

DIPLOMADO DE PROFUNDIZACION CISCO
PRUEBA DE HABILIDADES PRÁCTICAS CCNP

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

DHCP: Servidor de Red que permite la asignación de manera automática los direccionamientos IP que tendrán uno o varios dispositivos dentro de una red y asignando junto con la respectiva puerta de enlace.

VLAN: Del acrónimo Virtual Local Área Network, es un método para crear redes lógicas independientes que de manera física se conectan mediante la misma interfaz o puerto, permitiendo sectorizar la información proveniente de diferentes áreas dentro de una red y permitiendo minimizar la cantidad de puertos usados en un dispositivo.

HSRP: Del acrónimo Hot Standby Router Protocol, es un protocolo creado por CISCO con el fin de aumentar la disponibilidad de la red al entregar diferentes prioridades a los router de una red, se verifica la disponibilidad de estos elementos de la topología y cambiar sus prioridades en cada caso de la pérdida de gestión de ciertos equipos.

BGP: Del acrónimo Border Gateway Protocol, es un protocolo donde cada organización tendrá un número diferente asignado de sistema autónomo o AS, permitiendo entregar diferente información entre grupos de enrutadores para estabilizar la comunicación entre los mismos. Este protocolo, puede ser bajo redes externas o EBGp o IBGP en caso de las redes internas.

RESUMEN

Dentro del marco del diplomado de Cisco CCNP, es necesario demostrar las habilidades adquiridas a lo largo de todo el curso, aplicando los diferentes protocolos de redes según lo solicite la topología entregada, por tal motivo, se presenta un paso a paso del escenario propuesto junto con la configuración de cada equipo, que va desde una configuración básica de sus interfaces o nombres de los equipos, pasando con la configuración tanto de IPv4 como de IPv6.

Adicional, todo este proceso lleva un orden según las solicitudes de la prueba de habilidades con registro dentro de cada equipo configurado.

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

ABSTRACT

Within the framework of the Cisco CCNP diploma course, it is necessary to demonstrate the skills acquired throughout the course, applying the different network protocols as requested by the delivered topology, for this reason, a step by step of the proposed scenario is presented together with the configuration of each device, which ranges from a basic configuration of its interfaces or device names, passing through the configuration of both IPv4 and IPv6.

Additionally, this entire process is ordered according to the requests for the skills test with registration within each configured team.

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

INTRODUCCIÓN

En la actualidad y con el auge de la tecnología en prácticamente todos los campos de la vida cotidiana, adquirir un conocimiento a profundidad de las redes de internet se hace una tarea prácticamente obligada para futuros profesionales en el área de la Ingeniería electrónica y las diferencias entre cada protocolo a implementar en ciertas topologías.

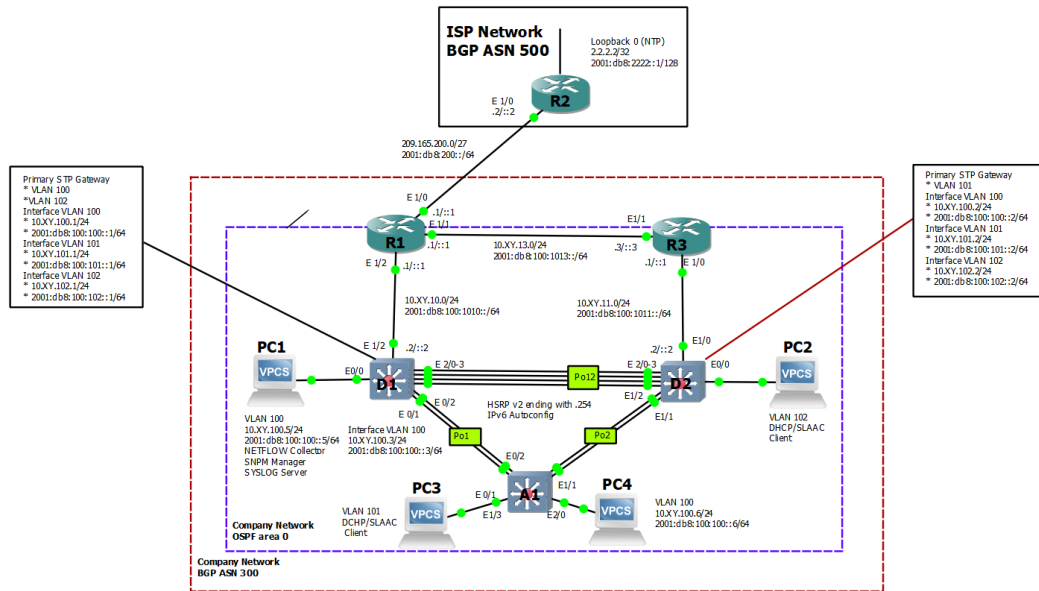
Y estos protocolos, como el protocolo de comunicación dinámica DHCP, Spanning Tree Protocol STP, OSPF, RIP V1 o V2 entre otros, entregan particularidades que mejoran la disponibilidad de una red o la minimización de consumo de energía con el envío de paquetes de una manera más estratégica.

DESARROLLO DEL PROYECTO

ESCENARIO 1

Topología

Figura 1. Topología planteada.



Fuente: Autor.

Tabla de direccionamientos

Tabla 1. Tabla de direccionamientos.

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	10.02.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	E1/1	10.02.13.1/24	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

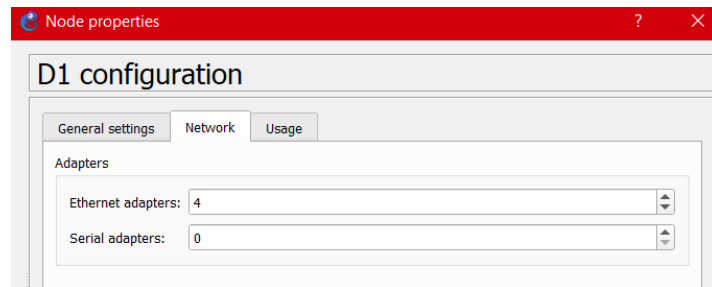
Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
	Loopback 0	2.2.2.2/32	2001:db8:2222::1/128	fe80::2:3
R3	E1/0	10.02.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
	E1/1	10.02.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	E1/2	10.02.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
	VLAN 100	10.02.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10.02.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
	VLAN 102	10.02.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	E1/0	10.02.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10.02.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
	VLAN 101	10.02.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10.02.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.02.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.02.100.5/24	2001:db8:100:100::5/64	EUI-64
PC2	NIC	DHCP	SLAAC	EUI-64
PC3	NIC	DHCP	SLAAC	EUI-64
PC4	NIC	10.02.100.6/24	2001:db8:100:100::6/64	EUI-64

Fuente: Autor.

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

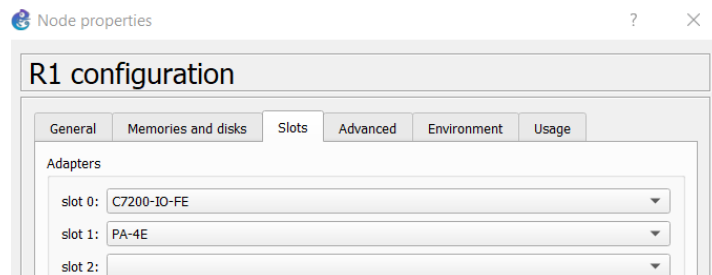
In Part 1, you will set up the network topology and configure basic settings and interface addressing.

Figura 2. Configuración Switch.



Fuente: Autor.

Figura 3. Configuración Router.

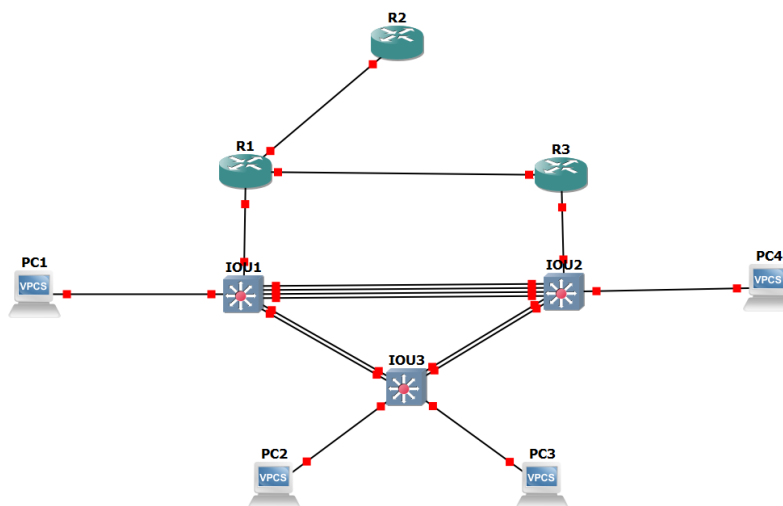


Fuente: Autor.

Step 1: Cable the network as shown in the topology.

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

Figura 4. Implementación de la topología propuesta.



Fuente: Autor.

Step 2: Configure basic settings for each device.

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

Router R1

```

hostname R1 //se cambia el nombre del router
ipv6 unicast-routing //config ipv6 en R1
no ip domain lookup //Sin IP de dominio
banner motd # R1, ENCOR Skills Assessment# //mensaje de bienvenida R1
line con 0 //configuración de consola
exec-timeout 0 0
logging synchronous //configuración de ingreso sincrono
exit
interface e1/0 //ingreso a la interfaz ethernet 1/0
ip address 209.165.200.225 255.255.255.224 //Dirección IPv4 en E1/0
ipv6 address fe80::1:1 link-local //Dirección local IPv6
ipv6 address 2001:db8:200::1/64 //diercción IPv6
no shutdown //Encender interfaz
exit //salida de la interfaz E1/0
interface e1/2 //ingreso interfaz ethernet 1/2
ip address 10.02.10.1 255.255.255.0 //Config IPv4 en E1/2
ipv6 address fe80::1:2 link-local //IP local IPv6
ipv6 address 2001:db8:100:1010::1/64 //IP en IPv6
no shutdown //Encender interfaz
exit

```

```

interface e1/1          //Ingreso interfaz Ethernet 1/1
ip address 10.02.13.1 255.255.255.0 //IP asignada para la interfaz IPv4
ipv6 address fe80::1:3 link-local //IP local IPv6
ipv6 address 2001:db8:100:1013::1/64 //IPv6 asignada a interfaz
no shutdown           //encender interfaz
exit                  //salida de la interfaz

```

Router R2

```

hostname R2           //se cambia el nombre del router
ipv6 unicast-routing //config ipv6 en R2
no ip domain lookup
banner motd # R2, ENCOR Skills Assessment# //mensaje de bienvenida R1
line con 0           //Configuración consola
exec-timeout 0 0
logging synchronous //ingreso sincronico
exit
interface e1/0       //ingreso a la interfaz ethernet 1/0
ip address 209.165.200.226 255.255.255.224 //IPv4 asignada a interfaz
ipv6 address fe80::2:1 link-local //IPv6 local asignada
ipv6 address 2001:db8:200::2/64 //IPv6 asignada a interfaz
no shutdown         //Encender interfaz
exit
interface Loopback 0 //ingreso interfaz loopback
ip address 2.2.2.2 255.255.255.255 //IPv4 loopback asignada
ipv6 address fe80::2:3 link-local //IPv6 local asignada
ipv6 address 2001:db8:2222::1/128 //IPv6 loopback solicitada
no shutdown         //encendiendo interfaz loopback
exit                //salida interfaz

```

Router R3

```

hostname R3           //Nombre del equipo
ipv6 unicast-routing //Habilitación de IPv6 en R3
no ip domain lookup //deshabilitación búsqueda de dominio
banner motd # R3, ENCOR Skills Assessment# //mensaje bienvenida
line con 0           //ingreso a config de consola
exec-timeout 0 0     //Configuración desconexión de consola
logging synchronous //Configuración de ingreso sincronico
exit
interface e1/0       //ingreso interfaz Ethernet 1/0
ip address 10.02.11.1 255.255.255.0 //config IPv4 en E1/0
ipv6 address fe80::3:2 link-local //IPv6 local en R3
ipv6 address 2001:db8:100:1011::1/64 //IPv6 configurada en la interfaz
no shutdown         //encendiendo interfaz

```

```

exit
interface e1/1                //ingreso a interfaz ethernet 1/1
ip address 10.02.13.3 255.255.255.0 //IPv4 asignada a E1/1
ipv6 address fe80::3:3 link-local //IPv6 local asignada
ipv6 address 2001:db8:100:1010::2/64 //IPv6 asignada a interfaz
no shutdown                   //encendiendo interfaz
exit

```

Switch D1

```

hostname D1                    //Config del nombre en el switch D1
ip routing                     //habilitación de IPv4
ipv6 unicast-routing          //habilitación de IPv6
no ip domain lookup           //Busqueda por dominio desactivada
banner motd # D1, ENCOR Skills Assessment# //config mensaje bienvenida
line con 0                    //config de consola
exec-timeout 0 0              //config desconexión de consola
logging synchronous           //Config ingreso sincrónico
exit
vlan 100                      //ingreso VLAN100
name Management               //config nombre de VLAN100
exit
vlan 101                      //config VLAN101
name UserGroupA               //config nombre de VLAN101
exit
vlan 102                      //config VLAN 102
name UserGroupB               //Nombre asignado a VLAN102
exit
vlan 999                      //ingreso a vlan nativa 999
name NATIVE                   //cambio del nombre
exit
interface e1/2                //ingreso interfaz ethernet 1/2
no switchport                 //encender interfaz
ip address 10.02.10.2 255.255.255.0 //IPv4 asignada
ipv6 address fe80::d1:1 link-local //IPv6 local asignada
ipv6 address 2001:db8:100:1010::2/64 //IPv6 de interfaz asignada
no shutdown                   //encender interfaz
exit
interface vlan 100             //ingreso VLAN100
ip address 10.02.100.1 255.255.255.0 //config IP en VLAN100
ipv6 address fe80::d1:2 link-local //config IPv6 local
ipv6 address 2001:db8:100:100::1/64 //config IPv6 VLAN100
no shutdown                   //encendida
exit
interface vlan 101             //ingreso VLAN101

```



```

ip address 10.02.101.1 255.255.255.0 //config IP en VLAN101
ipv6 address fe80::d1:3 link-local //config IPv6 local
ipv6 address 2001:db8:100:101::1/64 //config IPv6 VLAN101
no shutdown
exit //encender interfaz
interface vlan 102 //ingreso VLAN102
ip address 10.02.102.1 255.255.255.0 //config IP en VLAN102
ipv6 address fe80::d1:4 link-local //config IPv6 local
ipv6 address 2001:db8:100:102::1/64 //config IPv6 VLAN102
no shutdown //encender interfaz
exit
ip dhcp excluded-address 10.02.101.1 10.02.101.109
ip dhcp excluded-address 10.02.101.141 10.02.101.254
ip dhcp excluded-address 10.02.102.1 10.02.102.109
ip dhcp excluded-address 10.02.102.141 10.02.102.254
ip dhcp pool VLAN-101
network 10.02.101.0 255.255.255.0
default-router 10.02.101.254
exit
//en las 7 líneas anteriores se configura el servicio DHCP en los rangos mostrados
de las IP 10.02
ip dhcp pool VLAN-102
network 10.02.102.0 255.255.255.0
default-router 10.02.102.254
exit
interface range e0/0-3,e1/0-1,e1/3,e2/0-3,e3/0-3
shutdown //se apagan todas las interfaces no usadas
exit

```

Switch D2

```

hostname D2 //Config del nombre en el switch D2
ip routing //habilitación de IPv4
ipv6 unicast-routing //habilitación de IPv6
no ip domain lookup //Busqueda por dominio desactivada
banner motd # D2, ENCOR Skills Assessment# //config mensaje bienvenida
line con 0 //config de consola
exec-timeout 0 0 //config desconexión de consola
logging synchronous //Config ingreso sincrónico
exit
vlan 100 //ingreso VLAN100
name Management //config nombre de VLAN100
exit
vlan 101 //config VLAN101
name UserGroupA //config nombre de VLAN101

```

```

exit
vlan 102                //config VLAN 102
name UserGroupB        //Nombre asignado a VLAN102
exit
vlan 999                //ingreso a vlan nativa 999
name NATIVE            //cambio del nombre
exit
interface e1/0          //ingreso interfaz ethernet 1/0
no switchport          //encender interfaz
ip address 10.02.11.2 255.255.255.0 //IPv4 asignada
ipv6 address fe80::d1:1 link-local //IPv6 local asignada
ipv6 address 2001:db8:100:1011::2/64 //IPv6 de interfaz asignada
no shutdown            //encender interfaz
exit
interface vlan 100      //ingreso VLAN100
ip address 10.02.100.2 255.255.255.0 //config IP en VLAN100
ipv6 address fe80::d2:2 link-local //config IPv6 local
ipv6 address 2001:db8:100:100::2/64 //config IPv6 VLAN100
no shutdown            //Interfaz encendida
exit
interface vlan 101      //ingreso VLAN101
ip address 10.02.101.2 255.255.255.0 //config IP en VLAN101
ipv6 address fe80::d2:3 link-local //config IPv6 local
ipv6 address 2001:db8:100:101::2/64 //config IPv6 VLAN101
no shutdown            //encender interfaz
exit
interface vlan 102      //ingreso VLAN102
ip address 10.02.102.2 255.255.255.0 //config IP en VLAN102
ipv6 address fe80::d2:4 link-local //config IPv6 local
ipv6 address 2001:db8:100:102::2/64 //config IPv6 VLAN102
no shutdown            //encender interfaz
exit
ip dhcp excluded-address 10.02.101.1 10.02.101.209
ip dhcp excluded-address 10.02.101.241 10.02.101.254
ip dhcp excluded-address 10.02.102.1 10.02.102.209
ip dhcp excluded-address 10.02.102.241 10.02.102.254
ip dhcp pool VLAN-101
network 10.02.101.0 255.255.255.0
default-router 02.0.101.254
exit //en las 7 líneas anteriores se configura el servicio DHCP en los rangos
mostrados de las IP 10.02
ip dhcp pool VLAN-102
network 10.02.102.0 255.255.255.0
default-router 10.02.102.254
exit

```

```

interface range e0/0-3,e1/1-3,e2/0-3,e3/0-3
shutdown //se apagan todas las interfaces no usadas
exit

```

Switch A1

```

hostname A1 //Config del nombre en el switch A1
no ip domain lookup //Busqueda por dominio desactivada
banner motd # A1, ENCOR Skills Assessment# //config mensaje bienvenida
line con 0 //config de consola
exec-timeout 0 0 //config desconexión de consola
logging synchronous //Config ingreso sincrono
exit
vlan 100 //ingreso VLAN100
name Management //config nombre de VLAN100
exit
vlan 101 //config VLAN101
name UserGroupA //config nombre de VLAN101
exit
vlan 102 //config VLAN 102
name UserGroupB //Nombre asignado a VLAN102
exit
vlan 999 //ingreso a vlan nativa 999
name NATIVE //cambio del nombre
exit
interface vlan 100 //ingreso VLAN100
ip address 10.02.100.3 255.255.255.0 //config IP en VLAN100
ipv6 address fe80::a1:1 link-local //config IPv6 local
ipv6 address 2001:db8:100:100::3/64 //config IPv6 VLAN100
no shutdown //activación VLAN100
exit
interface range e0/0,e0/3,e1/0,e2/1-3,e3/0-3
shutdown //se apagan todas las interfaces no usadas
exit

```

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

Copy running-config startup-config

Figura 5. Guardando configuración sobre A1.

```
A1#copy
A1#copy r
*Oct 12 17:21:16.850: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/0, changed state to down
*Oct 12 17:21:16.861: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/1, changed state to down
*Oct 12 17:21:16.871: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/2, changed state to down
*Oct 12 17:21:16.871: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/3, changed state to down
A1#copy run
A1#copy running-config st
A1#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
Compressed configuration from 1632 bytes to 985 bytes[OK]
A1#
```

Fuente: Autor.

- c. Configure PC 1 and PC 4 host addressing as shown in the addressing table. Assign a default gateway address of 10.02.100.254 which will be the HSRP virtual IP address used in Part 4.

ip 10.02.100.5 255.255.255.0 10.02.100.25

ip 2001:db8:100:100::5/64

Figura 6. Configuración IPv4 e IPv6 sobre PC1.

```
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)
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 10.02.100.5 255.255.255.0 10.02.100.25
Checking for duplicate address...
PC1 : 10.2.100.5 255.255.255.0 gateway 10.2.100.25

PC1> ip 10.02.100.5 255.255.255.0 10.02.100.254
Checking for duplicate address...
PC1 : 10.2.100.5 255.255.255.0 gateway 10.2.100.254

PC1> ip 2001:db8:100:100::5/64
PC1 : 2001:db8:100:100::5/64

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

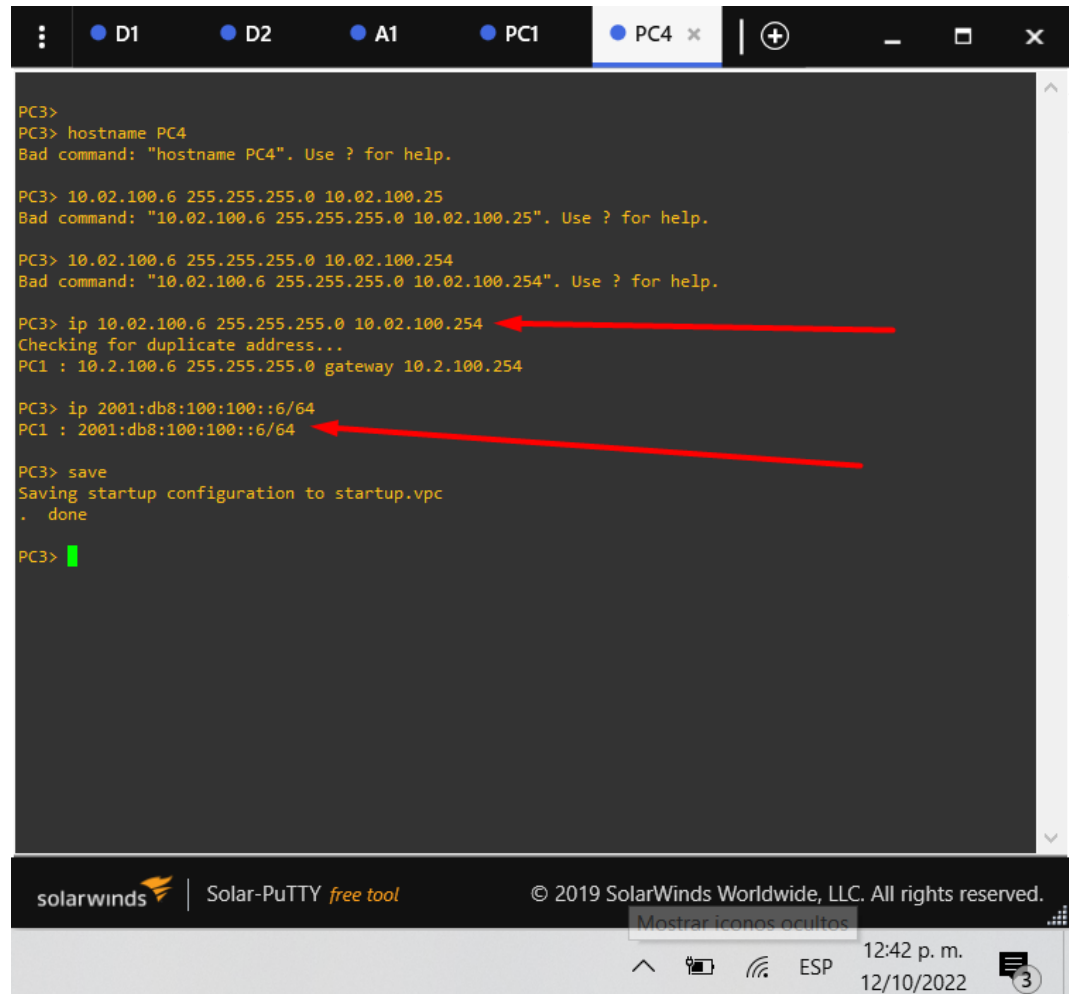
PC1> []
```

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12:38 p. m. 12/10/2022

Fuente: Autor.

Figura 7. Configuración IPv4 e IPv6 sobre PC1.



```
PC3>
PC3> hostname PC4
Bad command: "hostname PC4". Use ? for help.

PC3> 10.02.100.6 255.255.255.0 10.02.100.25
Bad command: "10.02.100.6 255.255.255.0 10.02.100.25". Use ? for help.

PC3> 10.02.100.6 255.255.255.0 10.02.100.254
Bad command: "10.02.100.6 255.255.255.0 10.02.100.254". Use ? for help.

PC3> ip 10.02.100.6 255.255.255.0 10.02.100.254
Checking for duplicate address...
PC1 : 10.2.100.6 255.255.255.0 gateway 10.2.100.254

PC3> ip 2001:db8:100:100::6/64
PC1 : 2001:db8:100:100::6/64

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

PC3>
```

Fuente: Autor.

Part 2: Configure the Layer 2 Network and Host Support

In this part of the Skills Assessment, you will complete the Layer 2 network configuration and set up basic host support. At the end of this part, all the switches should be able to communicate. PC2 and PC3 should receive addressing from DHCP and SLAAC.

Your configuration tasks are as follows:

Tabla 2, Tareas de configuración.

Task#	Task	Specification	Points
2.1	On all switches, configure IEEE 802.1Q trunk interfaces on interconnecting switch links	Enable 802.1Q trunk links between: <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

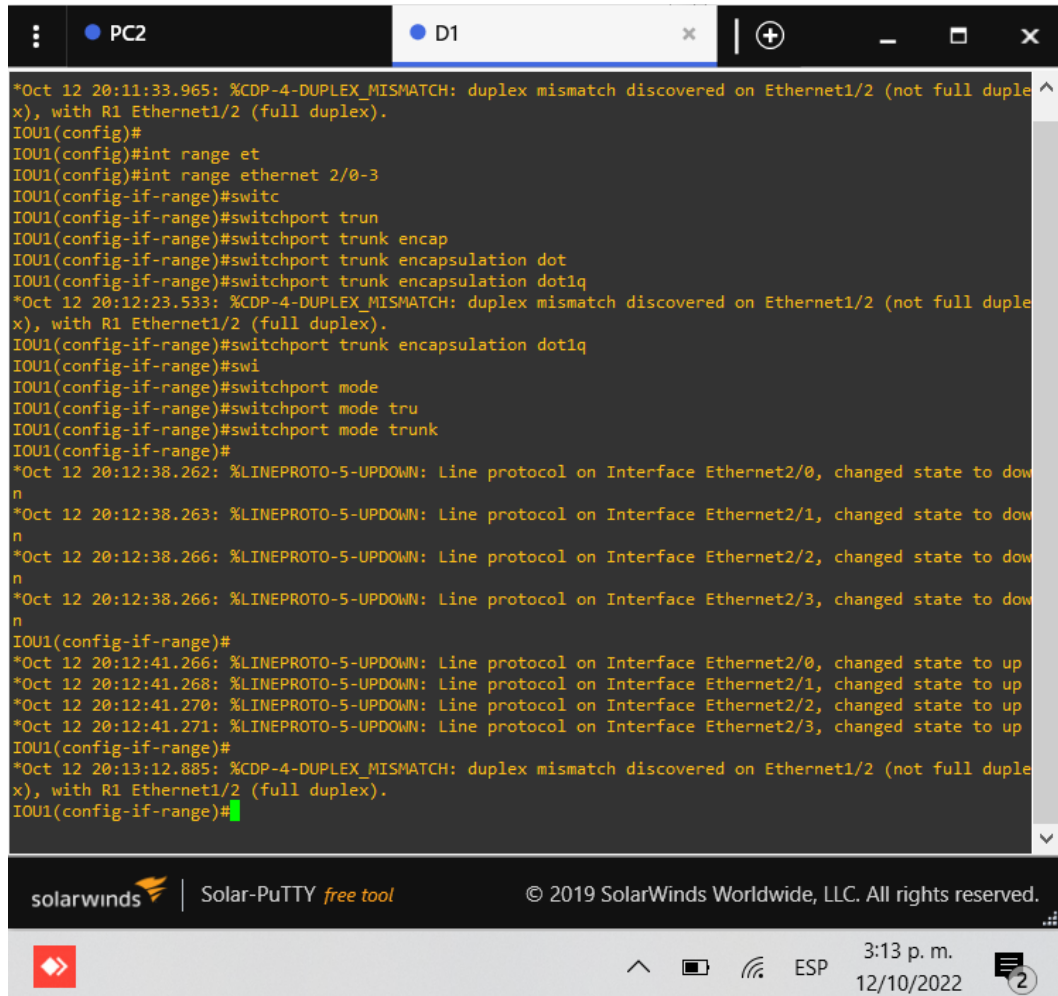
Task#	Task	Specification	Points
2.7	Verify IPv4 DHCP services.	PC2 and PC3 are DHCP clients and should be receiving valid IPv4 addresses.	1
2.8	Verify local LAN connectivity.	<p>PC1 should successfully ping:</p> <ul style="list-style-type: none"> • D1: 10.02.100.1 • D2: 10.02.100.2 • PC4: 10.02.100.6 <p>PC2 should successfully ping:</p> <ul style="list-style-type: none"> • D1: 10.02.102.1 • D2: 10.02.102.2 <p>PC3 should successfully ping:</p> <ul style="list-style-type: none"> • D1: 10.02.101.1 • D2: 10.02.101.2 <p>PC4 should successfully ping:</p> <ul style="list-style-type: none"> • D1: 10.02.100.1 • D2: 10.02.100.2 • PC1: 10.02.100.5 	1

Fuente: Autor.

Task 2.1 On all switches, configure IEEE 802.1Q trunk interfaces on interconnecting switch links

Entre D1 y D2:

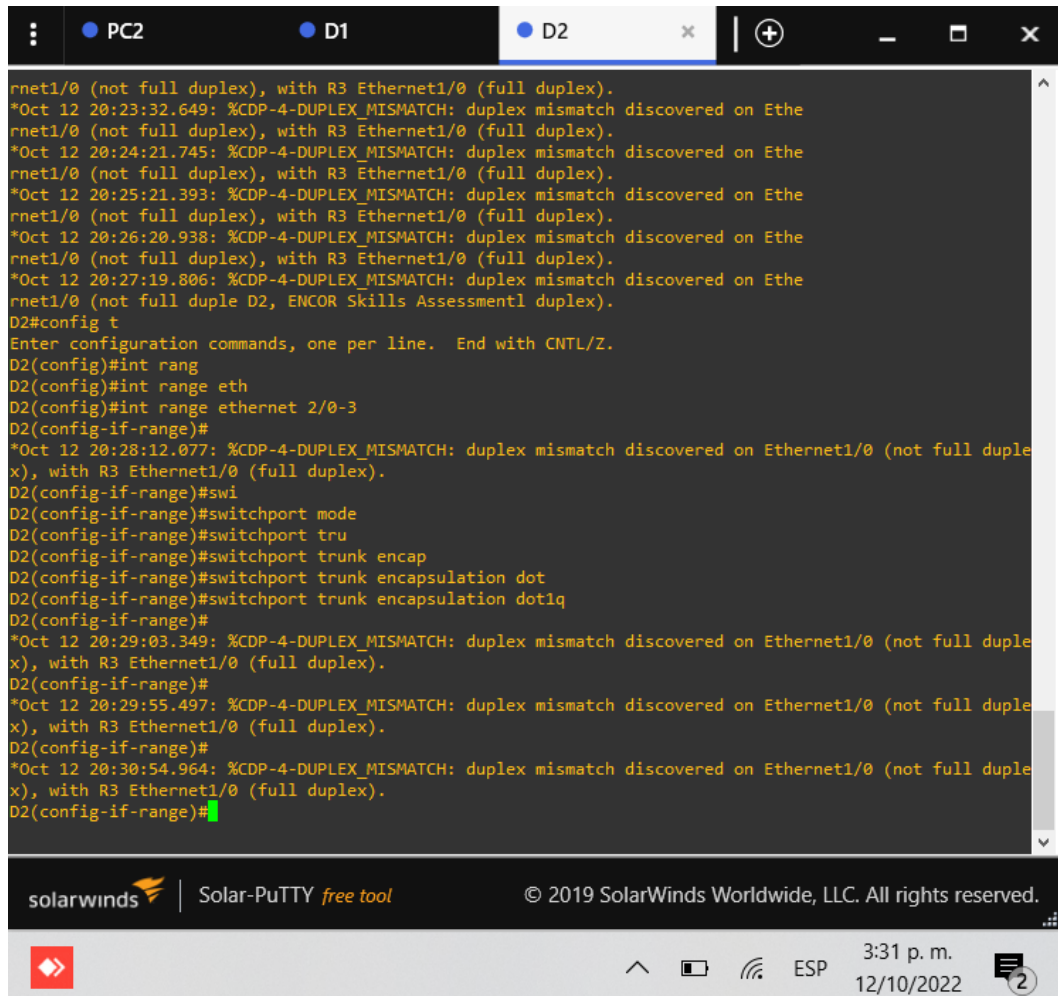
Figura 8. Encapsulación Dot1Q sobre D1 a D2.



```
*Oct 12 20:11:33.965: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
IOU1(config)#
IOU1(config)#int range et
IOU1(config)#int range ethernet 2/0-3
IOU1(config-if-range)#switc
IOU1(config-if-range)#switchport trun
IOU1(config-if-range)#switchport trunk encap
IOU1(config-if-range)#switchport trunk encapsulation dot
IOU1(config-if-range)#switchport trunk encapsulation dot1q
*Oct 12 20:12:23.533: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
IOU1(config-if-range)#switchport trunk encapsulation dot1q
IOU1(config-if-range)#swi
IOU1(config-if-range)#switchport mode
IOU1(config-if-range)#switchport mode tru
IOU1(config-if-range)#switchport mode trunk
IOU1(config-if-range)#
*Oct 12 20:12:38.262: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to down
*Oct 12 20:12:38.263: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to down
*Oct 12 20:12:38.266: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to down
*Oct 12 20:12:38.266: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to down
IOU1(config-if-range)#
*Oct 12 20:12:41.266: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to up
*Oct 12 20:12:41.268: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to up
*Oct 12 20:12:41.270: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/2, changed state to up
*Oct 12 20:12:41.271: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to up
IOU1(config-if-range)#
*Oct 12 20:13:12.885: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
IOU1(config-if-range)#
```

Fuente: Autor.

Figura 9. Encapsulación Dot1Q sobre D2 a D1.

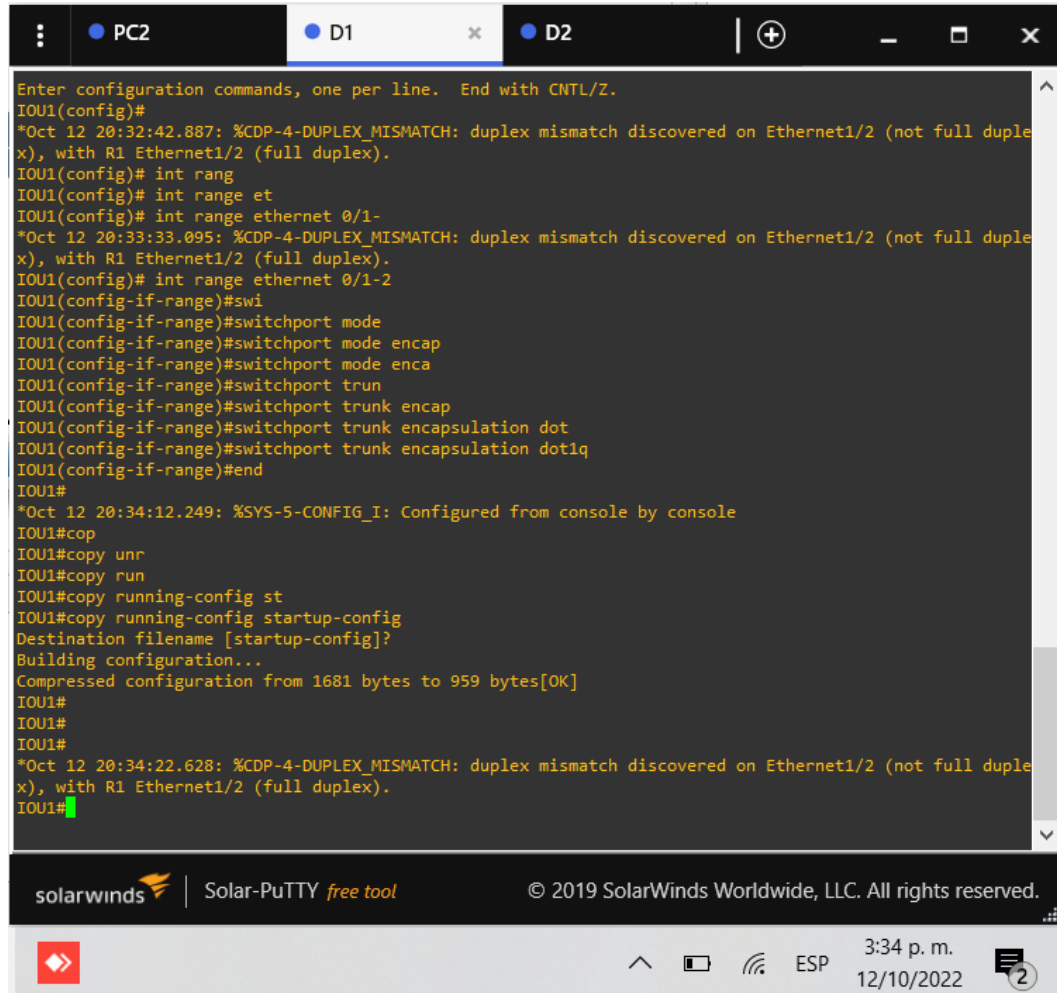


```
rnet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
*Oct 12 20:23:32.649: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethe
rnet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
*Oct 12 20:24:21.745: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethe
rnet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
*Oct 12 20:25:21.393: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethe
rnet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
*Oct 12 20:26:20.938: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethe
rnet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
*Oct 12 20:27:19.806: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethe
rnet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#config t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#int rang
D2(config)#int range eth
D2(config)#int range ethernet 2/0-3
D2(config-if-range)#
*Oct 12 20:28:12.077: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config-if-range)#swi
D2(config-if-range)#switchport mode
D2(config-if-range)#switchport tru
D2(config-if-range)#switchport trunk encap
D2(config-if-range)#switchport trunk encapsulation dot
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#
*Oct 12 20:29:03.349: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config-if-range)#
*Oct 12 20:29:55.497: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config-if-range)#
*Oct 12 20:30:54.964: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config-if-range)#
```

Fuente: Autor.

Entre D1 y A1:

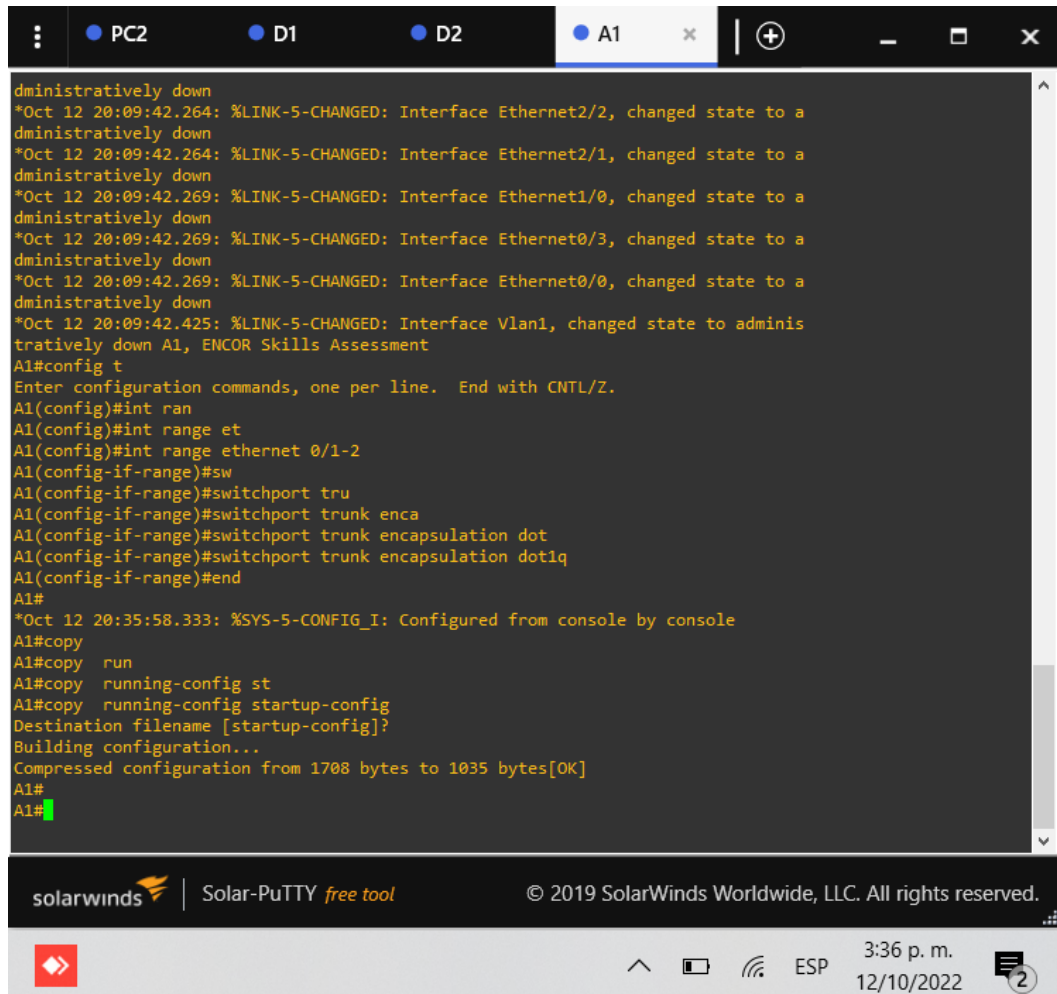
Figura 10. Encapsulación Dot1Q sobre D1 a A1.



```
Enter configuration commands, one per line. End with CNTL/Z.
IOU1(config)#
*Oct 12 20:32:42.887: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
IOU1(config)# int rang
IOU1(config)# int range et
IOU1(config)# int range ethernet 0/1-
*Oct 12 20:33:33.095: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
IOU1(config)# int range ethernet 0/1-2
IOU1(config-if-range)#swi
IOU1(config-if-range)#switchport mode
IOU1(config-if-range)#switchport mode encap
IOU1(config-if-range)#switchport mode enca
IOU1(config-if-range)#switchport trunk
IOU1(config-if-range)#switchport trunk encap
IOU1(config-if-range)#switchport trunk encapsulation dot
IOU1(config-if-range)#switchport trunk encapsulation dot1q
IOU1(config-if-range)#end
IOU1#
*Oct 12 20:34:12.249: %SYS-5-CONFIG_I: Configured from console by console
IOU1#cop
IOU1#copy unr
IOU1#copy run
IOU1#copy running-config st
IOU1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 1681 bytes to 959 bytes[OK]
IOU1#
IOU1#
IOU1#
*Oct 12 20:34:22.628: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
IOU1#
```

Fuente: Autor.

Figura 11. Encapsulación Dot1Q sobre A1 a D1.



```
administratively down
*Oct 12 20:09:42.264: %LINK-5-CHANGED: Interface Ethernet2/2, changed state to a
administratively down
*Oct 12 20:09:42.264: %LINK-5-CHANGED: Interface Ethernet2/1, changed state to a
administratively down
*Oct 12 20:09:42.269: %LINK-5-CHANGED: Interface Ethernet1/0, changed state to a
administratively down
*Oct 12 20:09:42.269: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to a
administratively down
*Oct 12 20:09:42.269: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to a
administratively down
*Oct 12 20:09:42.425: %LINK-5-CHANGED: Interface Vlan1, changed state to adminis
tratively down A1, ENCOR Skills Assessment
A1#config t
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#int ran
A1(config)#int range et
A1(config)#int range ethernet 0/1-2
A1(config-if-range)#sw
A1(config-if-range)#switchport tru
A1(config-if-range)#switchport trunk enca
A1(config-if-range)#switchport trunk encapsulation dot
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#end
A1#
*Oct 12 20:35:58.333: %SYS-5-CONFIG_I: Configured from console by console
A1#copy
A1#copy run
A1#copy running-config st
A1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 1708 bytes to 1035 bytes[OK]
A1#
A1#
```

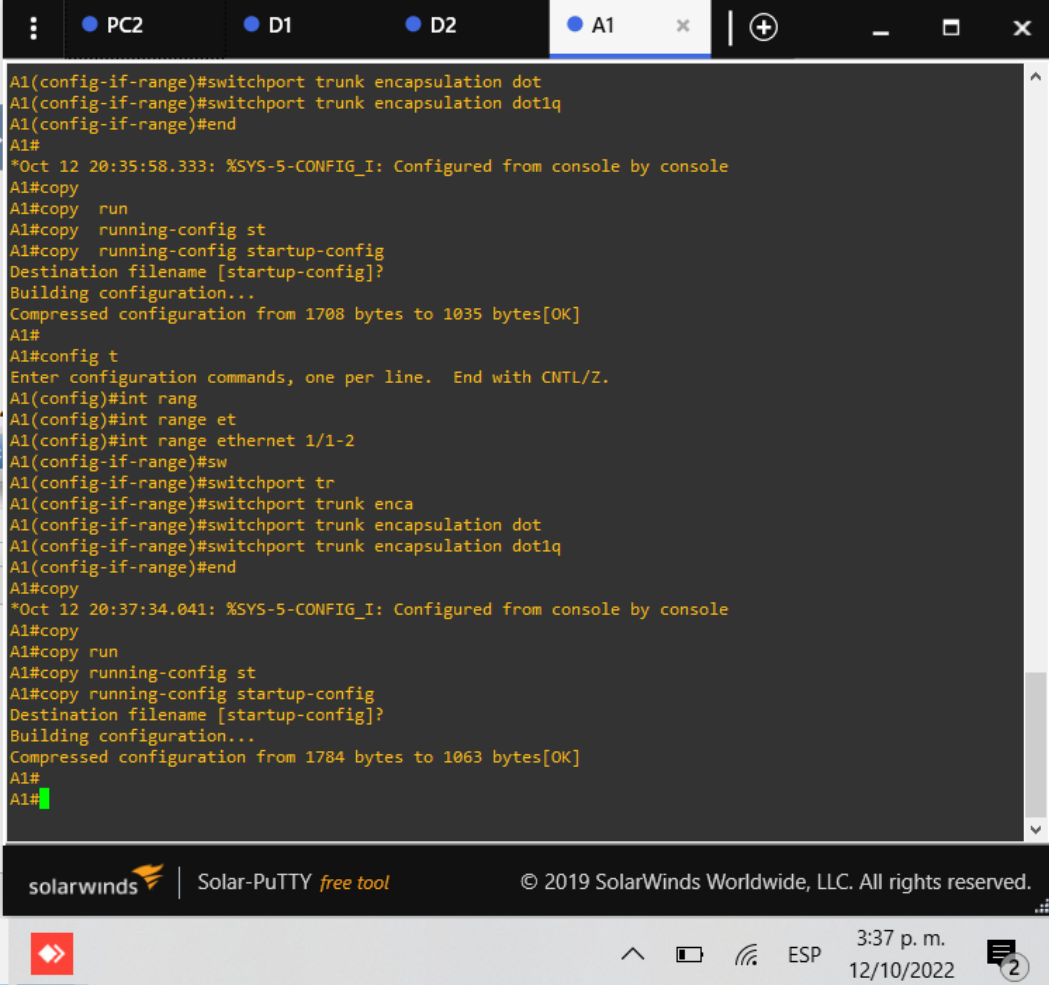
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3:36 p. m. 12/10/2022

Fuente: Autor.

Entre D2 y A1:

Figura 12. Encapsulación Dot1Q sobre A1 a D2.



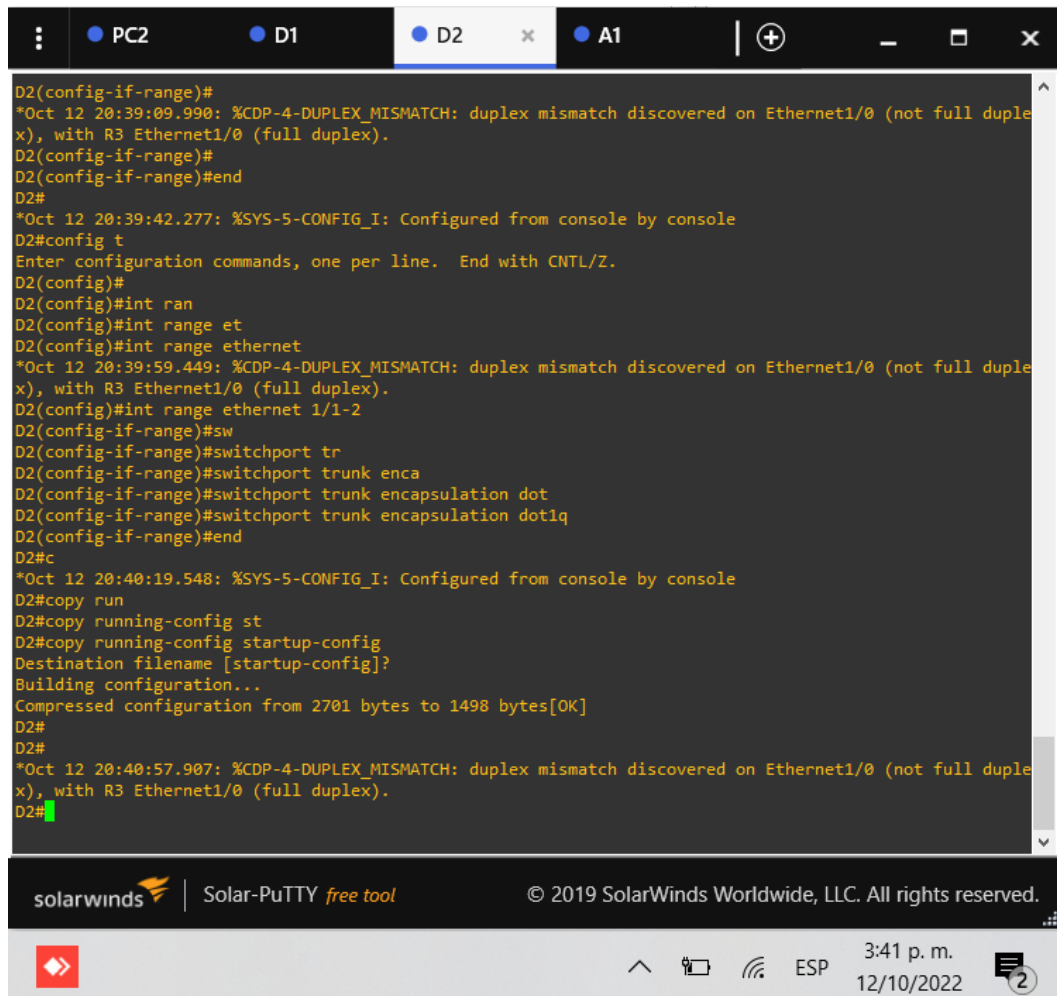
```
A1(config-if-range)#switchport trunk encapsulation dot
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#end
A1#
*Oct 12 20:35:58.333: %SYS-5-CONFIG_I: Configured from console by console
A1#copy
A1#copy run
A1#copy running-config st
A1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 1708 bytes to 1035 bytes[OK]
A1#
A1#config t
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#int rang
A1(config)#int range et
A1(config)#int range ethernet 1/1-2
A1(config-if-range)#sw
A1(config-if-range)#switchport tr
A1(config-if-range)#switchport trunk enca
A1(config-if-range)#switchport trunk encapsulation dot
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#end
A1#copy
*Oct 12 20:37:34.041: %SYS-5-CONFIG_I: Configured from console by console
A1#copy
A1#copy run
A1#copy running-config st
A1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 1784 bytes to 1063 bytes[OK]
A1#
A1#
```

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3:37 p. m. 12/10/2022

Fuente: Autor.

Figura 13. Encapsulación Dot1Q sobre D2 a A1.



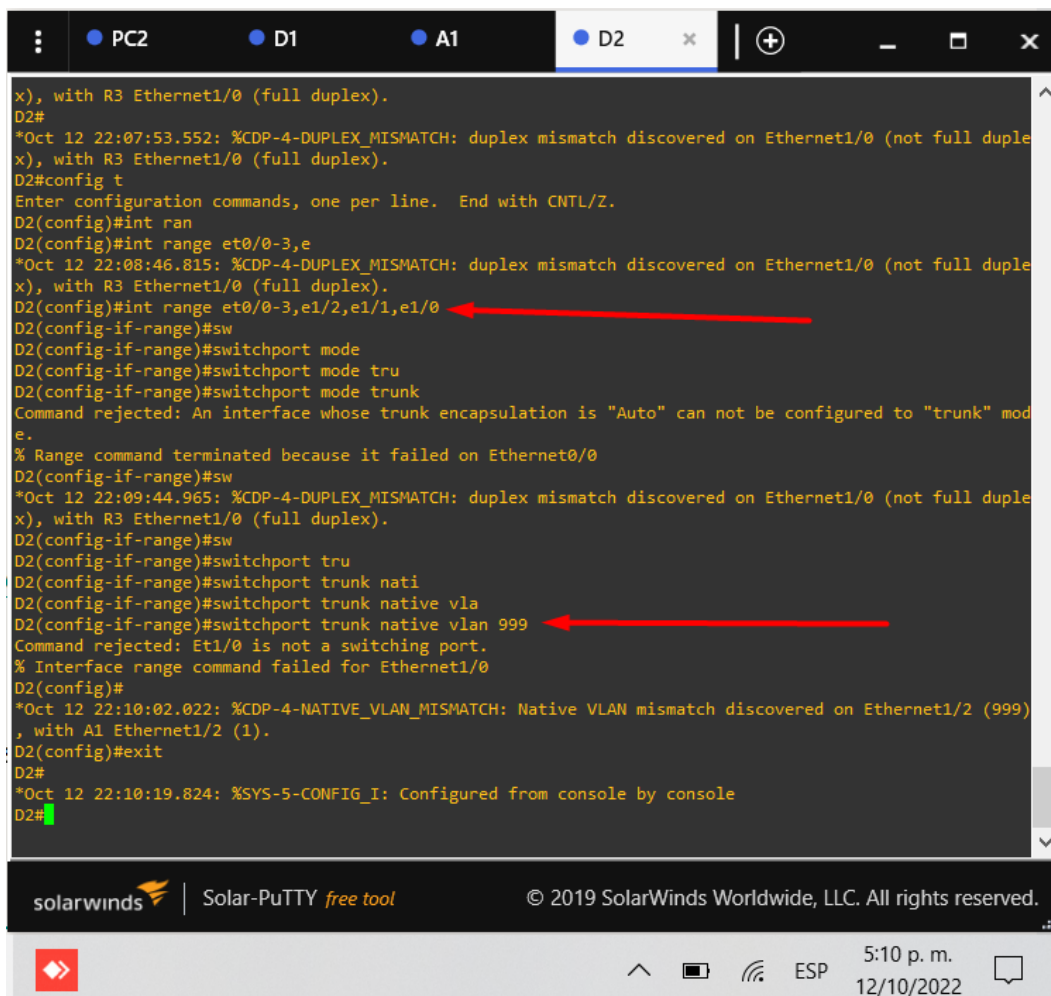
```
D2(config-if-range)#
*Oct 12 20:39:09.990: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config-if-range)#
D2(config-if-range)#end
D2#
*Oct 12 20:39:42.277: %SYS-5-CONFIG_I: Configured from console by console
D2#config t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#
D2(config)#int ran
D2(config)#int range et
D2(config)#int range ethernet
*Oct 12 20:39:59.449: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#int range ethernet 1/1-2
D2(config-if-range)#sw
D2(config-if-range)#switchport tr
D2(config-if-range)#switchport trunk enca
D2(config-if-range)#switchport trunk encapsulation dot
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#end
D2#
D2#
*Oct 12 20:40:19.548: %SYS-5-CONFIG_I: Configured from console by console
D2#copy run
D2#copy running-config st
D2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 2701 bytes to 1498 bytes[OK]
D2#
D2#
*Oct 12 20:40:57.907: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
```

Fuente: Autor.

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

Use VLAN 999 as the native VLAN:

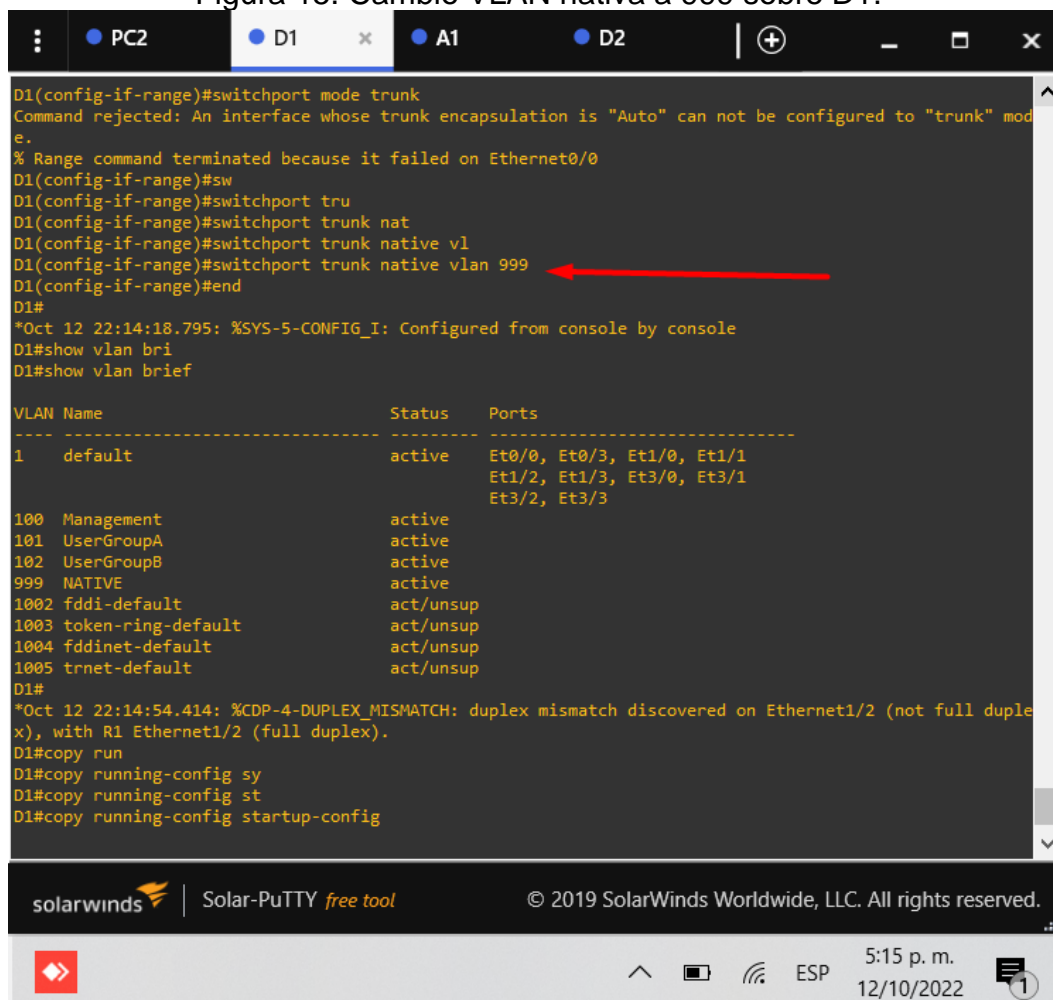
Figura 14. Cambio VLAN nativa a 999 sobre D2.



```
D2#
*Oct 12 22:07:53.552: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#config t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#int ran
D2(config)#int range et0/0-3,e
*Oct 12 22:08:46.815: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#int range et0/0-3,e1/2,e1/1,e1/0
D2(config-if-range)#sw
D2(config-if-range)#switchport mode
D2(config-if-range)#switchport mode tru
D2(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 Ethernet0/0
D2(config-if-range)#sw
*Oct 12 22:09:44.965: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config-if-range)#sw
D2(config-if-range)#switchport tru
D2(config-if-range)#switchport trunk nati
D2(config-if-range)#switchport trunk native vla
D2(config-if-range)#switchport trunk native vlan 999
Command rejected: Et1/0 is not a switching port.
% Interface range command failed for Ethernet1/0
D2(config)#
*Oct 12 22:10:02.022: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet1/2 (999), with A1 Ethernet1/2 (1).
D2(config)#exit
D2#
*Oct 12 22:10:19.824: %SYS-5-CONFIG_I: Configured from console by console
D2#
```

Fuente: Autor.

Figura 15. Cambio VLAN nativa a 999 sobre D1.



```
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 Ethernet0/0
D1(config-if-range)#sw
D1(config-if-range)#switchport tru
D1(config-if-range)#switchport trunk nat
D1(config-if-range)#switchport trunk native vl
D1(config-if-range)#switchport trunk native vlan 999
D1(config-if-range)#end
D1#
*Oct 12 22:14:18.795: %SYS-5-CONFIG_I: Configured from console by console
D1#show vlan bri
D1#show vlan brief
```

VLAN Name	Status	Ports
1 default	active	Et0/0, Et0/3, Et1/0, Et1/1 Et1/2, Et1/3, Et3/0, Et3/1 Et3/2, Et3/3
100 Management	active	
101 UserGroupA	active	
102 UserGroupB	active	
999 NATIVE	active	
1002 fddi-default	act/unsup	
1003 token-ring-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trnet-default	act/unsup	

```
D1#
*Oct 12 22:14:54.414: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#copy run
D1#copy running-config sy
D1#copy running-config st
D1#copy running-config startup-config
```

Fuente: Autor.

Figura 16. Cambio VLAN nativa a 999 sobre A1.

```
*Oct 12 22:12:35.375: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet1/1 (1),
with D2 Ethernet1/1 (999).
A1(config-if-range)#switchport mode tru
A1(config-if-range)#switchport mode trunk
A1(config-if-range)#sw
A1(config-if-range)#switchport tru
A1(config-if-range)#switchport trunk nati
A1(config-if-range)#switchport trunk native vl
A1(config-if-range)#switchport trunk native vlan 999
A1(config-if-range)#exit
A1(config)#exit
A1#
*Oct 12 22:13:09.599: %SYS-5-CONFIG_I: Configured from console by console
A1#show vlan brie
A1#show vlan brief
```

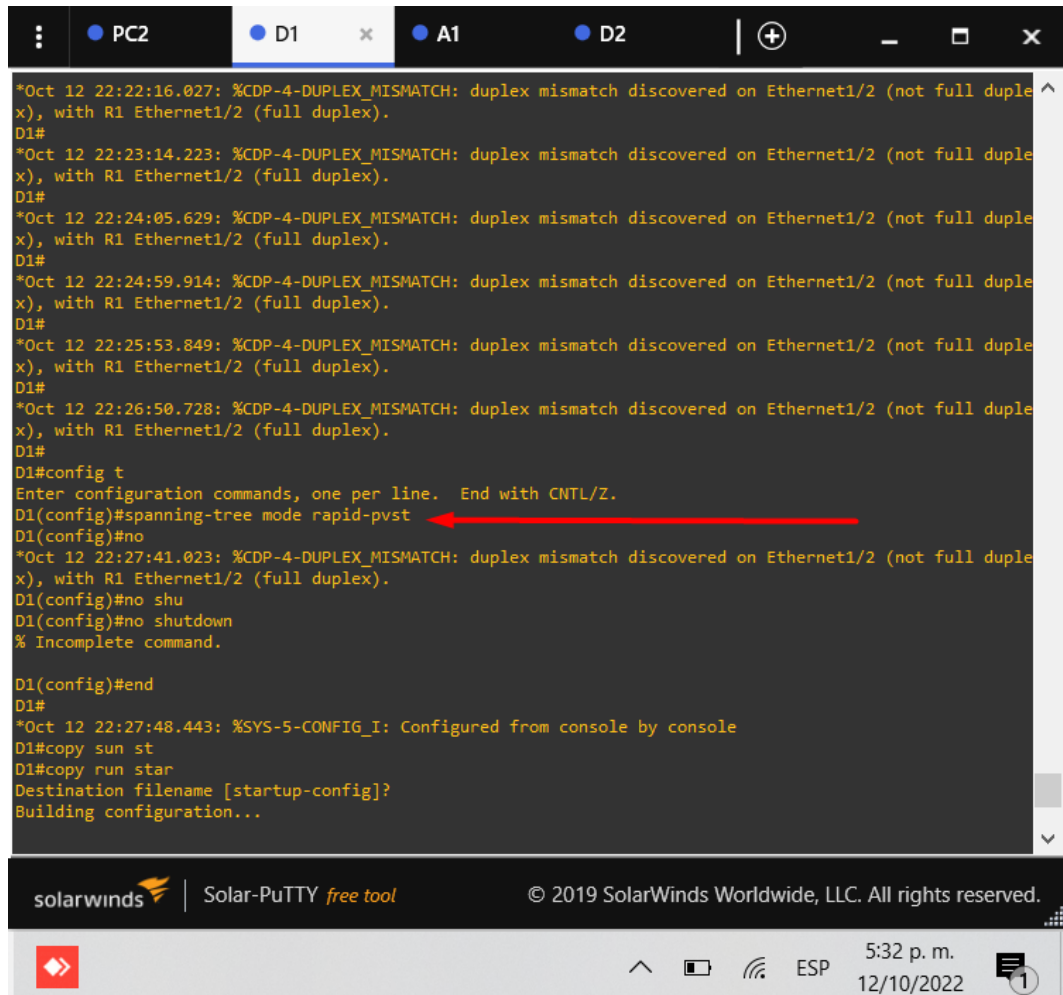
VLAN Name	Status	Ports
1 default	active	Et0/0, Et0/3, Et1/0, Et1/3 Et2/0, Et2/1, Et2/2, Et2/3 Et3/0, Et3/1, Et3/2, Et3/3
100 Management	active	
101 UserGroupA	active	
102 UserGroupB	active	
999 NATIVE	active	
1002 fddi-default	act/unsup	
1003 token-ring-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trnet-default	act/unsup	

```
A1#
*Oct 12 22:13:26.983: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (999)
, with D1 Ethernet0/1 (1).
A1#
*Oct 12 22:13:48.464: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2 (999)
, with D1 Ethernet0/2 (1).
```

Fuente: Autor.

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

Figura 17. STP en D1.

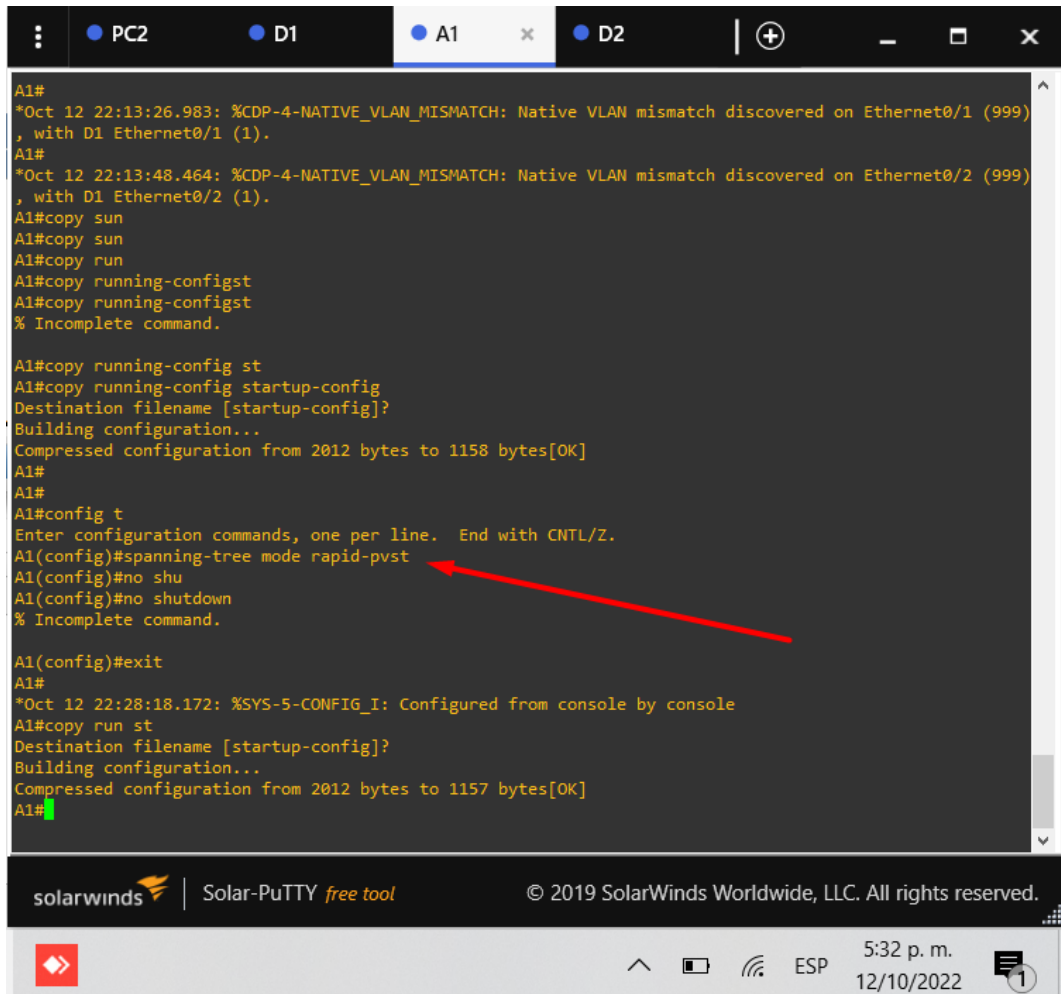


```
*Oct 12 22:22:16.027: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#
*Oct 12 22:23:14.223: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#
*Oct 12 22:24:05.629: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#
*Oct 12 22:24:59.914: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#
*Oct 12 22:25:53.849: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#
*Oct 12 22:26:50.728: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#
D1#config t
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#spanning-tree mode rapid-pvst
D1(config)#no
*Oct 12 22:27:41.023: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1(config)#no shu
D1(config)#no shutdown
% Incomplete command.

D1(config)#end
D1#
*Oct 12 22:27:48.443: %SYS-5-CONFIG_I: Configured from console by console
D1#copy sun st
D1#copy run star
Destination filename [startup-config]?
Building configuration...
```

Fuente: Autor.

Figura 18. STP sobre A1.

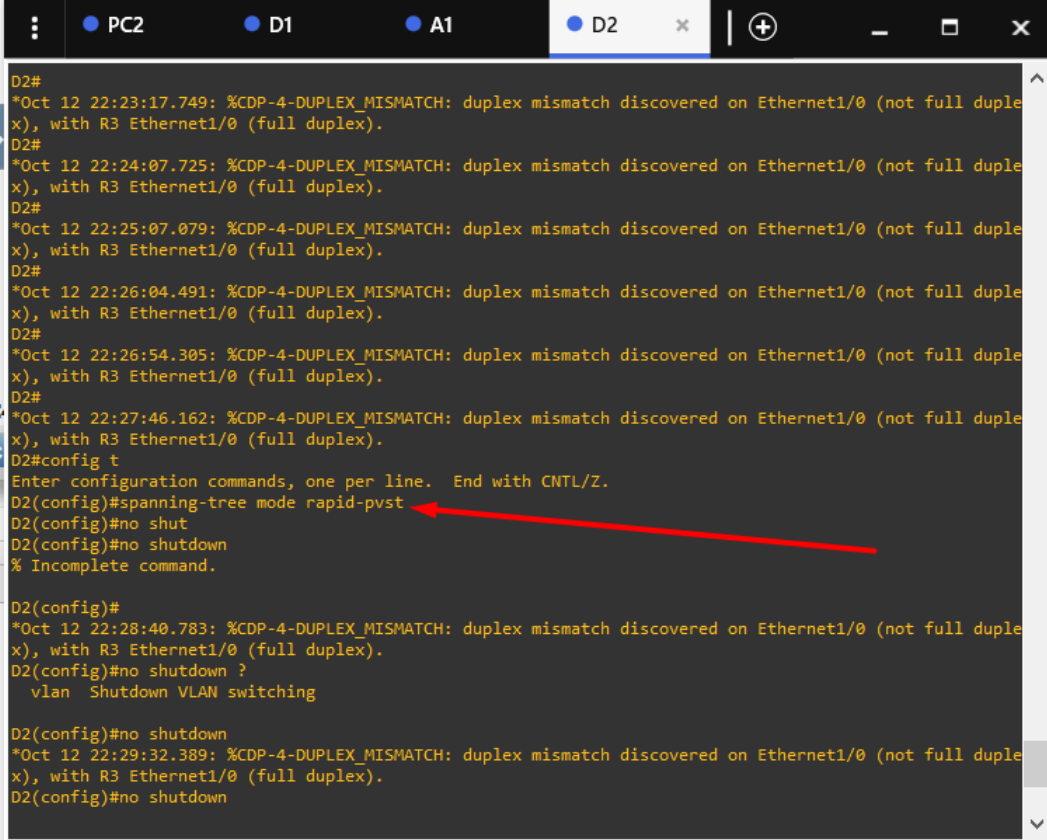


```
A1#
*Oct 12 22:13:26.983: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (999)
, with D1 Ethernet0/1 (1).
A1#
*Oct 12 22:13:48.464: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2 (999)
, with D1 Ethernet0/2 (1).
A1#copy sun
A1#copy sun
A1#copy run
A1#copy running-config st
A1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 2012 bytes to 1158 bytes[OK]
A1#
A1#
A1#config t
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#spanning-tree mode rapid-pvst
A1(config)#no shu
A1(config)#no shutdown
% Incomplete command.

A1(config)#exit
A1#
*Oct 12 22:28:18.172: %SYS-5-CONFIG_I: Configured from console by console
A1#copy run st
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 2012 bytes to 1157 bytes[OK]
A1#
```

Fuente: Autor.

Figura 19. STP sobre D2.



```
D2#
*Oct 12 22:23:17.749: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
*Oct 12 22:24:07.725: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
*Oct 12 22:25:07.079: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
*Oct 12 22:26:04.491: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
*Oct 12 22:26:54.305: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
*Oct 12 22:27:46.162: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#config t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#spanning-tree mode rapid-pvst
D2(config)#no shut
D2(config)#no shutdown
% Incomplete command.

D2(config)#
*Oct 12 22:28:40.783: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#no shutdown ?
    vlan Shutdown VLAN switching

D2(config)#no shutdown
*Oct 12 22:29:32.389: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config)#no shutdown
```

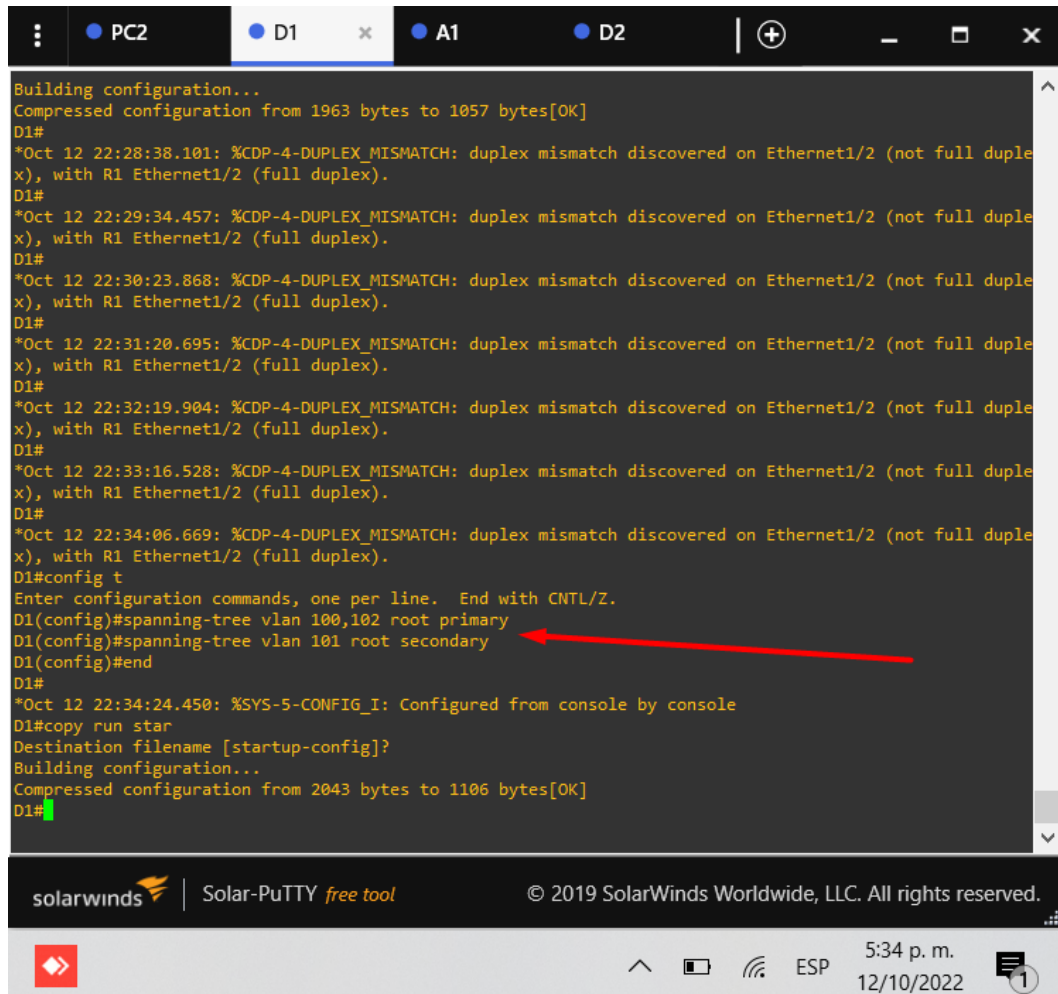
Fuente: Autor.

Task 2.4 On D1 and D2, configure the appropriate RSTP root bridges based on the information in the topology diagram.

D1 and D2 must provide backup in case of root bridge failure.

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

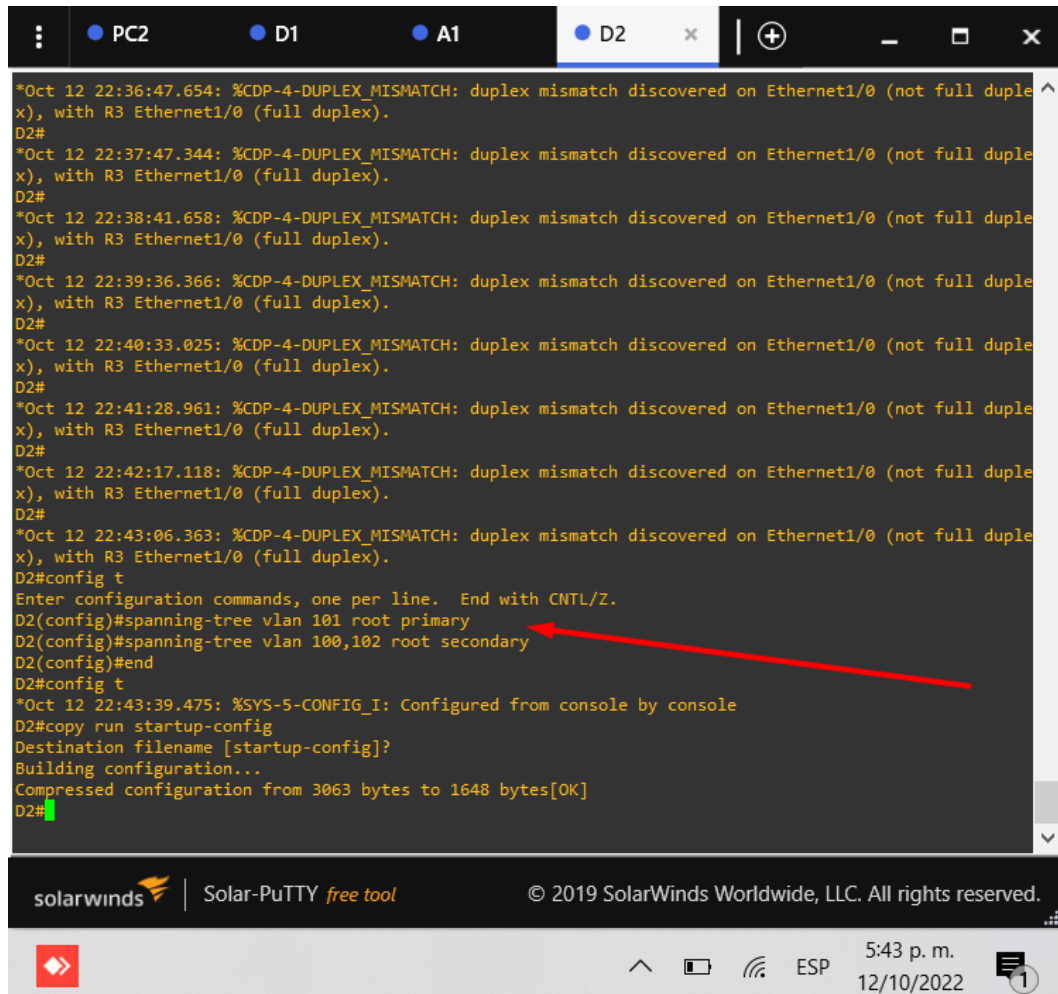
Figura 20. Vlan 100 primaria sobre D1.



```
Building configuration...
Compressed configuration from 1963 bytes to 1057 bytes[OK]
D1#
*Oct 12 22:28:38.101: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#
*Oct 12 22:29:34.457: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#
*Oct 12 22:30:23.868: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#
*Oct 12 22:31:20.695: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#
*Oct 12 22:32:19.904: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#
*Oct 12 22:33:16.528: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#
*Oct 12 22:34:06.669: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1/2 (full duplex).
D1#
D1#config t
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#spanning-tree vlan 100,102 root primary
D1(config)#spanning-tree vlan 101 root secondary
D1(config)#end
D1#
*Oct 12 22:34:24.450: %SYS-5-CONFIG_I: Configured from console by console
D1#copy run star
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 2043 bytes to 1106 bytes[OK]
D1#
```

Fuente: Autor.

Figura 21. Vlan 101 primaria sobre D2.



```
*Oct 12 22:36:47.654: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
*Oct 12 22:37:47.344: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
*Oct 12 22:38:41.658: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
*Oct 12 22:39:36.366: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
*Oct 12 22:40:33.025: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
*Oct 12 22:41:28.961: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
*Oct 12 22:42:17.118: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
*Oct 12 22:43:06.363: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
D2#config t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#spanning-tree vlan 101 root primary
D2(config)#spanning-tree vlan 100,102 root secondary
D2(config)#end
D2#config t
*Oct 12 22:43:39.475: %SYS-5-CONFIG_I: Configured from console by console
D2#copy run startup-config
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 3063 bytes to 1648 bytes[OK]
D2#
```

Fuente: Autor.

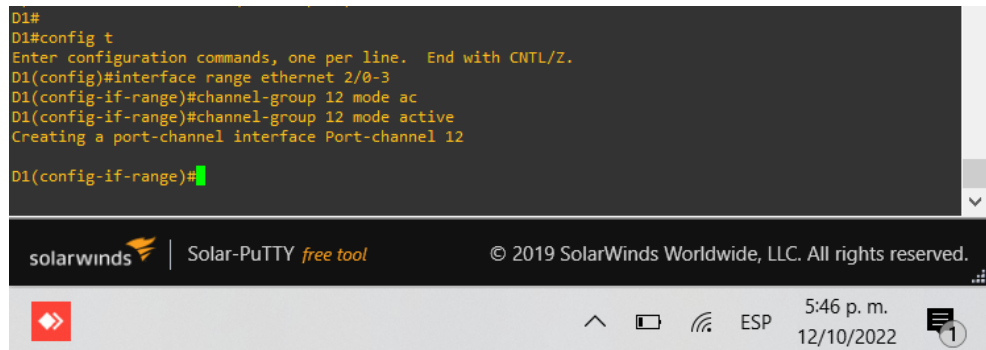
Task 2.5 On all switches, create LACP EtherChannels as shown in the topology diagram.

Use the following channel numbers:

- D1 to D2 – Port channel 12

Figura 22. LACP canal 12 en D1.

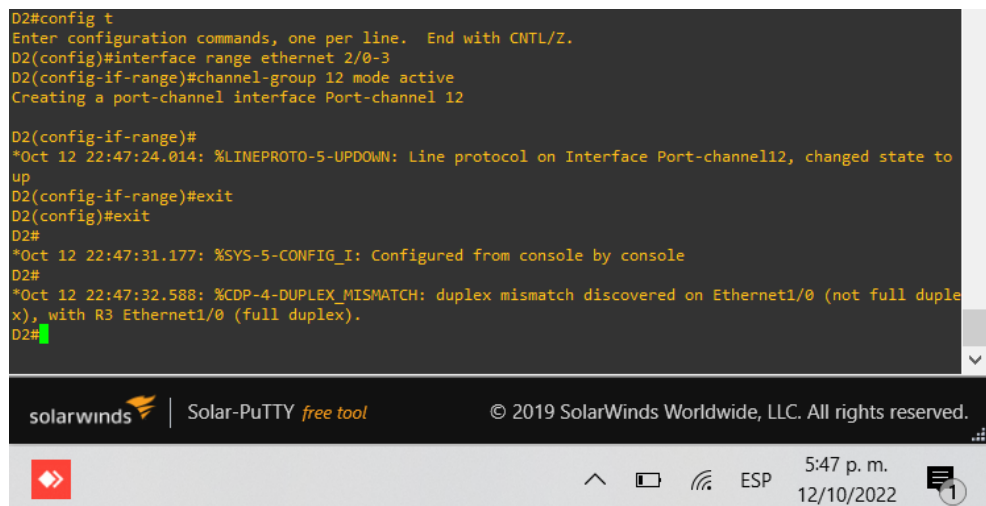
```
D1#
D1#config t
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#interface range ethernet 2/0-3
D1(config-if-range)#channel-group 12 mode ac
D1(config-if-range)#channel-group 12 mode active
Creating a port-channel interface Port-channel 12
D1(config-if-range)#
```



Fuente: Autor.

Figura 23. LACP canal 12 en D2.

```
D2#config t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#interface range ethernet 2/0-3
D2(config-if-range)#channel-group 12 mode active
Creating a port-channel interface Port-channel 12
D2(config-if-range)#
*Oct 12 22:47:24.014: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel12, changed state to
up
D2(config-if-range)#exit
D2(config)#exit
D2#
*Oct 12 22:47:31.177: %SYS-5-CONFIG_I: Configured from console by console
D2#
*Oct 12 22:47:32.588: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2#
```



Fuente: Autor.

- D1 to A1 – Port channel 1

Figura 24. LACP canal 1 en D1.

```
D1(config)#interface range ethernet 0/1-2
D1(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1

D1(config-if-range)#
*Oct 12 22:48:15.856: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*Oct 12 22:48:15.857: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
D1(config-if-range)#exit
D1(config)#
*Oct 12 22:48:20.630: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to up
*Oct 12 22:48:20.632: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to up
D1(config)#
*Oct 12 22:48:22.751: %EC-5-L3DONTBNDL2: Et0/2 suspended: LACP currently not enabled on the remote port
*Oct 12 22:48:23.012: %EC-5-L3DONTBNDL2: Et0/1 suspended: LACP currently not enabled on the remote port
D1(config)#
```

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Fuente: Autor.

Figura 25. LACP canal 1 en A1.

```
A1#config t
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#interface range ethernet 0/1-2
A1(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1

A1(config-if-range)#exit
A1(config)#
*Oct 12 22:49:14.826: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel1, changed state to up
A1(config)#
```

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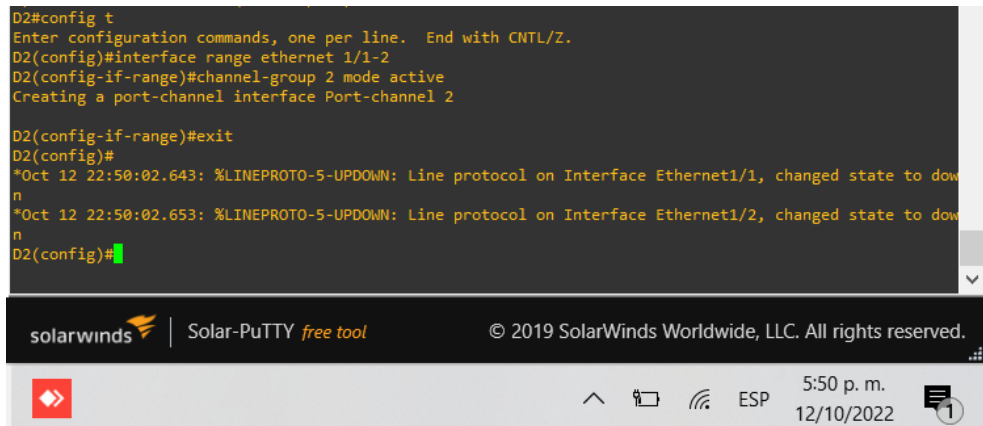
Fuente: Autor.

- D2 to A1 – Port channel 2

Figura 26. LACP canal 2 en D2.

```
D2#config t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#interface range ethernet 1/1-2
D2(config-if-range)#channel-group 2 mode active
Creating a port-channel interface Port-channel 2

D2(config-if-range)#exit
D2(config)#
*Oct 12 22:50:02.643: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
*Oct 12 22:50:02.653: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to down
D2(config)#
```

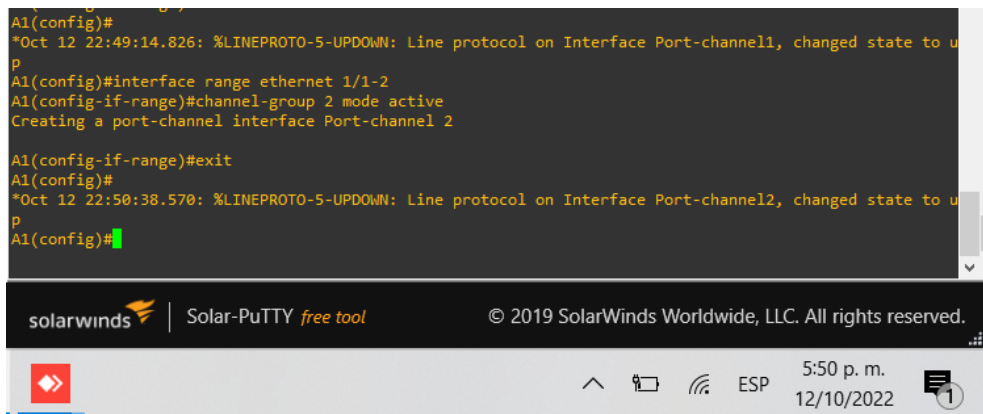


Fuente: Autor.

Figura 27. LACP canal 2 en A1.

```
A1(config)#
*Oct 12 22:49:14.826: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel1, changed state to up
A1(config)#interface range ethernet 1/1-2
A1(config-if-range)#channel-group 2 mode active
Creating a port-channel interface Port-channel 2

A1(config-if-range)#exit
A1(config)#
*Oct 12 22:50:38.570: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel2, changed state to up
A1(config)#
```



Fuente: Autor.

Task 2.6 On all switches, configure host access ports connecting to PC1, PC2, PC3, and PC4

Configure access ports with appropriate VLAN settings as shown in the topology diagram.

Host ports should transition immediately to forwarding state.

PC1:

Figura 28. Modo acceso en D1, VLAN 100.

```
D1(config)#int et 0/0
D1(config-if)#sw
D1(config-if)#switchport mode
D1(config-if)#switchport mode acc
D1(config-if)#switchport mode access
D1(config-if)#sw
D1(config-if)#switchport acc
D1(config-if)#switchport access vla
D1(config-if)#switchport access vlan 100
D1(config-if)#spann
D1(config-if)#spanning-tree port
D1(config-if)#spanning-tree portfa
D1(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.
D1(config-if)#no shu
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#
```

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Fuente: Autor.

PC2:

Figura 29. Modo acceso en D2, VLAN 102.

```
x), with R3 Ethernet1/0 (full duplex).
D2(config)#
*Oct 12 22:52:04.014: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duple
x), with R3 Ethernet1/0 (full duplex).
D2(config)#interface ethernet 0/0
D2(config-if)#switchport mode access
D2(config-if)#switchport acces 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
*Oct 12 22:52:58.699: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duple
x), with R3 Ethernet1/0 (full duplex).
D2(config-if)#exit
*Oct 12 22:52:58.713: %LINK-3-UPDOWN: Interface Ethernet0/0, changed state to up
*Oct 12 22:52:59.717: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to up
D2(config-if)#exit
D2(config)#
```

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Fuente: Autor.

PC3 y PC4 desde A1:

Figura 30. Modo acceso en A1, VLAN 101.

```
A1(config)#interface ethernet 1/3
A1(config-if)#switchport mode access
A1(config-if)#switchport access vlan 101
A1(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 Ethernet1/3 but will only
have effect when the interface is in a non-trunking mode.
A1(config-if)#no shutdown
A1(config-if)#exit
A1(config)#interface ethernet 2/0
A1(config-if)#switchport mode access
A1(config-if)#switchport access vlan 100
A1(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 Ethernet2/0 but will only
have effect when the interface is in a non-trunking mode.
A1(config-if)#no shutdown
A1(config-if)#exit
A1(config)#exit
A1#
*Oct 12 22:54:35.385: %SYS-5-CONFIG_I: Configured from console by console
A1#copy eun star
Destination filename [startup-config]?
%Error opening unix:eun (No such file or directory)
A1#
A1#
```

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5:55 p. m. 12/10/2022

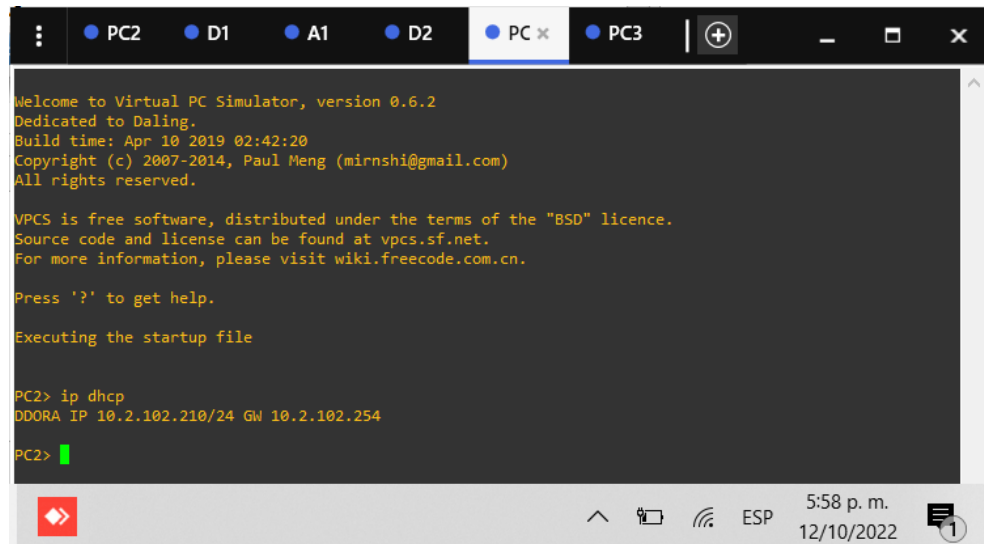
Fuente: Autor.

Task 2.7 Verify IPv4 DHCP services.

PC2 and PC3 are DHCP clients and should be receiving valid IPv4 addresses.

PC2:

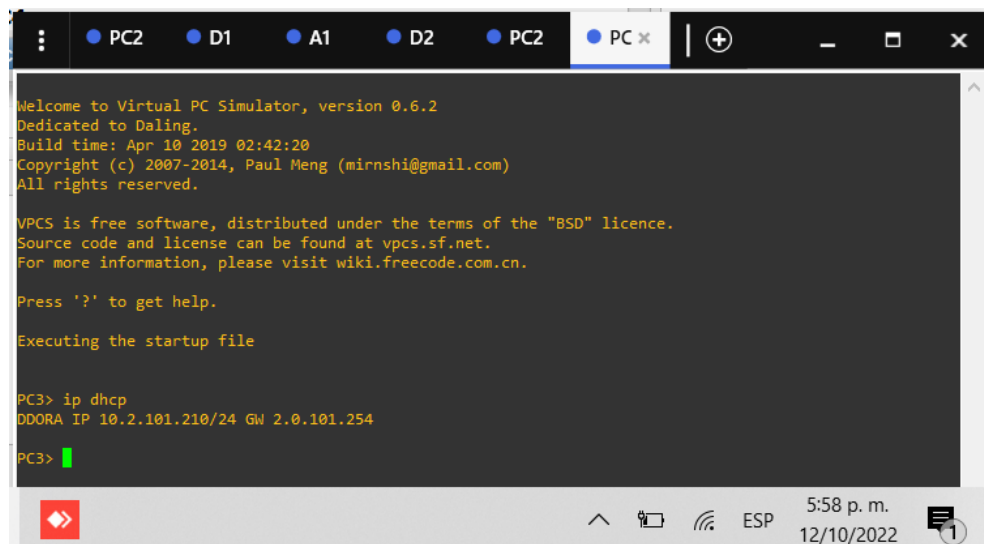
Figura 31. Configuración DHCP sobre PC2.



Fuente: Autor.

PC3:

Figura 32. Configuración DHCP sobre PC3.



Fuente: Autor.

Task 2.8 Verify local LAN connectivity.

PC1 should successfully ping:

- D1: 10.02.100.1
- D2: 10.02.100.2
- PC4: 10.02.100.6

Figura 33. Prueba PING PC1.

```
PC1> ping 10.02.100.1
host (10.2.100.1) not reachable

PC1> ping 10.02.100.2
84 bytes from 10.2.100.2 icmp_seq=1 ttl=255 time=2.109 ms
84 bytes from 10.2.100.2 icmp_seq=2 ttl=255 time=2.026 ms
84 bytes from 10.2.100.2 icmp_seq=3 ttl=255 time=2.060 ms
84 bytes from 10.2.100.2 icmp_seq=4 ttl=255 time=2.126 ms
84 bytes from 10.2.100.2 icmp_seq=5 ttl=255 time=1.884 ms

PC1> ping 10.02.100.6
host (10.2.100.6) not reachable

PC1> █
```

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Fuente: Autor.

PC2 should successfully ping:

- D1: 10.02.102.1
- D2: 10.02.102.2

Figura 34. Prueba PING PC2.

```
PC2> ping 10.02.102.1
host (10.2.102.1) not reachable

PC2> ping 10.02.102.2
84 bytes from 10.2.102.2 icmp_seq=1 ttl=255 time=0.997 ms
84 bytes from 10.2.102.2 icmp_seq=2 ttl=255 time=1.415 ms
84 bytes from 10.2.102.2 icmp_seq=3 ttl=255 time=1.316 ms
84 bytes from 10.2.102.2 icmp_seq=4 ttl=255 time=1.275 ms
84 bytes from 10.2.102.2 icmp_seq=5 ttl=255 time=1.161 ms

PC2> █
```

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Fuente: Autor.

PC3 should successfully ping:

- D1: 10.02.101.1
- D2: 10.02.101.2

Figura 35. Prueba PING PC3.

```
PC3> ping 10.02.101.1
host (10.2.101.1) not reachable

PC3> ping 10.02.101.2
84 bytes from 10.2.101.2 icmp_seq=1 ttl=255 time=2.383 ms
84 bytes from 10.2.101.2 icmp_seq=2 ttl=255 time=2.119 ms
84 bytes from 10.2.101.2 icmp_seq=3 ttl=255 time=1.889 ms
84 bytes from 10.2.101.2 icmp_seq=4 ttl=255 time=1.729 ms
84 bytes from 10.2.101.2 icmp_seq=5 ttl=255 time=2.207 ms

PC3> ping 10.02.101.1
host (10.2.101.1) not reachable

PC3> █
```

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6:02 p. m. 12/10/2022

Fuente: Autor.

PC4 should successfully ping:

- D1: 10.02.100.1
- D2: 10.02.100.2
- PC1: 10.02.100.5

Figura 36. Prueba PING PC4.

```
PC3> ping 10.02.100.1
host (10.2.100.1) not reachable

PC3> ping 10.02.100.2
84 bytes from 10.2.100.2 icmp_seq=1 ttl=255 time=2.941 ms
84 bytes from 10.2.100.2 icmp_seq=2 ttl=255 time=2.775 ms
84 bytes from 10.2.100.2 icmp_seq=3 ttl=255 time=3.325 ms
84 bytes from 10.2.100.2 icmp_seq=4 ttl=255 time=2.734 ms
84 bytes from 10.2.100.2 icmp_seq=5 ttl=255 time=2.437 ms

PC3> 10.02.100.5
Bad command: "10.02.100.5". Use ? for help.

PC3> ping 10.02.100.5
84 bytes from 10.2.100.5 icmp_seq=1 ttl=64 time=2.417 ms
84 bytes from 10.2.100.5 icmp_seq=2 ttl=64 time=3.087 ms
84 bytes from 10.2.100.5 icmp_seq=3 ttl=64 time=3.054 ms
84 bytes from 10.2.100.5 icmp_seq=4 ttl=64 time=2.553 ms
84 bytes from 10.2.100.5 icmp_seq=5 ttl=64 time=5.300 ms

PC3> █
```

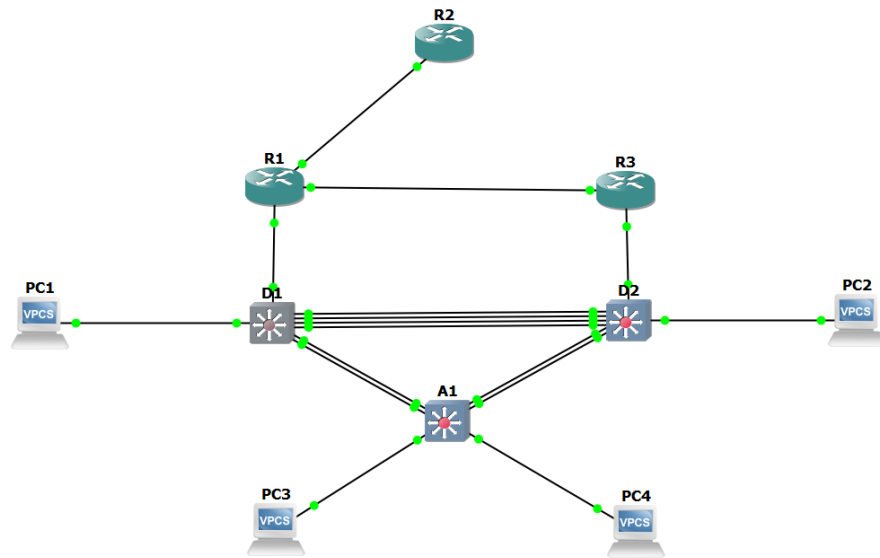
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6:04 p. m. 12/10/2022

Fuente: Autor.

Topología de la red en funcionamiento:

Figura 37. Topología final en funcionamiento.



Fuente: Autor.

ESCENARIO 2

Part 1: Configure Routing Protocols

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

Use OSPF Process ID 4 and assign the following router-IDs:

R1: 0.0.4.1

Se asigna el ID para R1

```
R1(config)#router ospf 4           //creación OSPF con ID 4
R1(config-router)#router-id 0.0.4.1 //IP asignada R1
```

R3: 0.0.4.3

Se asigna el ID para R2

```
R3(config)#router ospf 4           //creación OSPF con ID 4
R3(config-router)#router-id 0.0.4.3 //IP asignada R2
```

D1: 0.0.4.131

Se asigna el ID para D1

```
D1(config)#router ospf 4           //creación OSPF con ID 4
D1(config-router)#router-id 0.0.4.131 //IP asignada D1
```

D2: 0.0.4.132

Se asigna el ID para D2

```
D2(config)#router ospf 4           //creación OSPF con ID 4
D2(config-router)#router-id 0.0.4.132 //IP asignada D2
```

On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0.

- **On R1, do not advertise the R1 – R2 network.**

Configuración de R1:

```
R1(config-router)#network 10.02.10.0 0.0.0.255 area 0 //Asignaciones de area 0
a R1
R1(config-router)#network 10.02.13.0 0.0.0.255 area 0
```



```
R3(config-router)#network 10.02.11.0 0.0.0.255 area 0 //Asignaciones de area 0 a R3
```

```
R3(config-router)#network 10.02.13.0 0.0.0.255 area 0
```

```
D1(config-router)#network 10.02.10.0 0.0.0.255 area 0 //Asignaciones de area 0 a D1
```

```
D1(config-router)#network 10.02.100.0 0.0.0.255 area 0
```

```
D1(config-router)#network 10.02.101.0 0.0.0.255 area 0
```

```
D1(config-router)#network 10.02.102.0 0.0.0.255 area 0
```

```
D2(config-router)#network 10.02.11.0 0.0.0.255 area 0 //Asignaciones de area 0 a D2
```

```
D2(config-router)#network 10.02.100.0 0.0.0.255 area 0
```

```
D2(config-router)#network 10.02.101.0 0.0.0.255 area 0
```

```
D2(config-router)#network 10.02.102.0 0.0.0.255 area 0
```

- **On R1, propagate a default route. Note that the default route will be provided by BGP.**

```
R1(config-router)#default-information originate
```

Disable OSPFv2 advertisements on:

- **D1: All interfaces except E1/2**

```
D1(config-router)#passive-interface Ethernet 0/0 //Deshabilitación de las interfaces no usadas
```

```
D1(config-router)#passive-interface Ethernet 0/1
```

```
D1(config-router)#passive-interface Ethernet 0/2
```

```
D1(config-router)#passive-interface Ethernet 0/3
```

```
D1(config-router)#passive-interface Ethernet 1/0
```

```
D1(config-router)#passive-interface Ethernet 1/1
```

```
D1(config-router)#passive-interface Ethernet 1/3
```

```
D1(config-router)#passive-interface Ethernet 2/0
```

```
D1(config-router)#passive-interface Ethernet 2/1
```

```
D1(config-router)#passive-interface Ethernet 2/2
```

```
D1(config-router)#passive-interface Ethernet 2/3
```

```
D1(config-router)#passive-interface Ethernet 3/0
```

```
D1(config-router)#passive-interface Ethernet 3/1
```

```
D1(config-router)#passive-interface Ethernet 3/2
```

```
D1(config-router)#passive-interface Ethernet 3/3
```

- **D2: All interfaces except E1/0**

```

D2(config-router)#passive-interface Ethernet 0/0 //Deshabilitación de las
interfaces no usadas
D2(config-router)#passive-interface Ethernet 0/1
D2(config-router)#passive-interface Ethernet 0/2
D2(config-router)#passive-interface Ethernet 0/3
D2(config-router)#passive-interface Ethernet 1/1
D2(config-router)#passive-interface Ethernet 1/2
D2(config-router)#passive-interface Ethernet 1/3
D2(config-router)#passive-interface Ethernet 2/0
D2(config-router)#passive-interface Ethernet 2/1
D2(config-router)#passive-interface Ethernet 2/2
D2(config-router)#passive-interface Ethernet 2/3
D2(config-router)#passive-interface Ethernet 3/0
D2(config-router)#passive-interface Ethernet 3/1
D2(config-router)#passive-interface Ethernet 3/2
D2(config-router)#passive-interface Ethernet 3/3

```

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

Use OSPF Process ID 6 and assign the following router-IDs:

R1: 0.0.6.1

Se asigna el ID para R1

```

R1(config)#ipv6 unicast-routing //Proceso OSPF IPv6 unidifusión
R1(config)#ipv6 router ospf 6 //config OSPF ID 6
R1(config-rtr)#router-id 0.0.6.1 //IP para R1

```

R3: 0.0.6.3

Se asigna el ID para R2

```

R3(config)#ipv6 unicast-routing //Proceso OSPF IPv6 unidifusión
R3(config)#ipv6 router ospf 6 //config OSPF ID 6
R3(config-rtr)#router-id 0.0.6.3 //IP para R2

```

D1: 0.0.6.131

Se asigna el ID para D1

```

D1(config)#ipv6 unicast-routing //Proceso OSPF IPv6 unidifusión
D1(config)#ipv6 router ospf 6 //config OSPF ID 6
D1(config-rtr)#router-id 0.0.6.131 //IP para D1

```

D2: 0.0.6.132

Se asigna el ID para D2

```
D2(config)#ipv6 unicast-routing           //Proceso OSPF IPv6 unidifusión
D2(config)#ipv6 router ospf 6             //config OSPF ID 6
D2(config-rtr)#router-id 0.0.6.132       //IP para D2
```

On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0.

- **On R1, do not advertise the R1 – R2 network.**

Para R1:

//a continuación se vinculan el área 6 creada bajo las interfaces ethernet 1/0 y 1/2

```
R1(config)#int E1/0
R1(config-if)#ipv6 ospf 6 area 0
R1(config-if)#int E1/2
R1(config-if)#ipv6 ospf 6 area 0
```

Para R3:

//a continuación se vinculan el área 6 creada bajo las interfaces ethernet 1/1 y 1/2

```
R3(config)#int E1/2
R3(config-if)#ipv6 ospf 6 area 0
R3(config-if)#int E1/1
R3(config-if)#ipv6 ospf 6 area 0
```

Para D1:

//a continuación se vinculan el área 6 creada bajo las interfaces ethernet 0/0 y las vlan 100, 101, 102

```
D1(config)#int E0/0
D1(config-if)#ipv6 ospf 6 area 0
D1(config)#int vlan 100
D1(config-if)#ipv6 ospf 6 area 0
D1(config)#int vlan 101
D1(config-if)#ipv6 ospf 6 area 0
D1(config)#int vlan 102
D1(config-if)#ipv6 ospf 6 area 0
```

Para D2:

//a continuación se vinculan el área 6 creada bajo las interfaces ethernet 0/0 y las vlan 100, 101, 102

```
D2(config)#int E0/0
D2(config-if)#ipv6 ospf 6 area 0
```

```
D2(config)#int vlan 100
D2(config-if)#ipv6 ospf 6 area 0
D2(config)#int vlan 101
D2(config-if)#ipv6 ospf 6 area 0
D2(config)#int vlan 102
D2(config-if)#ipv6 ospf 6 area 0
```

- **On R1, propagate a default route. Note that the default route will be provided by BGP.**

```
R1(config)#ipv6 router ospf 6
R1(config-router)#default-information originate //se abren procesos de
información según el BGP a configurar
```

Disable OSPFv3 advertisements on:

- **D1: All interfaces except E1/2**

```
D1(config-rtr)#passive-interface Ethernet 0/0 //Se configuran las interfaces
de forma pasiva que no son usadas por seguridad
D1(config-rtr)#passive-interface Ethernet 0/1
D1(config-rtr)#passive-interface Ethernet 0/2
D1(config-rtr)#passive-interface Ethernet 0/3
D1(config-rtr)#passive-interface Ethernet 1/0
D1(config-rtr)#passive-interface Ethernet 1/1
D1(config-rtr)#passive-interface Ethernet 1/3
D1(config-rtr)#passive-interface Ethernet 2/0
D1(config-rtr)#passive-interface Ethernet 2/1
D1(config-rtr)#passive-interface Ethernet 2/2
D1(config-rtr)#passive-interface Ethernet 2/3
D1(config-rtr)#passive-interface Ethernet 3/0
D1(config-rtr)#passive-interface Ethernet 3/1
D1(config-rtr)#passive-interface Ethernet 3/2
D1(config-rtr)#passive-interface Ethernet 3/3
```

- **D2: All interfaces except E1/0**

```
D2(config-rtr)#passive-interface Ethernet 0/0 //Se configuran las interfaces
de forma pasiva que no son usadas por seguridad
D2(config-rtr)#passive-interface Ethernet 0/1
D2(config-rtr)#passive-interface Ethernet 0/2
D2(config-rtr)#passive-interface Ethernet 0/3
D2(config-rtr)#passive-interface Ethernet 1/1
D2(config-rtr)#passive-interface Ethernet 1/2
```

```

D2(config-rtr)#passive-interface Ethernet 1/3
D2(config-rtr)#passive-interface Ethernet 2/0
D2(config-rtr)#passive-interface Ethernet 2/1
D2(config-rtr)#passive-interface Ethernet 2/2
D2(config-rtr)#passive-interface Ethernet 2/3
D2(config-rtr)#passive-interface Ethernet 3/0
D2(config-rtr)#passive-interface Ethernet 3/1
D2(config-rtr)#passive-interface Ethernet 3/2
D2(config-rtr)#passive-interface Ethernet 3/3

```

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

Configure two default static routes via interface Loopback 0:

- **An IPv4 default static route.**

```
R2(config)#ip route 0.0.0.0 0.0.0.0 0.0.0.0 //IP por defecto
```

- **An IPv6 default static route.**

```
R2(config)#ipv6 route 0::0/64 0::0 //IP por defecto
```

Configure R2 in BGP ASN 500 and use the router-id 2.2.2.2.

```

R2(config)#router bgp 500//Se asigna el AS 500 para compartir información
importante y estabilizar la conexión entre los dispositivos
R2(config-router)# bgp router-id 2.2.2.2 //IP configurada
R2(config-router)# neighbor 209.165.200.225 remote-as 300 //config de
vecinos entre las areas
R2(config-router)# neighbor 2001:db8:200::1 remote-as 300 //config de
vecinos entre las areas

```

Configure and enable an IPv4 and IPv6 neighbor relationship with R1 in ASN 300.

In IPv4 address family, advertise:

- **The Loopback 0 IPv4 network (/32).**
- **The default route (0.0.0.0/0).**

```

R2(config-router)# address-family ipv4
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
```

In IPv6 address family, advertise:

- **The Loopback 0 IPv4 network (/128).**
- **The default route (::/0).**

```
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
```

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

Configure two static summary routes to interface Null 0:

- **A summary IPv4 route for 10.02.0.0/8.**

```
R1(config)#ip route 10.02.0.0 255.0.0.0 null0
```

- **A summary IPv6 route for 2001:db8:100::/48.**

```
R1(config)#ipv6 route 2001:db8:100::/48 null0
```

Configure R1 in BGP ASN 300 and use the router-id 1.1.1.1.

```
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
```

Configure an IPv4 and IPv6 neighbor relationship with R2 in ASN 500.

In IPv4 address family:

- **Disable the IPv6 neighbor relationship.**

```
R1(config-router-af)# no neighbor 2001:db8:200::2 activate
R1(config-router-af)# exit-address-family
```

- **Enable the IPv4 neighbor relationship.**

```
R1(config-router)# address-family ipv4 unicast
R1(config-router-af)# neighbor 209.165.200.226 activate
```

- **Advertise the 10.02.0.0/8 network.**

```
R1(config-router-af)# network 10.02.0.0 mask 255.0.0.0
```

In IPv6 address family:

- **Disable the IPv4 neighbor relationship.**

```
R1(config-router)# address-family ipv6 unicast
R1(config-router-af)# no neighbor 209.165.200.226 activate
```

- **Enable the IPv6 neighbor relationship.**

```
R1(config-router-af)# neighbor 2001:db8:200::2 activate
R1(config-router-af)# exit-address-family
```

- **Advertise the 2001:db8:100::/48 network.**

```
R1(config-router-af)# network 2001:db8:100::/48
```

Part 2: Configure Routing Protocols

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

Create two IP SLAs.

- **Use SLA number 4 for IPv4.**

```
D1# config ter //ingreso modo configuración
D1(config)# track 4 ip sla 4 //creación SLA 4
D1(config-track)# delay down 10 up 15 //configuración del retardo
```

- **Use SLA number 6 for IPv6.**

```
D1(config)# track 6 ip sla 6 //creación SLA 6
D1(config-track)# delay down 10 up 15 //configuración del retardo
```

The IP SLAs will test availability of R1 E1/2 interface every 5 seconds.
Schedule the SLA for immediate implementation with no end time.

Create an IP SLA object for IP SLA 4 and one for IP SLA 6.

- **Use track number 4 for IP SLA 4.**

```
D1(config)# ip sla 4
D1(config-ip-sla) icmp-echo 10.0.10.1 //IP para los paquetes
D1(config-ip-sla-echo)#frequency 5 //frecuencia de cada 5 segundos
D1(config-ip-sla-echo)# exit
D1(config)# ip sla schedule 4 life forever start-time now
```

- **Use track number 6 for IP SLA 6.**

```
D1(config)# ip sla 6 //asignación de IPv6 para paquetes
D1(config-ip-sla) icmp-echo 2001:db8:100:1010::1
D1(config-ip-sla-echo)#frequency 5 //frecuencia de cada 5 segundos
D1(config-ip-sla-echo)# exit
D1(config)# ip sla schedule 6 life forever start-time now
```

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.

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

Create two IP SLAs.

- **Use SLA number 4 for IPv4.**

```
D2#config ter
D2(config)# track 4 ip sla 4 //creación SLA 4
D2(config)# delay down 10 up 15 //tiempos de retardo
```

- **Use SLA number 6 for IPv6.**

```
D2(config)# track 6 ip sla 6 //creación SLA 4
D2(config)# delay down 10 up 15 //tiempos de retardo
```

The IP SLAs will test availability of R3 E1/0 interface every 5 seconds.

Schedule the SLA for immediate implementation with no end time.

Create an IP SLA object for IP SLA 4 and one for IP SLA 6.

- **Use track number 4 for IP SLA 4.**


```

D2(config)# ip sla 4
D2(config-ip-sla) icmp-echo 10.0.10.1 //IP para envío de paquetes
D2(config-ip-sla-echo)frequency 5 //frecuencia de 5 segundos
D2(config-ip-sla-echo)# exit //Salida
D2(config)# ip sla schedule 4 life forever start-time now

```

- **Use track number 6 for IP SLA 6.**

```

D2(config)# ip sla 6 //Ingreso al SLA creado
D2(config-ip-sla) icmp-echo 2001:db8:100:1010::1
D2(config-ip-sla-echo)frequency 5 //frecuencia de cada 5 segundos
D2(config-ip-sla-echo)# exit
D2(config)# ip sla schedule 6 life forever start-time now

```

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.

4.3 On D1, configure HSRPv2.

D1 is the primary router for VLANs 100 and 102; therefore, their priority will also be changed to 150.

Configure HSRP version 2.

Configure IPv4 HSRP group 104 for VLAN 100:

- **Assign the virtual IP address 10.02.100.254.**

```

D1(config)#interface Vlan100 //se configuran las IP virtuales en la
VLAN100
D1(config-if)#standby version 2 //version 2 de HSRP
D1(config-if)#standby 104 ip 10.02.100.254

```

- **Set the group priority to 150.**

```

D1(config-if)#standby 104 priority 150 //cambio de la prioridad del grupo a
150

```

- **Enable preemption.**

```

D1(config-if)#standby 104 preempt //Preferencia de 104

```

- **Track object 4 and decrement by 60.**

```
D1(config-if)#standby 104 track 4 decrement 60
```

Configure IPv4 HSRP group 114 for VLAN 101:

- **Assign the virtual IP address 10.02.101.254.**

```
D1(config)#interface Vlan101 //se configuran las IP virtuales en la
VLAN101
D1(config-if)#standby version 2
D1(config-if)#standby 114 ip 10.02.101.254
```

- **Enable preemption.**

```
D1(config-if)#standby 114 preempt //preferencia del grupo a 114
```

- **Track object 4 to decrement by 60.**

```
D1(config-if)#standby 114 track 4 decrement 60
D1(config-if)#exit
```

Configure IPv4 HSRP group 124 for VLAN 102:

- **Assign the virtual IP address 10.02.102.254.**

```
D1(config)#interface Vlan102 //se configuran las IP virtuales en la
VLAN100
D1(config-if)#standby version 2
D1(config-if)#standby 124 ip 10.02.102.254
```

- **Set the group priority to 150.**

```
D1(config-if)#standby 124 priority 150 //Prioridad de 150
```

- **Enable preemption.**

```
D1(config-if)#standby 124 preempt
```

- **Track object 4 to decrement by 60.**

```
D1(config-if)#standby 124 track 4 decrement 60
```

Configure IPv6 HSRP group 106 for VLAN 100:

- **Assign the virtual IP address using ipv6 autoconfig.**

```
D1(config)#interface Vlan100
D1(config-if)#standby 106 ipv6 autoconfig
```

- **Set the group priority to 150.**

```
D1(config-if)#standby 106 priority 150
```

- **Enable preemption.**

```
D1(config-if)#standby 106 preempt
```

- **Track object 6 and decrement by 60.**

```
D1(config-if)#standby 106 track 6 decrement 60
```

Configure IPv6 HSRP group 116 for VLAN 101:

- **Assign the virtual IP address using ipv6 autoconfig.**

```
D1(config-if)#standby 116 ipv6 autoconfig
```

- **Enable preemption.**

```
D1(config-if)#standby 116 preempt
```

- **Track object 6 and decrement by 60.**

```
D1(config-if)#standby 116 track 6 decrement 60
```

Configure IPv6 HSRP group 126 for VLAN 102:

- **Assign the virtual IP address using ipv6 autoconfig.**

```
D1(config)#interface Vlan102
D1(config-if)#standby 126 ipv6 autoconfig
```

- **Set the group priority to 150.**

```
D1(config-if)#standby 126 priority 150
```

- **Enable preemption.**

```
D1(config-if)#standby 126 preempt
```

- **Track object 6 and decrement by 60.**

```
D1(config-if)#standby 126 track 6 decrement 60
```

D2 is the primary router for VLAN 101; therefore, the priority will also be changed to 150.

Configure HSRP version 2.

Configure IPv4 HSRP group 104 for VLAN 100:

- **Assign the virtual IP address 10.02.100.254.**

```
D2(config)#interface Vlan100 //se configuran las IP virtuales en la
VLAN100
```

```
D2(config-if)#standby version 2 //V2 de HSRP
```

```
D2(config-if)#standby 104 ip 10.02.100.254
```

- **Enable preemption.**

```
D2(config-if)#standby 104 preempt
```

- **Track object 4 and decrement by 60.**

```
D2(config-if)#standby 104 track 4 decrement 60
```

Configure IPv4 HSRP group 114 for VLAN 101:

- **Assign the virtual IP address 10.02.101.254.**

```
D2(config)#interface Vlan101 //se configuran las IP virtuales en la
VLAN101
```

```
D2(config-if)#standby version 2
```

```
D2(config-if)#standby 114 ip 10.02.101.254
```

- **Set the group priority to 150.**

```
D2(config-if)#standby 114 priority 150
```

- **Enable preemption.**

```
D2(config-if)#standby 114 preempt
```

- **Track object 4 to decrement by 60.**

```
D2(config-if)#standby 114 track 4 decrement 60
```

Configure IPv4 HSRP group 124 for VLAN 102:

- **Assign the virtual IP address 10.02.102.254.**

```
D2(config)#interface Vlan102
D2(config-if)#standby version 2
D2(config-if)#standby 124 ip 10.02.102.254
```

- **Enable preemption.**

```
D2(config-if)#standby 124 preempt
```

- **Track object 4 to decrement by 60.**

```
D2(config-if)#standby 124 track 4 decrement 60
```

Configure IPv6 HSRP group 106 for VLAN 100:

- **Assign the virtual IP address using ipv6 autoconfig.**

```
D2(config)#interface Vlan100
D2(config-if)#standby 106 ipv6 autoconfig
```

- **Enable preemption.**

```
D2(config)#interface Vlan100
D2(config-if)#standby 106 preempt
```

- **Track object 6 and decrement by 60.**

```
D2(config-if)#standby 106 track 6 decrement 60
```

Configure IPv6 HSRP group 116 for VLAN 101:

- **Assign the virtual IP address using ipv6 autoconfig.**

```
D2(config)#interface Vlan101
D2(config-if)#standby 116 ipv6 autoconfig
```

- **Set the group priority to 150.**

```
D2(config-if)#standby 116 priority 150
```

- **Enable preemption.**

```
D2(config-if)#standby 116 preempt
```

- **Track object 6 and decrement by 60.**

```
D2(config-if)#standby 116 track 6 decrement 60
```

Configure IPv6 HSRP group 126 for VLAN 102:

- **Assign the virtual IP address using ipv6 autoconfig.**

```
D2(config)#interface Vlan102
D2(config-if)#standby 126 ipv6 autoconfig
```

- **Enable preemption.**

```
D2(config-if)#standby 126 preempt
```

- **Track object 6 and decrement by 60.**

```
D2(config-if)#standby 126 track 6 decrement 60
```

CONCLUSIONES

Gracias a la topología planteada dentro del marco del Diplomado CISCO CCNP, se logra evidenciar como bajo una topología de pocos elementos es posible evidenciar cada tema tratado durante el mismo, diferenciando las configuraciones básicas para capa 2 como capa 3, lo que afianzó en detalle lo previamente adquirido durante cada paso del curso.

Las ventajas presentadas entre Packet Tracer y el software GNS3, es de gran diferencia debido a que este último, permite cargar una imagen del equipo a trabajar de manera tal, que se puede tener alcance a su totalidad de posibles configuraciones y es allí donde el software de Cisco se ve un poco rezagado al impedir lanzar ciertos comandos, inclusive, GNS3 al permitir cargar diversas imágenes, permite topologías más complejas donde pueden intervenir equipos de otras marcas como Mikrotik (por mencionar solo alguna)

Al evidenciar las configuraciones realizadas a cada Switch, se evidencia las buenas prácticas de configuración con el fin de dividir el tráfico existente entre estos elementos o terminales finales para las VLAN 100, 101, 102 sin contar con la redundancia evidenciada en la topología que permite una segunda ruta en caso de posibles fallas de cableado entre los equipos

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