

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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Diplomado de opción de grado presentado para optar el título de INGENIERÍA
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GLOSARIO

DHCP: es un servidor de Red el cual permite una asignación automática de direcciones IP, gateway predeterminadas, así como otros parámetros de red que necesiten los clientes. El sistema DHCP envía automáticamente todos los parámetros para que los clientes se comuniquen sin problema dentro de la red.

NETWORK: es una red física y lógica que contribuye a lograr estas interconexiones. La misma implica el trabajo conjunto de un número variable de servidores, acumulando con los mismos una capacidad de cómputo significativa.

SLAAC: es un método en el cual un dispositivo puede obtener una dirección IPv6 de unidifusión global sin los servicios de un servidor de DHCPv6. ICMPv6 se encuentra en el centro de SLAAC. ICMPv6 es similar a ICMPv4, pero incluye funcionalidad adicional y es un protocolo mucho más sólido.

SPANNING TREE: es un protocolo de red de capa 2 del modelo OSI. Su función es la de gestionar la presencia de bucles en topologías de red debido a la existencia de enlaces redundantes.

ETHERCHANNEL: es una tecnología de Cisco construida de acuerdo con los estándares 802.3 full-dúplex Fast Ethernet. Permite la agrupación lógica de varios enlaces físicos Ethernet, esta agrupación es tratada como un único enlace y permite sumar la velocidad nominal de cada puerto físico Ethernet usado y así obtener un enlace troncal de alta velocidad.

VLAN: es un método para crear redes lógicas independientes dentro de una misma red física. Varias VLAN pueden coexistir en un único conmutador físico o en una única red física. Son útiles para reducir el dominio de difusión y ayudan en la administración de la red, separando segmentos lógicos de una red de área local que no deberían intercambiar datos usando la red local.

BGP: es un protocolo mediante el cual se intercambia información de encaminamiento entre sistemas autónomos. Por ejemplo, los proveedores de servicio registrados en Internet suelen componerse de varios sistemas autónomos y para este caso es necesario un protocolo como BGP.

HSRP: es un protocolo propiedad de CISCO que permite el despliegue de enrutadores redundantes tolerantes de fallos en una red. Este protocolo evita la existencia de puntos de fallo únicos (single point of failure) en la red mediante técnicas de redundancia y comprobación del estado de los routers. Evitar puntos únicos de fallo en la red es muy importante para dotar de alta disponibilidad al servicio de red. Es un protocolo muy similar a VRRP, que no es propietario.

RESUMEN

De acuerdo a la topología de red se realiza una serie de configuraciones que van primeramente con la asignación de los parámetros básicos de seguridad y las interfaces de direccionamiento, cada uno de los dispositivos cuenta con una configuración asignada que permite preparar los segmentos de redes de acuerdo a las diferentes capas del modelo OSI; configuración de interfaces troncales que interconectan enlaces de switch, cambios de vlans nativas en los puertos troncales, realización de una configuración apropiada de RSTP puente raíz basada de acuerdo al diagrama de topología, creación de LACP Etherchannel, asignación del protocolo DHCP de acuerdo a la necesidad de red y validación de los direccionamientos obtenidos.

Por otra parte, se tiene que realizar una configuración de protocolos de enrutamiento tanto IPV4 como IPV6, demostrando que la red debería estar completamente convergida, para ello se agregan configuraciones de propagación OSPFv2, configuración áreas únicas en algunos de los dispositivos y configuración de BGP en R2.

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

ABSTRACT

According to the network topology, a series of configurations are made that go first with the assignment of the basic security parameters and the addressing interfaces, each of the devices has an assigned configuration that allows preparing the network segments according to the different layers of the OSI model; configuration of trunk interfaces that interconnect switch links, changes native VLANs on trunk ports, perform proper root bridge RSTP configuration based on topology diagram, create LACP Etherchannel, assign DHCP protocol as needed network and validation of the addresses obtained.

On the other hand, it is necessary to configure both IPv4 and IPv6 routing protocols, demonstrating that the network should be completely converged, for which OSPFv2 propagation configurations are added, configuration of unique areas in some of the devices and BGP configuration in R2.

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

1. INTRODUCCIÓN

De acuerdo a los desarrollos que deben presentarse al momento de realizar una topología de red, se implementa primeramente la configuración de los dispositivos que conforman esta topología que van desde el cambio en el nombre de host, la desactivación de la búsqueda de dominio, la habilitación del direccionamiento ipv6unicast y la aplicación de mensaje de bienvenida y verificaciones en la línea de consola. Seguido a esto, se realiza la configuración de las interfaces que conforman el direccionamiento, así como la vinculación de interfaces Loopback, aplicación de DHCP y demás configuraciones que dejan lista la topología para realizar las respectivas verificaciones y aseguran la interconexión entre las redes de la compañía.

Luego, se realiza la configuración de la capa 2 de la red y el soporte de Host, habilitando los enlaces trunk 802.1Q entre los switches de capa 3 y el switch de capa2. Enlazando la troncal a la vlan nativa 999, habilitando el protocolo Rapid Spanning-Tree (RSTP), se configuran los puentes raíz RSTP root bridges según la información suministrada del diagrama de topología, complementado por la adición de un respaldo en caso de el puente raíz falle.

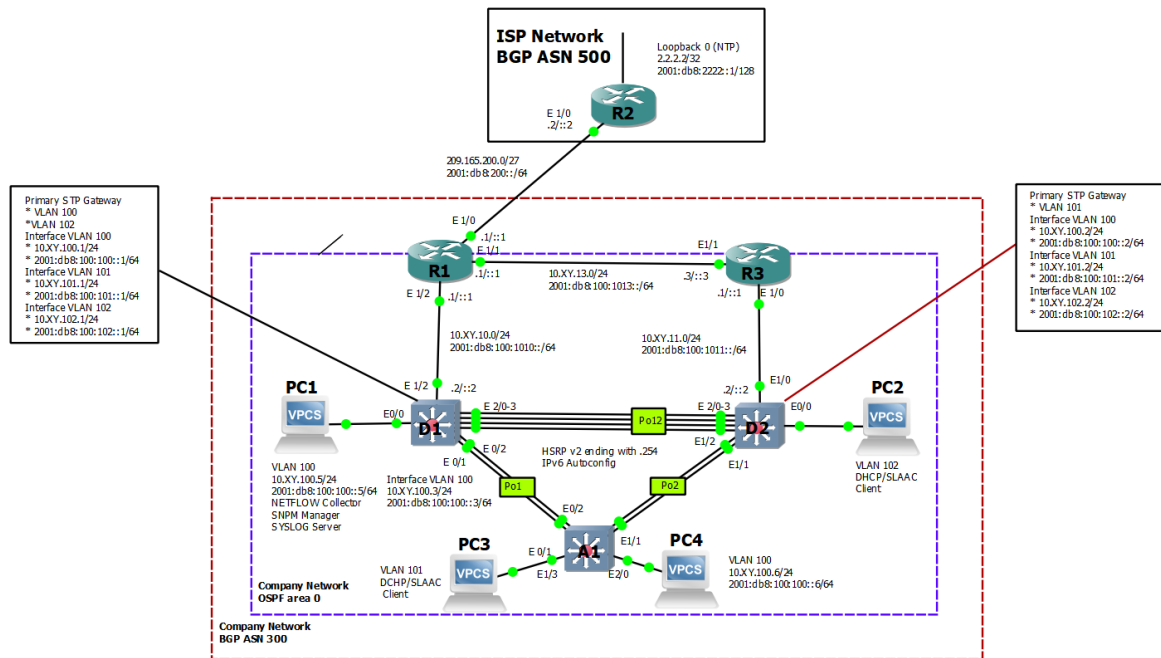
Finalmente se realiza la configuración de los protocolos de enrutamiento en los dispositivos para que la red esté completamente convergente. Para ello se realiza la configuración OSPF tanto para el direccionamiento IPv4 como para el IPv6, se configura MP-BGP en el router R2 y R1.

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	10.0.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	E1/1	10.0.13.1/24	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	10.0.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
	E1/1	10.0.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	E1/2	10.0.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
	VLAN 100	10.0.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10.0.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
	VLAN 102	10.0.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	E1/0	10.0.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10.0.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
	VLAN 101	10.0.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10.0.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.0.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.0.100.5/24	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	10.0.100.6/24	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).

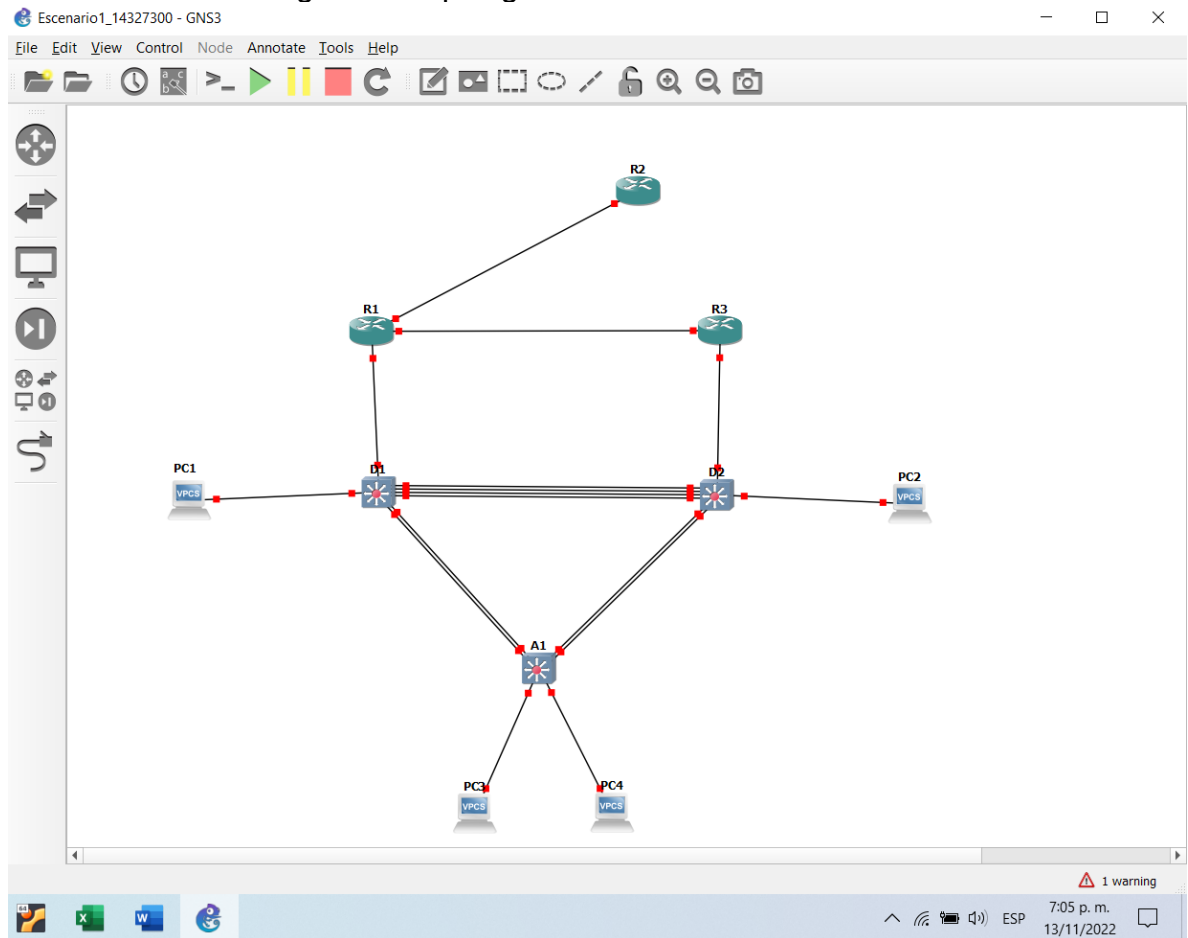
2.1.1. Part 1: Build the Network and Configure Basic Device Settings and Interface Addressing

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 10.0.10.1 255.255.255.0 //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 10.0.13.1 255.255.255.0 //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

```

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
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

```

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 10.0.11.1 255.255.255.0 //Se configura el
direcccionamiento IPv4
R3(config-if)# ipv6 address fe80::3:2 link-local //Se configura el
direcccionamiento para el enlace local
R3(config-if)# ipv6 address 2001:db8:100:1011::1/64 //Se configura el
direcccionamiento 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 10.0.13.3 255.255.255.0 //Se configura el
direcccionamiento IPv4
R3(config-if)# ipv6 address fe80::3:3 link-local //Se configura el
direcccionamiento para el enlace local
R3(config-if)# ipv6 address 2001:db8:100:1010::2/64 //Se configura el
direcccionamiento 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 vlan	//Se asigna un nombre de vlan
D1(config-vlan)# exit	
D1(config)#vlan 102	//Se configura la vlan
D1(config-vlan)# name UserGroupB vlan	//Se asigna un nombre de vlan
D1(config-vlan)# exit	
D1(config)#vlan 999	//Se configura la vlan
D1(config-vlan)# name NATIVE vlan	//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 10.0.10.2 255.255.255.0	//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 10.0.100.1 255.255.255.0	//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 10.0.101.1 255.255.255.0	//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 10.0.102.1 255.255.255.0	//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 10.0.101.1 10.0.101.109 //Se excluyen
las direcciones para el servidor DHCP
D1(config)#ip dhcp excluded-address 10.0.101.141 10.0.101.254 //Se excluyen
las direcciones para el servidor DHCP
D1(config)#ip dhcp excluded-address 10.0.102.1 10.0.102.109 //Se excluyen
las direcciones para el servidor DHCP
D1(config)#ip dhcp excluded-address 10.0.102.141 10.0.102.254 //Se excluyen
las direcciones para el servidor DHCP
D1(config)#ip dhcp pool VLAN-101 //Se configura un pool DHCP
D1(dhcp-config)# network 10.0.101.0 255.255.255.0 //Se define la red del pool de
direcciones DHCP
D1(dhcp-config)# default-router 10.0.101.254 //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 10.0.102.0 255.255.255.0 //Se define la red del pool de
direcciones DHCP
D1(dhcp-config)# default-router 10.0.102.254 //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 10.0.11.2 255.255.255.0	//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 10.0.100.2 255.255.255.0	//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 10.0.101.2 255.255.255.0	//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 10.0.102.2 255.255.255.0 //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 10.0.101.1 10.0.101.209 //Se excluyen
las direcciones para el servidor DHCP
D2(config)#ip dhcp excluded-address 10.0.101.241 10.0.101.254 //Se excluyen
las direcciones para el servidor DHCP
D2(config)#ip dhcp excluded-address 10.0.102.1 10.0.102.209 //Se excluyen
las direcciones para el servidor DHCP
D2(config)#ip dhcp excluded-address 10.0.102.241 10.0.102.254 //Se excluyen
las direcciones para el servidor DHCP
D2(config)#ip dhcp pool VLAN-101 //Se configura un pool DHCP
D2(dhcp-config)# network 10.0.101.0 255.255.255.0 //Se define la red del pool de
direcciones DHCP
D2(dhcp-config)# default-router 0.0.101.254 //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 10.0.102.0 255.255.255.0 //Se define la red del pool de
direcciones DHCP
D2(dhcp-config)# default-router 10.0.102.254 //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 10.0.100.3 255.255.255.0 //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 del dispositivo	//Se guarda la configuracion
R2#copy running-config startup-config del dispositivo	//Se guarda la configuracion
R3#copy running-config startup-config del dispositivo	//Se guarda la configuracion
D1#copy running-config startup-config del dispositivo	//Se guarda la configuracion
D2#copy running-config startup-config del dispositivo	//Se guarda la configuracion
A1#copy running-config startup-config del dispositivo	//Se guarda la configuracion

- c. Configure PC 1 and PC 4 host addressing as shown in the addressing table.
Assign a default gateway address of 10.0.100.254 which will be the HSRP
virtual IP address used in Part 4.

PC1> ip 10.0.100.5 255.255.255.0 10.0.100.254 direccionamiento IPv4 del equipo	//Se configura el
PC1> ip 2001:db8:100:100::5/64 eui-64 direccionamiento IPv6 del equipo	//Se configura el
PC4> ip 10.0.100.6 255.255.255.0 10.0.100.254 direccionamiento IPv4 del equipo	//Se configura el
PC4> ip 2001:db8:100:100::6/64 eui-64 direccionamiento IPv6 del equipo	//Se configura el

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: • 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: • 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: • D1: 10.0.100.1 • D2: 10.0.100.2

Task#	Task	Specification
		• PC4: 10.0.100.6 PC2 should successfully ping: • D1: 10.0.102.1 • D2: 10.0.102.2 PC3 should successfully ping: • D1: 10.0.101.1 • D2: 10.0.101.2 PC4 should successfully ping: • D1: 10.0.100.1 • D2: 10.0.100.2 • PC1: 10.0.100.5

Fuente: Autor del documento.

Configuración en D1.

D1#configure terminal

D1(config)#interface range e2/0-3 //Se accede a las interfaces

D1(config-if-range)#switchport trunk encapsulation dot1q //Se habilita la encapsulación para el enlace troncal

D1(config-if-range)#switchport mode trunk //Se configuran las interfaces como enlaces troncales

D1(config-if-range)# switchport trunk native vlan 999 //Se configura la vlan como nativa

D1(config-if-range)# channel-group 12 mode active //Se habilita el LACP de grupo 12

D1(config-if-range)# no shutdown //Se enciende las interfaces

D1(config-if-range)# exit

D1(config)#interface range e0/1-2 //Se accede a las interfaces

D1(config-if-range)# switchport trunk encapsulation dot1q //Se habilita la encapsulación para el enlace troncal

D1(config-if-range)# switchport mode trunk //Se configuran las interfaces como enlaces troncales

D1(config-if-range)# switchport trunk native vlan 999 //Se configura la vlan como nativa

D1(config-if-range)# channel-group 1 mode active //Se habilita el LACP de grupo 1

D1(config-if-range)# no shutdown //Se enciende las interfaces

D1(config-if-range)# exit

D1(config)#spanning-tree mode rapid-pvst //Se habilita el modo rapid-pvst

```

D1(config)#spanning-tree vlan 100,102 root primary //Se configuran las vlans
como raices primarias de spanning-tree
D1(config)#spanning-tree vlan 101 root secondary //Se configuran las vlans
como raices secundarias de spanning-tree
D1(config)#interface e0/0 //Se accede a la interface
D1(config-if)# switchport mode access //Se configura en modo de
acceso
D1(config-if)# switchport access vlan 100 //Se configura la vlan en el
puerto de acceso
D1(config-if)# spanning-tree portfast //Se configura el spanning-
tree en modo portfast
D1(config-if)# no shutdown //Se enciende las interfaces
D1(config-if)# exit
D1(config)#end

```

Configuración en D2.

```

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

```

Configuración en A1.

```

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

Procedemos a verificar el dhcp y auto en los PC2 y PC3.

Figura 3. Validación de la obtención de direccionamiento DHCP en PC2.

```

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

Executing the startup file

PC2> ip auto
GLOBAL SCOPE      : 2001:db8:100:1010:2050:79ff:fe66:6803/64
ROUTER LINK-LAYER : ca:01:07:8a:00:1e

PC2> ip dhcp
DHCPA IP 10.0.102.110/24 GW 10.0.102.254

PC2>

```

Fuente: Autor del documento.

Figura 4. Validación de la obtención de direccionamiento DHCP en PC3.



```
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Press '?' to get help.

Executing the startup file

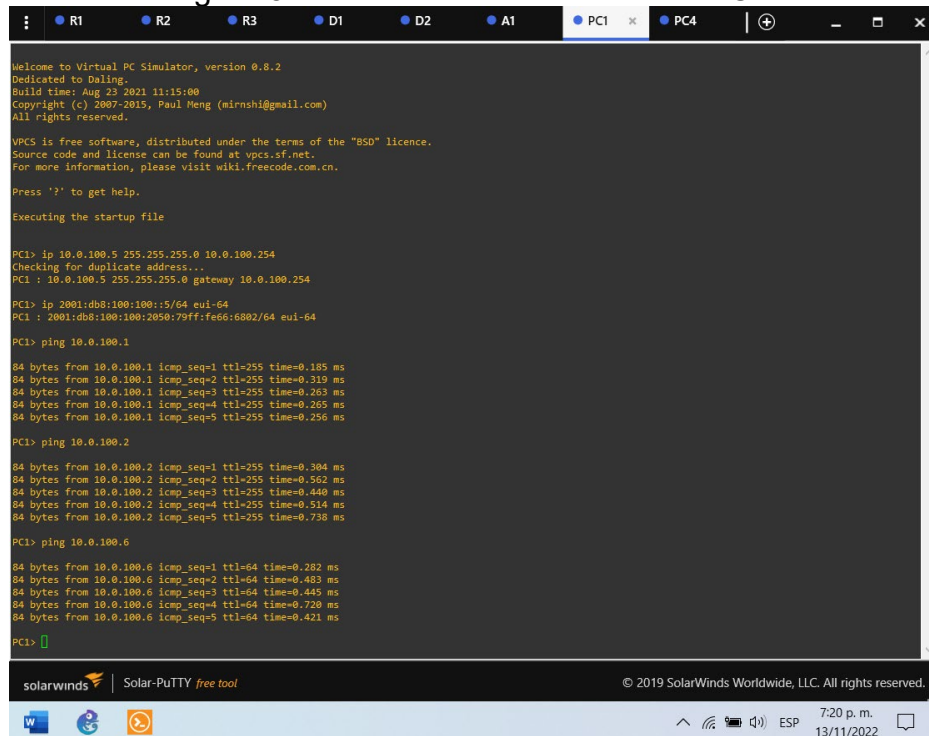
PC3> ip auto
GLOBAL SCOPE : 2001:db8:100:1010:2050:79ff:fe66:6801/64
ROUTER LINK-LAYER : ca:01:07:0a:00:1e

PC3> ip dhcp
ODORA IP 10.0.101.110/24 GW 10.0.101.254

PC3>
```

Fuente: Autor del documento.

Figura 5. Pruebas de conectividad en PC1.



```
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Press '?' to get help.

Executing the startup file

PC1> ip 10.0.100.5 255.255.255.0 10.0.100.254
Checking for duplicate address...
PC1 : 10.0.100.5 255.255.255.0 gateway 10.0.100.254

PC1> ip 2001:db8:100:100::5/64 eui-64
PC1 : 2001:db8:100:100:2050:79ff:fe66:6802/64 eui-64

PC1> ping 10.0.100.1

84 bytes from 10.0.100.1 icmp_seq=1 ttl=255 time=0.185 ms
84 bytes from 10.0.100.1 icmp_seq=2 ttl=255 time=0.319 ms
84 bytes from 10.0.100.1 icmp_seq=3 ttl=255 time=0.263 ms
84 bytes from 10.0.100.1 icmp_seq=4 ttl=255 time=0.265 ms
84 bytes from 10.0.100.1 icmp_seq=5 ttl=255 time=0.256 ms

PC1> ping 10.0.100.2

84 bytes from 10.0.100.2 icmp_seq=1 ttl=255 time=0.304 ms
84 bytes from 10.0.100.2 icmp_seq=2 ttl=255 time=0.562 ms
84 bytes from 10.0.100.2 icmp_seq=3 ttl=255 time=0.440 ms
84 bytes from 10.0.100.2 icmp_seq=4 ttl=255 time=0.514 ms
84 bytes from 10.0.100.2 icmp_seq=5 ttl=255 time=0.730 ms

PC1> ping 10.0.100.6

84 bytes from 10.0.100.6 icmp_seq=1 ttl=64 time=0.282 ms
84 bytes from 10.0.100.6 icmp_seq=2 ttl=64 time=0.483 ms
84 bytes from 10.0.100.6 icmp_seq=3 ttl=64 time=0.445 ms
84 bytes from 10.0.100.6 icmp_seq=4 ttl=64 time=0.720 ms
84 bytes from 10.0.100.6 icmp_seq=5 ttl=64 time=0.421 ms

PC1>
```

Fuente: Autor del documento.

Figura 6. Pruebas de conectividad en PC2.



```

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Press '?' to get help.

Executing the startup file

PC2> ip auto
GLOBAL SCOPE      : 2001:db8:100:1010:2050:79ff:fe66:6803/64
ROUTER LINK-LAYER : ca:01:07:8a:00:1e

PC2> ip dhcp
DDORA IP 10.0.102.110/24 GW 10.0.102.254

PC2> ping 10.0.102.1

64 bytes from 10.0.102.1 icmp_seq=1 ttl=255 time=0.232 ms
64 bytes from 10.0.102.1 icmp_seq=2 ttl=255 time=0.454 ms
64 bytes from 10.0.102.1 icmp_seq=3 ttl=255 time=0.688 ms
64 bytes from 10.0.102.1 icmp_seq=4 ttl=255 time=0.452 ms
64 bytes from 10.0.102.1 icmp_seq=5 ttl=255 time=0.418 ms

PC2> ping 10.0.102.2

64 bytes from 10.0.102.2 icmp_seq=1 ttl=255 time=0.143 ms
64 bytes from 10.0.102.2 icmp_seq=2 ttl=255 time=0.394 ms
64 bytes from 10.0.102.2 icmp_seq=3 ttl=255 time=0.308 ms
64 bytes from 10.0.102.2 icmp_seq=4 ttl=255 time=0.417 ms
64 bytes from 10.0.102.2 icmp_seq=5 ttl=255 time=0.279 ms

PC2>

```

Fuente: Autor del documento.

Figura 7. Pruebas de conectividad en PC3.



```

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Press '?' to get help.

Executing the startup file

PC3> ip auto
GLOBAL SCOPE      : 2001:db8:100:1010:2050:79ff:fe66:6801/64
ROUTER LINK-LAYER : ca:01:07:8a:00:1e

PC3> ip dhcp
DDORA IP 10.0.101.110/24 GW 10.0.101.254

PC3> ping 10.0.101.1

64 bytes from 10.0.101.1 icmp_seq=1 ttl=255 time=0.279 ms
64 bytes from 10.0.101.1 icmp_seq=2 ttl=255 time=0.695 ms
64 bytes from 10.0.101.1 icmp_seq=3 ttl=255 time=1.163 ms
64 bytes from 10.0.101.1 icmp_seq=4 ttl=255 time=0.606 ms
64 bytes from 10.0.101.1 icmp_seq=5 ttl=255 time=0.566 ms

PC3> ping 10.0.101.2

64 bytes from 10.0.101.2 icmp_seq=1 ttl=255 time=0.191 ms
64 bytes from 10.0.101.2 icmp_seq=2 ttl=255 time=0.733 ms
64 bytes from 10.0.101.2 icmp_seq=3 ttl=255 time=0.404 ms
64 bytes from 10.0.101.2 icmp_seq=4 ttl=255 time=0.413 ms
64 bytes from 10.0.101.2 icmp_seq=5 ttl=255 time=0.364 ms

PC3>

```

Fuente: Autor del documento.

Figura 8. Pruebas de conectividad en PC4.

```

?          Print help
arp        Shortcut for: show arp. Show arp table
clear [ARG] Clear IPv4/IPv6, arp/neighbor cache, command history
dhcp [OPTION] Shortcut for: ip dhcp. Get IPv4 address via DHCP
disconnect Exit the telnet session (daemon mode)
echo [TEXT] Display TEXT in output. See also set echo ?
help       Print help
history    Shortcut for: show history. List the command history
ip [ARG ... [OPTION]] Configure the current VPC's IP settings. See ip ?
load [FILENAME] Load the configuration/script from the file FILENAME
ping [HOST [OPTION ...]] Ping HOST with ICMP (default) or TCP/UDP. See ping ?
quit       Quit program
relay [ARG ...] Configure packet relay between UDP ports. See relay ?
rlogin [ip] port Telnet to port on host at ip (relative to host PC)
save [FILENAME] Save the configuration to the file FILENAME
set [ARG ...] Set VPC name and other options. Try set ?
show [ARG ...] Print the information of VPCs (default). See show ?
sleep [seconds] [TEXT] Print TEXT and pause running script for seconds
trace [HOST [OPTION ...]] Print the path packets take to network HOST
version    Shortcut for: show version

To get command syntax help, please enter '?' as an argument of the command.

PC4> ping 10.0.100.2

64 bytes from 10.0.100.2 icmp_seq=1 ttl=255 time=0.287 ms
64 bytes from 10.0.100.2 icmp_seq=2 ttl=255 time=0.705 ms
64 bytes from 10.0.100.2 icmp_seq=3 ttl=255 time=1.299 ms
64 bytes from 10.0.100.2 icmp_seq=4 ttl=255 time=0.604 ms
64 bytes from 10.0.100.2 icmp_seq=5 ttl=255 time=0.564 ms

PC4> ping 10.0.100.5

64 bytes from 10.0.100.5 icmp_seq=1 ttl=64 time=0.226 ms
64 bytes from 10.0.100.5 icmp_seq=2 ttl=64 time=0.470 ms
64 bytes from 10.0.100.5 icmp_seq=3 ttl=64 time=0.430 ms
64 bytes from 10.0.100.5 icmp_seq=4 ttl=64 time=0.406 ms

PC4> ping 10.0.100.1

64 bytes from 10.0.100.1 icmp_seq=1 ttl=255 time=0.517 ms
64 bytes from 10.0.100.1 icmp_seq=2 ttl=255 time=0.580 ms
64 bytes from 10.0.100.1 icmp_seq=3 ttl=255 time=0.323 ms
64 bytes from 10.0.100.1 icmp_seq=4 ttl=255 time=1.327 ms
64 bytes from 10.0.100.1 icmp_seq=5 ttl=255 time=0.421 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	Use OSPF Process ID 4 and assign the following router-IDs: • R1: 0.0.4.1 • R3: 0.0.4.3 • D1: 0.0.4.131 • D2: 0.0.4.132

Task#	Task	Specification
	single-area OSPFv2 in area 0.	On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0. • On R1, do not advertise the R1 – R2 network. • On R1, propagate a default route. Note that the default route will be provided by BGP. Disable OSPFv2 advertisements on: • D1: All interfaces except E1/2 • D2: All interfaces except E1/0
3.2	On the “Company Network” (i.e., R1, R3, D1, and D2), configure classic single-area OSPFv3 in area 0.	Use OSPF Process ID 6 and assign the following router-IDs: • R1: 0.0.6.1 • R3: 0.0.6.3 • D1: 0.0.6.131 • D2: 0.0.6.132 On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0. • On R1, do not advertise the R1 – R2 network. • On R1, propagate a default route. Note that the default route will be provided by BGP. Disable OSPFv3 advertisements on: • D1: All interfaces except E1/2 • D2: All interfaces except E1/0
3.3	On R2 in the “ISP Network”, configure MP-BGP.	Configure two default static routes via interface Loopback 0: • An IPv4 default static route. • An IPv6 default static route. Configure R2 in BGP ASN 500 and use the router-id 2.2.2.2. Configure and enable an IPv4 and IPv6 neighbor relationship with R1 in ASN 300. In IPv4 address family, advertise: • The Loopback 0 IPv4 network (/32). • The default route (0.0.0.0/0). In IPv6 address family, advertise:

Task#	Task	Specification
		• The Loopback 0 IPv4 network (/128). • The default route (::/0).
3.4	On R1 in the “ISP Network”, configure MP-BGP.	Configure two static summary routes to interface Null 0: • A summary IPv4 route for 10.XY.0.0/8. • A summary IPv6 route for 2001:db8:100::/48. Configure R1 in BGP ASN 300 and use the router-id 1.1.1.1. Configure an IPv4 and IPv6 neighbor relationship with R2 in ASN 500. In IPv4 address family: • Disable the IPv6 neighbor relationship. • Enable the IPv4 neighbor relationship. • Advertise the 10.XY.0.0/8 network. In IPv6 address family: • Disable the IPv4 neighbor relationship. • Enable the IPv6 neighbor relationship. • Advertise the 2001:db8:100::/48 network.

Fuente: Autor del documento.

Configuración en R1.

```

R1#configure terminal
R1(config)#router ospf 4 //Se configura OSPF IPv4
R1(config-router)# router-id 0.0.4.1 //Se asigna el id OSPF
R1(config-router)# network 10.0.10.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
R1(config-router)# network 10.0.13.0 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)#!
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)#!
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)#

```

Configuración en R2

```

R2#configure terminal
R2(config)#ip route 0.0.0.0 0.0.0.0 loopback 0 //Se configura una ruta
estatica por defecto IPv4 vía Loopback 0
R2(config)#ipv6 route ::/0 loopback 0 //Se configura una ruta
estatica por defecto IPv6 vía Loopback 0

```

```

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

```

Configuración en R3

```

R3#configure terminal
R3(config)#router ospf 4 //Se configura OSPF IPv4
R3(config-router)# router-id 0.0.4.3 //Se asigna el id OSPF
R3(config-router)# network 10.0.11.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
R3(config-router)# network 10.0.13.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
R3(config-router)# exit
R3(config)#ipv6 router ospf 6 //Se configura OSPF IPv6
R3(config-rtr)# router-id 0.0.6.3 //Se asigna el id OSPF
R3(config-rtr)# exit
R3(config)#interface e1/0 //Se accede a la interface
R3(config-if)# ipv6 ospf 6 area 0 //Se configura el
enrutamiento ospf ipv6 en el área 0

```

```

R3(config-if)# exit
R3(config)#interface e1/1 //Se accede a la interface
R3(config-if)# ipv6 ospf 6 area 0 //Se configura el
enrutamiento ospf ipv6 en el área 0
R3(config-if)# exit
R3(config)#end

```

Configuración en D1

```

D1#configure terminal
D1(config)#router ospf 4 //Se configura OSPF IPv4
D1(config-router)# router-id 0.0.4.131 //Se asigna el id OSPF
D1(config-router)# network 10.0.100.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D1(config-router)# network 10.0.101.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D1(config-router)# network 10.0.102.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D1(config-router)# network 10.0.10.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D1(config-router)# passive-interface default //Se desactiva los anuncios
en todas las interfaces
D1(config-router)# no passive-interface e1/2 //Se activa el anuncio en la
interface
D1(config-router)# exit
D1(config)#ipv6 router ospf 6 //Se configura OSPF IPv6
D1(config-rtr)# router-id 0.0.6.131 //Se asigna el id OSPF
D1(config-rtr)# passive-interface default //Se desactiva los anuncios
en todas las interfaces
D1(config-rtr)# no passive-interface e1/2 //Se activa el anuncio en la
interface
D1(config-rtr)# exit
D1(config)#interface e1/2 //Se accede a la interface
D1(config-if)# ipv6 ospf 6 area 0 //Se configura el
enrutamiento ospf ipv6 en el área 0
D1(config-if)# exit
D1(config)#interface vlan 100 //Se accede a la interface
D1(config-if)# ipv6 ospf 6 area 0 //Se configura el
enrutamiento ospf ipv6 en el área 0
D1(config-if)# exit
D1(config)#interface vlan 101 //Se accede a la interface
D1(config-if)# ipv6 ospf 6 area 0 //Se configura el
enrutamiento ospf ipv6 en el área 0
D1(config-if)# exit
D1(config)#interface vlan 102 //Se accede a la interface

```

```

D1(config-if)# ipv6 ospf 6 area 0 //Se configura el
enrutamiento ospf ipv6 en el área 0
D1(config-if)# exit
D1(config)#end

```

Configuración en D2

```

D2#configure terminal
D2(config)#router ospf 4 //Se configura OSPF IPv4
D2(config-router)# router-id 0.0.4.132 //Se asigna el id OSPF
D2(config-router)# network 10.0.100.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D2(config-router)# network 10.0.101.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D2(config-router)# network 10.0.102.0 0.0.0.255 area 0 //Se configura la red
conectada directamente en el área 0
D2(config-router)# network 10.0.11.0 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

```

Figura 9. Validación de configuración OSPF en R1.

```

R1(config-rtr)# exit
R1(config)#interface e1/2
R1(config-if)# ipv6 ospf 6 area 0
R1(config-if)# exit
R1(config)#interface e1/1
R1(config-if)# ipv6 ospf 6 area 0
R1(config-if)# exit
R1(config)#!
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)#
R1(config-router)#
*Nov 14 00:27:34.603: %BGP-5-ADJCHANGE: neighbor 2001:DB8:200::2 Up
R1(config-router)#
*Nov 14 00:27:35.643: %BGP-5-ADJCHANGE: neighbor 209.165.200.226 Up
R1(config-router)#
*Nov 14 00:28:06.643: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config-router)#
*Nov 14 00:28:14.299: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config-router)#
*Nov 14 00:28:33.235: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.131 on Ethernet1/2 from LOADING to FULL, Loading Done
*Nov 14 00:28:33.315: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config-router)#end
R1#
*Nov 14 00:30:04.955: %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 10.0.10.0 0.0.0.255 area 0
network 10.0.13.0 0.0.0.255 area 0
default-information originate
R1#

```

Fuente: Autor del documento.

Figura 10. Validación de configuración OSPF en R3.

```

R3(config)#
*Nov 14 00:09:07.171: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Nov 14 00:09:07.319: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
*Nov 14 00:09:08.171: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
R3(config)#
*Nov 14 00:09:08.319: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
R3(config)#exit
R3#copy running-config startup-config
Destination filename [startup-config]?
*Nov 14 00:12:44.899: %SYS-5-CONFIG_I: Configured from console by console
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 4
R3(config-router)# router-id 0.0.4.3
R3(config-router)# network 10.0.11.0 0.0.0.255 area 0
R3(config-router)# network 10.0.13.0 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 00:27:16.483: %SYS-5-CONFIG_I: Configured from console by console
*Nov 14 00:27:16.571: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 14 00:27:24.223: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 14 00:28:15.007: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#
*Nov 14 00:28:20.551: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#show run | section ^router ospf
router ospf 4
router-id 0.0.4.3
network 10.0.11.0 0.0.0.255 area 0
network 10.0.13.0 0.0.0.255 area 0
R3#

```

Fuente: Autor del documento.

Figura 11. Validación de configuración OSPF en D1.

```

D1#
*Nov 14 00:18:39.286: %KDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (999), with A1 Ethernet0/1 (1).
D1#
*Nov 14 00:18:51.991: %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 10.0.100.0 0.0.0.255 area 0
D1(config-router)# network 10.0.101.0 0.0.0.255 area 0
D1(config-router)# network 10.0.102.0 0.0.0.255 area 0
D1(config-router)# network 10.0.10.0 0.0.0.255 area 0
D1(config-router)# passive-interface default
D1(config-router)# no passive-interface e1/2
D1(config-router)# exit
D1(config)#ipv6 router ospf 6
D1(config-rtr)# router-id 0.0.6.131
D1(config-rtr)# passive-interface default
D1(config-rtr)# no passive-interface e1/2
D1(config-rtr)# exit
D1(config)#interface e1/2
D1(config-if)# ipv6 ospf 6 area 0
D1(config-if)# exit
D1(config)#interface vlan 100
D1(config-if)# ipv6 ospf 6 area 0
D1(config-if)# exit
D1(config)#interface vlan 101
D1(config-if)# ipv6 ospf 6 area 0
D1(config-if)# exit
D1(config)#interface vlan 102
D1(config-if)# ipv6 ospf 6 area 0
D1(config-if)# exit
D1(config)#end
D1#
*Nov 14 00:28:33.650: %SYS-5-CONFIG_I: Configured from console by console
*Nov 14 00:28:33.767: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/2 from LOADING to FULL, Loading Done
*Nov 14 00:28:33.840: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/2 from LOADING to FULL, Loading Done
D1#show run | section ^router ospf
router ospf 4
router-id 0.0.4.131
passive-interface default
no passive-interface Ethernet1/2
network 10.0.10.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
D1#

```

Fuente: Autor del documento.

Figura 12. Validación de configuración OSPF en D2.

```

D2#
*Nov 14 00:18:35.169: %KDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet1/2 (999), with A1 Ethernet1/2 (1).
D2#
*Nov 14 00:18:51.928: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel2, changed state to up
D2#
D2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#router ospf 4
D2(config-router)# router-id 0.0.4.132
D2(config-router)# network 10.0.100.0 0.0.0.255 area 0
D2(config-router)# network 10.0.101.0 0.0.0.255 area 0
D2(config-router)# network 10.0.102.0 0.0.0.255 area 0
D2(config-router)# network 10.0.11.0 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 00:29:05.428: %SYS-5-CONFIG_I: Configured from console by console
*Nov 14 00:29:05.612: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on Ethernet1/0 from LOADING to FULL, Loading Done
D2#
*Nov 14 00:29:11.154: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.3 on Ethernet1/0 from LOADING to FULL, Loading Done
D2#show run | section ^router ospf
router ospf 4
router-id 0.0.4.132
passive-interface default
no passive-interface Ethernet1/0
network 10.0.11.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
D2#

```

Fuente: Autor del documento.

Figura 13. Validación de configuración OSPF IPv6 en R1.

```

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)#
R1(config-router)#
R1(config-router)#
*Nov 14 00:27:34.003: %BGP-5-ADJCHANGE: neighbor 2001:DB8:200::2 Up
R1(config-router)#
*Nov 14 00:27:35.643: %BGP-5-ADJCHANGE: neighbor 209.165.200.226 Up
R1(config-router)#
*Nov 14 00:28:06.643: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config-router)#
*Nov 14 00:28:14.299: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config-router)#
*Nov 14 00:28:33.235: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.131 on Ethernet1/2 from LOADING to FULL, Loading Done
*Nov 14 00:28:33.315: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config-router)#end
R1#
R1#
*Nov 14 00:30:04.955: %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 10.0.10.0 0.0.0.255 area 0
network 10.0.13.0 0.0.0.255 area 0
default-information originate
R1#show run | section ^ipv6 route
ipv6 route 2001:DB8:100::/48 Null0
R1#show run | section ^ipv6 router ospf 6
router-id 0.0.6.1
default-information originate
R1#show ipv6 ospf interface brief

```

Interface	PID	Area	Intf ID	Cost	State	Nbrs	F/C
E1/1	6	0	6	10	DR	1/1	
E1/2	6	0	7	10	DR	1/1	

Fuente: Autor del documento.

Figura 14. Validación de configuración OSPF IPv6 en R3.

```

R3#copy running-config startup-config
Destination filename [startup-config]:
*Nov 14 00:12:44.899: %SYS-5-CONFIG_I: Configured from console by console

Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 4
R3(config-router)# router-id 0.0.4.3
R3(config-router)# network 10.0.11.0 0.0.0.255 area 0
R3(config-router)# network 10.0.13.0 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 00:27:16.483: %SYS-5-CONFIG_I: Configured from console by console
R3#
*Nov 14 00:27:16.571: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 14 00:27:24.223: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 14 00:28:15.007: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#
*Nov 14 00:28:20.551: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#show run | section ^router ospf
router ospf 4
router-id 0.0.4.3
network 10.0.11.0 0.0.0.255 area 0
network 10.0.13.0 0.0.0.255 area 0
R3#show run | section ^ipv6 route
ipv6 route 2001:DB8:100::/48 Null0
R3#show run | section ^ipv6 router ospf 6
router-id 0.0.6.3
default-information originate
R3#show ipv6 ospf interface brief

```

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

Fuente: Autor del documento.

Figura 15. Validación de configuración OSPF IPv6 en D1.

```

D1(config-router)# network 10.0.102.0 0.0.0.255 area 0
D1(config-router)# network 10.0.10.0 0.0.0.255 area 0
D1(config-router)# passive-interface default
D1(config-router)# no passive-interface e1/2
D1(config-router)# exit
D1(config)#ipv6 router ospf 6
D1(config-rtr)# router-id 0.0.6.131
D1(config-rtr)# passive-interface default
D1(config-rtr)# no passive-interface e1/2
D1(config-rtr)# exit
D1(config)#interface e1/2
D1(config-if)# ipv6 ospf 6 area 0
D1(config-if)# exit
D1(config)#interface vlan 100
D1(config-if)# ipv6 ospf 6 area 0
D1(config-if)# exit
D1(config)#interface vlan 101
D1(config-if)# ipv6 ospf 6 area 0
D1(config-if)# exit
D1(config)#interface vlan 102
D1(config-if)# ipv6 ospf 6 area 0
D1(config-if)# exit
D1(config)#end
D1#
*Nov 14 00:28:33.650: %SYS-5-CONFIG_I: Configured from console by console
*Nov 14 00:28:33.767: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/2 from LOADING to FULL, Loading Done
*Nov 14 00:28:33.840: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/2 from LOADING to FULL, Loading Done
D1#show run | section ^router ospf
router ospf 4
  router-id 0.0.4.131
  passive-interface default
  no passive-interface Ethernet1/2
  network 10.0.10.0 0.0.0.255 area 0
  network 10.0.100.0 0.0.0.255 area 0
  network 10.0.101.0 0.0.0.255 area 0
  network 10.0.102.0 0.0.0.255 area 0
D1#show run | section ^ipv6 route
ipv6 router ospf 6
  router-id 0.0.6.131
  passive-interface default
  no passive-interface Ethernet1/2
D1#show ipv6 ospf interface brief

```

Interface	PID	Area	Intf ID	Cost	State	Nbrs	F/C
Vl102	6	0	23	1	DR	0/0	
Vl101	6	0	22	1	DR	0/0	
Vl100	6	0	21	1	DR	0/0	
e1/2	6	0	20	10	BDR	1/1	

Fuente: Autor del documento.

Figura 16. Validación de configuración OSPF IPv6 en D2.

```

D2(config-router)# network 10.0.11.0 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 00:29:05.428: %SYS-5-CONFIG_I: Configured from console by console
*Nov 14 00:29:05.612: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on Ethernet1/0 from LOADING to FULL, Loading Done
D2#show run | section ^router ospf
router ospf 4
  router-id 0.0.4.132
  passive-interface default
  no passive-interface Ethernet1/0
  network 10.0.11.0 0.0.0.255 area 0
  network 10.0.100.0 0.0.0.255 area 0
  network 10.0.101.0 0.0.0.255 area 0
  network 10.0.102.0 0.0.0.255 area 0
D2#show run | section ^ipv6 route
ipv6 router ospf 6
  router-id 0.0.6.132
  passive-interface default
  no passive-interface Ethernet1/0
D2#show ipv6 ospf interface brief

```

Interface	PID	Area	Intf ID	Cost	State	Nbrs	F/C
Vl102	6	0	23	1	DR	0/0	
Vl101	6	0	22	1	DR	0/0	
Vl100	6	0	21	1	DR	0/0	
E1/0	6	0	20	10	BDR	1/1	

Fuente: Autor del documento.

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

```

R2(config-router)# bgp router-id 2.2.2.2
R2(config-router)# neighbor 209.165.200.225 remote-as 300
R2(config-router)# neighbor 2001:db8:200::1 remote-as 300
R2(config-router)# address-family ipv4
R2(config-router-af)# neighbor 209.165.200.225 activate
R2(config-router-af)# no neighbor 2001:db8:200::1 activate
R2(config-router-af)# network 2.2.2.2 mask 255.255.255.255
R2(config-router-af)# network 0.0.0.0
R2(config-router-af)# exit-address-family
R2(config-router)# address-family ipv6
R2(config-router-af)# no neighbor 209.165.200.225 activate
R2(config-router-af)# neighbor 2001:db8:200::1 activate
R2(config-router-af)# network 2001:db8:2222::/128
R2(config-router-af)# network ::/0
R2(config-router-af)# exit-address-family
R2(config-router)#
*Nov 14 00:27:14.603: %BGP-5-ADJCHANGE: neighbor 2001:DB8:200::1 Up
R2(config-router)#
*Nov 14 00:27:15.639: %BGP-5-ADJCHANGE: neighbor 209.165.200.225 Up
R2(config-router)#end
R2#
R2#
*Nov 14 00:36:14.387: %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#
  
```

Fuente: Autor del documento.

Figura 18. Validación de configuración BGP en R1.

```

R1(config-router)#
*Nov 14 00:27:14.603: %BGP-5-ADJCHANGE: neighbor 2001:DB8:200::2 Up
R1(config-router)#
*Nov 14 00:27:35.643: %BGP-5-ADJCHANGE: neighbor 209.165.200.226 Up
R1(config-router)#
*Nov 14 00:28:06.643: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config-router)#
*Nov 14 00:28:14.299: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1(config-router)#
*Nov 14 00:28:33.235: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.131 on Ethernet1/2 from LOADING to FULL, Loading Done
*Nov 14 00:28:33.315: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config-router)#end
R1#
R1#
*Nov 14 00:30:04.955: %SYS-5-CONFIG_I: Configured from console by console
R1#show run | section ^router ospf
router ospf 6
  router-id 0.0.4.1
  network 10.0.10.0 0.0.0.255 area 0
  network 10.0.13.0 0.0.0.255 area 0
  default-information originate
R1#show run | section ^ipv6 route
ipv6 route 2001:DB8:100::/48 Null0
ipv6 router ospf 6
  router-id 0.0.6.1
  default-information originate
R1#show ipv6 ospf interface brief
Interface  PID  Area  Intf ID  Cost  State  Nbrs  F/C
Et1/1      6    0      6       10  DR    1/1
Et1/2      6    0      7       10  DR    1/1
R1#show run | section bgp
router bgp 300
  bgp router-id 1.1.1.1
  bgp log-neighbor-changes
  neighbor 2001:DB8:200::2 remote-as 500
  neighbor 209.165.200.226 remote-as 500
  !
  address-family ipv4
    network 10.0.0.0
    no neighbor 2001:DB8:200::2 activate
    neighbor 209.165.200.226 activate
  exit-address-family
  !
  address-family ipv6
    network 2001:DB8:100::/48
    neighbor 2001:DB8:200::2 activate
  exit-address-family
R1#
  
```

Fuente: Autor del documento.

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

```

R1#
R1#
*Nov 14 00:30:04.955: %SYS-5-CONFIG_I: Configured from console by console
R1#show run | section "router ospf
router ospf 4
  router-id 0.0.0.1
  network 10.0.10.0 0.0.0.255 area 0
  default-information originate
R1#show run | section "ipv6 route
ipv6 route 2001:D88:100::/48 Null0
R1#show run | section "ip router ospf
ip router ospf 6
  router-id 0.0.0.1
  default-information originate
R1#show ip 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#show run | section bgp
router bgp 300
  bgp router-id 1.1.1.1
  bgp log-neighbor-changes
  neighbor 2001:D88:200::2 remote-as 500
  neighbor 209.165.200.226 remote-as 500
  address-family ipv4
    network 10.0.0.0
    no neighbor 2001:D88:200::2 activate
    neighbor 209.165.200.226 activate
  exit-address-family
  address-family ipv6
    network 2001:D88:100::/48
    neighbor 2001:D88:200::2 activate
  exit-address-family
R1#show ip route | include 0/0
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       O - ODR, P - periodic downloaded static route, H - NHRP, I - LISP
B* 0.0.0.0/0 [20/0] via 209.165.200.226, 00:09:06
O 2.2.2.2 [20/0] via 209.165.200.226, 00:09:06
O 10.0.11.0/24 [110/20] via 10.0.13.3, 00:09:18, Ethernet1/1
O 10.0.100.0/24 [110/11] via 10.0.10.2, 00:08:59, Ethernet1/2
O 10.0.101.0/24 [110/11] via 10.0.10.2, 00:08:59, Ethernet1/2
O 10.0.102.0/24 [110/11] via 10.0.10.2, 00:08:59, Ethernet1/2
R1#

```

Fuente: Autor del documento.

Figura 20. Validación de rutas IPv6 en R1.

```

Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       O - ODR, P - periodic downloaded static route, H - NHRP, I - LISP
B* 0.0.0.0/0 [20/0] via 209.165.200.226, 00:09:06
O 2.2.2.2 [20/0] via 209.165.200.226, 00:09:06
O 10.0.11.0/24 [110/20] via 10.0.13.3, 00:09:18, Ethernet1/1
O 10.0.100.0/24 [110/11] via 10.0.10.2, 00:08:59, Ethernet1/2
O 10.0.101.0/24 [110/11] via 10.0.10.2, 00:08:59, Ethernet1/2
O 10.0.102.0/24 [110/11] via 10.0.10.2, 00:08:59, Ethernet1/2
R1#show ipv6 route
IPv6 Routing Table - default - 13 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, HA - Home Agent, MR - Mobile Router, R - RIP
       H - NHRP, I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea
       IS - ISIS summary, D - EIGRP, EX - EIGRP external, NM - NEMO
       ND - ND default, NDP - ND Prefix, DCE - Destination, NDR - Redirect
       O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, I - LISP
B ::/0 [20/0]
  via FE80::2:1, Ethernet1/0
S 2001:D88:100::/48 [1/0]
  via Null0, directly connected
O 2001:D88:100:100::/64 [110/11]
  via FE80::D1:1, Ethernet1/2
O 2001:D88:100:101::/64 [110/11]
  via FE80::D1:1, Ethernet1/2
O 2001:D88:100:102::/64 [110/11]
  via FE80::D1:1, Ethernet1/2
C 2001:D88:100:1010::/64 [0/0]
  via Ethernet1/2, directly connected
L 2001:D88:100:1010::1/128 [0/0]
  via Ethernet1/2, receive
O 2001:D88:100:1011::/64 [110/20]
  via FE80::3:3, Ethernet1/1
C 2001:D88:100:1013::/64 [0/0]
  via Ethernet1/2, directly connected
O 2001:D88:100:1013::1/128 [0/0]
  via Ethernet1/1, receive
C 2001:D88:200::/64 [0/0]
  via Ethernet1/0, directly connected
L 2001:D88:200::1/128 [0/0]
  via Ethernet1/0, receive
L FF00::/8 [0/0]
  via Null0, receive
R1#

```

Fuente: Autor del documento.

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

```

R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 4
R3(config-router)# router-id 0.0.4.3
R3(config-router)# network 10.0.11.0 0.0.0.255 area 0
R3(config-router)# network 10.0.13.0 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 00:27:16.483: %SYS-5-CONFIG_I: Configured from console by console
*Nov 14 00:27:16.571: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 14 00:27:24.223: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 14 00:28:15.007: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#
*Nov 14 00:28:20.551: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#show run | section ^router ospf
router ospf 4
router-id 0.0.4.3
network 10.0.11.0 0.0.0.255 area 0
network 10.0.13.0 0.0.0.255 area 0
R3#show run | section ^ipv6 route
ipv6 router ospf 6
router-id 0.0.6.3
R3#show ipv6 ospf interface brief
Interface PID Area Intf ID Cost State Nbrs F/C
Et1/1 6 0 6 10 BDR 1/1
Et1/0 6 0 5 10 DR 1/1
R3#show ip route ospf | begin Gateway
Gateway of last resort is 10.0.13.1 to network 0.0.0.0

O'E2 0.0.0.0/0 [110/1] via 10.0.13.1, 00:09:46, Ethernet1/1
0 10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
0 10.0.10.0/24 [110/20] via 10.0.13.1, 00:09:56, Ethernet1/1
0 10.0.100.0/24 [110/11] via 10.0.11.2, 00:09:02, Ethernet1/0
0 10.0.101.0/24 [110/11] via 10.0.11.2, 00:09:02, Ethernet1/0
0 10.0.102.0/24 [110/11] via 10.0.11.2, 00:09:02, Ethernet1/0
R3#

```

Fuente: Autor del documento.

Figura 22. Validación de rutas IPv6 OSPF en R3.

```

*Nov 14 00:27:16.571: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 14 00:27:24.223: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
*Nov 14 00:28:15.007: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#
*Nov 14 00:28:20.551: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.132 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#show run | section ^router ospf
router ospf 4
router-id 0.0.4.3
network 10.0.11.0 0.0.0.255 area 0
network 10.0.13.0 0.0.0.255 area 0
R3#show run | section ^ipv6 route
ipv6 router ospf 6
router-id 0.0.6.3
R3#show ipv6 ospf interface brief
Interface PID Area Intf ID Cost State Nbrs F/C
Et1/1 6 0 6 10 BDR 1/1
Et1/0 6 0 5 10 DR 1/1
R3#show ip route ospf | begin Gateway
Gateway of last resort is 10.0.13.1 to network 0.0.0.0

O'E2 0.0.0.0/0 [110/1] via 10.0.13.1, 00:09:46, Ethernet1/1
0 10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
0 10.0.10.0/24 [110/20] via 10.0.13.1, 00:09:56, Ethernet1/1
0 10.0.100.0/24 [110/11] via 10.0.11.2, 00:09:02, Ethernet1/0
0 10.0.101.0/24 [110/11] via 10.0.11.2, 00:09:02, Ethernet1/0
0 10.0.102.0/24 [110/11] via 10.0.11.2, 00:09:02, Ethernet1/0
R3#show ipv6 route ospf
IPv6 Routing Table - default - 10 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
0 - 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, I - IISP
OE2 ::0 [110/1], tag 6
via FE80::13, Ethernet1/1
O 2001:DB8:100:100::/64 [110/11]
via FE80::D1:1, Ethernet1/0
O 2001:DB8:100:101::/64 [110/11]
via FE80::D1:1, Ethernet1/0
O 2001:DB8:100:102::/64 [110/11]
via FE80::D1:1, 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 reachability of R1 interface E1/2.	Create two IP SLAs. • Use SLA number 4 for IPv4. • Use SLA number 6 for IPv6. The IP SLAs will test availability of R1 E1/2 interface every 5 seconds. Schedule the SLA for immediate implementation with no end time. Create an IP SLA object for IP SLA 4 and one for IP SLA 6. • Use track number 4 for IP SLA 4. • Use track number 6 for IP SLA 6. The tracked objects should notify D1 if the IP SLA state changes from down to up after 10 seconds, or from up to down after 15 seconds.
4.2	On D2, create IP SLAs that test the reachability of R3 interface E1/0.	Create two IP SLAs. • Use SLA number 4 for IPv4. • Use SLA number 6 for IPv6. The IP SLAs will test availability of R3 E1/0 interface every 5 seconds. Schedule the SLA for immediate implementation with no end time. Create an IP SLA object for IP SLA 4 and one for IP SLA 6. • Use track number 4 for IP SLA 4. • Use track number 6 for IP SLA 6.

Task#	Task	Specification
		The tracked objects should notify D1 if the IP SLA state changes from down to up after 10 seconds, or from up to down after 15 seconds.
4.3	On D1, configure HSRPv2.	D1 is the primary router for VLANs 100 and 102; therefore, their priority will also be changed to 150. Configure HSRP version 2. Configure IPv4 HSRP group 104 for VLAN 100: • Assign the virtual IP address 10.XY.100.254. • Set the group priority to 150. • Enable preemption. • Track object 4 and decrement by 60. Configure IPv4 HSRP group 114 for VLAN 101: • Assign the virtual IP address 10.XY.101.254. • Enable preemption. • Track object 4 to decrement by 60. Configure IPv4 HSRP group 124 for VLAN 102: • Assign the virtual IP address 10.XY.102.254. • Set the group priority to 150. • Enable preemption. • Track object 4 to decrement by 60. Configure IPv6 HSRP group 106 for VLAN 100: • Assign the virtual IP address using ipv6 autoconfig. • Set the group priority to 150. • Enable preemption. • Track object 6 and decrement by 60. Configure IPv6 HSRP group 116 for VLAN 101: • Assign the virtual IP address using ipv6 autoconfig. • Enable preemption. • Track object 6 and decrement by 60. Configure IPv6 HSRP group 126 for VLAN 102: • Assign the virtual IP address using ipv6 autoconfig. • Set the group priority to 150. • Enable preemption. • Track object 6 and decrement by 60.
	On D2, configure HSRPv2.	D2 is the primary router for VLAN 101; therefore, the priority will also be changed to 150. Configure HSRP version 2. Configure IPv4 HSRP group 104 for VLAN 100:

Task#	Task	Specification
		• Assign the virtual IP address 10.XY.100.254. • Enable preemption. • Track object 4 and decrement by 60. Configure IPv4 HSRP group 114 for VLAN 101: • Assign the virtual IP address 10.XY.101.254. • Set the group priority to 150. • Enable preemption. • Track object 4 to decrement by 60. Configure IPv4 HSRP group 124 for VLAN 102: • Assign the virtual IP address 10.XY.102.254. • Enable preemption. • Track object 4 to decrement by 60. Configure IPv6 HSRP group 106 for VLAN 100: • Assign the virtual IP address using ipv6 autoconfig. • Enable preemption. • Track object 6 and decrement by 60. Configure IPv6 HSRP group 116 for VLAN 101: • Assign the virtual IP address using ipv6 autoconfig. • Set the group priority to 150. • Enable preemption. • Track object 6 and decrement by 60. Configure IPv6 HSRP group 126 for VLAN 102: • Assign the virtual IP address using ipv6 autoconfig. • Enable preemption. • Track object 6 and decrement by 60.

Fuente: Autor del documento.

Configuración en D1

```

D1#configure terminal
D1(config)#ip sla 4 //Se configura SLA con numero 4
para IPv4
D1(config-ip-sla)# icmp_echo 10.0.10.1 //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 10.0.100.254             //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
D1(config-if)# standby 106 ipv6 autoconfig
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
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 10.0.101.254            //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 10.0.102.254            //Se asigna una dirección ip virtual
D1(config-if)# standby 124 priority 150                //Se configura la prioridad de grupo
D1(config-if)# standby 124 preempt                    //Se habilita preferencia
D1(config-if)# standby 124 track 4 decrement 60        //Se configura una pista con
decremento de 60

```

```

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

```

Configuración en D2.

```

D2#configure terminal
D2(config)#ip sla 4 //Se configura SLA con numero 4
para IPv4
D2(config-ip-sla)# icmp-echo 10.0.11.1 //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 10 sg a 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 10 sg a 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 10.0.100.254 //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
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 10.0.101.254 //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 10.0.102.254 //Se asigna una dirección ip virtual
D2(config-if)# standby 124 preempt
D2(config-if)# standby 124 track 4 decrement 60 //Se configura una pista con
decremento de 60
D2(config-if)# standby 126 ipv6 autoconfig //Se asigna una dirección ip virtual
autoconfigurable
D2(config-if)# standby 126 preempt //Se habilita preferencia
D2(config-if)# standby 126 track 6 decrement 60 //Se configura una pista con
decremento de 60
D2(config-if)# exit
D2(config)#end

```

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

```

D1#
Nov 14 00:39:27.552: %SYS-5-CONFIG_I: Configured from console by console
D1#
Nov 14 00:39:49.688: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Standby -> Active
Nov 14 00:39:50.212: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Standby -> Active
Nov 14 00:39:50.462: %HSRP-5-STATECHANGE: Vlan100 Grp 104 state Standby -> Active
D1#
Nov 14 00:39:50.685: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Standby -> Active
Nov 14 00:39:51.120: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Standby -> Active
D1#
Nov 14 00:40:00.400: %HSRP-5-STATECHANGE: Vlan102 Grp 124 state Standby -> Active
D1#
Nov 14 00:40:42.063: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Active -> Speak
D1#
Nov 14 00:40:53.306: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Speak -> Standby
D1#
Nov 14 00:41:00.534: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Active -> Speak
Nov 14 00:41:01.189: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Active -> Speak
Nov 14 00:41:01.241: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Active -> Speak
D1#
Nov 14 00:41:11.167: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Speak -> Standby
Nov 14 00:41:11.287: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Speak -> Standby
D1#
Nov 14 00:41:13.236: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Speak -> Standby
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 00:41:57.695: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Standby -> Active
Nov 14 00:41:58.525: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Standby -> Active
D1(config)#exit
D1#
Nov 14 00:42:27.817: %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 10.0.10.1
frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
icmp-echo 2001:DB8:100:1010::1
frequency 5
ip sla schedule 6 life forever start-time now
D1#

```

Fuente: Autor del documento.

Figura 24. Validación del standby en D1.

```

Nov 14 00:40:00.400: %HSRP-5-STATECHANGE: Vlan102 Grp 124 state Standby -> Active
D1#
Nov 14 00:40:42.063: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Active -> Speak
D1#
Nov 14 00:40:53.306: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Speak -> Standby
D1#
Nov 14 00:41:00.534: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Active -> Speak
Nov 14 00:41:01.189: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Active -> Speak
Nov 14 00:41:01.241: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Active -> Speak
D1#
Nov 14 00:41:11.167: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Speak -> Standby
Nov 14 00:41:11.287: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Speak -> Standby
D1#
Nov 14 00:41:13.236: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Speak -> Standby
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 00:41:57.695: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Standby -> Active
Nov 14 00:41:58.525: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Standby -> Active
D1(config)#exit
D1#
Nov 14 00:42:27.817: %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 10.0.10.1
frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
icmp-echo 2001:DB8:100:1010::1
frequency 5
ip sla schedule 6 life forever start-time now
D1#show standby brief
D1#
P indicates configured to preempt.

```

Interface	Grp	Pri	P State	Active	Standby	Virtual IP
Vl100	104	150	P Active	local	10.0.100.2	10.0.100.254
Vl100	106	150	P Active	local	FE80::02:2	FE80::15:73FF:FEA0:6A
Vl101	114	100	P Standby	10.0.101.2	local	10.0.101.254
Vl101	116	100	P Standby	FE80::02:3	local	FE80::15:73FF:FEA0:74
Vl102	124	150	P Active	local	10.0.102.2	10.0.102.254
Vl102	126	150	P Active	local	FE80::02:4	FE80::15:73FF:FEA0:7E

Fuente: Autor del documento.

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

```

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 00:40:39.442: %SYS-5-CONFIG_I: Configured from console by console
D2#
*Nov 14 00:40:42.062: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Listen -> Active
D2#
*Nov 14 00:41:00.533: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Speak -> Active
*Nov 14 00:41:01.189: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Speak -> Active
*Nov 14 00:41:01.241: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Speak -> Active
D2#
*Nov 14 00:41:02.748: %HSRP-5-STATECHANGE: Vlan102 Grp 124 state Speak -> Standby
*Nov 14 00:41:03.056: %HSRP-5-STATECHANGE: Vlan100 Grp 104 state Speak -> Standby
D2#
*Nov 14 00:41:57.696: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Active -> Speak
*Nov 14 00:41:58.525: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Active -> Speak
D2#
*Nov 14 00:42:08.921: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Speak -> Standby
*Nov 14 00:42:09.039: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Speak -> Standby
D2#
D2#show standby brief
      |
      | P indicates configured to preempt.
      |
Interface  Grp  Pri  P State  Active        Standby        Virtual IP
-----
Vl100     104  100  P Standby  10.0.100.1    local          10.0.100.254
Vl100     106  100  P Standby  FE80::D1:2    local          FE80::5:73FF:FEA0:6A
Vl101     114  150  P Active   local         10.0.101.1     10.0.101.254
Vl101     116  150  P Active   local         FE80::D1:3     FE80::5:73FF:FEA0:74
Vl102     124  100  P Standby  10.0.102.1    local          10.0.102.254
Vl102     126  100  P Standby  FE80::D1:4    local          FE80::5:73FF:FEA0:7E
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 10.0.11.1
frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
icmp-echo 2001:DB8:100:1011::1
frequency 5
ip sla schedule 6 life forever start-time now
D2#
  
```

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W 7:43 p. m. 13/11/2022

Fuente: Autor del documento.

CONCLUSIONES

CCNP proporciona a los estudiantes los conocimientos y habilidades necesarios para planificar, implementar, proteger y mantener soluciones a fallas de red en un negocio convergente. CCNP tiene como objetivo reflejar habilidades y responsabilidades laborales relacionadas con los roles profesionales de ingeniería Ingeniero de redes, ingeniero de sistemas, ingeniero de soporte de redes, administrador de redes Ingeniero de telecomunicaciones de red, consultor de redes e integrador de sistemas y otras carreras relacionadas.

Esta prueba permite comprender como sería la aplicación de varios conceptos de redes, la implementación de técnicas y la verificación de aplicaciones realizadas a los dispositivos, que van desde la implementación de vlans en dispositivos switch capa 3, la habilitación del enrutamiento ipv6 y la ejecución de BGP con un ASN designado.

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