/11] via 10.9.11.2, 00:04:32, Ethernet1/0
R3#
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, T1 - ISIS L1, T2 - ISIS L2, IA - ISIS interarea
        IS - ISIS summary, D - EIGRP, EX - EIGRP external, NM - NEMO
        ND - ND Default, Ndp - ND Prefix, DCE - Destination, NDr - Redirect
        O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
        ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, L - LISP
OE2 ::0 [110/1], tag 6
    via FE80::1:3, Ethernet1/1
O  2001:DB8:100:100::/64 [110/11]
    via FE80::01:1, Ethernet1/0
O  2001:DB8:100:101::/64 [110/11]
    via FE80::01:1, Ethernet1/0
O  2001:DB8:100:102::/64 [110/11]
    via FE80::01:1, Ethernet1/0
O  2001:DB8:100:103::/64 [110/10]
    via Ethernet1/1, directly connected
R3#

```

Fuente: Autor del documento.

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 10.9.100.254. • 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 10.9.101.254. • 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 10.9.102.254. • 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 10.9.100.254. • 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 10.9.101.254. • 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 10.9.102.254. • 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.

Switch D1

```

D1#configure terminal
D1(config)#ip sla 4 //Se configura SLA con
numero 4 para IPv4
D1(config-ip-sla)# icmp-echo 10.9.10.1 //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 10.9.100.254 //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 10.9.101.254 //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 10.9.102.254 //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
D1(config-if)# exit
D1(config)#end

```

Switch D2

```

D2#configure terminal
D2(config)#ip sla 4 //Se configura SLA con
numero 4 para IPv4
D2(config-ip-sla)# icmp-echo 10.9.11.1 //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 10.9.100.254 //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 10.9.101.254 //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 10.9.102.254 //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

```

Figura 23. Verificación de los comandos IP SLA aplicados en D1.



```
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 14 22:46:13.537: %SYS-5-CONFIG_I: Configured from console by console
D1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#ip sla schedule 6 life forever start-time now
D1(config)#
*Nov 14 22:46:36.614: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Standby -> Active
*Nov 14 22:46:36.733: %HSRP-5-STATECHANGE: Vlan102 Grp 124 state Standby -> Active
*Nov 14 22:46:37.602: %HSRP-5-STATECHANGE: Vlan100 Grp 104 state Standby -> Active
D1(config)#
*Nov 14 22:46:37.936: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Standby -> Active
*Nov 14 22:46:38.153: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Standby -> Active
D1(config)#
*Nov 14 22:46:47.500: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Standby -> Active
D1(config)#
*Nov 14 22:47:23.704: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Active -> Speak
D1(config)#
*Nov 14 22:47:25.846: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Active -> Speak
D1(config)#
*Nov 14 22:47:34.270: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Speak -> Standby
D1(config)#
*Nov 14 22:47:37.105: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Speak -> Standby
D1(config)#end
D1#
*Nov 14 22:47:40.105: %SYS-5-CONFIG_I: Configured from console by console
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 10.9.10.1
  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#
```

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Fuente: Autor del documento.

Figura 24. Verificación de los comandos standby aplicados en D1.

```

D1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#ip sla schedule 6 life forever start-time now
D1(config)#
*Nov 14 22:46:36.614: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Standby -> Active
*Nov 14 22:46:36.733: %HSRP-5-STATECHANGE: Vlan102 Grp 124 state Standby -> Active
*Nov 14 22:46:37.602: %HSRP-5-STATECHANGE: Vlan100 Grp 104 state Standby -> Active
D1(config)#
*Nov 14 22:46:37.936: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Standby -> Active
*Nov 14 22:46:38.153: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Standby -> Active
D1(config)#
*Nov 14 22:46:47.500: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Standby -> Active
D1(config)#
*Nov 14 22:47:23.704: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Active -> Speak
D1(config)#
*Nov 14 22:47:25.846: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Active -> Speak
D1(config)#
*Nov 14 22:47:34.270: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Speak -> Standby
D1(config)#
*Nov 14 22:47:37.105: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Speak -> Standby
D1(config)#end
D1#
*Nov 14 22:47:40.105: %SYS-5-CONFIG_I: Configured from console by console
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 10.9.10.1
  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#
D1#show standby brief
      P indicates configured to preempt.
      |
Interface Grp Pri P State Active Standby Virtual IP
Vl1000    104 150 P Active local 10.9.100.2 10.9.100.254
Vl100    106 150 P Active local FE80::D2:2 FE80::5:73FF:FEA0:6A
Vl101    114 100 P Standby 10.9.101.2 local 10.9.101.254
Vl101    116 100 P Standby FE80::D2:3 local FE80::5:73FF:FEA0:74
Vl102    124 150 P Active local 10.9.102.2 10.9.102.254
Vl102    126 150 P Active local FE80::D2:4 FE80::5:73FF:FEA0:7E
D1#
  
```

Fuente: Autor del documento.

Figura 25. Verificación de los comandos IP SLA aplicados en D2.



```
D2(config-if)# exit
D2(config)#interface vlan 101
D2(config-if)# standby version 2
D2(config-if)# standby 114 ip 10.9.101.254
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 10.9.102.254
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 14 22:47:03.372: %SYS-5-CONFIG_I: Configured from console by console
D2#
*Nov 14 22:47:23.703: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Speak -> Active
D2#
*Nov 14 22:47:25.845: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Speak -> Active
*Nov 14 22:47:25.851: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Speak -> Standby
D2#
*Nov 14 22:47:26.991: %HSRP-5-STATECHANGE: Vlan100 Grp 104 state Speak -> Standby
*Nov 14 22:47:27.628: %HSRP-5-STATECHANGE: Vlan102 Grp 124 state Speak -> Standby
*Nov 14 22:47:27.644: %HSRP-5-STATECHANGE: Vlan100 Grp 106 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 10.9.11.1
  frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
  icmp-echo 2001:DB8:100:1011::1
  frequency 5
ip sla schedule 6 life forever start-time now
D2#
```

Fuente: Autor del documento.

CONCLUSIONES

Con las herramientas GNS3, se encuentran inconvenientes para encontrar imágenes con las que probar las habilidades, y algunos no podían reconocer la mayoría de los comandos necesarios para conectarse entre las herramientas. Equipo. Entonces, el objetivo es reflejar las habilidades y responsabilidades involucradas en la realización de actividades de conectividad, así como la validación de la implementación realizada al ejecutar el contenido recomendado en una topología de red.

Esta prueba le permite comprender la aplicación de varios conceptos de redes, aumento de tecnología y verificación de aplicaciones en dispositivos, incluido el aumento de VLAN en dispositivos de conmutación de capa 3 que proporcionan enrutamiento ipv6 y el uso de ASN especificado en BGP.

En última instancia, este enfoque permite que los administradores de red estén expuestos a una gran parte del contenido, ya que cada implementación debe cumplir con los requisitos, y los conceptos aprendidos en el curso son fundamentales para comprender y completar con éxito la operación.

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