DIPLOMADO DE PROFUNDIZACION CISCO
PRUEBA DE HABILIDADES PRÁCTICAS CCNP

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Diplomado de opción de grado presentado para
optar eltítulo de INGENIERO DE
TELECOMUNICACIONES

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NOTA DE ACEPTACIÓN

Firma del Presidente del Jurado

Firma del Jurado

Firma del Jurado

BOGOTA D.C, 02 de diciembre de 2022

AGRADECIMIENTOS

Este esfuerzo lo dedico a mi familia, a mis padres y hermana por su apoyo incondicional e incansable para hoy poder llegar a un logro más, agradecimientos alos instructores de la Universidad Nacional Abierta y a Distancia – UNAD por sus esfuerzos, conocimiento y guía académica para ser de nosotros profesionales íntegros que podamos aportar positivamente al desarrollo de nuestras comunidades y país, igualmente agradecer a la universidad por la modalidad de estudios virtuales implementada ya que presentan gran oportunidad a muchas personas que poseendificultades para acceder a educación presencial.

CONTENIDO

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GLOSARIO

NETWORKING: El término hacer contactos, o el anglicismo *networking*, se usa enel mundo de los negocios para hacer referencia a una actividad socio económica enla que profesionales y emprendedores se reúnen para formar relaciones empresariales, crear y desarrollar oportunidades de negocio, compartir informacióny buscar clientes potenciales.

LOOPBACK: La dirección de *loopback* es una dirección especial que los hosts utilizan para dirigir el tráfico hacia ellos mismos. La dirección de *loopback* crea un método de acceso directo para las aplicaciones y servicios TCP/IP que se ejecutanen el mismo dispositivo para comunicarse entre sí. Al utilizar la dirección de *loopback*, en lugar de la dirección host IPv4 asignada, dos servicios en el mismo host pueden desviar las capas inferiores del *stack* de TCP/IP. También es posible hacer ping a la dirección de *loopback* para probar la configuración de TCP/IP en el host local.

PING: Como programa, ping es una utilidad de diagnóstico en redes de computadoras que comprueba el estado de la comunicación del anfitrión local con uno o varios equipos remotos de una red que ejecuten IP. Se vale del envío de paquetes ICMP de solicitud (*ICMP Echo Request*) y de respuesta (*ICMP Echo Reply*). Mediante esta utilidad puede diagnosticarse el estado, velocidad y calidad de una red determinada.

CCNP: Certificación de enrutamiento y conmutación CCNP.
La certificación de enrutamiento y conmutación Cisco *Certified Network Professional(CCNP)* valida la capacidad de planificar, implementar, verificar y solucionar problemas de redes empresariales locales y de área amplia y trabajar en colaboración con especialistas en soluciones avanzadas de seguridad, voz, inalámbrica y video.

VLAN: Una VLAN, acrónimo de virtual LAN (red de área local virtual), es un métodopara 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 (los departamentos de una empresa, por ejemplo) que no deberían intercambiar datos usando la red local (aunque podrían hacerlo a través de un enrutador o un conmutador de capa OSI 3 y 4.

RESUMEN

Este trabajo tiene como objetivo desarrollar la prueba de habilidades prácticas que es una herramienta de evaluación del Diplomado de profundización de Cisco CCNP, con la cual se busca medir las habilidades y competencias que el estudiante logró alcanzar mediante el desarrollo del diplomado y cada una de sus actividades.

Esta actividad final contara con dos escenarios en la cual cada estudiante realizará cada una de las configuraciones necesarias, apoyándose en los conocimientos adquiridos en conmutación, enrutamiento, redes y electrónica para dar solución a los dos problemas planteados, el estudiante contara con el apoyo de software especializado y pondrá en ejecución lo aprendido en el transcurso del curso.

Palabras Clave: CISCO, CCNP, Conmutación, Enrutamiento, Redes, Electrónica.

ABSTRACT

This work aims to develop the practical skills test, which is an evaluation tool of theCisco CCNP Deepening Diploma, which seeks to measure the skills and competences that the student achieved through the development of the diploma andeach of its activities.

This final activity will have two scenarios in which each student will perform each ofthe necessary configurations, relying on the knowledge acquired in switching, routing, network design and electronics to solve the two problems posed, the studentwill have the support specialized software and will implement what has been learnedduring the course.

Keywords: CISCO, CCNP, Routing, Swicthing, Networking, Electronics.

INTRODUCCIÓN

Este trabajo presenta el desarrollar de la prueba de habilidades prácticas la cual es una herramienta de evaluación del Diplomado de profundización Cisco CCNP, para optar el título de ingeniero. El desarrollo de esta actividad se llevará a cabo poniendo en práctica los conocimientos tanto teóricos y prácticos adquiridos a lo largo del curso. Empleando la metodología adquirida a lo largo del diplomado la cual consistió en estudiar y entender la parte teórica para luego llevarla a la práctica mediremos nuestro conocimiento mediante la solución de dos problemas que abarcan el diseño, implementación y configuración de redes de datos, protocolos deenrutamiento, programación, normas preparándonos e instruyéndonos para que seamos capaces de asumir retos en nuestra vida laboral y profesional, la cual como futuro ingeniero de Telecomunicaciones poder aplicar estos conocimientos en la transformación, mejoramiento y expansión de redes de nueva generación y de la tecnología que nos rodea.

En el primer escenario se desarrollará la evaluación de habilidades ENCOR, donde tiene como primer objetivo construir una red y configurar los ajustes básicos del dispositivo y direccionamiento de la interfaz, el segundo objetivo es configurar la red de capa 2 y la compatibilidad con el host, seguido del tercer objetivo configurar protocolos de enrutamiento y como cuarto objetivo configurar la redundancia del primer salto.

En esta evaluación de habilidades, se tiene la responsabilidad completar la configuración de la red para que haya accesibilidad completa de extremo a extremo, para que los hosts tengan soporte de puerta de enlace predeterminada confiable y para que los protocolos de administración estén operativos dentro de la parte de "Red de la empresa" de la topología.

Se debe verificar que las configuraciones cumplan con las especificaciones proporcionadas y que los dispositivos funcionen según lo requerido.
Los enrutadores utilizados con los laboratorios prácticos de CCNP son enrutadores Cisco 7200. Los conmutadores utilizados en las prácticas de laboratorio son conmutadores Cisco Catalyst L2.

El segundo escenario se desarrollará la evaluación de habilidades ENCOR continuación Escenario 1, la cual consiste en configurar protocolos de enrutamiento IPv4 e IPv6. Al final de esta parte, la red debe estar completamente convergente. Los pings de IPv4 e IPv6 a la interfaz Loopback 0 desde D1 y D2 deberían ser exitosos.

DESARROLLO

1. ESCENARIO 1

ENCOR Skills Assessment (Scenario 1)

Topology

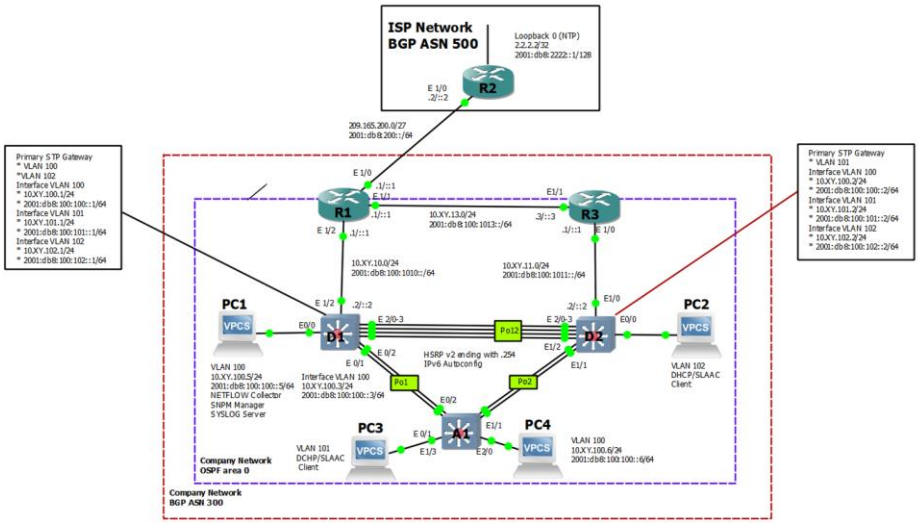


Figura 1. Simulación escenario 1

Addressing Table

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	10.27.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	E1/1	10. 27.13.1/24	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. 27.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
	E1/1	10. 27.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	E1/2	10. 27.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
	VLAN 100	10. 27.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10.27.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
	VLAN 102	10.27.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	E1/0	10.27.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10.27.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
	VLAN 101	10.27.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10.27.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.27.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.27.100.5/24	2001:db8:100:100::5/64	EUI-64
PC2	NIC	DHCP	SLAAC	EUI-64
PC3	NIC	DHCP	SLAAC	EUI-64
PC4	NIC	10.27.100.6/24	2001:db8:100:100::6/64	EUI-64

Tabla 1. Addressing Table

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.

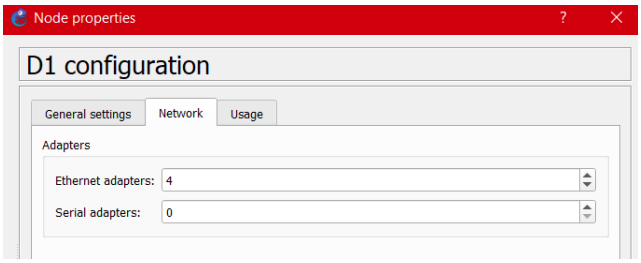
Note: The routers used with CCNP hands-on labs are Cisco 7200 routers. The switches used in the labs are Cisco Catalyst L2 switches Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from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

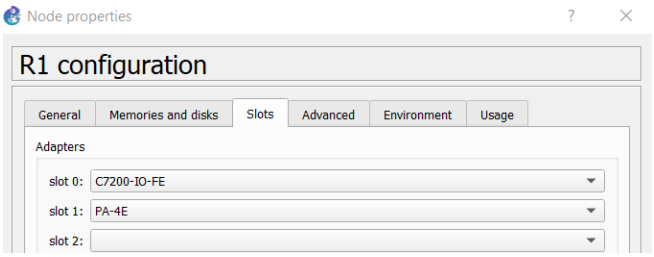
Note: The letters "X, Y" represent the last two digits of your ID number (cédula). Para mi caso mi cedula es (1032422827), últimos dos numero son(27)

Required Resources

- 3 Routers (Cisco 7200). Click on the download link of the images for GNS3.
- 3 Switches (Cisco IOU L2). Click on the download link of the images for GNS3.
- 4 PCs (Use the GNS3’s VPCS)
- After the configuration of devices in GNS3, the Slots of the network adapters of the SW must be configured as follows:



And of the Routers like this:



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

```
hostname R1
ipv6 unicast-routing
no ip domain lookup
banner motd # R1, ENCOR Skills Assessment#
line con 0
 exec-timeout 0 0
 logging synchronous
 exit
interface e1/0
 ip address 209.165.200.225 255.255.255.224
 ipv6 address fe80::1:1 link-local
 ipv6 address 2001:db8:200::1/64
 no shutdown
 exit
interface e1/2
 ip address 10.27.10.1 255.255.255.0
 ipv6 address fe80::1:2 link-local
 ipv6 address 2001:db8:100:1010::1/64
 no shutdown
 exit
interface e1/1
 ip address 10.XY.13.1 255.255.255.0
 ipv6 address fe80::1:3 link-local
 ipv6 address 2001:db8:100:1013::1/64
 no shutdown
exit
```

Figura 2. Configuración Router R1

Router R2

```
hostname R2
ipv6 unicast-routing
no ip domain lookup
banner motd # R2, ENCOR Skills Assessment#
line con 0
 exec-timeout 0 0
 logging synchronous
 exit
interface e1/0
 ip address 209.165.200.226 255.255.255.224
```

```
 ipv6 address fe80::2:1 link-local
 ipv6 address 2001:db8:200::2/64
 no shutdown
 exit
interface Loopback 0
 ip address 2.2.2.2 255.255.255.255
 ipv6 address fe80::2:3 link-local
 ipv6 address 2001:db8:2222::1/128
 no shutdown
exit
```

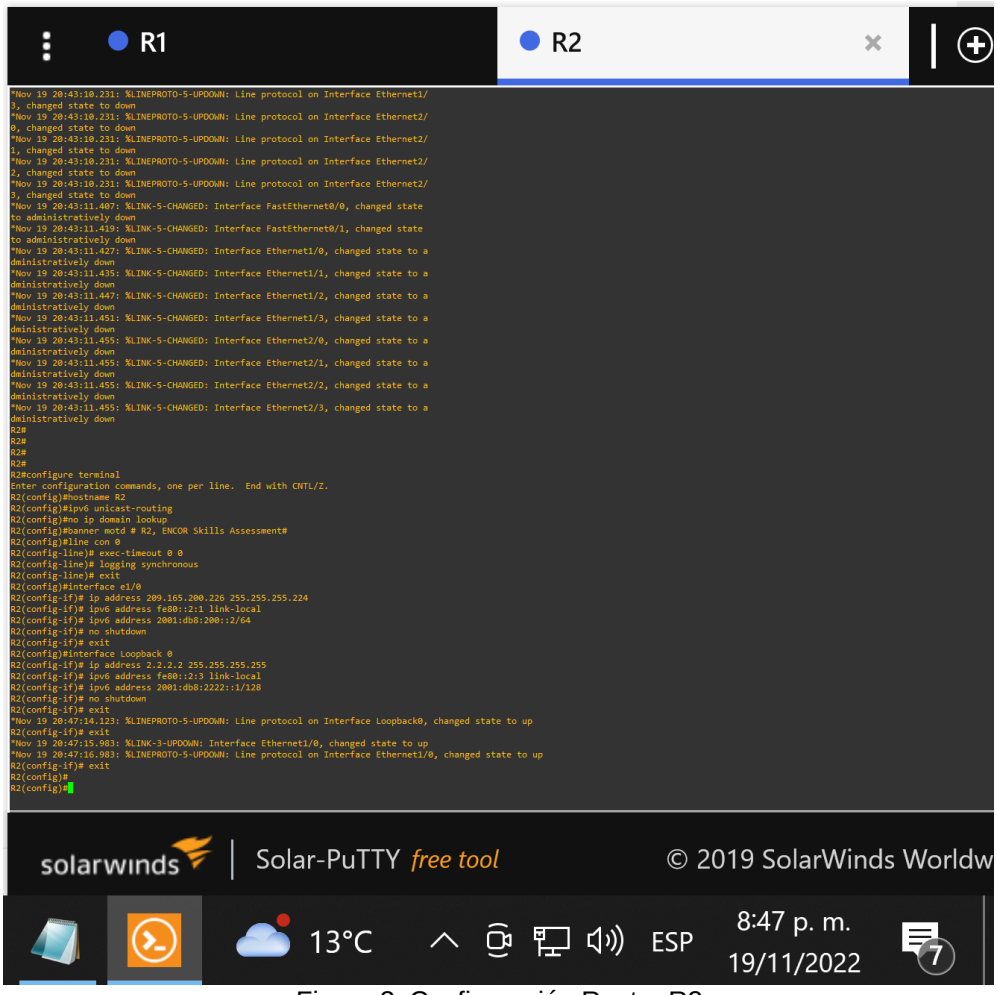


Figura 3. Configuración Router R2

Router R3

```
hostname R3
ipv6 unicast-routing
no ip domain lookup
```

```
banner motd # R3, ENCOR Skills Assessment#
line con 0
 exec-timeout 0 0
 logging synchronous
 exit
interface e1/0
 ip address 10.27.11.1 255.255.255.0
 ipv6 address fe80::3:2 link-local
 ipv6 address 2001:db8:100:1011::1/64
 no shutdown
 exit
interface e1/1
 ip address 10.27.13.3 255.255.255.0
 ipv6 address fe80::3:3 link-local
 ipv6 address 2001:db8:100:1010::2/64
 no shutdown
                                        exit
```

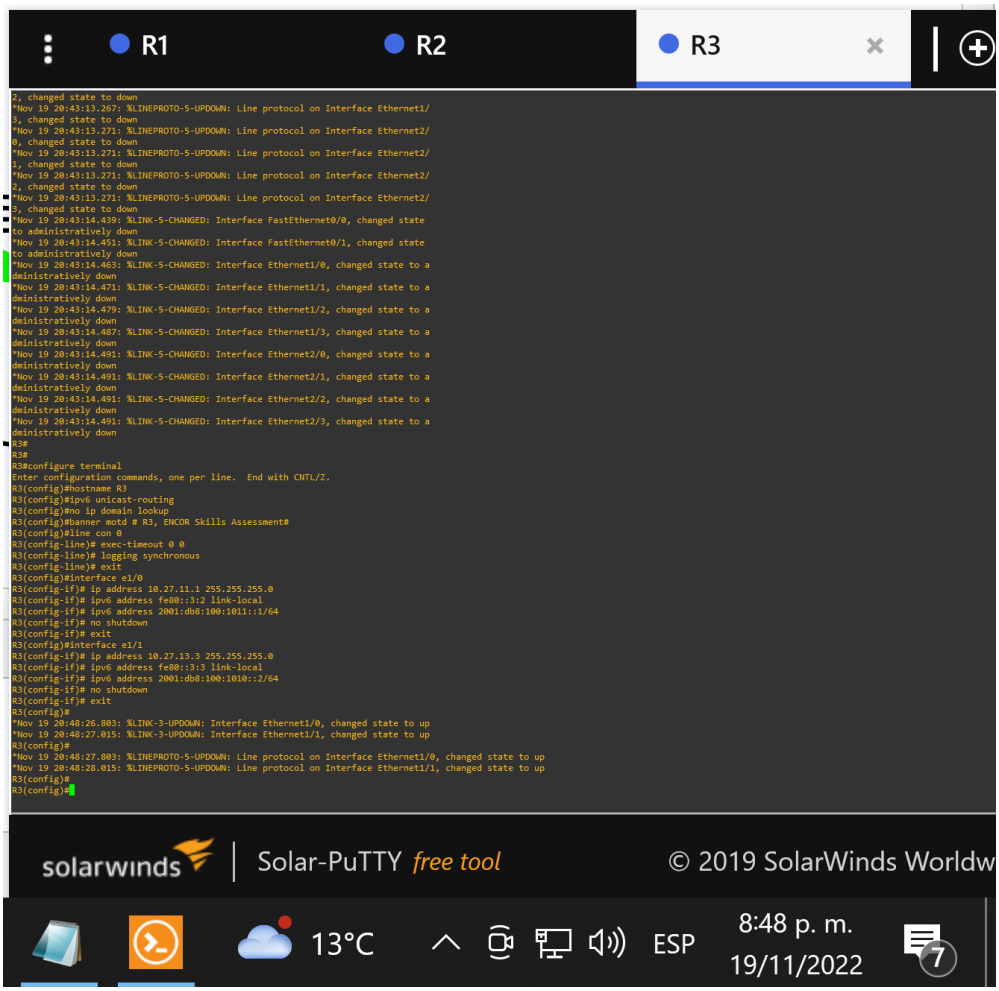


Figura 4. Configuración Router R3

Switch D1

```
hostname D1
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D1, ENCOR Skills Assessment#
line con 0
 exec-timeout 0 0
 logging synchronous
 exit
vlan 100
 name Management
 exit
vlan 101
 name UserGroupA
```

```
 exit
vlan 102
 name UserGroupB
 exit
vlan 999
 name NATIVE
 exit
interface e1/2
 no switchport
 ip address 10.27.10.2 255.255.255.0
 ipv6 address fe80::d1:1 link-local
 ipv6 address 2001:db8:100:1010::2/64
 no shutdown
 exit
interface vlan 100
 ip address 10.27.100.1 255.255.255.0
 ipv6 address fe80::d1:2 link-local
 ipv6 address 2001:db8:100:100::1/64
 no shutdown
 exit
interface vlan 101
 ip address 10.27.101.1 255.255.255.0
 ipv6 address fe80::d1:3 link-local
 ipv6 address 2001:db8:100:101::1/64
 no shutdown
 exit
interface vlan 102
 ip address 10.27.102.1 255.255.255.0
 ipv6 address fe80::d1:4 link-local
 ipv6 address 2001:db8:100:102::1/64
 no shutdown
 exit
ip dhcp excluded-address 10.27.101.1 10.27.101.109
ip dhcp excluded-address 10.27.101.141 10.27.101.254
ip dhcp excluded-address 10.27.102.1 10.27.102.109
ip dhcp excluded-address 10.27.102.141 10.27.102.254
ip dhcp pool VLAN-101
 network 10.27.101.0 255.255.255.0
 default-router 10.27.101.254
 exit
ip dhcp pool VLAN-102
 network 10.27.102.0 255.255.255.0
 default-router 10.27.102.254
```

exit
interface range e0/0-3,e1/0-1,e1/3,e2/0-3,e3/0-3
shutdown
exit

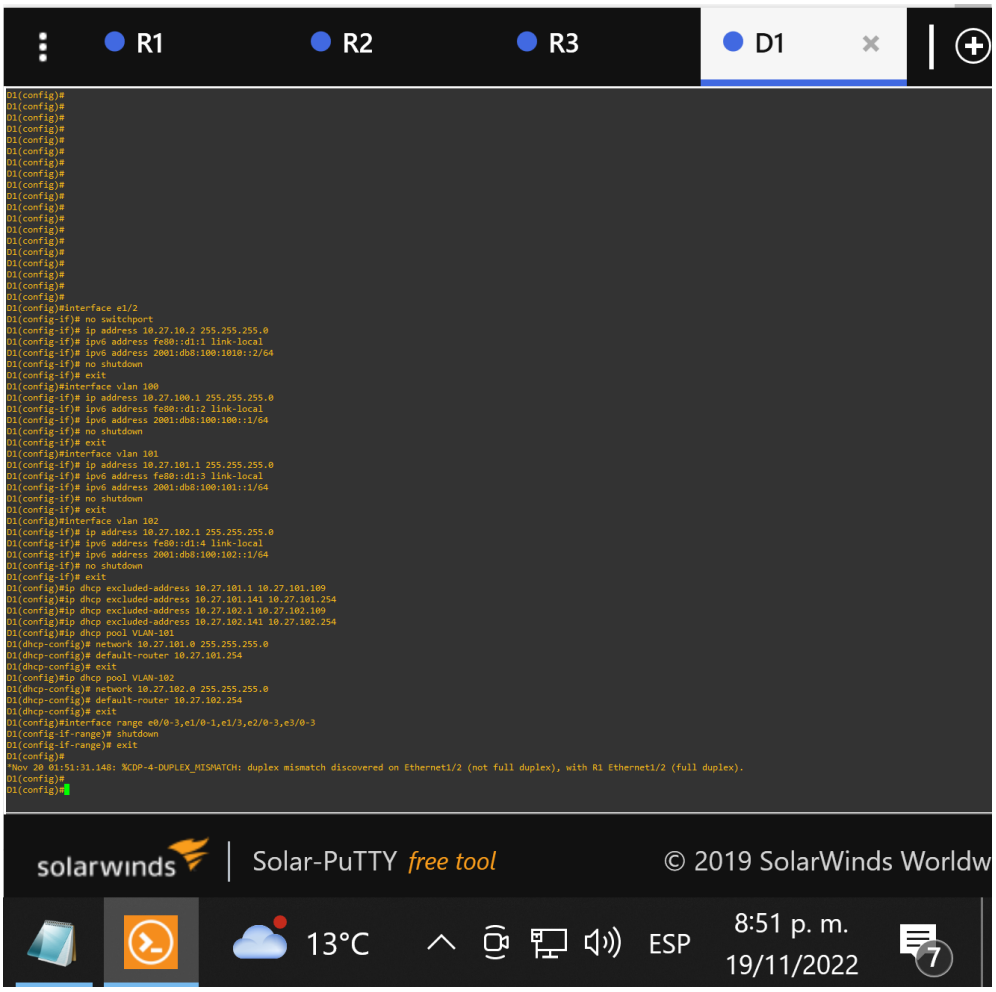


Figura 5. Configuración Switch D1

Switch D2

hostname D2
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D2, ENCOR Skills Assessment#
line con 0

```
 exec-timeout 0 0
 logging synchronous
 exit
vlan 100
 name Management
 exit
vlan 101
 name UserGroupA
 exit
vlan 102
 name UserGroupB
 exit
vlan 999
 name NATIVE
 exit
interface e1/0
 no switchport
 ip address 10.27.11.2 255.255.255.0
 ipv6 address fe80::d1:1 link-local
 ipv6 address 2001:db8:100:1011::2/64
 no shutdown
 exit
interface vlan 100
 ip address 10.27.100.2 255.255.255.0
 ipv6 address fe80::d2:2 link-local
 ipv6 address 2001:db8:100:100::2/64
 no shutdown
 exit
interface vlan 101
 ip address 10.27.101.2 255.255.255.0
 ipv6 address fe80::d2:3 link-local
 ipv6 address 2001:db8:100:101::2/64
 no shutdown
 exit
interface vlan 102
 ip address 10.27.102.2 255.255.255.0
 ipv6 address fe80::d2:4 link-local
 ipv6 address 2001:db8:100:102::2/64
 no shutdown
 exit
ip dhcp excluded-address 10.27.101.1 10.27.101.209
ip dhcp excluded-address 10.27.101.241 10.27.101.254
ip dhcp excluded-address 10.27.102.1 10.27.102.209
```

```
ip dhcp excluded-address 10.27.102.241 10.27.102.254
ip dhcp pool VLAN-101
 network 10.27.101.0 255.255.255.0
 default-router 27.0.101.254
 exit
ip dhcp pool VLAN-102
 network 10.27.102.0 255.255.255.0
 default-router 10.27.102.254
 exit
interface range e0/0-3,e1/1-3,e2/0-3,e3/0-3
 shutdown
exit
```

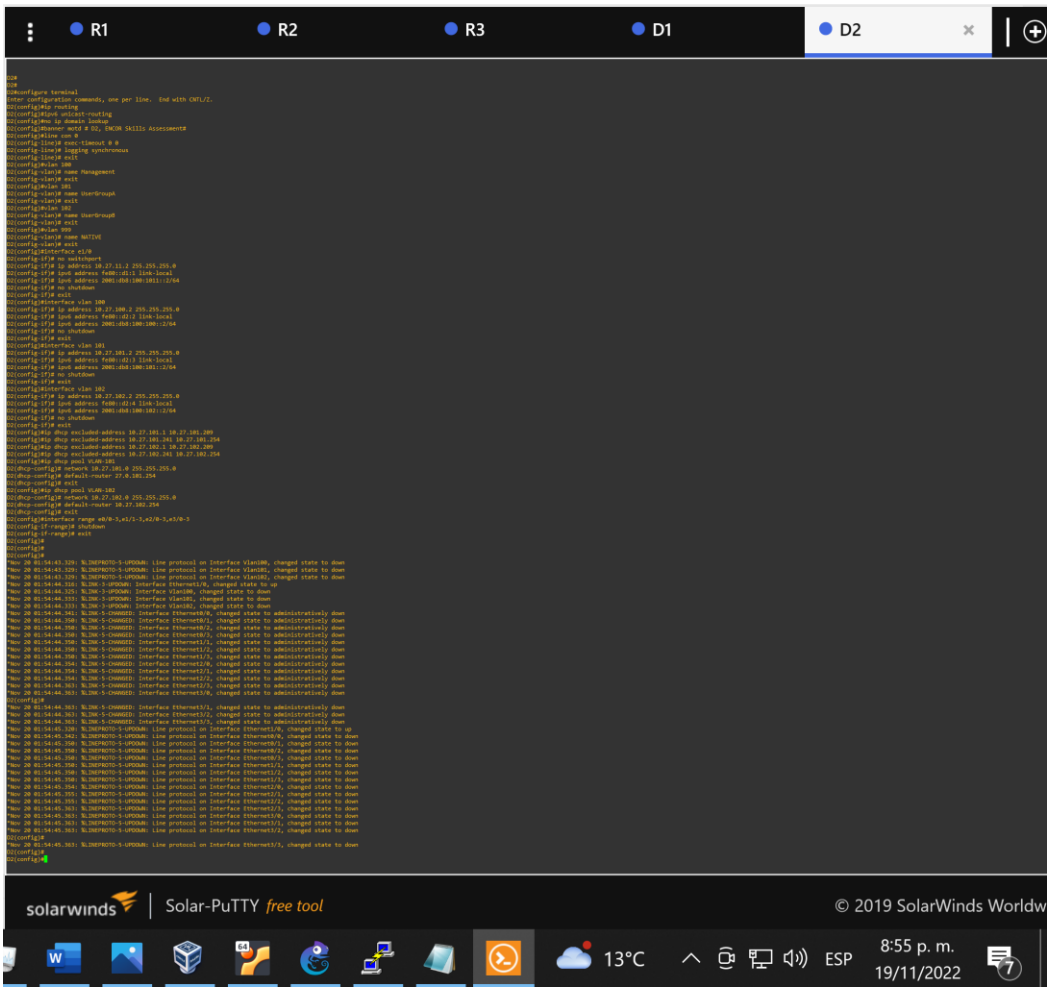


Figura 6. Configuración Switch D1

Switch A1

```
hostname A1
no ip domain lookup
banner motd # A1, ENCOR Skills Assessment#
line con 0
 exec-timeout 0 0
 logging synchronous
 exit
vlan 100
 name Management
 exit
vlan 101
 name UserGroupA
 exit
vlan 102
 name UserGroupB
 exit
vlan 999
 name NATIVE
 exit
interface vlan 100
 ip address 10.27.100.3 255.255.255.0
 ipv6 address fe80::a1:1 link-local
 ipv6 address 2001:db8:100:100::3/64
 no shutdown
 exit
interface range e0/0,e0/3,e1/0,e2/1-3,e3/0-3
 shutdown
exit
```

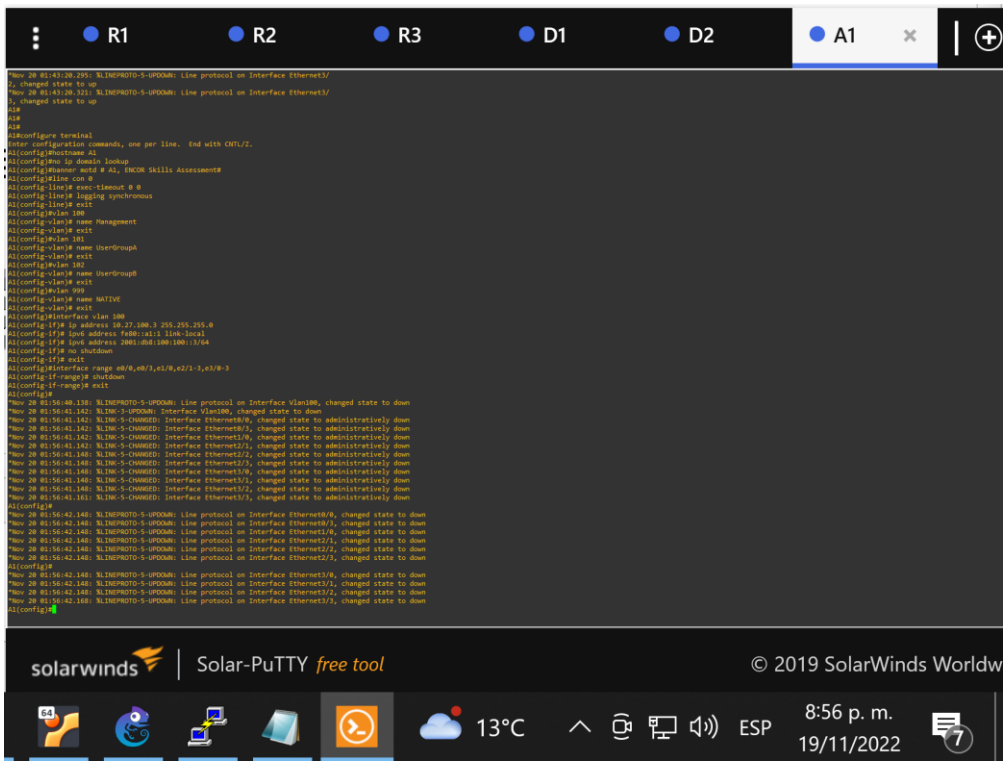


Figura 7. Configuración Switch A1

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

b. Configure PC 1 and PC 4 host addressing as shown in the addressing table. Assign a default gateway address of 10.27.100.254 which will be the HSRP virtual IP address used in Part 4.

PC 1:

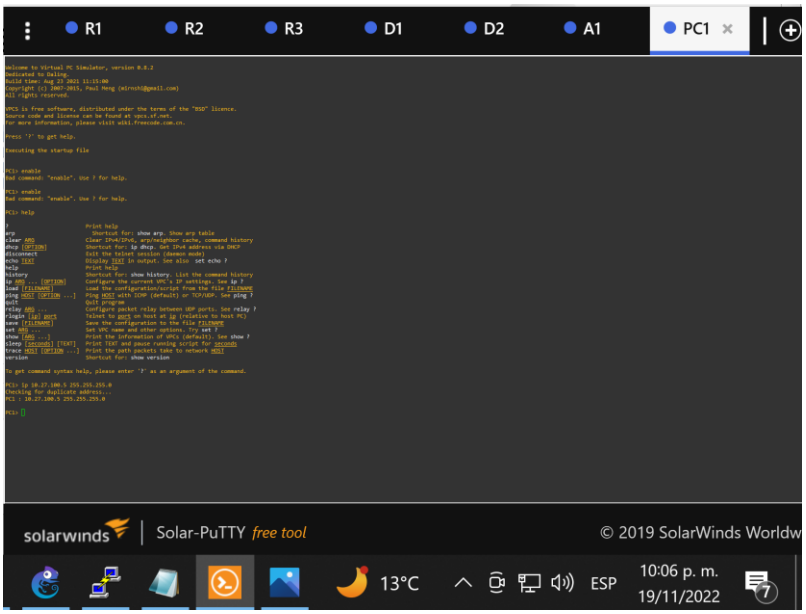


Figura 8. Configuración PC1

PC 4:

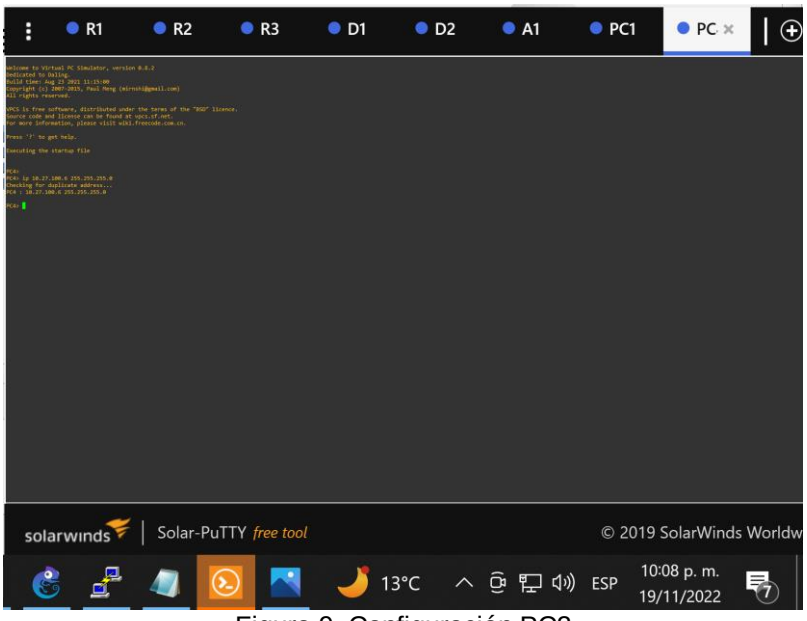


Figura 9. Configuración PC2

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:

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: 10.27.100.1 • D2: 10.27.100.2 • PC4: 10.27.100.6 PC2 should successfully ping: • D1: 10.27.102.1 • D2: 10.27.102.2 PC3 should successfully ping: • D1: 10.27.101.1 • D2: 10.27.101.2 PC4 should successfully ping: • D1: 10.27.100.1 • D2: 10.27.100.2 • PC1: 10.27.100.5	1

Tabla 2. Configuración de la red de capa 2 y la compatibilidad con el host

Task 2.1 – 2.6

Switch D1:

```
interface range e2/0-3
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999
channel-group 12 mode active
no shutdown
exit
interface range e0/1-2
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999
channel-group 1 mode active
no shutdown
exit
spanning-tree mode rapid-pvst
spanning-tree vlan 100,102 root primary
spanning-tree vlan 101 root secondary
interface e0/0
switchport mode access
switchport access vlan 100
spanning-tree portfast
```

no shutdown
exit
end

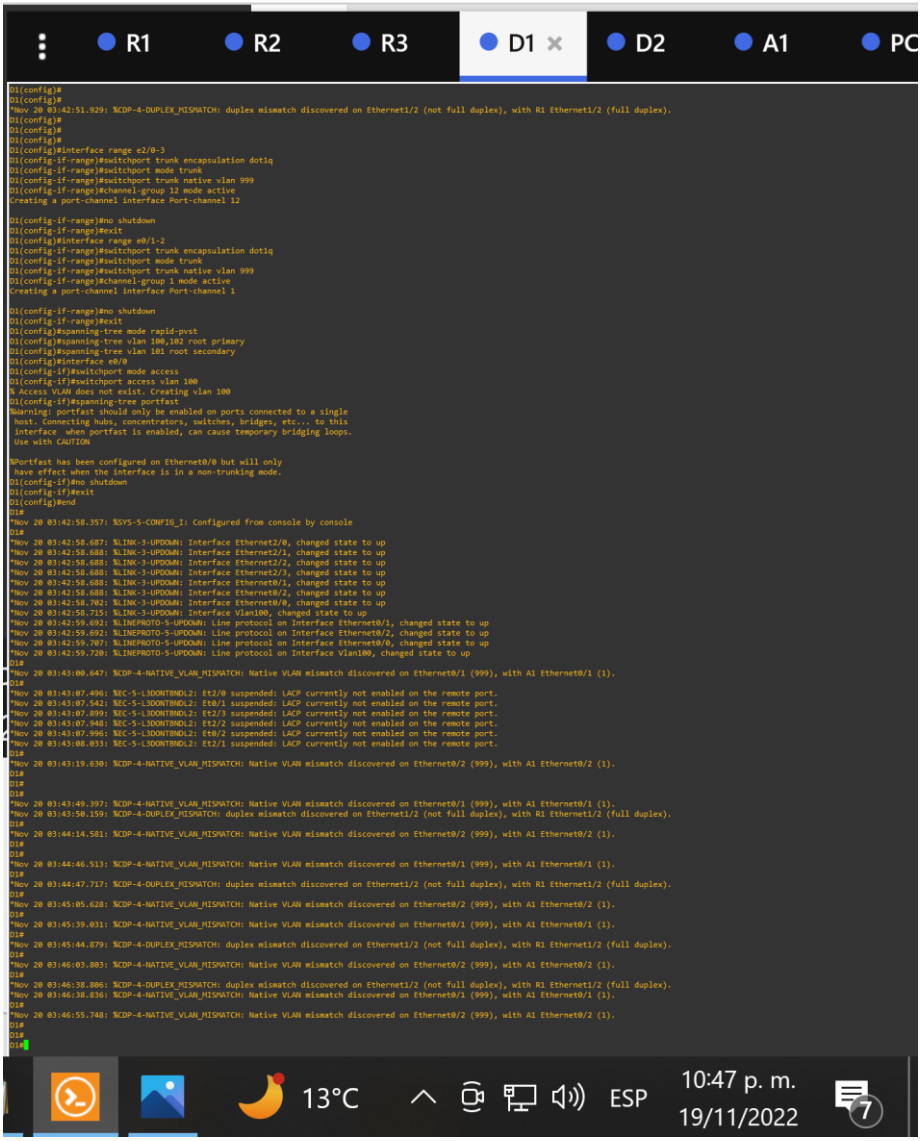


Figura 10. Configuración Switch D1 Tarea 2.1 – 2.6

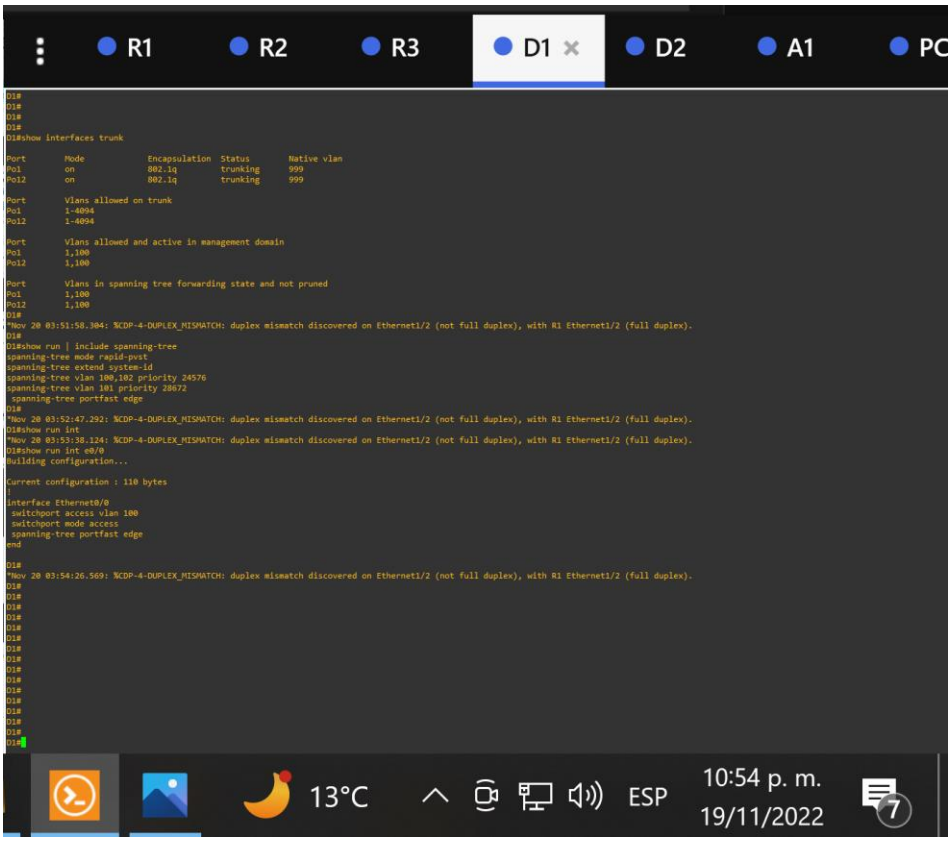


Figura 11. Verificación Configuración Switch D1 Tarea 2.1 – 2.6

Switch D2:

interface range e2/0-3
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999
channel-group 12 mode active
no shutdown
exit
interface range e0/1-2
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999
channel-group 1 mode active
no shutdown

exit

spanning-tree mode rapid-pvst

spanning-tree vlan 100 root primary

spanning-tree vlan 100,102 root secondary

interface e0/0

switchport mode access

switchport access vlan 102

spanning-tree portfast

no shutdown

exit

end

Figura 12. Configuración Switch D2 Tarea 2.1 – 2.6

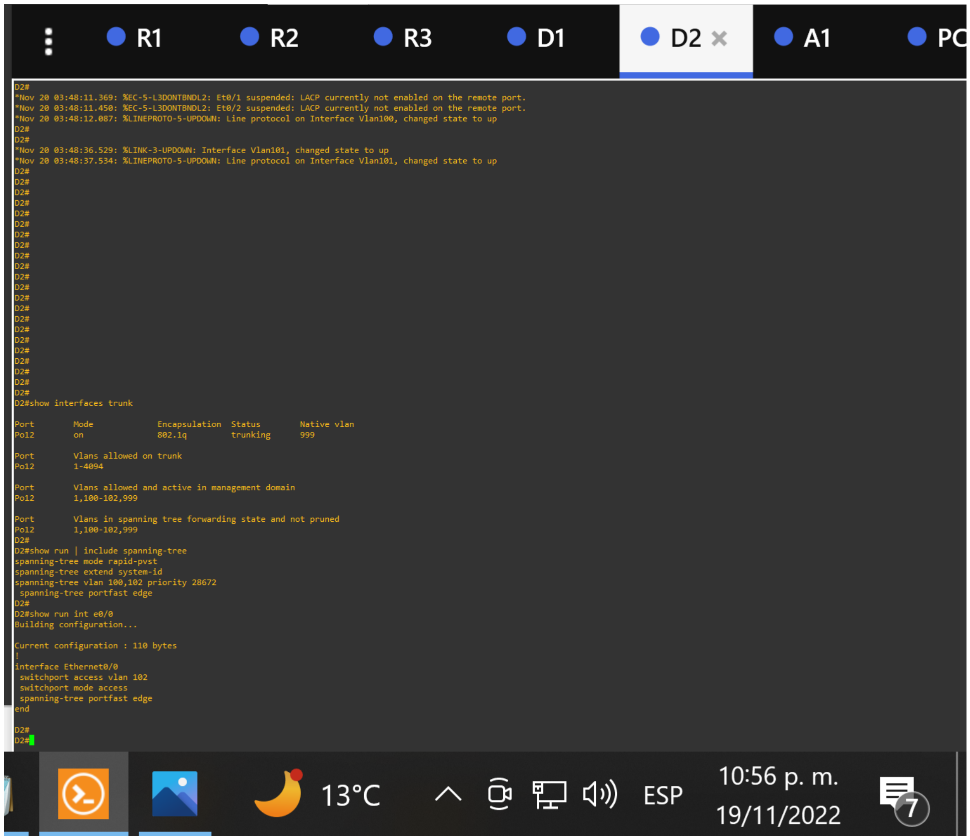


Figura 13. Verificación Configuración Switch D2 Tarea 2.1 – 2.6

Switch A1:

spanning-tree mode rapid-pvst

interface range e0/1-2

switchport trunk encapsulation dot1q

switchport mode trunk

switchport trunk native vlan 999

channel-group 1 mode active

no shutdown

exit

interface range e1/1-2

switchport trunk encapsulation dot1q

switchport mode trunk

switchport trunk native vlan 999

channel-group 2 mode active

```
no shutdown
exit
interface e1/3
switchport mode access
switchport access vlan 101
spanning-tree portfast
no shutdown
exit
interface e2/0
switchport mode access
switchport access vlan 100
spanning-tree portfast
no shutdown
exit
end
```

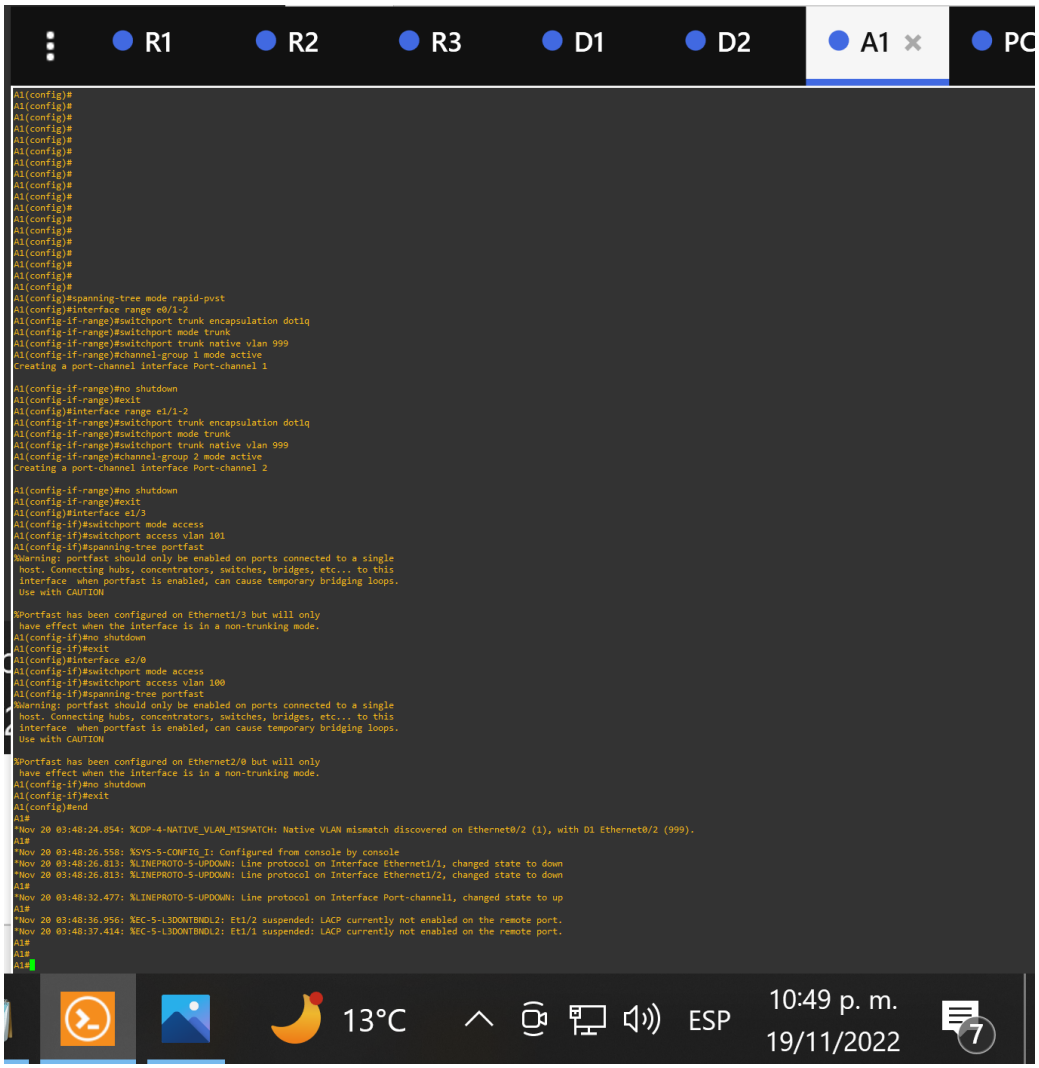


Figura 14. Configuración Switch A1 Tarea 2.1 – 2.6

Figura 15. Verificación Configuración Switch D2 Tarea 2.1 – 2.6

TASK 2.8 Verifique la conectividad LAN local.

PC 1:

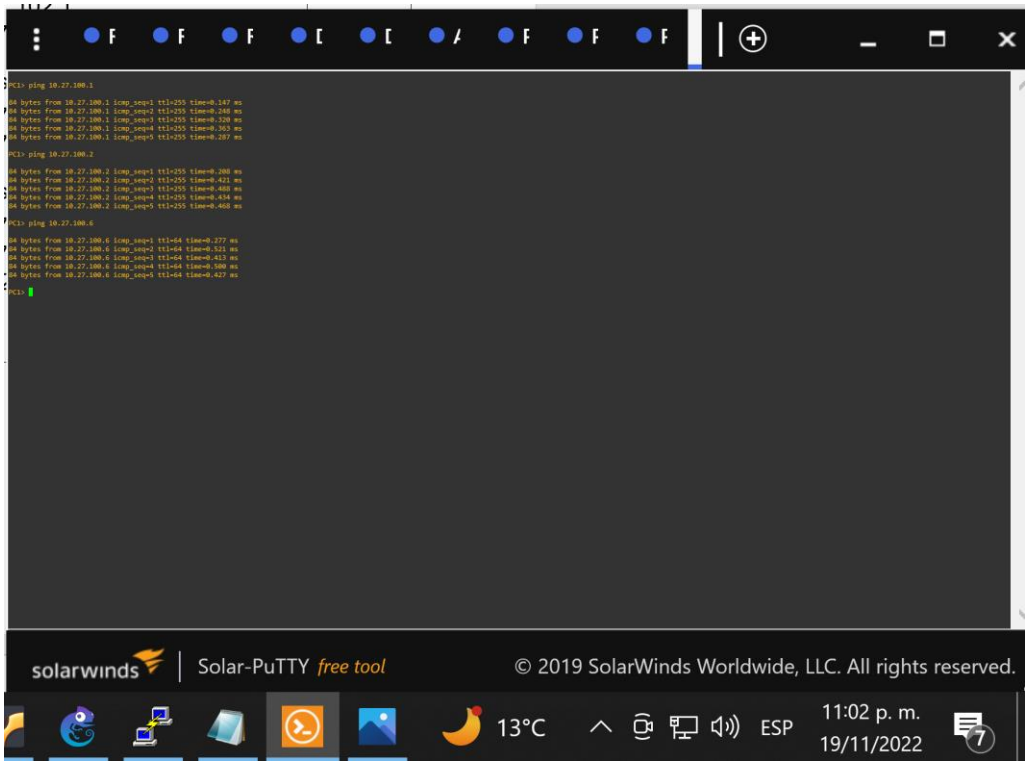


Figura 16. Verificación conectividad LAN local PC1

PC 2:

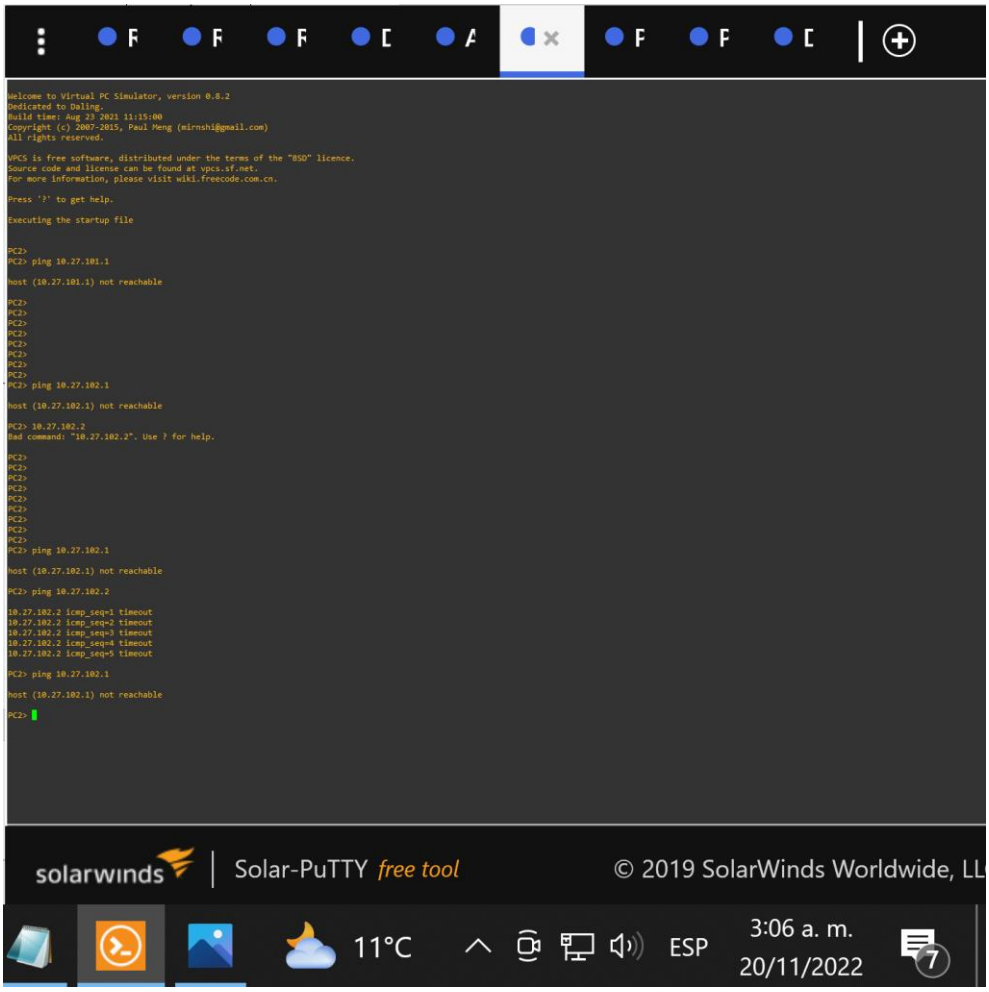


Figura 17. Verificación conectividad LAN local PC2

PC 3:

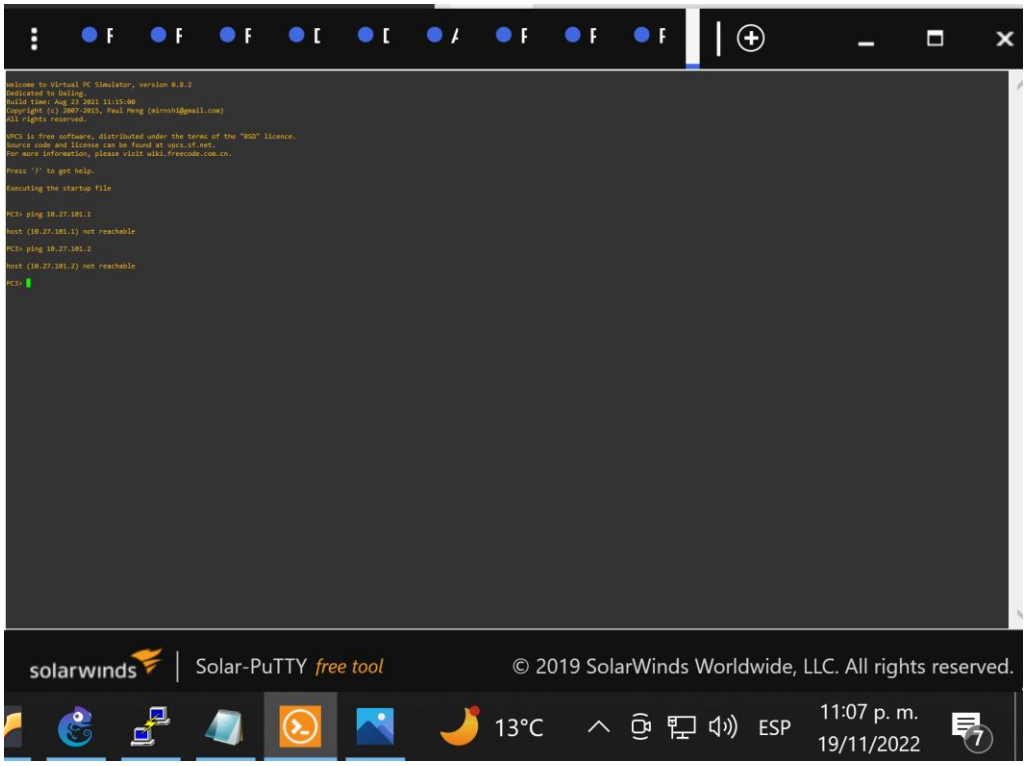


Figura 18. Verificación conectividad LAN local PC3

PC 4:

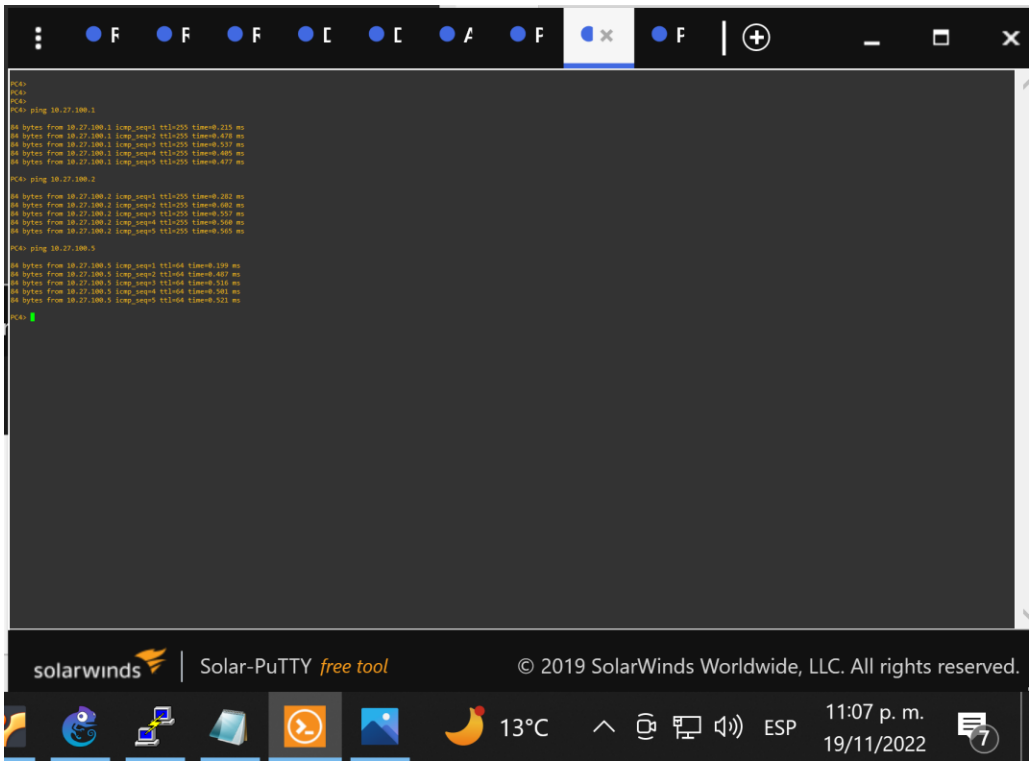


Figura 19. Verificación conectividad LAN local PC4

Escenario 2 Prueba de Habilidades Diplomado CCNP

ENCOR Skills Assessment (Scenario 1)

Continuation of the Scenario 1
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:

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
3.2	On the “Company Network” (i.e., R1, R3, D1, and D2), configure classic single-area OSPFv3 in area 0.	Use OSPF Process ID **6** and assign the following router-IDs: • R1: 0.0.6.1 • R3: 0.0.6.3 • D1: 0.0.6.131 • D2: 0.0.6.132 On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0. • On R1, do not advertise the R1 – R2 network. • On R1, propagate a default route. Note that the default route will be provided by BGP. Disable OSPFv3 advertisements on: • D1: All interfaces except E1/2 • D2: All interfaces except E1/0	8

Task#	Task	Specification	Points
3.3	On R2 in the “ISP Network”, configure MP-BGP.	Configure two default static routes via interface Loopback 0: • An IPv4 default static route. • An IPv6 default static route. Configure R2 in BGP ASN **500** and use the router-id 2.2.2.2. Configure and enable an IPv4 and IPv6 neighbor relationship with R1 in ASN 300. In IPv4 address family, advertise: • The Loopback 0 IPv4 network (/32). • The default route (0.0.0.0/0). In IPv6 address family, advertise: • The Loopback 0 IPv4 network (/128). • The default route (::/0).	4
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 10.27.0.0/8. • 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 10.27.0.0/8 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 – 3.4 Configurar protocolos de enrutamiento.

Router 1 (R1):

```
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
exit
ipv6 router ospf 6
router-id 0.0.6.1
default-information originate
exit
interface e1/2
ipv6 ospf 6 area 0
exit
interface e1/1
ipv6 ospf 6 area 0
exit
ip route 10.27.0.0 255.0.0.0 null0
ipv6 route 2001:db8:100::/48 null0
router bgp 300
bgp router-id 1.1.1.1
neighbor 209.165.200.226 remote-as 500
neighbor 2001:db8:200::2 remote-as 500
address-family ipv4 unicast
neighbor 209.165.200.226 activate
no neighbor 2001:db8:200::2 activate
network 10.27.0.0 mask 255.0.0.0
exit-address-family
address-family ipv6 unicast
no neighbor 209.165.200.226 activate
neighbor 2001:db8:200::2 activate
network 2001:db8:100::/48
```

exit-address-family

Figura 20. Configuración protocolos de enrutamiento R1 Task 3.1 – 3.4

Router 2 (R2):

ip route 0.0.0.0 0.0.0.0 loopback 0

ipv6 route ::/0 loopback 0

router bgp 500

bgp router-id 2.2.2.2

neighbor 209.165.200.225 remote-as 300

neighbor 2001:db8:200::1 remote-as 300

address-family ipv4

neighbor 209.165.200.225 activate

no neighbor 2001:db8:200::1 activate

network 2.2.2.2 mask 255.255.255.255

network 0.0.0.0

exit-address-family

address-family ipv6

no neighbor 209.165.200.225 activate

neighbor 2001:db8:200::1 activate

network 2001:db8:2222::/128

network ::/0

exit-address-family

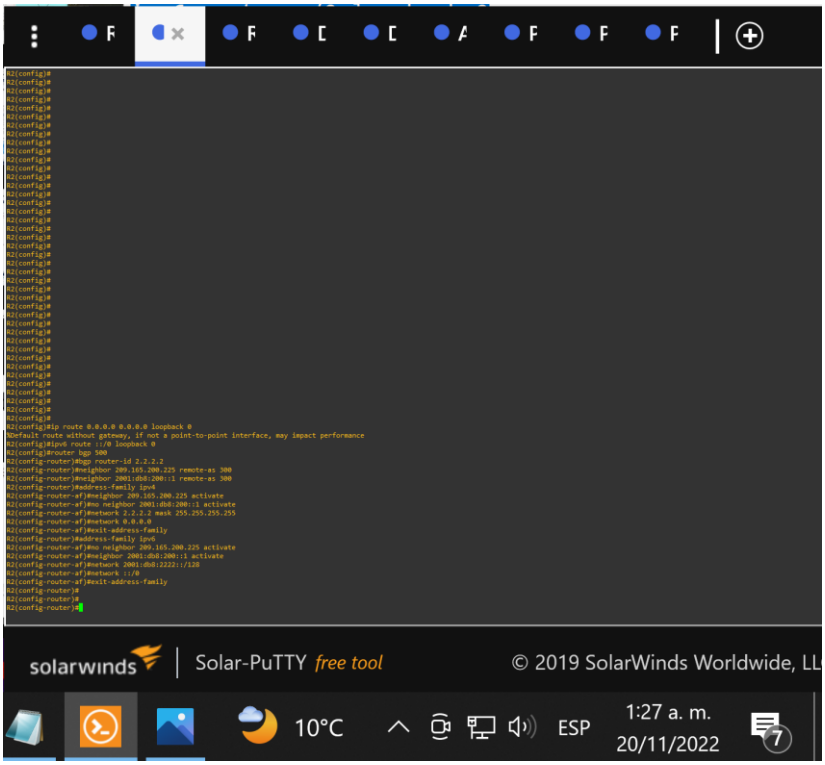


Figura 21. Configuración protocolos de enrutamiento R2 Task 3.1 – 3.4

Router 3 (R3):

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

exit

ipv6 router ospf 6

router-id 0.0.6.3

exit

interface e1/1

ipv6 ospf 6 area 0

exit

interface e1/0

ipv6 ospf 6 area 0

exit

end

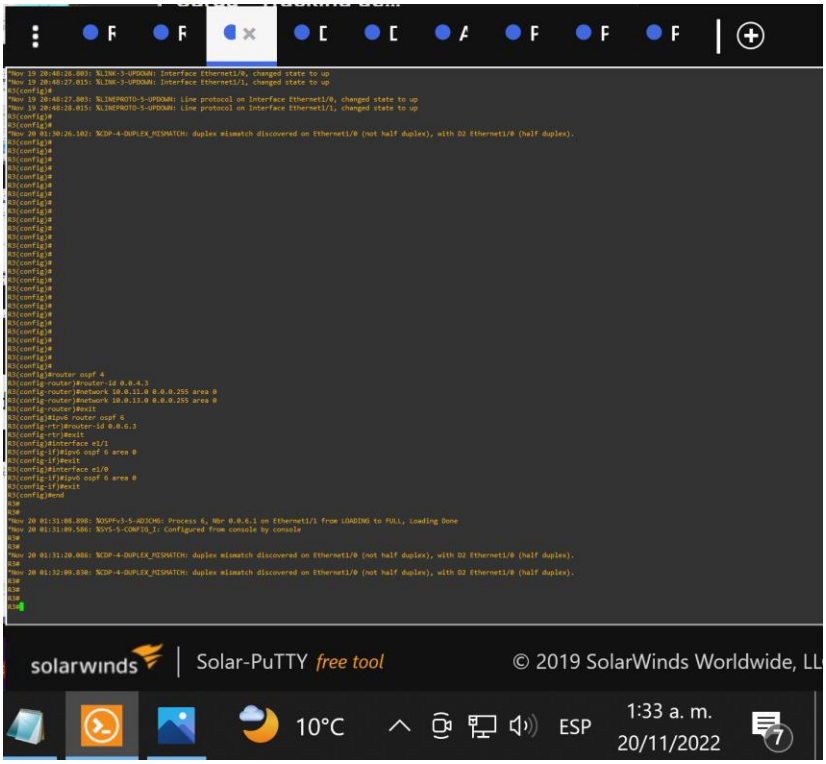


Figura 22. Configuración protocolos de enrutamiento R3 Task 3.1 – 3.4

Switch D1:

router ospf 4

router-id 0.0.4.131

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

```
network 10.0.10.0 0.0.0.255 area 0
passive-interface default
no passive-interface e1/2
exit
ipv6 router ospf 6
router-id 0.0.6.131
passive-interface default
no passive-interface e1/2
exit
interface e1/2
ipv6 ospf 6 area 0
exit
interface vlan 100
ipv6 ospf 6 area 0
exit
interface vlan 101
ipv6 ospf 6 area 0
exit
interface vlan 102
ipv6 ospf 6 area 0
exit
end
```

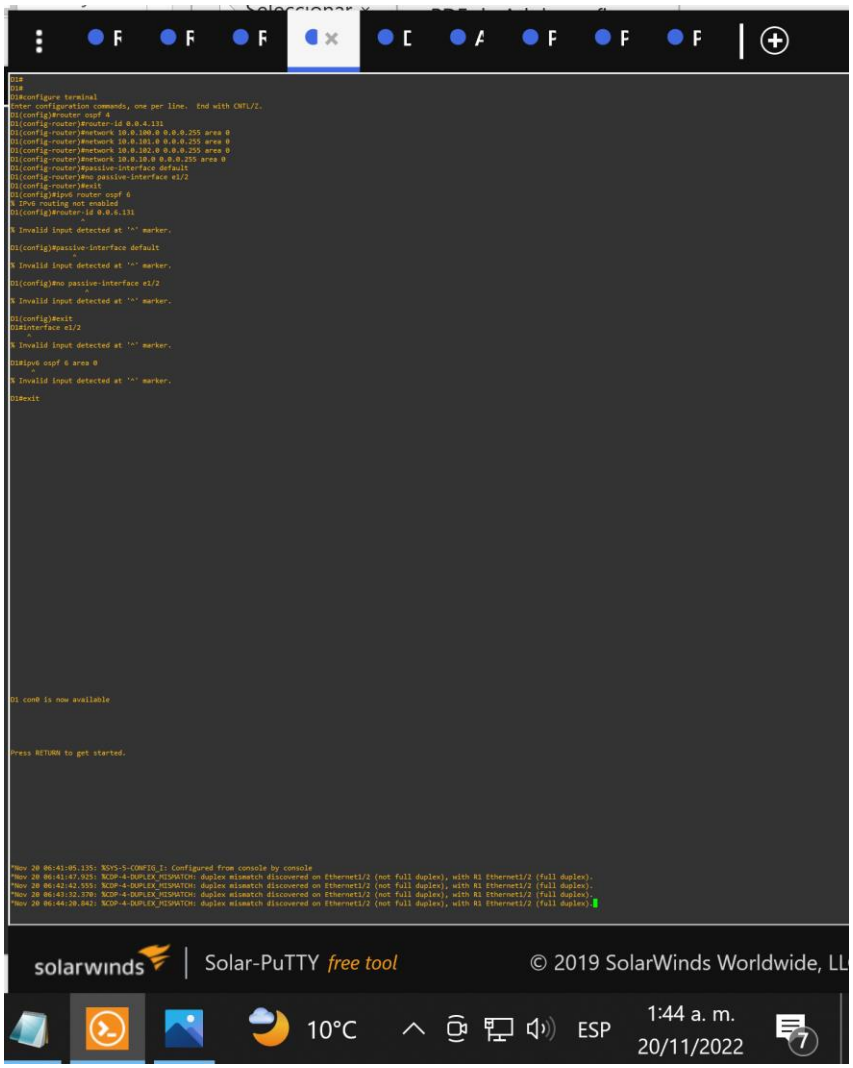


Figura 23. Configuración protocolos de enrutamiento Switch D1 Task 3.1 – 3.4

Switch D2:

router ospf 4

router-id 0.0.4.132

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

network 10.0.11.0 0.0.0.255 area 0

passive-interface default

no passive-interface e1/0

```
exit
ipv6 router ospf 6
router-id 0.0.6.132
passive-interface default
no passive-interface e1/0
exit
interface e1/0
ipv6 ospf 6 area 0
exit
interface vlan 100
ipv6 ospf 6 area 0
exit
interface vlan 101
ipv6 ospf 6 area 0
exit
interface vlan 102
ipv6 ospf 6 area 0
exit
end
```

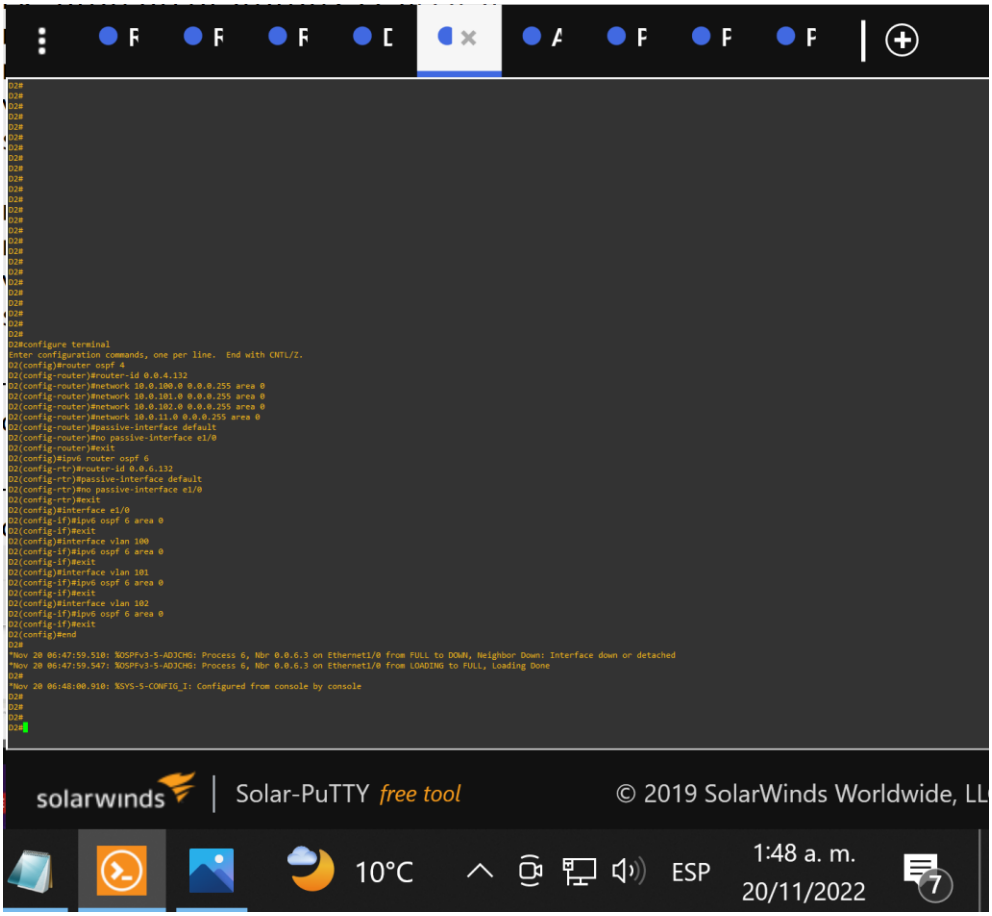


Figura 24. Configuración protocolos de enrutamiento Switch D2 Task 3.1 – 3.4

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:

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
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 **10.27.100.254**. • 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 **10.27.101.254**. • Enable preemption. • Track object 4 to decrement by 60. Configure IPv4 HSRP group **124** for VLAN 102: • Assign the virtual IP address **10.27.102.254**. • 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
	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 **10.27.100.254**. • Enable preemption. • Track object 4 and decrement by 60. Configure IPv4 HSRP group **114** for VLAN 101: • Assign the virtual IP address **10.27.101.254**. • 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 **10.27.102.254**. • 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 – 4.4 Configurar la redundancia del primer salto

Switch D1:

```
ip sla 4
icmp-echo 10.0.10.1
frequency 5
```

```
exit
ip sla 6
icmp-echo 2001:db8:100:1010::1
frequency 5
exit
ip sla schedule 4 life forever start-time now
ip sla schedule 6 life forever start-time now
track 4 ip sla 4
delay down 10 up 15
exit
track 6 ip sla 6
delay down 10 up 15
exit
interface vlan 100
standby version 2
standby 104 ip 10.27.100.254
standby 104 priority 150
standby 104 preempt
standby 104 track 4 decrement 60
standby 106 ipv6 autoconfig
standby 106 priority 150
standby 106 preempt
standby 106 track 6 decrement 60
exit
interface vlan 101
standby version 2
standby 114 ip 10.27.101.254
standby 114 preempt
standby 114 track 4 decrement 60
standby 116 ipv6 autoconfig
standby 116 preempt
standby 116 track 6 decrement 60
exit
interface vlan 102
standby version 2
```

```
standby 124 ip 10.27.102.254
standby 124 priority 150
standby 124 preempt
standby 124 track 4 decrement 60
standby 126 ipv6 autoconfig
standby 126 priority 150
standby 126 preempt
standby 126 track 6 decrement 60
exit
end
```

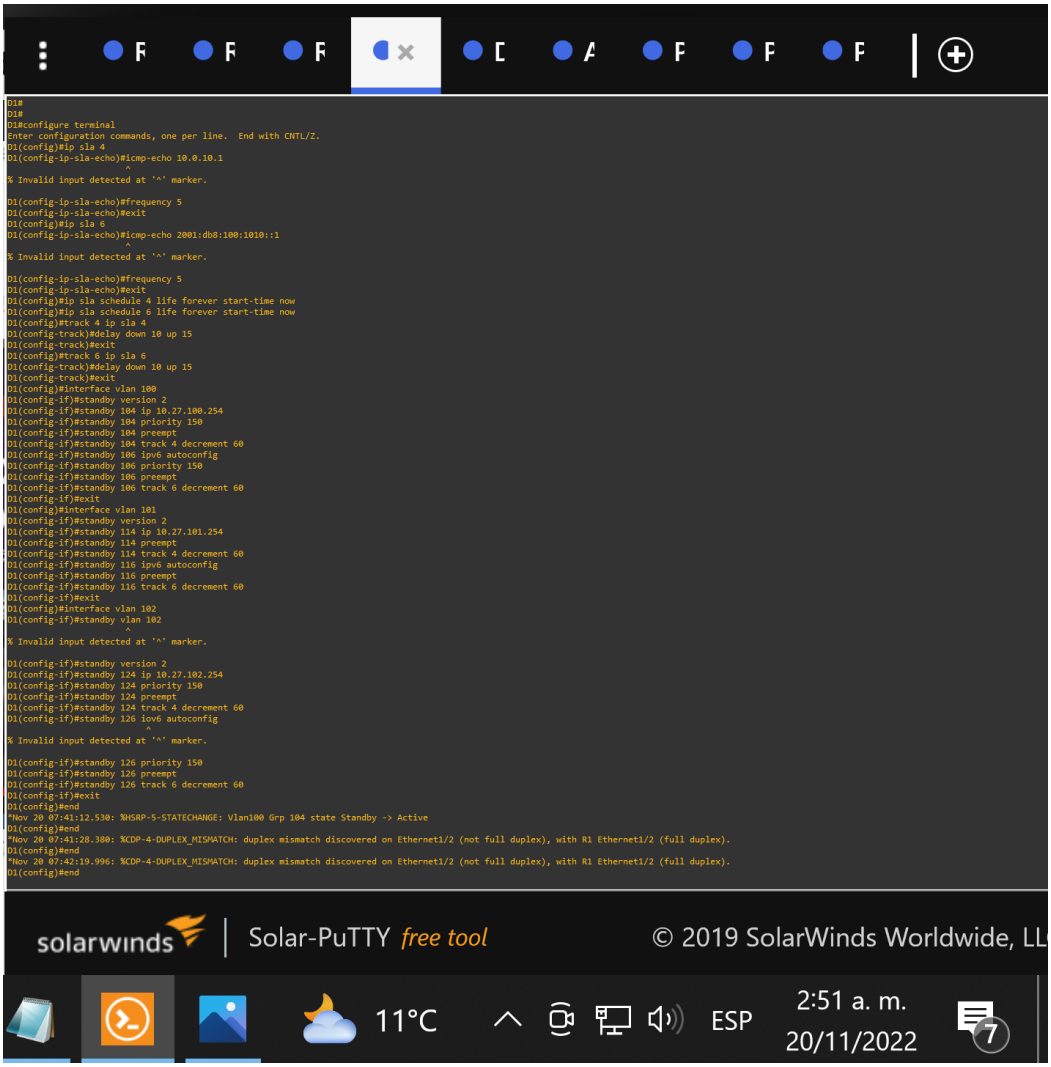


Figura 25. Configurar la redundancia del primer salto Switch D1 Task 4.1 – 4.4

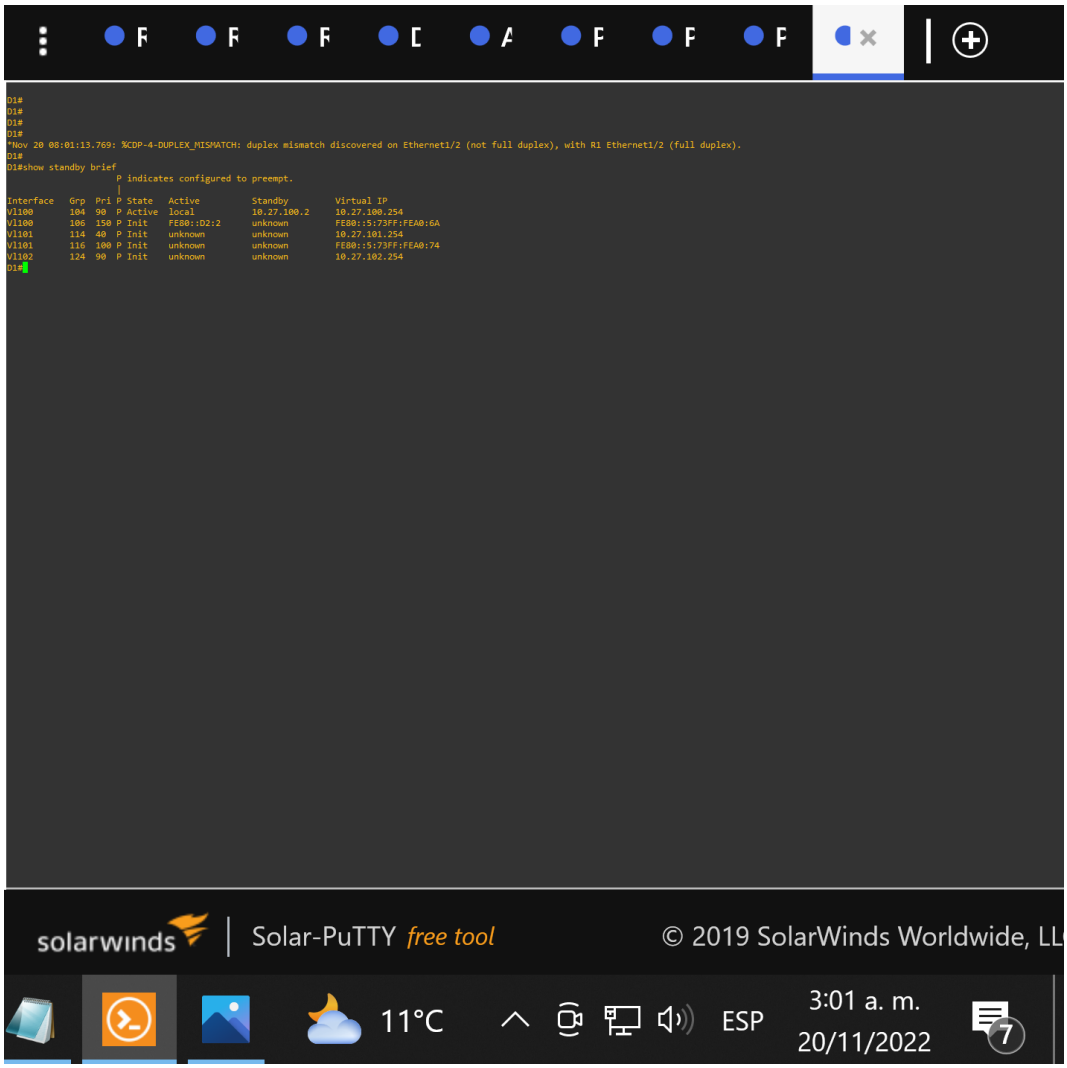


Figura 26. Verificación configurar la redundancia del primer salto Switch D1 Task 4.1 – 4.4

Switch D2:

ip sla 4

icmp-echo 10.0.11.1

frequency

exit

ip sla 6

icmp-echo 2001:db8:100:1011::1

frequency

exit

ip sla schedule 4 life foreve start-time now

```
ip sla schedule 6 life foreve start-time now
track 4 ip sla 4
delay down 10 up 15
exit
track 6 ip sla 6
delay down 10 up 15
exit
interface vlan 100
standby vesion 2
standby 104 ip 10.0.100.254
standby 104 preempt
standby 104 track 4 decrement 60
standby 106 ipv6 autoconfig
standby 106 priority 150
standby 106 preempt
standby 106 track 6 decrement 60
exit
interface vlan 101
standby version 2
standby 114 ip 10.0.101.254
standby 114 preempt
standby 114 track 4 decrement 60
standby 116 ipv6 autoconfig
standby 116 preempt
standby 116 track 6 decrement 60
exit
interface vlan 102
standby version 2
standby 124 ip 10.0.102.254
standby 124 priority 150
standby 124 preempt
standby 124 track 4 decrement 60
standby 126 ipv6 autoconfig
standby 126 priority 150
standby 126 preempt
```

standby 126 track 6 decrement 60

exit

end

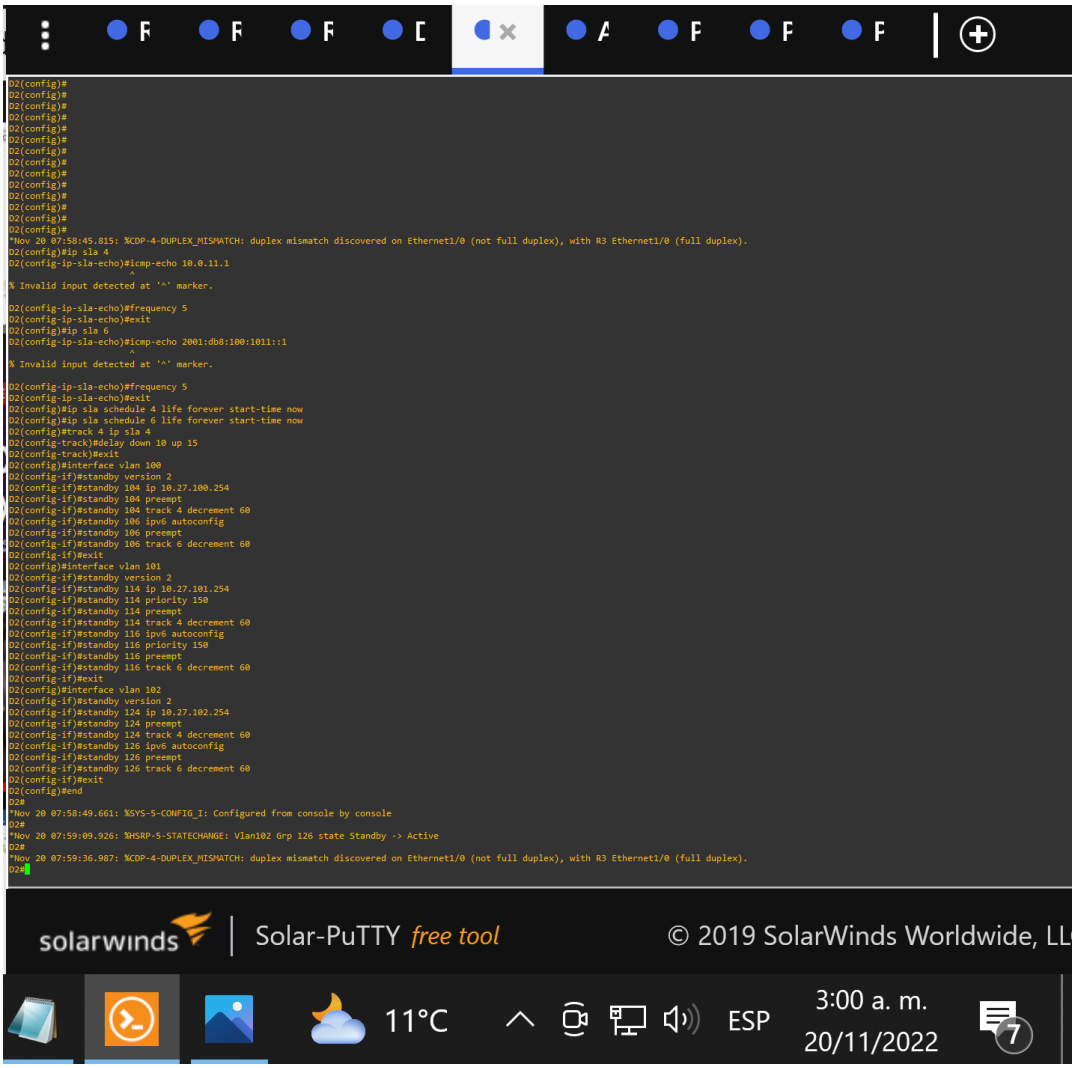


Figura 27. Configurar la redundancia del primer salto Switch D2 Task 4.1 – 4.4

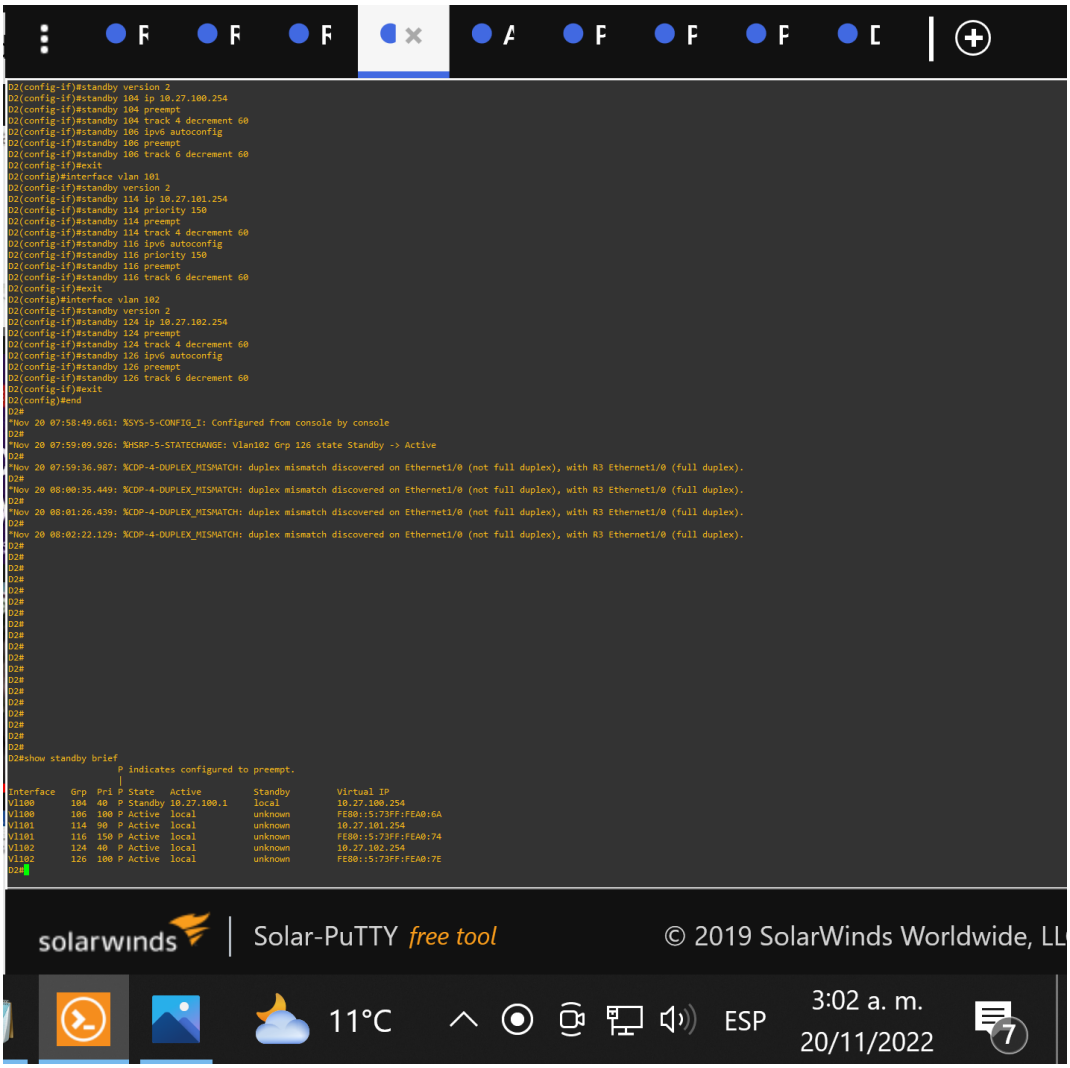


Figura 28. Verificación configurar la redundancia del primer salto Switch D2 Task 4.1 - 4.4

CONCLUSIONES

Por medio del desarrollo de la evaluación de habilidades ENCOR – Escenario 1 y Escenario 2 se comprendío como se implementa y configura una red de capa 2 implementando direccionamiento de la interfaz y proporcionando compatibilidad con los host, para esto utilizando protocolos de configuración de enrutamiento y configurando la redundancia del primer salto la cual es la capacidad que tiene una red para recuperarse dinámicamente de la falla de un dispositivo que funciona como Gateway predeterminado.

Se reforzó diversos conocimientos adquiridos a través de la realización de las guías y laboratorios desarrollados durante el transcurso del curso Diplomado de profundización cisco CCNP y la solución de las lecciones evacuativas en el entornode cisco (Netacad).

Con el desarrollo adecuada de la evaluación de habilidades ENCOR escenario 1, se pudo completar la configuración de la red para que hubiera accesibilidad completa de extremo a extremo, y para que los hosts tuvieran soporte de puerta de enlace predeterminada confiable y para que los protocolos de administración fueran operativos dentro de la parte de "Red de la empresa" de la topología. Se verifico que sus configuraciones cumplieron con las especificaciones proporcionadas y que los dispositivos funcionaran según lo requerido.

Con el desarrollo adecuado de la evaluación de habilidades ENCOR escenario 2, se pudo completar la configuración de protocolos de enrutamiento y se configuro los protocolos de enrutamiento IPv4 e IPv6. Al final de esta parte se verifico que la red estuviera completamente convergente. Los pings de IPv4 e IPv6 a la interfaz Loopback 0 desde D1 y D2 fueron exitosos.

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