DIPLOMADO DE PROFUNDIZACION CISCO
INFORME– PRUEBA DE HABILIDADES PRÁCTICA

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA - UNAD
ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA - ECBTI
INGENIERÍA ELECTRONICA
PEREIRA
2022

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Andrés Mauricio Gutierrez Martínez

Diplomado de opción de grado presentado para optar el título de INGENIERO ELECTRONICO

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NOTA DE ACEPTACIÓN

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Firma del Presidente del Jurado

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Jurado

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Jurado

Pereira, 16 de Noviembre del 2022

DEDICATORIA

A mi hija, que durante estos años ha sido siempre mi más grande motivación y fortaleza en la vida.

A mi padre, que con su apoyo y compromiso me ha hecho más llevadero la culminación de este proyecto de vida.

A mi madre, que siempre ha estado ahí para apoyarme y alentarme toda la vida y en cuyo ejemplo de lucha siempre he encontrado una motivación.

A mis hermanas y hermano por siempre estar ahí para mi cuando los he necesitado.

A Diana y sus pecas, que, en este tiempo de culminación de esta etapa, me ha llenado de felicidad y me ha acompañado con determinación en la búsqueda de este y otros proyectos de vida.

AGRADECIMIENTOS

A mis tutores que han hecho de este proceso una aventura de aprendizaje y me han fortalecido para afrontar nuevas responsabilidades y a sentirme más seguro de mis capacidades.

A las personas que durante el proceso me han acompañado y fortalecido en los momentos en que me he sentido sin fuerzas.

CONTENIDO

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GLOSARIO

CISCO: Es una empresa dedicada al desarrollo de equipos de red con su propio sistema operativo y configurables por comandos. Adicional a esta línea de negocio tiene una serie de certificaciones que permiten a quienes las desarrollan adquirir las habilidades necesarias para realizar configuraciones en los equipos que le permiten poner en funcionamiento una red.

CCNP: (Cisco Certified Network Professional) la certificación en routing y switching de Cisco System valida las habilidades para planear, implementar, verificar y resolver problemas de área local y de área extendida en una red empresarial.

REDES: Las redes son formadas por una cierta cantidad de equipos que necesitan compartir información entre si o acceder a la web, estos equipos pueden ser inalámbricos o alámbricos y cumplir diferentes funciones dentro de la misma, como ruteo, conmutación o PC de usuario.

Existen diferentes tipos de red como son las redes WAN (Wide Area Network), MAN (Metropolitan Area Network) y LAN (Local Area Network).

ELECTRÓNICA: Es una ciencia que se encarga de estudiar el comportamiento de los electrones que circulan por un circuito y su respectivo control por medio de diferentes dispositivos como transistores, circuitos integrados, microcontroladores entre otros.

ENRUTAMIENTO: El ruteo en una red es el proceso de seleccionar un camino a través de una o más redes. Estos principios de ruteo pueden ser aplicados a cualquier tipo de red, desde redes telefónicas hasta redes de transporte público.

En redes de internet el Router selecciona el camino para que los paquetes del protocolo de internet (IP) viajen desde su origen a destino.

Para ello existen diferentes protocolos de enrutamiento que dependiendo del uso de la red pueden mejorar el proceso de selección de la ruta, como son OSPF, EIGRP, RIP, RDISC.

CONMUTACIÓN: La conmutación es un proceso para reenviar paquetes de un puerto a otro que los dirige a su destino. Este destino suele ser un equipo de destino final como computadoras, teléfonos IP, televisores y otros equipos con capacidad de direccionamiento IP.

RESUMEN

La presente prueba de habilidades prácticas del diplomado de profundización CCNP (Cisco Certified Network Professional) consta de dos escenarios en el que se plantean dos etapas de configuración, las cuales, evaluadas en conjunto, componen la totalidad de las etapas de configuración de una red empresarial real.

El primer escenario propone una red con 3 Routers, dos Switches y cuatro dispositivos finales, a los cuales se les debe realizar la configuración básica para que los dispositivos operen adecuadamente con una compañía proveedora de servicio de internet.

Para la segunda prueba de habilidades se configuran los protocolos de ruteo para IPV4 e IPV6 y para ello se proponen unas tareas donde se prueba con varios de ellos.

Para el desarrollo de los escenarios propuestos se utiliza el software especializado en simulación de redes GNS3

PALABRAS CLAVE: CCNP, REDES, ELECTRONICA, ROUTING, SWITCHING, CISCO.

ABSTRACT

This practical skills test of the CCNP (Cisco Certified Network Professional) deepening diploma consists of two scenarios in which two configuration stages are proposed, which, evaluated together, make up all the configuration stages network of a real company.

The first scenario proposes a network with 3 Routers, two Switches and four end devices, to which the basic configuration must be carried out so that the devices operate properly with an internet service provider company.

For the second skills test, the routing protocols for IPV4 and IPV6 are configured and for this, some tasks are proposed where several of them are tested.

For the development of the proposed scenarios, the specialized software for network simulation GNS3 is used.

KEYWORDS: CCNP, NETWORKING, ELECTRONICS, ROUTING, SWITCHING, CISCO.

INTRODUCCIÓN

El curso de profundización en CCNP (Cisco Certified Network Professional), permite desarrollar habilidades en el área del networking, que posibilitan administrar una red desde su diseño, planificación, implementación y verificación, orientada a redes empresariales.

Para el desarrollo del curso se establecen una serie de ejercicios y finalmente se proponen dos escenarios en donde se ponen a prueba los conocimientos y habilidades adquiridas en el desarrollo de cada etapa del curso. El primer escenario, donde se evalúan habilidades de configuraciones básicas y configuraciones de red de capa 2, para luego pasar a la creación de enlaces troncales y root bridges.

El segundo escenario plantea la necesidad de administrar y configurar una red a nivel de capa 3 con diferentes protocolos de Routing, y la aplicación del HSRP, para tener redundancia de Routers ante una posible falla de alguno de ellos.

DESARROLLO

1. PRIMER ESCENARIO

ENCOR Skills Assessment (Scenario 1)
Topology

Ilustración 1 Red prueba de habilidades 1

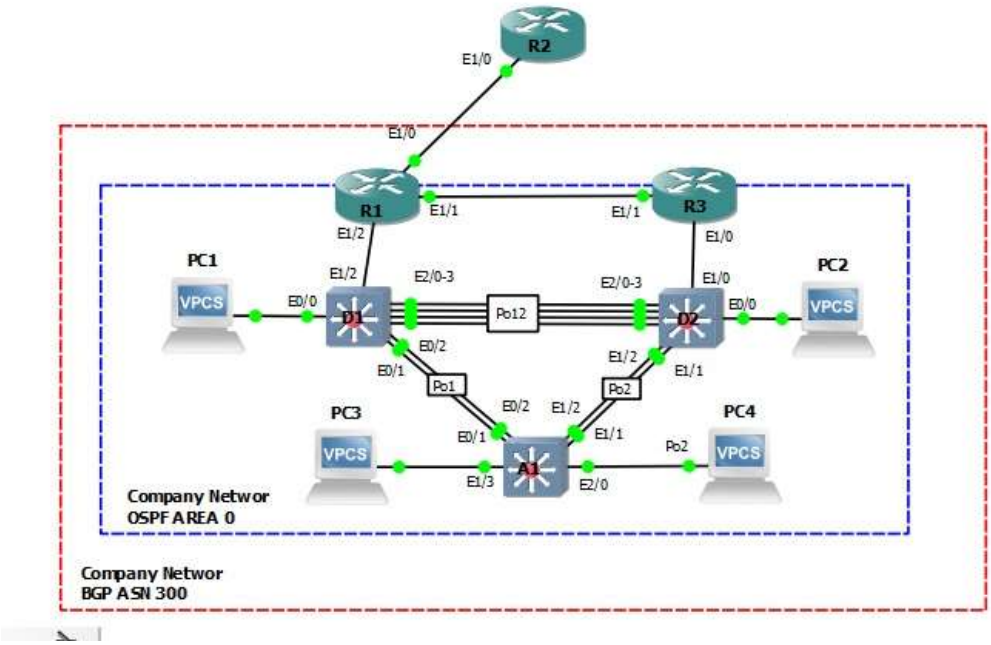


Tabla 1 Direccionamiento

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	E1/0	209.165.200.225/27	2001:db8:200::1/64	fe80::1:1
	E1/2	10.41.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	E1/1	10. 41.13.1/24	2001:db8:100:1013::1/64	fe80::1:3
R2	E1/0	209.165.200.226/27	2001:db8:200::2/64	fe80::2:1
	Loopback0	2.2.2.2/32	2001:db8:2222::1/128	fe80::2:3
R3	E1/0	10. 41.11.1/24	2001:db8:100:1011::1/64	fe80::3:2

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
	E1/1	10. 41.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	E1/2	10.41.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
	VLAN 100	10.41.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10.41.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
	VLAN 102	10.41.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	E1/0	10.41.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10.41.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
	VLAN 101	10.41.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10.41.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.41.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.41.100.5/24	2001:db8:100:100::5/64	EUI-64
PC2	NIC	DHCP	SLAAC	EUI-64
PC3	NIC	DHCP	SLAAC	EUI-64
PC4	NIC	10.0.100.6/24	2001:db8:100:100::6/64	EUI-64

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.

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

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

Step 1 Cable the network as shown in the topology

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

Step 2 Configure basic settings for each device

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

Router R1

R1#

R1#enable

R1#config term

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

R1(config)#hostname R1

R1(config)#ipv6 unicast-routing

R1(config)#no ip domain lookup

R1(config)#banner motd # R1, ENCOR Skills Assessment#

R1(config)#line con 0

R1(config-line)# exec-timeout 0 0

R1(config-line)# logging synchronous

R1(config-line)#exit

R1(config)#interface e1/0

R1(config-if)# ip address 209.165.200.225 255.255.255.224

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

R1(config-if)# ipv6 address 2001:db8:200::1/64

R1(config-if)#no shutdown

R1(config-if)#exit

```
R1(config)#interface e1/2
R1(config-if)# ip address 10.41.10.1 255.255.255.0
R1(config-if)# ipv6 address fe80::1:2 link-local
R1(config-if)# ipv6 address 2001:db8:100:1010::1/64
R1(config-if)# no shutdown
R1(config-if)# exit
R1(config)#interface e1/1
R1(config-if)# ip address 10.41.13.1 255.255.255.0
R1(config-if)# ipv6 address fe80::1:3 link-local
R1(config-if)# ipv6 address 2001:db8:100:1013::1/64
R1(config-if)# no shutdown
R1(config-if)# exit
R1(config)#exit
R1#
R1#copy running-config startup-config
Destination filename [startup-config]?
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]
R1#
```

Router R2

```
R2#enable
R2#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#hostname R2
R2(config)#ipv6 unicast-routing
R2(config)#no ip domain lookup
R2(config)#banner motd # R2, ENCOR Skills Assessment#
```

```
R2(config)#line con 0
R2(config-line)#exec-timeout 0 0
R2(config-line)#logging synchronous
R2(config-line)#exit
R2(config)#interface e1/0
R2(config-if)#if address 209.165.200.226 255.255.255.224
R2(config-if)#ip address 209.165.200.226 255.255.255.224
R2(config-if)#ipv6 address fe80::2:1 link-local
R2(config-if)#ipv6 address 2001:db8:200::2/64
R2(config-if)#no shutdown
R2(config-if)#
R2(config-if)#exit
R2(config)#interface Loopback 0
R2(config-if)#ip address 2.2.2.2 255.255.255.255
R2(config-if)#ipv6 address fe80::2:3 link-local
R2(config-if)#ipv6 address 2001:db8:2222::1/128
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#exit
R2#
R2#copy running-config startup-config
Destination filename [startup-config]?
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]
R2#
```

Router R3

```
R3#enable
```

```
R3#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#hostname R3
R3(config)#ipv6 unicast-routing
R3(config)#no ip domain lookup
R3(config)#banner motd # R3, ENCOR Skills Assessment#
R3(config)#line con 0
R3(config-line)#exec-timeout 0 0
R3(config-line)#logging synchronous
R3(config-line)#exit
R3(config)#interface e1/0
R3(config-if)#ip address 10.41.11.1 255.255.255.0
R3(config-if)#ipv6 address fe80::3:2 link-local
R3(config-if)#ipv6 address 2001:db8:100:1011::1/64
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#interface e1/1
R3(config-if)#ip address 10.41.13.3 255.255.255.0
R3(config-if)#ipv6 address fe80::3:3 link-local
R3(config-if)#ipv6 address 2001:db8:100:1010::2/64
R3(config-if)#no shutdown
R3(config-if)#
R3(config-if)#exit
R3(config)#exit
R3#
R3#copy running-config startup-config
Destination filename [startup-config]?
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#

Switch D1

```
D1#enable
D1#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
D1(config)#hostname D1
D1(config)#ip routing
D1(config)#ipv6 unicast-routing
D1(config)#no ip domain lookup
D1(config)#banner motd # D1, ENCOR Skills Assessment#
D1(config)#line con 0
D1(config-line)#exec-timeout 0 0
D1(config-line)#logging synchronous
D1(config-line)#exit
D1(config)#vlan 100
D1(config-vlan)#name Management
D1(config-vlan)#exit
D1(config)#
D1(config)#vlan 101
D1(config-vlan)#name UserGroupA
D1(config-vlan)#exit
D1(config)#vlan 102
D1(config-vlan)#name UserGroupB
D1(config-vlan)#exit
D1(config)#vlan 999
D1(config-vlan)#name NATIVE
D1(config-vlan)#exit
D1(config)#interface e1/2
D1(config-if)#no switchport
```

```
D1(config-if)#ip address 10.41.10.2 255.255.255.0
D1(config-if)#ipv6 address fe80::d1:1 link-local
D1(config-if)#ipv6 address 2001:db8:100:1010::2/64
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#interface vlan 100
D1(config-if)#ip address 10.41.100.1 255.255.255.0
D1(config-if)#ipv6 address fe80::d1:2 link-local
D1(config-if)#ipv6 address 2001:db8:100:100::1/64
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#interface vlan 101
D1(config-if)#ip address 10.41.101.1 255.255.255.0
D1(config-if)#ipv6 address fe80::d1:3 link-local
D1(config-if)#ipv6 address 2001:db8:100:101::1/64
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#interface vlan 102
D1(config-if)#ip address 10.41.102.1 255.255.255.0
D1(config-if)#ipv6 address fe80::d1:4 link-local
D1(config-if)#ipv6 address 2001:db8:100:102::1/64
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#ip dhcp excluded-address 10.41.101.1 10.41.101.109
D1(config)#ip dhcp excluded-address 10.41.101.141 10.41.101.254
D1(config)#ip dhcp excluded-address 10.41.102.1 10.41.102.109
D1(config)#ip dhcp excluded-address 10.41.102.141 10.41.102.254
D1(config)#ip dhcp pool VLAN-101
D1(dhcp-config)#network 10.41.101.0 255.255.255.0
D1(dhcp-config)#default-router 10.41.101.254
D1(dhcp-config)#exit
```

D1(config)#ip dhcp pool VLAN-102
D1(dhcp-config)#network 10.41.102.0 255.255.255.0
D1(dhcp-config)#default-router 10.41.102.254
D1(dhcp-config)#exit
D1(config)#interface range e0/0-3,e1/0-1,e1/3,e2/0-3,e3/0-3
D1(config-if-range)#shutdown
D1(config-if-range)#exit
D1(config)#exit
D1#copy running-config startup-config
Destination filename [startup-config]?
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...
Compressed configuration from 2489 bytes to 1377 bytes[OK]
D1#

Switch D2

D2#enable
D2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#hostname D2
D2(config)#
{D2(config)#ip routing
D2(config)#ipv6 unicast-routing
D2(config)#no ip domain lookup
D2(config)#banner motd # D2, ENCOR Skills Assessment#
D2(config)#line con 0
D2(config-line)#exec-timeout 0 0
D2(config-line)#logging synchronous
D2(config-line)#logging synchronous

```
D2(config-line)#exit
D2(config)#vlan 100
D2(config-vlan)#name Management
D2(config-vlan)#exit
D2(config)#vlan 101
D2(config-vlan)#name UserGroupA
D2(config-vlan)#exit
D2(config)#vlan 102
D2(config-vlan)#name UserGroupB
D2(config-vlan)#exit
D2(config)#vlan 999
D2(config-vlan)#name NATIVE
D2(config-vlan)#exit
D2(config)#interface e1/0
D2(config-if)#no switchport
D2(config-if)#ip address 10.41.11.2 255.255.255.0
D2(config-if)#ipv6 address fe80::d1:1 link-local
D2(config-if)#ipv6 address 2001:db8:100:1011::2/64
D2(config-if)#no shutdown
D2(config-if)#exit
D2(config)#interface vlan 100
D2(config-if)#ip address 10.41.100.2 255.255.255.0
D2(config-if)#ipv6 address fe80::d2:2 link-local
D2(config-if)#ipv6 address 2001:db8:100:100::2/64
D2(config-if)#no shutdown
D2(config-if)#exit
D2(config)#interface vlan 101
D2(config)#interface vlan 101
D2(config-if)#ip address 10.41.101.2 255.255.255.0
D2(config-if)#ipv6 address fe80::d2:3 link-local
D2(config-if)#ipv6 address 2001:db8:100:101::2/64
```

```
D2(config-if)#no shutdown
D2(config-if)#exit
D2(config)#interface vlan 102
D2(config-if)#ip address 10.41.102.2 255.255.255.0
D2(config-if)#ipv6 address fe80::d2:4 link-local
D2(config-if)#ipv6 address 2001:db8:100:102::2/64
D2(config-if)#ipv6 address 2001:db8:100:102::2/64
D2(config-if)#no shutdown
D2(config-if)#exit
D2(config)#ip dhcp excluded-address 10.41.101.1 10.41.101.209
D2(config)#ip dhcp excluded-address 10.41.101.241 10.41.101.254
D2(config)#ip dhcp excluded-address 10.41.102.1 10.41.102.209
D2(config)#ip dhcp excluded-address 10.41.102.241 10.41.102.254
D2(config)#ip dhcp pool VLAN-101
D2(dhcp-config)#network 10.41.101.0 255.255.255.0
D2(dhcp-config)#default-router 10.41.101.254
D2(dhcp-config)#exit
D2(config)#ip dhcp pool VLAN-102
D2(dhcp-config)#network 10.41.102.0 255.255.255.0
D2(dhcp-config)#default-router 10.41.102.254
D2(dhcp-config)#exit
D2(config)#interface range e0/0-3,e1/1-3,e2/0-3,e3/0-3
D2(config-if-range)#shutdown
D2(config-if-range)#exit
D2(config)#exit
D2#copy running-config startup-config
Destination filename [startup-config]?
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...
```

```
Compressed configuration from 2489 bytes to 1388 bytes[OK]
D2#
```

Switch A1

```
A1#enable
A1#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
A1(config)#hostname A1
A1(config)#no ip domain lookup
A1(config)#banner motd # A1, ENCOR Skills Assessment#
A1(config)#line con 0
A1(config-line)#exec-timeout 0 0
A1(config-line)#logging synchronous
A1(config-line)#exit
A1(config)#vlan 100
A1(config-vlan)#name Management
A1(config-vlan)#exit
A1(config)#vlan 101
A1(config-vlan)#name UserGroupA
A1(config-vlan)#exit
A1(config)#vlan 102
A1(config-vlan)#name UserGroupB
A1(config-vlan)#exit
A1(config)#vlan 999
A1(config-vlan)#name NATIVE
A1(config-vlan)#exit
A1(config)#interface vlan 100
A1(config-if)#ip address 10.41.100.3 255.255.255.0
A1(config-if)#ipv6 address fe80::a1:1 link-local
A1(config-if)#ipv6 address 2001:db8:100:100::3/64
A1(config-if)#no shutdown
A1(config-if)#exit
A1(config)#interface range e0/0,e0/3,e1/0,e2/1-3,e3/0-3
A1(config-if-range)#shutdown
A1(config-if-range)#exit
A1(config)#exit
```

A1#copy running-config startup-config
Destination filename [startup-config]?
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...
Compressed configuration from 1632 bytes to 985 bytes[OK]
A1#

Ilustración 2 Configuraciones en R1

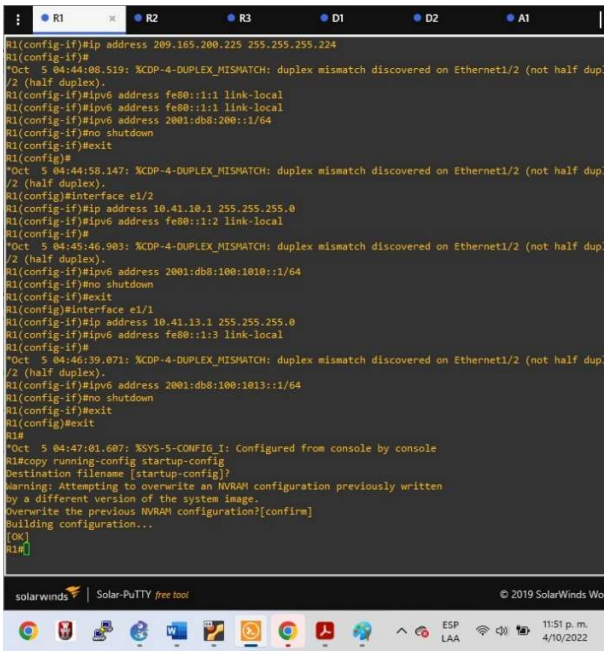


Ilustración 3 Configuraciones en R2

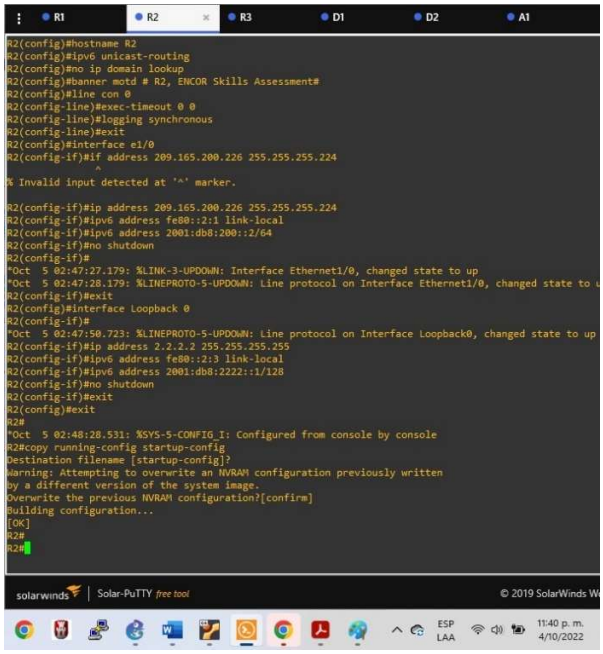


Ilustración 4 Configuraciones en R3

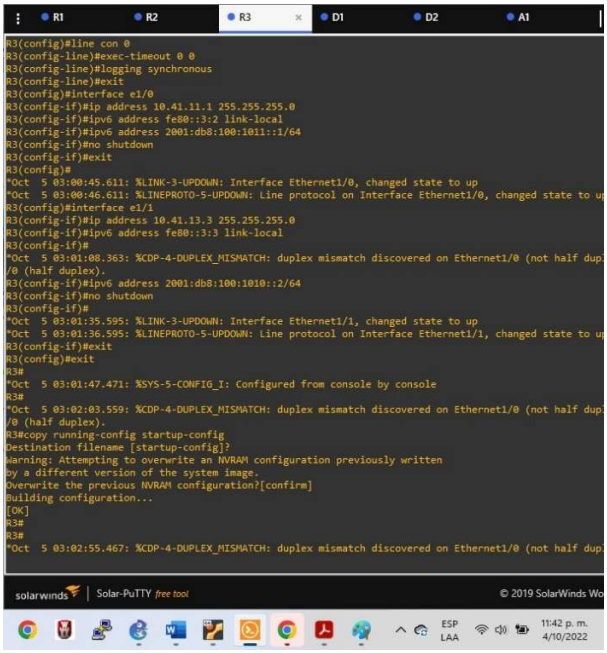


Ilustración 5 Configuraciones en D1

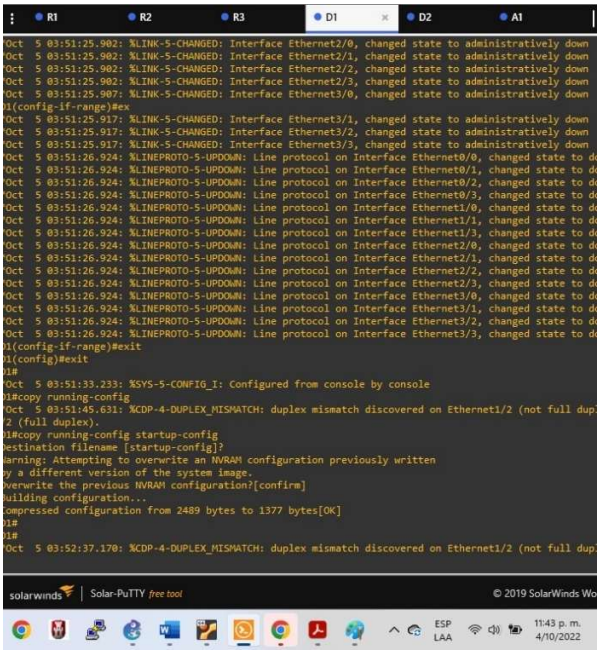


Ilustración 6 Configuraciones en D2

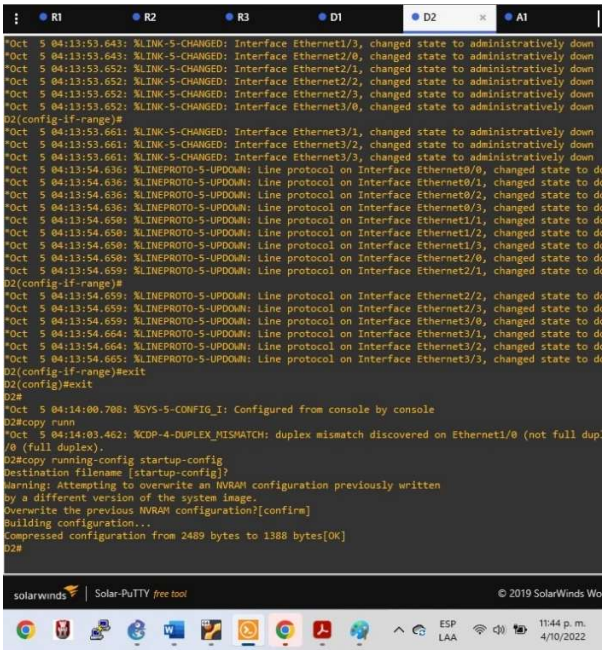
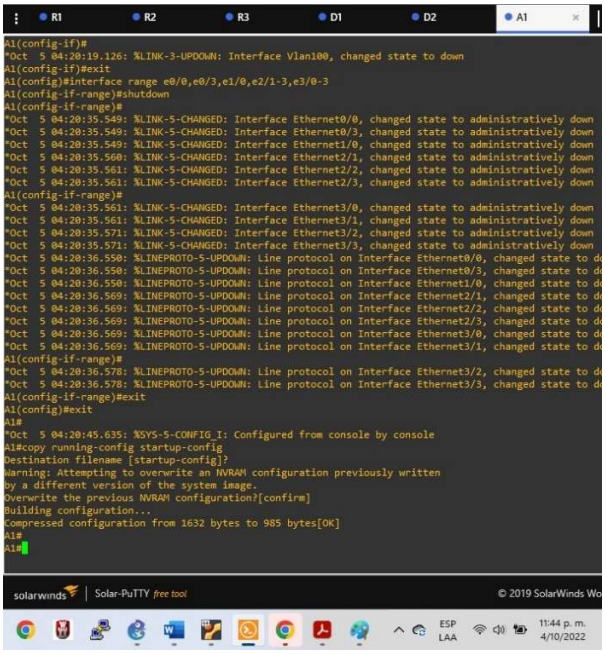


Ilustración 7 Configuraciones en A1



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

   Respuesta: Al final de la configuración de cada dispositivo se utilizó el comando “copy running-config startup-config” para guardar la configuración realizada como configuración de arranque

c. Configure PC 1 and PC 4 host addressing as shown in the addressing table. Assign a default gateway address of 10.41.100.254 which will be the HSRP virtual IP address used in Part 4.

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 Tareas de configuración

Task#	Task	Specification	Points
2.1	On all switches, configure IEEE 802.1Q trunk interfaces on interconnecting switch links	Enable 802.1Q trunk links between: • D1 and D2 • D1 and A1 • D2 and A1	6
2.2	On all switches, change the native VLAN on trunk links.	Use VLAN 999 as the native VLAN.	6
2.3	On all switches, enable the Rapid Spanning-Tree Protocol.	Use Rapid Spanning Tree.	3
2.4	On D1 and D2, configure the appropriate RSTP root bridges based on the information in the topology diagram. D1 and D2 must provide backup in case of root bridge failure.	Configure D1 and D2 as root for the appropriate VLANs with mutually supporting priorities in case of switch failure.	2
2.5	On all switches, create LACP EtherChannels as shown in the topology diagram.	Use the following channel numbers: • D1 to D2 – Port channel 12 • D1 to A1 – Port channel 1 • D2 to A1 – Port channel 2	3
2.6	On all switches, configure host access ports connecting to PC1, PC2, PC3, and PC4.	Configure access ports with appropriate VLAN settings as shown in the topology diagram. Host ports should transition immediately to forwarding state.	4
2.7	Verify IPv4 DHCP services.	PC2 and PC3 are DHCP clients and should be receiving valid IPv4 addresses.	1

Task#	Task	Specification	Points
2.8	Verify local LAN connectivity.	PC1 should successfully ping: • D1: 10.41.100.1 • D2: 10.41.100.2 • PC4: 10.41.100.6 PC2 should successfully ping: • D1: 10.41.102.1 • D2: 10.41.102.2 PC3 should successfully ping: • D1: 10.41.101.1 • D2: 10.41.101.2 PC4 should successfully ping: • D1: 10.41.100.1 • D2: 10.41.100.2 • PC1: 10.41.100.5	1

Task 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

SWITCH D1

```
D1#enable
D1#config term
D1(config)#interface range e2/0 - 3, e0/1 - 2
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#switchport mode trunk
D1(config-if-range)#no shutdown
D1(config-if-range)#exit
D1(config)#
```

SWITCH D2

```
D2#enable
D2#config term
D2(config)#interface range e2/0 - 3, e1/1 - 2
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#no shutdown
D2(config-if-range)#exit
D2(config)#
```

SWITCH A1

```
A1#enable
A1#config term
A1(config)#interface range e0/1 - 2, e1/1 - 2
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#switchport mode trunk
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
A1(config)#
```

Task 2.2
On all switches, change the native VLAN on trunk links. Use VLAN 999 as the native VLAN.

SWITCH D1:

```
D1(config)#interface range e2/0 - 3, e0/1 - 2
D1(config-if-range)#
D1(config-if-range)#switchport trunk native vlan 999
D1(config-if-range)#exit
D1(config)#
```

SWITCH D2:

```
D2(config)#interface range e2/0 - 3, e1/1 - 2
D2(config-if-range)#switchport trunk native vlan 999
D2(config-if-range)#exit
D2(config)#
```

SWITCH A1:
A1(config)#interface range e0/1 - 2, e1/1 - 2
A1(config-if-range)#switchport trunk native vlan 999
A1(config-if-range)#exit
A1(config)#

Task 2.3
On all switches, enable the Rapid Spanning-Tree Protocol. Use Rapid Spanning Tree.

SWITCH D1:
D1(config)#spanning-tree mode rapid-pvst
D1(config)#

SWITCH D2:
D2(config)#spanning-tree mode rapid-pvst
D2(config)#

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

Task 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.

SWITCH D1:
D1(config)#spanning-tree vlan 100 root primary
D1(config)#spanning-tree vlan 102 root primary
D1(config)#spanning-tree vlan 101 root secondary
D1(config)#

SWITCH D2:
D2(config)#spanning-tree vlan 101 root primary
D2(config)#spanning-tree vlan 100 root secondary
D2(config)#spanning-tree vlan 102 root secondary
D1(config)#

Task 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

SWITCH D1:
D1(config)# interface range e2/0 - 3
D1(config-if-range)#channel-protocol lacp
D1(config-if-range)#channel-group 12 mode active
D1(config-if-range)#
Creating a port-channel interface Port-channel 12
D1(config-if-range)#exit
D1(config)#interfac port-channel 12
D1(config-if)#switchport trunk encapsulation dot1q
D1(config-if)#switchport mode trunk
D1(config-if)#switchport trunk native vlan 999
D1(config-if)#switchport trunk allowed vlan 100-102
D1(config-if)#exit
D1(config)# interface range e0/1 - 2
D1(config-if-range)#channel-protocol lacp
D1(config-if-range)#channel-group 1 mode active
D1(config-if-range)#
Creating a port-channel interface Port-channel 1
D1(config-if-range)#exit
D1(config)#interface port-channel 1
D1(config-if)#switchport trunk encapsulation dot1q
D1(config-if)#switchport mode trunk
D1(config-if)#switchport trunk native vlan 999
D1(config-if)#switchport trunk allowed vlan 100-102
D1(config-if)#exit

D1(config)#

SWITCH D2:
D2(config)# interface range e2/0 - 3
D2(config-if-range)#channel-protocol lacp
D2(config-if-range)#channel-group 12 mode active
D2(config-if-range)#
Creating a port-channel interface Port-channel 12
D2(config-if-range)#exit
D2(config)#interface port-channel 12
D2(config-if)#switchport trunk encapsulation dot1q
D2(config-if)#switchport mode trunk
D2(config-if)#switchport trunk native vlan 999
D2(config-if)#switchport trunk allowed vlan 100-102
D2(config-if)#exit
D2(config)# interface range e1/1 - 2
D2(config-if-range)#channel-protocol lacp
D2(config-if-range)#channel-group 2 mode active
D2(config-if-range)#
Creating a port-channel interface Port-channel 2
D2(config-if-range)#exit
D2(config)#interface port-channel 2
D2(config-if)#switchport trunk encapsulation dot1q
D2(config-if)#switchport mode trunk
D2(config-if)#switchport trunk native vlan 999
D2(config-if)#switchport trunk allowed vlan 100-102
D2(config-if)#exit
D2(config)#

SWITCH A1:
A1(config)# interface range e0/1 - 2
A1(config-if-range)#channel-protocol lacp
A1(config-if-range)#channel-group 1 mode passive
A1(config-if-range)#
Creating a port-channel interface Port-channel 1
A1(config-if-range)#exit
A1(config)#interface port-channel 1
A1(config-if)#switchport trunk native vlan 999
A1(config-if)#switchport trunk allowed vlan 100-102

```
A1(config-if)#switchport mode trunk
A1(config-if)#exit
A1(config)# interface range e1/1 - 2
A1(config-if-range)#channel-protocol lacp
A1(config-if-range)#channel-group 2 mode passive
A1(config-if-range)#
Creating a port-channel interface Port-channel 2
A1(config-if-range)#exit
A1(config)#interface port-channel 2
A1(config-if)#switchport mode trunk
A1(config-if)#switchport trunk native vlan 999
A1(config-if)#switchport trunk allowed vlan 100-102
A1(config-if)#exit
A1(config)#
```

Task 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.

SWITCH D1:

```
D1(config)# interface e0/0
D1(config-if)#switchport mode access
D1(config-if)#switchport access vlan 100
D1(config-if)#exit
D1(config)#
```

SWITCH D2:

```
D2(config)# interface e0/0
D2(config-if)#switchport mode access
D2(config-if)#switchport access vlan 102
D2(config-if)#exit
D2(config)#
```

SWITCH A1:

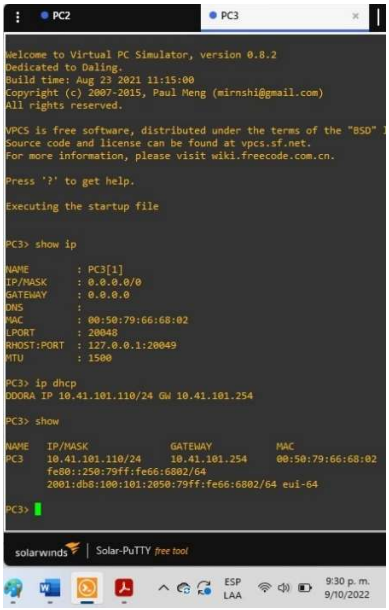
```
A1(config)# interface e1/3
A1(config-if)#switchport mode access
```

```
A1(config-if)#switchport access vlan 101
A1(config-if)#exit
A1(config)# interface e2/0
A1(config-if)#switchport mode access
A1(config-if)#switchport access vlan 100
A1(config-if)#exit
A1(config)#
```

Task 2.7

Ilustración 8 Configuración por DHCP de PC2

Ilustración 9 Configuración por DHCP de PC3



Task 2.8

Ilustración 10 Ping desde PC1 a D1, D2 y PC4

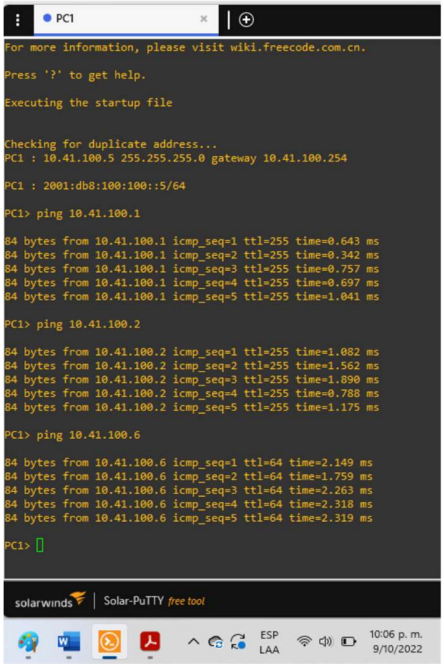


Ilustración 11 Ping PC2 a D1 y D2

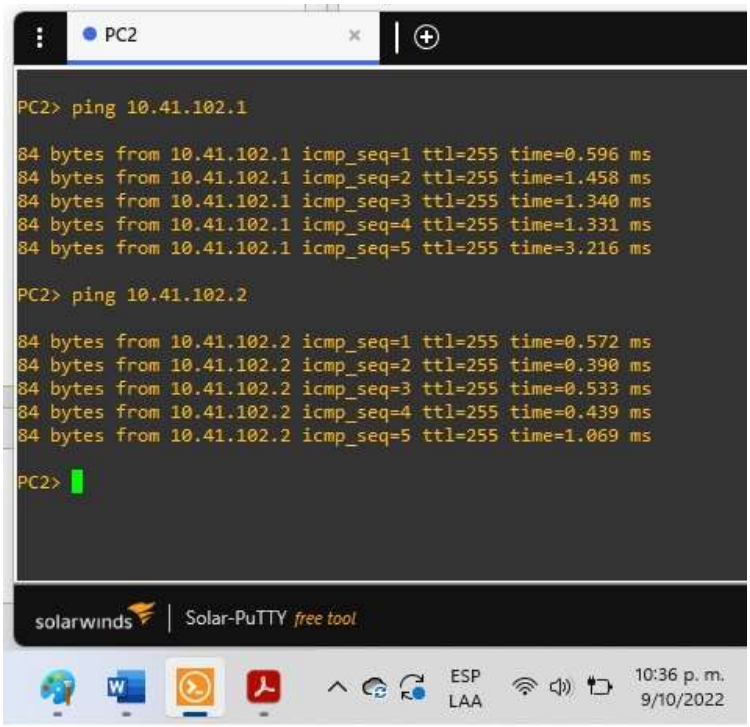


Ilustración 12 Ping PC3 a D1 y D2

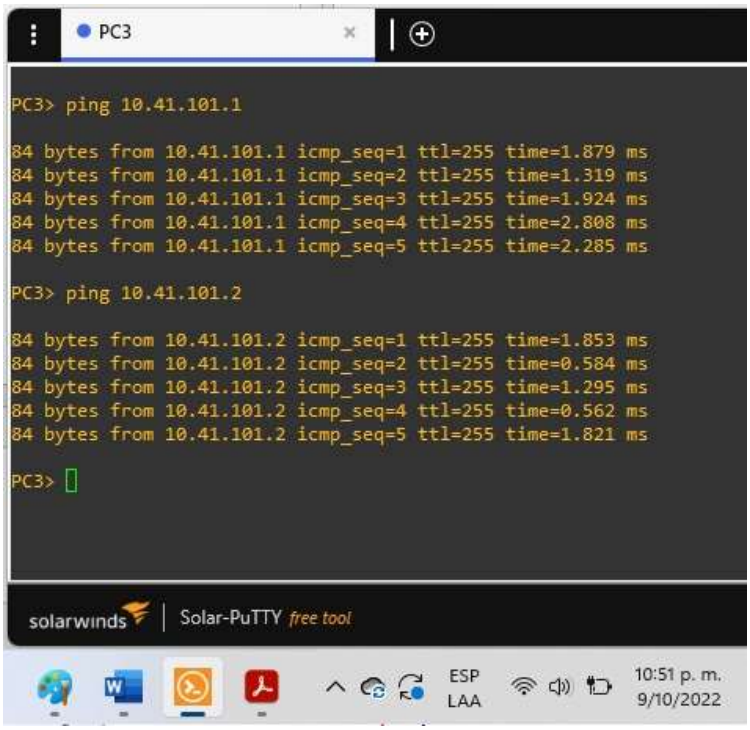
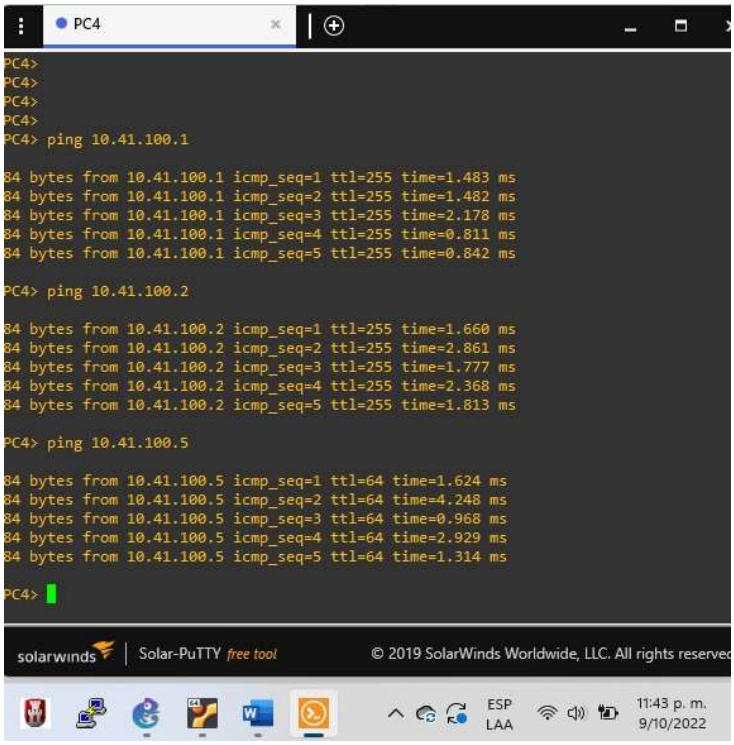


Ilustración 13 Ping desde PC4 a D1, D2 y PC1



2. SEGUNDO ESCENARIO

ENCOR Skills Assessment (Scenario 2)
Continuation of the Scenario 1

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 Tareas de configuración de protocolos de ruteo

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

Task#	Task	Specification	Points
3.2	On the “Company Network” (i.e., R1, R3, D1, and D2), configure classic single-area OSPFv3 in area 0.	Use OSPF Process ID **6** and assign the following router-IDs: • R1: 0.0.6.1 • R3: 0.0.6.3 • D1: 0.0.6.131 • D2: 0.0.6.132 On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0. • On R1, do not advertise the R1 – R2 network. • On R1, propagate a default route. Note that the default route will be provided by BGP. Disable OSPFv3 advertisements on: • D1: All interfaces except E1/2 • D2: All interfaces except E1/0	8
3.3	On R2 in the “ISP Network”, configure MP-BGP.	Configure two default static routes via interface Loopback 0: • An IPv4 default static route. • An IPv6 default static route. Configure R2 in BGP ASN **500** and use the router-id 2.2.2.2. Configure and enable an IPv4 and IPv6 neighbor relationship with R1 in ASN 300. In IPv4 address family, advertise: • The Loopback 0 IPv4 network (/32). • The default route (0.0.0.0/0). In IPv6 address family, advertise: • The Loopback 0 IPv4 network (/128). • The default route (::/0).	4

Task#	Task	Specification	Points
3.4	On R1 in the “ISP Network”, configure MP-BGP.	Configure two static summary routes to interface Null 0: • A summary IPv4 route for 10.41.0.0/8. • 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 10.41.0.0/8 network. In IPv6 address family: • Disable the IPv4 neighbor relationship. • Enable the IPv6 neighbor relationship. • Advertise the 2001:db8:100::/48 network.	4

Task 3.1

On the “Company Network” (i.e., R1, R3, D1, and D2), configure single-area OSPFv2 in area 0.

Router R1

```
R1#
R1#config t
R1(config)#router ospf 4
R1(config-router)#router-id 0.0.4.1
```

```
R1(config-router)#network 10.41.10.0 0.0.0.255 area 0
R1(config-router)#network 10.41.13.0 0.0.0.255 area 0
R1(config-router)#exit
R1(config)#ip route 0.0.0.0 0.0.0.0 e1/0
R1(config)#router ospf 4
R1(config-router)#default-information originate
R1(config-router)#end
R1#copy running-config startup-config
R1#
```

Router R3:

```
R3#
R3#config t
R3(config)#router ospf 4
R3(config-router)#router-id 0.0.4.3
R3(config-router)#network 10.41.11.0 0.0.0.255 area 0
R3(config-router)#network 10.41.13.0 0.0.0.255 area 0
R3(config-router)#end
R3#copy running-config startup-config
R3#
```

Switch D1

```
D1#
D1#config t
Enter configuration commands, one per line.  End with CNTL/Z.
D1(config)#router ospf 4
D1(config-router)#router-id 0.0.4.131
D1(config-router)#network 10.41.10.0 0.0.0.255 area 0
D1(config-router)#network 10.41.100.0 0.0.0.255 area 0
D1(config-router)#network 10.41.101.0 0.0.0.255 area 0
D1(config-router)#network 10.41.102.0 0.0.0.255 area 0
D1(config-router)#network 10.41.102.0 0.0.0.255 area 0
D1(config-router)#passive-interface default
D1(config-router)#no passive-interface e1/2
D1(config-router)#end
D1#copy running-config startup-config
D1#
```

Switch D2

```
D2#
D2#config t
D2(config)#router ospf 4
D2(config-router)#router-id 0.0.4.132
D2(config-router)#network 10.41.11.0 0.0.0.255 area 0
D2(config-router)#network 10.41.100.0 0.0.0.255 area 0
D2(config-router)#network 10.41.100.0 0.0.0.255 area 0
D2(config-router)#network 10.41.101.0 0.0.0.255 area 0
D2(config-router)#network 10.41.102.0 0.0.0.255 area 0
D2(config-router)#passive-interface default
D2(config-router)#no passive-interface e1/0
D2(config-router)#end
D2#copy running-config startup-config
D2#
```

Task 3.2

On the “Company Network” (i.e., R1, R3, D1, and D2), configure classic single-area OSPFv3 in area 0.

Router R1

```
R1#
R1#config t
R1(config)#ipv6 router ospf 6
R1(config)#ipv6 router ospf 6
R1(config-rtr)#router-id 0.0.6.1
R1(config-rtr)#exit
R1(config)#interface e1/1
R1(config-if)#ipv6 ospf 6 area 0
R1(config-if)#interface e1/2
R1(config-if)#ipv6 ospf 6 area 0
R1(config-if)#exit
R1(config)#ipv6 route ::/0 e1/0
R1(config)#ipv6 router ospf 6
```

```
R1(config-rtr)#default-information originate
R1(config-rtr)#end
R1#copy running-config startup-config
R1#
```

Router R2

```
R3#
R3#config t
R3(config)#ipv6 router ospf 6
R3(config-rtr)#router-id 0.0.6.3
R3(config-rtr)#exit
R3(config)#interface e1/1
R3(config-if)#ipv6 ospf 6 area 0
R3(config-if)#interface e1/0
R3(config-if)#ipv6 ospf 6 area 0
R3(config-if)#end
R3#copy running-config startup-config
R3#
```

Router D1

```
D1#
D1#config t
D1(config)#ipv6 router ospf 6
D1(config-rtr)#router-id 0.0.6.131
D1(config-rtr)#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)#interface vlan 101
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#interface vlan 102
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#end
D1#copy running-config startup-config
D1#
```

.

Switch D2

```
D2#
D2#config t
D2(config)#ipv6 router ospf 6
D2(config-rtr)#router-id 0.0.6.132
D2(config-rtr)#interface e1/0
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#interface vlan 100
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#interface vlan 101
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#interface vlan 102
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#end
D2#copy running-config startup-config
D2#
```

Task 3.3

On R2 in the “ISP Network”, configure MP-BGP.

Router R2

```
R2#
R2#config t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#ip route 0.0.0.0 0.0.0.0 loopback 0
R2(config)#ipv6 route ::/0 loopback 0
R2(config)#router bgp 500
R2(config-router)#bgp router-id 2.2.2.2
R2(config-router)#no bgp default ipv4-unicast
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 unicast
R2(config-router-af)#neighbor 209.165.200.225 activate
R2(config-router-af)#network 2.2.2.2 mask 255.255.255.255
```

```
R2(config-router-af)#network 0.0.0.0 mask 0.0.0.0
R2(config-router-af)#exit
R2(config-router)#address-family ipv6 unicast
R2(config-router-af)#neighbor 2001:db8:200::1 activate
R2(config-router-af)#network 2001:db8:2222::1/128
R2(config-router-af)#network ::/0
R2(config-router-af)#end
R2#copy running-config startup-config
R2#
```

Task 3.4

On R1 in the “ISP Network”, configure MP-BGP.

Router R1

```
R1#
R1#config t
R1(config)#
R1(config)#ip route 10.41.0.0 255.255.0.0 null 0
R1(config)#ipv6 route 2001:db8:100::/48 null 0
R1(config)#router bgp 300
R1(config-router)#bgp router-id 1.1.1.1
R1(config-router)#no bgp default ipv4-unicast
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)#network 10.41.0.0 mask 255.255.0.0
R1(config-router-af)#exit
R1(config-router)#address-family ipv6 unicast
R1(config-router-af)#neighbor 2001:db8:200::2 activate
R1(config-router-af)#network 2001:db8:100::/48
R1(config-router-af)#end
R1#copy running-config startup-config
R1#
```

Verificación de tablas de ruta IPv4:

Ilustración 14 Show IP route en R1

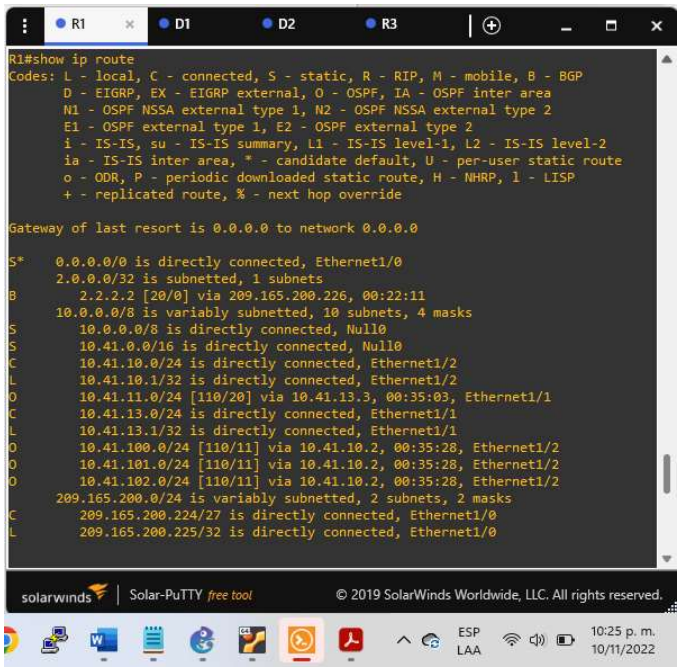


Ilustración 15 Show IP route en D1

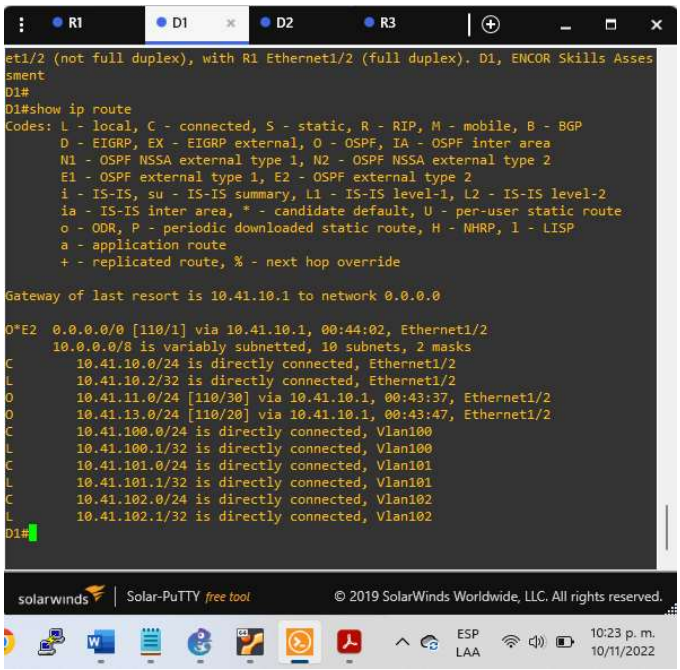


Ilustración 16 Show IP route en D2

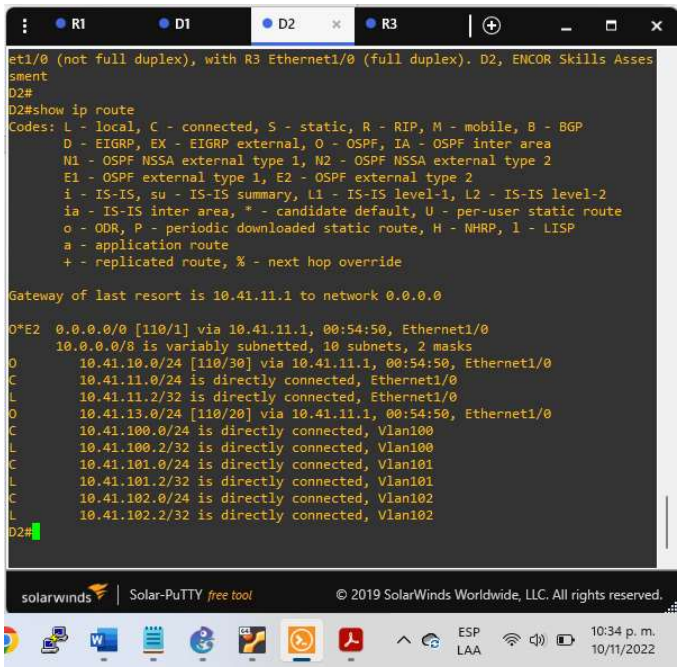
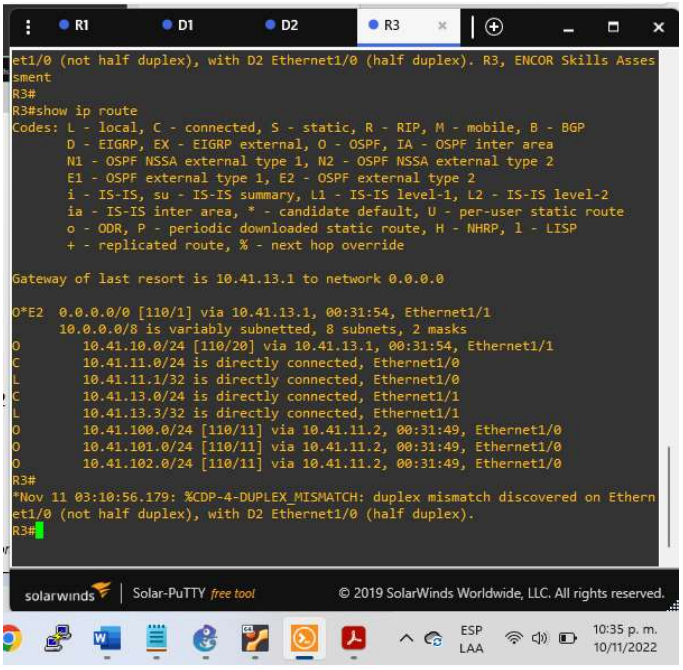


Ilustración 17 Show IP route en R3



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 Tareas de configuración de HSRP

Task#	Task	Specification	Points
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.	2

Task#	Task	Specification	Points
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. The tracked objects should notify D1 if the IP SLA state changes from down to up after 10 seconds, or from up to down after 15 seconds.	2

Task#	Task	Specification	Points
4.3	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 **10.41.100.254**. • 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 **10.41.101.254**. • Enable preemption. • Track object 4 to decrement by 60. Configure IPv4 HSRP group **124** for VLAN 102: • Assign the virtual IP address **10.41.102.254**. • 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.	8

Task#	Task	Specification	Points
4.4	On D2, configure HSRPv2.	D2 is the primary router for VLAN 101; therefore, the priority will also be changed to 150. Configure HSRP version 2. Configure IPv4 HSRP group **104** for VLAN 100: • Assign the virtual IP address **10.41.100.254**. • Enable preemption. • Track object 4 and decrement by 60. Configure IPv4 HSRP group **114** for VLAN 101: • Assign the virtual IP address **10.41.101.254**. • 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 **10.41.102.254**. • 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.	

Task 4.1

On D1, create IP SLAs that test the reachability of R1 interface E1/2.

Switch D1

```
D1#config t
D1(config)#ip sla 4
D1(config-ip-sla)#icmp-echo 10.41.10.1 source-ip 10.41.10.2
D1(config-ip-sla-echo)#frequency 5
D1(config-ip-sla-echo)#exit
D1(config)#ip sla schedule 4 start-time now life forever
D1(config)#track 4 ip sla 4 reachability
D1(config-track)#delay up 10 down 15
D1(config-track)#delay up 10 down 15
D1(config-track)#exit
D1(config)#ip sla 6
D1(config-ip-sla)#icmp-echo 2001:db8:100:1010::1 source-interface e1/2
D1(config-ip-sla-echo)#frequency 5
D1(config-ip-sla-echo)#exit
D1(config)#ip sla schedule 6 start-time now life forever
D1(config)#track 6 ip sla 6 reachability
D1(config-track)# delay up 10 down 15
D1(config-track)#end
D1#copy running-config startup-config
D1#
```

Task 4.2

On D2, create IP SLAs that test the reachability of R3 interface E1/0.

Switch D2

```
D2#
D2#config t
Enter configuration commands, one per line.  End with CNTL/Z.
D2(config)#ip sla 4
D2(config-ip-sla)#
D2(config-ip-sla)#icmp-echo 10.41.11.1 source-interface e1/0
D2(config-ip-sla-echo)#frequency 5
D2(config-ip-sla-echo)#exit
```

```
D2(config)#ip sla schedule 4 start-time now life forever
D2(config)#track 4 ip sla 4 reachability
D2(config-track)#delay up 10 down 15
D2(config-track)#exit
D2(config)#ip sla 6
D2(config-ip-sla)#icmp-echo 2001:db8:100:1011::1 source-interface e1/0
D2(config-ip-sla-echo)#frequency 5
D2(config-ip-sla-echo)#exit
D2(config)#ip sla schedule 6 start-time now life forever
D2(config)#track 6 ip sla 6 reachability
D2(config-track)#delay up 10 down 15
D2(config-track)#end
D2#copy running-config startup-config
D2#
```

Task 4.3

On D1, configure HSRPv2.

Switch D1

```
D1#
D1#config t
D1(config)#interface vlan 100
D1(config-if)#standby version 2
D1(config-if)#standby 104 ip 10.41.100.254
D1(config-if)#standby 104 priority 150
D1(config-if)#standby 104 preempt
D1(config-if)#standby 104 track 4 decrement 60
D1(config-if)#standby 106 ipv6 autoconfig
D1(config-if)#standby 106 priority 150
D1(config-if)#standby 106 preempt
D1(config-if)#standby 106 track 6 decrement 60
D1(config-if)#exit
D1(config)#interface vlan 101
D1(config-if)#standby version 2
D1(config-if)#standby 114 ip 10.41.101.254
D1(config-if)#standby 114 preempt
D1(config-if)#standby 114 track 4 decrement 60
```

```
D1(config-if)#standby 116 ipv6 autoconfig
D1(config-if)#standby 116 preempt
D1(config-if)#standby 116 track 6 decrement 60
D1(config-if)#exit
D1(config)#interface vlan 102
D1(config-if)#standby version 2
D1(config-if)#standby 124 ip 10.41.102.254
D1(config-if)#standby 124 priority 150
D1(config-if)#standby 124 preempt
D1(config-if)#standby 124 track 4 decrement 60
D1(config-if)#standby 126 ipv6 autoconfig
D1(config-if)#standby 126 priority 150
D1(config-if)#standby 126 preempt
D1(config-if)#standby 126 track 6 decrement 60
D1(config-if)#end
D1#copy running-config startup-config
D1#
```

Task 4.4

On D2, configure HSRPv2.

Switch D2

```
D2#config t
D2(config)#interface vlan 100
D2(config-if)#standby version 2
D2(config-if)#standby 104 ip 10.41.100.254
D2(config-if)#standby 104 preempt
D2(config-if)#standby 104 track 4 decrement 60
D2(config-if)#standby 106 ipv6 autoconfig
D2(config-if)#standby 106 preempt
D2(config-if)#standby 106 track 6 decrement 60
D2(config-if)#exit
D2(config)#interface vlan 101
D2(config-if)#standby version 2
D2(config-if)#standby 114 ip 10.41.101.254
D2(config-if)#standby 114 priority 150
```

```
D2(config-if)#standby 114 preempt
D2(config-if)#standby 114 track 4 decrement 60
D2(config-if)#standby 116 ipv6 autoconfig
D2(config-if)#standby 116 priority 150
D2(config-if)#standby 116 preempt
D2(config-if)#standby 116 track 6 decrement 60
D2(config-if)#exit
D2(config)#interface vlan 102
D2(config-if)#standby version 2
D2(config-if)#standby 124 ip 10.41.102.254
D2(config-if)#standby 124 preempt
D2(config-if)#standby 124 track 4 decrement 60
D2(config-if)#standby 126 ipv6 autoconfig
D2(config-if)#standby 126 preempt
D2(config-if)#standby 126 track 6 decrement 60
D2(config-if)#end
D2#copy running-config startup-config
D2#
```

Verificación de SLAs en D1 y D2

Ilustración 18 Verificación SLA en D1

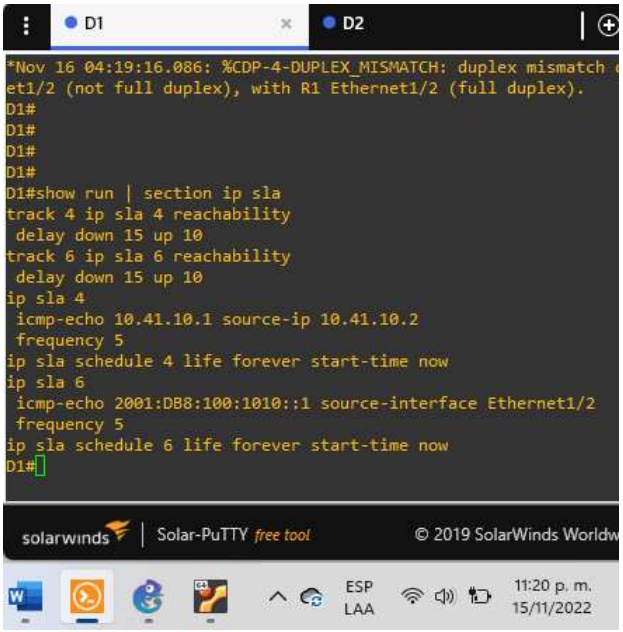
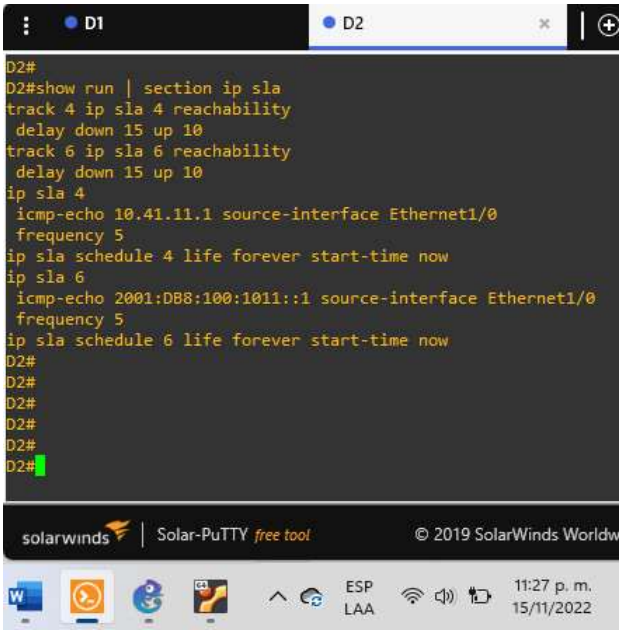


Ilustración 19 Configuración SLA en D2



Verificación de Standby en D1 y D2

Ilustración 20 Verificación de Standby en D1

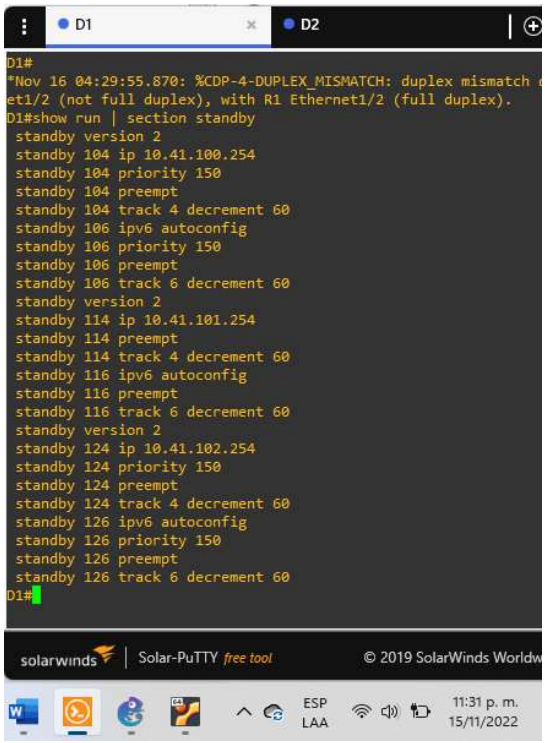
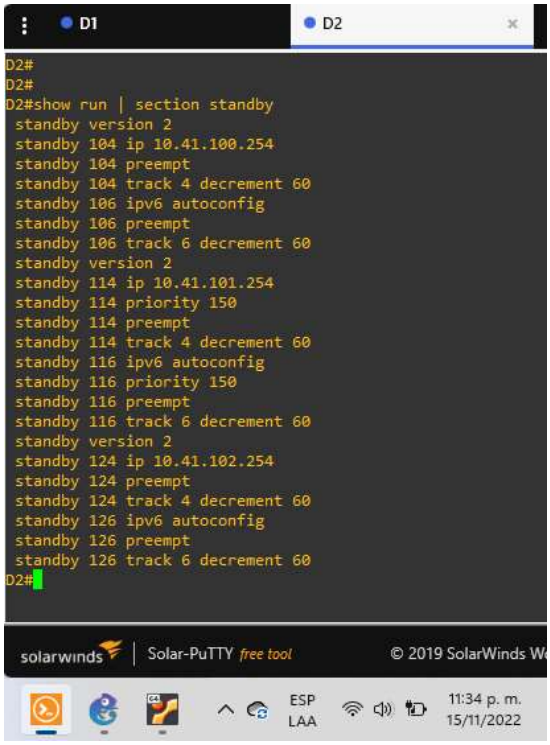


Ilustración 21 Verificación de Standby en D2



CONCLUSIONES

Es de resaltar el uso de diferentes protocolos y técnicas en busca del mejor enrutamiento en la capa 2, como lo son el spanning tree y el LACP. Con el primero habilitamos la red para que funcione con enlaces redundantes sin generar bucles, lo que nos permite garantizar la disponibilidad de enlaces para mantener la red interconectada, mientras que con LACP complementamos la redundancia de enlaces proporcionando enlace virtual de dos puertos físicos con lo que generamos un mejor ancho de banda para la red.

Del mismo modo es importante conocer que los protocolos de enrutamiento utilizados en el desarrollo de esta prueba de habilidades como lo son el OSPF y BGP, son protocolos ampliamente utilizados en muchas organizaciones. El protocolo OSPF mantiene una tabla de enrutamiento que comparte con los routers adyacentes, con el fin de tener siempre datos actualizados de la red cuando sufre modificaciones o cambios de topología, lo que permite una rápida adaptabilidad y escalabilidad de la red, determinando siempre la ruta más rápida. Por su parte el protocolo BGP es mayormente utilizado en enlaces WAN y determina su tabla de enrutamiento en la mejor ruta posible. Ambos protocolos son dinámicos y convergentes lo que garantiza que la red se adapta con cierta facilidad a los cambios en la misma.

Con la configuración de First Hop Redundancy y SLA, obtenemos una red protegida de fallos por falta de acceso al Gateway, al tener redundancia en la configuración de este y monitoreo constante de los enlaces. Adicionalmente al configurar HSRP garantizamos la disponibilidad de un router activo y uno de respaldo haciendo nuestra red más redundante y protegida a diferentes fallos que puedan presentarse.

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