

DIPLOMADO DE PROFUNDIZACION CISCO
PRUEBA DE HABILIDADES PRACTICAS CCNP

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA - UNAD ESCUELA DE
CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA - ECBTI
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PRÁCTICAS CCNP

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NOTA DE ACEPTACIÓN

Firma del Presidente del Jurado

Firma del Jurado

Firma del Jurado

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Hoy doy gracias a Dios, a mis padres que ya no están, a mi esposa a mis tres niñas, con el apoyo de estas personas las que me animaron a seguir adelante. A esta prestigiosa Universidad UNAD Universidad abierta y a a distancia que brindo todo el apoyo y la asesoría para consolidad esta profesionalización que hoy estamos logrando. A profesores directores, que asesoraron en todo momento, enseñando y exigiendo.

Hoy estoy muy orgullosos y agradecido de haber navegado por los senderos del conocimiento, muchas gracias

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GLOSARIO

CCNA (Cisco Certified Networking Associate): Es una de las certificaciones más importantes dentro de la industria de la Tecnología de la Información. Esta certificación representa el nivel asociado, orientada a habilidades prácticas en el diagnóstico y solución de problemas específicos de redes

DCHP El Protocolo de configuración dinámica de host (DHCP) es un protocolo cliente/servidor que proporciona automáticamente un host de Protocolo de Internet (IP) con su dirección IP y otra información de configuración relacionada, como la máscara de subred y la puerta de enlace predeterminada.

HSRP El Hot Standby Router Protocol es un protocolo propiedad de CISCO que permite el despliegue de enrutadores redundantes tolerantes de fallos en una red. Este protocolo evita la existencia de puntos de fallo únicos en la red mediante técnicas de redundancia y comprobación del estado de los routers

OSPFv2: Open Shortest Path First, protocolo de enrutamiento dinámico que detecta cambios en la topología, fallas de enlace y converge en una nueva estructura rápidamente, específicamente para IPv4.

Router-On-A-Stick: En informática, un enrutador en un dispositivo, también conocido como enrutador de un solo brazo, es un enrutador que tiene una única conexión física o lógica a una red. Es un método de enrutamiento entre VLAN en el que un enrutador está conectado a un conmutador a través de un solo cable

VLAN, acrónimo de virtual LAN, es un método para crear redes lógicas independientes dentro de una misma red física. Varias VLAN pueden coexistir en un único conmutador físico o en una única red física

VRF: En las redes informáticas basadas en IP, el enrutamiento y reenvío virtual es una tecnología que permite que coexistan múltiples instancias de una tabla de enrutamiento dentro del mismo enrutador al mismo tiempo.

RESUMEN

En el siguiente escenario representa el fruto del aprendizaje en las diferentes practicas simuladas en la plataforma CISCO Networking Academy, en la plataforma Netcad para desarrollar toda la temática diseñada por la UNAD para optar por el título de Ingeniero electrónico. El desarrolla de dos escenarios en el programa GNS3, con máquina virtual, Reuter, configurar plataformas, de comunicaciones, con switches, ruoters, Pcs configurar las VLANs en escenarios corporativos, configuraciones de ruoter con direccionamiento IPV6, IPV4 con protocolos OSPF, BGP entre otros

PALABRAS CLAVE: CISCO, CCNP, UNAD, GNS3, Enrutamiento, Redes, Electrónica.

ABSTRAC

The following scenario represents the fruit of learning in the different simulated practices on the CISCO Networking Academy platform, on the Netcad platform to develop all the themes designed by UNAD to opt for the title of Electronic Engineer. He develops two scenarios in the GNS3 program, with a virtual machine, Router, configuring platforms, communications, with switches, routers, PCs, configuring VLANs in corporate scenarios, router configurations with IPV6, IPV4 addressing with OSPF, BGP protocols, among others.

KEY WORDS: CISCO, CCNP, UNAD, GNS3, Routing, Networks, Electronics.

INTRODUCCION

En este trabajo tiene como propósito de sustentar de una forma practica el uso de dispositivos, equipos maquinas sistemas de sistemas o redes de computadores que están diseñadas para que esta sea efectiva, estableciendo protocolos, optimizando el tiempo, y sobre todo permitir que como estudiante desarrollemos esta tecnología de enrutamiento, poniendo en práctica lo aprendido durante toda la capacitación en la plataforma CISCO, las direcciones Ip de cada uno de los equipo o dispositivos, los distintos protocolos de enrutamiento, configuraciones interconexiones de equipos, de puertos trocales, después de adquirir todo este cumulo de conocimientos se estará presentando el proyecto final el cual se desarrolla en GNS3 usando una máquina virtual

PLANTEAMIENTO DEL PROBLEMA

En esta evaluación de habilidades, usted es responsable de completar la configuración de la red para que haya una accesibilidad completa de extremo a extremo, para que los hosts tengan compatibilidad confiable con la puerta de enlace predeterminada y para que los protocolos de administración estén operativos dentro de la parte "Red de la empresa" de la topología. Tenga cuidado de verificar que sus configuraciones cumplan con las especificaciones proporcionadas y que los dispositivos funcionen según lo requerido.

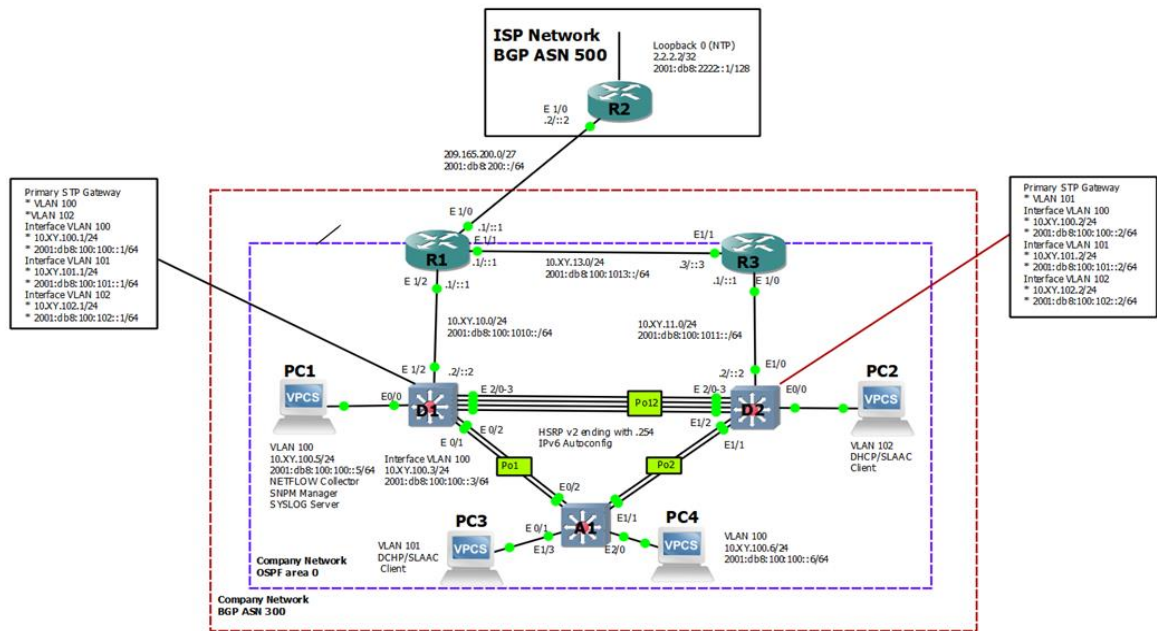


Figura 1. Escenario propuesto a desarrollar

A partir de la siguiente tabla de enrutamiento este proyecto se desarrolla en las siguientes partes:

- Parte 1: Construir la red y configurar los ajustes básicos del dispositivo y el direccionamiento de la interfaz
- Parte 2: Configurar la red de capa 2 y la compatibilidad con el host
- Parte 3: Configurar protocolos de enrutamiento
- Parte 4: Configurar la redundancia de primer salto

DESARROLLO DEL PROYECTO ESCENARIO 1

Parte 1. Construir la red y configurar los ajustes básicos del dispositivo y el direccionamiento de la interfaz

En la Parte 1, configurará la topología de red y configurará los ajustes básicos y el direccionamiento de la interfaz.

Paso1. Cablee la red como se muestra en la topología.
Conecte los dispositivos como se muestra en el diagrama de topología y cablee según sea necesario.

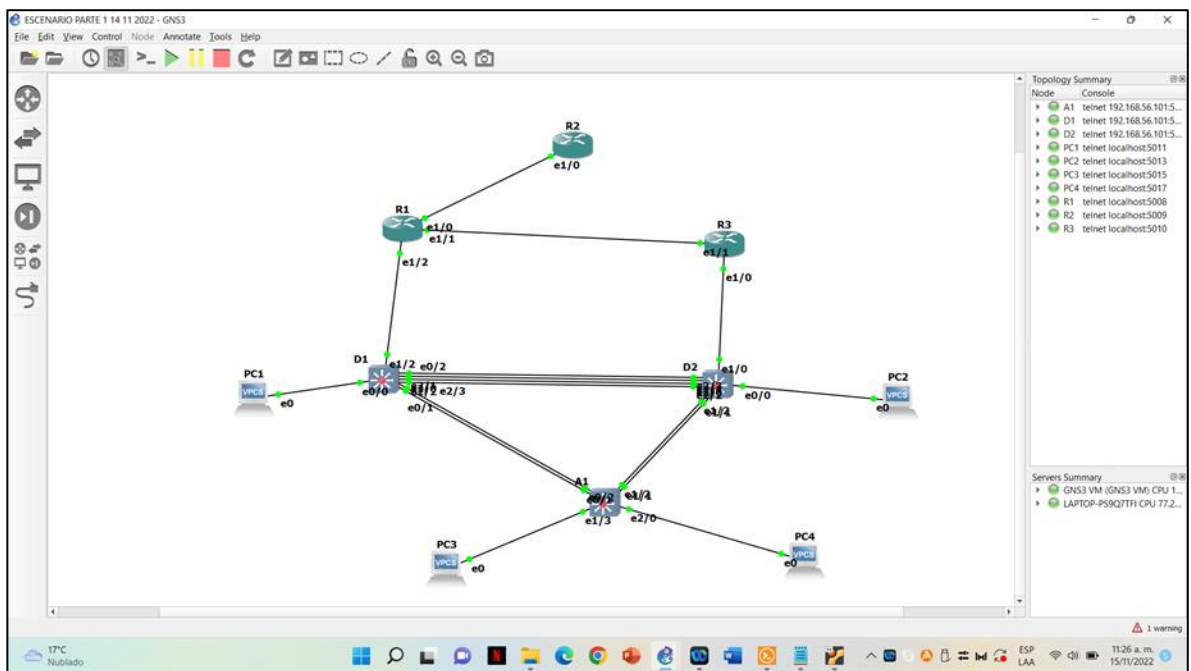


Figura 2. Topología

Paso 2. Configure los ajustes básicos para cada dispositivo.

- a. Consola en cada dispositivo, ingrese al modo de configuración global y aplique la configuración básica. Las configuraciones de inicio para cada dispositivo se proporcionan a continuación.

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.XY.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	E1/1	10. XY.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. XY.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
	E1/1	10. XY.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	E1/2	10. XY.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
	VLAN 100	10. XY.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10.XY.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
	VLAN 102	10.XY.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	E1/0	10.XY.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10.XY.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
	VLAN 101	10.XY.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10.XY.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.XY.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.XY.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.XY.100.6/24	2001:db8:100:100::6/64	EUI-64

Tabla 1. Tabla configuraciones Escenario 1 Parte 1

```

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 10.79.10.1 255.255.255.0
ipv6 address fe80::1:2 link-local
ipv6 address 2001:db8:100:1010::1/64
no shutdown
exit
interface e1/1
ip address 10.79.13.1 255.255.255.0
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 10.79.11.1 255.255.255.0
ipv6 address fe80::3:2 link-local
ipv6 address 2001:db8:100:1011::1/64
no shutdown
exit
interface e1/1
ip address 10.79.13.3 255.255.255.0
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 10.79.10.2 255.255.255.0
ipv6 address fe80::d1:1 link-local
ipv6 address 2001:db8:100:1010::2/64
no shutdown
exit
interface vlan 100
ip address 10.79.100.1 255.255.255.0
ipv6 address fe80::d1:2 link-local
ipv6 address 2001:db8:100:100::1/64
no shutdown
```



```

exit
interface vlan 101
ip address 10.79.101.1 255.255.255.0
ipv6 address fe80::d1:3 link-local
ipv6 address 2001:db8:100:101::1/64
no shutdown
exit
interface vlan 102
ip address 10.79.102.1 255.255.255.0
ipv6 address fe80::d1:4 link-local
ipv6 address 2001:db8:100:102::1/64
no shutdown
exit
ip dhcp excluded-address 10.79.101.1 10.79.101.109
ip dhcp excluded-address 10.79.101.141 10.79.101.254
ip dhcp excluded-address 10.79.102.1 10.79.102.109
ip dhcp excluded-address 10.79.102.141 10.79.102.254
ip dhcp pool VLAN-101
network 10.79.101.0 255.255.255.0
default-router 10.79.101.254
exit
ip dhcp pool VLAN-102
network 10.79.102.0 255.255.255.0
default-router 10.79.102.254
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 10.79.11.2 255.255.255.0
ipv6 address fe80::d1:1 link-local
ipv6 address 2001:db8:100:1011::2/64
no shutdown
exit
interface vlan 100
ip address 10.79.100.2 255.255.255.0
ipv6 address fe80::d2:2 link-local
ipv6 address 2001:db8:100:100::2/64
no shutdown
exit
interface vlan 101
ip address 10.79.101.2 255.255.255.0
ipv6 address fe80::d2:3 link-local
ipv6 address 2001:db8:100:101::2/64
no shutdown
exit
interface vlan 102
ip address 10.79.102.2 255.255.255.0
ipv6 address fe80::d2:4 link-local
ipv6 address 2001:db8:100:102::2/64
no shutdown
exit
ip dhcp excluded-address 10.79.101.1 10.79.101.209
ip dhcp excluded-address 10.79.101.241 10.79.101.254
ip dhcp excluded-address 10.79.102.1 10.79.102.209
ip dhcp excluded-address 10.79.102.241 10.79.102.254
ip dhcp pool VLAN-101
network 10.79.101.0 255.255.255.0
default-router XY.0.101.254
exit
ip dhcp pool VLAN-102
network 10.79.102.0 255.255.255.0
default-router 10.79.102.254
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 10.79.100.3 255.255.255.0
  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
startup-config

```

- b. Guarde la configuración en ejecución en startup-config en todos los dispositivos.
- c. Configure el direccionamiento de host de PC 1 y PC 4 como se muestra en la tabla de direccionamiento. Asigne una dirección de puerta de enlace predeterminada de 10.XY.100.254, que será la dirección IP virtual HSRP utilizada en la Parte 4.

Parte 2. Configurar la red de capa 2 y la compatibilidad con el host

En esta parte de la evaluación de habilidades, completará la configuración de red de capa 2 y configurará el soporte básico de host. Al final de esta parte, todos los interruptores deberían poder comunicarse. PC2 y PC3 deben recibir direccionamiento de DHCP y SLAAC.

Las tareas de configuración son las siguientes:

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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • D1: 10.XY.100.1 • D2: 10.XY.100.2 • PC4: 10.XY.100.6 PC2 should successfully ping: <ul style="list-style-type: none"> • D1: 10.XY.102.1 • D2: 10.XY.102.2 PC3 should successfully ping: <ul style="list-style-type: none"> • D1: 10.XY.101.1 • D2: 10.XY.101.2 PC4 should successfully ping: <ul style="list-style-type: none"> • D1: 10.XY.100.1 • D2: 10.XY.100.2 • PC1: 10.XY.100.5 	1

Tabla 2. Tabla tareas escenario 1 parte 2

2.1 Configuración IEEE

Switch D1

```

Enable
Configure t
interface range e2/0-3
switchport trunk encapsulation dot1q
switchport mode trunk
interface range e0/0-1
switchport trunk encapsulation dot1q
switchport mode trunk

```

```

D1
D2
D3
D4
D5
D6
D7
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```

Figura 3. Configuración Switch D1

Switch D2

Enable
Configure t
interface range e2/0-3
switchport trunk encapsulation dot1q
switchport mode trunk
interface range e1/1-2
switchport trunk encapsulation dot1q
switchport mode trunk

```
D2 comb is now available

Press RETURN to get started.

D2, ENCOM Skills Assessment
D2#enable
D2#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#interface range e2/0-1
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#interface range e1/0-1
% Invalid input detected at '^' marker.
D2(config)#switchport trunk encapsulation dot1q
% Invalid input detected at '^' marker.
D2(config)#switchport mode trunk
% Invalid input detected at '^' marker.
D2(config)#exit
D2#.
*Oct 13 07:20:25.084: RV5-S-COM10_1: Configured from console by console
D2#enable
D2#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#interface range e1/0-1
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#interface range e1/1-2
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#
```

Figura 4. Configuración Switch D2

Switch A1

Enable
Configure t
interface range e0/1-2
switchport trunk encapsulation dot1q
switchport mode trunk
interface range e1/1-2
switchport trunk encapsulation dot1q
switchport mode trunk

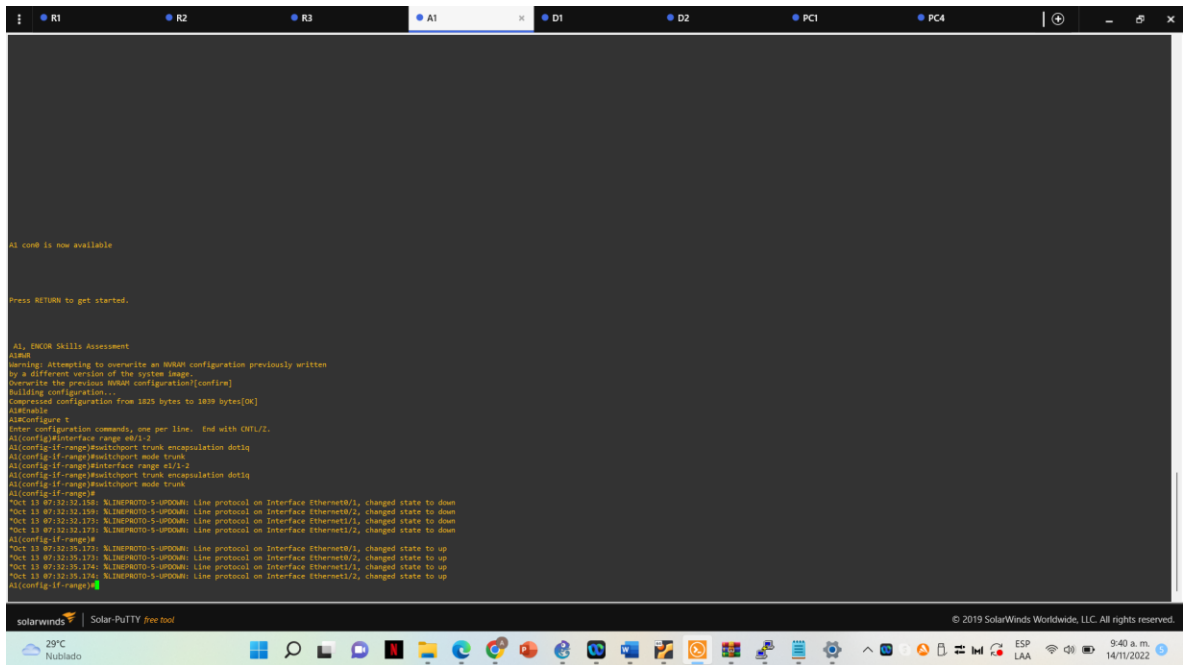


Figura 5. Configuración Switch A1

2.2 En todos los switches cambie la VLAN nativa en los enlaces troncales.

Switch D1

```
interface range e2/0-3
switchport trunk native vlan 999
exit
interface range e0/1-2
switchport trunk native vlan 999
exit
```

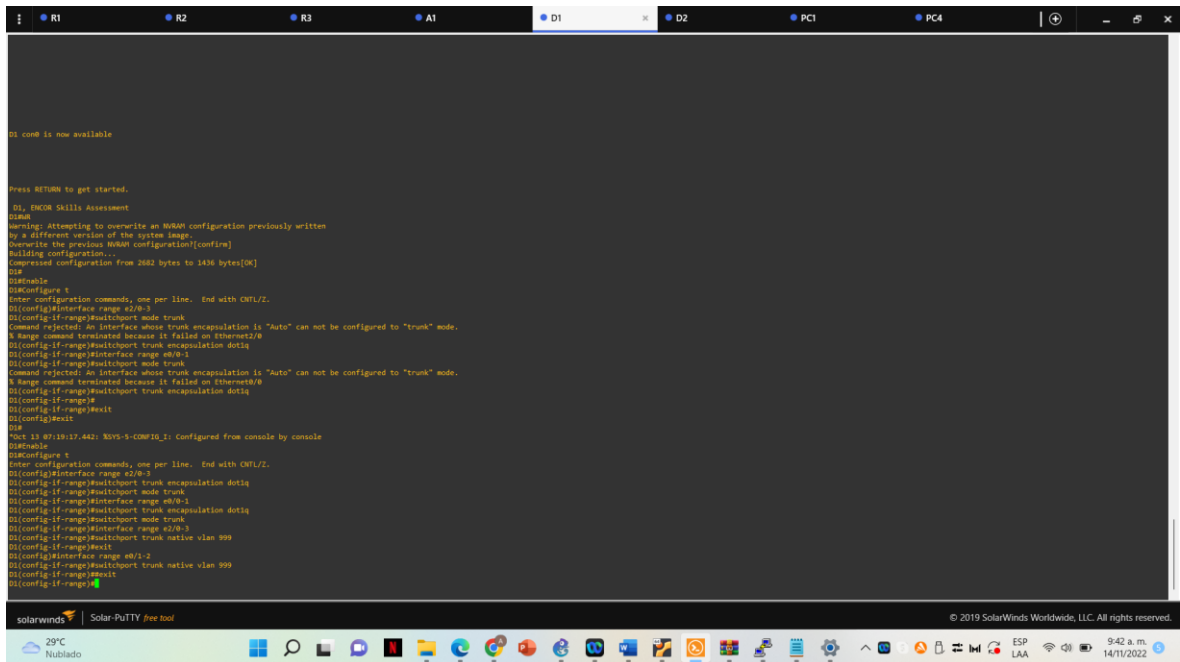



Figura 6. Configuración Vlan Nativa Switch D1

Switch D2

```
interface range e2/0-3
switchport trunk native vlan 999
exit
interface range e1/1-2
switchport trunk native vlan 999
exit
```

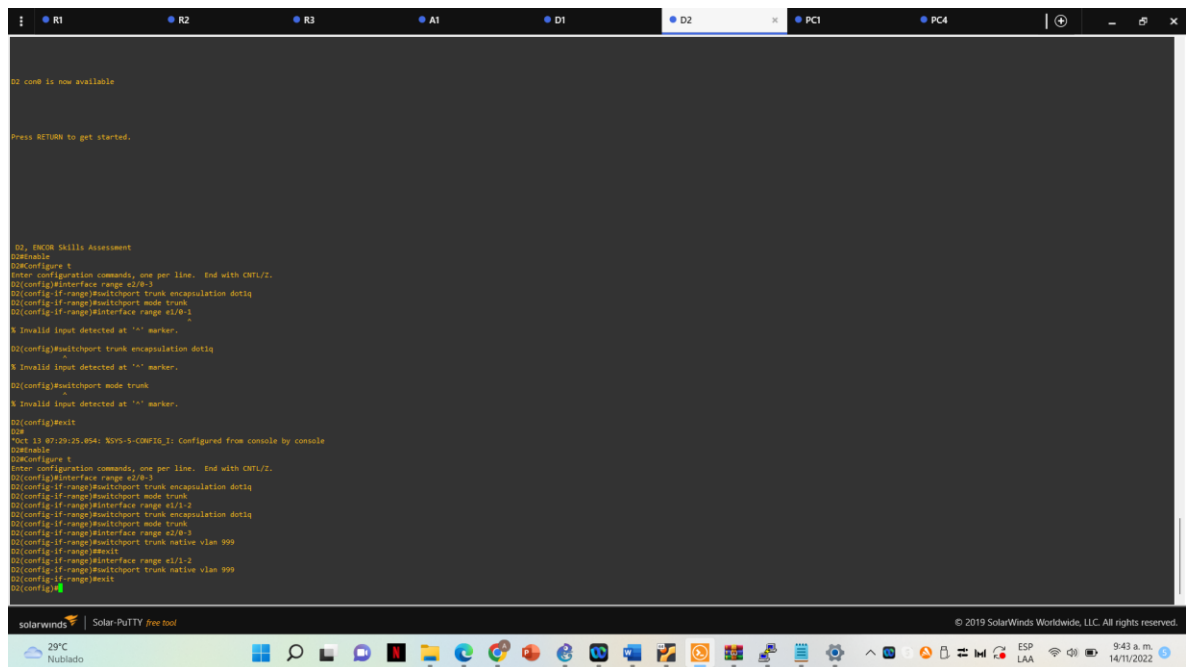


Figura 7. Configuración Vlan Nativa Switch D2

Switch A1

```
interface range e0/1-2
switchport trunk native vlan 999
exit
interface range e1/1-2
switchport trunk native vlan 999
exit
```

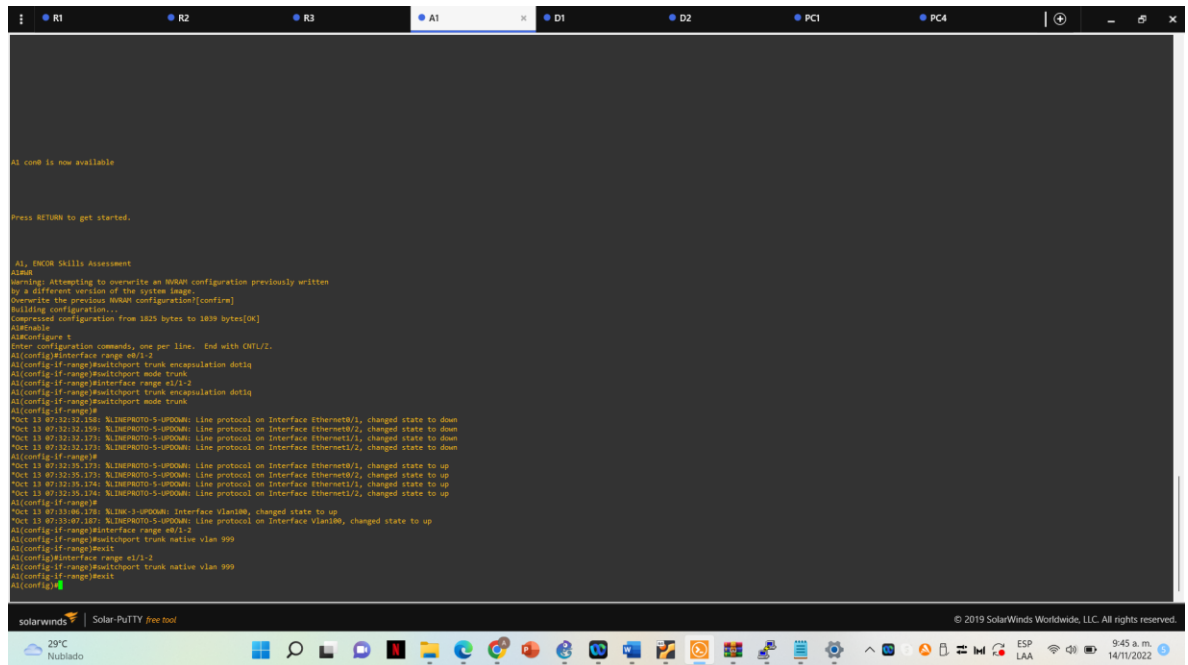


Figura 8. Configuración Vlan Nativa Switch A1

2.3 En todos los switches habilite el protocolo Rapid Spanning-Tree (RSTP)

Switch D1

spanning-tree mode rapid-pvst

```
by a different version of the system image.
Overwrite the previous RWAM configuration?[confirm]
Building configuration...
Compressed configuration from 2682 bytes to 1436 bytes[OK]
D1#
D1#enable
D1#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#interface range e2/8-3
D1(config-if-range)#switchport mode trunk
Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.
% Range command terminated because it failed on 19wrec2/8
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#interface range e0/8-1
D1(config-if-range)#switchport mode trunk
Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.
% Range command terminated because it failed on 19wrec2/8
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#
D1(config-if-range)#exit
D1(config)#exit
D1#
*Oct 13 07:19:17.442: X9Y-5-COMP10_1: Configured from console by console
D1#enable
D1#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#interface range e2/8-3
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#interface range e0/8-1
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#switchport mode trunk
D1(config-if-range)#interface range e2/8-3
D1(config-if-range)#switchport trunk native vlan 999
D1(config-if-range)#exit
D1(config)#interface range e0/1-2
D1(config-if-range)#switchport trunk native vlan 999
D1(config-if-range)#exit
D1(config)#spanning-tree mode rapid-pvst
D1(config)#no shutdown
% Incomplete command.
D1(config)#exit
D1#
*Oct 13 07:38:44.411: X9Y-5-COMP10_1: Configured from console by console
D1#enable
D1#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#spanning-tree mode rapid-pvst
D1(config)#no shutdown
% Incomplete command.
D1(config)#exit
D1#
*Oct 13 07:48:49.127: X9Y-5-COMP10_1: Configured from console by console
D1#enable
D1#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#spanning-tree mode rapid-pvst
D1(config)#
```

Figura 9. Configuración Rapid Spanning-Tree Switch D1

Switch D2

spanning-tree mode rapid-pvst

```

D2: EN0R Skills Assessment
D2#enable
D2#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#interface range e2/8-3
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#interface range e1/8-1
D2(config-if-range)#interface range e1/8-1
% Invalid input detected at '^' marker.
D2(config)#switchport trunk encapsulation dot1q
% Invalid input detected at '^' marker.
D2(config)#switchport mode trunk
% Invalid input detected at '^' marker.
D2(config)#exit
D2#
*Oct 13 07:29:25.654: NVRAM-5-CFGIO_1: Configured from console by console
D2#enable
D2#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#interface range e2/8-3
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#interface range e1/1-2
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#interface range e2/8-3
D2(config-if-range)#switchport trunk native vlan 999
D2(config-if-range)#exit
D2(config-if-range)#interface range e1/1-2
D2(config-if-range)#switchport trunk native vlan 999
D2(config-if-range)#exit
D2(config)#spanning-tree mode rapid-pvst
D2(config)#no shutdown
% Incomplete command.
D2(config)#exit
D2#
*Oct 13 07:43:31.230: NVRAM-5-CFGIO_1: Configured from console by console
D2#enable
D2#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#spanning-tree mode rapid-pvst
D2(config)#no shutdown
% Incomplete command.
D2(config)#exit
D2#
*Oct 13 07:44:36.654: NVRAM-5-CFGIO_1: Configured from console by console
D2#enable
D2#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#spanning-tree mode rapid-pvst
D2(config)#

```

Figura 10. Configuración Rapid Spanning-Tree Switch D2

Switch A1

spanning-tree mode rapid-pvst

```

A1 con0 is now available.
Press RETURN to get started.

A1: EN0R Skills Assessment
A1#
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
Compressed configuration from 1825 bytes to 1839 bytes[OK]
A1#enable
A1#configure t
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#interface range e2/8-2
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#switchport mode trunk
A1(config-if-range)#interface range e1/1-2
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#switchport mode trunk
*Oct 13 07:32:28.150: ALIENPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*Oct 13 07:32:28.159: ALIENPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
*Oct 13 07:32:32.173: ALIENPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to up
*Oct 13 07:32:32.173: ALIENPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to up
A1(config-if-range)#
*Oct 13 07:32:35.193: ALIENPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to up
*Oct 13 07:32:35.173: ALIENPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to up
*Oct 13 07:32:35.174: ALIENPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to up
*Oct 13 07:32:35.174: ALIENPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to up
A1(config-if-range)#
*Oct 13 07:33:06.198: ALIENPROTO-5-UPDOWN: Interface Vlan100, changed state to up
*Oct 13 07:33:07.187: ALIENPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state to up
A1(config-if-range)#interface range e1/1-2
A1(config-if-range)#switchport mode trunk
A1(config-if-range)#switchport trunk native vlan 999
A1(config-if-range)#exit
A1(config)#interface range e1/1-2
A1(config-if-range)#switchport trunk native vlan 999
A1(config-if-range)#exit
A1(config)#spanning-tree mode rapid-pvst
A1(config)#

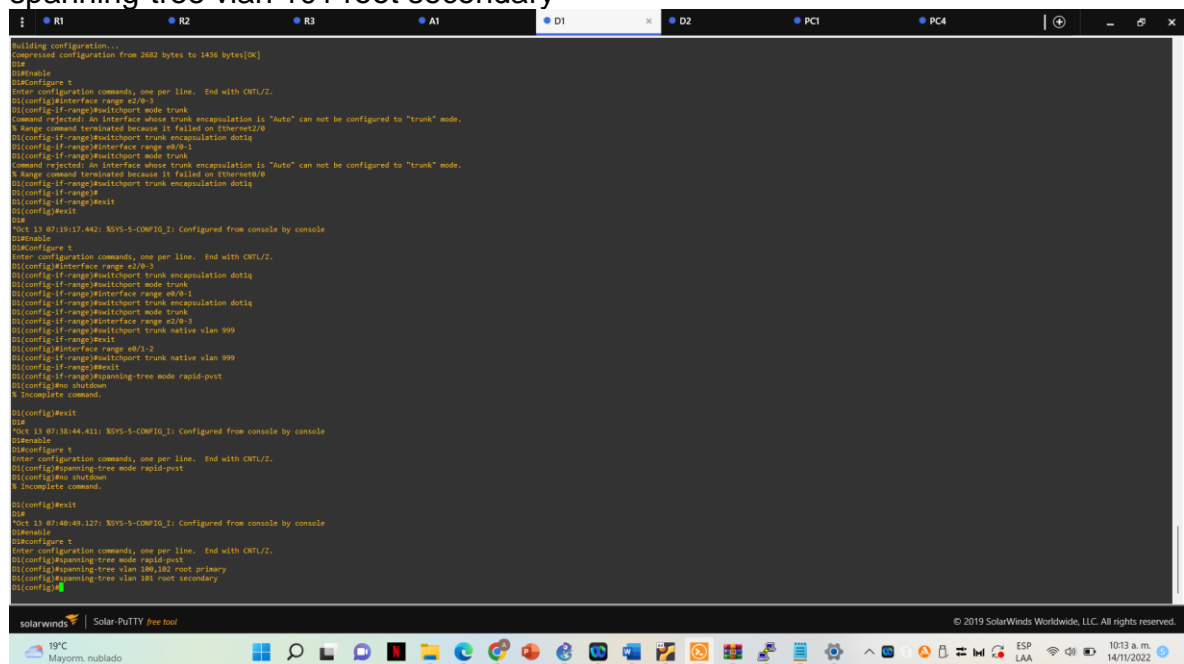
```

Figura 11. Configuración Rapid Spanning-Tree Switch A1

2.4 En D1 y D2, configure los puentes raíz RSTP (root bridges) según la información del diagrama de topología.
D1 y D2 deben proporcionar respaldo en caso de falla del puente raíz (root bridge).

Switch D1

spanning-tree vlan 100,102 root primary
spanning-tree vlan 101 root secondary



```
building configuration...
Compressed configuration from 2682 bytes to 1436 bytes[OK]
D1#
D1#enable
D1#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#interface range e2/0-3
D1(config-if-range)#switchport mode trunk
Command rejected: on interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.
% Range command terminated because it failed on Ethernet2/0
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#interface range e0/0-3
D1(config-if-range)#switchport mode trunk
Command rejected: on interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.
% Range command terminated because it failed on Ethernet0/0
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#
D1(config)#exit
D1#
D1#
*Oct 13 07:30:17.442: NOV-5-COMF10_1: Configured from console by console
D1#enable
D1#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#interface range e2/0-3
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#switchport mode trunk
D1(config-if-range)#interface range e0/0-3
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#switchport trunk native vlan 999
D1(config-if-range)#exit
D1(config)#interface range e0/1-2
D1(config-if-range)#switchport trunk native vlan 999
D1(config-if-range)#exit
D1(config)#spanning-tree mode rapid-pvst
D1(config)#no shutdown
% Incomplete command.
D1(config)#exit
D1#
*Oct 13 07:30:44.411: NOV-5-COMF10_1: Configured from console by console
D1#enable
D1#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#spanning-tree mode rapid-pvst
D1(config)#no shutdown
% Incomplete command.
D1(config)#exit
D1#
*Oct 13 07:40:49.127: NOV-5-COMF10_1: Configured from console by console
D1#enable
D1#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#spanning-tree mode rapid-pvst
D1(config)#spanning-tree vlan 100,102 root primary
D1(config)#spanning-tree vlan 101 root secondary
D1(config)#
```

Figura 12. Configuración puente raíz Switch D1

Switch D2

spanning-tree vlan 101 root primary
spanning-tree vlan 100,102 root secondary

```
D2#enable
D2#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#interface range e2/0-3
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#interface range e1/0-1
% Invalid input detected at '^' marker.
D2(config)#switchport trunk encapsulation dot1q
% Invalid input detected at '^' marker.
D2(config)#switchport mode trunk
% Invalid input detected at '^' marker.
D2(config)#exit
D2#
Nov 13 07:29:25.004: N95V-S-COMP[D_1]: Configured from console by console
D2#enable
D2#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#interface range e2/0-3
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#interface range e1/1-2
D2(config-if-range)#switchport trunk native vlan 999
D2(config-if-range)#exit
D2(config-if-range)#interface range e1/1-2
D2(config-if-range)#switchport trunk native vlan 999
D2(config-if-range)#exit
D2(config)#spanning-tree mode rapid-pvst
D2(config)#no shutdown
% Incomplete command.
D2(config)#exit
D2#
Nov 13 07:41:31.239: N95V-S-COMP[D_1]: Configured from console by console
D2#enable
D2#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#spanning-tree mode rapid-pvst
D2(config)#no shutdown
% Incomplete command.
D2(config)#exit
D2#
Nov 13 07:44:36.854: N95V-S-COMP[D_1]: Configured from console by console
D2#enable
D2#configure t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#spanning-tree mode rapid-pvst
D2(config)#spanning-tree vlan 181 root primary
D2(config)#spanning-tree vlan 180,182 root secondary
D2(config)#
```

Figura 13. Configuración puente raíz Switch D2

2.5 En todos los switches, cree EtherChannels LACP como se muestra en el diagrama de topología.

Switch D1

```
interface range e2/0-3
channel-group 12 mode active
no shutdown
exit
interface range e0/1-2
channel-group 1 mode active
no shutdown
exit
```

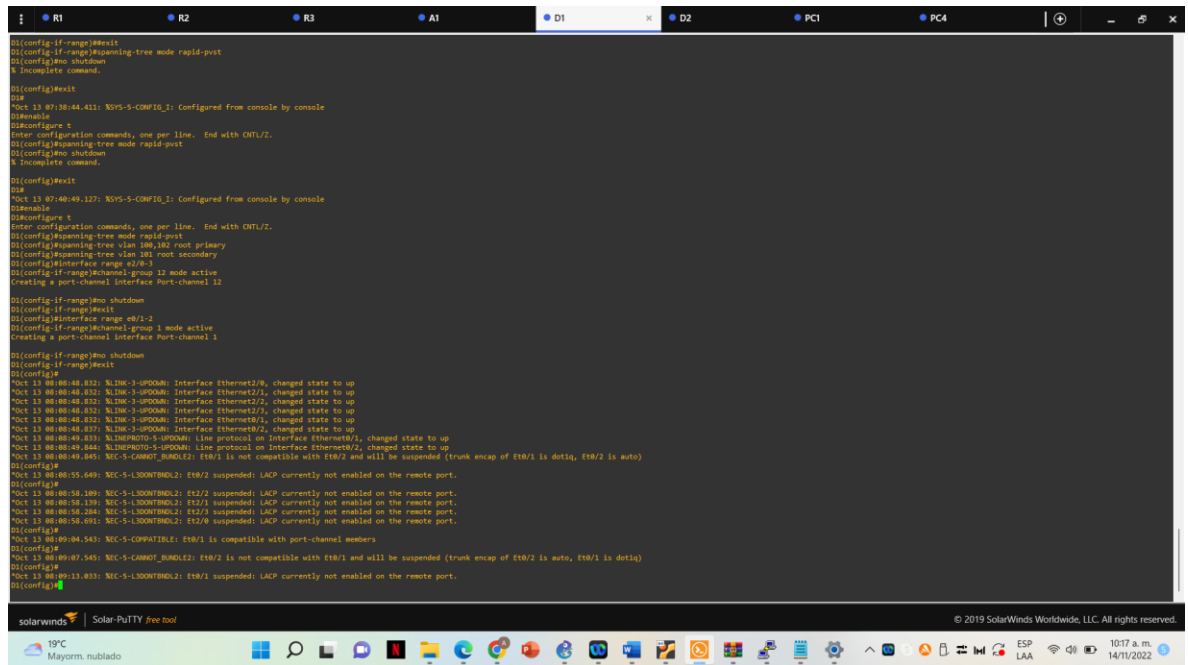


Figura 14. Configuración LACP Switch D1

Switch D2

```

interface range e2/0-3
channel-group 12 mode active
no shutdown
exit
interface range e1/1-2
channel-group 1 mode active
no shutdown
exit
  
```

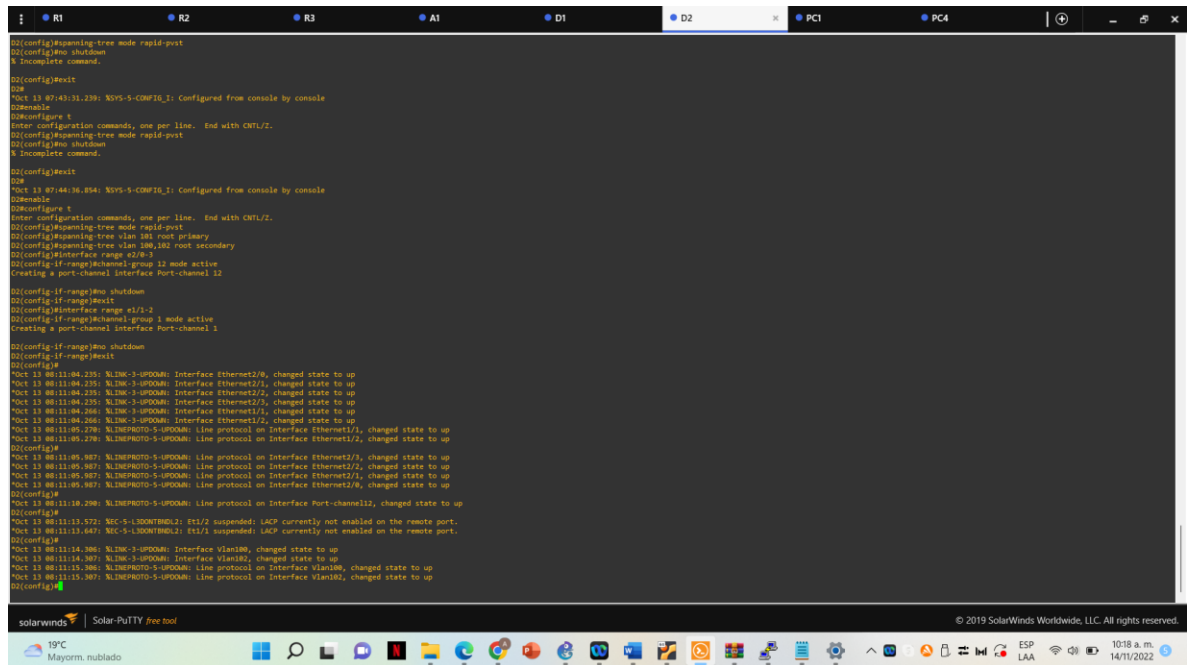



Figura 15. Configuración LACP Switch D2

Switch A1

```

interface range e0/1-2
channel-group 1 mode active
no shutdown
interface range e1/1-2
channel-group 2 mode active
no shutdown
spanning-tree portfast
no shutdown
exit

```

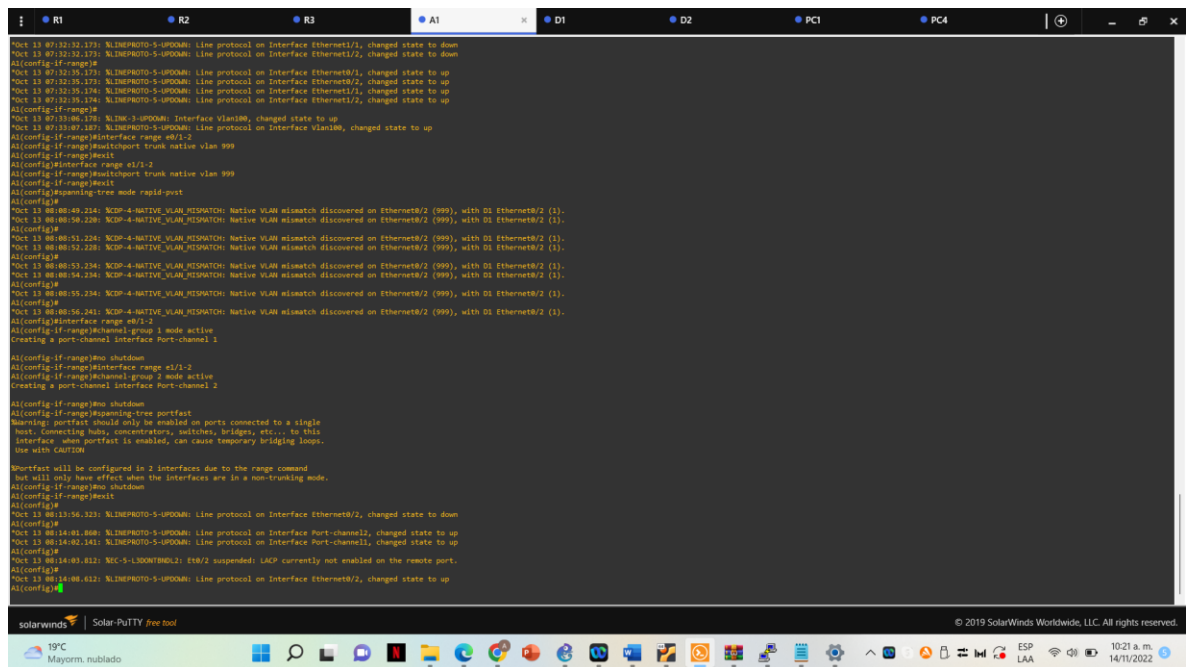


Figura 16. Configuración LACP Switch A1

2.6 En todos los switches, configure los puertos de acceso del host (host access port) que se conectan a PC1, PC2, PC3 y PC4.

Switch D1

```

interface e0/0
switchport mode access
switchport access vlan 100
spanning-tree portfast
no shutdown
exit

```

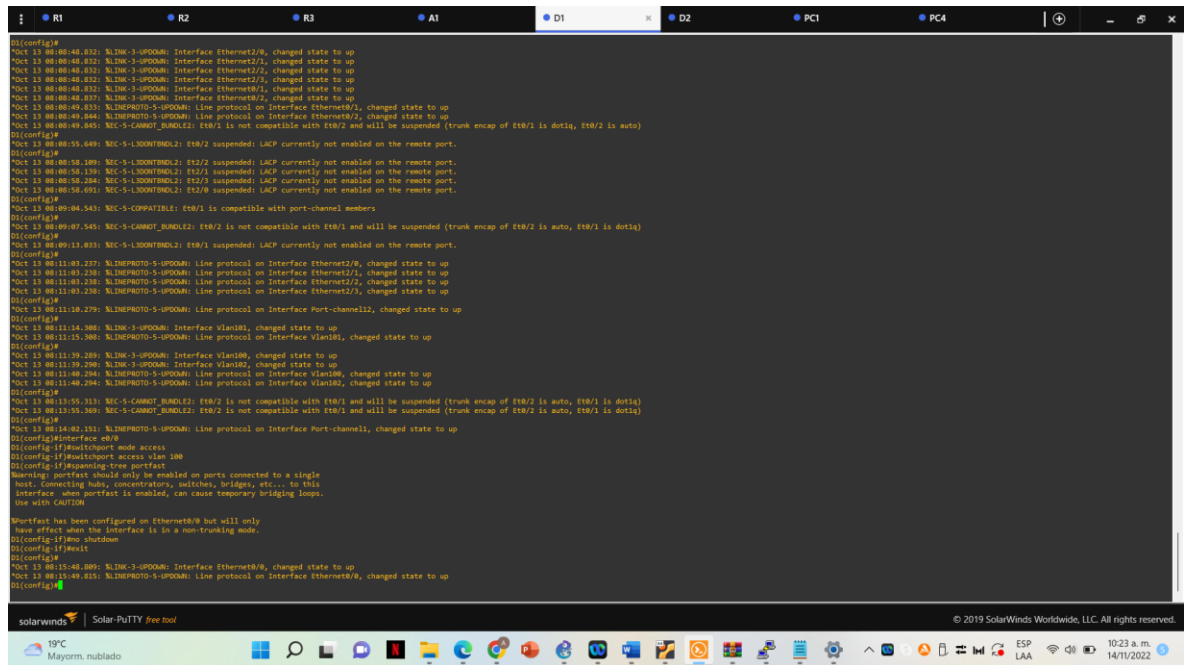


Figura 17. Configuración Puerto acceso host Switch D1

Switch D2
 interface e0/0
 switchport mode access
 switchport access vlan 102
 spanning-tree portfast
 no shutdown
 exit

```

D2(config)#spanning-tree vlan 101 root primary
D2(config)#spanning-tree vlan 100,102 root secondary
D2(config)#interface range e2/0-3
D2(config-if-range)#channel-group 12 mode active
Creating a port-channel interface Port-channel 12
D2(config-if-range)#no shutdown
D2(config-if-range)#exit
D2(config)#interface range e1/1-2
D2(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1
D2(config-if-range)#no shutdown
D2(config-if-range)#exit
D2(config)#if-range#exit
D2(config)#
M0ct 13 08:11:04.235: NLINK-3-UPDOWN: Interface Ethernet2/0, changed state to up
M0ct 13 08:11:04.235: NLINK-3-UPDOWN: Interface Ethernet2/1, changed state to up
M0ct 13 08:11:04.235: NLINK-3-UPDOWN: Interface Ethernet2/2, changed state to up
M0ct 13 08:11:04.235: NLINK-3-UPDOWN: Interface Ethernet2/3, changed state to up
M0ct 13 08:11:04.264: NLINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
M0ct 13 08:11:04.265: NLINK-3-UPDOWN: Interface Ethernet2/2, changed state to up
M0ct 13 08:11:05.270: NLINK-3-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
M0ct 13 08:11:05.270: NLINK-3-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to up
D2(config)#
M0ct 13 08:11:05.987: NLINK-3-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to up
M0ct 13 08:11:05.987: NLINK-3-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to up
M0ct 13 08:11:05.987: NLINK-3-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to up
M0ct 13 08:11:05.987: NLINK-3-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to up
D2(config)#
M0ct 13 08:11:10.290: NLINK-3-UPDOWN: Line protocol on Interface Port-channel12, changed state to up
D2(config)#
M0ct 13 08:11:13.572: SEC-5-LSONTMNL2: E11/2 suspended: LACP currently not enabled on the remote port.
M0ct 13 08:11:13.697: SEC-5-LSONTMNL2: E11/1 suspended: LACP currently not enabled on the remote port.
D2(config)#
M0ct 13 08:11:14.980: NLINK-3-UPDOWN: Interface Vlan100, changed state to up
M0ct 13 08:11:14.980: NLINK-3-UPDOWN: Interface Vlan102, changed state to up
M0ct 13 08:11:15.986: NLINK-3-UPDOWN: Line protocol on Interface Vlan100, changed state to up
M0ct 13 08:11:15.987: NLINK-3-UPDOWN: Line protocol on Interface Vlan102, changed state to up
D2(config)#
M0ct 13 08:11:20.281: NLINK-3-UPDOWN: Interface Vlan101, changed state to up
M0ct 13 08:11:40.294: NLINK-3-UPDOWN: Line protocol on Interface Vlan101, changed state to up
D2(config)#
M0ct 13 08:14:01.055: NLINK-3-UPDOWN: Line protocol on Interface Port-channel1, changed state to up
D2(config)#interface e0/0
D2(config-if)#switchport mode access
D2(config-if)#switchport access vlan 102
D2(config-if)#spanning-tree portfast
Warning: portfast should only be enabled on ports connected to a single
device. Connecting hubs, concentrators, switches, bridges, etc... to this
interface when portfast is enabled, can cause temporary bridging loops.
Use with CAUTION
Portfast has been configured on Ethernet0/0 but will only
have effect when the interface is in a non-trunking mode.
D2(config-if)#no shutdown
D2(config-if)#exit
D2(config)#
M0ct 13 08:18:05.277: NLINK-3-UPDOWN: Interface Ethernet0/0, changed state to up
M0ct 13 08:18:06.281: NLINK-3-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to up
D2(config)#

```

Figura 18. Configuración Puerto acceso host Switch D2

Switch A1
 interface e1/3
 switchport mode access
 switchport access vlan 101
 spanning-tree portfast
 no shutdown
 interface e2/0
 switchport mode access
 switchport access vlan 100
 spanning-tree portfast
 no shutdown
 exit

En este escenario se comprueban configuraciones en P1, PC2, PC3 Y PC4.

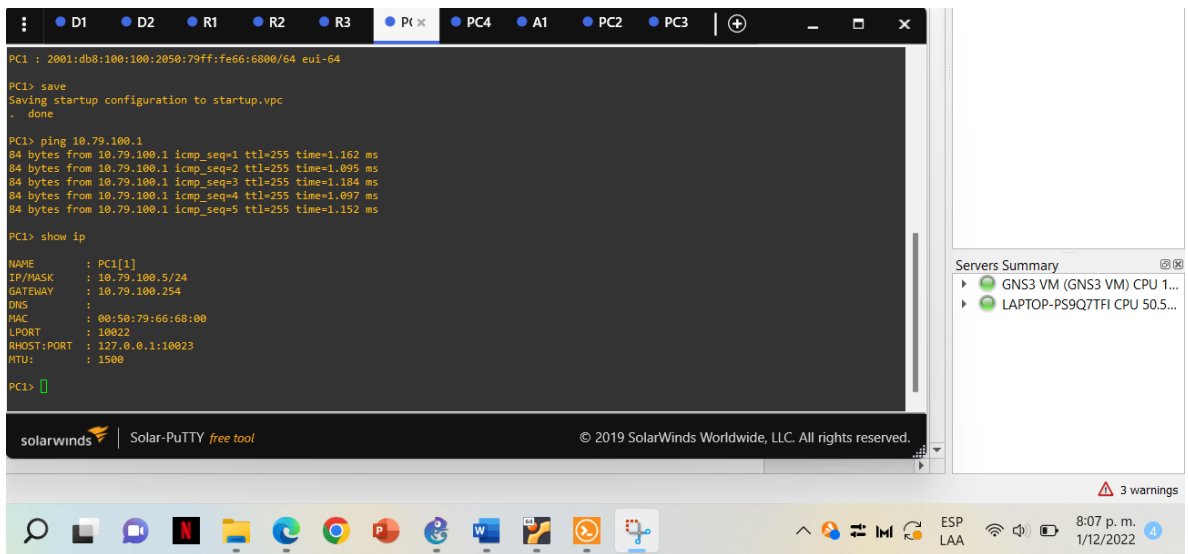


Figura 19. Comprobación IP PC1

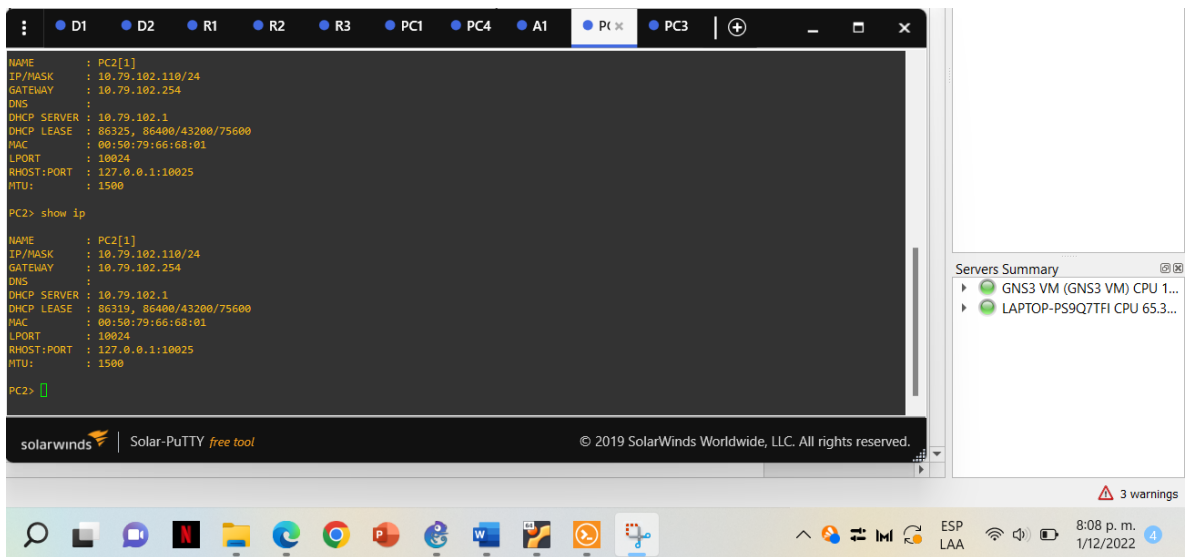


Figura 20. Comprobación IP PC2

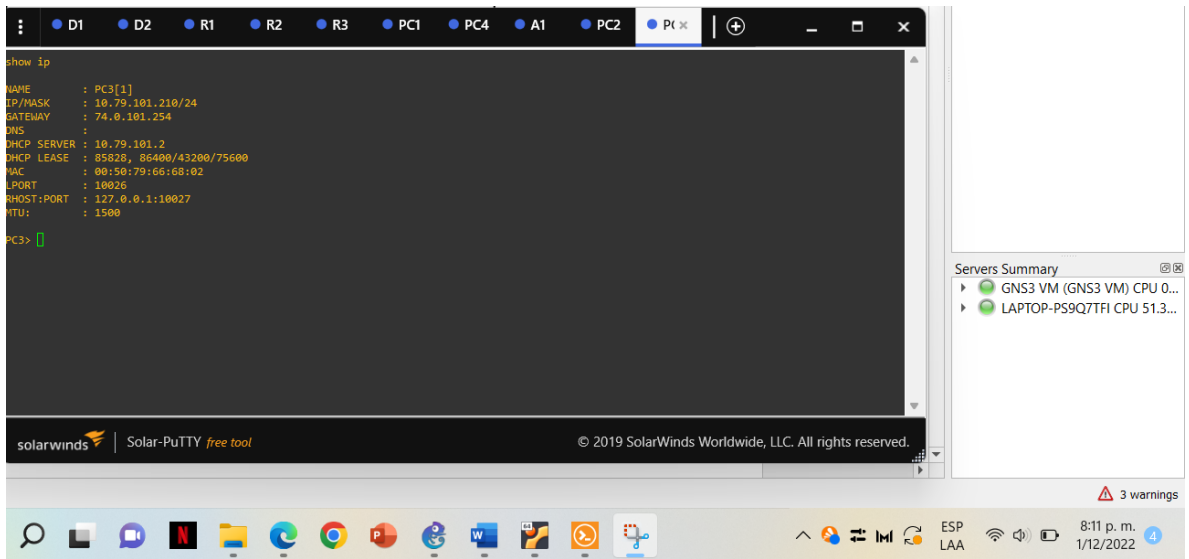


Figura 21. Comprobación IP PC3

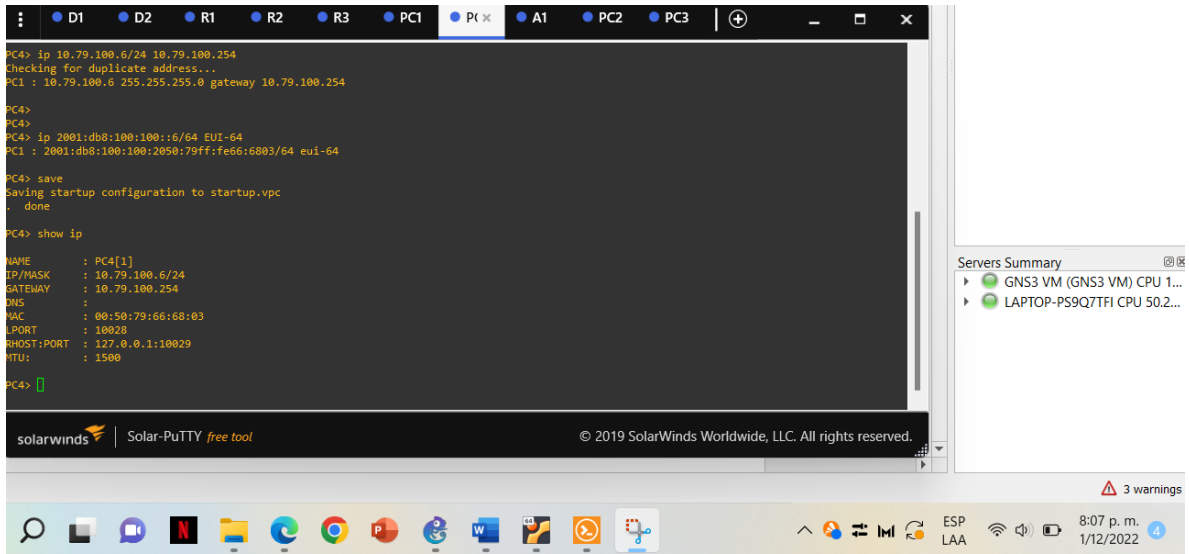


Figura 22. Comprobación IP PC4

Se hace ping para verificar conexiones en P1, PC2, PC3 Y PC4.

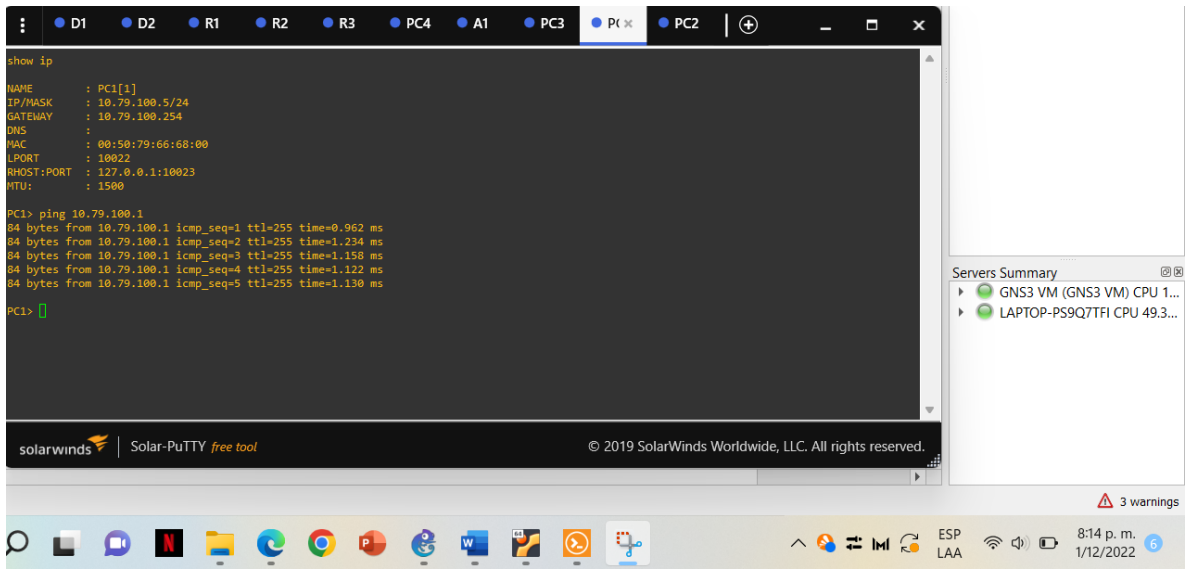


Figura 23. Ping PC1 10.79.100.1

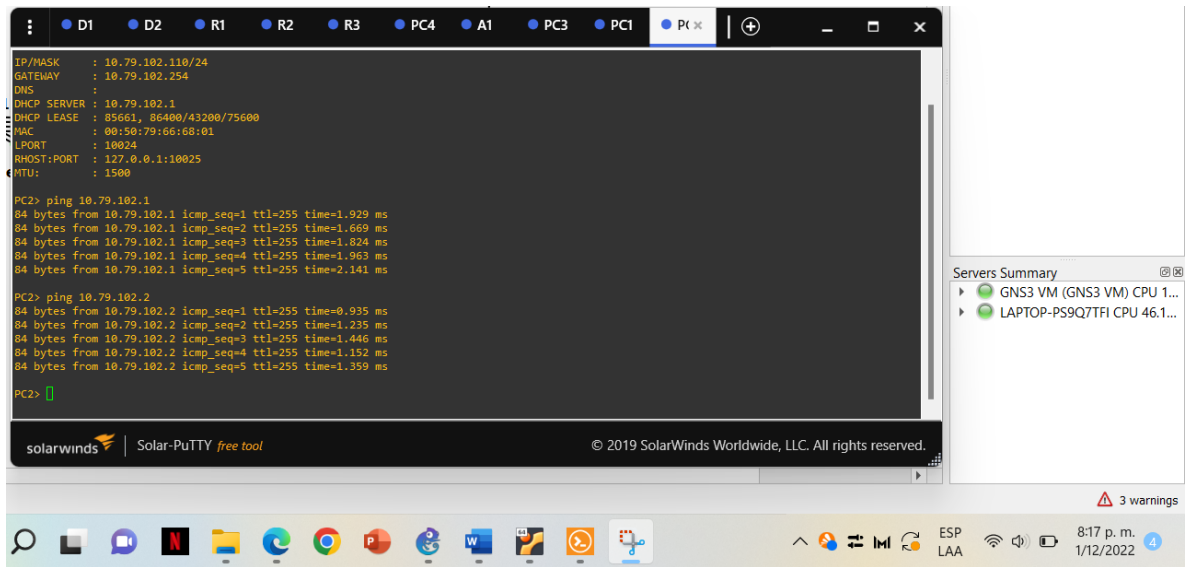


Figura 24. Ping Pc2 10.79.102.1 y 10.79.102.2

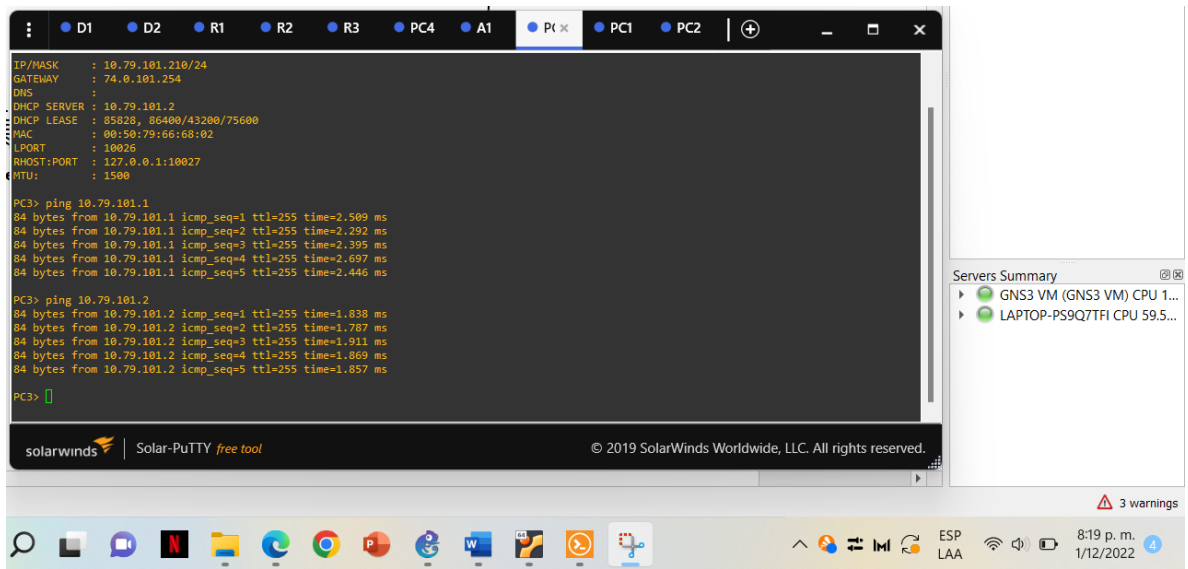


Figura 25. Ping Pc3 10.79.101.1 y 10.79.101.2

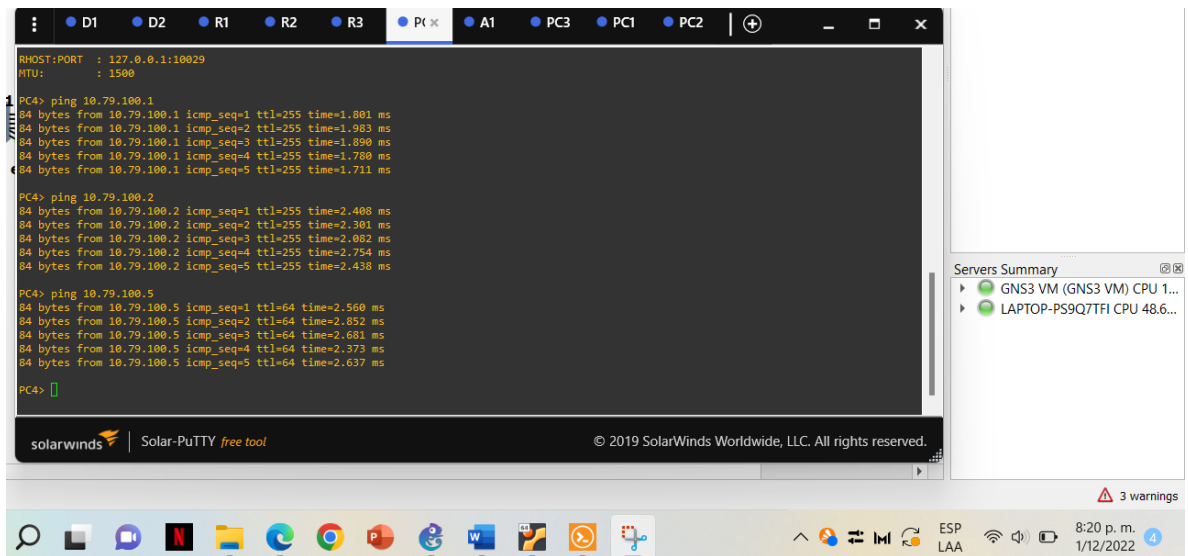


Figura 26. Ping Pc4 10.79.100.1, 10.79.100.2, 10.79.100.5

DESARROLLO DEL PROYECTO ESCENARIO 2

Parte 1. Configurar protocolos de enrutamiento

En esta parte, configurará los protocolos de enrutamiento IPv4 e IPv6. Al final de esta parte, la red debe ser completamente convergente. Los pings IPv4 e IPv6 a la interfaz Loopback 0 desde D1 y D2 deberían realizarse correctamente.

Nota: Los pings de los hosts no se realizarán correctamente porque sus puertas de enlace predeterminadas apuntan a la dirección HSRP que se habilitará en la Parte 4.

Las tareas de configuración son las siguientes:

Task#	Task	Specification	Points
3.1	On the "Company Network" (i.e., R1, R3, D1, and D2), configure single-area OSPFv2 in area 0.	<p>Use OSPF Process ID 4 and assign the following router-IDs:</p> <ul style="list-style-type: none"> • R1: 0.0.4.1 • R3: 0.0.4.3 • D1: 0.0.4.131 • D2: 0.0.4.132 <p>On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0.</p> <ul style="list-style-type: none"> • On R1, do not advertise the R1 – R2 network. • On R1, propagate a default route. Note that the default route will be provided by BGP. <p>Disable OSPFv2 advertisements on:</p> <ul style="list-style-type: none"> • D1: All interfaces except E1/2 • D2: All interfaces except E1/0 	8
3.2	On the "Company Network" (i.e., R1, R3, D1, and D2), configure classic single-area OSPFv3 in area 0.	<p>Use OSPF Process ID 6 and assign the following router-IDs:</p> <ul style="list-style-type: none"> • R1: 0.0.6.1 • R3: 0.0.6.3 • D1: 0.0.6.131 • D2: 0.0.6.132 <p>On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0.</p> <ul style="list-style-type: none"> • On R1, do not advertise the R1 – R2 network. • On R1, propagate a default route. Note that the default route will be provided by BGP. <p>Disable OSPFv3 advertisements on:</p> <ul style="list-style-type: none"> • D1: All interfaces except E1/2 • D2: All interfaces except E1/0 	8

Task#	Task	Specification	Points
3.3	On R2 in the "ISP Network", configure MP-BGP.	<p>Configure two default static routes via interface Loopback 0:</p> <ul style="list-style-type: none"> • An IPv4 default static route. • An IPv6 default static route. <p>Configure R2 in BGP ASN 500 and use the router-id 2.2.2.2.</p> <p>Configure and enable an IPv4 and IPv6 neighbor relationship with R1 in ASN 300.</p> <p>In IPv4 address family, advertise:</p> <ul style="list-style-type: none"> • The Loopback 0 IPv4 network (/32). • The default route (0.0.0.0/0). <p>In IPv6 address family, advertise:</p> <ul style="list-style-type: none"> • The Loopback 0 IPv4 network (/128). • The default route (::/0). 	4
3.4	On R1 in the "ISP Network", configure MP-BGP.	<p>Configure two static summary routes to interface Null 0:</p> <ul style="list-style-type: none"> • A summary IPv4 route for 10.XY.0.0/8. • A summary IPv6 route for 2001:db8:100::/48. <p>Configure R1 in BGP ASN 300 and use the router-id 1.1.1.1.</p> <p>Configure an IPv4 and IPv6 neighbor relationship with R2 in ASN 500.</p> <p>In IPv4 address family:</p> <ul style="list-style-type: none"> • Disable the IPv6 neighbor relationship. • Enable the IPv4 neighbor relationship. • Advertise the 10.XY.0.0/8 network. <p>In IPv6 address family:</p> <ul style="list-style-type: none"> • Disable the IPv4 neighbor relationship. • Enable the IPv6 neighbor relationship. • Advertise the 2001:db8:100::/48 network. 	4

Tabla 3. Tabla tareas escenario 2 parte 1

Parte 2. Configurar redundancia de primer salto

En esta parte, configurará HSRP versión 2 para proporcionar redundancia de primer salto para hosts en la "Red de la empresa".

Las tareas de configuración son las siguientes:

Task#	Task	Specification	Points
4.1	On D1, create IP SLAs that test the reachability of R1 interface E1/2.	<p>Create two IP SLAs.</p> <ul style="list-style-type: none"> • Use SLA number 4 for IPv4. • Use SLA number 6 for IPv6. <p>The IP SLAs will test availability of R1 E1/2 interface every 5 seconds.</p> <p>Schedule the SLA for immediate implementation with no end time.</p> <p>Create an IP SLA object for IP SLA 4 and one for IP SLA 6.</p> <ul style="list-style-type: none"> • Use track number 4 for IP SLA 4. • Use track number 6 for IP SLA 6. <p>The tracked objects should notify D1 if the IP SLA state changes from down to up after 10 seconds, or from up to down after 15 seconds.</p>	2
4.2	On D2, create IP SLAs that test the reachability of R3 interface E1/0.	<p>Create two IP SLAs.</p> <ul style="list-style-type: none"> • Use SLA number 4 for IPv4. • Use SLA number 6 for IPv6. <p>The IP SLAs will test availability of R3 E1/0 interface every 5 seconds.</p> <p>Schedule the SLA for immediate implementation with no end time.</p> <p>Create an IP SLA object for IP SLA 4 and one for IP SLA 6.</p> <ul style="list-style-type: none"> • Use track number 4 for IP SLA 4. • Use track number 6 for IP SLA 6. <p>The tracked objects should notify D1 if the IP SLA state changes from down to up after 10 seconds, or from up to down after 15 seconds.</p>	2

Task#	Task	Specification	Points
4.3	On D1, configure HSRPv2.	<p>D1 is the primary router for VLANs 100 and 102; therefore, their priority will also be changed to 150.</p> <p>Configure HSRP version 2.</p> <p>Configure IPv4 HSRP group 104 for VLAN 100:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.XY.100.254. • Set the group priority to 150. • Enable preemption. • Track object 4 and decrement by 60. <p>Configure IPv4 HSRP group 114 for VLAN 101:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.XY.101.254. • Enable preemption. • Track object 4 to decrement by 60. <p>Configure IPv4 HSRP group 124 for VLAN 102:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.XY.102.254. • Set the group priority to 150. • Enable preemption. • Track object 4 to decrement by 60. <p>Configure IPv6 HSRP group 106 for VLAN 100:</p> <ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Set the group priority to 150. • Enable preemption. • Track object 6 and decrement by 60. <p>Configure IPv6 HSRP group 116 for VLAN 101:</p> <ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Enable preemption. • Track object 6 and decrement by 60. <p>Configure IPv6 HSRP group 126 for VLAN 102:</p> <ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Set the group priority to 150. • Enable preemption. • Track object 6 and decrement by 60. 	8

Task#	Task	Specification	Points
	On D2, configure HSRPv2.	<p>D2 is the primary router for VLAN 101; therefore, the priority will also be changed to 150.</p> <p>Configure HSRP version 2.</p> <p>Configure IPv4 HSRP group 104 for VLAN 100:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.XY.100.254. • Enable preemption. • Track object 4 and decrement by 60. <p>Configure IPv4 HSRP group 114 for VLAN 101:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.XY.101.254. • Set the group priority to 150. • Enable preemption. • Track object 4 to decrement by 60. <p>Configure IPv4 HSRP group 124 for VLAN 102:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.XY.102.254. • Enable preemption. • Track object 4 to decrement by 60. <p>Configure IPv6 HSRP group 106 for VLAN 100:</p> <ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Enable preemption. • Track object 6 and decrement by 60. <p>Configure IPv6 HSRP group 116 for VLAN 101:</p> <ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Set the group priority to 150. • Enable preemption. • Track object 6 and decrement by 60. <p>Configure IPv6 HSRP group 126 for VLAN 102:</p> <ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Enable preemption. • Track object 6 and decrement by 60. 	

Tabla 4. Tabla tareas escenario 2 parte 2

3.1 RUOTER 1

```

Enable
Configure t
router ospf 4
router-id 0.0.4.1
network 10.79.10.0 0.0.0.255 area 0
network 10.79.13.0 0.0.0.255 area 0
default-information originate
exit

```

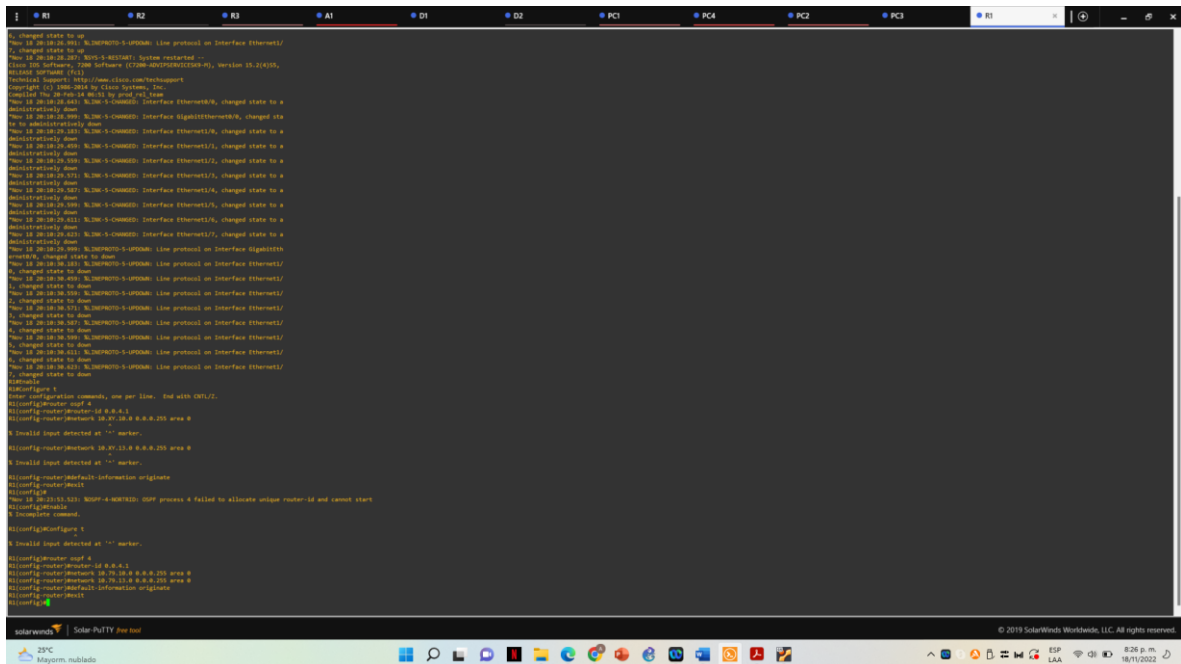


Figura 27. Configuración OSPF R1

3.1 ROUTER 3

```

Enable
Configure t
router ospf 4
router-id 0.0.4.3
network 10.79.11.0 0.0.0.255 area 0
network 10.79.13.0 0.0.0.255 area 0
default-information originate
exit

```

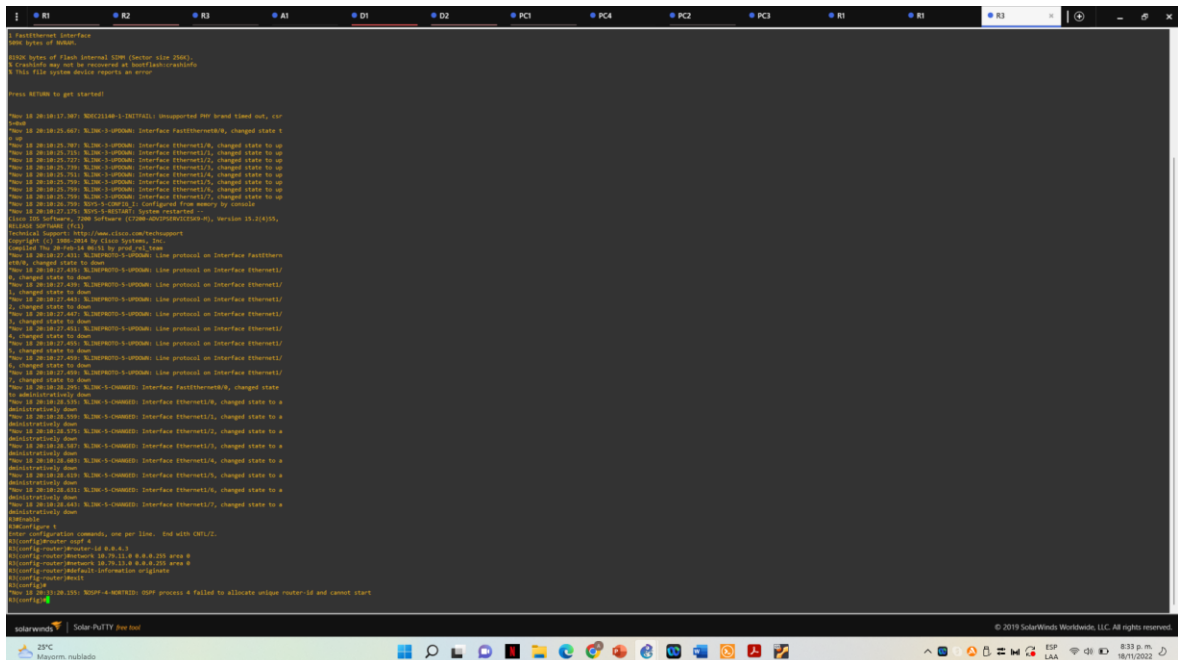


Figura 28. Configuración OSPF R3

```

3.1 SWITCH D1
Enable
Configure t
router ospf 4
router-id 0.0.4.131
network 10.79.100.0 0.0.0.255 area 0
network 10.79.101.0 0.0.0.255 area 0
network 10.79.102.0 0.0.0.255 area 0
network 10.79.10.0 0.0.0.255 area 0
passive-interface default
passive-interface e1/2
exit

```

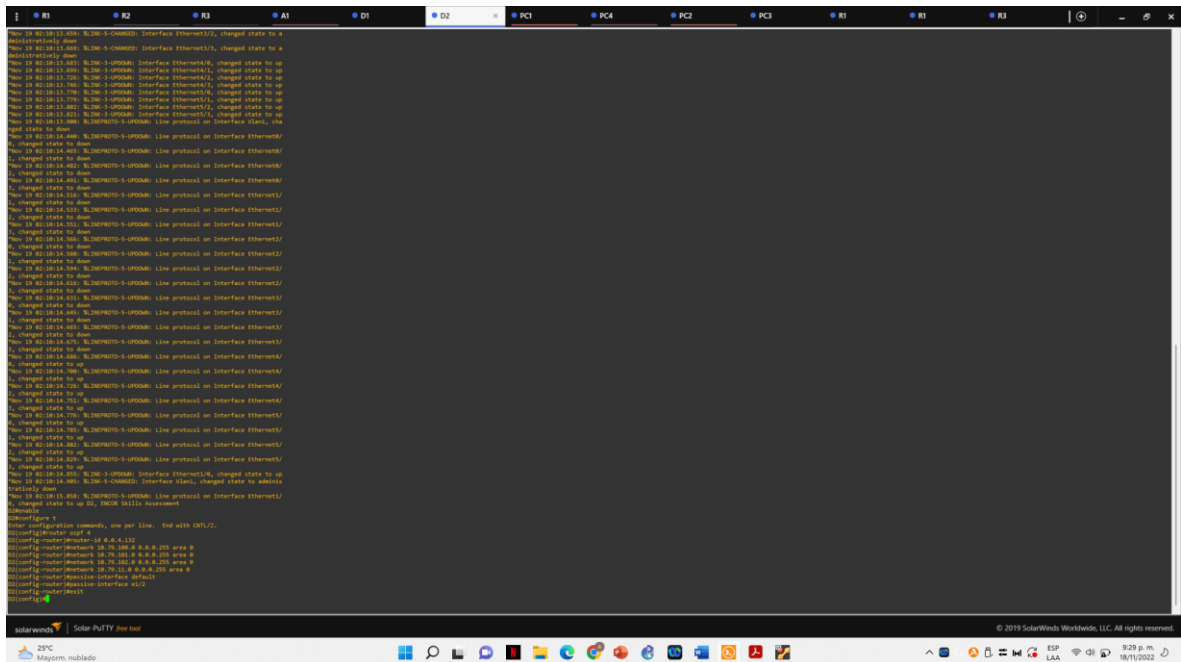



Figura 30. Configuración OSPF D2

3.2

ROUTER R1

```

  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
  
```

```

Powershell input detected as " " marker.
R3>enable
R3>configure t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#hostname R1
R1(config)#ipv6 unicast-routing
R1(config)#no ip domain lookup
R1(config)#banner motd # R1, ENCON Skills Assessment
R1(config)#line con 0
R1(config)#line#logging synchronous
R1(config)#line#exec-timeout 0 0
R1(config)#interface e1/0
R1(config)#ip address 209.165.200.225 255.255.255.224
R1(config)#ipv6 address fe80::111:: link-local
R1(config)#ip# shutdown
R1(config)#no shutdown
R1(config)#interface e1/2
R1(config)#ip address 10.79.10.1 255.255.255.0
R1(config)#ipv6 address fe80::112:: link-local
R1(config)#ip# shutdown
R1(config)#no shutdown
R1(config)#interface e1/1
R1(config)#ip address 10.79.13.1 255.255.255.0
R1(config)#ipv6 address 2001::db8:1003::1/64
R1(config)#ip# shutdown
R1(config)#no shutdown
R1(config)#router ospf 6
R1(config)#router#router-id 0.0.4.1
R1(config)#router#network 10.79.10.0 0.0.0.255 area 0
R1(config)#router#network 10.79.13.0 0.0.0.255 area 0
R1(config)#router#default-information originate
R1(config)#router#exit
R1(config)#
Nov 19 01:12:37.779: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
Nov 19 01:12:38.451: %LINK-3-UPDOWN: Interface Ethernet1/2, changed state to up
Nov 19 01:12:38.779: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
Nov 19 01:12:38.859: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
R1(config)#
Nov 19 01:12:451: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to up
R1(config)#
Nov 19 01:12:459: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
R1(config)#
Nov 19 01:12:50.999: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not half duplex), with D1 Ethernet1/2 (half duplex).
R1(config)#
Nov 19 01:12:50.999: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not half duplex), with D1 Ethernet1/2 (half duplex).
R1(config)#router ospf 6
R1(config)#router#router-id 0.0.6.1
R1(config)#router#default-information originate
R1(config)#router#exit
R1(config)#interface e1/2
R1(config)#ip# shutdown
R1(config)#no shutdown
R1(config)#interface e1/1
R1(config)#ip# shutdown
R1(config)#no shutdown
R1(config)#
Nov 19 01:12:19.215: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.131 on Ethernet1/2 from LOADING to FULL, Loading Done
R1(config)#

```

Figura 31. Configuración OSPF R1

```

3.2 ROUTER R3
ipv6 router ospf 6
router-id 0.0.6.3
default-information originate
exit
interface e1/1
ipv6 ospf 6 area 0
exit
interface e1/0
ipv6 ospf 6 area 0
exit
end

```

```

R3#end
% Invalid input detected at '^' marker.
R3#enable
R3#configure t
Enter configuration commands, one per line. End with CTRL/Z.
R3(config)#hostname R3
R3(config)#ip ospf unix-rt-rtospf
R3(config)#no ip domain lookup
R3(config)#banner motd @ R3, ENOC Skills Assessment
R3(config)#line con 0
R3(config)#line con 0
R3(config)#line vty 0 4
R3(config)#logging synchronous
R3(config)#no ip
R3(config)#interface v1/0
R3(config-if)#ip address 10.79.11.1 255.255.255.0
R3(config-if)#ip ospf address 1000::11 128::128
R3(config-if)#ip ospf address 2001:db8:1001:1011::1/64
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#interface v2/1
R3(config-if)#ip address 10.79.13.1 255.255.255.0
R3(config-if)#ip ospf address 1000::11 128::128
R3(config-if)#ip ospf address 2001:db8:1001:1010::1/64
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#
Mon 19 02:00:23.755: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
Mon 19 02:00:24.231: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
Mon 19 02:00:24.755: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
R3(config)#
Mon 19 02:00:29.231: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
R3(config)#
Mon 19 02:00:40.935: %SDP-4-DUPLICATION: duplex mismatch discovered on ethernet1/0 (not half duplex), with D2 Ethernet1/0 (half duplex).
R3(config)#router ospf 6
R3(config-router)#router-id 0.0.6.132
R3(config-router)#network 10.79.11.0 0.0.0.255 area 0
R3(config-router)#network 10.79.13.0 0.0.0.255 area 0
R3(config-router)#default-information originate
R3(config-router)#exit
R3(config)#router ospf 6
R3(config-router)#router-id 0.0.6.132
R3(config-router)#default-information originate
R3(config-router)#exit
R3(config)#interface e1/1
R3(config-if)#ip ospf 6 area 0
R3(config-if)#exit
R3(config)#interface e1/0
R3(config-if)#ip ospf 6 area 0
R3(config-if)#exit
R3(config)#end
R3#
Mon 19 02:00:30.619: %SYS-5-CONFIG-I: Configured from console by console
Mon 19 02:00:30.775: %SDPP-3-ADJCHG: Process 6, Mr 0.0.6.132 on Ethernet1/0 from LOADING to FULL, Loading Done
Mon 19 02:00:30.775: %SDPP-3-ADJCHG: Process 6, Mr 0.0.6.132 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
Mon 19 02:00:31.503: %SDPP-5-ADJCHG: Process 4, Mr 0.0.6.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3#
Mon 19 02:00:39.463: %SDP-4-DUPLICATION: duplex mismatch discovered on Ethernet1/0 (not half duplex), with D2 Ethernet1/0 (half duplex).
R3#

```

Figura 32. Configuración classic single area OSPF R3

3.2 SWICH D2

```

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

```

3.2 SWICH D1

```

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
```

3.3 ROUTER 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
```

```

R2#enable
R2#configure t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#hostname R2
R2(config)#ip routing
R2(config)#no ip domain lookup
R2(config)#banner motd # R2: INCOB Skills Assessment
R2(config)#line con 0
R2(config)#line protocol timeout 0 0
R2(config)#line logging synchronous
R2(config)#line#exit
R2(config)#interface e1/0
R2(config)#ip address 209.165.200.226 255.255.255.224
R2(config)#ip address 2001::1 128:1:0:0:1
R2(config)#ipv6 address 2001:db8:200::2/64
R2(config)#no shutdown
R2(config)#exit
R2(config)#interface Loopback 0
R2(config)#ip address 2.2.2.2 255.255.255.255
R2(config)#ipv6 address 2001:db8:2222::1/128
R2(config)#no shutdown
R2(config)#exit
R2(config)#
New 19 02:27:59.091: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
R2(config)#
New 19 02:28:08.872: %LINEPROTO-5-UPDOWN: Interface Ethernet1/0, changed state to up
New 19 02:28:08.872: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
The default route without gateway, if not a point-to-point interface, may impact performance
R2(config)#ip route 1/0 Loopback 0
R2(config)#router bgp 300
R2(config-router)#bgp router-id 2.2.2.2
R2(config-router)#neighbor 209.165.200.226 remote-as 500
R2(config-router)#neighbor 2001:db8:200::1 remote-as 500
R2(config-router)#address-family ipv4
R2(config-router)#neighbor 209.165.200.226 activate
R2(config-router)#neighbor 2001:db8:200::1 activate
R2(config-router)#address-family ipv6
R2(config-router)#neighbor 2001:db8:200::1 activate
R2(config-router)#neighbor 2001:db8:2222::1 activate
R2(config-router)#address-family ipv4
R2(config-router)#network 209.165.200.226 activate
R2(config-router)#network 2001:db8:200::1 activate
R2(config-router)#network 2001:db8:2222::1 activate
R2(config-router)#network 1/0
R2(config-router)#exit address-family
R2(config-router)#

```

Figura 33. Configuración MPBGP R2

3.4 ROUTER R1

```

ip route 10.79.0.0 255.0.0.0 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 10.0.0.0 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

```

```

R1# Inval1d input detected at '^' marker.
R1(config)#2(config)#ip route 1:0 loopback 0
R1# Inval1d input detected at '^' marker.
R1(config)#2(config)#router bgp 500
R1# Inval1d input detected at '^' marker.
R1(config)#2(config-router)#bgp router-id 2.2.2.2
R1# Inval1d input detected at '^' marker.
R1(config)#2(config-router)#neighbor 200.165.200.225 remote-as 300
R1# Inval1d input detected at '^' marker.
R1(config)#2(config-router)#neighbor 2001:db8:200::1 remote-as 300
R1# Inval1d input detected at '^' marker.
R1(config)#2(config-router)#address-family ipv4
R1# Inval1d input detected at '^' marker.
R1(config)#2(config-router-af)#neighbor 200.165.200.225 activate
R1# Inval1d input detected at '^' marker.
R1(config)#
R1# Mon 19 02:39:21.079: NDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not half duplex), with 01 Ethernet1/2 (half duplex).
R1(config)#
R1(config)#ip route 10.79.0.0 255.0.0.0 null0
R1# Inconsistent address and mask
R1(config)#ip route 2001:db8:100::/48 null0
R1(config)#router bgp 300
R1(config)#router bgp router-id 1.1.1.1
R1(config)#router#neighbor 200.165.200.228 remote-as 500
R1(config)#router#neighbor 2001:db8:200::2 remote-as 500
R1(config)#router#address-family ipv4 unicast
R1(config)#router-af#neighbor 200.165.200.228 activate
R1(config)#router-af#neighbor 2001:db8:200::2 activate
R1(config)#router-af#network 10.0.0.0 mask 255.0.0.0
R1(config)#router-af#exit-address-family
R1(config)#router#address-family ipv4 unicast
R1(config)#router-af#network 200.165.200.228 activate
R1(config)#router-af#neighbor 2001:db8:200::2 activate
R1(config)#router-af#network 2001:db8:100::/48
R1(config)#router-af#exit-address-family
R1(config)#router#
R1# Mon 19 02:40:14.075: NDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not half duplex), with 01 Ethernet1/2 (half duplex).
R1(config)#router#
R1# Mon 19 02:40:14.087: NDP-4-ADJCHNGD: neighbor 2001:db8:200::2 up
R1(config)#router#
R1# Mon 19 02:40:16.721: NDP-4-ADJCHNGD: neighbor 200.165.200.228 up
R1(config)#router#
R1# Mon 19 02:41:03.347: NDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not half duplex), with 01 Ethernet1/2 (half duplex).
R1(config)#router#
R1# Mon 19 02:41:03.361: NDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not half duplex), with 01 Ethernet1/2 (half duplex).
R1(config)#router#

```

Figura 34. Configuración MPBGP R1

4.1 SWCH D1

```

ip sla 4
icmp-echo 10.79.10.1
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

```

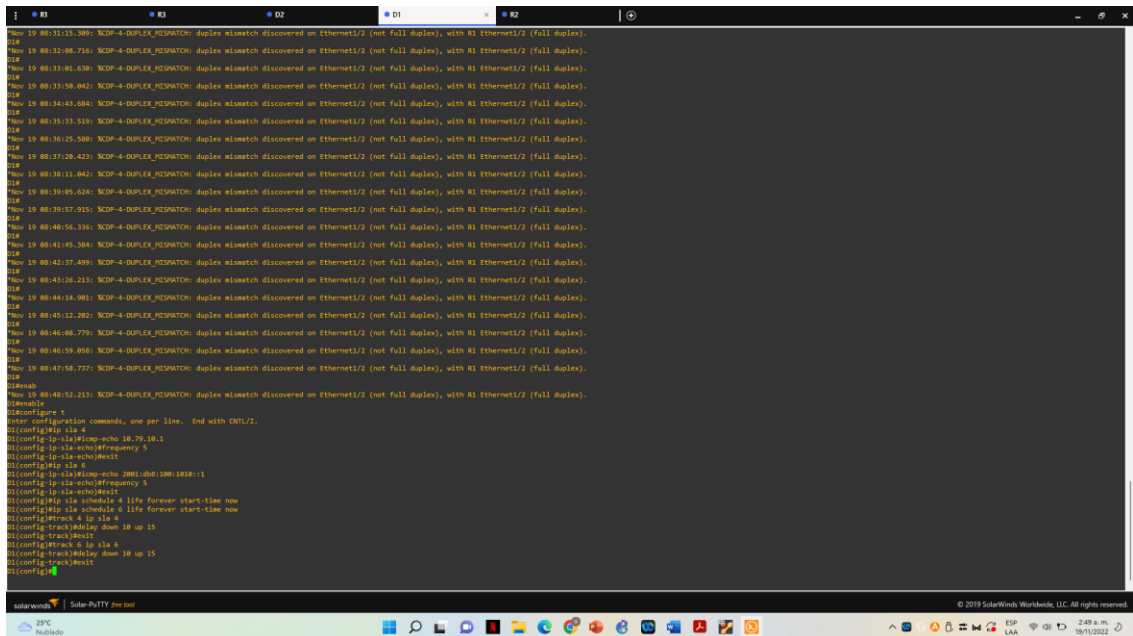


Figura 35. Configuración IP SLA D1

4.2 SWCHC D2

```

ip sla 4
icmp-echo 10.79.11.1 source-ip 10.79.11.2
frequency 5
exit
ip sla 6
icmp-echo 2001:db8:100:1011::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 up 10 down 15
exit
track 6 ip sla 6
delay up 10 down 15
exit

```

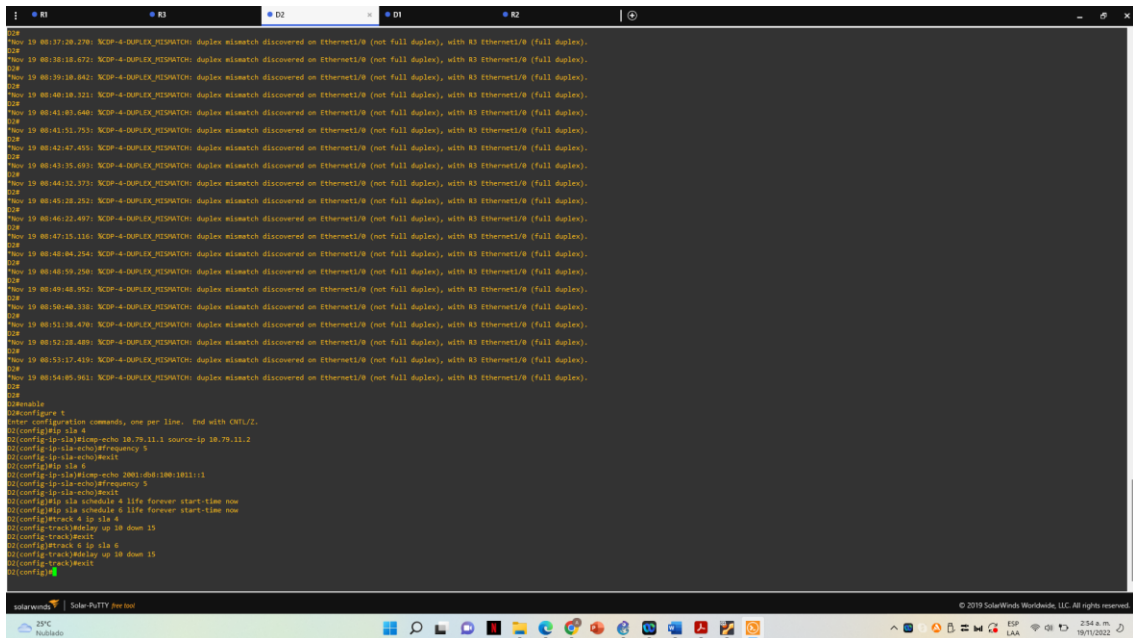


Figura 36. Configuración IP SLA D2

4.3 SWITCH D1

```

interface vlan100
standby version 2
standby 104 ip 10.79.100.254
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 vlan101
standby version 2
standby 114 ip 10.79.101.254
standby 114 preempt
standby 114 track 4 decrement 60
standby 116 ipv6 autoconfig
standby 116 preempt
standby 116 track 6 decrement 60
exit
interface vlan102
standby version 2
standby 124 ip 10.79.102.254
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

```

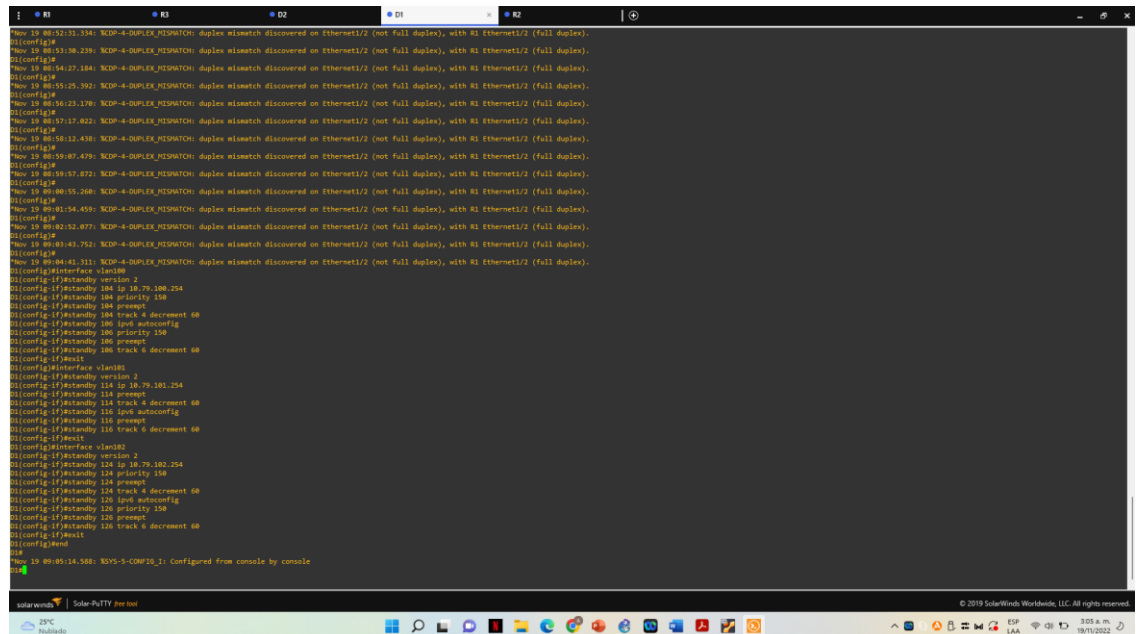


Figura 37. Configuración HSRP D1

```

4.4 D2
interface vlan100
standby version 2
standby 104 ip 10.79.100.254
standby 104 preempt
standby 104 track 4 decrement 60
standby 106 ipv6 autoconfig
standby 106 preempt
standby 106 track 6 decrement 60
exit
interface vlan101
standby version 2
standby 114 ip 10.79.101.254
standby 114 priority 150
standby 114 preempt

```

```

standby 114 track 4 decrement 60
standby 116 ipv6 autoconfig
standby 116 priority 150
standby 116 preempt
standby 116 track 6 decrement 60
exit
interface vlan102
standby version 2
standby 124 ip 10.79.102.254
standby 124 preempt
standby 124 track 4 decrement 60
standby 126 ipv6 autoconfig
standby 126 preempt
standby 126 track 6 decrement 60
exit
end

```

```

New 19 09:12:18.581: XDP-4-DUPLICATION: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#
New 19 09:13:17.623: XDP-4-DUPLICATION: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#
New 19 09:14:08.241: XDP-4-DUPLICATION: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#
New 19 09:15:07.246: XDP-4-DUPLICATION: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#
New 19 09:16:06.937: XDP-4-DUPLICATION: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#
New 19 09:16:56.228: XDP-4-DUPLICATION: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#
New 19 09:17:51.188: XDP-4-DUPLICATION: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#
New 19 09:18:49.464: XDP-4-DUPLICATION: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#
New 19 09:19:49.451: XDP-4-DUPLICATION: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#
New 19 09:20:41.389: XDP-4-DUPLICATION: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#
New 19 09:21:39.118: XDP-4-DUPLICATION: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#
New 19 09:22:31.647: XDP-4-DUPLICATION: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#
D2(config)#interface vlan100
D2(config-if)#standby version 2
D2(config-if)#standby 114 ip 10.79.100.254
D2(config-if)#standby 114 preempt
D2(config-if)#standby 114 track 4 decrement 60
D2(config-if)#standby 116 ipv6 autoconfig
D2(config-if)#standby 116 preempt
D2(config-if)#standby 116 track 6 decrement 60
D2(config-if)#exit
D2(config)#interface vlan101
D2(config-if)#standby version 2
D2(config-if)#standby 114 ip 10.79.101.254
D2(config-if)#standby 114 priority 150
D2(config-if)#standby 114 track 4 decrement 60
D2(config-if)#standby 116 ipv6 autoconfig
D2(config-if)#standby 116 preempt
D2(config-if)#standby 116 track 6 decrement 60
D2(config-if)#exit
D2(config)#interface vlan102
D2(config-if)#standby version 2
D2(config-if)#standby 124 ip 10.79.102.254
D2(config-if)#standby 124 preempt
D2(config-if)#standby 124 track 4 decrement 60
D2(config-if)#standby 126 ipv6 autoconfig
D2(config-if)#standby 126 preempt
D2(config-if)#standby 126 track 6 decrement 60
D2(config-if)#exit
D2(config)#end
D2
New 19 09:23:12.434: SOPS-5-CMPF1_1: Configured from console by console
D2#
New 19 09:23:22.628: XDP-4-DUPLICATION: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
Building configuration...
Compressed configuration from 3772 bytes to 1961 bytes[OK]
D2#

```

Figura 38. Configuración HSRP D2

VERIFICACION CONFIGURACIÓN

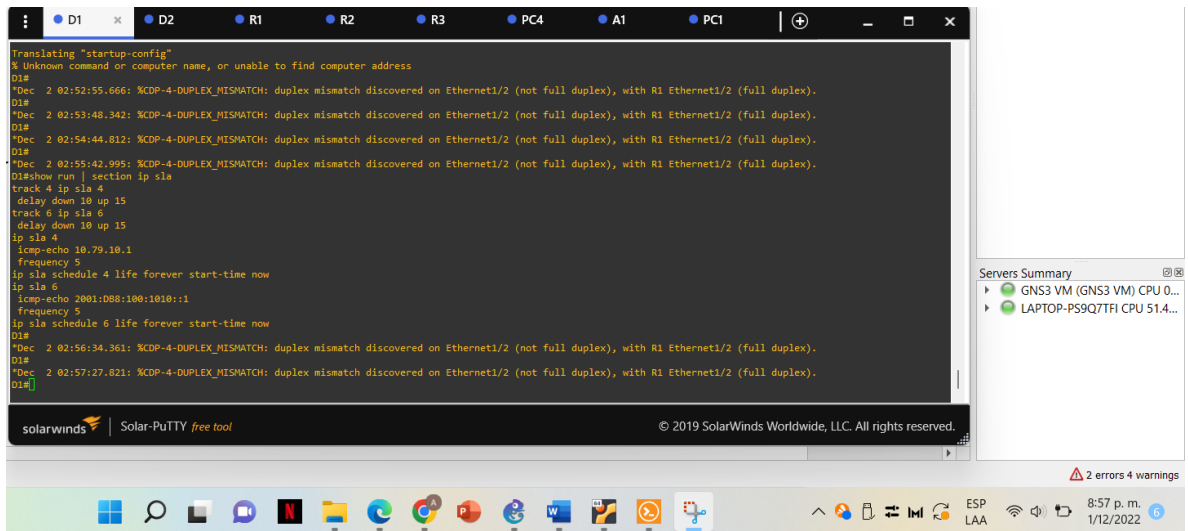


Figura 39. Show run | section ip sla D1

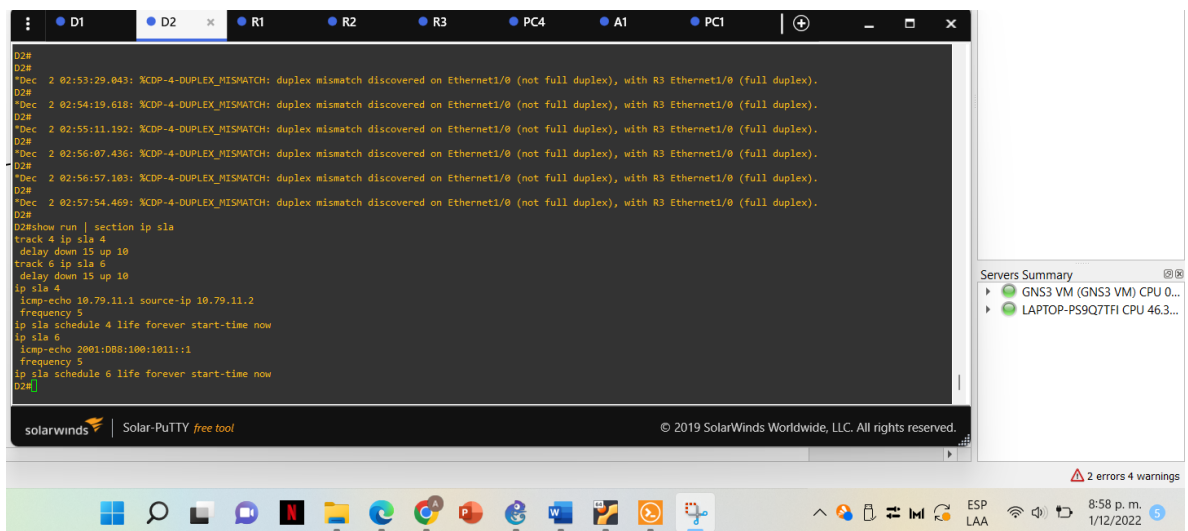


Figura 40. Show run | section ip sla D2

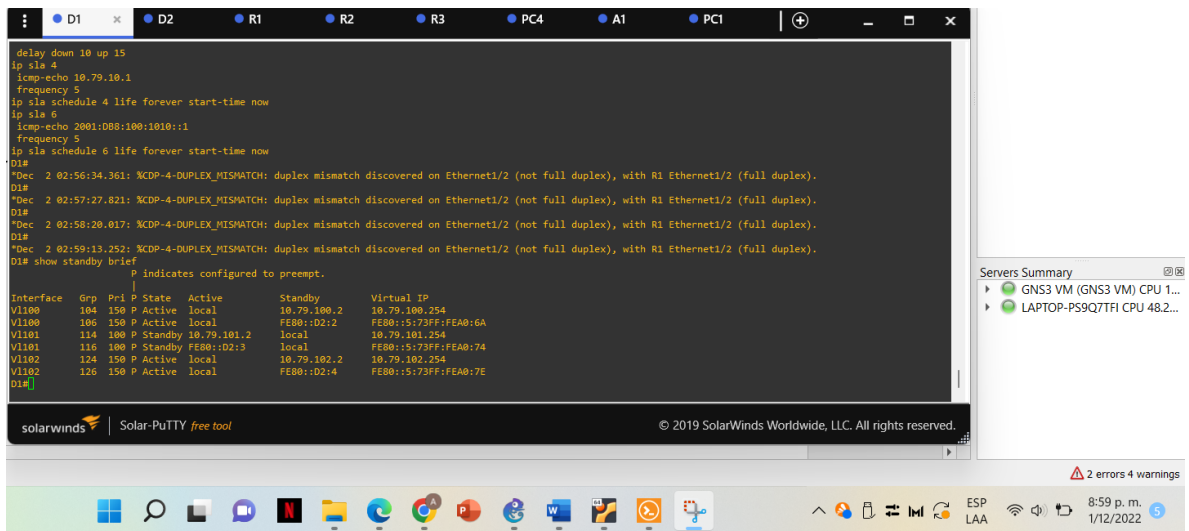


Figura 41. Show standby brief D1

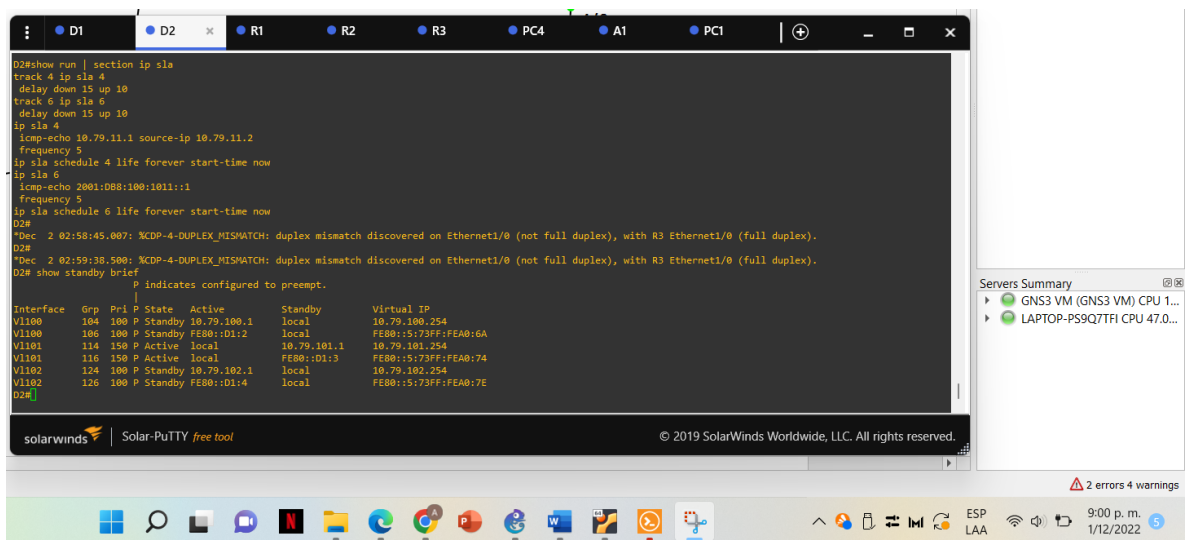


Figura 42. Show standby brief D2

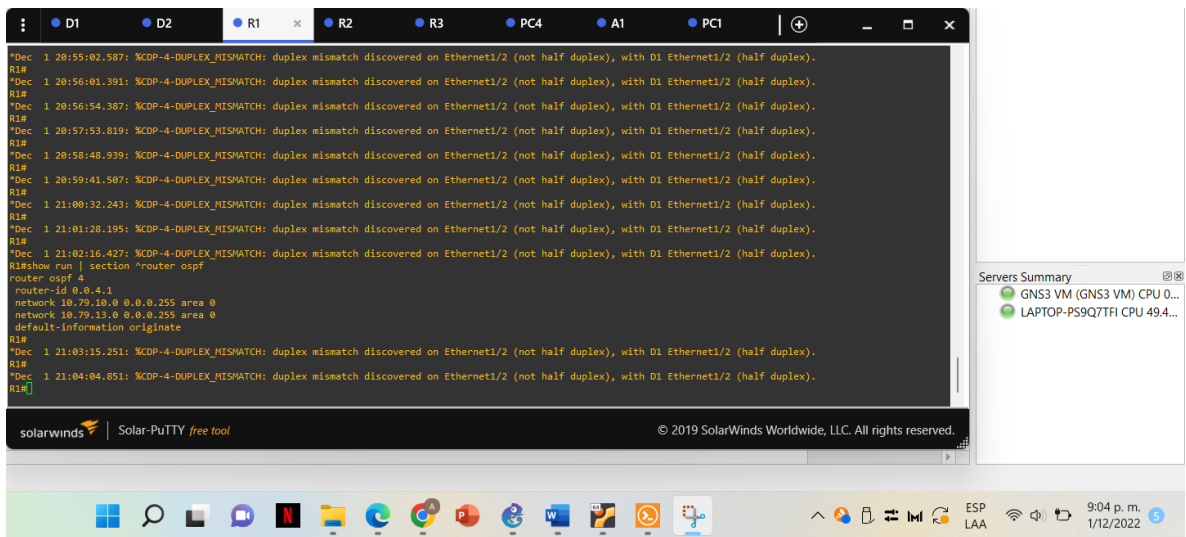


Figura 43. Show run | section ^router ospf R1

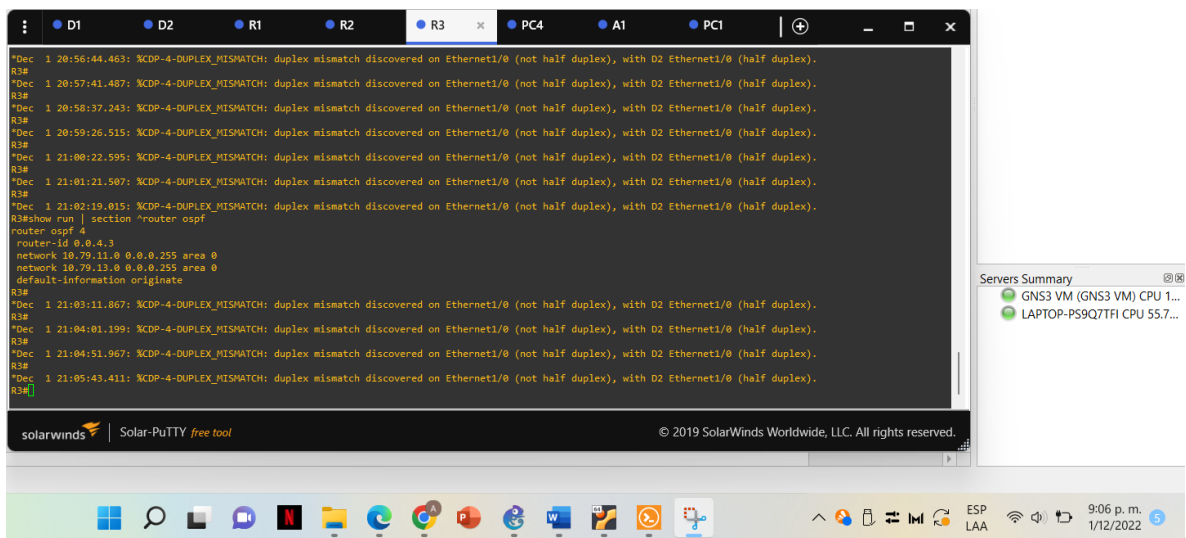


Figura 44. Show run | section ^router ospf R3

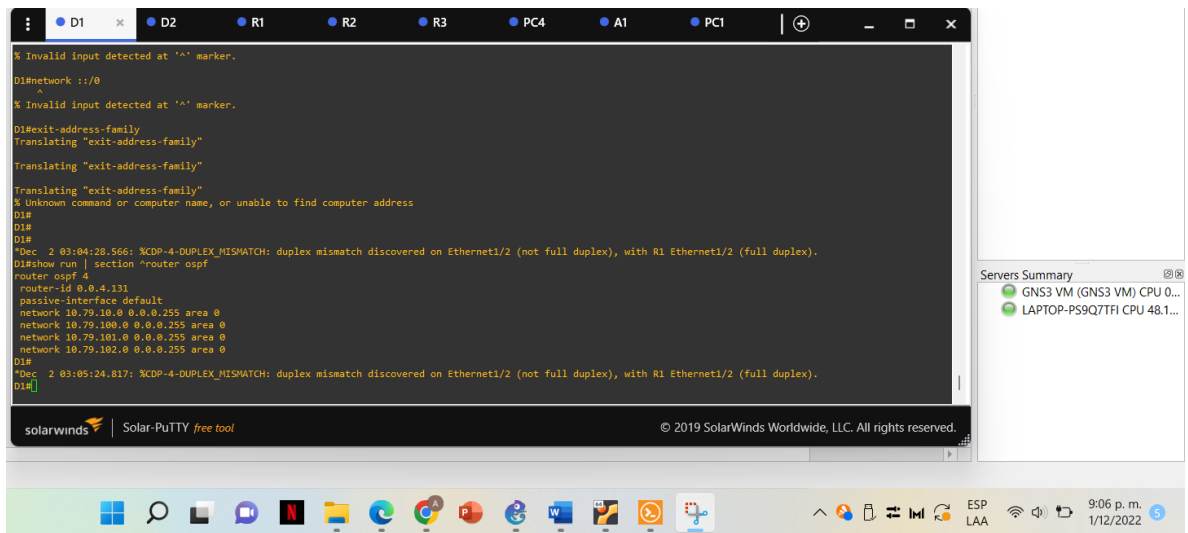


Figura 45. Show run | section ^router ospf D1

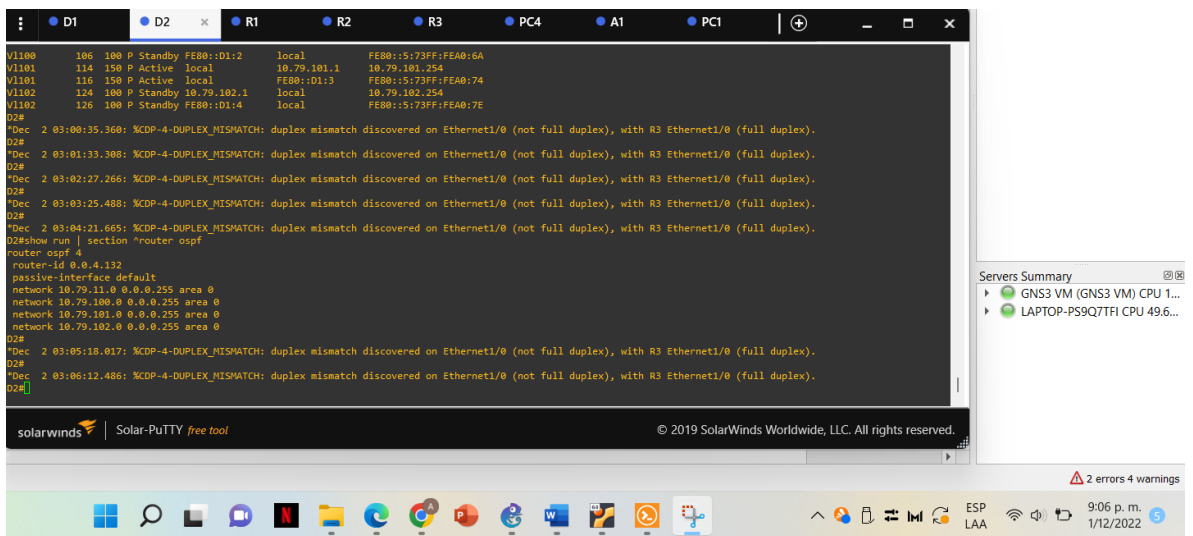


Figura 46. Show run | section ^router ospf D2

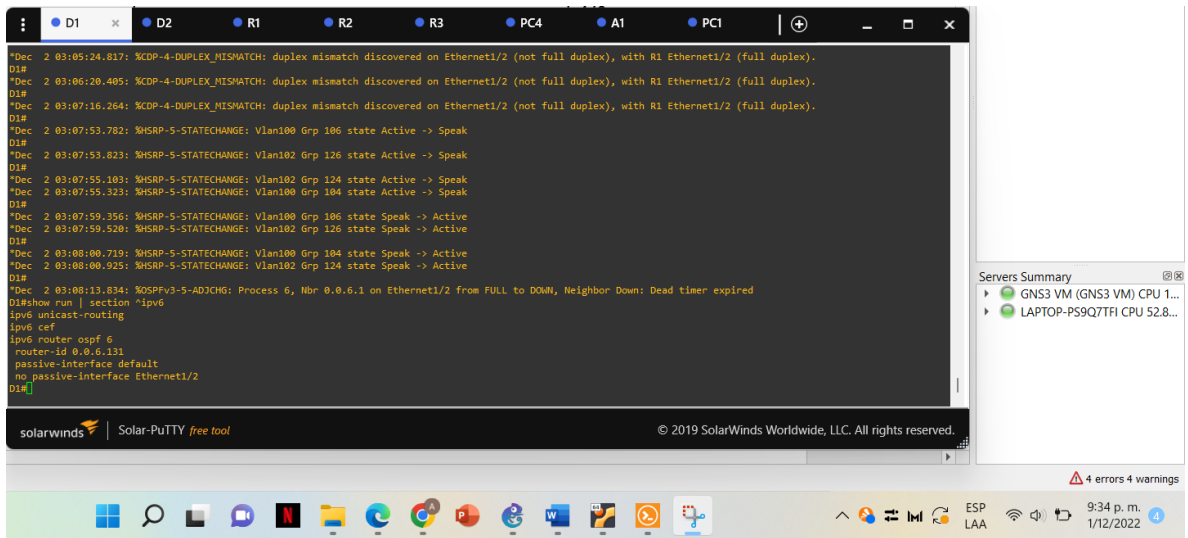


Figura 47. Show run | section ^ipv6 D1

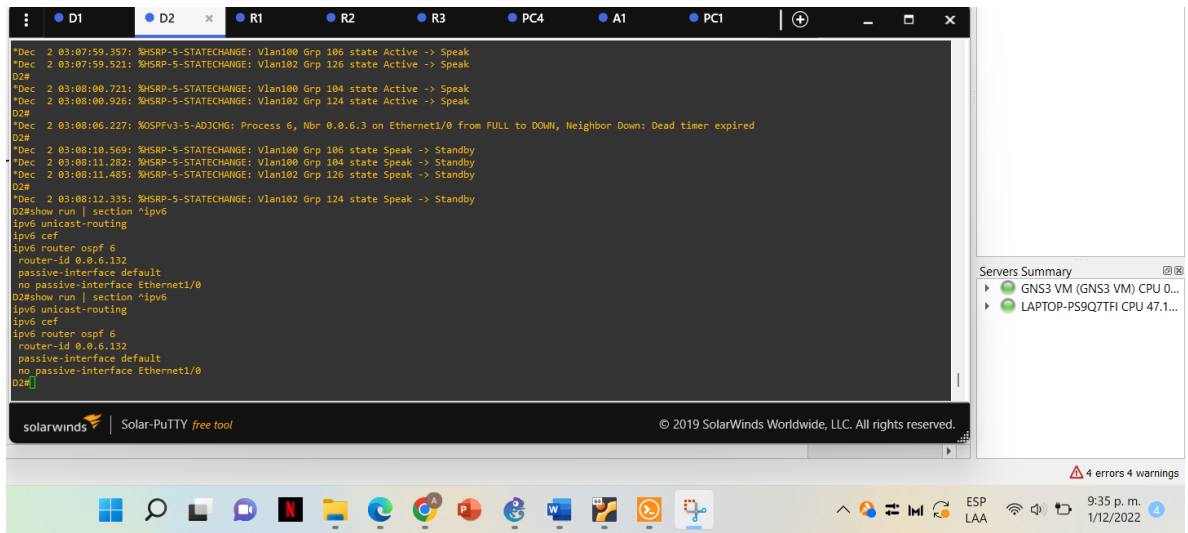


Figura 48. Show run | section ^ipv6 D2

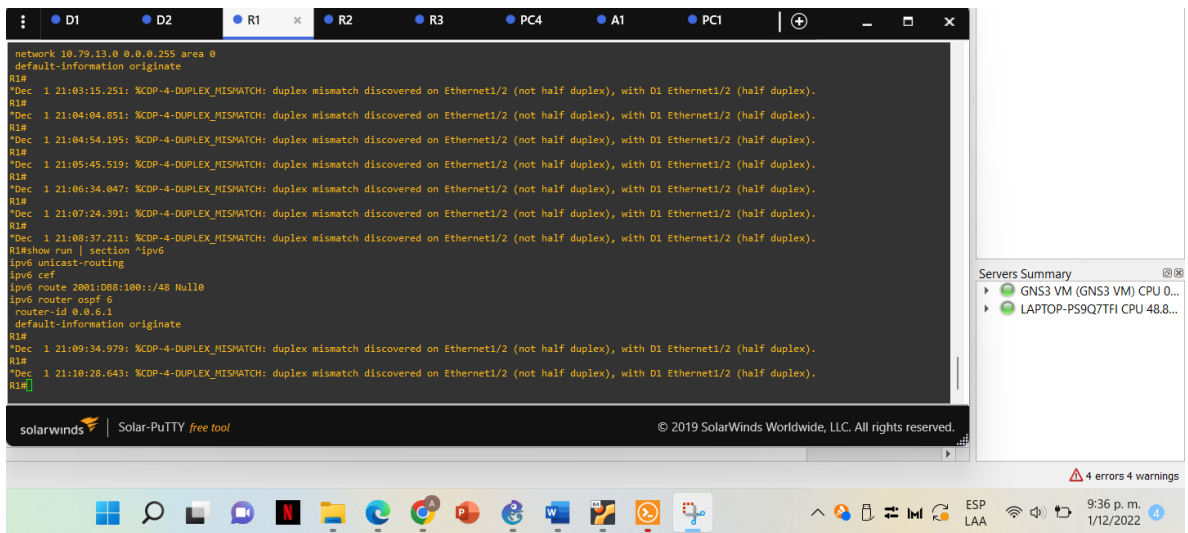


Figura 49. Show run | section ^ipv6 R1

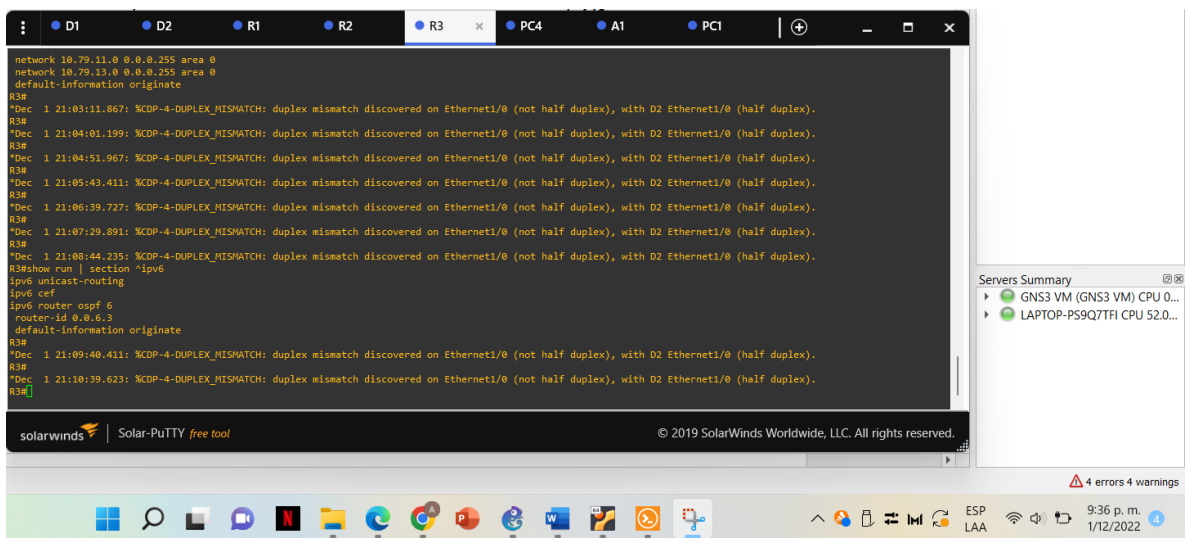


Figura 50. Show run | section ^ipv6 R3

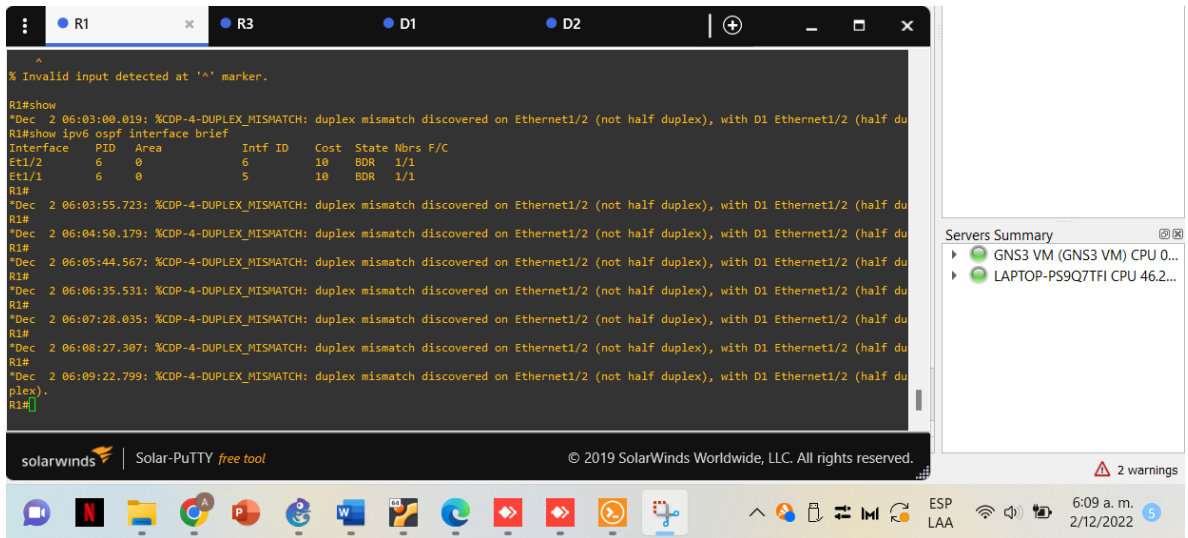


Figura 51. Show ipv6 ospf interface brief R1

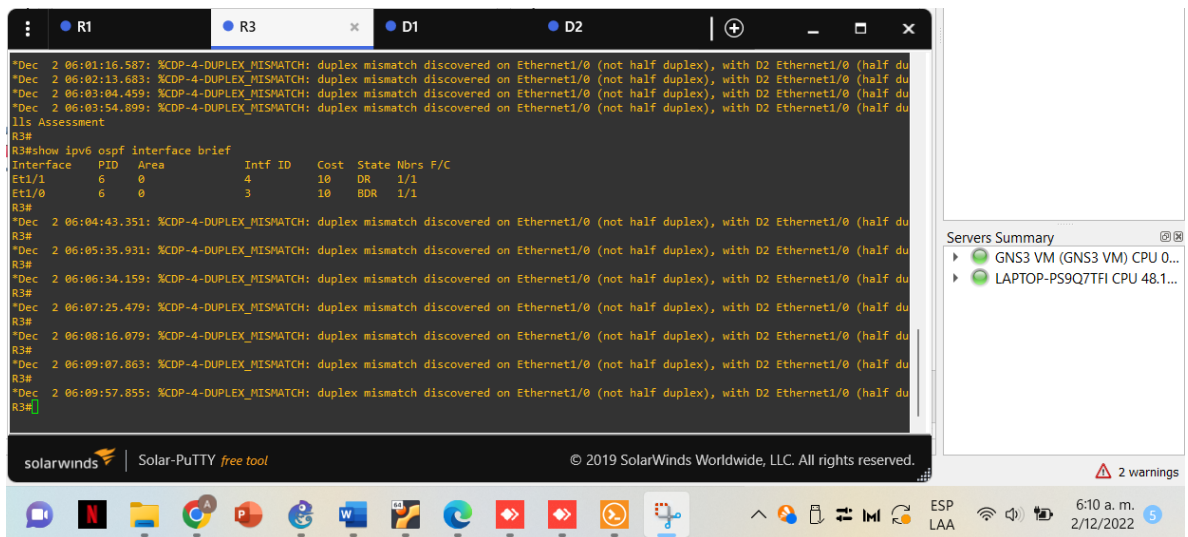


Figura 52. Show ipv6 ospf interface brief R3

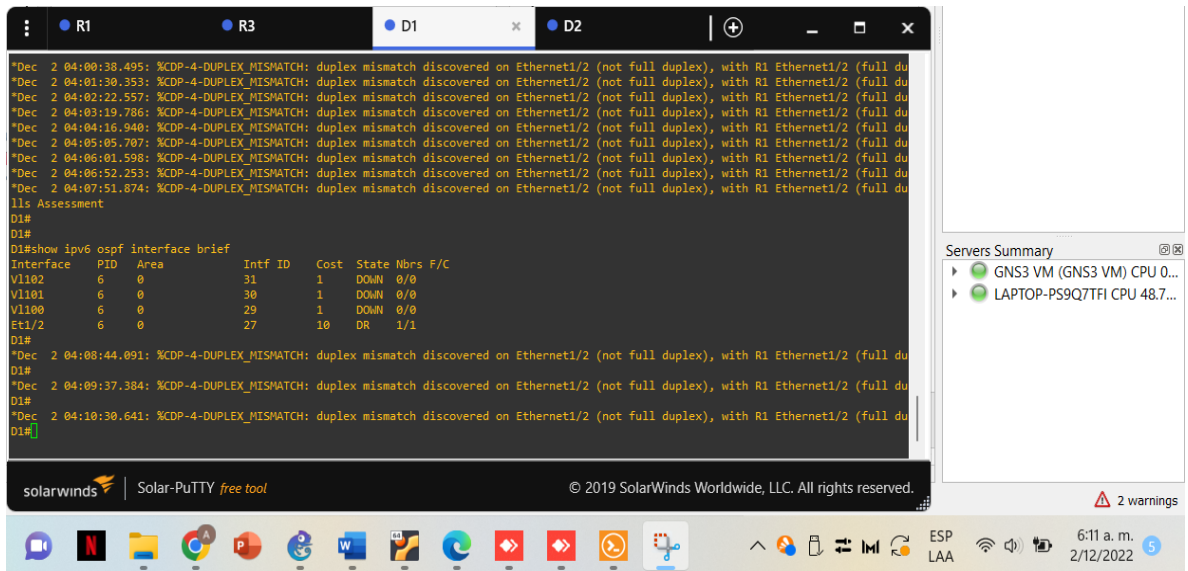


Figura 53. Show ipv6 ospf interface brief D1

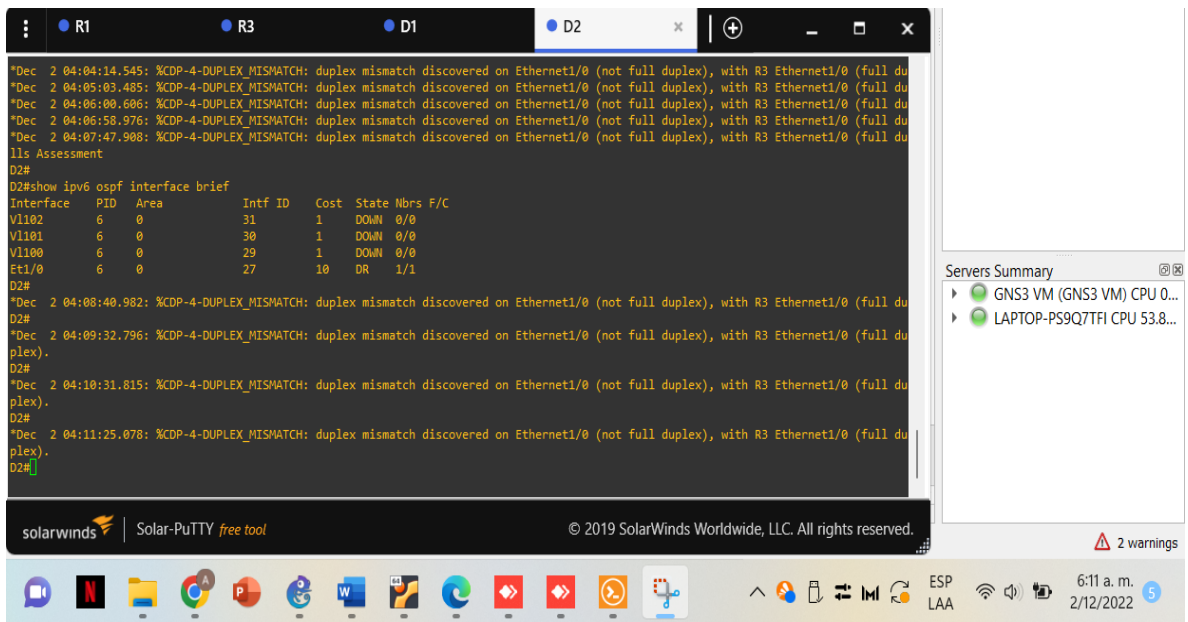


Figura 54. Show ipv6 ospf interface brief D2



Figura 55. Show run | section bgp R1



Figura 56. Show ip route | include O/B R1

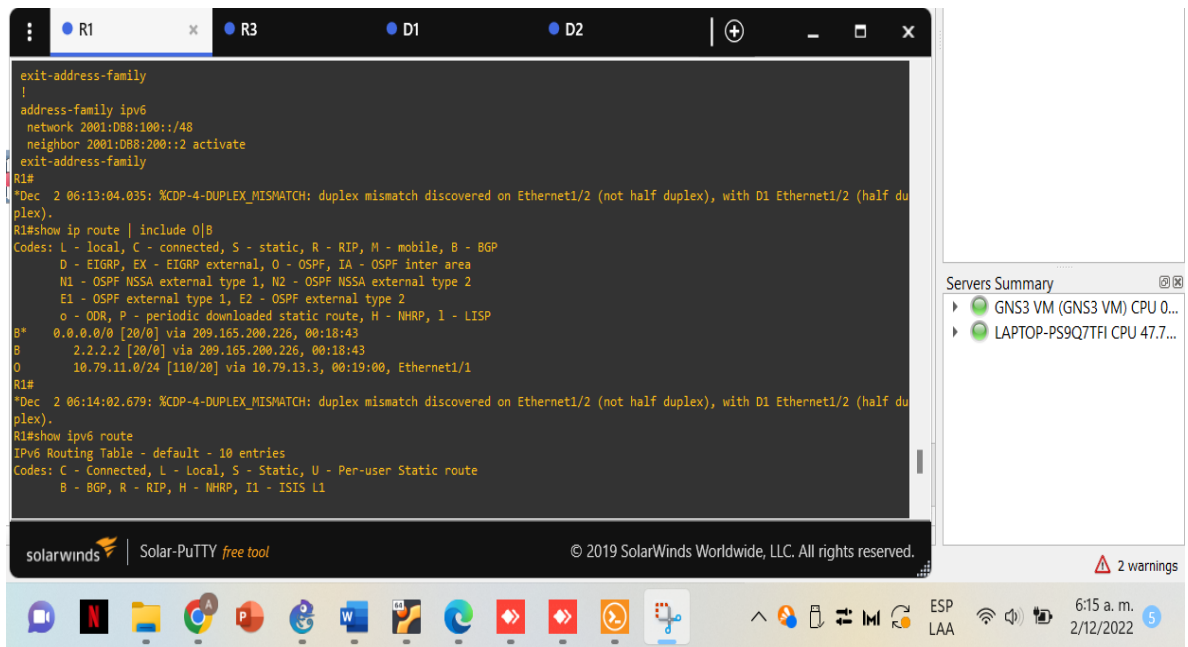


Figura 57. Show ipv6 route R1

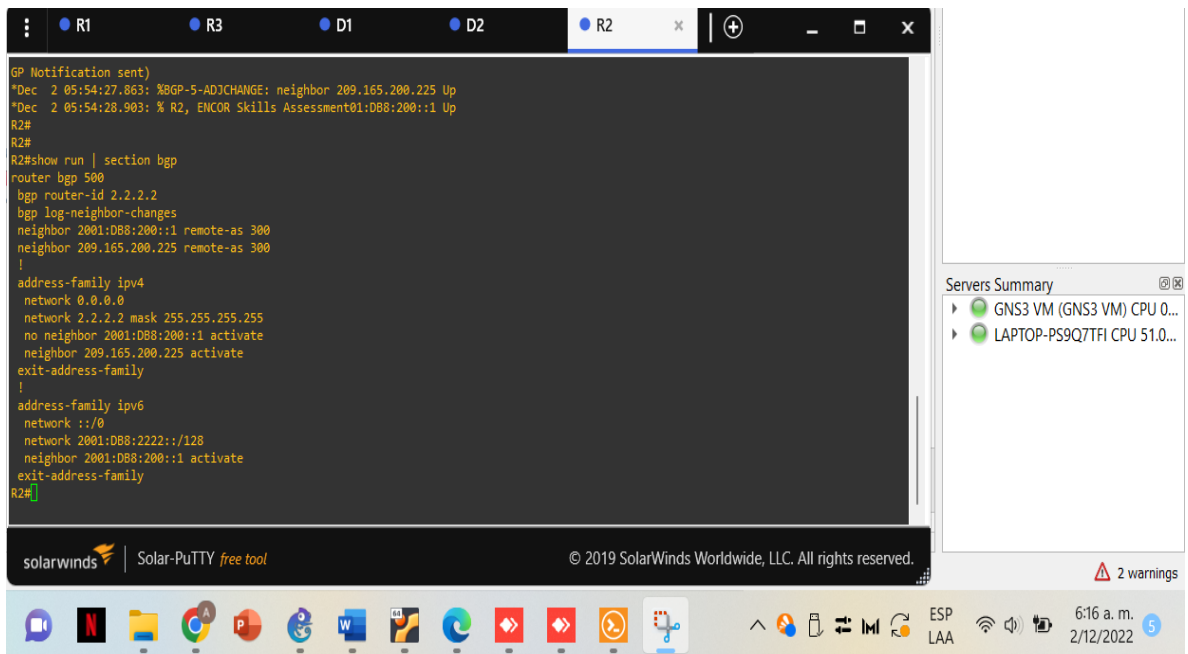


Figura 58. Show run | section bgp R2

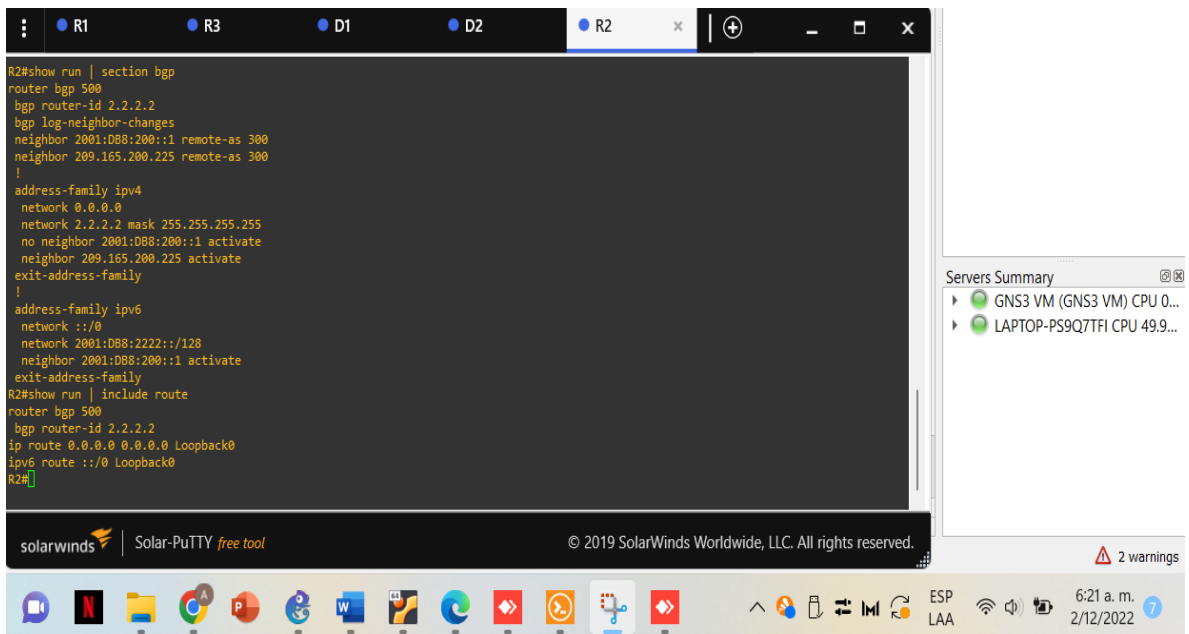


Figura 59. Show run | include route R2

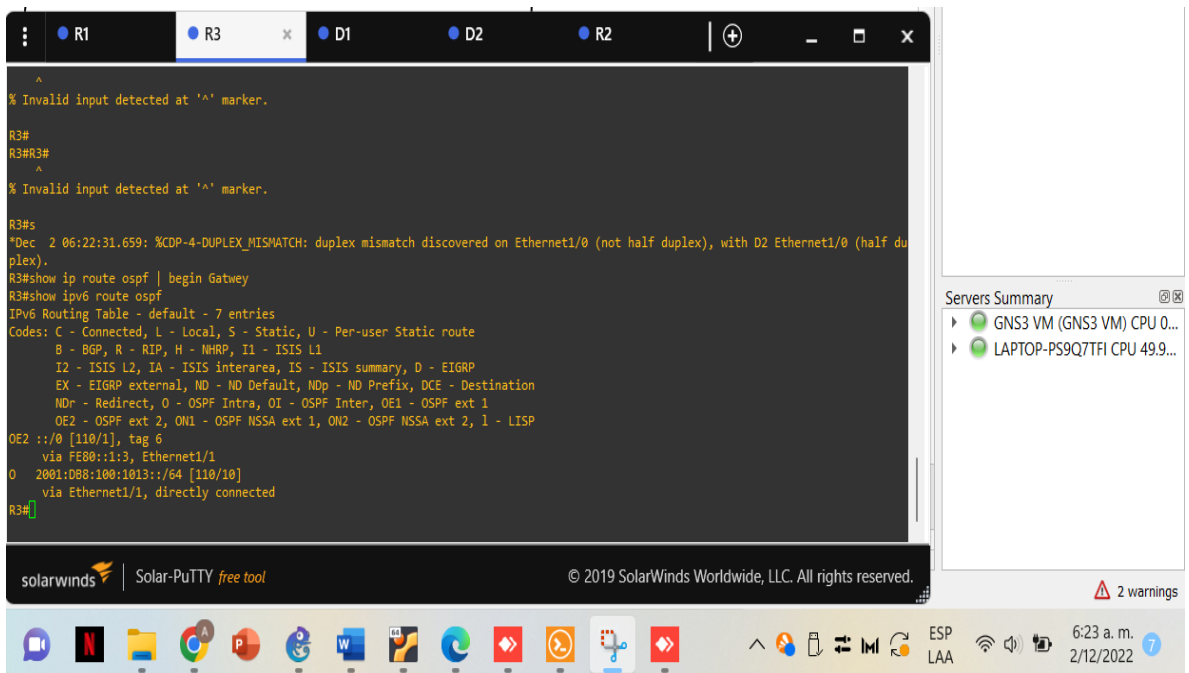


Figura 60. Show ipv6 route ospf R3

CONCLUSIONES

Durante el desarrollo de este trabajo se aprovechó la gran importancia del manejo de las redes y subredes modo de operación subredes, entender los beneficios de administrar dominios de broadcast

Manejo del simulador GNS3 escenarios de una red jerárquica convergente. Basada en switches, mediante el uso de protocolos como STP y la configuración de VLANs y aplicación al momento de enfrentarnos a configurar redes corporativas. Implementación en la solución de una red escalable, mediante el uso de los principios de enrutamiento y conmutación de paquetes en ambientes LAN y WAN, de configuración avanzada en routers, aplicando el conocimiento alcanzado en el uso de comandos IOS en protocolos de enrutamiento.

Se configuraron los protocolos de enrutamiento IPv4 e IPv6. Se verificó la convergencia, Se realizan pings de IPv4 e IPv6 a la interfaz Loopback 0 desde D1 y D2 siendo exitosos

Cumplir en cada uno de los lineamientos establecidos en los enunciados de la actividad, obtener la configuración correcta de cada uno de los dispositivos de networking que forman parte del escenario propuesto. Realizando la simulación de manera adecuada y verificando su funcionalidad. Demostrar durante el desarrollo del proyecto y elaboración del documento final el uso de metodologías y técnicas de investigación que permitió validar y comprobar los resultados obtenidos.

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