

DIPLOMADO DE PROFUNDIZACION CISCO
PRUEBA DE HABILIDADES PRACTICAS CCNP

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA – UNAD
ESCUELA DE CIENCIAS BASICAS, TECNOLOGIA E INGENIERIA – ECBTI
INGENIERIA ELECTRONICA
CALI
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Diplomado de opción de grado presentado para optar el título
de INGENIERO ELECTRONICO

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NOTA DE ACEPTACION

Firma del presidente del Jurado

Firma del Jurado

Firma del Jurado

CALI, 27 de Noviembre de 2022

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Quiero agradecerle a Dios por darme la fuerza, la constancia y la perseverancia de llegar hasta este punto tan esperando, el de estar finalizando la carrera.

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GLOSARIO

ESTÁNDAR IEEE 802.1Q: Es una variación al estándar de Ethernet, aplica un sistema que permite a varias redes interconectadas por medio de puentes o switches transmitir o compartir por el mismo medio físico libre de problemas de interferencia (trunking).

IPV4: Utiliza direcciones de 32 bits lo que es igual a 4.294.967.296 direcciones únicas, este límite está impidiendo el crecimiento de internet.

IPV6: Es la sexta versión del protocolo de internet y sustituye a IPv4 ya que el límite de direcciones es más amplio lo que es igual a 128 bits

PUERTO TRUNK: Es un enlace en donde cada puerto de cada switch se configura en modo trunk para si el tráfico de las VLANs pueda fluir a través de los switches de la red.

RSTP: reduce significativamente el tiempo de convergencia de la topología de la red cuando ocurre un cambio en la topología. Roles de los puertos RSTP: Raíz – Es un puerto de envío elegido para la topología Spanning Tree. Designado – Un puerto de envío elegido para cada segmento de la red.

VLAN: Acrónimo de virtual LAN, es una forma o manera de construir redes lógicas que coexisten independientemente dentro de una misma red física. Las Vlan nos dan la facilidad en la administración de la red por que la configuración se realiza por medio de software y reducen el tamaño del dominio de difusión

VRF: Acrónimo de enrutamiento virtual, nos permite que muchas instancias de una tabla de enrutamiento puedan coexistir y trabajar de manera simultánea en el mismo router, en el cual puede aislar el tráfico y trabajar en enrutamiento de diferentes clientes, eso le genera optimización ya que no es necesario varios routers y también mejora la seguridad de la red.

RESUMEN

Para el siguiente trabajo se utilizó la máquina virtual (Virtual Box) y el simulador GNS3.

Se diseñó la topología de red planteada por Cisco y se procedió a la configuración de los diferentes dispositivos (Router, Switchs, Pc's).

Para el primer escenario, para la configuración de los diferentes dispositivos, se asocia las Vlan con los routers y switchs, se configuran las VRF-lite, el enrutamiento estático y la conmutación para obtener la accesibilidad completa de extremo a extremo.

A los enrutadores se configuraron las interfaces de capa 2 para soportar la conectividad hosts.

Para el segundo escenario se configuró los protocolos de enrutamiento IPv4–IPv6 para tener convergencia en la red. Luego se configura la versión 2 de HSRP para así proporcionar redundancia de primer salto para los hosts en la red empresarial.

Palabras Clave: GNS3, Cisco, topología, Vlan, enrutamiento, conectividad.

ABSTRACT

For the following work, the virtual machine (Virtual Box) and the GNS3 simulator were used.

The network topology proposed by Cisco was designed and the different devices were configured (Router, Switches, PCs).

For the configuration of the different devices, VLANs are associated with routers and switches, VRF-lite, static routing and switching are configured to obtain full end-to-end accessibility.

Layer 2 interfaces will be configured on the routers to support hosts connectivity.

For the second scenario, the IPv4-IPv6 routing protocols were configured to have convergence in the network. HSRP version 2 is then configured to provide first hop redundancy for hosts on the enterprise network.

Keywords: GNS3, cisco, topology, Vlan, routing, connectivity.

INTRODUCCION

El desarrollo de la siguiente actividad va enfocada en la obtención de conocimiento y habilidades en CCNP, adquiriendo la capacidad de implementar, verificar y solucionar problemas en un entorno de red empresaria LAN/WAN. Para ello previamente se realizo la instalación de una maquina virtual (Virtual Box) y el simulador GNS3, los cuales nos permitirán realizar la topología de red propuesta y poner en marcha las simulaciones entre los dispositivos.

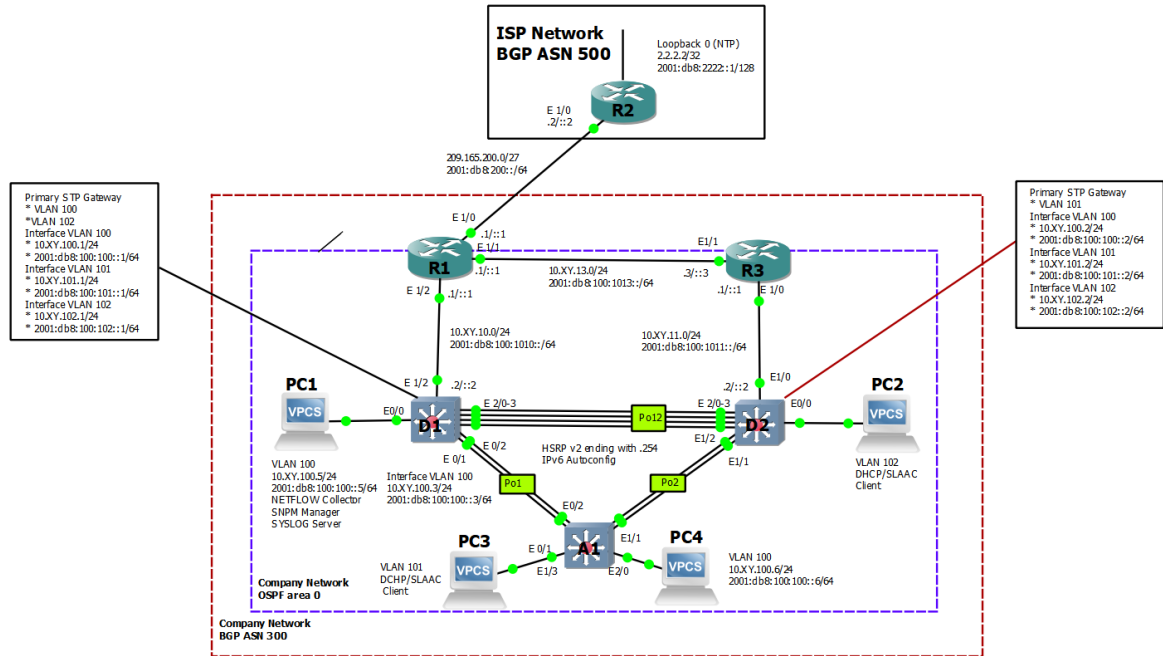
Para su desarrollo la actividad se divido en dos escenarios, para el primer escenario se pretende estructurar redes conmutadas mediante el uso del protocolo STP y la configuración de VLANs, con esto se comprende las características de una infraestructura de red jerárquica convergente. También se diseñaron 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.

Para el segundo escenario se pretende planificar redes inalámbricas de acceso remoto y sitio a sitio seguras, mediante el análisis de escenarios simulados de infraestructura de red empresarial para la aplicación de servicios de autenticación, roaming y localización. Como la implementación de una red empresarial con acceso seguro a través de la automatización y virtualización de la red, y así aplicar métodos de solución de problemas en ambientes de red LAN y WAN.

DESARROLLO

ESCENARIO 1

Figura 1. Topología de red planteada



Fuente: documento guía

Tabla 1: direccionamiento

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	E1/0	209.165.200.225/27	2001:db8:200::1/64	fe80::1:1
	E1/2	10.81.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	E1/1	10.81.13.1/24	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	10.81.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
	E1/1	10.81.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	E1/2	10.81.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
	VLAN 100	10.81.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10.81.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
	VLAN 102	10.81.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	E1/0	10.81.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10.81.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
	VLAN 101	10.81.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10.81.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.81.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.81.100.5/24	2001:db8:100:100::5/64	EUI-64
PC2	NIC	DHCP	SLAAC	EUI-64
PC3	NIC	DHCP	SLAAC	EUI-64
PC4	NIC	10.81.100.6/24	2001:db8:100:100::6/64	EUI-64

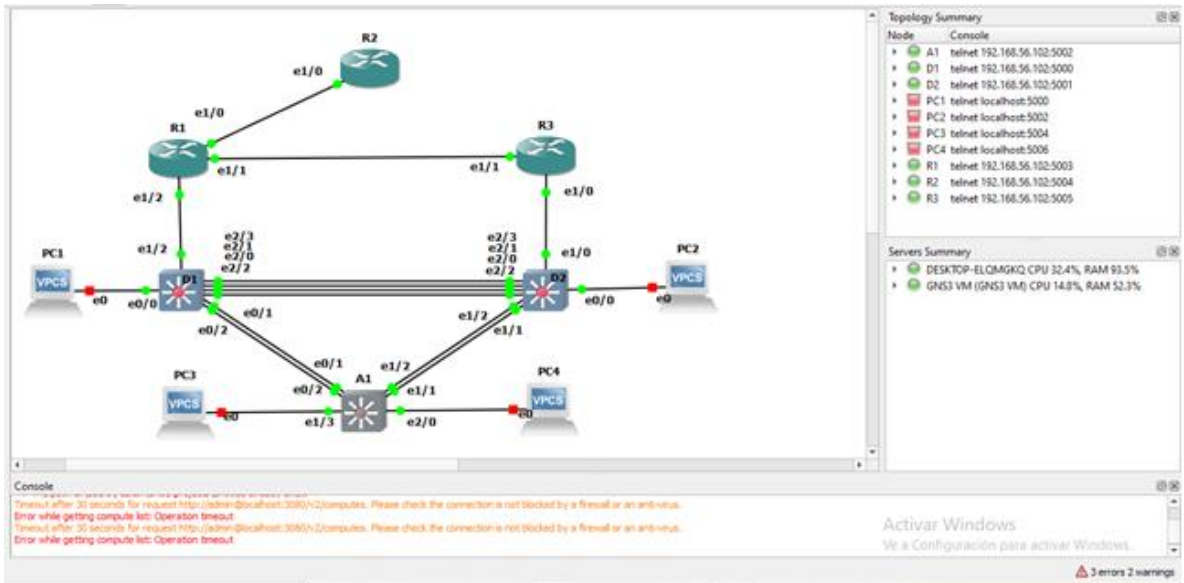
Fuente: documento guía

PARTE 1: construir la red y configurar los ajustes básicos del dispositivo y el direccionamiento de la interfaz

Paso 1: 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 de red a desarrollar



Fuente: elaboración propia

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.

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 10.81.10.1 255.255.255.0
ipv6 address fe80::1:2 link-local
ipv6 address 2001:db8:100:1010::1/64
no shutdown
exit
interface e1/1
ip address 10.81.13.1 255.255.255.0
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 10.81.11.1 255.255.255.0
ipv6 address fe80::3:2 link-local
ipv6 address 2001:db8:100:1011::1/64
no shutdown
exit
interface e1/1
```

```
ip address 10.81.13.3 255.255.255.0
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 10.81.10.2 255.255.255.0
ipv6 address fe80::d1:1 link-local
ipv6 address 2001:db8:100:1010::2/64
no shutdown
exit
interface vlan 100
ip address 10.81.100.1 255.255.255.0
ipv6 address fe80::d1:2 link-local
ipv6 address 2001:db8:100:100::1/64
no shutdown
exit
interface vlan 101
ip address 10.81.101.1 255.255.255.0
ipv6 address fe80::d1:3 link-local
ipv6 address 2001:db8:100:101::1/64
no shutdown
exit
interface vlan 102
ip address 10.81.102.1 255.255.255.0
ipv6 address fe80::d1:4 link-local
ipv6 address 2001:db8:100:102::1/64
no shutdown
exit
ip dhcp excluded-address 10.81.101.1 10.81.101.109
ip dhcp excluded-address 10.81.101.141 10.81.101.254
ip dhcp excluded-address 10.81.102.1 10.81.102.109
ip dhcp excluded-address 10.81.102.141 10.81.102.254
ip dhcp pool VLAN-101
network 10.81.101.0 255.255.255.0
default-router 10.81.101.254
```

```
exit
ip dhcp pool VLAN-102
network 10.81.102.0 255.255.255.0
default-router 10.81.102.254
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 10.81.11.2 255.255.255.0
  ipv6 address fe80::d1:1 link-local
  ipv6 address 2001:db8:100:1011::2/64
  no shutdown
exit
interface vlan 100
  ip address 10.81.100.2 255.255.255.0
  ipv6 address fe80::d2:2 link-local
  ipv6 address 2001:db8:100:100::2/64
  no shutdown
exit
interface vlan 101
  ip address 10.81.101.2 255.255.255.0
  ipv6 address fe80::d2:3 link-local
  ipv6 address 2001:db8:100:101::2/64
  no shutdown
exit
interface vlan 102
  ip address 10.81.102.2 255.255.255.0
  ipv6 address fe80::d2:4 link-local
  ipv6 address 2001:db8:100:102::2/64
  no shutdown
exit
ip dhcp excluded-address 10.81.101.1 10.81.101.209
ip dhcp excluded-address 10.81.101.241 10.81.101.254
ip dhcp excluded-address 10.81.102.1 10.81.102.209
ip dhcp excluded-address 10.81.102.241 10.81.102.254
```

```
ip dhcp pool VLAN-101
network 10.81.101.0 255.255.255.0
default-router 81.0.101.254
exit
ip dhcp pool VLAN-102
network 10.81.102.0 255.255.255.0
default-router 10.81.102.254
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 10.81.100.3 255.255.255.0
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

```

Paso 3: Evidencia de las configuraciones en cada uno de los dispositivos

Figura 3. Configuración R1

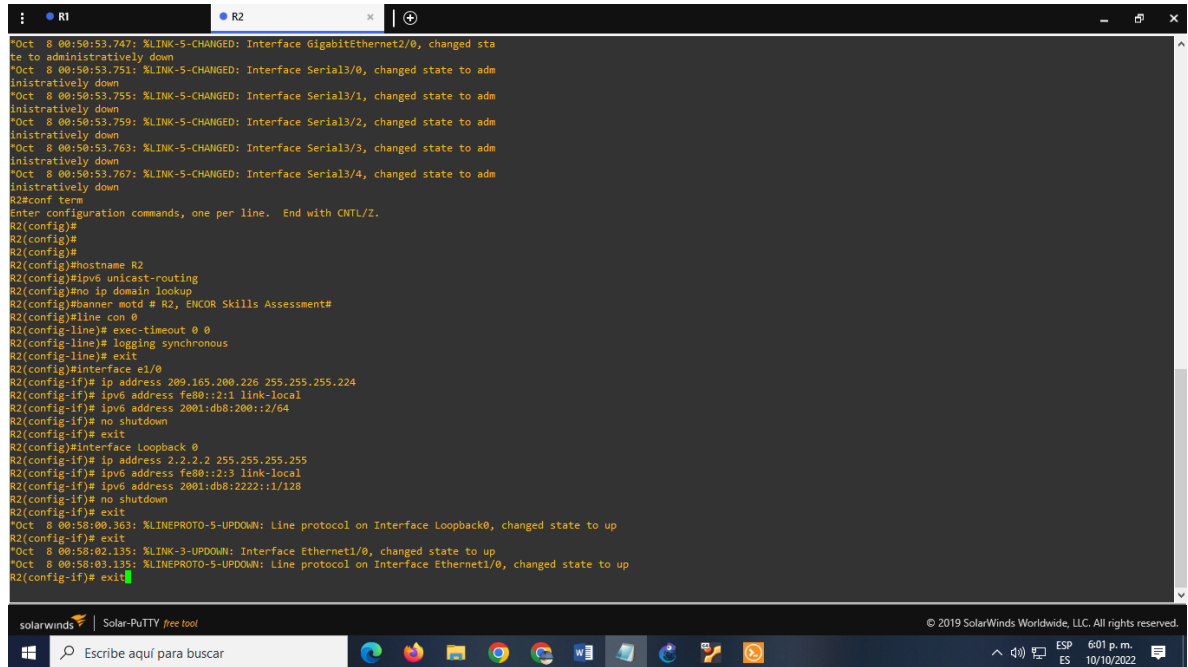
```

*Oct 8 00:40:22.463: %LINK-5-CHANGED: Interface Serial3/1, changed state to adm
inistratively down
*Oct 8 00:40:22.467: %LINK-5-CHANGED: Interface Serial3/2, changed state to adm
inistratively down
R1#conf term
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#
R1(config)#hostname R1
R1(config)#ipv6 unicast-routing
R1(config)#no ip domain lookup
R1(config)#banner motd # R1, ENCOR Skills Assessment#
R1(config)#line con 0
R1(config-line)# exec-timeout 0 0
R1(config-line)# logging synchronous
R1(config-line)# exit
R1(config)#interface e1/0
R1(config-if)# ip address 209.165.200.225 255.255.255.224
R1(config-if)# ipv6 address fe80::1:1 link-local
R1(config-if)# ipv6 address 2001:db8:200::1/64
R1(config-if)# no shutdown
R1(config-if)# exit
R1(config)#interface e1/2
R1(config-if)# ip address 10.81.10.1 255.255.255.0
R1(config-if)# ipv6 address fe80::1:2 link-local
R1(config-if)# ipv6 address 2001:db8:100:1010::1/64
R1(config-if)# no shutdown
R1(config-if)# exit
R1(config)#interface e1/1
R1(config-if)# ip address 10.81.13.1 255.255.255.0
R1(config-if)# ipv6 address fe80::1:3 link-local
R1(config-if)# ipv6 address 2001:db8:100:1013::1/64
R1(config-if)# no shutdown
R1(config-if)# exit
R1(config)#
*Oct 8 00:43:04.103: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Oct 8 00:43:04.579: %LINK-3-UPDOWN: Interface Ethernet1/2, changed state to up
*Oct 8 00:43:04.963: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
*Oct 8 00:43:05.103: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
R1(config)#
*Oct 8 00:43:05.579: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to up
*Oct 8 00:43:05.963: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
R1(config)#

```

Fuente: elaboración propia

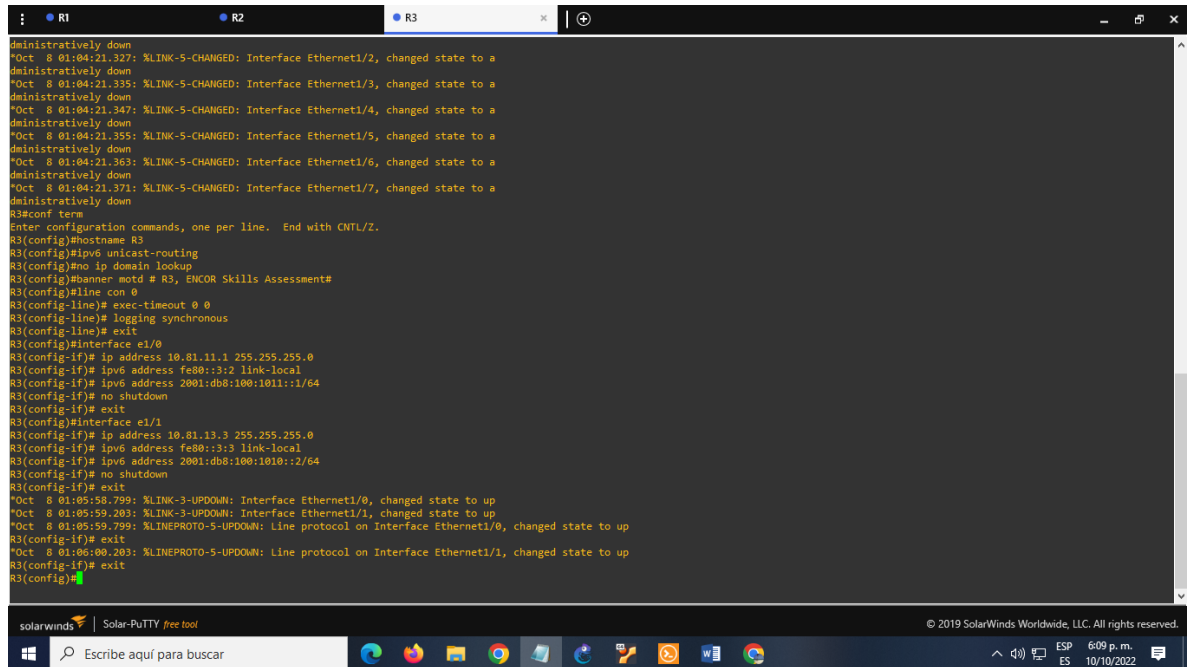
Figura 4. Configuración R2



```
Oct 8 00:50:53.747: %LINK-5-CHANGED: Interface GigabitEthernet2/0, changed state to administratively down
Oct 8 00:50:53.751: %LINK-5-CHANGED: Interface Serial3/0, changed state to administratively down
Oct 8 00:50:53.755: %LINK-5-CHANGED: Interface Serial3/1, changed state to administratively down
Oct 8 00:50:53.759: %LINK-5-CHANGED: Interface Serial3/2, changed state to administratively down
Oct 8 00:50:53.763: %LINK-5-CHANGED: Interface Serial3/3, changed state to administratively down
Oct 8 00:50:53.767: %LINK-5-CHANGED: Interface Serial3/4, changed state to administratively down
R2#conf term
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#
R2(config)#
R2(config)#
R2(config)#hostname R2
R2(config)#ipv6 unicast-routing
R2(config)#no ip domain lookup
R2(config)#banner motd # R2, ENCOR Skills Assessment#
R2(config)#line con 0
R2(config-line)# exec-timeout 0 0
R2(config-line)# logging synchronous
R2(config-line)# exit
R2(config)#interface e1/0
R2(config-if)# ip address 209.165.200.226 255.255.255.224
R2(config-if)# ipv6 address fe80::2:1 link-local
R2(config-if)# ipv6 address 2001::db8:200::2/64
R2(config-if)# no shutdown
R2(config-if)# exit
R2(config)#interface Loopback 0
R2(config-if)# ip address 2.2.2.2 255.255.255.255
R2(config-if)# ipv6 address fe80::2:3 link-local
R2(config-if)# ipv6 address 2001::db8:2222::1/128
R2(config-if)# no shutdown
R2(config-if)# exit
Oct 8 00:58:00.363: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
R2(config-if)# exit
Oct 8 00:58:02.135: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
Oct 8 00:58:03.135: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
R2(config-if)# exit
```

Fuente: elaboración propia

Figura 5. Configuración R3



```
Administratively down
Oct 8 01:04:21.327: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to administratively down
Oct 8 01:04:21.335: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to administratively down
Oct 8 01:04:21.347: %LINK-5-CHANGED: Interface Ethernet1/4, changed state to administratively down
Oct 8 01:04:21.355: %LINK-5-CHANGED: Interface Ethernet1/5, changed state to administratively down
Oct 8 01:04:21.363: %LINK-5-CHANGED: Interface Ethernet1/6, changed state to administratively down
Oct 8 01:04:21.371: %LINK-5-CHANGED: Interface Ethernet1/7, changed state to administratively down
R3#conf term
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#hostname R3
R3(config)#ipv6 unicast-routing
R3(config)#no ip domain lookup
R3(config)#banner motd # R3, ENCOR Skills Assessment#
R3(config)#line con 0
R3(config-line)# exec-timeout 0 0
R3(config-line)# logging synchronous
R3(config-line)# exit
R3(config)#interface e1/0
R3(config-if)# ip address 10.01.11.1 255.255.255.0
R3(config-if)# ipv6 address fe80::13:2 link-local
R3(config-if)# ipv6 address 2001::db8:100:1011::1/64
R3(config-if)# no shutdown
R3(config-if)# exit
R3(config)#interface e1/1
R3(config-if)# ip address 10.01.13.3 255.255.255.0
R3(config-if)# ipv6 address fe80::13:3 link-local
R3(config-if)# ipv6 address 2001::db8:100:1010::2/64
R3(config-if)# no shutdown
R3(config-if)# exit
Oct 8 01:05:58.799: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
Oct 8 01:05:59.201: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
Oct 8 01:05:59.799: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
R3(config-if)# exit
Oct 8 01:06:00.203: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
R3(config-if)# exit
R3(config)#
```

Fuente: elaboración propia

Figura 6. Configuración D1

```

D1#
D1(conf term
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#
*Oct 8 01:26:34.329: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1(config)#hostname D1
D1(config)#ip routing
D1(config)#ipv6 unicast-routing
D1(config)#no ip domain lookup
D1(config)#banner motd # D1, ENCOR Skills Assessment#
D1(config)#line con 0
D1(config-line)# exec-timeout 0 0
D1(config-line)# logging synchronous
D1(config-line)# exit
D1(config)#vlan 100
D1(config-vlan)# name Management
D1(config-vlan)# exit
D1(config)#vlan 101
D1(config-vlan)# name UserGroupA
D1(config-vlan)# exit
D1(config)#vlan 102
D1(config-vlan)# name UserGroupB
D1(config-vlan)# exit
D1(config)#vlan 999
D1(config-vlan)# name NATIVE
D1(config-vlan)# exit
D1(config)#interface e1/2
D1(config-if)# no switchport
D1(config-if)# ip address 10.81.10.2 255.255.255.0
D1(config-if)# ipv6 address fe80::d1:1 link-local
D1(config-if)# ipv6 address 2001:db8:100:1010::2/64
D1(config-if)# no shutdown
D1(config-if)# exit
D1(config)#interface v100
D1(config-if)# ip address 10.81.100.1 255.255.255.0
D1(config-if)# ipv6 address fe80::d1:2 link-local
D1(config-if)# ipv6 address 2001:db8:100:100::1/64
D1(config-if)# no shutdown
D1(config-if)# exit
D1(config)#interface v101

```

Fuente: elaboración propia

Figura 7. Configuración D2

```

D2(config)#
*Oct 8 01:49:38.211: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#hostname D2
D2(config)#ip routing
D2(config)#ipv6 unicast-routing
D2(config)#no ip domain lookup
D2(config)#banner motd # D2, ENCOR Skills Assessment#
D2(config)#line con 0
D2(config-line)# exec-timeout 0 0
D2(config-line)# logging synchronous
D2(config-line)# exit
D2(config)#vlan 100
D2(config-vlan)# name Management
D2(config-vlan)# exit
D2(config)#vlan 101
D2(config-vlan)# name UserGroupA
D2(config-vlan)# exit
D2(config)#vlan 102
D2(config-vlan)# name UserGroupB
D2(config-vlan)# exit
D2(config)#vlan 999
D2(config-vlan)# name NATIVE
D2(config-vlan)# exit
D2(config)#interface e1/0
D2(config-if)# no switchport
D2(config-if)# ip address 10.81.11.2 255.255.255.0
D2(config-if)# ipv6 address fe80::d1:1 link-local
D2(config-if)# ipv6 address 2001:db8:100:1011::2/64
D2(config-if)# no shutdown
D2(config-if)# exit
D2(config)#interface v100
D2(config-if)# ip address 10.81.100.2 255.255.255.0
D2(config-if)# ipv6 address fe80::d2:2 link-local
D2(config-if)# ipv6 address 2001:db8:100:100::2/64
D2(config-if)# no shutdown
D2(config-if)# exit
D2(config)#interface v101
D2(config-if)# ip address 10.81.101.2 255.255.255.0
D2(config-if)# ipv6 address fe80::d2:3 link-local
D2(config-if)# ipv6 address 2001:db8:100:101::2/64
D2(config-if)# no shutdown

```

Fuente: elaboración propia

Figura 8. Configuración A1

```
A1(config-vlan)# exit
A1(config)#vlan 102
A1(config-vlan)# name UserGroupB
A1(config-vlan)# exit
A1(config)#vlan 999
A1(config-vlan)# name NATIVE
A1(config-vlan)# exit
A1(config)#interface vlan 100
A1(config-if)# ip address 10.81.100.3 255.255.255.0
A1(config-if)# ipv6 address fe80::1:1 link-local
A1(config-if)# ipv6 address 2001::db8:100:100:1:3/64
A1(config-if)# no shutdown
A1(config-if)# exit
A1(config)#interface range e0/0,e0/3,e1/0,e2/1-3,e3/0-3
A1(config-if-range)# shutdown
A1(config-if-range)# exit
A1(config)#
*Oct 8 02:00:10.999: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state to down
*Oct 8 02:00:12.005: %LINK-3-UPDOWN: Interface Vlan100, changed state to down
*Oct 8 02:00:12.023: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to administratively down
*Oct 8 02:00:12.023: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to administratively down
*Oct 8 02:00:12.023: %LINK-5-CHANGED: Interface Ethernet1/0, changed state to administratively down
*Oct 8 02:00:12.028: %LINK-5-CHANGED: Interface Ethernet2/1, changed state to administratively down
*Oct 8 02:00:12.038: %LINK-5-CHANGED: Interface Ethernet2/2, changed state to administratively down
*Oct 8 02:00:12.038: %LINK-5-CHANGED: Interface Ethernet2/3, changed state to administratively down
*Oct 8 02:00:12.038: %LINK-5-CHANGED: Interface Ethernet3/0, changed state to administratively down
*Oct 8 02:00:12.048: %LINK-5-CHANGED: Interface Ethernet3/1, changed state to administratively down
*Oct 8 02:00:12.048: %LINK-5-CHANGED: Interface Ethernet3/2, changed state to administratively down
*Oct 8 02:00:12.048: %LINK-5-CHANGED: Interface Ethernet3/3, changed state to administratively down
A1(config)#
*Oct 8 02:00:13.032: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to down
*Oct 8 02:00:13.032: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to down
*Oct 8 02:00:13.032: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to down
*Oct 8 02:00:13.032: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to down
*Oct 8 02:00:13.045: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to down
*Oct 8 02:00:13.045: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to down
A1(config)#
*Oct 8 02:00:13.045: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/0, changed state to down
*Oct 8 02:00:13.055: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/1, changed state to down
*Oct 8 02:00:13.055: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/2, changed state to down
*Oct 8 02:00:13.055: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/3, changed state to down
A1(config)#
```

Fuente: elaboración propia

b. Guarde la configuración en ejecución en startup-config en todos los dispositivos. Con el comando **copy running-config startup-config**, guardamos las configuraciones en los dispositivos. Ejemplo con D1:

```
D1#copy running-config startup-config
```

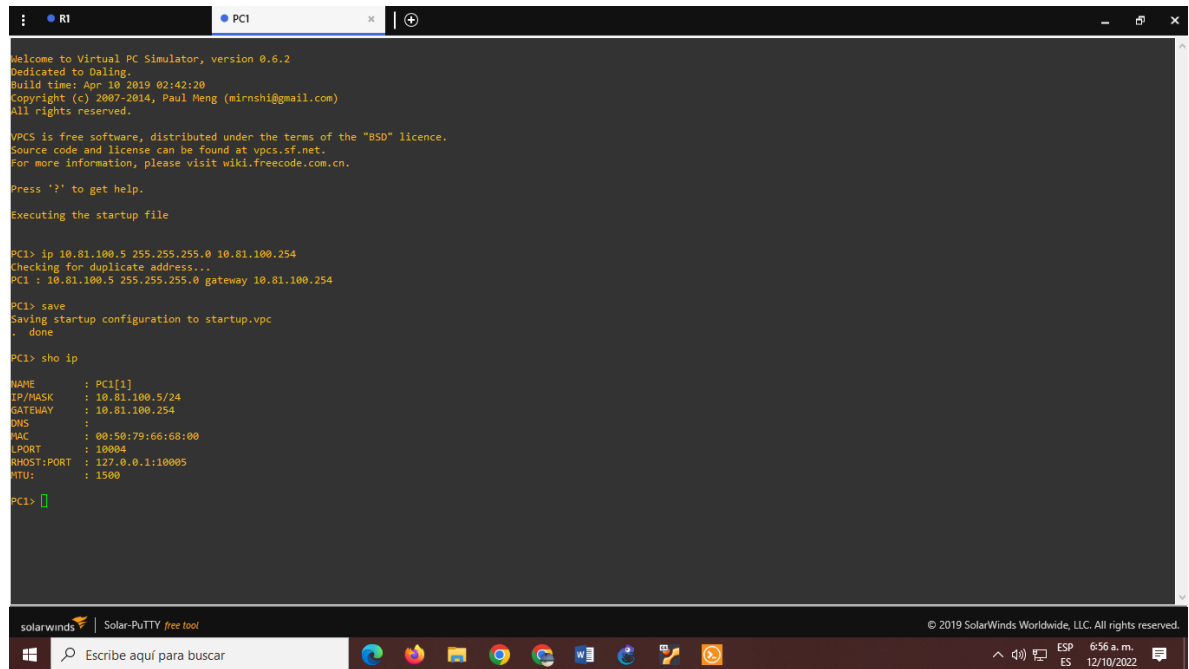
```
Destination filename [startup-config]?
```

```
Building configuration...
```

```
Compressed configuration from 3321 bytes to 1729 bytes[OK]
```

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 10.81.100.254, que será la dirección IP virtual de HSRP utilizada en la Parte 4.

Figura 9. Direccionamiento PC1



```
Welcome to Virtual PC Simulator, version 0.6.2
Dedicated to Daling.
Build times: Apr 10 2019 02:42:20
Copyright (c) 2007-2014, Paul Meng (mirnshi@gmail.com)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.

Executing the startup file

PC1> ip 10.81.100.5 255.255.255.0 10.81.100.254
Checking for duplicate address...
PC1 : 10.81.100.5 255.255.255.0 gateway 10.81.100.254

PC1> save
Saving startup configuration to startup.vpc
. done

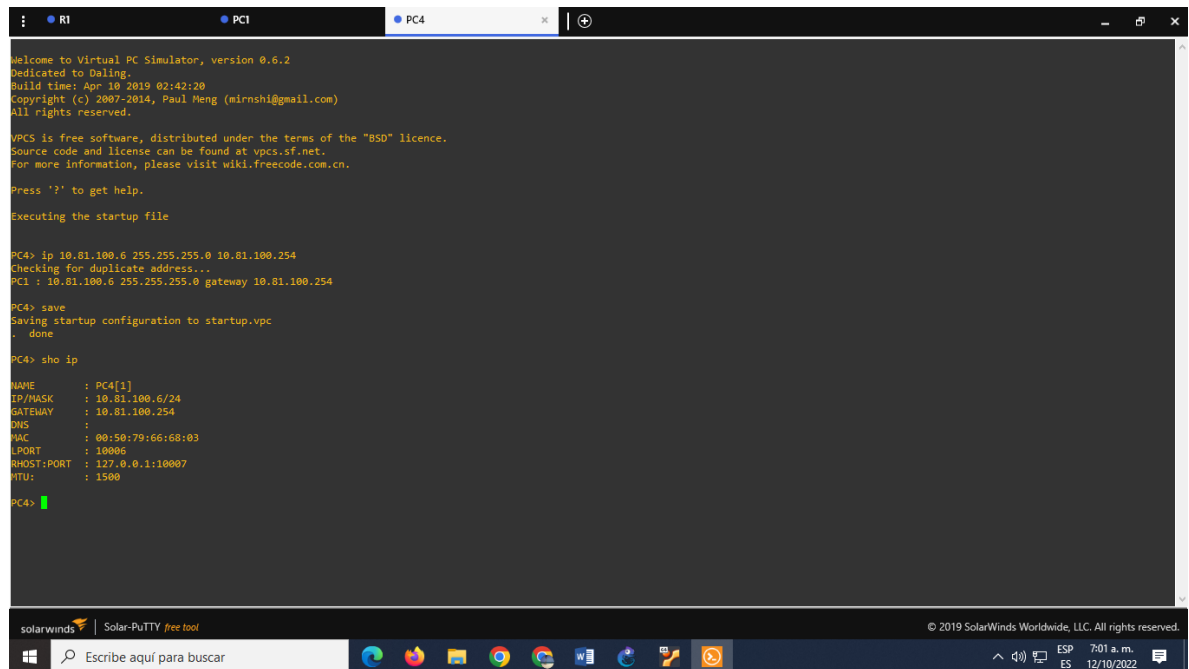
PC1> sho ip

NAME      : PC1[1]
IP/MASK   : 10.81.100.5/24
GATEWAY   : 10.81.100.254
DNS       :
MAC       : 00:50:79:66:68:00
LPORT     : 10004
RHOST:PORT : 127.0.0.1:10005
MTU       : 1500

PC1> []
```

Fuente: elaboración propia

Figura 10. Direccionamiento PC2



```
Welcome to Virtual PC Simulator, version 0.6.2
Dedicated to Daling.
Build times: Apr 10 2019 02:42:20
Copyright (c) 2007-2014, Paul Meng (mirnshi@gmail.com)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.

Executing the startup file

PC4> ip 10.81.100.6 255.255.255.0 10.81.100.254
Checking for duplicate address...
PC1 : 10.81.100.6 255.255.255.0 gateway 10.81.100.254

PC4> save
Saving startup configuration to startup.vpc
. done

PC4> sho ip

NAME      : PC4[1]
IP/MASK   : 10.81.100.6/24
GATEWAY   : 10.81.100.254
DNS       :
MAC       : 00:50:79:66:68:03
LPORT     : 10005
RHOST:PORT : 127.0.0.1:10007
MTU       : 1500

PC4> █
```

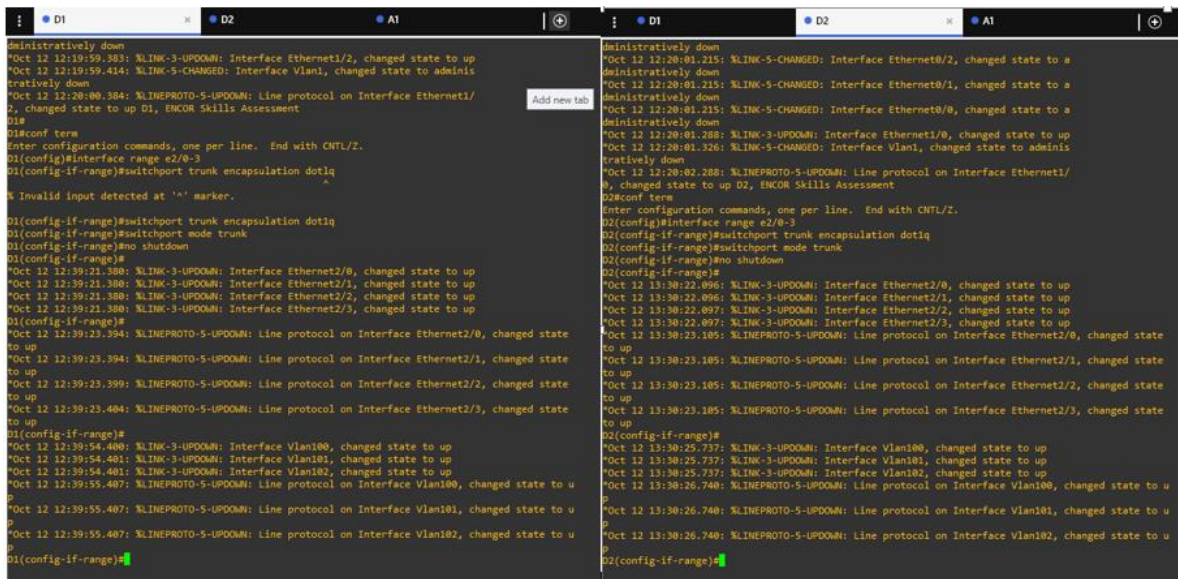
Fuente: elaboración propia

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

2.1 En todos los conmutadores, configure las interfaces troncales IEEE 802.1Q en los enlaces de conmutador de interconexión

Figura 11. Enable 802.1Q trunk links between D1-D2



```
D1
administratively down
*Oct 12 12:19:59.383: %LINK-3-UPDOWN: Interface Ethernet1/2, changed state to up
*Oct 12 12:19:59.414: %LINK-5-CHANGED: Interface Vlan1, changed state to administratively down
*Oct 12 12:20:00.384: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to up D1, ENCOR Skills Assessment
D1#
D1#conf term
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
% Invalid input detected at '^' marker.
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#switchport mode trunk
D1(config-if-range)#no shutdown
D1(config-if-range)#
*Oct 12 12:39:21.380: %LINK-3-UPDOWN: Interface Ethernet2/0, changed state to up
*Oct 12 12:39:21.380: %LINK-3-UPDOWN: Interface Ethernet2/1, changed state to up
*Oct 12 12:39:21.380: %LINK-3-UPDOWN: Interface Ethernet2/2, changed state to up
*Oct 12 12:39:21.380: %LINK-3-UPDOWN: Interface Ethernet2/3, changed state to up
D1(config-if-range)#
*Oct 12 12:39:23.394: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to up
*Oct 12 12:39:23.394: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to up
*Oct 12 12:39:23.399: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to up
*Oct 12 12:39:23.404: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to up
D1(config-if-range)#
*Oct 12 12:39:54.400: %LINK-3-UPDOWN: Interface Vlan100, changed state to up
*Oct 12 12:39:54.401: %LINK-3-UPDOWN: Interface Vlan101, changed state to up
*Oct 12 12:39:54.401: %LINK-3-UPDOWN: Interface Vlan102, changed state to up
*Oct 12 12:39:55.407: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state to up
*Oct 12 12:39:55.407: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan101, changed state to up
*Oct 12 12:39:55.407: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan102, changed state to up
D1(config-if-range)#

D2
administratively down
*Oct 12 12:20:01.215: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to administratively down
*Oct 12 12:20:01.215: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively down
*Oct 12 12:20:01.215: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to administratively down
*Oct 12 12:20:01.288: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Oct 12 12:20:01.320: %LINK-5-CHANGED: Interface Vlan1, changed state to administratively down
*Oct 12 12:20:02.288: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up D2, ENCOR Skills Assessment
D2#
D2#conf term
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)#no shutdown
D2(config-if-range)#
*Oct 12 13:30:22.096: %LINK-3-UPDOWN: Interface Ethernet2/0, changed state to up
*Oct 12 13:30:22.096: %LINK-3-UPDOWN: Interface Ethernet2/1, changed state to up
*Oct 12 13:30:22.097: %LINK-3-UPDOWN: Interface Ethernet2/2, changed state to up
*Oct 12 13:30:22.097: %LINK-3-UPDOWN: Interface Ethernet2/3, changed state to up
*Oct 12 13:30:23.105: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to up
*Oct 12 13:30:23.105: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to up
*Oct 12 13:30:23.105: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to up
*Oct 12 13:30:23.105: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to up
D2(config-if-range)#
*Oct 12 13:30:25.737: %LINK-3-UPDOWN: Interface Vlan100, changed state to up
*Oct 12 13:30:25.737: %LINK-3-UPDOWN: Interface Vlan101, changed state to up
*Oct 12 13:30:25.737: %LINK-3-UPDOWN: Interface Vlan102, changed state to up
*Oct 12 13:30:26.740: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state to up
*Oct 12 13:30:26.740: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan101, changed state to up
*Oct 12 13:30:26.740: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan102, changed state to up
D2(config-if-range)#
```

Fuente: elaboración propia

2.2 En todos los conmutadores, cambie la VLAN nativa en los enlaces troncales. Utilice la VLAN 999 como la VLAN nativa.

Figura 14. D1 VLAN 999 como la VLAN nativa

```

D1
to up
*Oct 12 12:39:23.484: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to up
*Oct 12 12:39:54.480: %LINK-3-UPDOWN: Interface Vlan100, changed state to up
*Oct 12 12:39:54.481: %LINK-3-UPDOWN: Interface Vlan101, changed state to up
*Oct 12 12:39:54.481: %LINK-3-UPDOWN: Interface Vlan102, changed state to up
*Oct 12 12:39:55.487: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state to up
*Oct 12 12:39:55.487: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan101, changed state to up
*Oct 12 12:39:55.487: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan102, changed state to up
D1(config-if-range)#exit
D1(config)#interface range e0/1-2
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#switchport mode trunk
D1(config-if-range)#no shutdown
D1(config-if-range)#
*Oct 12 13:35:37.979: %LINK-3-UPDOWN: Interface Ethernet0/1, changed state to up
*Oct 12 13:35:37.979: %LINK-3-UPDOWN: Interface Ethernet0/2, changed state to up
*Oct 12 13:35:38.981: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to up
*Oct 12 13:35:38.981: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to up
D1(config-if-range)#switchport trunk native vlan 999
D1(config-if-range)#
*Oct 12 14:09:01.874: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (999), with A1 Ethernet0/1 (1).
D1(config-if-range)#
*Oct 12 14:09:35.586: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2 (999), with A1 Ethernet0/2 (1).
D1(config-if-range)#
*Oct 12 14:09:54.277: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (999), with A1 Ethernet0/1 (1).
D1(config-if-range)#
*Oct 12 14:10:23.966: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2 (999), with A1 Ethernet0/2 (1).
D1(config-if-range)#
*Oct 12 14:10:40.251: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (999), with A1 Ethernet0/1 (1).
D1(config-if-range)#
  
```

Fuente: elaboración propia

Figura 15. D2 VLAN 999 como la VLAN nativa

```

D2
D2(config-if-range)#no shutdown
D2(config-if-range)#
*Oct 12 13:38:22.896: %LINK-3-UPDOWN: Interface Ethernet2/0, changed state to up
*Oct 12 13:38:22.896: %LINK-3-UPDOWN: Interface Ethernet2/1, changed state to up
*Oct 12 13:38:22.897: %LINK-3-UPDOWN: Interface Ethernet2/2, changed state to up
*Oct 12 13:38:22.897: %LINK-3-UPDOWN: Interface Ethernet2/3, changed state to up
*Oct 12 13:38:23.185: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to up
*Oct 12 13:38:23.185: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to up
*Oct 12 13:38:23.185: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to up
*Oct 12 13:38:23.185: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to up
D2(config-if-range)#
*Oct 12 13:38:25.737: %LINK-3-UPDOWN: Interface Vlan100, changed state to up
*Oct 12 13:38:25.737: %LINK-3-UPDOWN: Interface Vlan101, changed state to up
*Oct 12 13:38:25.737: %LINK-3-UPDOWN: Interface Vlan102, changed state to up
*Oct 12 13:38:26.740: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state to up
*Oct 12 13:38:26.740: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan101, changed state to up
*Oct 12 13:38:26.740: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan102, changed state to up
D2(config-if-range)#exit
D2(config)#interface range e1/1-2
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#no shutdown
D2(config-if-range)#
*Oct 12 14:02:19.981: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
*Oct 12 14:02:19.981: %LINK-3-UPDOWN: Interface Ethernet1/2, changed state to up
*Oct 12 14:02:19.988: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
*Oct 12 14:02:19.988: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to up
D2(config-if-range)#switchport trunk native vlan 999
D2(config-if-range)#
*Oct 12 14:11:08.311: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet1/2 (999), with A1 Ethernet1/2 (1).
D2(config-if-range)#
*Oct 12 14:11:18.180: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet1/1 (999), with A1 Ethernet1/1 (1).
D2(config-if-range)#
  
```

Fuente: elaboración propia

Figura 16. A1 VLAN 999 como la VLAN nativa

```

A1(config-if-range)#
*Oct 12 14:11:49.984: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1
(1), with D1 Ethernet0/1 (999).
A1(config-if-range)#
*Oct 12 14:12:26.431: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2
(1), with D1 Ethernet0/2 (999).
A1(config-if-range)#
*Oct 12 14:12:41.008: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1
(1), with D1 Ethernet0/1 (999).
A1(config-if-range)#
*Oct 12 14:13:25.317: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2
(1), with D1 Ethernet0/2 (999).
A1(config-if-range)#
*Oct 12 14:13:59.196: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet1/1
(1), with D2 Ethernet1/1 (999).
*Oct 12 14:13:59.819: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1
(1), with D1 Ethernet0/1 (999).
A1(config-if-range)#
*Oct 12 14:14:13.571: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2
(1), with D1 Ethernet0/2 (999).
A1(config-if-range)#
*Oct 12 14:14:13.522: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet1/2
(1), with D2 Ethernet1/2 (999).
A1(config-if-range)#
*Oct 12 14:14:12.485: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet1/1
(1), with D2 Ethernet1/1 (999).
A1(config-if-range)#
*Oct 12 14:14:12.251: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1
(1), with D1 Ethernet0/1 (999).
A1(config-if-range)#switchport trunk native vlan 999
A1(config-if-range)#
*Oct 12 14:15:08.857: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2 (1), with D1 Ethernet0/2 (999).
A1(config-if-range)#
*Oct 12 14:15:26.764: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (1), with D1 Ethernet0/1 (999).
A1(config-if-range)#
*Oct 12 14:16:00.305: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2 (1), with D1 Ethernet0/2 (999).
A1(config-if-range)#
*Oct 12 14:16:23.383: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (1), with D1 Ethernet0/1 (999).
A1(config-if-range)#
(1), with D1 Ethernet0/1 (999).
A1(config-if-range)#
*Oct 12 14:24:09.480: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2
(1), with D1 Ethernet0/2 (999).
A1(config-if-range)#exit
A1#
*Oct 12 14:24:22.961: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1
(1), with D1 Ethernet0/1 (999).
A1#
*Oct 12 14:24:23.647: %SYS-5-CONFIG_I: Configured from console by console
A1#
Building configuration...
Compressed configuration: from 1945 bytes to 1148 bytes[OK]
A1#show interface trunk
Port      Mode      Encapsulation  Status  Native vlan
Et0/1    on        802.1q          trunking  1
Et0/2    on        802.1q          trunking  1
Et1/1    on        802.1q          trunking  999
Et1/2    on        802.1q          trunking  999

Port      Vlans allowed on trunk
Et0/1    1-4094
Et0/2    1-4094
Et1/1    1-4094
Et1/2    1-4094

Port      Vlans allowed and active in management domain
Et0/1    1,100-102,999
Et0/2    1-4094
Et1/1    1,100-102,999
Et1/2    1,100-102,999

Port      Vlans in spanning tree forwarding state and not pruned
Et0/1    1,100-102,999
Et0/2    none
Et1/1    none
Et1/2    none
A1#
A1#
  
```

Fuente: elaboración propia

2.3 En todos los conmutadores, habilite el protocolo Rapid Spanning-Tree. Utilice el árbol de expansión rápida.

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

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

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

2.4 En D1 y D2, configure los puentes raíz RSTP apropiados según la información del diagrama de topología.

D1 y D2 deben proporcionar respaldo en caso de falla del puente raíz. Configure D1 y D2 como raíz para las VLAN apropiadas con prioridades que se apoyen mutuamente en caso de falla del conmutador.

Figura 17. Configuración D1 con VLAN apropiada

```
D1, ENCOR Skills Assessment
D1#conf term
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#spanning-tree mode rapid-pvst
D1(config)#spanning-tree vlan 100,101 root primary
D1(config)#spanning-tree vlan 101 root secondary
D1(config)#interface e0/0
D1(config-if)#switchport mode access
D1(config-if)#switchport access vlan 100
D1(config-if)#spanning-tree portfast
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#end
D1#
*Oct 15 16:26:32.185: %SYS-5-CONFIG_I: Configured from console by console
D1#
```

Fuente: elaboración propia

Figura 18. Configuración D2 con VLAN apropiada

```
D2#conf term
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#spanning-tree mode rapid-pvst
D2(config)#spanning-tree vlan 101 root primary
D2(config)#spanning-tree vlan 100,102 root secondary
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
host. 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)#end
*Oct 15 16:18:43.985: %LINK-3-UPDOWN: Interface Ethernet0/0, changed state to up
*Oct 15 16:18:44.989: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to up
D2(config)#end
D2#
*Oct 15 16:19:09.173: %SYS-5-CONFIG_I: Configured from console by console
D2#
```

Fuente: elaboración propia

2.5 En todos los switches, cree LACP EtherChannels como se muestra en el diagrama de topología. Utilice los siguientes números de canal:

- D1 a D2: canal de puerto 12
- D1 a A1: canal de puerto 1
- D2 a A1: canal de puerto 2

Figura 19. D1-D2: canal de puerto 12

```

D1, ENCOR Skills Assessment
D1#conf term
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)#switchport trunk native vlan 999
D1(config-if-range)#channel-group 12 mode active
Command rejected (Port-channel12, Et2/0): Either port is L2 and port-channel is L3
, or vice-versa
% Range command terminated because it failed on Ethernet2/0
D1(config-if-range)#no shutdown
D1(config-if-range)#exit
D1(config)#exit
D1#
*Oct 15 19:06:29.568: %SYS-5-CONFIG_I: Configured from console by console
D1#show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone s - suspended
       H - Hot-standby (LACP only)
       R - Layer3        S - Layer2
       U - in use        N - not in use, no aggregation
       f - failed to allocate aggregator

       M - not in use, minimum links not met
       m - not in use, port not aggregated due to minimum links not met
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port

       A - formed by Auto LAG

Number of channel-groups in use: 2
Number of aggregators:          2

Group  Port-channel  Protocol    Ports
-----
 1     Po1(SU)         LACP       Et0/1(P)  Et0/2(P)
 12    Po12(RD)        LACP       Et1/2(s)

```

```

D2, ENCOR Skills Assessment
D2#conf term
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#
*Oct 15 17:41:57.054: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered
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)#switchport trunk native vlan 999
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)#
*Oct 15 17:42:08.048: %EC-5-L3DONTBNDL2: Et2/2 suspended: LACP currently not enabl
*Oct 15 17:42:08.168: %EC-5-L3DONTBNDL2: Et2/1 suspended: LACP currently not enabl
*Oct 15 17:42:08.227: %EC-5-L3DONTBNDL2: Et2/3 suspended: LACP currently not enabl
*Oct 15 17:42:08.228: %EC-5-L3DONTBNDL2: Et2/0 suspended: LACP currently not enabl
D2(config)#exit
D2#s
*Oct 15 17:58:53.972: %SYS-5-CONFIG_I: Configured from console by console
D2#show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone s - suspended
       H - Hot-standby (LACP only)
       R - Layer3        S - Layer2
       U - in use        N - not in use, no aggregation
       f - failed to allocate aggregator

       M - not in use, minimum links not met
       m - not in use, port not aggregated due to minimum links not met
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port

       A - formed by Auto LAG

Number of channel-groups in use: 1
Number of aggregators:          1

Group  Port-channel  Protocol    Ports
-----
 12    Po12(SD)       LACP       Et2/0(s)  Et2/1(s)  Et2/2(s)
              Et2/3(s)
D2#

```

Fuente: elaboración propia

Figura 20. D1-A1: canal de puerto 1

```
D1#conf term
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#interface range e0/1-2
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#switchport mode trunk
D1(config-if-range)#switchport trunk native vlan 999
D1(config-if-range)#channel-group 1 mode active
D1(config-if-range)#no shutdown
D1(config-if-range)#exit
D1(config)#exit
D1#conf term
*Oct 15 19:23:13.122: %SYS-5-CONFIG_I: Configured from console by console
D1#show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone s - suspended
       H - Hot-standby (LACP only)
       R - Layer3        S - Layer2
       U - in use        N - not in use, no aggregation
       f - failed to allocate aggregator

       M - not in use, minimum links not met
       m - not in use, port not aggregated due to minimum links not met
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port

       A - formed by Auto LAG

Number of channel-groups in use: 2
Number of aggregators:          2

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----+-----
1      Po1(SU)         LACP        Et0/1(P)   Et0/2(P)
12     Po12(RD)        LACP        Et1/2(s)
```

```
A1#conf term
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#interface range e0/1-2
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#switchport mode trunk
A1(config-if-range)#switchport trunk native vlan 999
A1(config-if-range)#channel-group 1 mode active
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
A1(config)#exit
A1#show etherchannel summary
*Oct 15 19:27:12.720: %SYS-5-CONFIG_I: Configured from console by console
A1#show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone s - suspended
       H - Hot-standby (LACP only)
       R - Layer3        S - Layer2
       U - in use        N - not in use, no aggregation
       f - failed to allocate aggregator

       M - not in use, minimum links not met
       m - not in use, port not aggregated due to minimum links not met
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port

       A - formed by Auto LAG

Number of channel-groups in use: 2
Number of aggregators:          2

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----+-----
1      Po1(SU)         LACP        Et0/1(P)   Et0/2(P)
2      Po2(SD)         LACP        Et1/1(s)   Et1/2(s)
```

Fuente: elaboración propia

Figura 21. D2-A1: canal de puerto 2

```
D2#conf term
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#interface range e1/1-2
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#switchport trunk native vlan 999
D2(config-if-range)#channel-group 2 mode active
Creating a port-channel interface Port-channel 2

D2(config-if-range)#no shutdown
D2(config-if-range)#exit
D2(config)#exit
D2#
*Oct 15 19:31:10.182: %SYS-5-CONFIG_I: Configured from console by console
D2#conf term
*Oct 15 19:31:13.070: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel
2, changed state to up
D2#show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone  s - suspended
       H - Hot-standby (LACP only)
       R - Layer3      S - Layer2
       U - in use      N - not in use, no aggregation
       f - failed to allocate aggregator

       M - not in use, minimum links not met
       m - not in use, port not aggregated due to minimum links not met
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port

       A - formed by Auto LAG

Number of channel-groups in use: 2
Number of aggregators:          2

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----+-----+-----
 2      Po2(SU)         LACP        Et1/1(P)   Et1/2(P)
12     Po12(SD)        LACP        Et2/0(s)   Et2/1(s)   Et2/2(s)
                                     Et2/3(s)
```

```
A1#
A1#conf term
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#interface range e1/1-2
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#switchport mode trunk
A1(config-if-range)#switchport trunk native vlan 999
A1(config-if-range)#channel-group 2 mode active
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
A1(config)#exit
A1#conf term
*Oct 15 19:34:55.357: %SYS-5-CONFIG_I: Configured from console by console
A1#show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone  s - suspended
       H - Hot-standby (LACP only)
       R - Layer3      S - Layer2
       U - in use      N - not in use, no aggregation
       f - failed to allocate aggregator

       M - not in use, minimum links not met
       m - not in use, port not aggregated due to minimum links not met
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port

       A - formed by Auto LAG

Number of channel-groups in use: 2
Number of aggregators:          2

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----+-----+-----
 1      Po1(SU)         LACP        Et0/1(P)   Et0/2(P)
 2      Po2(SU)         LACP        Et1/1(P)   Et1/2(P)
--More--
```

Fuente: elaboración propia

2.6 En todos los conmutadores, configure los puertos de acceso del host que se conectan a PC1, PC2, PC3 y PC4. Configure los puertos de acceso con la configuración de VLAN adecuada, como se muestra en el diagrama de topología. Los puertos de host deben pasar inmediatamente al estado de reenvío.

Figura 22. D1- Configuración de puertos de acceso con la VLAN adecuada

```
D1#
D1#conf term
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#interface e0/0
D1(config-if)#switchport mode access
D1(config-if)#switchport access vlan 100
D1(config-if)#spanning-tree portfast
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#end
D1#
D1#
*Oct 15 20:05:53.119: %SYS-5-CONFIG_I: Configured from console by console
D1#show interfaces status
```

Port	Name	Status	Vlan	Duplex	Speed	Type
Et0/0		connected	100	auto	auto	unknown
Et0/1		connected	trunk	auto	auto	unknown
Et0/2		connected	trunk	auto	auto	unknown
Et0/3		disabled	1	auto	auto	unknown
Et1/0		disabled	1	auto	auto	unknown
Et1/1		disabled	1	auto	auto	unknown
Et1/2		connected	routed	auto	auto	unknown
Et1/3		disabled	1	auto	auto	unknown
Et2/0		connected	trunk	auto	auto	unknown
Et2/1		connected	trunk	auto	auto	unknown
Et2/2		connected	trunk	auto	auto	unknown
Et2/3		connected	trunk	auto	auto	unknown
Et3/0		disabled	1	auto	auto	unknown
Et3/1		disabled	1	auto	auto	unknown
Et3/2		disabled	1	auto	auto	unknown
Et3/3		disabled	1	auto	auto	unknown
Po1		connected	trunk	auto	auto	
Po12		connected	routed	auto	auto	

```
D1#
```

Fuente: elaboración propia

Figura 23. D2- Configuración de puertos de acceso con la VLAN adecuada

```
D2, ENCOR Skills Assessment
D2#conf term
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#interface e0/0
D2(config-if)#switchport mode access
D2(config-if)#switchport access vlan 102
D2(config-if)#spanning-tree portfast
D2(config-if)#no shutdown
D2(config-if)#exit
D2(config)#end
D2#
*Oct 15 20:10:32.973: %SYS-5-CONFIG_I: Configured from console by console
D2#show interfaces status
```

Port	Name	Status	Vlan	Duplex	Speed	Type
Et0/0		connected	102	auto	auto	unknown
Et0/1		disabled	1	auto	auto	unknown
Et0/2		disabled	1	auto	auto	unknown
Et0/3		disabled	1	auto	auto	unknown
Et1/0		connected	routed	auto	auto	unknown
Et1/1		connected	trunk	auto	auto	unknown
Et1/2		connected	trunk	auto	auto	unknown
Et1/3		disabled	1	auto	auto	unknown
Et2/0		connected	trunk	auto	auto	unknown
Et2/1		connected	trunk	auto	auto	unknown
Et2/2		connected	trunk	auto	auto	unknown
Et2/3		connected	trunk	auto	auto	unknown
Et3/0		disabled	1	auto	auto	unknown
Et3/1		disabled	1	auto	auto	unknown
Et3/2		disabled	1	auto	auto	unknown
Et3/3		disabled	1	auto	auto	unknown
Po2		connected	trunk	auto	auto	
Po12		connected	unassigned	auto	auto	

```
D2#
```

Fuente: elaboración propia

Figura 24. A1 - Configuración de puertos de acceso con la VLAN adecuada

```
A1(config)#interface e1/3
A1(config-if)#switchport mode access
A1(config-if)#switchport access vlan 101
A1(config-if)#spanning-tree portfast
A1(config-if)#no shutdown
A1(config-if)#exit
A1(config)#interface e2/0
A1(config-if)#switchport mode access
A1(config-if)#switchport access vlan 100
A1(config-if)#spanning-tree portfast
A1(config-if)#no shutdown
A1(config-if)#exit
A1(config)#end
A1#
*Oct 15 20:14:06.303: %SYS-5-CONFIG_I: Configured from console by console
A1#show interfaces status
```

Port	Name	Status	Vlan	Duplex	Speed	Type
Et0/0		disabled	1	auto	auto	unknown
Et0/1		connected	trunk	auto	auto	unknown
Et0/2		connected	trunk	auto	auto	unknown
Et0/3		disabled	1	auto	auto	unknown
Et1/0		disabled	1	auto	auto	unknown
Et1/1		connected	trunk	auto	auto	unknown
Et1/2		connected	trunk	auto	auto	unknown
Et1/3		connected	101	auto	auto	unknown
Et2/0		connected	100	auto	auto	unknown
Et2/1		disabled	1	auto	auto	unknown
Et2/2		disabled	1	auto	auto	unknown
Et2/3		disabled	1	auto	auto	unknown
Et3/0		disabled	1	auto	auto	unknown
Et3/1		disabled	1	auto	auto	unknown
Et3/2		disabled	1	auto	auto	unknown
Et3/3		disabled	1	auto	auto	unknown
Po1		connected	trunk	auto	auto	
Po2		connected	trunk	auto	auto	

```
A1#
```

Fuente: elaboración propia

2.7 Verificar los servicios DHCP IPv4. PC2 y PC3 son clientes DHCP y deben recibir direcciones IPv4 válidas.

Figura 25. DHCP- PC2

```
PC2> ip dhcp
DDD
Can't find dhcp server

PC2> ip dhcp
DDORA IP 10.81.102.210/24 GW 10.81.102.254

PC2> save
Saving startup configuration to startup.vpc
. done

PC2> show ip

NAME       : PC2[1]
IP/MASK    : 10.81.102.210/24
GATEWAY    : 10.81.102.254
DNS        :
DHCP SERVER : 10.81.102.2
DHCP LEASE  : 86050, 86400/43200/75600
MAC        : 00:50:79:66:68:01
LPORT      : 10004
RHOST:PORT : 127.0.0.1:10005
MTU        : 1500
```

Fuente: elaboración propia

Figura 26. DHCP- PC3

```
PC3> ip dhcp
DDORA IP 10.81.101.110/24 GW 10.81.101.254

PC3> save
Saving startup configuration to startup.vpc
. done

PC3> show ip

NAME       : PC3[1]
IP/MASK    : 10.81.101.110/24
GATEWAY    : 10.81.101.254
DNS        :
DHCP SERVER : 10.81.101.1
DHCP LEASE  : 86390, 86400/43200/75600
MAC        : 00:50:79:66:68:02
LPORT      : 10006
RHOST:PORT : 127.0.0.1:10007
MTU        : 1500

PC3> █
```

Fuente: elaboración propia

2.8 Verificar la conectividad LAN local

Figura 27. Conectividad PC1 y PC2

```
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.

Executing the startup file

Checking for duplicate address...
PC1 : 10.81.100.5 255.255.255.0 gateway 10.81.100.254

PC1> ping 10.81.100.1
84 bytes from 10.81.100.1 icmp_seq=1 ttl=255 time=0.762 ms
84 bytes from 10.81.100.1 icmp_seq=2 ttl=255 time=1.686 ms
84 bytes from 10.81.100.1 icmp_seq=3 ttl=255 time=1.413 ms
84 bytes from 10.81.100.1 icmp_seq=4 ttl=255 time=1.836 ms
84 bytes from 10.81.100.1 icmp_seq=5 ttl=255 time=6.684 ms

PC1> 10.81.100.2
Bad command: "10.81.100.2". Use ? for help.

PC1> ping 10.81.100.2
84 bytes from 10.81.100.2 icmp_seq=1 ttl=255 time=3.826 ms
84 bytes from 10.81.100.2 icmp_seq=2 ttl=255 time=4.054 ms
84 bytes from 10.81.100.2 icmp_seq=3 ttl=255 time=2.250 ms
84 bytes from 10.81.100.2 icmp_seq=4 ttl=255 time=11.430 ms
84 bytes from 10.81.100.2 icmp_seq=5 ttl=255 time=4.711 ms

PC1> ping 10.81.100.6
host (10.81.100.6) not reachable

PC1> ping 10.81.100.6
host (10.81.100.6) not reachable

PC1> ping 10.81.100.6
host (10.81.100.6) not reachable

PC1>

Welcome to Virtual PC Simulator, version 0.6.2
Dedicated to Daling.
Build time: Apr 10 2019 02:42:20
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Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.

Executing the startup file

DDORA IP 10.81.102.210/24 GW 10.81.102.254

PC2> ping 10.81.102.1
host (10.81.102.1) not reachable

PC2> ping 10.81.102.1
host (10.81.102.1) not reachable

PC2> ping 10.81.102.2
84 bytes from 10.81.102.2 icmp_seq=1 ttl=255 time=0.750 ms
84 bytes from 10.81.102.2 icmp_seq=2 ttl=255 time=2.200 ms
84 bytes from 10.81.102.2 icmp_seq=3 ttl=255 time=1.390 ms
84 bytes from 10.81.102.2 icmp_seq=4 ttl=255 time=1.903 ms
84 bytes from 10.81.102.2 icmp_seq=5 ttl=255 time=1.392 ms

PC2> ping 10.81.102.1
host (10.81.102.1) not reachable

PC2>
```

Fuente: elaboración propia

Figura 28. Conectividad PC3 y PC4

```
Welcome to Virtual PC Simulator, version 0.6.2
Dedicated to Daling.
Build time: Apr 10 2019 02:42:20
Copyright (c) 2007-2014, Paul Meng (mirnshi@gmail.com)
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Press '?' to get help.

Executing the startup file

DDD
Can't find dhcp server

PC3> ping 10.81.101.1
10.81.101.1 icmp_seq=1 timeout
10.81.101.1 icmp_seq=2 timeout
10.81.101.1 icmp_seq=3 timeout
10.81.101.1 icmp_seq=4 timeout
10.81.101.1 icmp_seq=5 timeout

PC3> ping 10.81.101.2
10.81.101.2 icmp_seq=1 timeout
10.81.101.2 icmp_seq=2 timeout
10.81.101.2 icmp_seq=3 timeout
10.81.101.2 icmp_seq=4 timeout
10.81.101.2 icmp_seq=5 timeout

PC3>

Welcome to Virtual PC Simulator, version 0.6.2
Dedicated to Daling.
Build time: Apr 10 2019 02:42:20
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For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.

Executing the startup file

Checking for duplicate address...
PC1 : 10.81.100.6 255.255.255.0 gateway 10.81.100.254

PC4> ping 10.81.100.1
host (10.81.100.1) not reachable

PC4> ping 10.81.100.2
host (10.81.100.2) not reachable

PC4> ping 10.81.100.5
host (10.81.100.5) not reachable

PC4>
```

Fuente: elaboración propia

Figura 29. Corroboración de interfaces trunk D1 y A1

```

D1#show interfaces trunk
Port      Mode      Encapsulation  Status      Native vlan
Et2/0     on        802.1q         trunking    999
Et2/1     on        802.1q         trunking    999
Et2/2     on        802.1q         trunking    999
Et2/3     on        802.1q         trunking    999
Po1       on        802.1q         trunking    999

Port      Vlans allowed on trunk
Et2/0     1-4094
Et2/1     1-4094
Et2/2     1-4094
Et2/3     1-4094
Po1       1-4094

Port      Vlans allowed and active in management domain
Et2/0     1,100-102,999
Et2/1     1,100-102,999
Et2/2     1,100-102,999
Et2/3     1,100-102,999
Po1       1,100-102,999

Port      Vlans in spanning tree forwarding state and not pruned
Et2/0     1,100-102,999
Et2/1     1,100-102,999
Et2/2     1,100-102,999
Et2/3     1,100-102,999
Po1       1,100-102,999
D1#
*Oct 16 22:53:49.081: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#

D1, ENCOR Skills Assessment
D1#show run
*Oct 16 22:58:46.161: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#show run | include spanning-tree
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 24576
spanning-tree vlan 101 priority 28672
spanning-tree portfast edge
D1#
administratively down
*Oct 16 22:39:32.141: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to administratively down
*Oct 16 22:39:32.150: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to administratively down
*Oct 16 22:39:32.349: %LINK-5-CHANGED: Interface Vlan1, changed state to administratively down
*Oct 16 22:39:37.761: %LINK-3-UPDOWN: Interface Vlan100, changed state to up
*Oct 16 22:39:38.753: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel1, changed state to up
*Oct 16 22:39:38.763: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state to up
*Oct 16 22:39:40.173: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel12, changed state to up
A1#
A1#show int trunk
Port      Mode      Encapsulation  Status      Native vlan
Po1       on        802.1q         trunking    999
Po2       on        802.1q         trunking    999

Port      Vlans allowed on trunk
Po1       1-4094
Po2       1-4094

Port      Vlans allowed and active in management domain
Po1       1,100-102,999
Po2       1,100-102,999

Port      Vlans in spanning tree forwarding state and not pruned
Po1       1,100-102,999
Po2       1,100-102,999
A1#

```

Fuente: elaboración propia

ESCENARIO 2

Parte 3: configurar protocolos de enrutamiento

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

Nota: Los pings de los hosts no tendrán éxito porque sus puertos de enlace predeterminados apuntan a la dirección HSRP que se habilitará en la Parte 4. Sus tareas de configuración son las siguientes:

3.1 En la "Red de la empresa" (es decir, R1, R3, D1 y D2), configure OSPFv2 de área única en el área 0.

Utilice el ID de proceso OSPF 4 y asigne los siguientes ID de enrutador:

- R1: 0.0.4.1
- R3: 0.0.4.3
- D1: 0.0.4.131
- D2: 0.0.4.132

En R1, R3, D1 y D2, anuncie todas las redes/VLAN conectadas directamente en el Área 0.

- En R1, no anuncie la red R1 – R2.
- En el R1, propague una ruta predeterminada. Tenga en cuenta que BGP proporcionará la ruta predeterminada.

Deshabilite los anuncios OSPFv2 en:

- D1: Todas las interfaces excepto E1/2
- D2: Todas las interfaces excepto E1/0

3.2 En la "Red de la empresa" (es decir, R1, R3, D1 y D2), configure OSPFv3 clásico de área única en el área 0. Use el ID de proceso OSPF 6 y asigne los siguientes ID de enrutador:

- R1: 0.0.6.1
- R3: 0.0.6.3

- D1: 0.0.6.131
- D2: 0.0.6.132

En R1, R3, D1 y D2, anuncie todas las redes/VLAN conectadas directamente en el Área 0.

- En R1, no anuncie la red R1 – R2.
- En el R1, propague una ruta predeterminada. Tenga en cuenta que BGP proporcionará la ruta predeterminada.

Deshabilite los anuncios OSPFv3 en:

- D1: Todas las interfaces excepto E1/2
- D2: Todas las interfaces excepto E1/0

3.3 En el R2 en la “Red ISP”, configure MP-BGP. Configure dos rutas estáticas predeterminadas a través de la interfaz Loopback 0:

- Una ruta estática predeterminada de IPv4.
- Una ruta estática predeterminada de IPv6.

Configure R2 en BGP ASN 500 y use la identificación del enrutador 2.2.2.2.

Configure y habilite una relación de vecino IPv4 e IPv6 con R1 en ASN 300.

En la familia de direcciones IPv4, anuncie:

- La red Loopback 0 IPv4 (/32).
- La ruta por defecto (0.0.0.0/0).

En la familia de direcciones IPv6, anuncie:

- La red Loopback 0 IPv4 (/128).
- La ruta por defecto (::/0).

3.4 En el R1 en la “Red ISP”, configure MP-BGP. Configure dos rutas resumidas estáticas a la interfaz Null 0:

- Una ruta IPv4 resumida para 10.XY.0.0/8.
- Una ruta IPv6 resumida para 2001:db8:100::/48.

Configure R1 en BGP ASN 300 y use la identificación del enrutador 1.1.1.1.

Configure una relación de vecino IPv4 e IPv6 con R2 en ASN 500.

En la familia de direcciones IPv4:

- Deshabilitar la relación de vecino IPv6.
- Habilite la relación de vecino IPv4.
- Anuncie la red 10.XY.0.0/8.

En la familia de direcciones IPv6:

- Deshabilitar la relación de vecino IPv4.
- Habilite la relación de vecino IPv6.
- Anuncie la red 2001:db8:100::/48.

3.5 Código para configuración de Dispositivos (parte 3)

Router R1

```
router ospf 4
router-id 0.0.4.1
network 10.81.10.0 0.0.0.255 area 0
network 10.81.13.0 0.0.0.255 area 0
default-information originate
exit
```

```
ipv6 router ospf 6
router-id 0.0.6.1
default-information originate
exit
interface e1/2
ipv6 ospf 6 area 0
exit
interface e1/1
ipv6 ospf 6 area 0
exit
```

```
ip route 10.81.0.0 255.0.0.0 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 10.81.0.0 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
```

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
```

Router R3

```
router ospf 4
router-id 0.0.4.3
network 10.81.11.0 0.0.0.255 area 0
network 10.81.13.0 0.0.0.255 area 0
exit
ipv6 router ospf 6
router-id 0.0.6.3
exit
interface e1/0
ipv6 ospf 6 area 0
exit
interface e1/1
ipv6 ospf 6 area 0
exit
end
```

Switch D1

```
router ospf 4
router-id 0.0.4.131
```

```
network 10.81.100.0 0.0.0.255 area 0
network 10.81.101.0 0.0.0.255 area 0
network 10.81.102.0 0.0.0.255 area 0
network 10.81.10.0 0.0.0.255 area 0
passive-interface default
no passive-interface e1/2
exit
ipv6 router ospf 6
router-id 0.0.6.131
passive-interface default
no passive-interface e1/2
exit
interface e1/2
ipv6 ospf 6 area 0
exit
interface vlan 100
ipv6 ospf 6 area 0
exit
interface vlan 101
ipv6 ospf 6 area 0
exit
interface vlan 102
ipv6 ospf 6 area 0
exit
end
```

Switch D2

```
router ospf 4
router-id 0.0.4.132
network 10.81.100.0 0.0.0.255 area 0
network 10.81.101.0 0.0.0.255 area 0
network 10.81.102.0 0.0.0.255 area 0
network 10.81.11.0 0.0.0.255 area 0
passive-interface default
no passive-interface e1/0
exit
ipv6 router ospf 6
router-id 0.0.6.132
passive-interface default
no passive-interface e1/0
```

```

exit
interface e1/0
ipv6 ospf 6 area 0
exit
interface vlan 100
ipv6 ospf 6 area 0
exit
interface vlan 101
ipv6 ospf 6 area 0
exit
interface vlan 102
ipv6 ospf 6 area 0
exit
end

```

Figura 30. Configuración R1

```

R1
Press RETURN to get started.

R1, ENCOR Skills Assessment
R1#
R1#conf term
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router ospf 6
R1(config-router)#router-id 0.0.4.1
R1(config-router)#network 10.81.10.0 0.0.0.255 area 0
R1(config-router)#network 10.81.13.0 0.0.0.255 area 0
R1(config-router)#default-information originate
R1(config-router)#exit
R1(config)#
R1(config)#ipv6 router ospf 6
R1(config-rtr)#router-id 0.0.6.1
R1(config-rtr)#default-information originate
R1(config-rtr)#exit
R1(config)#interface e1/2
R1(config-if)#ipv6 ospf 6 area 0
R1(config-if)#exit
R1(config)#interface e1/1
R1(config-if)#ipv6 ospf 6 area 0
R1(config-if)#exit
R1(config)#
R1(config)#ip route 10.81.0.0 255.0.0.0 null0
%Inconsistent address and mask
R1(config)#ipv6 route 2001:db8:100::/48 null0
R1(config)#
R1(config)#router bgp 300
R1(config-router)#bgp router-id 1.1.1.1
R1(config-router)#neighbor 209.165.200.226 remote-as 500
R1(config-router)#neighbor 2001:db8:200::2 remote-as 500
R1(config-router)#address-family ipv4 unicast
R1(config-router-af)#neighbor 209.165.200.226 activate
R1(config-router-af)#neighbor 2001:db8:200::2 activate
R1(config-router-af)#network 10.81.0.0 mask 255.0.0.0
% BGP: Incorrect network or mask/prefix-length configured
R1(config-router-af)#exit-address-family
R1(config-router)#address-family ipv6 unicast
R1(config-router-af)#neighbor 209.165.200.226 activate
R1(config-router-af)#neighbor 2001:db8:200::2 activate
R1(config-router-af)#network 2001:db8:100::/48
R1(config-router-af)#exit-address-family
R1(config-router)#
*Nov 7 13:56:58.215: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not half duplex), with D1 Ethernet1/2 (half duplex).
R1(config-router)#

```

Fuente: elaboración propia

Figura 31. Configuración R2

```
R2 con0 is now available

Press RETURN to get started.

R2, ENCOR Skills Assessment
R2#
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ip route 0.0.0.0 0.0.0.0 loopback 0
R2(config)#ipv6 route ::/0 loopback 0
R2(config)#router bgp 500
R2(config-router)#bgp router-id 2.2.2.2
R2(config-router)#neighbor 209.165.200.225 remote-as 300
R2(config-router)#neighbor 2001:db8:200::1 remote-as 300
R2(config-router)#address-family ipv6
R2(config-router-af)#neighbor 209.165.200.225 activate
R2(config-router-af)#no neighbor 2001:db8:200::1 activate
R2(config-router-af)#network 2.2.2.2 mask 255.255.255.255
R2(config-router-af)#network 0.0.0.0
R2(config-router-af)#exit-address-family
R2(config-router)#address-family ipv6
R2(config-router-af)#no neighbor 209.165.200.225 activate
R2(config-router-af)#neighbor 2001:db8:200::1 activate
R2(config-router-af)#network 2001:db8:2222::/128
R2(config-router-af)#network ::/0
R2(config-router-af)#exit-address-family
R2(config-router)#
```

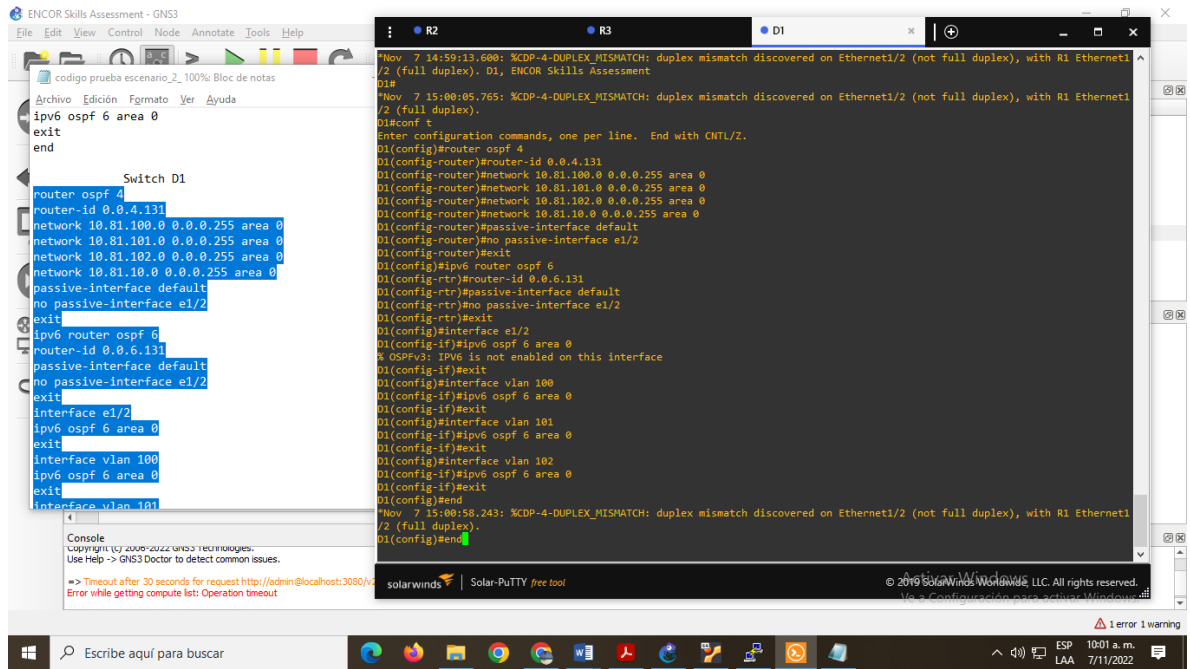
Fuente: elaboración propia

Figura 32. Configuración R3

```
Nov 7 14:11:53.843: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not half duplex), with D2 Ethernet1/0 (half duplex).
Nov 7 14:12:21.063: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not half duplex), with D2 Ethernet1/0 (half duplex).
Nov 7 14:12:49.475: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not half duplex), with D2 Ethernet1/0 (half duplex).
Nov 7 14:13:17.123: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not half duplex), with D2 Ethernet1/0 (half duplex).
Nov 7 14:13:42.655: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not half duplex), with D2 Ethernet1/0 (half duplex). R3, ENCOR Skills Assessment
R3#
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#
R3(config)#router ospf 4
R3(config-rtr)#router-id 0.0.4.3
R3(config-rtr)#network 10.81.11.0 0.0.0.255 area 0
R3(config-rtr)#network 10.81.13.0 0.0.0.255 area 0
R3(config-rtr)#exit
R3(config)#ipv6 router ospf 6
R3(config-rtr)#router-id 0.0.6.3
R3(config-rtr)#exit
R3(config)#interface e1/0
R3(config-if)#ipv6 ospf 6 area 0
R3(config-if)#exit
R3(config)#interface e1/1
R3(config-if)#ipv6 ospf 6 area 0
R3(config-if)#exit
R3(config)#end
R3(config)#end
Nov 7 14:15:31.379: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3(config)#end
Nov 7 14:15:35.075: %OSPFv3-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Ethernet1/1 from LOADING to FULL, Loading Done
R3(config)#end
R3(config)#
```

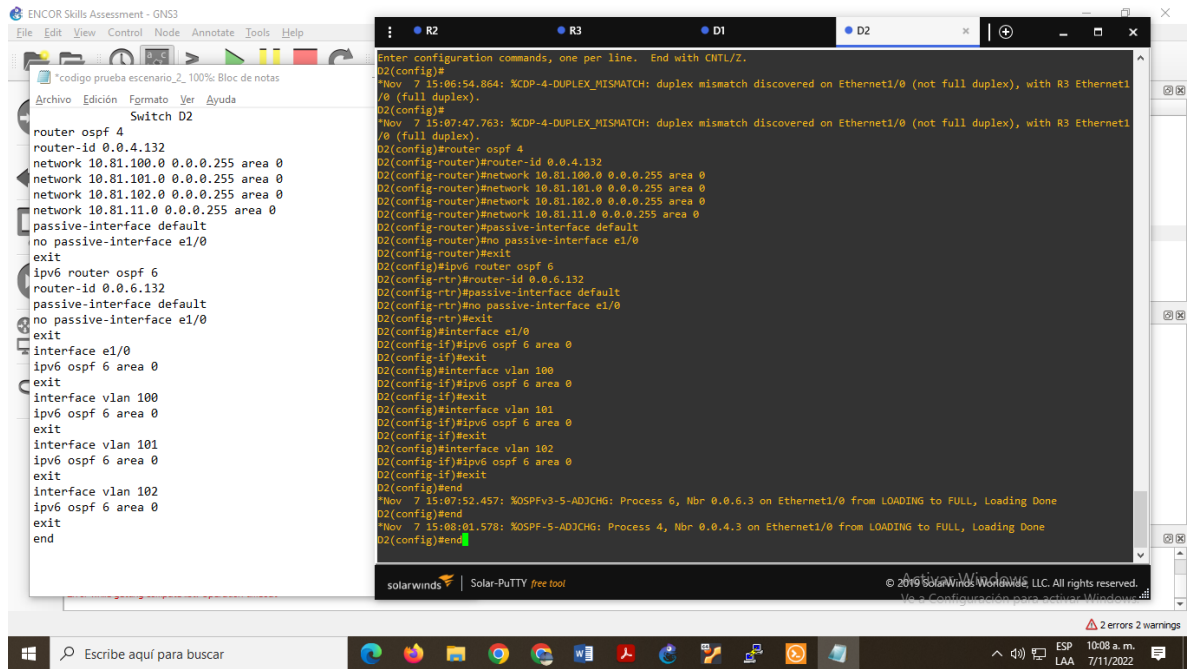
Fuente: elaboración propia

Figura 33. Configuración D1



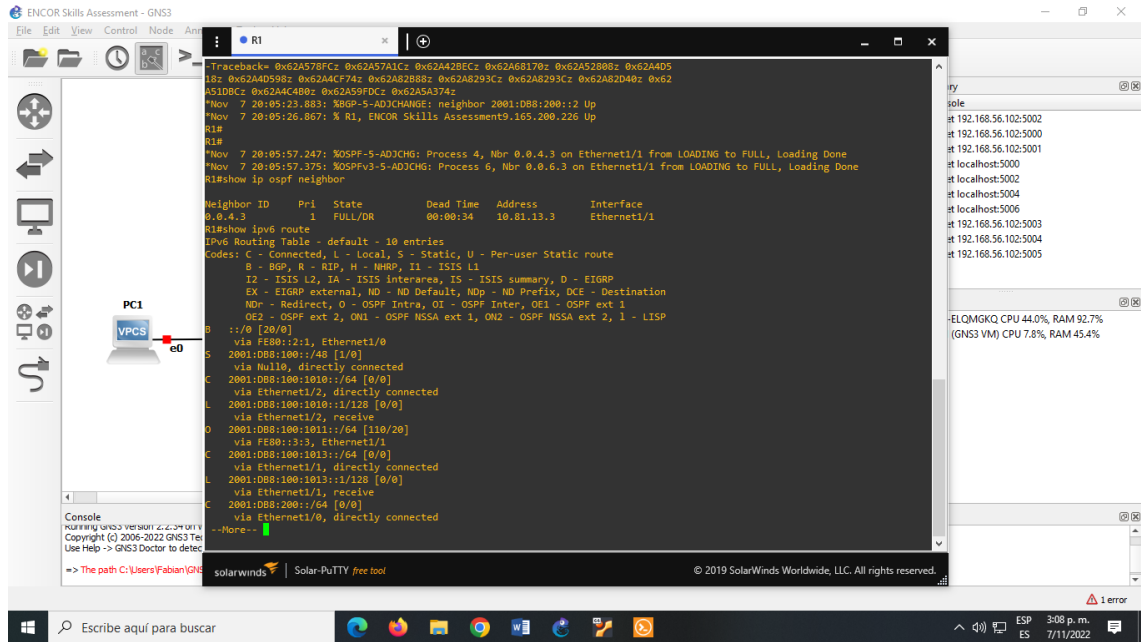
Fuente: elaboración propia

Figura 34. Configuración D2



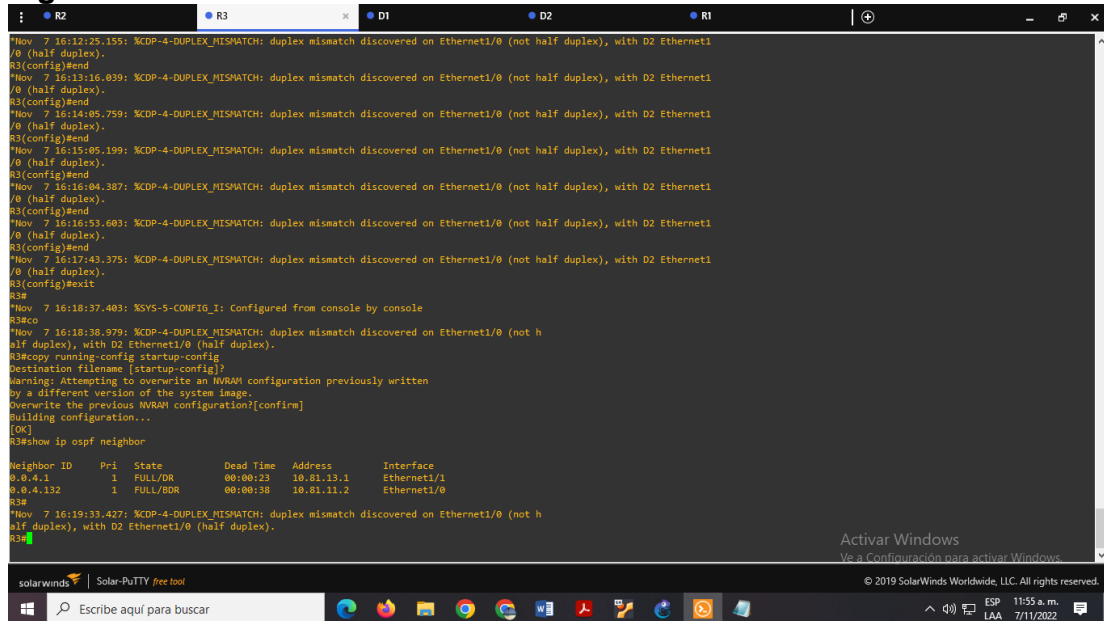
Fuente: elaboración propia

Figura 35. Verificación de interfaces R1



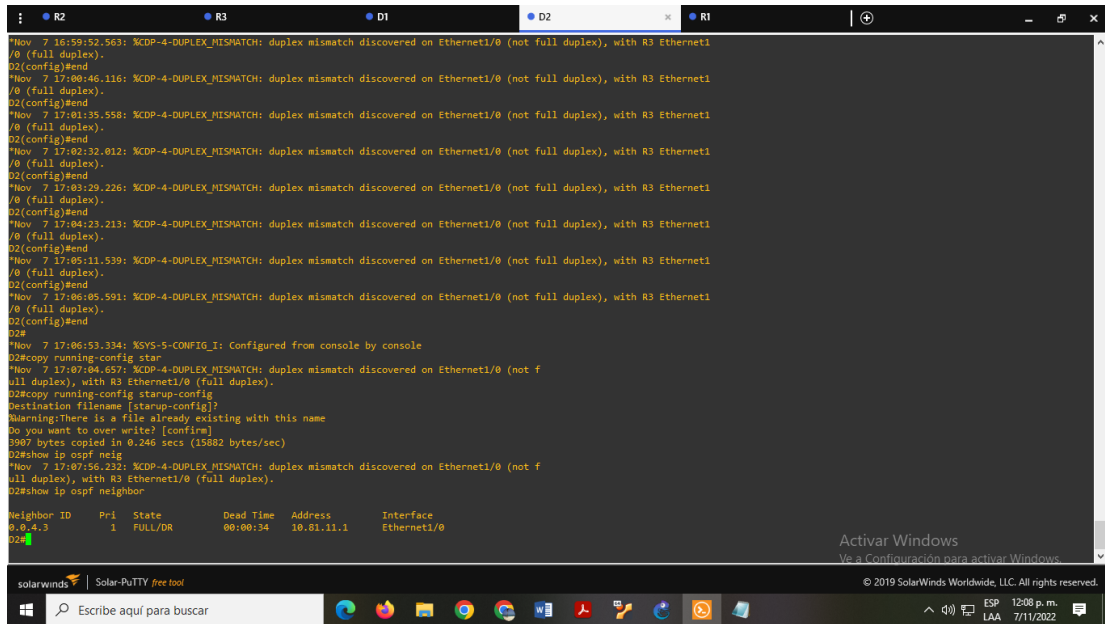
Fuente: elaboración propia

Figura 36. Verificación de interfaces R3



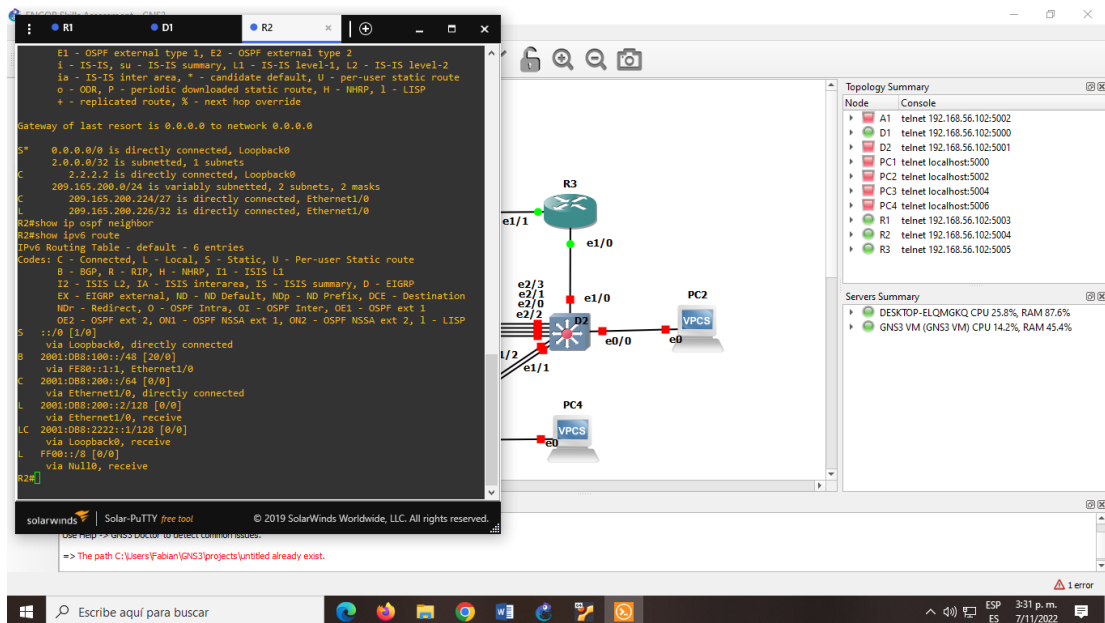
Fuente: elaboración propia

Figura 37. Verificación de interfaces D2



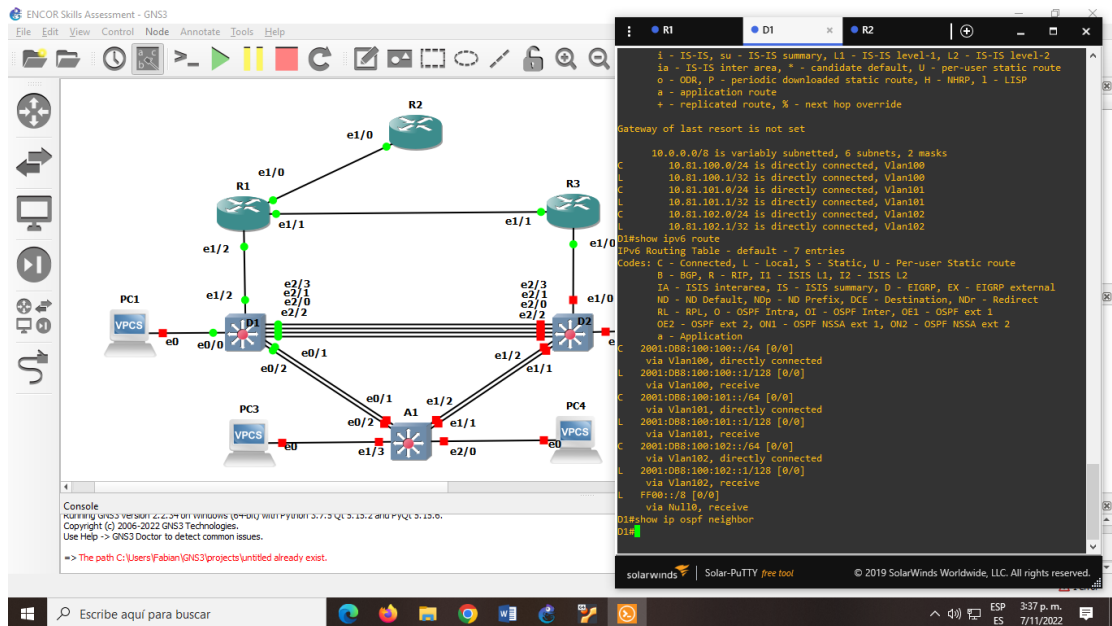
Fuente: elaboración propia

Figura 38. Verificación de interfaces R2



Fuente: elaboración propia

Figura 39. Verificación de interfaces D1



Fuente: elaboración propia

Parte 4: configurar la redundancia del primer salto

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

Sus tareas de configuración son las siguientes:

4.1 En D1, cree IP SLA que prueben la accesibilidad de la interfaz E1/2 de R1. Cree dos IP SLA.

- Utilice el SLA número 4 para IPv4.
- Utilice el SLA número 6 para IPv6.

Los IP SLA probarán la disponibilidad de la interfaz R1 E1/2 cada 5 segundos.

Programa el SLA para implementación inmediata sin tiempo de finalización.

Cree un objeto IP SLA para IP SLA 4 y otro para IP SLA 6.

- Use la pista número 4 para IP SLA 4.
- Use la pista número 6 para IP SLA 6.

Los objetos rastreados deben notificar a D1 si el estado de IP SLA cambia de abajo a arriba después de 10 segundos, o de arriba a abajo después de 15 segundos.

4.2 En D2, cree IP SLA que prueben la accesibilidad de la interfaz E1/0 de R3. Cree dos IP SLA.

- Utilice el SLA número 4 para IPv4.
- Utilice el SLA número 6 para IPv6.

Los IP SLA probarán la disponibilidad de la interfaz R3 E1/0 cada 5 segundos.

Programame el SLA para implementación inmediata sin tiempo de finalización.

Cree un objeto IP SLA para IP SLA 4 y otro para IP SLA 6.

- Use la pista número 4 para IP SLA 4.
- Use la pista número 6 para IP SLA 6.

Los objetos rastreados deben notificar a D1 si el estado de IP SLA cambia de abajo a arriba después de 10 segundos, o de arriba a abajo después de 15 segundos.

4.3 En D1, configure HSRPv2. D1 es el enrutador principal para las VLAN 100 y 102; por lo tanto, su prioridad también se cambiará a 150.

Configure la versión 2 de HSRP.

Configure el grupo 104 de HSRP de IPv4 para la VLAN 100:

- Asigne la dirección IP virtual 10.XY.100.254.
- Establezca la prioridad del grupo en 150.
- Habilitar preferencia.
- Siga el objeto 4 y disminuya en 60.

Configure el grupo 114 de HSRP de IPv4 para la VLAN 101:

- Asigne la dirección IP virtual 10.XY.101.254.
- Habilitar preferencia.
- Seguimiento del objeto 4 para disminuir en 60.

Configure el grupo 124 de HSRP de IPv4 para la VLAN 102:

- Asigne la dirección IP virtual 10.XY.102.254.
- Establezca la prioridad del grupo en 150.
- Habilitar preferencia.
- Seguimiento del objeto 4 para disminuir en 60.

Configure el grupo 106 de HSRP de IPv6 para la VLAN 100:

- Asigne la dirección IP virtual mediante la configuración automática de ipv6.
- Establezca la prioridad del grupo en 150.
- Habilitar preferencia.
- Siga el objeto 6 y disminuya en 60.

Configure el grupo 116 de HSRP de IPv6 para la VLAN 101:

- Asigne la dirección IP virtual mediante la configuración automática de ipv6.
- Habilitar preferencia.
- Siga el objeto 6 y disminuya en 60.

Configure el grupo 126 de HSRP de IPv6 para la VLAN 102:

- Asigne la dirección IP virtual mediante la configuración automática de ipv6.
- Establezca la prioridad del grupo en 150.
- Habilitar preferencia.
- Siga el objeto 6 y disminuya en 60.

En D2, configure HSRPv2. D2 es el enrutador principal para la VLAN 101; por lo tanto, la prioridad también se cambiará a 150.

Configure la versión 2 de HSRP.

Configure el grupo 104 de HSRP de IPv4 para la VLAN 100:

- Asigne la dirección IP virtual 10.XY.100.254.
- Habilitar preferencia.
- Siga el objeto 4 y disminuya en 60.

Configure el grupo 114 de HSRP de IPv4 para la VLAN 101:

- Asigne la dirección IP virtual 10.XY.101.254.

- Establezca la prioridad del grupo en 150.

- Habilitar preferencia.

- Seguimiento del objeto 4 para disminuir en 60.

Configure el grupo 124 de HSRP de IPv4 para la VLAN 102:

- Asigne la dirección IP virtual 10.XY.102.254.

- Habilitar preferencia.

- Seguimiento del objeto 4 para disminuir en 60.

Configure el grupo 106 de HSRP de IPv6 para la VLAN 100:

- Asigne la dirección IP virtual mediante la configuración automática de ipv6.

- Habilitar preferencia.

- Siga el objeto 6 y disminuya en 60.

Configure el grupo 116 de HSRP de IPv6 para la VLAN 101:

- Asigne la dirección IP virtual mediante la configuración automática de ipv6.

- Establezca la prioridad del grupo en 150.

- Habilitar preferencia.

- Siga el objeto 6 y disminuya en 60.

Configure el grupo 126 de HSRP de IPv6 para la VLAN 102:

- Asigne la dirección IP virtual mediante la configuración automática de ipv6.

- Habilitar preferencia.

- Siga el objeto 6 y disminuya en 60.

4.4 Código para configuración de Dispositivos (parte 4)

swiath D1

```
ip sla 4
icmp-echo 10.81.10.1
frequency 5
exit
ip sla 6
icmp-echo 2001:db8:100:1010::1
frequency 5
exit
ip sla schedule 4 life forever start-time now
ip sla schedule 6 life forever start-time now
track 4 ip sla 4
delay down 10 up 15
exit
track 6 ip sla 6
delay down 10 up 15
exit
interface vlan 100
standby version 2
standby 104 ip 10.81.100.254
standby 104 priority 150
standby 104 preempt
standby 104 track 4 decrement 60
standby 106 ipv6 autoconfig
standby 106 priority 150
standby 106 preempt
standby 106 track 6 decrement 60
exit
interface vlan 101
standby version 2
standby 114 ip 10.81.101.254
standby 114 preempt
standby 114 track 4 decrement 60
standby 116 ipv6 autoconfig
standby 116 preempt
standby 116 track 6 decrement 60
exit
interface vlan 102
```

```
standby version 2
standby 124 ip 10.81.102.254
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
```

switch D2

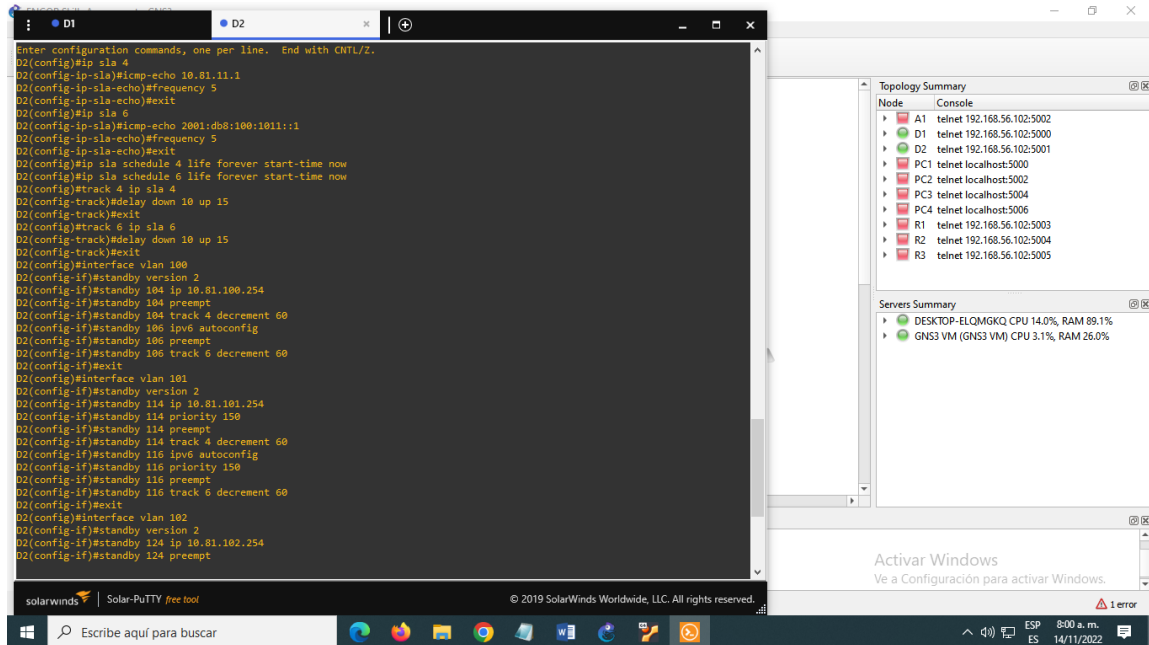
```
ip sla 4
icmp-echo 10.81.11.1
frequency 5
exit
ip sla 6
icmp-echo 2001:db8:100:1011::1
frequency 5
exit
ip sla schedule 4 life forever start-time now
ip sla schedule 6 life forever start-time now
track 4 ip sla 4
delay down 10 up 15
exit
track 6 ip sla 6
delay down 10 up 15
exit
interface vlan 100
standby version 2
standby 104 ip 10.81.100.254
standby 104 preempt
standby 104 track 4 decrement 60
standby 106 ipv6 autoconfig
standby 106 preempt
standby 106 track 6 decrement 60
exit
interface vlan 101
```

```

standby version 2
standby 114 ip 10.81.101.254
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 vlan 102
standby version 2
standby 124 ip 10.81.102.254
standby 124 preempt
standby 124 track 4 decrement 60
standby 126 ipv6 autoconfig
standby 126 preempt
standby 126 track 6 decrement 60
exit
end

```

Figura 40. Configuramos D2 con el código



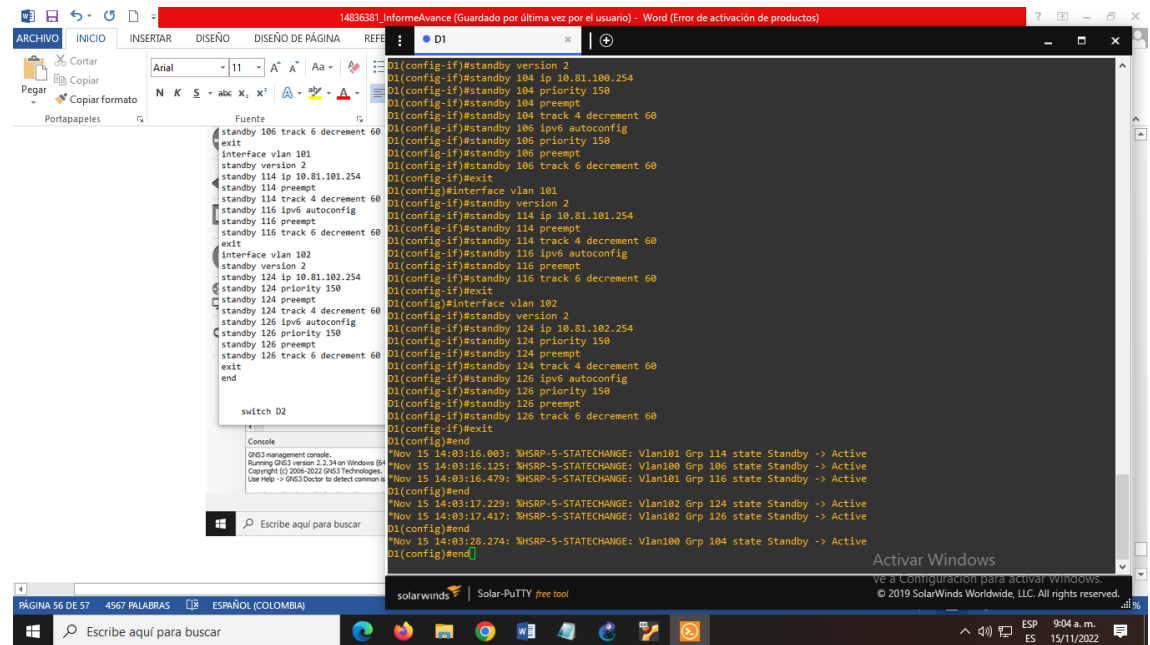
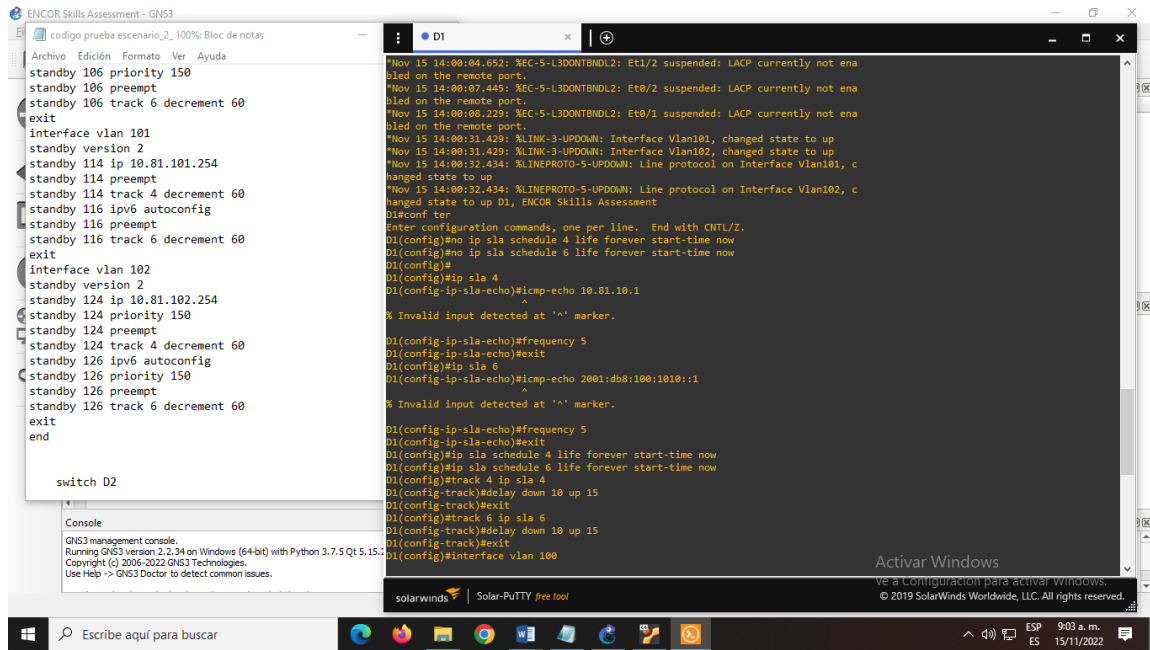
Fuente: elaboración propia

Sale error debido a que ya esta configurado el sla4 y sla6, por tanto se niegan estos comandos y se vuelven a configurar el D1 :

no ip sla schedule 4 life forever start-time now

no ip sla schedule 6 life forever start-time now

Figura 43. Nuevamente configuramos D1



Fuente: elaboración propia

Figura 44. Verificación de interfaces D1

The screenshot shows a GNS3 interface configuration window for D1. The configuration includes:

```
D1(config-if)#standby 114 track 4 decrement 60
D1(config-if)#standby 116 ipv6 autoconfig
D1(config-if)#standby 116 preempt
D1(config-if)#standby 116 track 6 decrement 60
D1(config-if)#exit
D1(config)#interface vlan 102
D1(config-if)#standby version 2
D1(config-if)#standby 124 ip 10.81.102.254
D1(config-if)#standby 124 priority 150
D1(config-if)#standby 124 preempt
D1(config-if)#standby 124 track 4 decrement 60
D1(config-if)#standby 126 ipv6 autoconfig
D1(config-if)#standby 126 priority 150
D1(config-if)#standby 126 preempt
D1(config-if)#standby 126 track 6 decrement 60
D1(config-if)#exit
D1(config)#end
D1(config)#end
*Nov 15 14:03:16.003: %HSRP-5-STATECHANGE: Vlan101 Grp 114 state Standby -> Active
*Nov 15 14:03:16.125: %HSRP-5-STATECHANGE: Vlan100 Grp 106 state Standby -> Active
*Nov 15 14:03:16.479: %HSRP-5-STATECHANGE: Vlan101 Grp 116 state Standby -> Active
D1(config)#end
*Nov 15 14:03:17.229: %HSRP-5-STATECHANGE: Vlan102 Grp 124 state Standby -> Active
*Nov 15 14:03:17.417: %HSRP-5-STATECHANGE: Vlan102 Grp 126 state Standby -> Active
D1(config)#end
*Nov 15 14:03:28.274: %HSRP-5-STATECHANGE: Vlan100 Grp 104 state Standby -> Active
D1(config)#end
D1#
Nov 15 14:10:16.394: %SYS-5-CONFIG_I: Configured from console by console
D1#
D1#show standby brief
P indicates configured to preempt.
|
Interface Grp Pri P State Active Standby Virtual IP
Vl100 104 90 P Active local unknown 10.81.100.254
Vl100 106 90 P Active local unknown FE80::5:73FF:FEA0:6A
Vl101 114 40 P Active local unknown 10.81.101.254
Vl101 116 40 P Active local unknown FE80::5:73FF:FEA0:74
Vl102 124 90 P Active local unknown 10.81.102.254
Vl102 126 90 P Active local unknown FE80::5:73FF:FEA0:7E
```

The network diagram shows a central switch D1 connected to a router R1 and three PCs (PC1, PC2, PC3). R1 is connected to D1 via e1/0 and e1/1. PC1 is connected to D1 via e0/0. PC2 is connected to D1 via e0/1. PC3 is connected to D1 via e0/2. D1 has multiple interfaces labeled e2/0, e2/1, e2/2, e2/3, e0/0, e0/1, e0/2, e0/3, e1/0, e1/1, e1/2, e1/3.

Fuente: elaboración propia

CONCLUSIONES

Fue necesario activar los puertos Ethernet de los diferentes dispositivos de la topología, procurando conservar la numeración correcta.

Así mismo en las direcciones IP el valor xy se cambio por el numero 81 equivalente a los últimos dígitos de mi cedula.

Importante usar el comando copy running-config startup-config para guardar las configuraciones de los dispositivos, ya que inicialmente se me habían borrado aquellas. Igualmente en los PC's usamos el comando save.

Según la topología de red planteada el switch D1: vlan100 -102 se configuro como primario y vlan101 como secundario, en el swicth D2: vlan 100 como primario y vlan 100 y 102 como secundario.

Se creo los LACP EtherChannels para D1-D2 como puerto12, para D1-A1 como puerto 1 y D2-A1 como puerto 2, así agrupamos varios puertos físicos en un único canal lógico.

Para los puertos de acceso, D1 se configuro con la vlan100 para PC1, D2 con la vlan102 para PC2 y por ultimo A1 con vlan101 para PC3 y vlan100 para PC4. Con los comandos #show interfaces trunk, #show interfaces status, #show run | include spanning-tree, verificamos la conectividad de los diferentes dispositivos de la topología planteada.

En la parte tres (3), con el comando #show ip route, revisamos las rutas ospf y las rutas estáticas propagadas.

Con el comando #show ip ospf neighbor, verificamos la estructura de datos de los vecinos en los dispositivos (Router y Switch's).

Cuando se configura la sla 4y sla6, solo se puede configurar una sola vez para los dispositivos, en mi caso se configuro primero en D2 y luego para D1 como generaba error, se debio quitarla con el comando **no** y luego volverla a configurar de nuevo, así obtuvimos un buen resultado.

Con el comando #show standby brief, verificamos el estado de las vlan's y su dirección IP virtual.

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