DIPLOMADO DE PROFUNDIZACIÓN CISCO CCNP
PRUEBA DE HABILIDADES PRÁCTICA ESENARIOS SIMULADOS

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA UNAD
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Diplomado de opción de grado presentado para optar el título de INGENIERO ELECTRÓNICO

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23 de Noviembre del 2022

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Mi agradecimiento en primera instancia es a Dios por brindarme sabiduría y salud para desarrollar todas mis actividades; en segunda instancia a mi familia motor de todos mis proyecto. Por ultimo; al alma mater la Universidad Nacional Abierta y a Distancia UNAD por mi formación con ayuda de los docentes y compañeros quienes han enriquecido mis conocimientos.

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GLOSARIO

VLANs: (redes de área local virtuales) pueden considerarse como dominios de difusión lógica. Una VLAN divide los grupos de usuarios de la red de una red física real en segmentos de redes lógicas.

CISCO PACKET TRACER: Es un poderoso programa de simulación de red que permite a los estudiantes experimentar con el comportamiento de la red. Como parte integral de la experiencia de aprendizaje integral de Networking Academy, Packet Tracer proporciona capacidades de simulación, visualización, autoría, evaluación y colaboración, y facilita la enseñanza y el aprendizaje de conceptos tecnológicos complejos.

SWITCH: Es un dispositivo de interconexión utilizado para conectar equipos en red formando lo que se conoce como una red de área local (LAN) y cuyas especificaciones técnicas siguen el estándar conocido como Ethernet (o técnicamente IEEE 802.3).

ROUTER: Un router es un dispositivo que ofrece una conexión Wi-Fi, que normalmente está conectado a un módem y que envía información de Internet a tus dispositivos personales, como ordenadores, teléfonos o tablets. Los dispositivos que están conectados a Internet en tu casa conforman tu red de área local (LAN).

RED: Es un conjunto de dispositivos interconectados entre sí a través de un medio, que intercambian información y comparten recursos

PROTOCOLO: Es un conjunto formal de estándares y normas que rigen tanto el formato como el control de la interacción entre los diferentes dispositivos dentro de una red o sistema de comunicación, permitiendo así que puedan transmitir datos entre ellos.

RESUMEN

En el presente documento escrito se plama una simulacion del paso dos donde se practican los comandos de la configuración de cada uno de los protocolos.

En los presente escenarios se configuran los routers según lo planteado en cada actividad y se verifican estas configuraciones mediante el uso de los comandos show ip route. Donde se estructurar redes conmutadas mediante el uso del protocolo e implementación de servicios IP con calidad de servicio en ambientes de red empresariales LAN y protocolo STP

Palabras clave: Cisco, switch, router, protocolo, VLANs

ABSTRACT

In this written document, a simulation of step two is planned, where the configuration commands of each of the protocols are practiced.

In these scenarios, the routers are configured as proposed in each activity and these configurations are verified by using the show ip route commands. Where switched networks are structured through the use of the protocol and implementation of IP services with quality of service in business network environments LAN and STP protocol

Keywords: Cisco, switch, router, protocol, VLANs

INTRODUCCIÓN

Las telecomunicaciones como herramienta para la competitividad global con visión sociohumanística), donde los estudiantes recibirán la formación necesaria para crear una red empresarial eficaz y escalable; así como a instalar, configurar, supervisar, y solucionar problemas en los equipos pertenecientes a la infraestructura de una red multipropósito y multiplataforma.

El Diplomado Cisco CCNP (Cisco Certified Networking Professional / Profesional en Redes certificado por Cisco) permite desarrollar 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, redes inalámbricas y video.

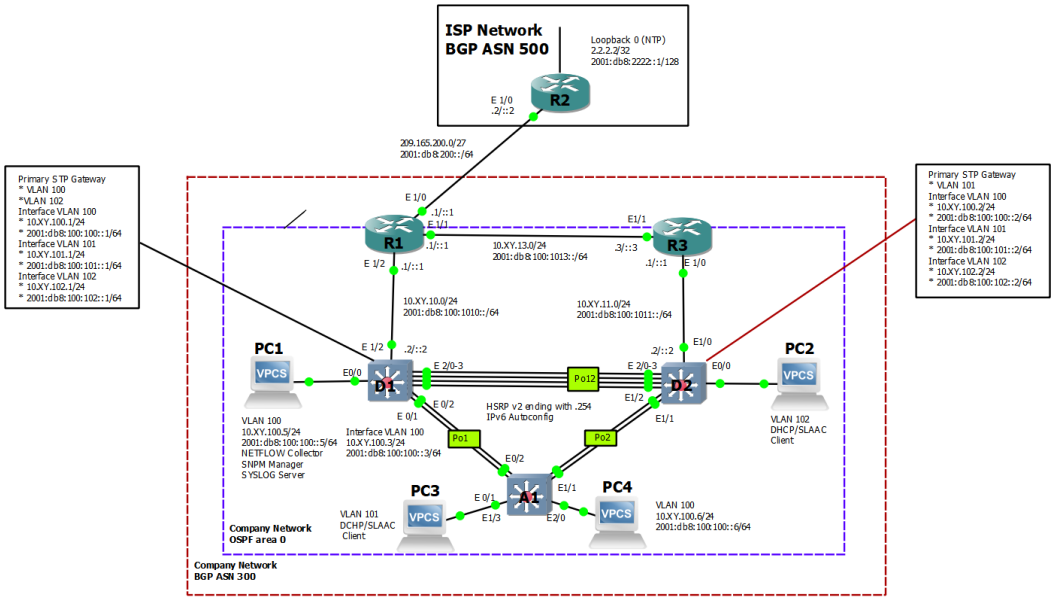
En el Paso 6 se evidenciará la configuración de redes conmutada, para comprender las características de una infraestructura de red jerárquica convergente. De igual forma; se diseñar soluciones de red escalables mediante la configuración básica y avanzada de protocolos de enrutamiento para la implementación de servicios IP con calidad de servicio en ambientes de red empresariales LAN y WAN.

ESCENARIO 1.

Topología de la red propuesta para el escenario 1.

Lab - Implement BGP Communities

Topology



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

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
	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

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.

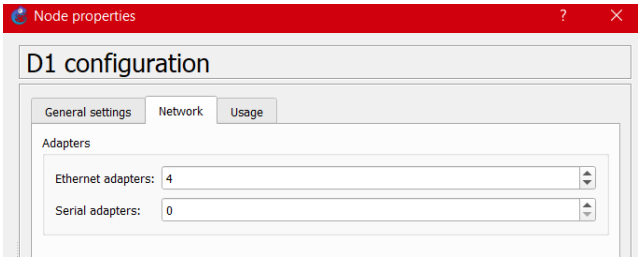
Note: The routers used with CCNP hands-on labs are Cisco 7200 routers. The switches used in the labs are Cisco Catalyst L2 switches Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from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

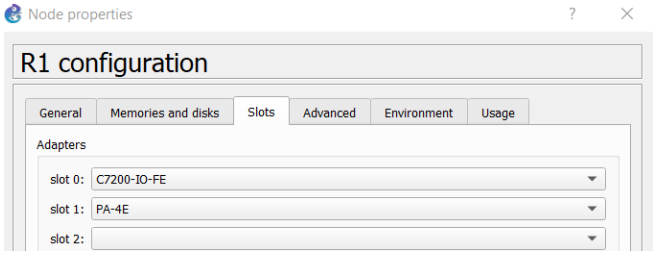
Note: The letters "X, Y" represent the last two digits of your ID number (cédula).

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.XY.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
```

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
```

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.XY.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.XY.13.3 255.255.255.0
 ipv6 address fe80::3:3 link-local
 ipv6 address 2001:db8:100:1010::2/64
 no shutdown
 exit
```

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.XY.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.XY.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.XY.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.XY.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.XY.101.1 10.XY.101.109
ip dhcp excluded-address 10.XY.101.141 10.XY.101.254
ip dhcp excluded-address 10.XY.102.1 10.XY.102.109
ip dhcp excluded-address 10.XY.102.141 10.XY.102.254
ip dhcp pool VLAN-101
```

```
 network 10.XY.101.0 255.255.255.0
 default-router 10.XY.101.254
 exit
ip dhcp pool VLAN-102
 network 10.XY.102.0 255.255.255.0
 default-router 10.XY.102.254
 exit
interface range e0/0-3,e1/0-1,e1/3,e2/0-3,e3/0-3
 shutdown
 exit
```

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.XY.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.XY.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.XY.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.XY.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.XY.101.1 10.XY.101.209
ip dhcp excluded-address 10.XY.101.241 10.XY.101.254
ip dhcp excluded-address 10.XY.102.1 10.XY.102.209
ip dhcp excluded-address 10.XY.102.241 10.XY.102.254
ip dhcp pool VLAN-101
 network 10.XY.101.0 255.255.255.0
 default-router XY.0.101.254
 exit
ip dhcp pool VLAN-102
 network 10.XY.102.0 255.255.255.0
 default-router 10.XY.102.254
 exit
interface range e0/0-3,e1/1-3,e2/0-3,e3/0-3
 shutdown
 exit
```

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.XY.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
```

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

c. Configure PC 1 and PC 4 host addressing as shown in the addressing table. Assign a default gateway address of 10.XY.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.

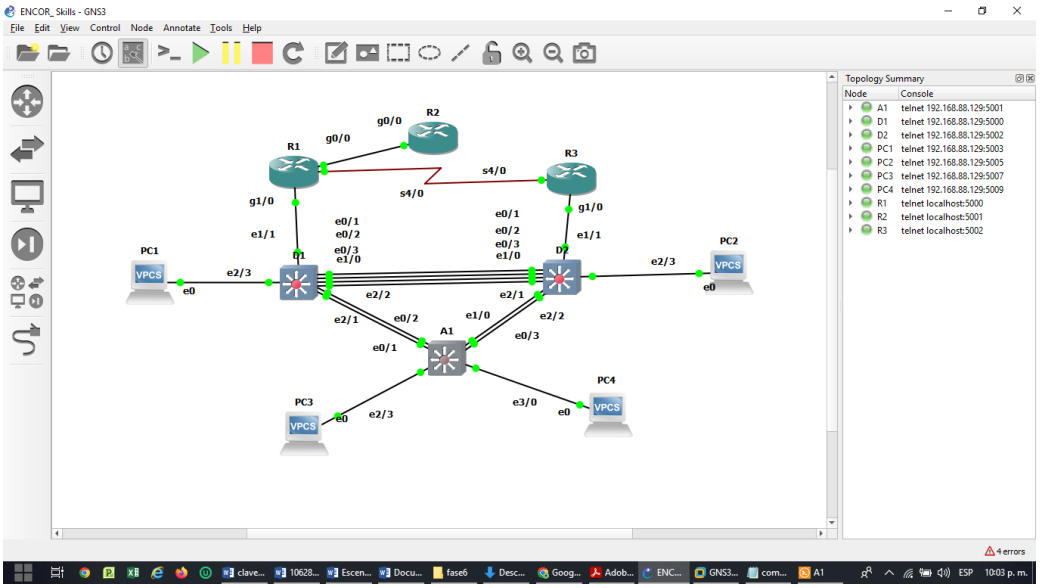
Your configuration tasks are as follows:

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.	Configure D1 and D2 as root for the appropriate VLANs with mutually supporting priorities in case of switch failure.	2

Task#	Task	Specification	Points
	D1 and D2 must provide backup in case of root bridge failure.		
2.5	On all switches, create LACP EtherChannels as shown in the topology diagram.	Use the following channel numbers: • D1 to D2 – Port channel 12 • D1 to A1 – Port channel 1 • D2 to A1 – Port channel 2	3
2.6	On all switches, configure host access ports connecting to PC1, PC2, PC3, and PC4.	Configure access ports with appropriate VLAN settings as shown in the topology diagram. Host ports should transition immediately to forwarding state.	4
2.7	Verify IPv4 DHCP services.	PC2 and PC3 are DHCP clients and should be receiving valid IPv4 addresses.	1
2.8	Verify local LAN connectivity.	PC1 should successfully ping: • 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

ENCOR Skills Assessment (Scenario 1)

Figura 1 Construcción del Escenario 1 en el simulador GNS3.

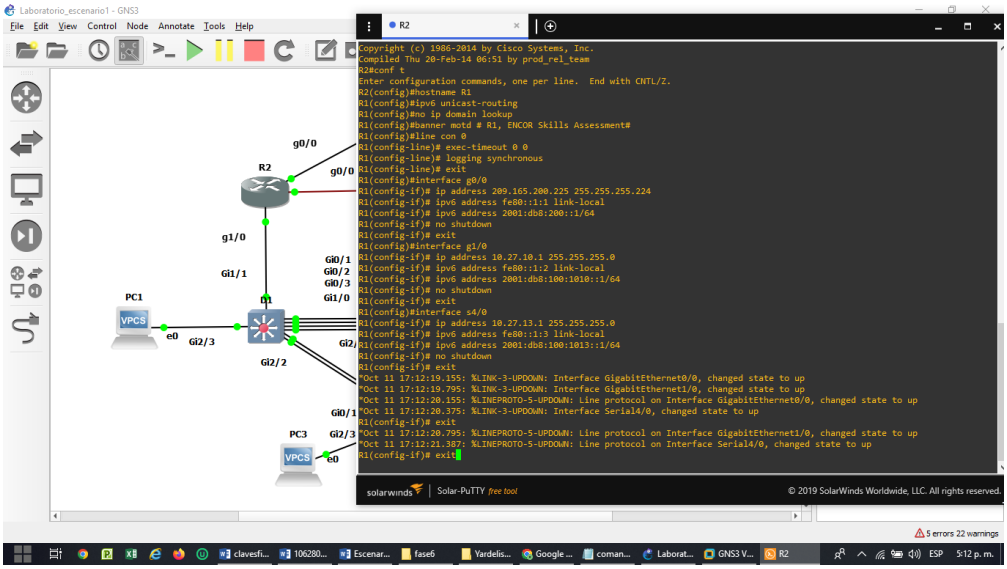


Configuración para router R1 en GNS3

```
conf t
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 g0/0
 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 g1/0
 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 s4/0
```

ip address 10.27.13.1 255.255.255.0
ipv6 address fe80::1:3 link-local
ipv6 address 2001:db8:100:1013::1/64
no shutdown
exit

Figura 2 Configuración para R1 en el simulador GNS3.

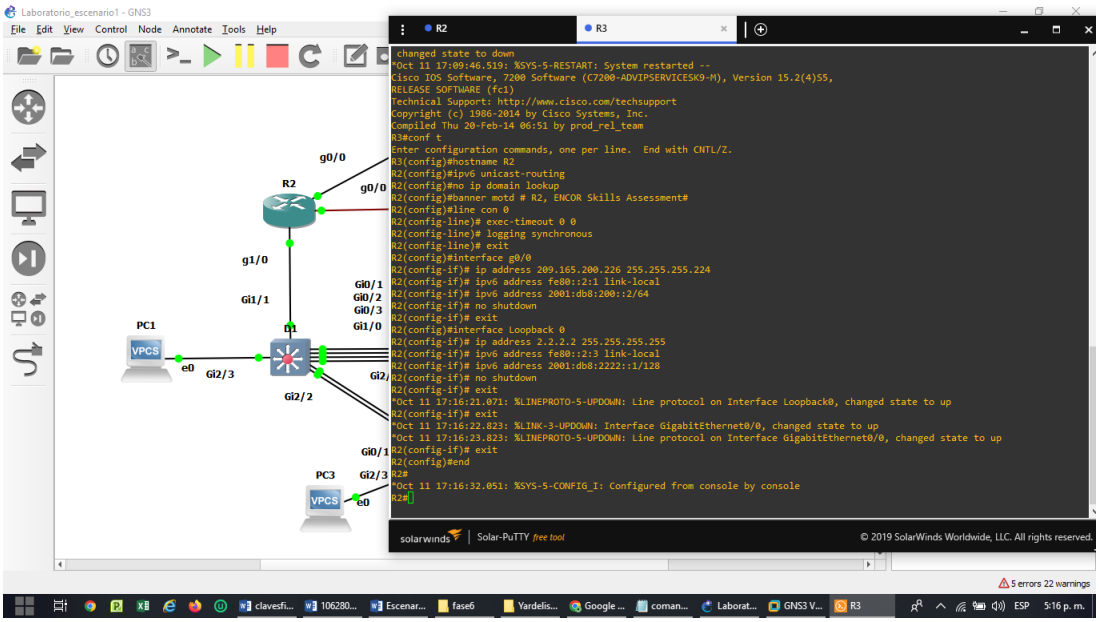


Configuración para router R2 en GNS3

```
conf t
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 g0/0
 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 para R2 en el simulador GNS3.

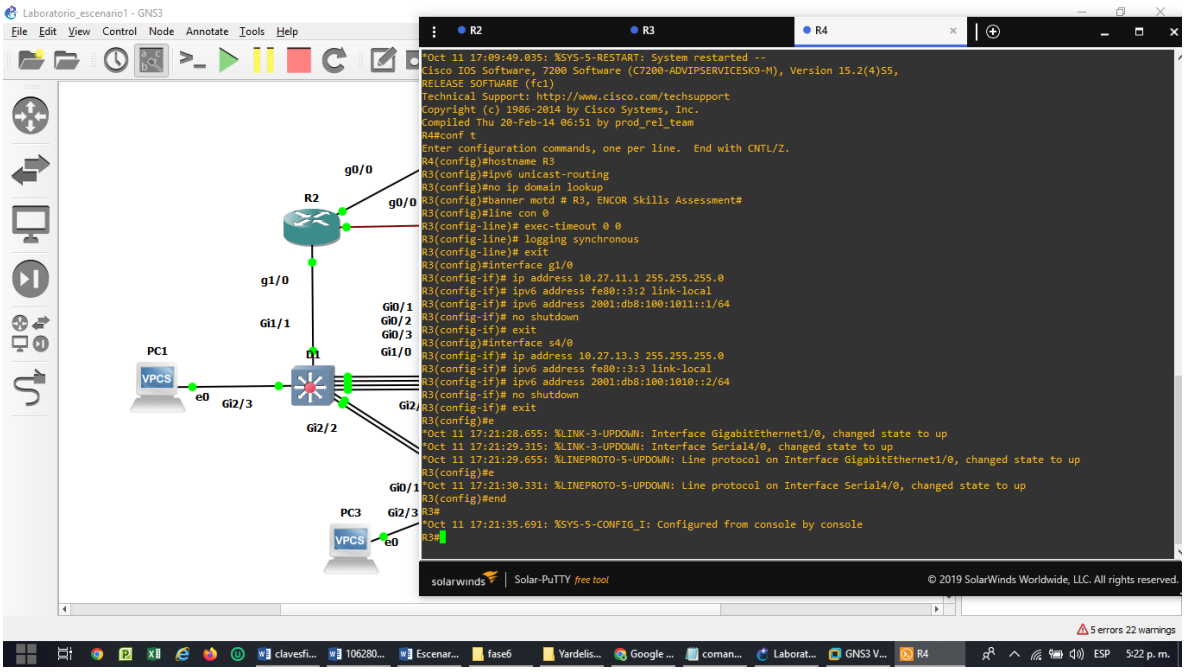


Configuración para router R3 en GNS3

```
conf t
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 g1/0
 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 s4/0
 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 para R3 en el simulador GNS3.



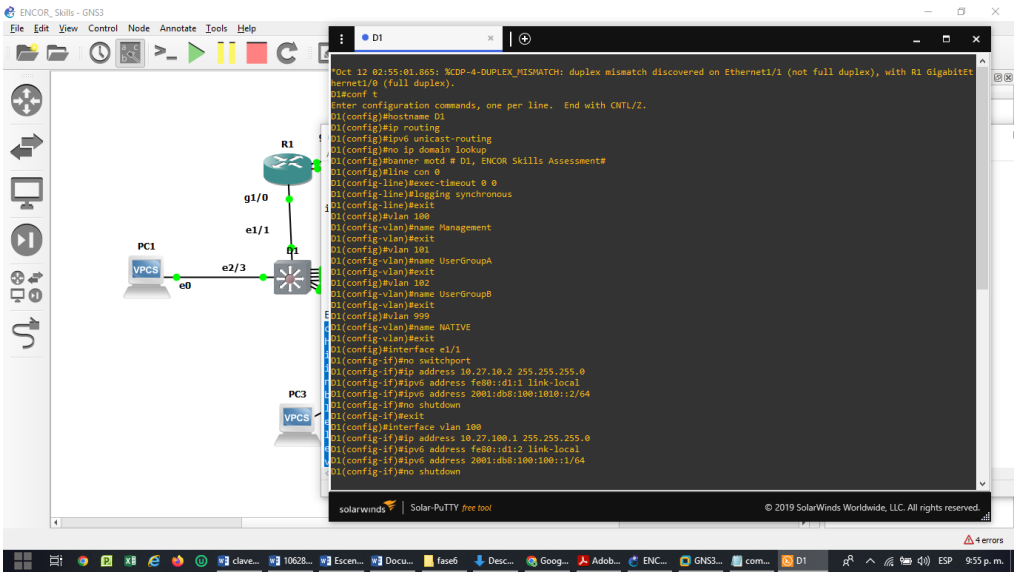
Configuración para router Switch D1 en GNS3

conf t
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 e1/1
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,e1/2-3,e2/0-3,e3/0-3
shutdown
exit

Figura 5 Configuración para D1 en el simulador GNS3.

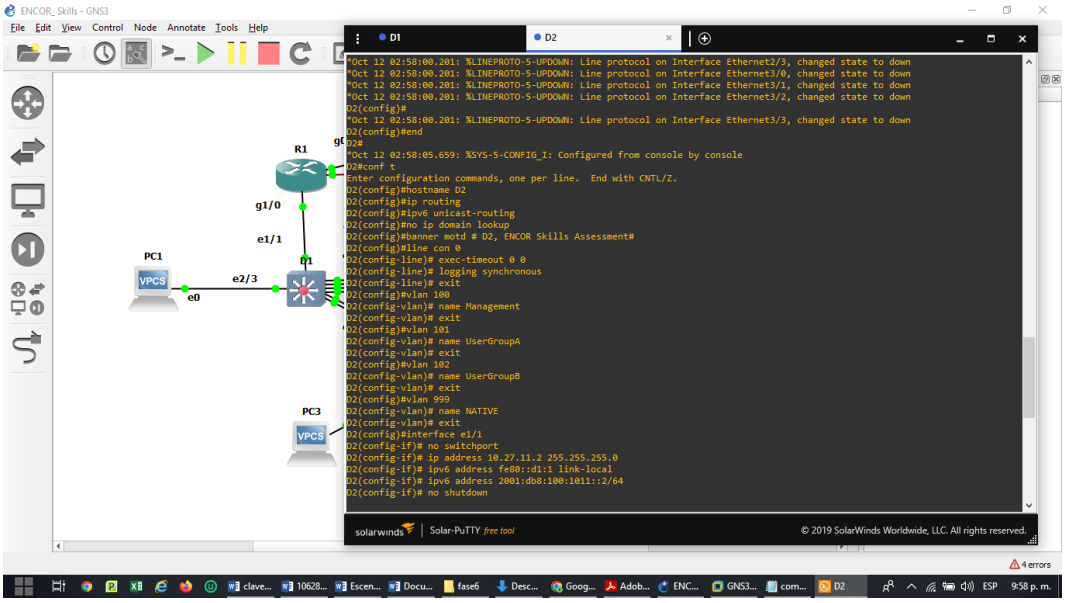


Configuración para router Switch D2 en GNS3

conf t
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 e1/1
 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,e1/0,e1/2-3,e2/0-3,e3/0-3
 shutdown
 exit
```

Figura 6. Configuración para D2 en el simulador GNS3.

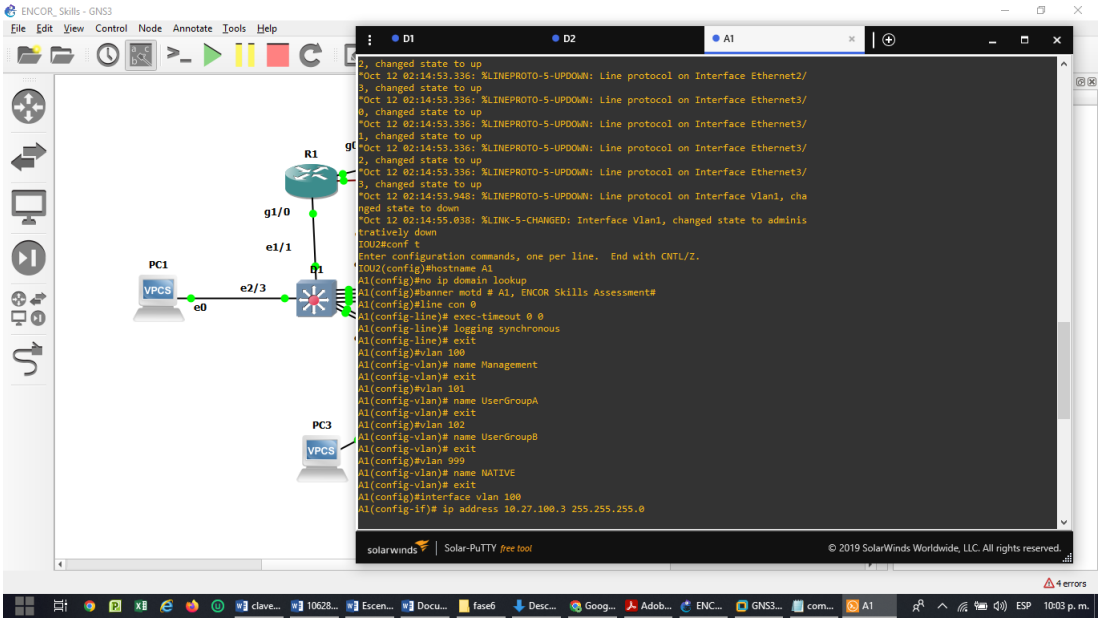


Configuración para router Switch A1 en GNS3

```
conf t
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 e1/1-3,e2/0-3,e3/0-3
 shutdown
 exit
```

Figura 7. Configuración para A1 en el simulador GNS3.



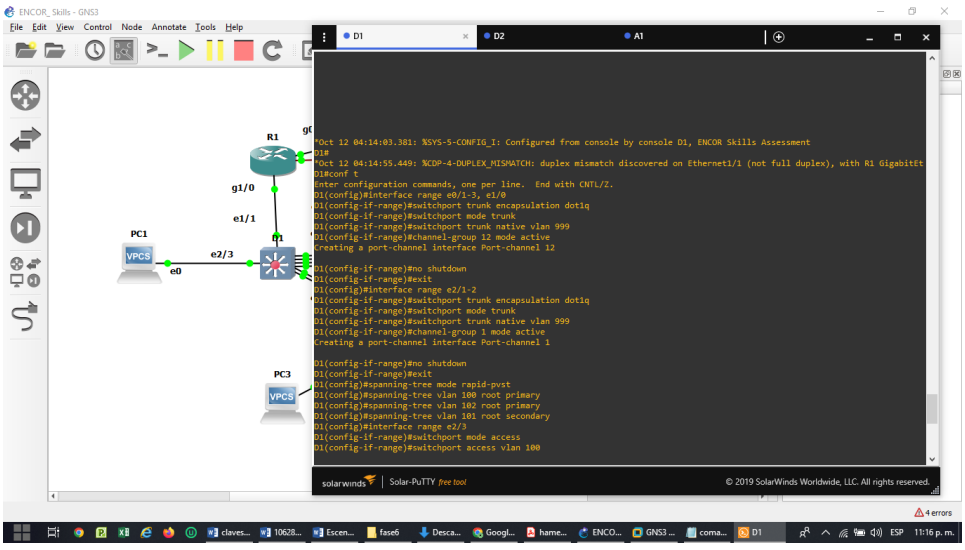
CONFIGURAR LA CAPA 2 DE LA RED Y EL SOPORTE DE HOST

Configuración para router Switch D1 en GNS3

```
conf t
interface range e0/1-3, e1/0
switchport trunk encapsulation dot1q
switchport mode trunk
```

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

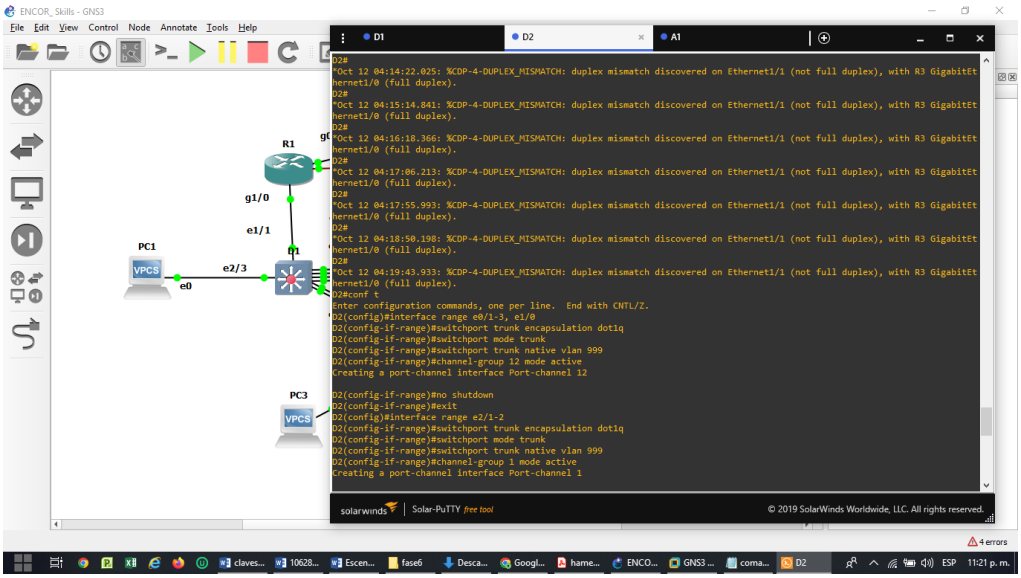
Figura 8. Configuración para D1 capa en el simulador GNS3.



Configuración para router Switch D2 en GNS3

```
conf t
interface range e0/1-3, e1/0
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999
channel-group 12 mode active
no shutdown
exit
interface range e2/1-2
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 102 root primary
spanning-tree vlan 101 root secondary
interface range e2/3
switchport mode access
switchport access vlan 100
spanning-tree portfast
no shutdown
exit
end
```

Figura 9. Configuración para D2 capa en el simulador GNS3

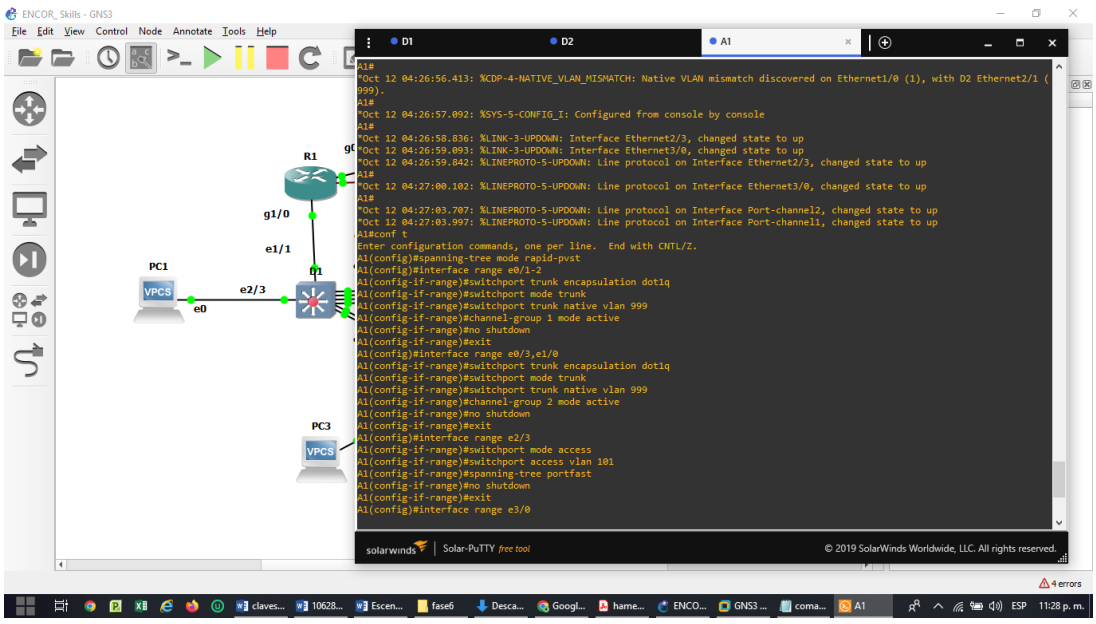


Configuración para router Switch A1 en GNS3

conf t
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 e0/3,e1/0
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999
channel-group 2 mode active
no shutdown
exit
interface range e2/3
switchport mode access
switchport access vlan 101
spanning-tree portfast
no shutdown
exit
interface range e3/0
switchport mode access
switchport access vlan 100
spanning-tree portfast

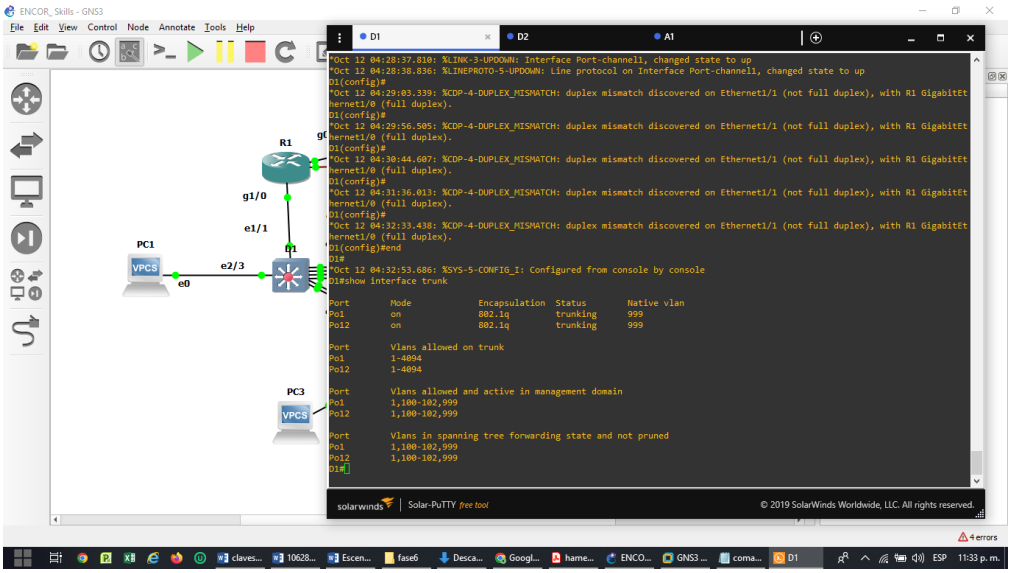
no shutdown
exit
end

Figura 10. Configuración para A1 capa en el simulador GNS3



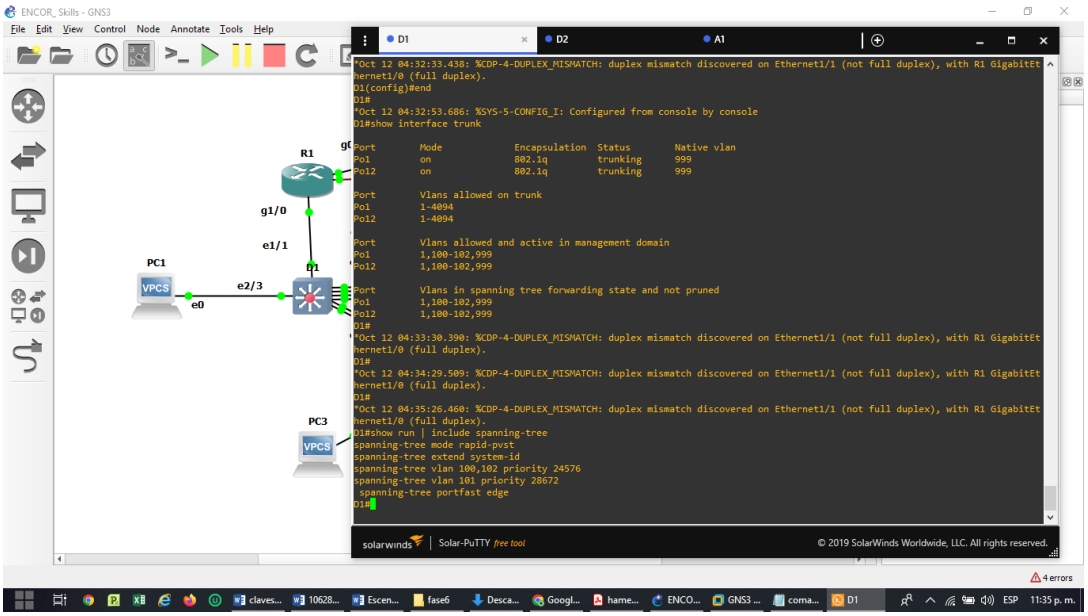
show interface trunk para router Switch D1 en GNS3

Figura 11. show interface trunk para router Switch D1 en el simulador GNS3



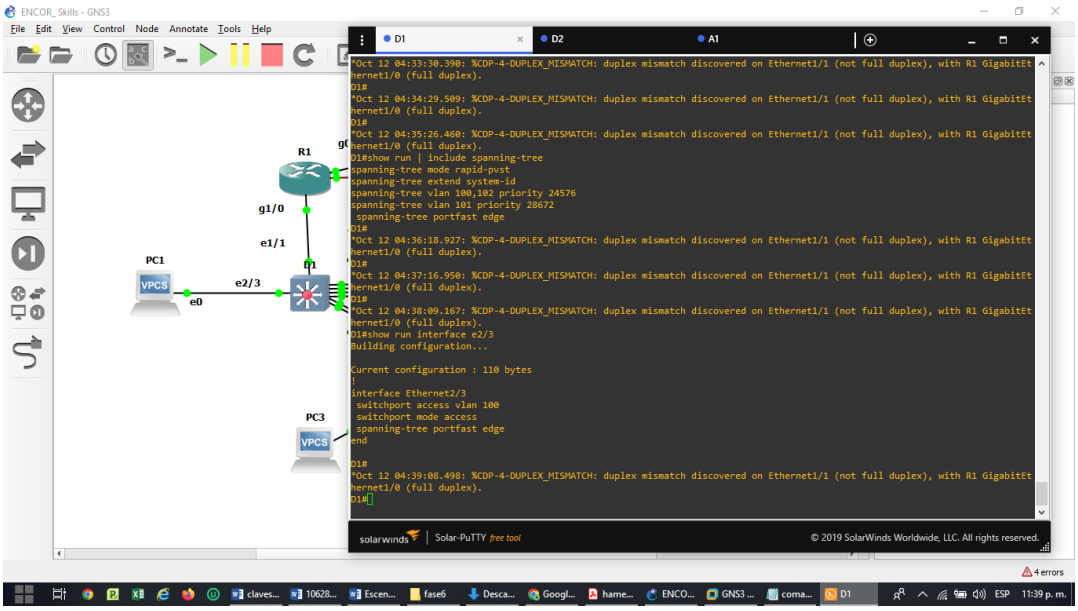
show run | include spanning-tree para router Switch D1 en GNS3

Figura 12. show run | include spanning-tree para router Switch D1 en el simulador GNS3



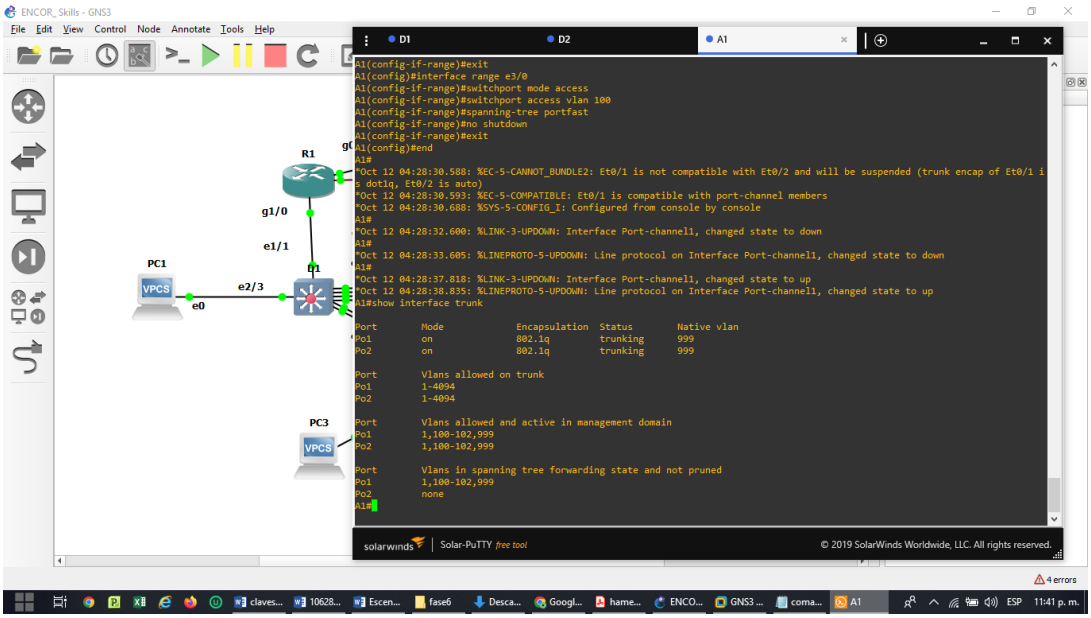
show run interface e2/3 para router Switch D1 en GNS3

Figura 13. show run interface e2/3 para router Switch D1 en el simulador GNS3



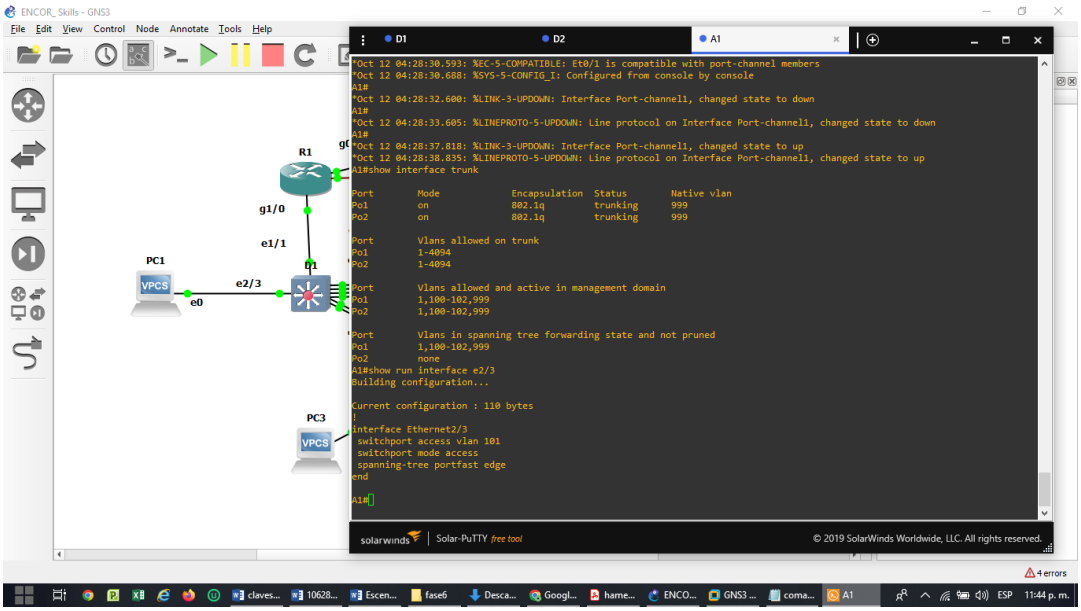
show interface trunk para router Switch A1 en GNS3

Figura 14. show interface trunk para router Switch A1 en el simulador GNS3



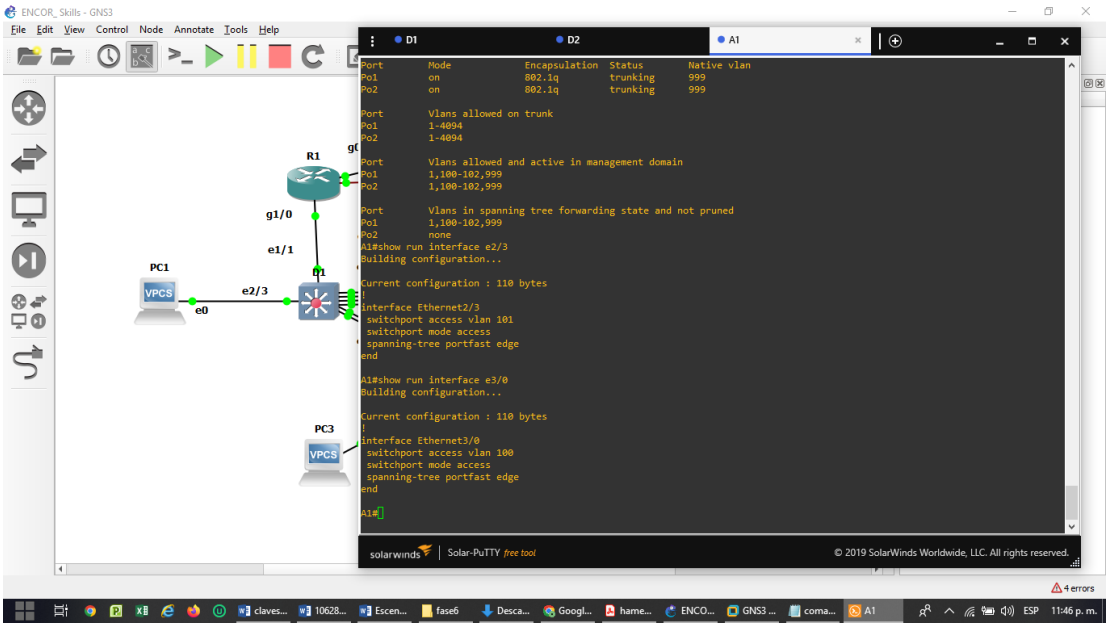
show run interface e2/3 para router Switch A1 en GNS3

Figura 15. show run interface e2/3 para router Switch A1 en el simulador GNS3



show run interface e3/0 para router Switch A1 en GNS3

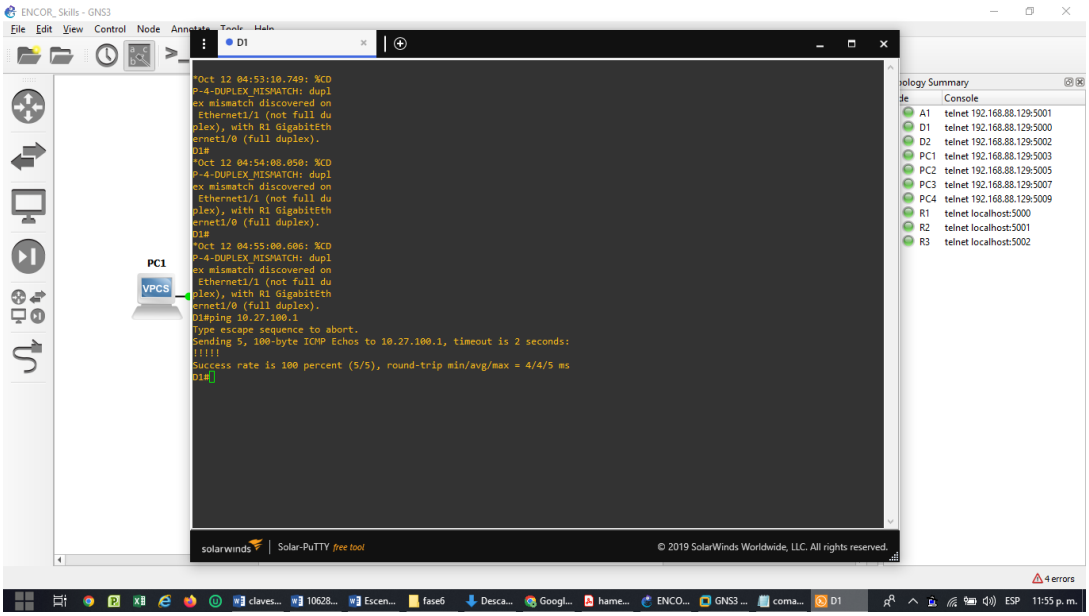
Figura 16. show run interface e3/0 para router Switch A1 en el simulador GNS3



PC1:

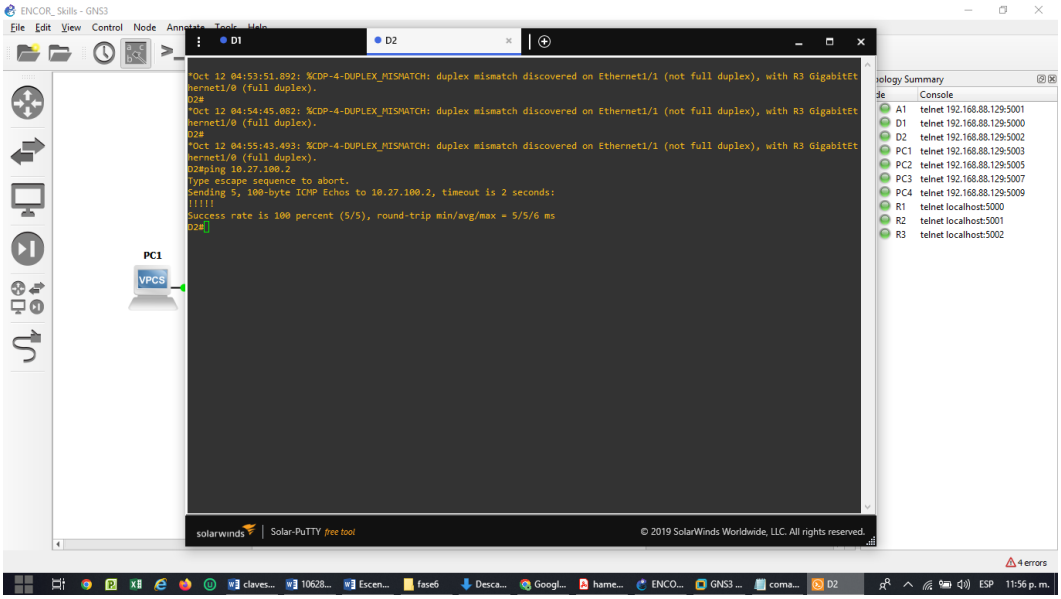
D1: **ping 10.27.100.1**

Figura 17. Ping 10.27.100.1



D2: **ping 10.27.100.2**

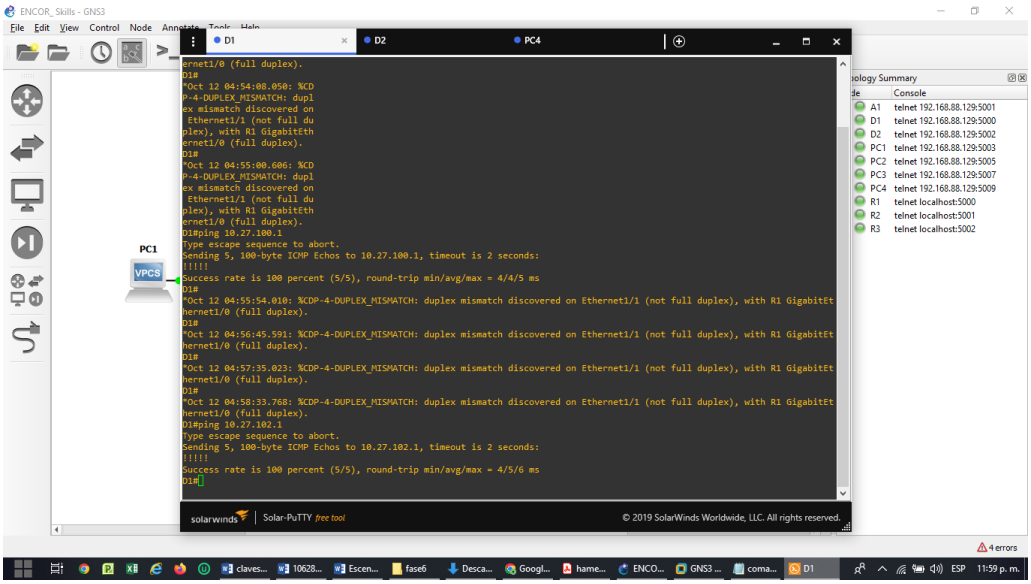
Figura 18. Ping 10.27.100.2



PC2

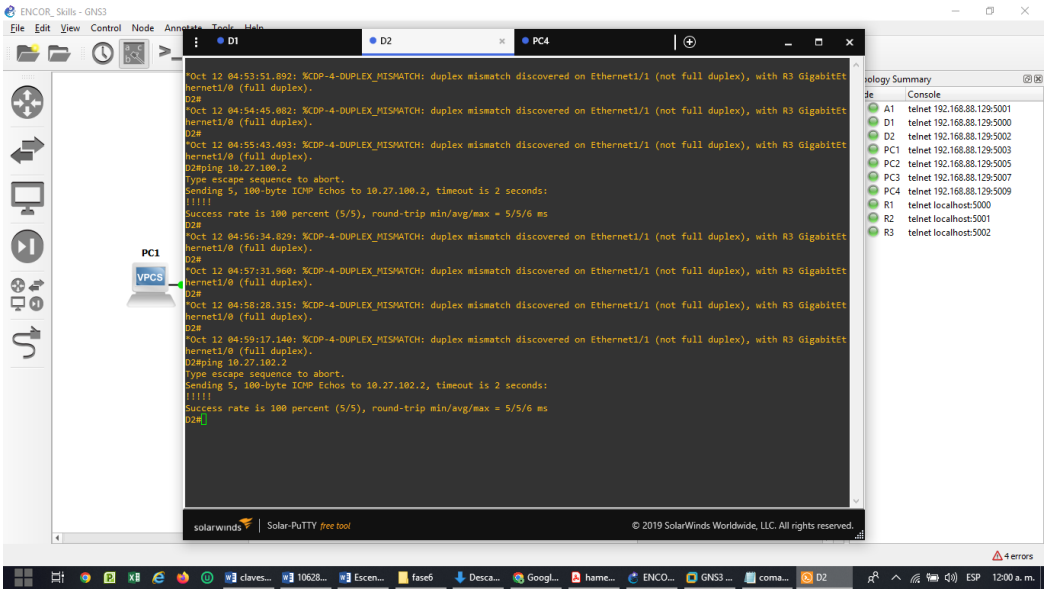
D1: **ping 10.27.102.1**

Figura 19. ping 10.27.102.1



D2: **ping 10.27.102.2**

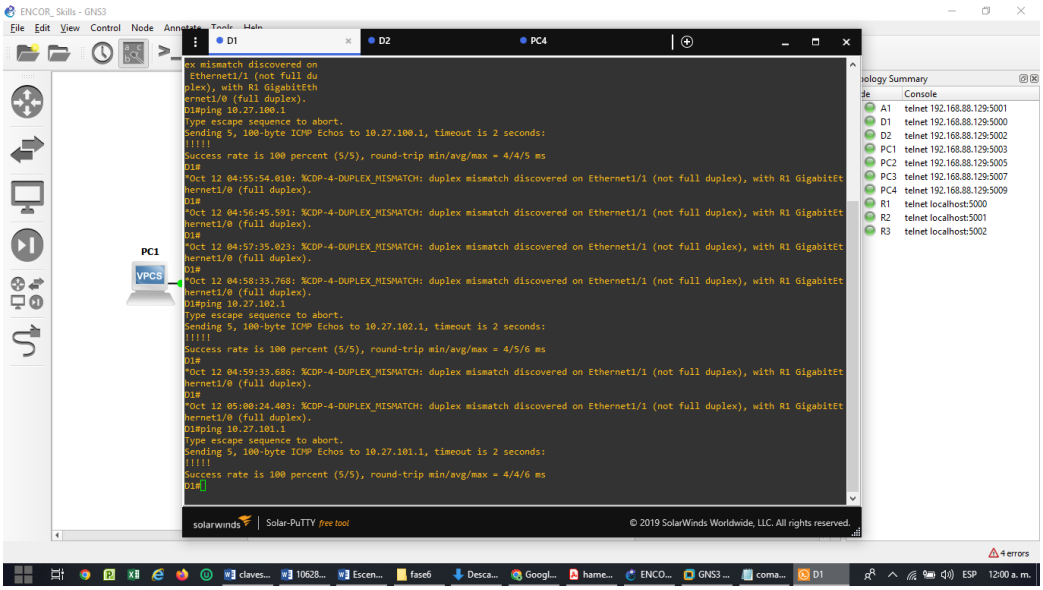
Figura 19. ping 10.27.102.2



PC3

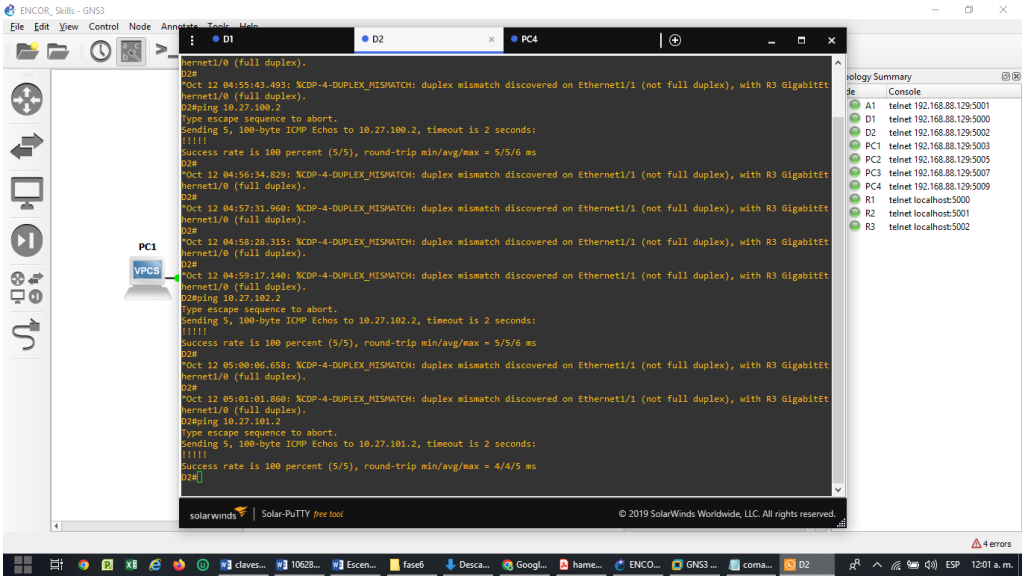
D1**: ping 10.27.101.1**

Figura 21. ping 10.27.101.1



D2: **ping 10.27.101.2**

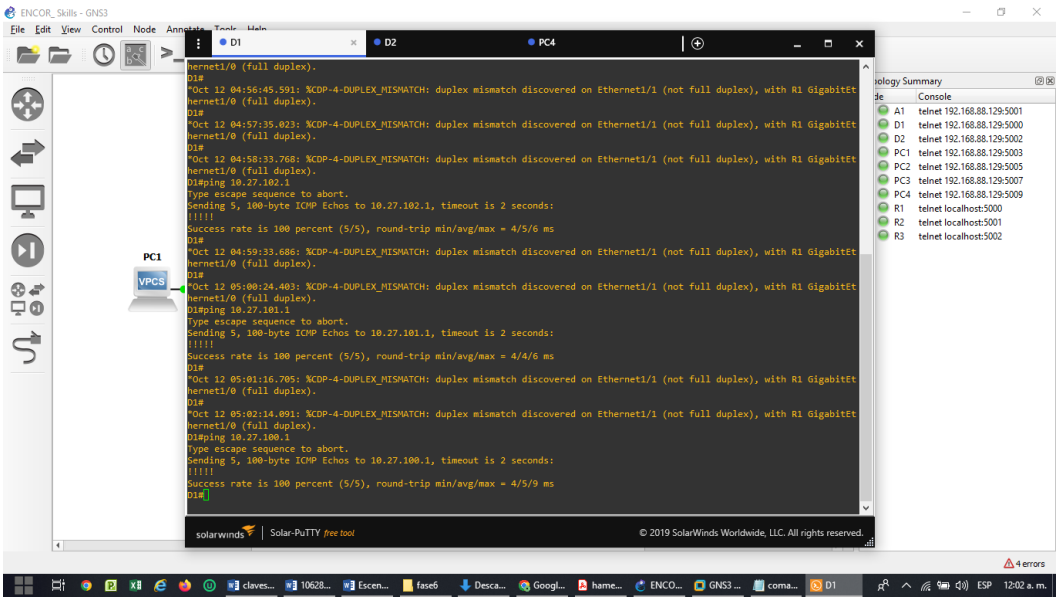
Figura 22. ping 10.27.101.2



PC4

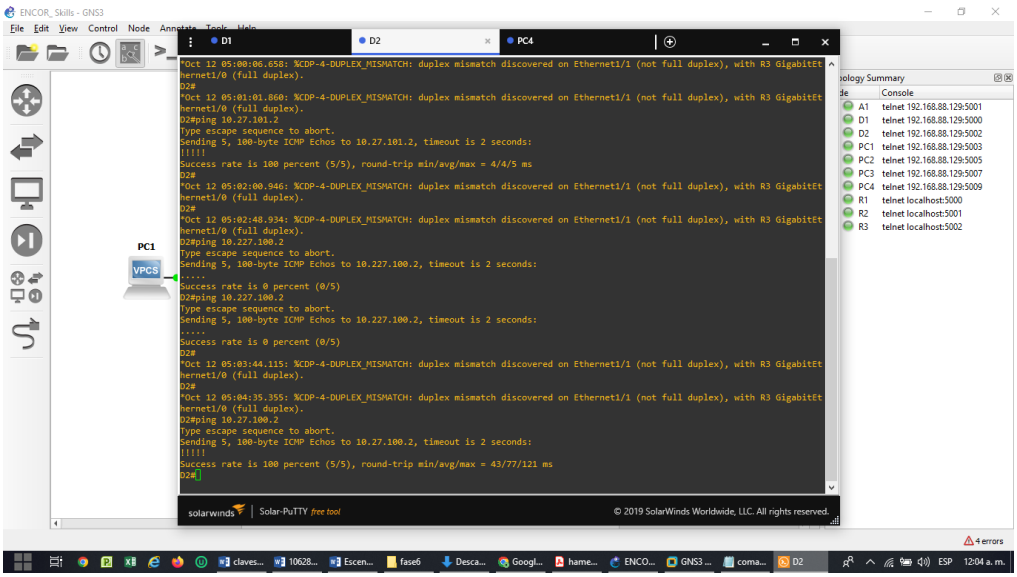
D1: **ping 10.27.100.1**

Figura 23. ping 10.27.100.1



D2: **ping 10.27.100.2**

Figura 24. ping 10.27.100.2



ENCOR Skills Assessment (Scenario 2)

Continuation of the Scenario 1

Part 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

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.XY.0.0/8. • A summary IPv6 route for 2001:db8:100::/48. Configure R1 in BGP ASN **300** and use the router-id 1.1.1.1. Configure an IPv4 and IPv6 neighbor relationship with R2 in ASN 500. In IPv4 address family: • Disable the IPv6 neighbor relationship. • Enable the IPv4 neighbor relationship. • Advertise the 10.XY.0.0/8 network. In IPv6 address family: • Disable the IPv4 neighbor relationship. • Enable the IPv6 neighbor relationship.	4

Task#	Task	Specification	Points
		• Advertise the 2001:db8:100::/48 network.	

Part 2: 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	2

Task#	Task	Specification	Points
		up after 10 seconds, or from up to down after 15 seconds.	
4.2	On D2, create IP SLAs that test the reachability of R3 interface E1/0.	Create two IP SLAs. • Use SLA number **4** for IPv4. • Use SLA number **6** for IPv6. The IP SLAs will test availability of R3 E1/0 interface every 5 seconds. Schedule the SLA for immediate implementation with no end time. Create an IP SLA object for IP SLA 4 and one for IP SLA 6. • Use track number **4** for IP SLA 4. • Use track number **6** for IP SLA 6. 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
4.3	On D1, configure HSRPv2.	D1 is the primary router for VLANs 100 and 102; therefore, their priority will also be changed to 150. Configure HSRP version 2. Configure IPv4 HSRP group **104** for VLAN 100: • Assign the virtual IP address **10.XY.100.254**. • Set the group priority to **150**. • Enable preemption. • Track object 4 and decrement by 60. Configure IPv4 HSRP group **114** for VLAN 101: • Assign the virtual IP address **10.XY.101.254**. • Enable preemption. • Track object 4 to decrement by 60. Configure IPv4 HSRP group **124** for VLAN 102:	8

Task#	Task	Specification	Points
		• Assign the virtual IP address **10.XY.102.254**. • Set the group priority to **150**. • Enable preemption. • Track object 4 to decrement by 60. Configure IPv6 HSRP group **106** for VLAN 100: • Assign the virtual IP address using **ipv6 autoconfig**. • Set the group priority to **150**. • Enable preemption. • Track object 6 and decrement by 60. Configure IPv6 HSRP group **116** for VLAN 101: • Assign the virtual IP address using **ipv6 autoconfig**. • Enable preemption. • Track object 6 and decrement by 60. Configure IPv6 HSRP group **126** for VLAN 102: • Assign the virtual IP address using **ipv6 autoconfig**. • Set the group priority to **150**. • Enable preemption. • Track object 6 and decrement by 60.	
	On D2, configure HSRPv2.	D2 is the primary router for VLAN 101; therefore, the priority will also be changed to 150. Configure HSRP version 2. Configure IPv4 HSRP group **104** for VLAN 100: • Assign the virtual IP address **10.XY.100.254**. • Enable preemption. • Track object 4 and decrement by 60. Configure IPv4 HSRP group **114** for VLAN 101:	

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

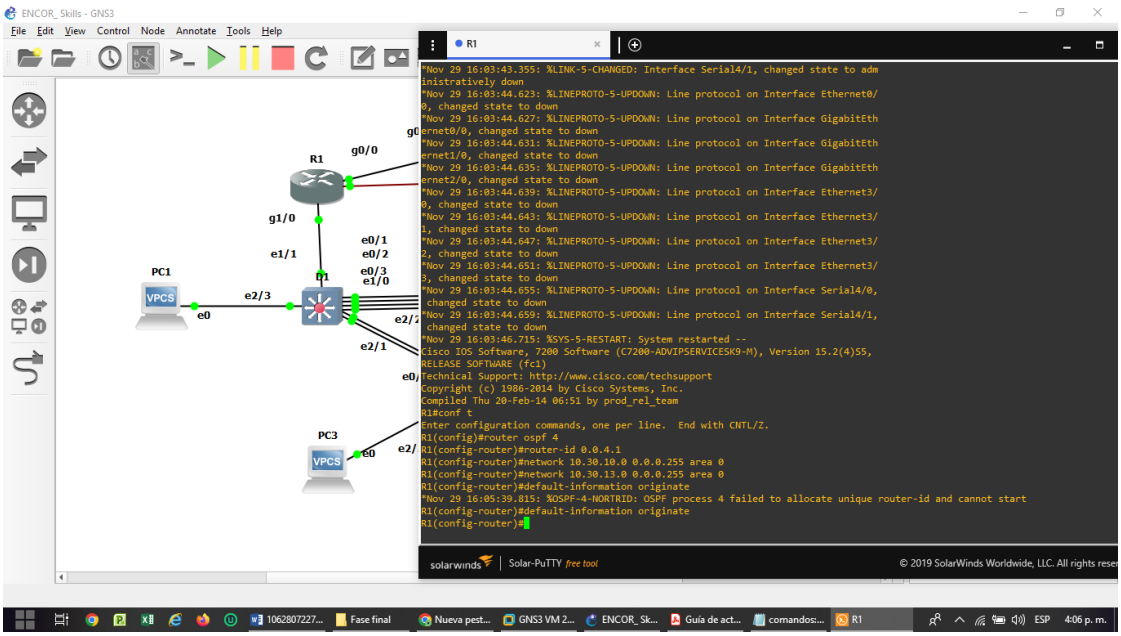
Configuración para router R1 0.0.4.1 en GNS3

conf t
router ospf 4
router-id 0.0.4.1
network 10.30.10.0 0.0.0.255 area 0

network 10.30.13.0 0.0.0.255 area 0

default-information originate

Figura 25. Configuración para router R1 0.0.4.1 en GNS3

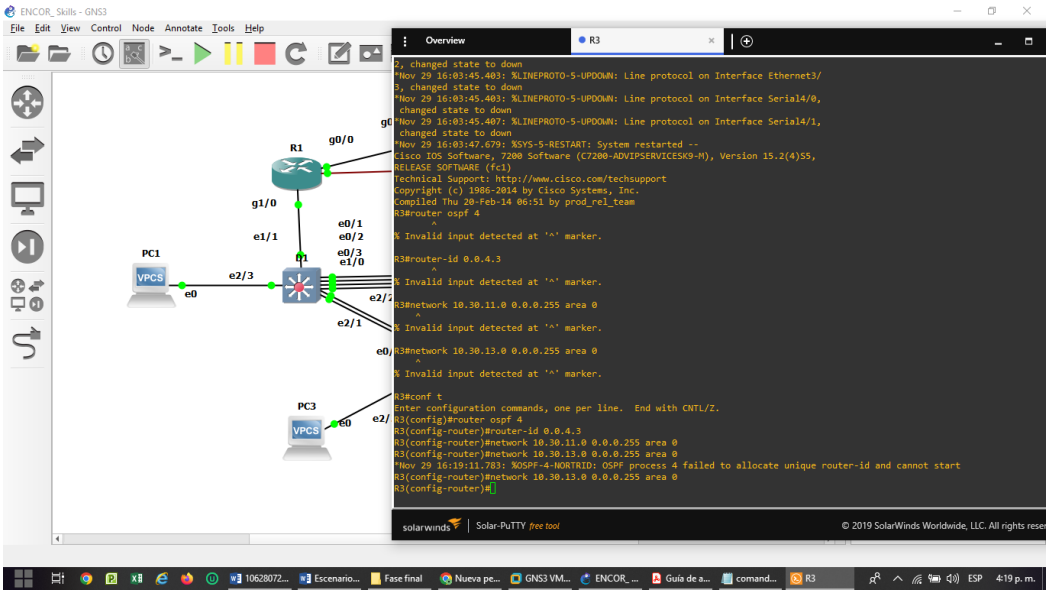


Configuración para router R3 0.0.4.3 en GNS3

conf t
router ospf 4
router-id 0.0.4.1
network 10.30.10.0 0.0.0.255 area 0

network 10.30.13.0 0.0.0.255 area 0
default-information originate

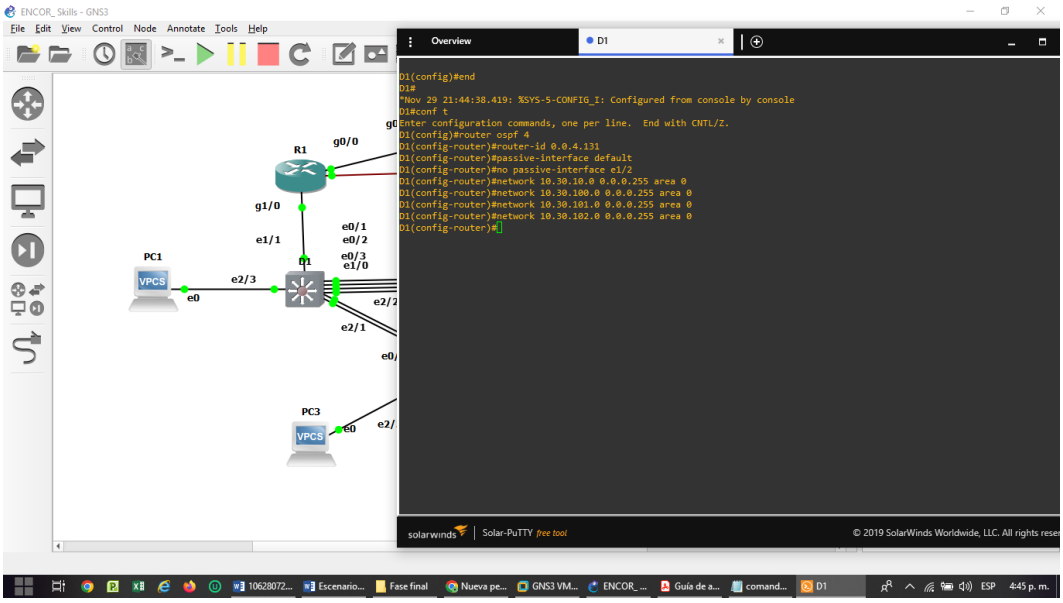
Figura 26. Configuración para router R3 0.0.4.3 en GNS3



Configuración para router D1 0.0.4.131 en GNS3

conf t
router ospf 4
router-id 0.0.4.131
passive-interface default
no passive-interface e1/2
network 10.30.10.0 0.0.0.255 area 0
network 10.30.100.0 0.0.0.255 area 0
network 10.30.101.0 0.0.0.255 area 0
network 10.30.102.0 0.0.0.255 area 0

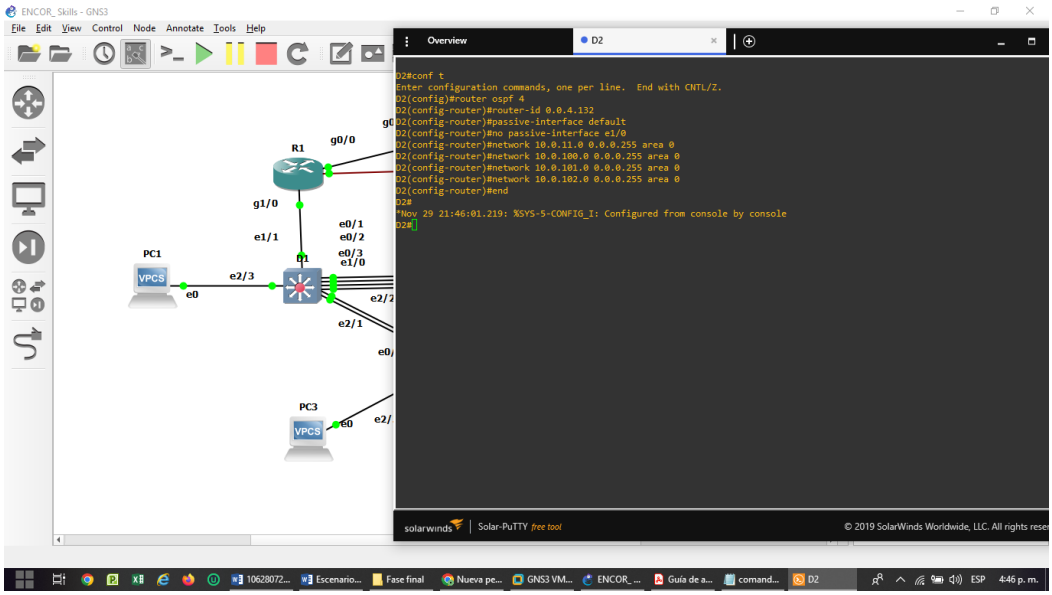
Figura 27. Configuración para router D1 0.0.4.131 en GNS3



Configuración para router D2 0.0.4.132 en GNS3

conf t
router ospf 4
router-id 0.0.4.132
passive-interface default
no passive-interface e1/0
network 10.0.11.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0

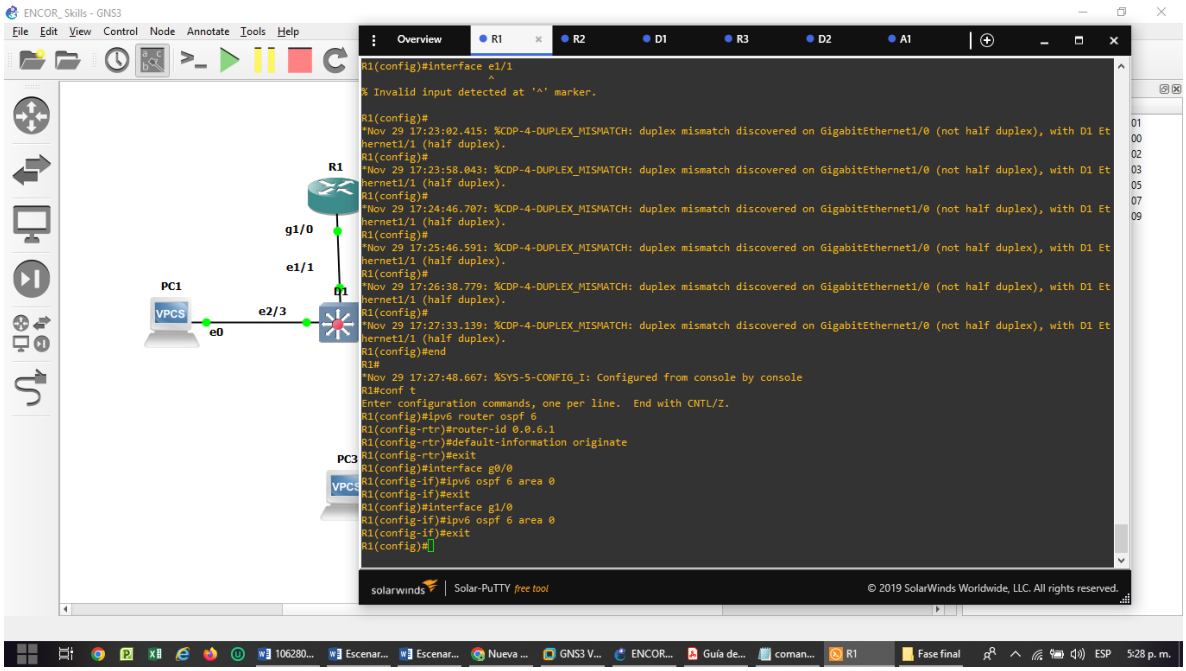
Figura 28. Configuración para router D2 0.0.4.132 en GNS3



Configuración para router R1 OSPF Process ID 6 en GNS3

conf t
router ospf 4
router-id 0.0.4.132
passive-interface default
no passive-interface e1/0
network 10.0.11.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0

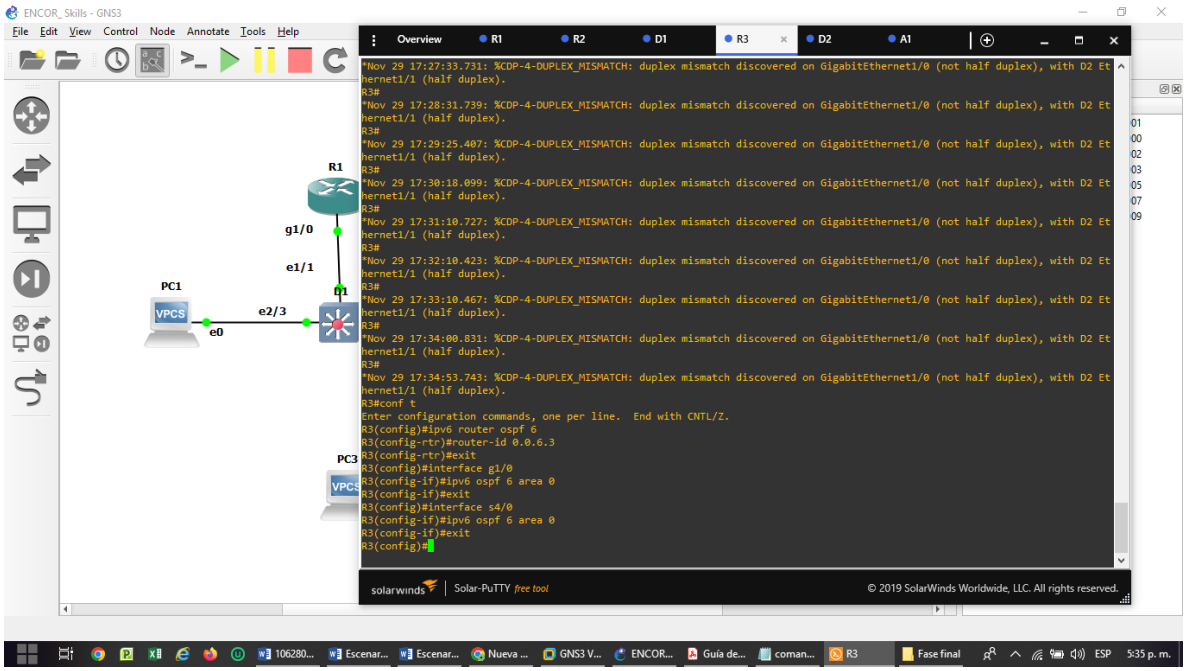
Figura 29. Configuración para router R1 OSPF Process ID 6 en GNS3



Configuración para router R3 OSPF Process ID 6 en GNS3

conf t
ipv6 router ospf 6
router-id 0.0.6.3
exit
interface g1/0
ipv6 ospf 6 area 0
exit
interface s4/0
ipv6 ospf 6 area 0
exit

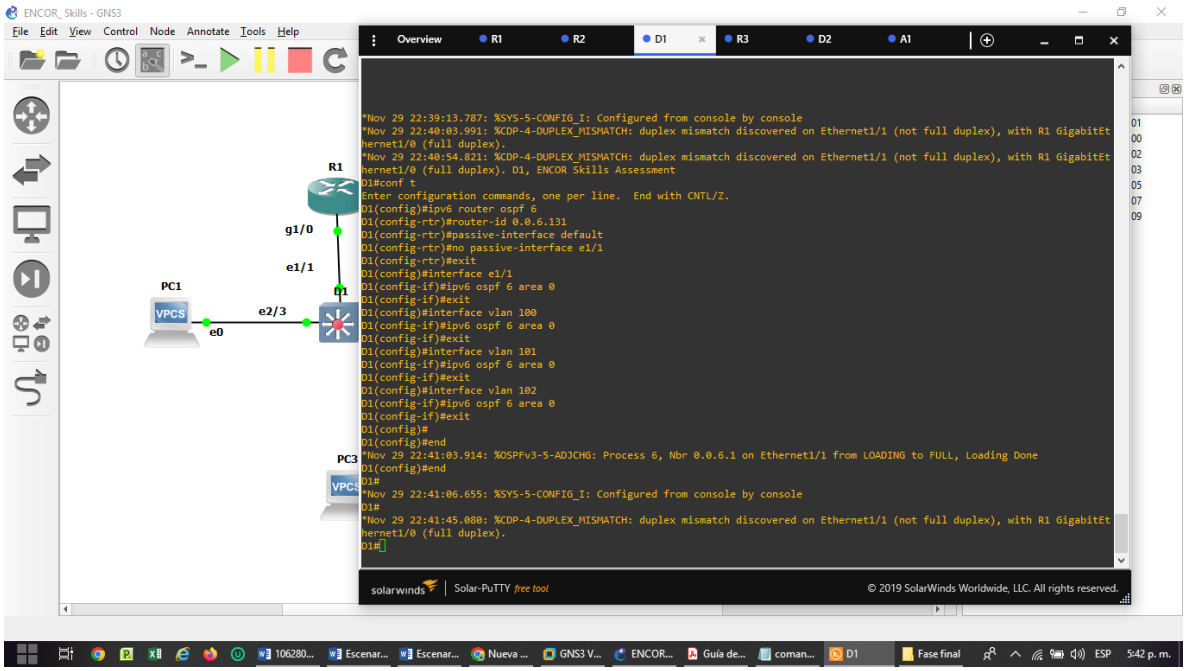
Figura 30. Configuración para router R3 OSPF Process ID 6 en GNS3



Configuración para router D1 OSPF Process ID 6 en GNS3

conf t
ipv6 router ospf 6
router-id 0.0.6.131
passive-interface default
no passive-interface e1/1
exit
interface e1/1
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

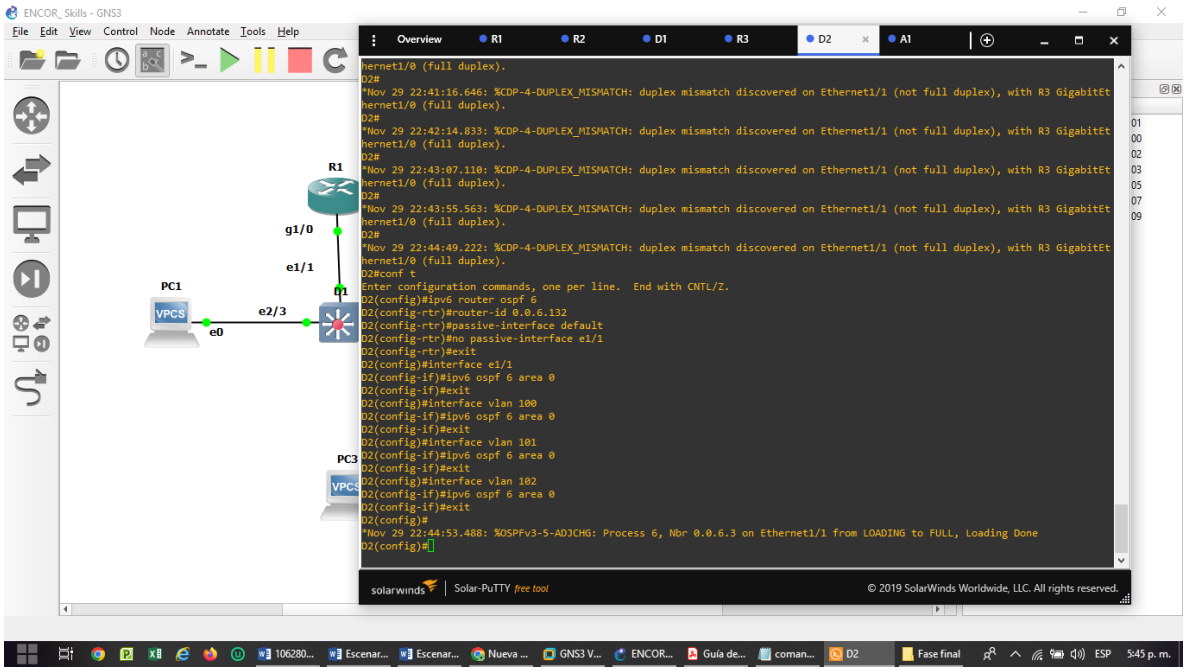
Figura 31. Configuración para router D1 OSPF Process ID 6 en GNS3



Configuración para router D2 OSPF Process ID 6 en GNS3

```
conf t
ipv6 router ospf 6
router-id 0.0.6.132
passive-interface default
no passive-interface e1/1
exit
interface e1/1
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
```

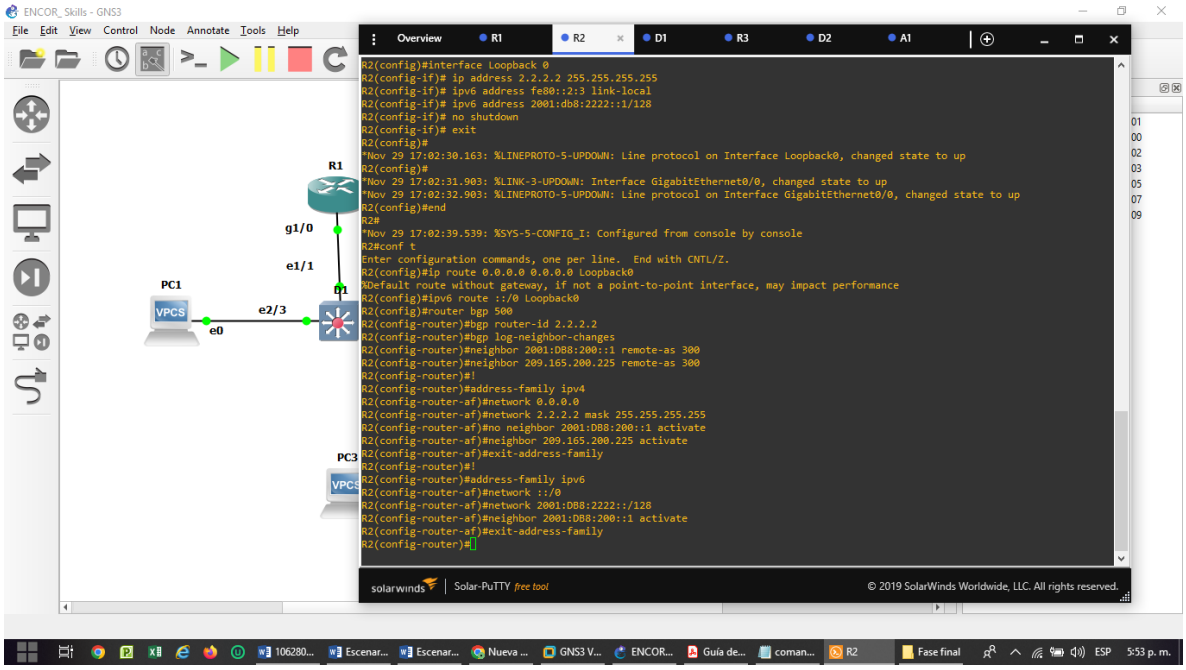
Figura 32. Configuración para router D2 OSPF Process ID 6 en GNS3



Configuración para router R2 configure MP-BGP en GNS3

conf t
ip route 0.0.0.0 0.0.0.0 Loopback0
ipv6 route ::/0 Loopback0
router bgp 500
bgp router-id 2.2.2.2
router bgp 500
bgp router-id 2.2.2.2
bgp log-neighbor-changes
neighbor 2001:DB8:200::1 remote-as 300
neighbor 209.165.200.225 remote-as 300
!
address-family ipv4
network 0.0.0.0
network 2.2.2.2 mask 255.255.255.255
no neighbor 2001:DB8:200::1 activate
neighbor 209.165.200.225 activate
exit-address-family
!
address-family ipv6
network ::/0
network 2001:DB8:2222::/128
neighbor 2001:DB8:200::1 activate
exit-address-family

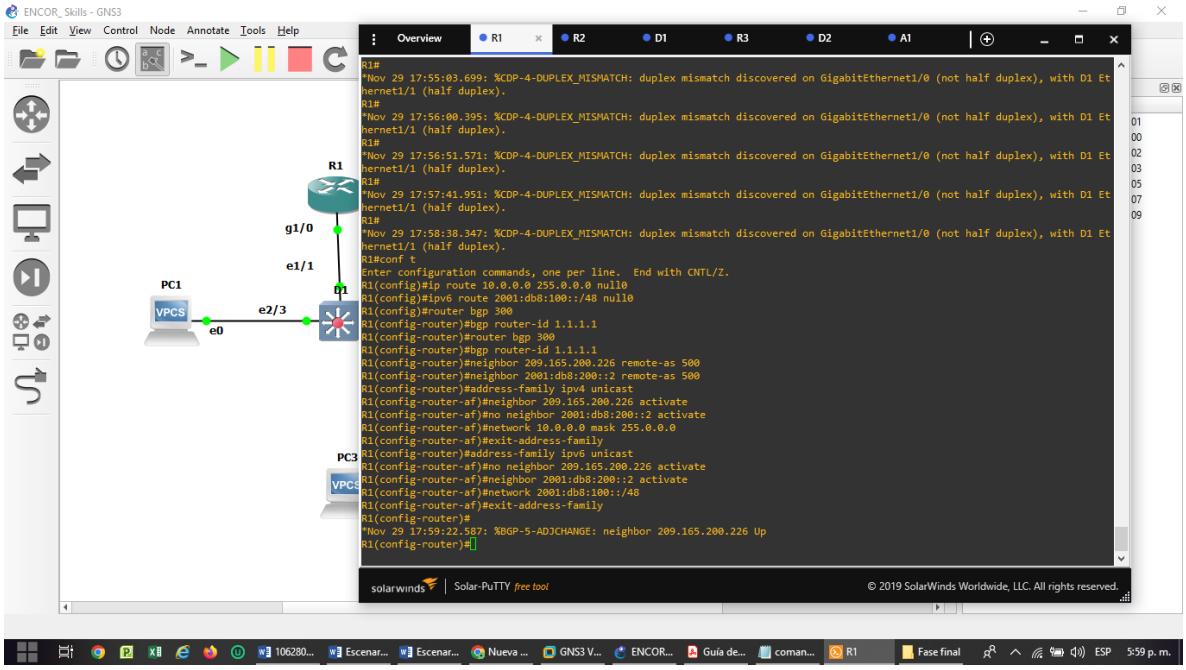
Figura 33. Configuración para router R2 configure MP-BGP en GNS3



Configuración para router R1 configure MP-BGP en GNS3

conf t
ip route 10.0.0.0 255.0.0.0 null0
ipv6 route 2001:db8:100::/48 null0
router bgp 300
bgp router-id 1.1.1.1
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 10.0.0.0 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

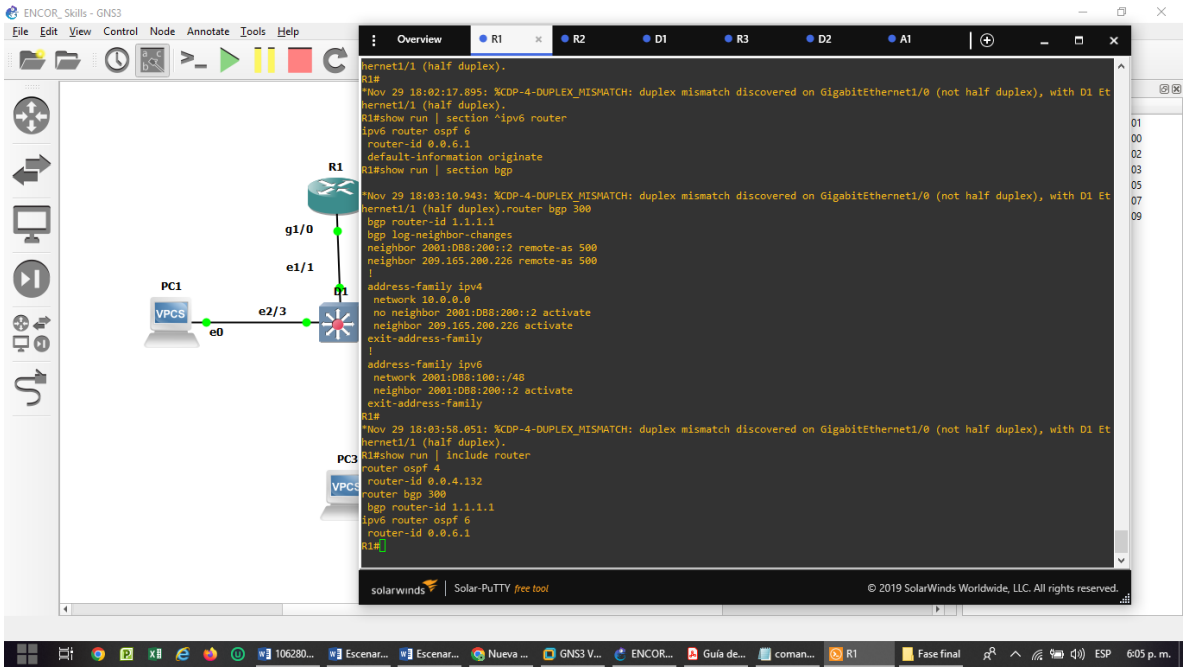
Figura 34. Configuración para router R1 configure MP-BGP en GNS3



Verificación para router R1

show run | section ^router ospf
show run | section ^ipv6 router
show run | section bgp
show run | include router

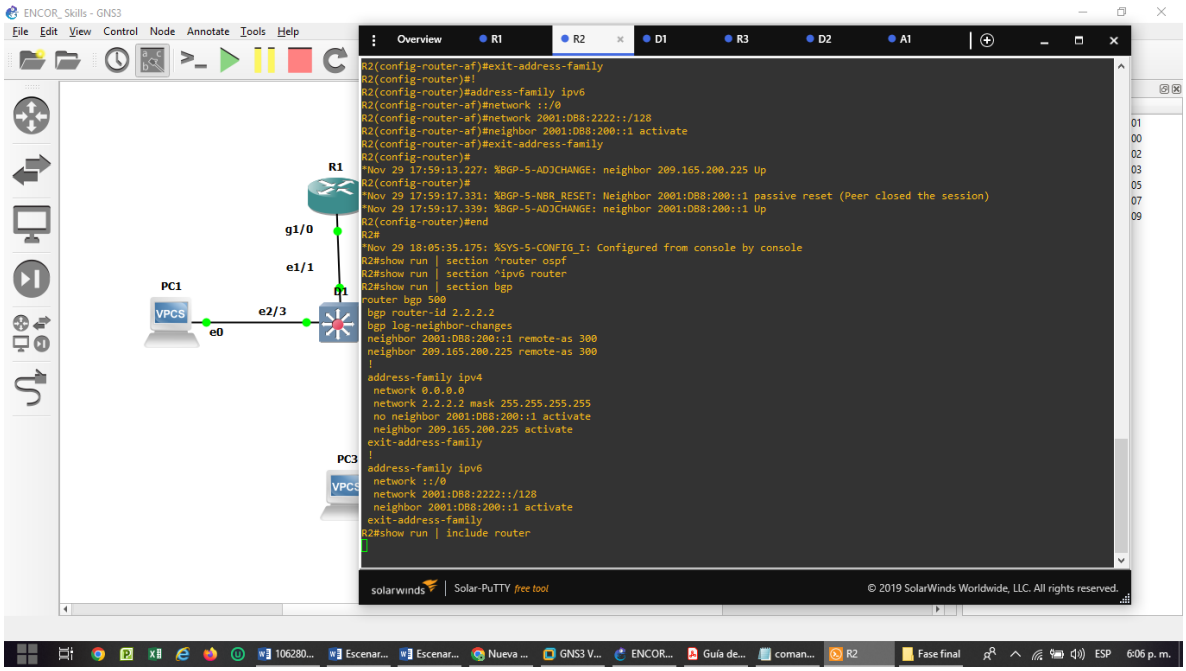
Figura 35. Verificación para router R1



Verificación para router R2

show run | section ^router ospf
show run | section ^ipv6 router
show run | section bgp
show run | include router

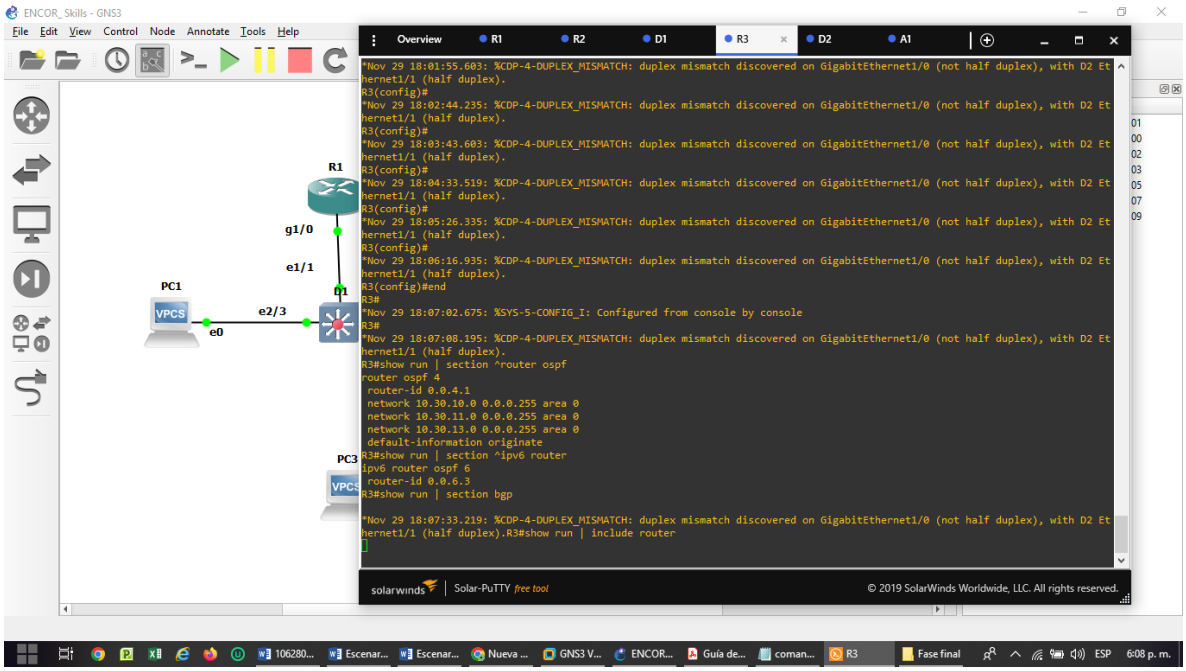
Figura 36. Verificación para router R2



Verificación para router R3

show run | section ^router ospf
show run | section ^ipv6 router
show run | section bgp
show run | include router

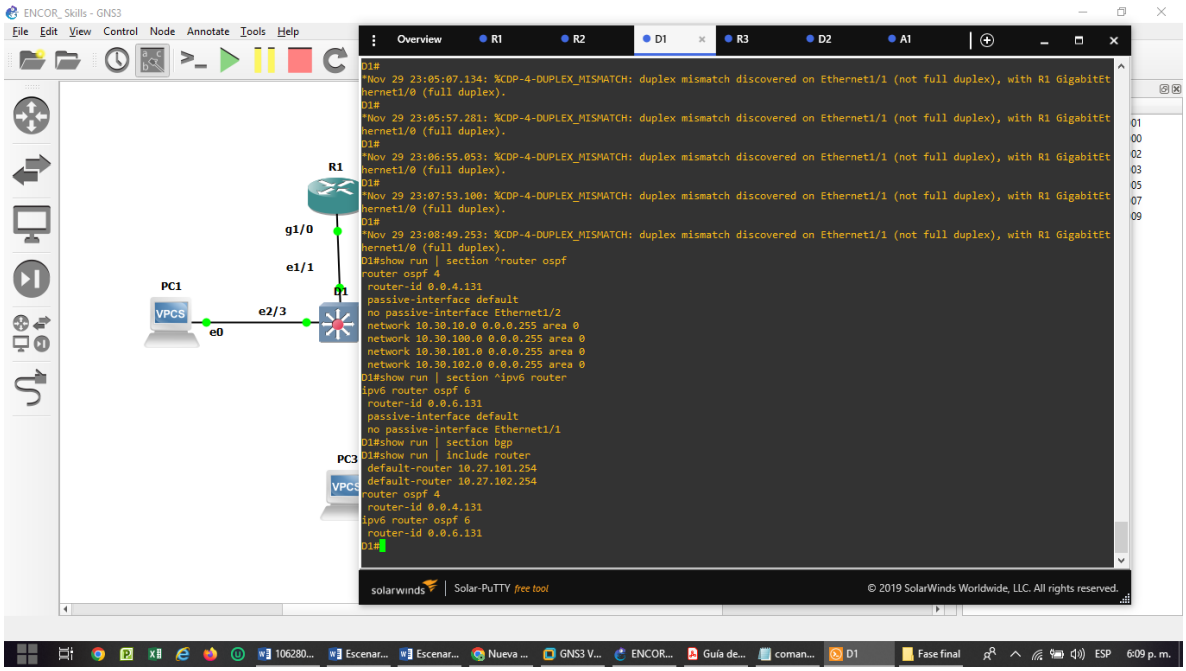
Figura 37. Verificación para router R3



Verificación para router D1

show run | section ^router ospf
show run | section ^ipv6 router
show run | section bgp
show run | include router

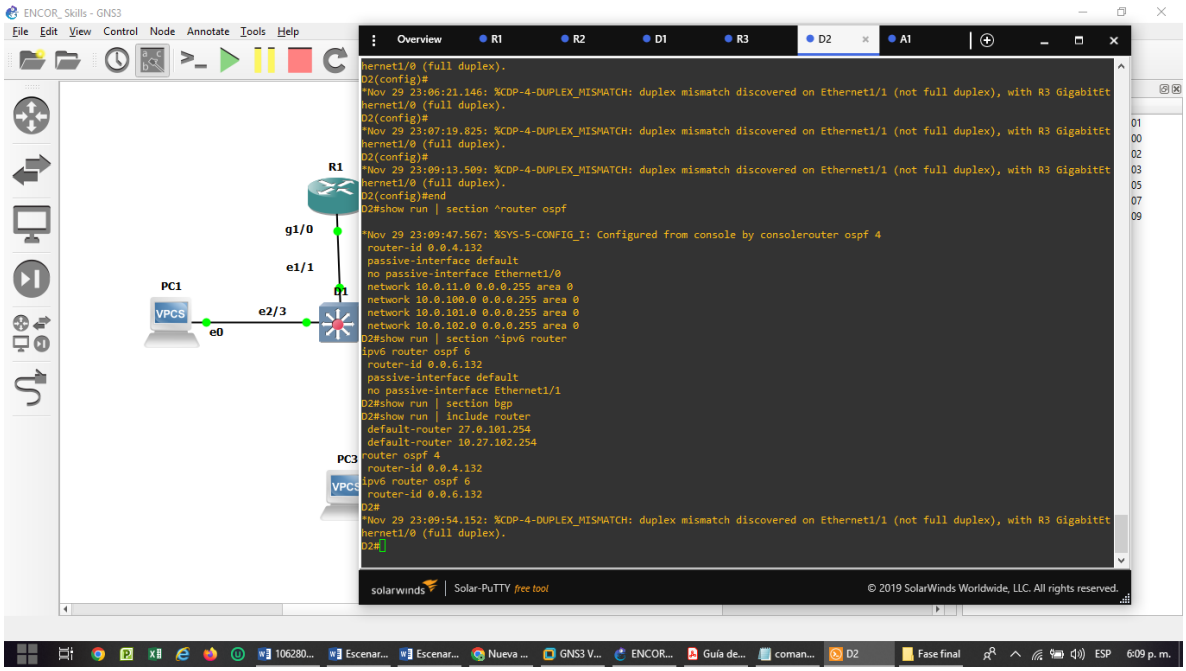
Figura 38. Verificación para router D1



Verificación para router D2

show run | section ^router ospf
show run | section ^ipv6 router
show run | section bgp
show run | include router

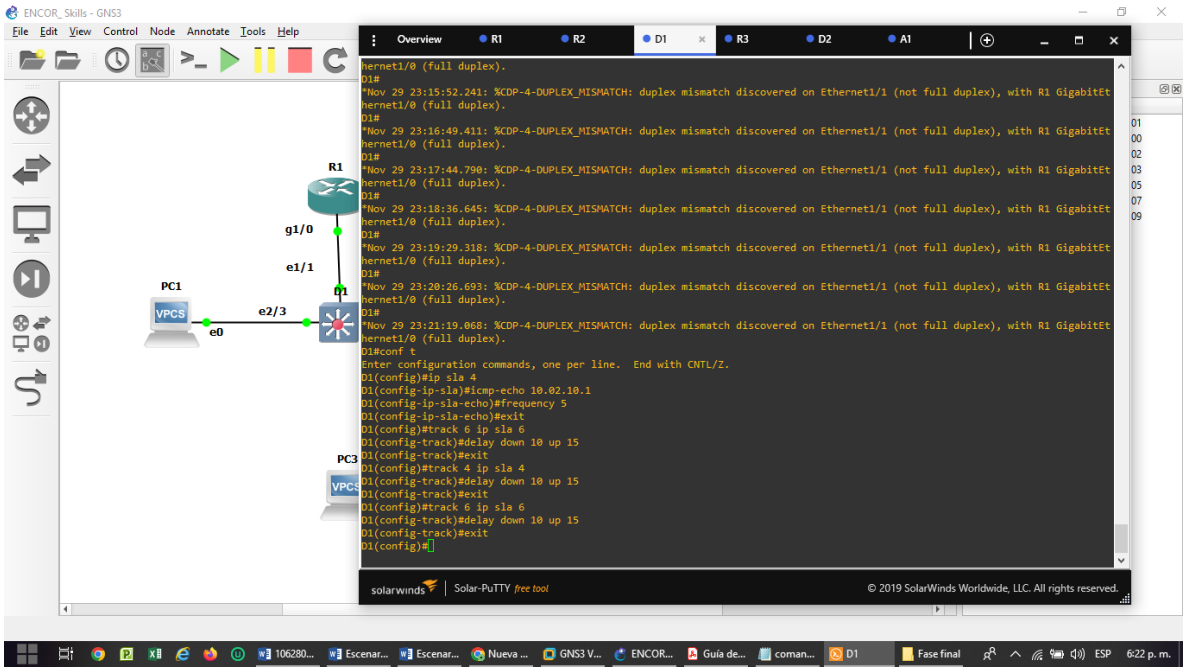
Figura 39. Verificación para router D2



Configuración IP SLA D1 en GNS3

conf t
ip sla 4
icmp-echo 10.02.10.1
frequency 5
exit
track 6 ip sla 6
delay down 10 up 15
exit
track 4 ip sla 4
delay down 10 up 15
exit
track 6 ip sla 6
delay down 10 up 15
exit

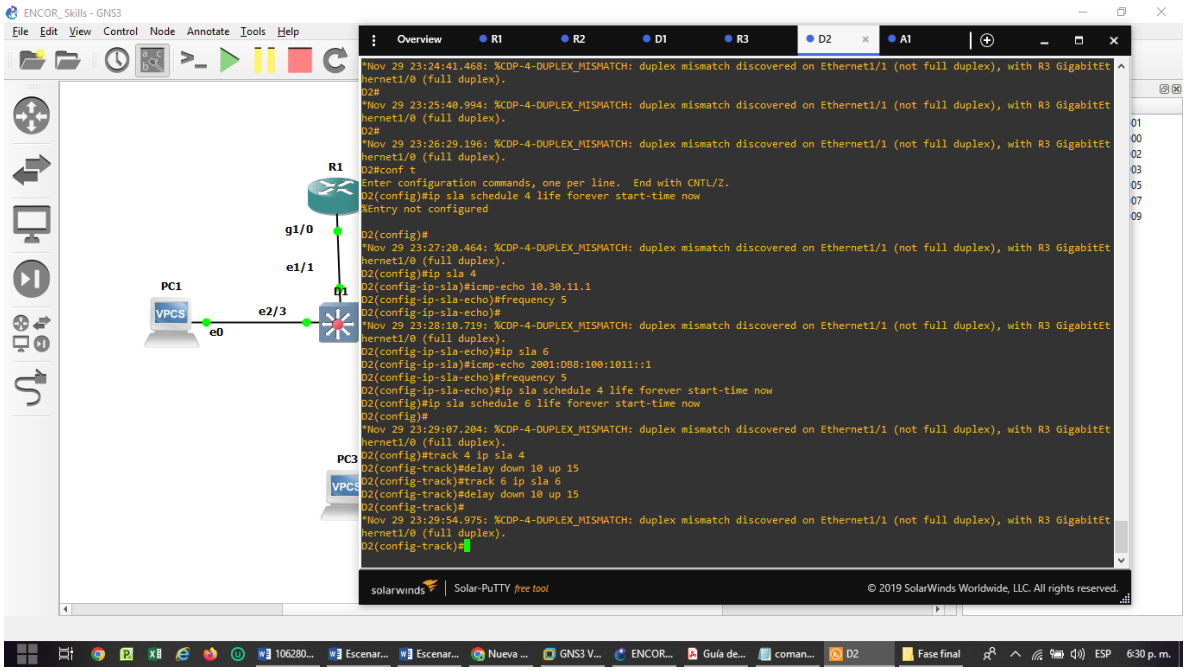
Figura 40. Configuración IP SLA D1 en GNS3



Configuración IP SLA D2 en GNS3

conf t
ip sla 4
icmp-echo 10.30.11.1
frequency 5
ip sla 6
icmp-echo 2001:DB8:100:1011::1
frequency 5
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
track 6 ip sla 6
delay down 10 up 15

Figura 41. Configuración IP SLA D1 en GNS3

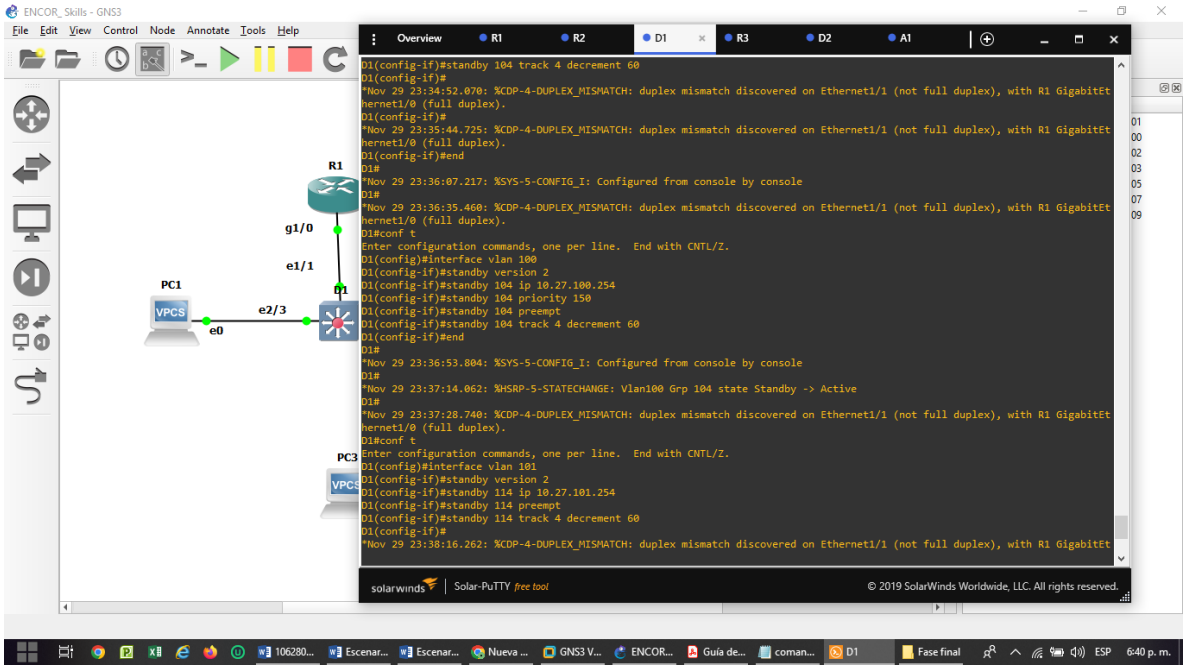


Configuración HSRPv2 D1 en GNS3

conf t
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
exit
interface vlan 101
standby version 2
standby 114 ip 10.27.101.254
standby 114 preempt
standby 114 track 4 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
exit
interface vlan 100
standby 106 ipv6 autoconfig

standby 106 priority 150
standby 106 preempt
standby 106 track 6 decrement 60
exit
interface vlan 101
standby 116 ipv6 autoconfig
standby 116 preempt
standby 116 track 6 decrement 60
exit
interface vlan 102
standby 126 ipv6 autoconfig
standby 126 priority 150
standby 126 preempt
standby 126 track 6 decrement 60
exit

Figura 42. Configuración HSRPv2 D1 en GNS3

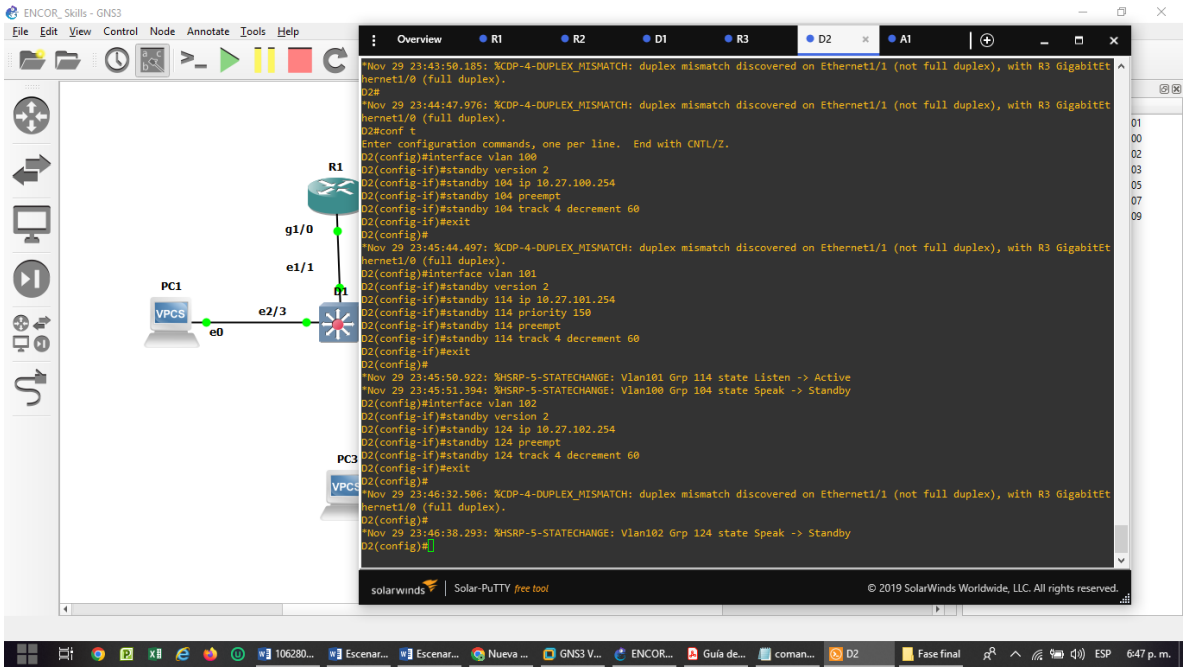


Configuración HSRPv2 D2 en GNS3

conf t
interface vlan 100
standby version 2
standby 104 ip 10.27.100.254

```
standby 104 preempt
standby 104 track 4 decrement 60
exit
interface vlan 101
standby version 2
standby 114 ip 10.27.101.254
standby 114 priority 150
standby 114 preempt
standby 114 track 4 decrement 60
exit
interface vlan 102
standby version 2
standby 124 ip 10.27.102.254
standby 124 preempt
standby 124 track 4 decrement 60
exit
interface vlan 100
standby 106 ipv6 autoconfig
standby 106 preempt
standby 106 track 6 decrement 60
exit
interface vlan 101
standby 116 ipv6 autoconfig
standby 116 priority 150
standby 116 preempt
standby 116 track 6 decrement 60
exit
interface vlan 102
standby 126 ipv6 autoconfig
standby 126 preempt
standby 126 track 6 decrement 60
exit
```

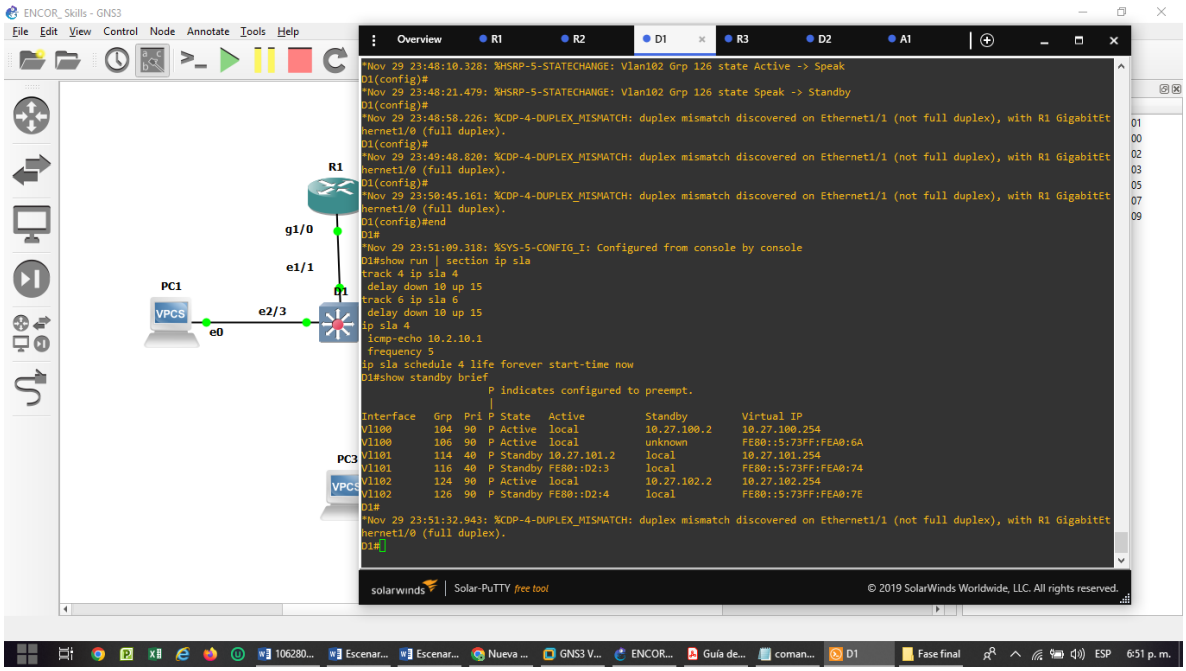
Figura 43. Configuración HSRPv2 D2 en GNS3



Comando de verificación D1

show run | section ip sla
show standby brief

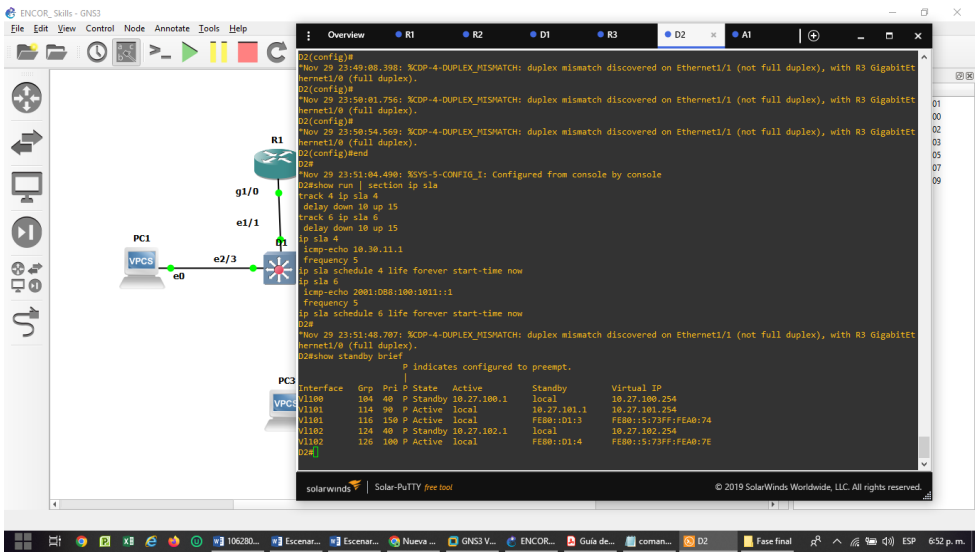
Figura 44. Comando de verificación D1 en GNS3



Comando de verificación D2

show run | section ip sla
show standby brief

Figura 45. Comando de verificación D1 en GNS3



CONCLUSIONES

Los modelos de simulación propuestos están integrados a un contexto específico, los cuales son tomados del mundo real. Las actividades pueden estar relacionadas con un caso, un juego de roles o una simulación, el cual se utilizará para el aprendizaje de conocimientos, habilidades y actitudes que permite apropiar las temáticas relacionadas con los principios básicos de la red y los protocolos de enrutamiento para una red empresariales LAN y WAN divide los grupos de usuarios de la red de una red física real en segmentos de redes lógicas.

En cuanto a la solución de los escenarios propuestos se resolvió los problemas de direccionamiento a través de la verificación detallada de la tipo de redes, en donde se consideraran las causas probables de la falla, se propone una solución donde se verifica que la solución dada haya resuelto el problema, de igual manera se evidencia las habilidades de integración en cuanto a configuración de direccionamiento y su verificación en cuanto a conectividad.

Los protocolos de enrutamiento utilizados en este escenario OSPF y BGP son los más comunes que se pueden encontrar en un entorno real, muchas organizaciones utilizan el OSPF para enrutar como protocolo interno porque permite que se conozca toda la red a través de la tabla de enrutamiento de cada router evitando loops, también actualizan automáticamente las tables con cualquier cambio en la topología; el BGP para interconectar sistemas autónomos.

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