

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  
INGENIERÍA DE TELECOMUNICACIONES  
BARRANQUILLA - ATLANTICO  
2021

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Diplomado de opción de grado presentado para optar el título de INGENIERO DE  
TELECOMUNICACIONES

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BARRANQUILLA - ATLANTICO  
2021

NOTA DE ACEPTACIÓN

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Firma del Jurado

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Barranquilla, 29 de noviembre del 2021

## **1. AGRADECIMIENTOS**

Primeramente, doy gracias a Dios por la vida, a mi familia a mi esposa a mi hija, a mis padres y hermanos, ellos son mi motor, todos me apoyaron en este proceso y a pesar de las adversidades, siempre mantuvieron la confianza y la esperanza de superación tanto en lo personal como en lo profesional, aspectos que me ayudaron a formarme como ingeniero de telecomunicaciones.

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### 3. GLOSARIO

**ENRUTAMIENTO:** Es el proceso el cual permite que los paquetes entre redes y a la vez buscando la mejor ruta para que esos paquetes lleguen a su destino.

**WAN:** (Wide Área Network, o WAN) es una red privada y amplia consiste en varias redes locales unidad.

**LAN:** (Local Área Network): son un conjunto de dispositivos electrónicos conectados entre sí.

**VLAN:** (Red de área local virtual o LAN virtual) es una red de área local que agrupa un conjunto de equipos de manera lógica y no física.

**INTERFAZ:** Es el elemento que sirve para indicar el enlace que se da de manera física.

**GATEWAY:** También llamado puerta de enlace puerta es un dispositivo dentro de una red de comunicaciones, que permite a través de sí mismo, ingresar a otra red.

**DNS:** Domain Name System” (Sistema de Nombre de Dominio). DNS es un servicio que habilita un enlace entre nombres de dominio y direcciones IP con la que están asociados.

**COMANDO:** Es una instrucción que se le da a un programa para que realice una tarea específica.

## **4. RESUMEN**

Las nuevas tecnologías de la información se han convertido en una revolución a nivel mundial, estas se adoptaron con gran auge porque ayudan al desarrollo de diferentes sectores como: Económico, social, político, etc. Hecho que ha generado una competitividad positiva en todos los ámbitos, de esta forma el hombre busca a diario una optimización en esta rama, la cual logra desarrollo a gran escala en la electrónica y las telecomunicaciones.

El diplomado de profundización de CISCO CCNP permite escalar y profundizar los diferentes temas, logrando habilidades y destreza a través de la investigación y la practica en cuanto a las redes LAN Y WAN. Apoyándome en los diferentes recursos y simuladores como los son GNS3 y Packet Tracert, se realizaron procesos de enrutamiento, Conmutación y comprobación de cada uno de los pasos en el desarrollo del trabajo.

Palabras claves: CISCO, CCNP DNS, LAN, WAN, VLAN, PING, EIGRP, IP, enrutamiento, Conmutación, Redes y electrónica.

## **ABSTRACT**

The new information technologies have become a revolution worldwide, they were adopted with great boom because they help the development of different sectors such as: Economic, social, political, etc. Fact that has generated positive competitiveness in all areas, in this way man seeks daily optimization in this branch, which achieves large-scale development in electronics and telecommunications.

The CISCO CCNP in-depth diploma allows to scale and deepen the different topics, achieving skills and dexterity through research and practice regarding LAN and WAN networks. Relying on the different resources and simulators such as GNS3 and Packet Tracert, routing, switching and checking processes were carried out for each of the steps in the development of the work.

Keywords: CISCO, CCNP DNS, LAN, WAN, VLAN, PING, EIGRP, IP, routing, Switching, Networks and electronics.

## 5. INTRODUCCION

Este documento es el desarrollo del Diplomado de Profundización CCNP, aquí se ha plasmado lo investigado y aprendido con las competencias dadas en cada guía de estudio a raíz de la solución expuesta, la cual se puso en práctica en el simulador Gns3, tomando como estrategia el enrutamiento y cada una de las configuraciones de los diferentes dispositivos que componen la topología dada.

Los ingenieros de telecomunicaciones muestran habilidades con las que pueden otorgar soluciones a diferentes problemas, por tal razón se puso en práctica los conocimientos obtenidos en el diplomado de profundización CCNP, enfocándonos en la realidad con respecto a las tecnologías de la información.

Se implementó una red de datos que podría presentarse en la vida diaria de cualquier persona o empresa, para ello nos presentan un escenario en cual se realizaran interconexiones y configuraciones de redes adaptándonos en cada paso e identificando los problemas propios del escenario ejecutado en el simulador GNS3 y una máquina virtual.

## 6. DESARROLLO

### Escenario Propuesto

Topología de la Red:

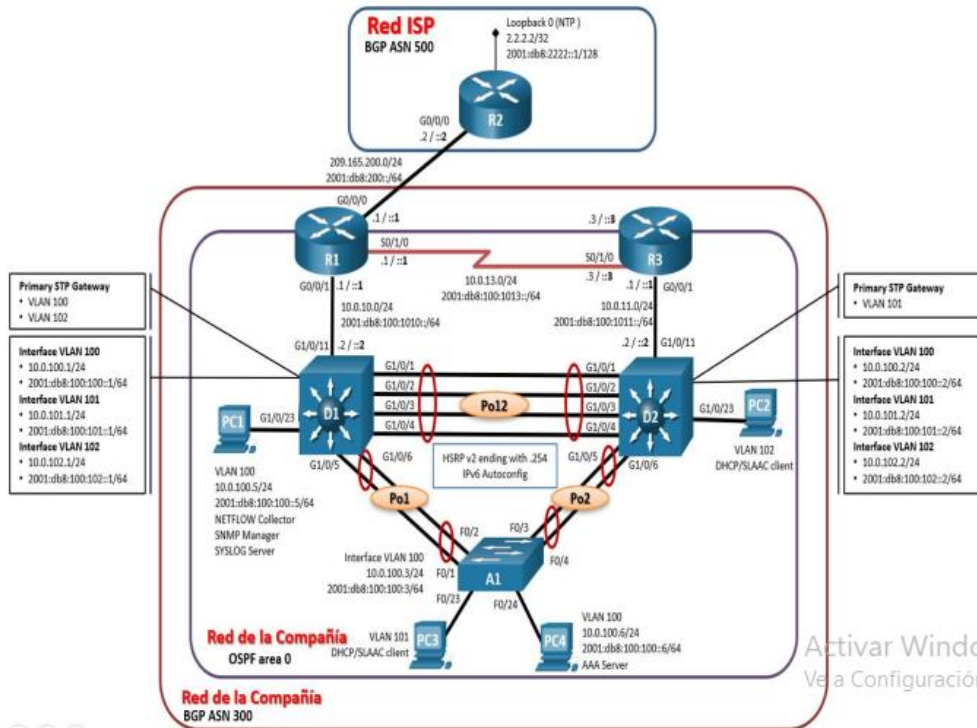


Figura 1. Escenario

## 5.1 Parte 1: Construir la red y configurar los parámetros básicos de los dispositivos y el direccionamiento de las interfaces

### Paso 1: Cablear la red como se muestra en la topología.

Conecte los dispositivos como se muestra en el diagrama de topología y conecte los cables según sea necesario.

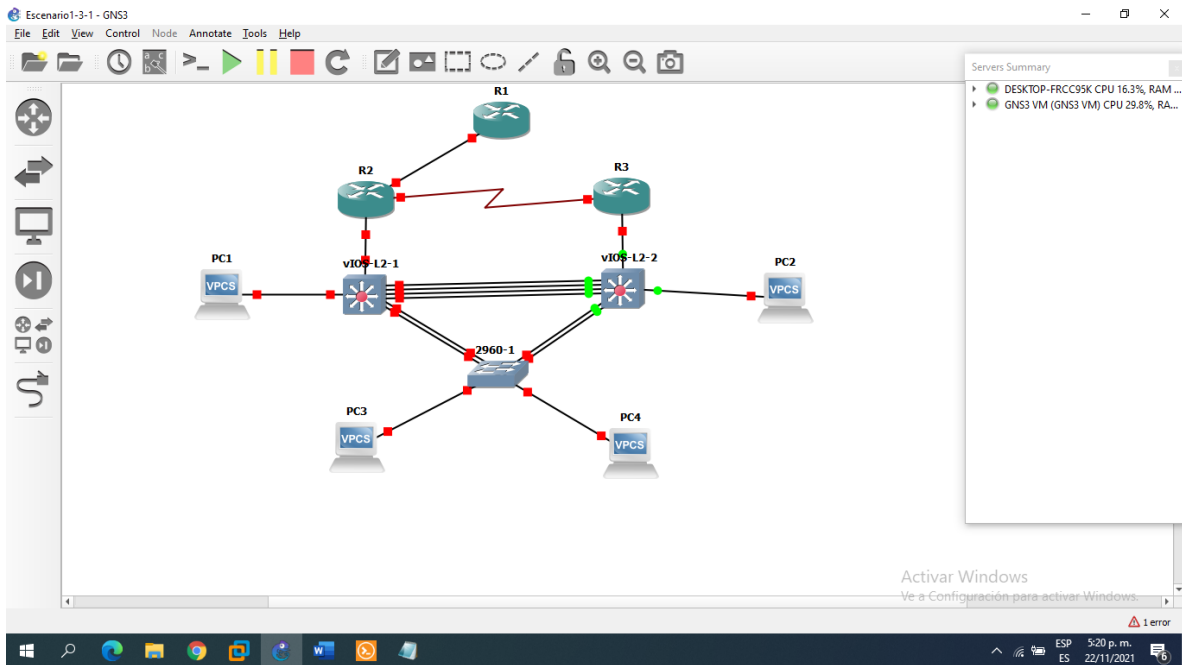


Figura 2. Simulación del escenario

## **Paso 2: Configurar los parámetros básicos para cada dispositivo.**

- a. Mediante una conexión de consola ingrese en cada dispositivo, entre al modo de configuración global y aplique los parámetros básicos. Las configuraciones de inicio para cada dispositivo son suministradas a continuación:
- b. Copie el archivo running-config al archivo startup-config en todos los dispositivos.
- c. Configure el direccionamiento de los host PC 1 y PC 4 como se muestra en la tabla de direccionamiento. Asigne una dirección de puerta de enlace predeterminada de 10.0.100.254, la cual será la dirección IP virtual HSRP utilizada en la Parte 4.

```
hostname R1
ipv6 unicast-routing
no ip domain lookup
banner motd # R1, ENCOR Skills Assessment, Scenario 1 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
interface g0/0
  ip address 209.165.200.225 255.255.255.224
  ipv6 address fe80::1:1 link-local
  ipv6 address 2001:db8:200::1/64
  no shutdown
exit
```

```
R1
R1(config)#no ip domain lookup
R1(config)#banner motd # R1, ENCOR Skills Assessment, Scenario 1 #
R1(config)#line con 0
R1(config-line)# exec-timeout 0 0
R1(config-line)# logging synchronous
R1(config-line)# exit
R1(config)#
R1(config)#
R1(config)#ex
% Ambiguous command: "ex"
R1(config)#exi
R1#
*Nov 20 19:49:21.923: %SYS-5-CONFIG_I: Configured from console by console
R1#
R1#
R1#conf
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#
R1(config)#inter
% Incomplete command.

R1(config)#int
R1(config)#interface g0/0
R1(config-if)#ip adr
R1(config-if)#ip add
R1(config-if)#ip address 209.165.200.255 255.255.255.224
Bad mask /27 for address 209.165.200.255
R1(config-if)#ipv6 add
R1(config-if)#ipv6 address fe80::1:1 link-
R1(config-if)#ipv6 address fe80::1:1 link-local
R1(config-if)#ipv6 ad
R1(config-if)#ipv6 address 2001:db
R1(config-if)#ipv6 address 2001:db8:200::1/64
R1(config-if)#no s
R1(config-if)#no shu
R1(config-if)#
*Nov 20 19:53:12.599: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state
to up
*Nov 20 19:53:13.599: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEther
net0/0, changed state to up
R1(config-if)#ex
```

Figura 3. Aplicando código R1

```
Router R2
hostname R2
ipv6 unicast-routing
no ip domain lookup
banner motd # R2, ENCOR Skills Assessment, Scenario 1 #
line con 0
exec-timeout 0 0
logging synchronous
exit
interface g0/0
```

```

ip address 209.165.200.226 255.255.255.224
ipv6 address fe80::2:1 link-local
ipv6 address 2001:db8:200::2/64
no shutdown
exit
interface Loopback 0
ip address 2.2.2.2 255.255.255.255
ipv6 address fe80::2:3 link-local
ipv6 address 2001:db8:2222::1/128
no shutdown
exit

```

```

R1 R2
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ipv6 unicast-routing
R2(config)#no ip domain lookup
R2(config)#banner motd # R2, ENCOR Skills Assessment, Scenario 1 #
R2(config)#line con 0
R2(config-line)# exec-timeout 0 0
R2(config-line)# logging synchronous
R2(config-line)#ex
% Ambiguous command: "ex"
R2(config-line)#exi
R2(config)#end
R2#
*Nov 20 20:07:06.231: %SYS-5-CONFIG_I: Configured from console by console
R2#conf
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#inter
R2(config)#interface g0/0
R2(config-if)#ip add
R2(config-if)#ip address 209.165.200.226 255.255.255.224
R2(config-if)#ipv6 add
R2(config-if)#ipv6 address fe80::2:1 link-local
R2(config-if)#ipv6 add
R2(config-if)#ipv6 address 2001:db8:200::2/64
R2(config-if)#no
R2(config-if)#no sh
R2(config-if)#
*Nov 20 20:09:40.287: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
*Nov 20 20:09:41.287: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
R2(config-if)#exit
R2(config)#inte
R2(config)#interface loopback 0
R2(config-if)#
*Nov 20 20:10:17.667: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
R2(config-if)#ip add
R2(config-if)#ip address 2.2.2.2 255.255.255.255
R2(config-if)#ipv6 add
R2(config-if)#ipv6 address fe80::2:3 link-local
R2(config-if)#ipv6 add
R2(config-if)#ipv6 address 2001:db8:2222::1/128
R2(config-if)#no sh

```

Figura 4. Aplicando código R2

```

Router R3
hostname R3
ipv6 unicast-routing
no ip domain lookup
banner motd # R3, ENCOR Skills Assessment, Scenario 1 #
line con 0
exec-timeout 0 0
logging synchronous
exit
interface g2/0

```

```

ip address 10.0.11.1 255.255.255.0
ipv6 address fe80::3:2 link-local
ipv6 address 2001:db8:100:1011::1/64
no shutdown
exit
interface s1/0
ip address 10.0.13.3 255.255.255.0
ipv6 address fe80::3:3 link-local
ipv6 address 2001:db8:100:1010::2/64
no shutdown
exit

```

```

changed state to down
*Nov 20 20:04:59.183: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet2/0, changed state to down
R3#
R3#conf
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ipv6 unicast-routing
R3(config)#no ip domain lookup
R3(config)#banner motd # R3, ENCOR Skills Assessment, Scenario 1 #
R3(config)#line con 0
R3(config-line)# exec-timeout 0 0
R3(config-line)# logging synchronous
R3(config-line)# exit
R3(config)#
R3(config)#interface g0/0
^
% Invalid input detected at '^' marker.

R3(config)#interface g2/0
R3(config-if)#ip address 10.0.11.1 255.255.255.0
R3(config-if)#ipv6 address fe80::3:2 link-local
R3(config-if)# ipv6 address 2001:db8:100:1011::1/64
R3(config-if)#no shutdown
R3(config-if)# exit
R3(config)#
R3(config)#
*Nov 20 20:25:56.147: %LINK-3-UPDOWN: Interface GigabitEthernet2/0, changed state to up
*Nov 20 20:25:57.147: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet2/0, changed state to up
R3(config)#
R3(config)#interface s1/0
R3(config-if)# ip address 10.0.13.3 255.255.255.0
R3(config-if)# ipv6 address fe80::3:3 link-local
R3(config-if)# ipv6 address 2001:db8:100:1010::2/64
R3(config-if)# no shutdown
R3(config-if)# exit
R3(config)#
R3(config)#
*Nov 20 20:26:31.843: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
R3(config)#
*Nov 20 20:26:32.855: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
R3(config)#

```

Figura 5. Aplicando código R3

### Switch D1

```

hostname D1
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D1, ENCOR Skills Assessment, Scenario 1 #
line con 0
exec-timeout 0 0
logging synchronous

```

exit

```
VIOS-L2-01>
VIOS-L2-01>
VIOS-L2-01>enable
VIOS-L2-01#conf
VIOS-L2-01#configure t
Enter configuration commands, one per line. End with CNTL/Z.
VIOS-L2-01(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, Scenario 1 #
D1(config)#line con 0
D1(config-line)# exec-timeout 0 0
D1(config-line)# logging synchronous
D1(config-line)# exit
```

solarwinds | Solar-PuTTY free tool | © 2019 SolarWinds Worldwide, LLC. All rights reserved.

Figura 6. Aplicando código\_1 Switch D1

```
vlan 100
name Management
exit
vlan 101
name UserGroupA
exit
vlan 102
name UserGroupB
exit
vlan 999
name NATIVE
exit
interface g0/0
no switchport
ip address 10.0.10.2 255.255.255.0
ipv6 address fe80::d1:1 link-local
ipv6 address 2001:db8:100:1010::2/64
no shutdown
exit
interface vlan 100
ip address 10.0.100.1 255.255.255.0
ipv6 address fe80::d1:2 link-local
ipv6 address 2001:db8:100:100::1/64
no shutdown
exit
interface vlan 101
ip address 10.0.101.1 255.255.255.0
ipv6 address fe80::d1:3 link-local
ipv6 address 2001:db8:100:101::1/64
no shutdown
```

```

exit
interface vlan 102
ip address 10.0.102.1 255.255.255.0
ipv6 address fe80::d1:4 link-local
ipv6 address 2001:db8:100:102::1/64
no shutdown
exit

```

```

D1(config)#interface g0/0
D1(config-if)#no switchport
D1(config-if)#
*Nov 21 00:33:04.215: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
*Nov 21 00:33:05.215: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
D1(config-if)#ip address 10.0.102.2 255.255.255.0
D1(config-if)# ipv6 address fe80::d1:1 link-local
D1(config-if)# ipv6 address 2001:db8:100:1010::2/64
%GigabitEthernet0/0: Error: 2001:DB8:100:1010::2/64 is in use on Group-Async0
D1(config-if)# no shutdown
D1(config-if)# exit
D1(config)#
D1(config)#interface vlan 100
D1(config-if)# ip address 10.0.100.1 255.255.255.0
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 vlan 101
D1(config-if)# ip address 10.0.101.1 255.255.255.0
D1(config-if)# ipv6 address fe80::d1:3 link-local
D1(config-if)# ipv6 address 2001:db8:100:101::1/64
D1(config-if)# no shutdown
D1(config-if)# exit
D1(config)#interface vlan 102
D1(config-if)# ip address 10.0.102.1 255.255.255.0
D1(config-if)# ipv6 address fe80::d1:4 link-local
D1(config-if)# ipv6 address 2001:db8:100:102::1/64
D1(config-if)# no shutdown

```

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Figura 7. Aplicando código\_2 Switch D1

```

ip dhcp excluded-address 10.0.101.1 10.0.101.109
ip dhcp excluded-address 10.0.101.141 10.0.101.254
ip dhcp excluded-address 10.0.102.1 10.0.102.109
ip dhcp excluded-address 10.0.102.141 10.0.102.254
ip dhcp pool VLAN-101
network 10.0.101.0 255.255.255.0
default-router 10.0.101.254
exit
ip dhcp pool VLAN-102
network 10.0.102.0 255.255.255.0
default-router 10.0.102.254
exit

```

```
*Nov 21 00:33:45.482: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan102, changed
to down
D1(config)#
*Nov 21 00:33:46.062: %LINK-3-UPDOWN: Interface Vlan100, changed state to down
*Nov 21 00:33:46.420: %LINK-3-UPDOWN: Interface Vlan101, changed state to down
*Nov 21 00:33:46.772: %LINK-3-UPDOWN: Interface Vlan102, changed state to down
D1(config)#
D1(config)#ip dhcp excluded-address 10.0.101.1 10.0.101.109
D1(config)#ip dhcp excluded-address 10.0.101.141 10.0.101.254
D1(config)#ip dhcp excluded-address 10.0.102.1 10.0.102.109
D1(config)#ip dhcp excluded-address 10.0.102.141 10.0.102.254
D1(config)#ip dhcp pool VLAN-101
D1(dhcp-config)# network 10.0.101.0 255.255.255.0
D1(dhcp-config)# default-router 10.0.101.254
D1(dhcp-config)#exit
D1(config)#ip dhcp pool VLAN-102
D1(dhcp-config)# network 10.0.102.0 255.255.255.0
D1(dhcp-config)# default-router 10.0.102.254
D1(dhcp-config)# exit
D1(config)#
```

Figura 8. Aplicando código\_3 Switch D1

```
interface g0/0
shutdown
interface g0/1
shutdown
interface g0/2
shutdown
interface g0/3
shutdown
interface g0/4
shutdown
interface g0/5
shutdown
interface g6
shutdown
interface g7
shutdown
interface g8
shutdown
exit
```

```
vIOS-L2-1
D1(config)#interface g5
D1(config-if)#interface g5
D1(config-if)#shutdown
D1(config-if)#
*Nov 21 00:42:12.187: %LINK-5-CHANGED: Interface Group-Async5, changed state to administratively down
D1(config-if)#interface g6
D1(config-if)#shutdown
D1(config-if)#interface g7
D1(config-if)#shutdown
D1(config-if)#interface g8
D1(config-if)#shutdown
D1(config-if)#
*Nov 21 00:42:33.607: %LINK-5-CHANGED: Interface Group-Async6, changed state to administratively down
*Nov 21 00:42:33.662: %LINK-5-CHANGED: Interface Group-Async7, changed state to administratively down
*Nov 21 00:42:33.729: %LINK-5-CHANGED: Interface Group-Async8, changed state to administratively down
D1(config-if)#
```

Figura 9. Código Encender interfaces Switch D1

## Switch D2

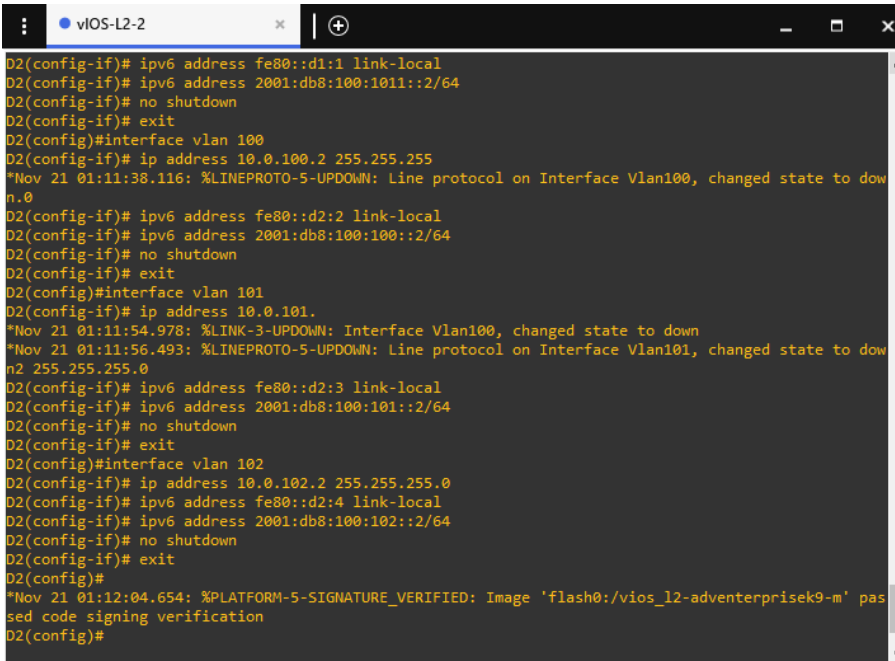
```
hostname D2
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D2, ENCOR Skills Assessment, Scenario 1 #
line con 0
exec-timeout 0 0
logging synchronous
exit
vlan 100
name Management
exit
vlan 101
name UserGroupA
exit
vlan 102
name UserGroupB
exit
vlan 999
name NATIVE
exit
```

```
vIOS-L2-2
* Prohibited.
*****
vIOS-L2-01>
vIOS-L2-01>
vIOS-L2-01>enable
vIOS-L2-01#confi t
Enter configuration commands, one per line. End with CNTL/Z.
vIOS-L2-01(config)#
vIOS-L2-01(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, Scenario 1 #
D2(config)#line con 0
D2(config-line)# exec-timeout 0 0
D2(config-line)# logging synchronous
D2(config-line)# exit
D2(config)#
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)#
```

Figura 10. Aplicando código\_1 Switch D2

```
interface g0/0
no switchport
ip address 10.0.11.2 255.255.255.0
ipv6 address fe80::d1:1 link-local
ipv6 address 2001:db8:100:1011::2/64
no shutdown
exit
interface vlan 100
ip address 10.0.100.2 255.255.255.0
ipv6 address fe80::d2:2 link-local
ipv6 address 2001:db8:100:100::2/64
no shutdown
exit
interface vlan 101
ip address 10.0.101.2 255.255.255.0
ipv6 address fe80::d2:3 link-local
ipv6 address 2001:db8:100:101::2/64
no shutdown
exit
interface vlan 102
ip address 10.0.102.2 255.255.255.0
ipv6 address fe80::d2:4 link-local
```

```
ipv6 address 2001:db8:100:102::2/64
no shutdown
exit
```

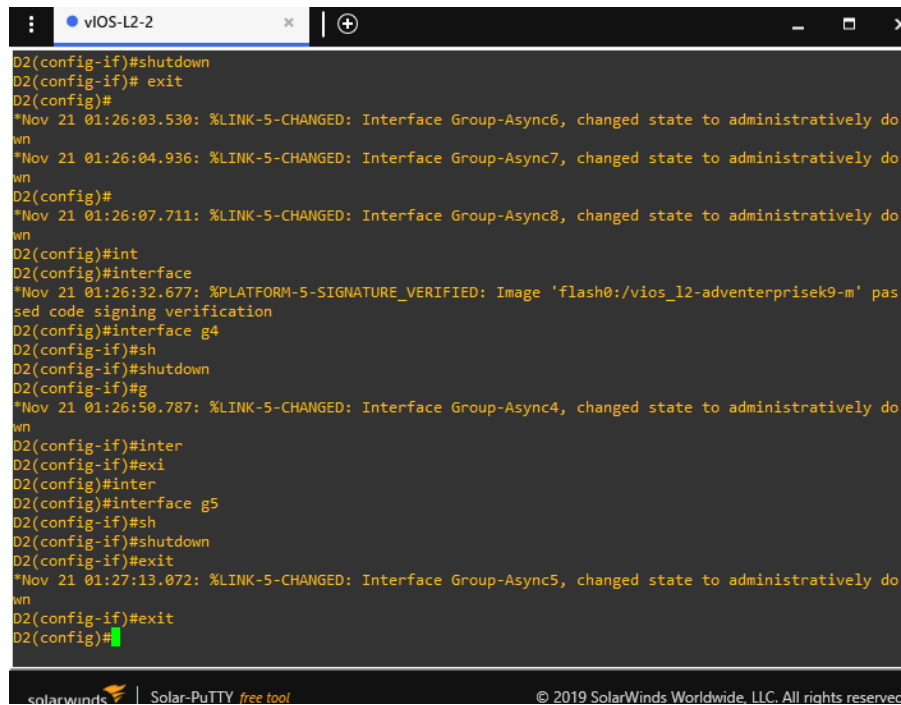


```
vIOS-L2-2
D2(config-if)# ipv6 address fe80::d1:1 link-local
D2(config-if)# ipv6 address 2001:db8:100:101::2/64
D2(config-if)# no shutdown
D2(config-if)# exit
D2(config)#interface vlan 100
D2(config-if)# ip address 10.0.100.2 255.255.255
*Nov 21 01:11:38.116: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state to down
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 vlan 101
D2(config-if)# ip address 10.0.101.
*Nov 21 01:11:54.978: %LINK-3-UPDOWN: Interface Vlan100, changed state to down
*Nov 21 01:11:56.493: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan101, changed state to down
D2(config-if)# ipv6 address fe80::d3 link-local
D2(config-if)# ipv6 address 2001:db8:100:101::2/64
D2(config-if)# no shutdown
D2(config-if)# exit
D2(config)#interface vlan 102
D2(config-if)# ip address 10.0.102.2 255.255.255.0
D2(config-if)# ipv6 address fe80::d4 link-local
D2(config-if)# ipv6 address 2001:db8:100:102::2/64
D2(config-if)# no shutdown
D2(config-if)# exit
D2(config)#
*Nov 21 01:12:04.654: %PLATFORM-5-SIGNATURE_VERIFIED: Image 'flash0:/vios_l2-adventerprisek9-m' passed code signing verification
D2(config)#
```

Figura 11. Aplicando código\_2 Switch D2

```
ip dhcp excluded-address 10.0.101.1 10.0.101.209
ip dhcp excluded-address 10.0.101.241 10.0.101.254
ip dhcp excluded-address 10.0.102.1 10.0.102.209
ip dhcp excluded-address 10.0.102.241 10.0.102.254
ip dhcp pool VLAN-101
network 10.0.101.0 255.255.255.0
default-router 10.0.101.254
exit
ip dhcp pool VLAN-102
network 10.0.102.0 255.255.255.0
default-router 10.0.102.254
exit
interface g0/0
shutdown
interface g0/1
shutdown
interface g0/2
shutdown
```

```
interface g0/3
shutdown
interface g0/4
shutdown
interface g0/5
shutdown
interface g6
shutdown
interface g7
shutdown
interface g8
shutdown
exit
```



```
vIOS-L2-2
D2(config-if)#shutdown
D2(config-if)# exit
D2(config)#
*Nov 21 01:26:03.530: %LINK-5-CHANGED: Interface Group-Async6, changed state to administratively do
wn
*Nov 21 01:26:04.936: %LINK-5-CHANGED: Interface Group-Async7, changed state to administratively do
wn
D2(config)#
*Nov 21 01:26:07.711: %LINK-5-CHANGED: Interface Group-Async8, changed state to administratively do
wn
D2(config)#int
D2(config)#interface
*Nov 21 01:26:32.677: %PLATFORM-5-SIGNATURE_VERIFIED: Image 'flash0:/vios_l2-adventerprisek9-m' pas
sed code signing verification
D2(config)#interface g4
D2(config-if)#sh
D2(config-if)#shutdown
D2(config-if)#g
*Nov 21 01:26:50.787: %LINK-5-CHANGED: Interface Group-Async4, changed state to administratively do
wn
D2(config-if)#inter
D2(config-if)#exi
D2(config)#inter
D2(config)#interface g5
D2(config-if)#sh
D2(config-if)#shutdown
D2(config-if)#exit
*Nov 21 01:27:13.072: %LINK-5-CHANGED: Interface Group-Async5, changed state to administratively do
wn
D2(config-if)#exit
D2(config)#
```

Figura 12. Aplicando código\_3 Switch D2

```

vIOS-L2-2
D2(config)#interface vlan 101
D2(config-if)# ip address 10.0.1
*Nov 21 01:23:07.114: %LINK-3-UPDOWN: Interface Vlan100, changed state to down
*Nov 21 01:23:07.114: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan101, changed state to down
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
D2(config-if)# exit
D2(config)#interface vlan 102
D2(config-if)# ip address 10.0.102
*Nov 21 01:23:21.845: %LINK-3-UPDOWN: Interface Vlan101, changed state to down
*Nov 21 01:23:23.442: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan102, changed state to down
D2(config-if)# ipv6 address fe80::d2:4 link-local
D2(config-if)# ipv6 address 2001:db8:100:102::2/64
D2(config-if)# no shutdown
D2(config-if)# exit
D2(config)#
*Nov 21 01:23:35.813: %LINK-3-UPDOWN: Interface Vlan102, changed state to down
D2(config)#ip dhcp excluded-address 10.0.101.1 10.0.101.209
D2(config)#ip dhcp excluded-address 10.0.101.241 10.0.101.254
D2(config)#ip dhcp excluded-address 10.0.102.1 10.0.102.209
D2(config)#ip dhcp excluded-address 10.0.102.241 10.0.102.254
D2(config)#ip dhcp pool VLAN-101
D2(dhcp-config)# network 10.0.101.0 255.255.255.0
D2(dhcp-config)# default-router 10.0.101.254
D2(dhcp-config)# exit
D2(config)#ip dhcp pool VLAN-102
D2(dhcp-config)# network 10.0.102.0 255.255.255.0
D2(dhcp-config)# default-router 10.0.102.254
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```

Figura 13. Código Encender interfaces Switch D2

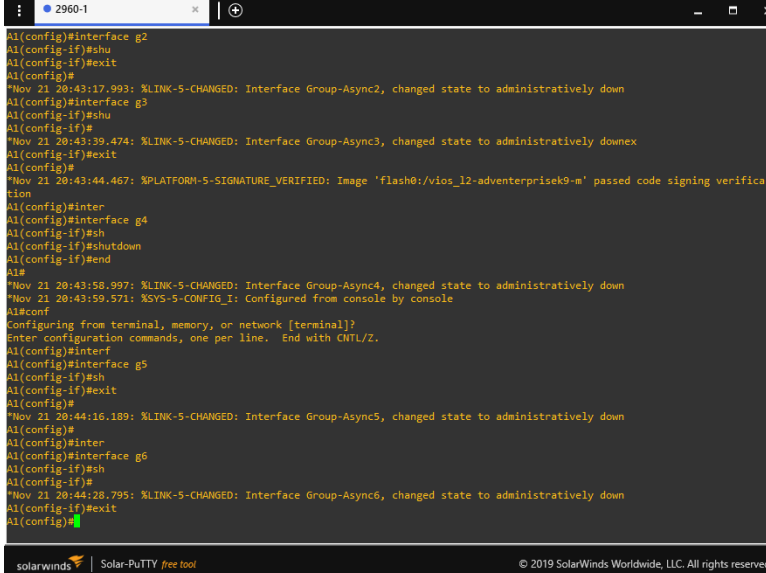
### Switch A1

```

hostname A1
no ip domain lookup
banner motd # A1, ENCOR Skills Assessment, Scenario 1 #
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 10.0.100.3 255.255.255.0
ipv6 address fe80::a1:1 link-local
ipv6 address 2001:db8:100:100::3/64
no shutdown
exit
interface g0
shutdown
exit
interface g1
shutdown
exit
interface g2
shutdown
exit
interface g3
shutdown
exit
interface g4
shutdown
exit
interface g5
shutdown
exit
```



```
2960-1 x +
A1(config)#interface g2
A1(config-if)#shu
A1(config-if)#exit
A1(config)#
*Nov 21 20:43:17.993: %LINK-5-CHANGED: Interface Group-Async2, changed state to administratively down
A1(config)#interface g3
A1(config-if)#shu
A1(config-if)#
*Nov 21 20:43:39.474: %LINK-5-CHANGED: Interface Group-Async3, changed state to administratively downex
A1(config-if)#exit
A1(config)#
*Nov 21 20:43:44.467: %PLATFORM-5-SIGNATURE_VERIFIED: Image 'flash0:/vios_l2-adventerprisek9-m' passed code signing verification
A1(config)#inter
A1(config)#interface g4
A1(config-if)#sh
A1(config-if)#shutdown
A1(config-if)#end
A1#
*Nov 21 20:43:58.997: %LINK-5-CHANGED: Interface Group-Async4, changed state to administratively down
*Nov 21 20:43:59.571: %SYS-5-CONFIG_I: Configured from console by console
A1#conf
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#interf
A1(config)#interface g5
A1(config-if)#sh
A1(config-if)#exit
A1(config)#
*Nov 21 20:44:16.189: %LINK-5-CHANGED: Interface Group-Async5, changed state to administratively down
A1(config)#inter
A1(config)#interface g6
A1(config-if)#sh
A1(config-if)#
*Nov 21 20:44:28.795: %LINK-5-CHANGED: Interface Group-Async6, changed state to administratively down
A1(config-if)#exit
A1(config)#
```

Figura 14. Aplicando código\_1 Switch A1

```
2960-1
* Unauthorized use or distribution of this software is expressly
* Prohibited.
*****
VIOS-L2-01>
VIOS-L2-01>
VIOS-L2-01>
VIOS-L2-01>enable
VIOS-L2-01#conf
VIOS-L2-01#configure
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
VIOS-L2-01(config)#hostname A1
A1(config)#no ip domain lookup
A1(config)#banner motd # A1, ENCOR Skills Assessment, Scenario 1 #
A1(config)#line con 0
A1(config-line)# exec-timeout 0 0
A1(config-line)# logging synchronous
A1(config-line)# exit
A1(config)#vlan 100
A1(config-vlan)# name Management
A1(config-vlan)# exit
A1(config)#vlan 101
A1(config-vlan)# name UserGroupA
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 10.0.100.3 255.255.255.0
A1(config-if)# ip
Nov 21 19:57:29.362: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state to downv6 address fe80::a1:1 li
nk-local
A1(config-if)# ipv6 address 2001:db8:100:100::3/64
A1(config-if)# no shutdown
A1(config-if)# exit
```

Figura 15. Aplicando código\_2 Switch A

## 5.2 Parte 2: Configurar la capa 2 de la red y el soporte de Host

En esta parte de la prueba de habilidades, debe completar la configuración de la capa 2 de la red y establecer el soporte básico de host. Al final de esta parte, todos los switches deben poder comunicarse. PC2 y PC3 deben recibir direccionamiento de DHCP y SLAAC.

Las tareas de configuración son las siguientes:

**2.1 En todos los switches configure interfaces troncales IEEE 802.1Q sobre los enlaces de interconexión entre switches.**

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

D1#

interf g1/0

switchport trunk encapsulation dot1q

switchport trunk native vlan 999

switchport mode trunk

```

D1#show inter trunk

Port      Mode           Encapsulation  Status      Native vlan
Gi1/0     on             802.1q         trunking    999

Port      Vlans allowed on trunk
Gi1/0     1-4094

Port      Vlans allowed and active in management domain
Gi1/0     1,100-102,200,300,999

Port      Vlans in spanning tree forwarding state and not pruned
Gi1/0     1,100-102,200,300,999
D1#

```

Figura 16. aplicando codigo show interface trunk D1

```

D2#
interf g1/0
switchport trunk encapsulation dot1q
switchport trunk native vlan 999
switchport mode trunk

```

```

D2#sho int tru

Port      Mode           Encapsulation  Status      Native vlan
Gi1/0     on             802.1q         trunking    999

Port      Vlans allowed on trunk
Gi1/0     1-4094

Port      Vlans allowed and active in management domain
Gi1/0     1,100-102,200,300,999

Port      Vlans in spanning tree forwarding state and not pruned
Gi1/0     1,100-102,200,300,999
D2#

```

Figura 17. Aplicando codigo show interface trunk D2

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

```

D1# show run | include spanning-tree
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
spanning-tree vlan 101 priority 24576

```

```
D1#
D1#show run | include spanning-tree
spanning-tree mode pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
spanning-tree vlan 101 priority 24576
D1#
```

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Figura 18. Show run | include spanning-tree D1

```
D2# show run | include spanning-tree
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
spanning-tree vlan 101 priority 24576
```

```
D2# show run | include spanning-tree
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
spanning-tree vlan 101 priority 24576
D2#
```

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Figura 19. show run | include spanning-tree D2

```
A1# show run | include spanning-tree
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
spanning-tree vlan 101 priority 24576
```

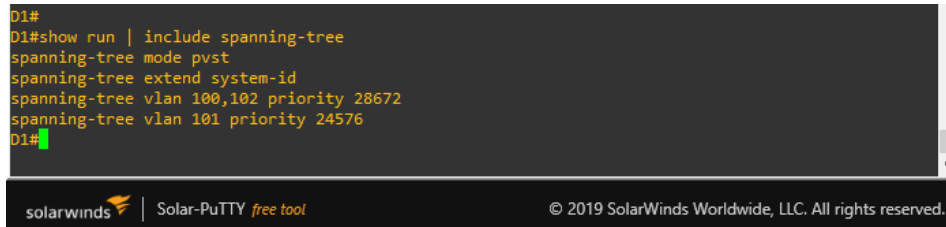
```
A1#show run | include spanning-tree
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
spanning-tree vlan 101 priority 24576
A1#
```

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Figura 20. show run | include spanning-tree A1

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

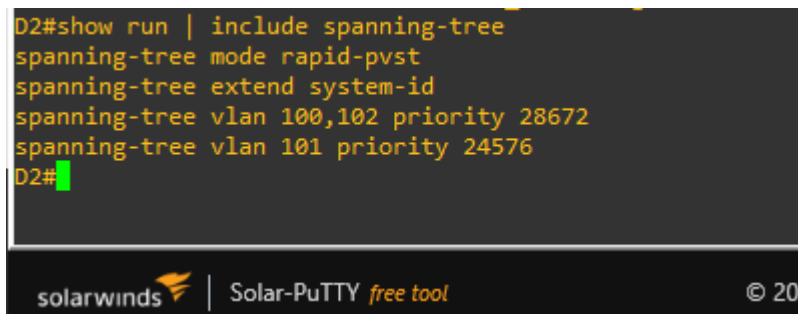
```
D1# show run | include spanning-tree
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
spanning-tree vlan 101 priority 24576
```



```
D1#
D1#show run | include spanning-tree
spanning-tree mode pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
spanning-tree vlan 101 priority 24576
D1#
```

*Figura 21. show run | include spanning-tree D1*

```
D2# show run | include spanning-tree
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
spanning-tree vlan 101 priority 24576
```



```
D2#show run | include spanning-tree
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
spanning-tree vlan 101 priority 24576
D2#
```

*Figura 22. show run | include spanning-tree D2*

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

```
int g0/1
no switchport
channel-group 12 mode active
channel-protocol LACP
no shutdown
exit
```

```
int g0/2
no switchport
channel-group 12 mode active
channel-protocol LACP
no shutdown
exit
int g0/3
no switchport
channel-group 12 mode active
channel-protocol LACP
no shutdown
exit
int g0/0
no switchport
channel-group 12 mode active
channel-protocol LACP
no shutdown
exit
```

```
D1#show etherchannel
      Channel-group listing:
      -----
Group: 12
-----
Group state = L3
Ports: 4   Maxports = 4
Port-channels: 1 Max Port-channels = 4
Protocol:  LACP
Minimum Links: 0

D1#
```

Figura 23. Show etherchannel D1

```
D2#show etherchannel
      Channel-group listing:
      -----
Group: 12
-----
Group state = L3
Ports: 4   Maxports = 4
Port-channels: 1 Max Port-channels = 4
Protocol:  LACP
Minimum Links: 0

D2#
```

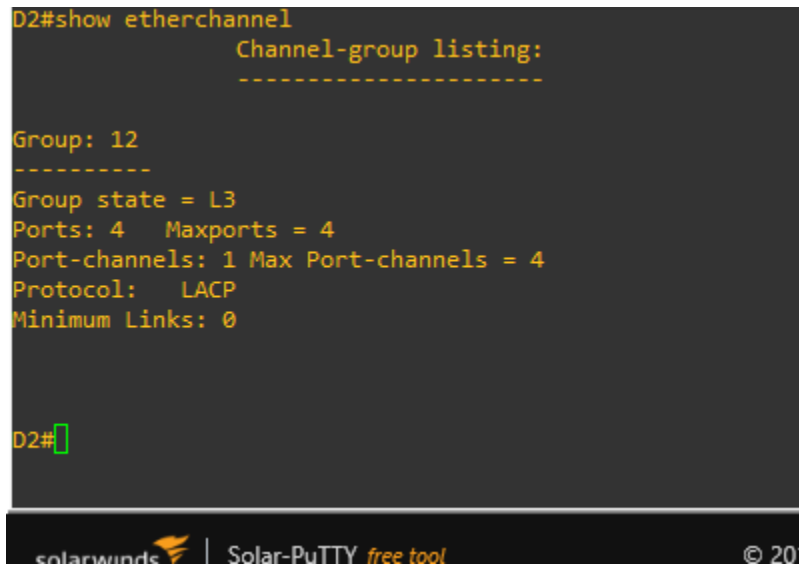


Figura 24. Show etherchannel D2

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

Inter g/1/1  
Switchport mode acces  
Switchpor Access vlan 100  
Exit

```
D1(config)#inter g1/1
D1(config-if)#swit
D1(config-if)#switchport mode access
D1(config-if)#sw
D1(config-if)#switchport ac
D1(config-if)#switchport access vl
D1(config-if)#switchport access vlan 100
D1(config-if)#
```

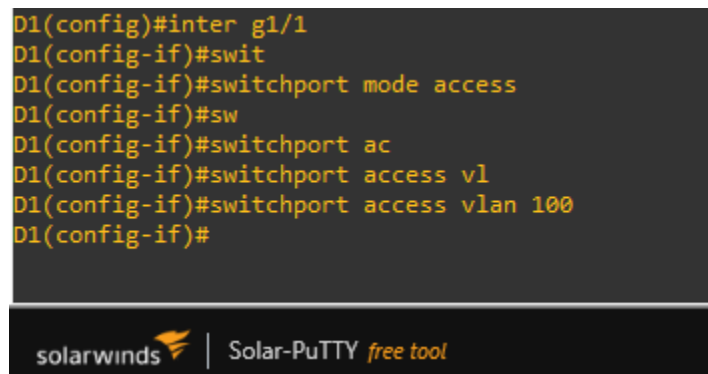


Figura 25. Host acces port D1

Inter g/1/1  
Switchport mode acces  
Switchpor Access vlan 102  
Exit

```
D2(config)#inter g1/1
D2(config-if)#switchport mode access
D2(config-if)# switchport access vlan 102
D2(config-if)#exit
D2(config)#
```



Figura 26. Host acces port D2

Inter g/1/1  
Switchport mode acces  
Switchpor Access vlan 101  
Exit

```
A1(config)#
A1(config)#inter g1/1
A1(config-if)#Switchport mode acces
A1(config-if)#Switchpor Access vlan 100
A1(config-if)#Exit
A1(config)#
A1(config)#exit
A1#
```

Figura 27. Host acces port A1

Inter g/1/0  
Switchport mode acces  
Switchpor Access vlan 101  
Exit

```
A1(config)#inter g1/0
A1(config-if)#Switchport mode acces
A1(config-if)#Switchpor Access vlan 101
A1(config-if)#Exit
A1(config)#
A1(config)#
```

Figura 28. Host acces port A1

## 2.7 Verifique los servicios DHCP IPv4. Puertos

```
PC2> ip 10.0.100.2 255.255.255.0
Checking for duplicate address...
PC1 : 10.0.100.2 255.255.255.0

PC2>
```

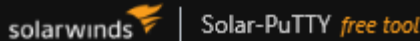


Figura 29. Ip pc2

```
PC2> show ip

NAME       : PC2[1]
IP/MASK    : 10.0.100.2/24
GATEWAY    : 255.255.255.0
DNS        :
MAC        : 00:50:79:66:68:01
LPORT     : 10006
RHOST:PORT : 127.0.0.1:10007
MTU       : 1500

PC2> █
```

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Figura 30. Show ip Pc2

## 2.8 Verifique la conectividad de la LAN local

```
PC2> show ip

NAME       : PC2[1]
IP/MASK    : 10.0.100.2/24
GATEWAY    : 255.255.255.0
DNS        :
MAC        : 00:50:79:66:68:01
LPORT     : 10006
RHOST:PORT : 127.0.0.1:10007
MTU       : 1500

PC2> █
```

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Figura 31. Conectividad pc2

```
PC2> ip 10.0.100.2 255.255.255.0
Checking for duplicate address...
PC1 : 10.0.100.2 255.255.255.0

PC2> █
```

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Figura 32. ip Pc2

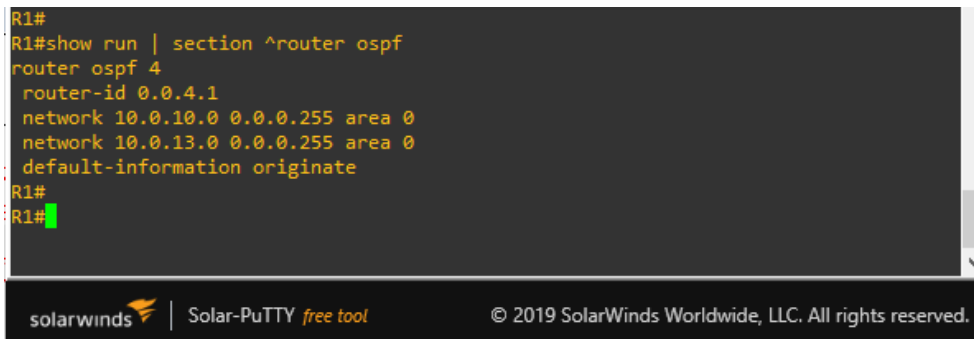
## 5.2 Parte 3: Configurar los protocolos de enrutamiento

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

**Nota:** Los pings desde los hosts no tendrán éxito porque sus puertas de enlace predeterminadas apuntan a la dirección HSRP que se habilitará en la Parte 4. Las tareas de configuración son las siguientes:

### 3.1 En la “Red de la Compañía” (es decir, R1, R3, D1, y D2), configure single area OSPFv2 en area 0.

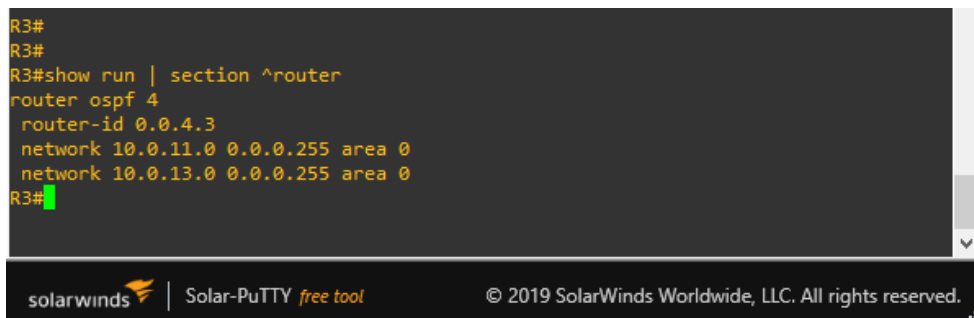
```
R1# show run | section ^router ospf
router ospf 4
router-id 0.0.4.1
network 10.0.10.0 0.0.0.255 area 0
network 10.0.13.0 0.0.0.255 area 0
default-information originate
```



```
R1#
R1#show run | section ^router ospf
router ospf 4
router-id 0.0.4.1
network 10.0.10.0 0.0.0.255 area 0
network 10.0.13.0 0.0.0.255 area 0
default-information originate
R1#
R1#
```

Figura 33. show run | section ^router ospf R1

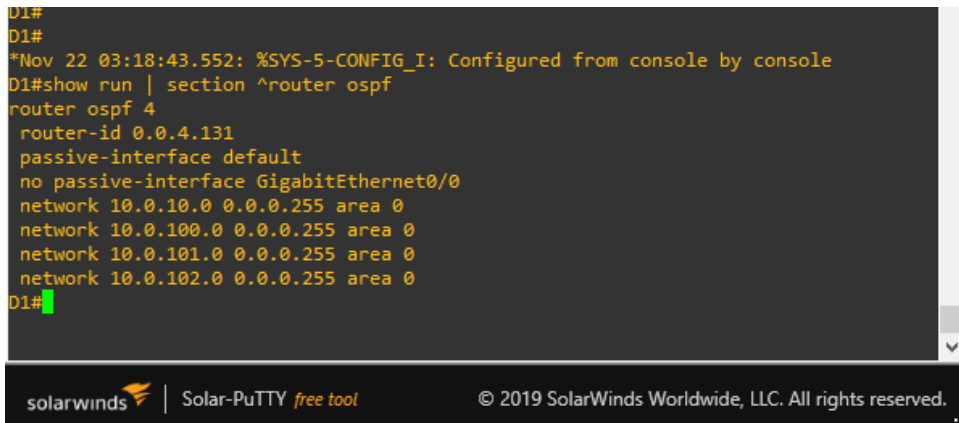
```
R3# show run | section ^router
ospf router ospf 4
router-id 0.0.4.3
network 10.0.11.0 0.0.0.255 area 0
network 10.0.13.0 0.0.0.255 area 0
```



```
R3#
R3#
R3#show run | section ^router
ospf router ospf 4
router-id 0.0.4.3
network 10.0.11.0 0.0.0.255 area 0
network 10.0.13.0 0.0.0.255 area 0
R3#
```

Figura 34. show run | section ^router R3

```
D1# show run | section ^router ospf
router ospf 4
router-id 0.0.4.131
passive-interface default
no passive-interface GigabitEthernet0/0
network 10.0.10.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
```



```
D1#
D1#
*Nov 22 03:18:43.552: %SYS-5-CONFIG_I: Configured from console by console
D1#show run | section ^router ospf
router ospf 4
router-id 0.0.4.131
passive-interface default
no passive-interface GigabitEthernet0/0
network 10.0.10.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
D1#
```

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*Figura 35. show run | section ^router ospf D1*

```
D2# show run | section ^router ospf
router ospf 4
router-id 0.0.4.131
passive-interface default
no passive-interface GigabitEthernet0/0
network 10.0.10.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
```

```
D2(config-router)#exit
D2(config)#exit
D2#show run | sect
*Nov 22 03:25:30.292: %SYS-5-CONFIG_I: Configured from console by consoleion ^router ospf
D2#show run | section ^router ospf
router ospf 4
router-id 0.0.4.132
passive-interface default
no passive-interface GigabitEthernet0/0
network 10.0.11.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
D2#
```

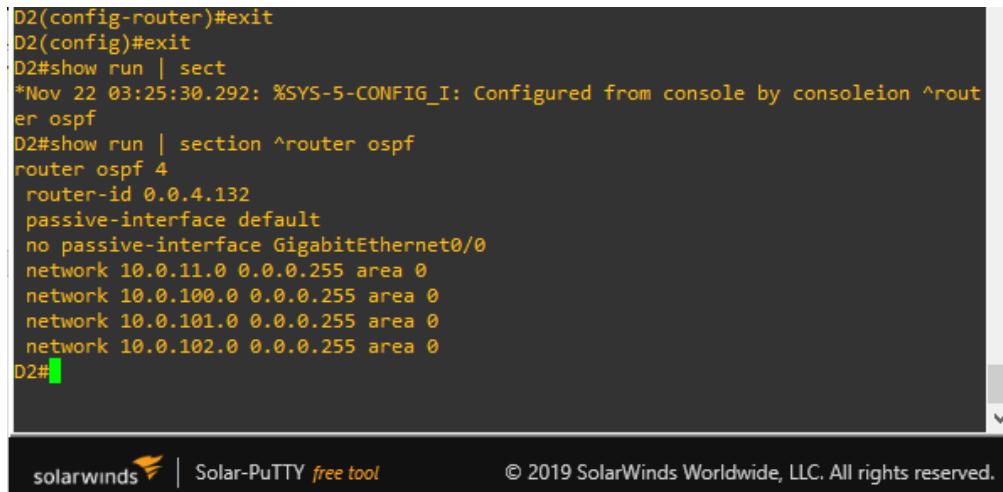


Figura 36. show run | section ^router ospf D2

### 3.2 En la “Red de la Compañía” (es decir, R1, R3, D1, y D2), configure classic single-area OSPFv3 en area 0.

```
R1# show run | section ^ipv6 router
ipv6 router ospf 6
router-id 0.0.6.1
default-information originate
```

```
R1#
R1#
R1#show run | section ^ipv6 router
ipv6 router ospf 6
router-id 0.0.6.1
default-information originate
R1#
```

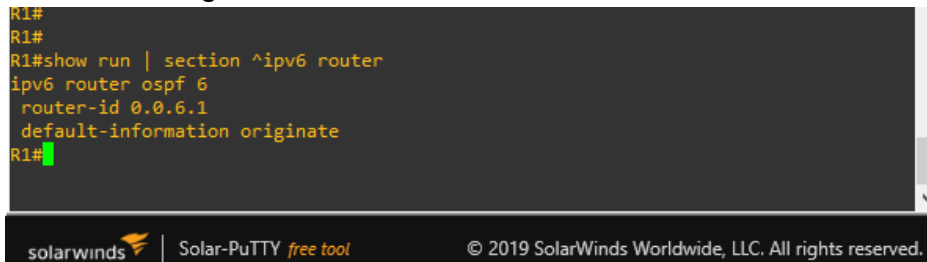


Figura 37. show run | section ^ipv6 router R1

```
R3# show run | section ^ipv6 router
ipv6 router ospf 6
router-id 0.0.6.1
```

```
R3#
R3#show run | section ^ipv6 router
ipv6 router ospf 6
router-id 0.0.6.1
default-information originate
R3#
```



Figura 38. show run | section ^ipv6 router R3

R3# show ipv6 ospf interface brief

Interface	PID	Area	Intf ID	Cost	State	Nbrs	F/C
Gi0/0			6		0		4
DR	0/0						

1

```
R1#show ipv6 ospf interface brief
Interface  PID  Area  Intf ID  Cost  State Nbrs F/C
Gi0/0     6    0     4        1    DR   0/0
R1#
```

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Figura 39. show ipv6 ospf interface brief R1

D2#

router ospf 6

router-id 0.0.4.131

network 10.0.11.0 0.0.0.255 area 0

network 10.0.100.0 0.0.0.255 area 0

network 10.0.101.0 0.0.0.255 area 0

network 10.0.102.0 0.0.0.255 area 0

passive-interface default

no passive-interface g0/0

```
!
router ospf 4
router-id 0.0.4.132
passive-interface default
no passive-interface GigabitEthernet0/0
network 10.0.11.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
!
router ospf 6
router-id 0.0.4.131
passive-interface default
no passive-interface GigabitEthernet0/0
network 10.0.11.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
!
ip sla 4
```

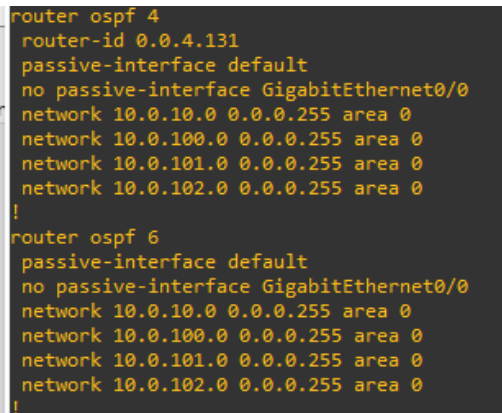
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Figura 40. show ipv6 ospf interface D2

```

D1#
router ospf 6
router-id 0.0.4.131
network 10.0.10.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
passive-interface default
no passive- g0/0

```



```

router ospf 4
router-id 0.0.4.131
passive-interface default
no passive-interface GigabitEthernet0/0
network 10.0.10.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
!
router ospf 6
passive-interface default
no passive-interface GigabitEthernet0/0
network 10.0.10.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
!

```

*Figura 41. show ipv6 ospf interface D1*

### 3.3 En R2 en la “Red ISP”, configure MPBGP

```

R2# show run | section router bgp
router bgp 500
  bgp router-id 2.2.2.2
  bgp log-neighbor-changes
  neighbor 2001:DB8:200::1 remote-as 300
  neighbor 209.165.200.225 remote-as 300
  !
  address-family ipv4
    network 0.0.0.0
    network 2.2.2.2 mask 255.255.255.255
    no neighbor 2001:DB8:200::1 activate
    neighbor 209.165.200.225 activate
  exit-address-family
  !
  address-family ipv6
    network ::/0
    network 2001:DB8:2222::/128
    neighbor 2001:DB8:200::1 activate
  exit-address-family

```

```
R2
*Nov 22 03:47:09.523: %SYS-5-CONFIG_I: Configured from console by console
R2#show run | section router bgp
router bgp 500
  bgp router-id 2.2.2.2
  bgp log-neighbor-changes
  neighbor 2001:DB8:200::1 remote-as 300
  neighbor 209.165.200.225 remote-as 300
  !
  address-family ipv4
    network 0.0.0.0
    network 2.2.2.2 mask 255.255.255.255
    no neighbor 2001:DB8:200::1 activate
    neighbor 209.165.200.225 activate
  exit-address-family
  !
  address-family ipv6
    network ::/0
    network 2001:DB8:2222::/128
    neighbor 2001:DB8:200::1 activate
  exit-address-family
```

Figura 42. show run | section router bgp R2

```
R2# show run | include route
router bgp 500
  bgp router-id 2.2.2.2
ip route 0.0.0.0 0.0.0.0 Loopback0
ipv6 route ::/0 Loopback0
```

```
R2#show run | include route
router bgp 500
  bgp router-id 2.2.2.2
ip route 0.0.0.0 0.0.0.0 Loopback0
ipv6 route ::/0 Loopback0
R2#
```

Figura 43. show run | include route R2

### 3.4 En R1 en la “Red ISP”, configure MPBGP.

```
R1# show run | section bgp
router bgp 300
  bgp router-id 1.1.1.1
  bgp log-neighbor-changes
  neighbor 2001:DB8:200::2 remote-as 500
  neighbor 209.165.200.226 remote-as 500
  !
  address-family ipv4
```

```

network 10.0.0.0
no neighbor 2001:DB8:200::2 activate
neighbor 209.165.200.226 activate
exit-address-family
!
address-family ipv6
network 2001:DB8:100::/48
neighbor 2001:DB8:200::2 activate
exit-address-family

```

```

R1#
R1#
R1#show run | section bgp
router bgp 300
  bgp router-id 1.1.1.1
  bgp log-neighbor-changes
  neighbor 2001:DB8:200::2 remote-as 500
  neighbor 209.165.200.226 remote-as 500
  !
  address-family ipv4
    network 10.0.0.0
    no neighbor 2001:DB8:200::2 activate
    neighbor 209.165.200.226 activate
  exit-address-family
  !
  address-family ipv6
    network 2001:DB8:100::/48
    neighbor 2001:DB8:200::2 activate
  exit-address-family
R1#

```

Figura 44. show run | section bgp R1

#### Parte 4: Configurar la Redundancia del Primer Salto (First Hop Redundancy)

En esta parte, debe configurar HSRP version 2 para proveer redundancia de primer salto para los host en la “Red de la Compañía”. Las tareas de configuración son las siguientes:

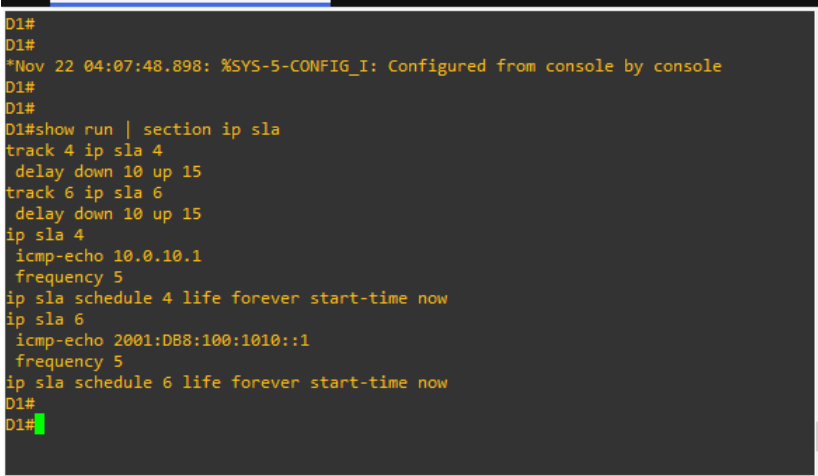
##### 4.1 En D1, cree IP SLAs que prueben la accesibilidad de la interfaz G 0/0

```

D1# show run | section ip sla
track 4 ip sla 4
  delay down 10 up 15
track 6 ip sla 6
  delay down 10 up 15
ip sla 4
  icmp-echo 10.0.10.1
  frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
  icmp-echo 2001:DB8:100:1010::1

```

```
frequency 5
ip sla schedule 6 life forever start-time now
```



```
D1#
D1#
*Nov 22 04:07:48.898: %SYS-5-CONFIG_I: Configured from console by console
D1#
D1#
D1#show run | section ip sla
track 4 ip sla 4
  delay down 10 up 15
track 6 ip sla 6
  delay down 10 up 15
ip sla 4
  icmp-echo 10.0.10.1
  frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
  icmp-echo 2001:DB8:100:1010::1
  frequency 5
ip sla schedule 6 life forever start-time now
D1#
D1#
```

*Figura 45. show run | section ip sla D1*

#### **4.2 En D2, cree IP SLAs que prueben la accesibilidad de la interfaz R3 G0/0/1.**

```
D2# show run | section ip sla
track 4 ip sla 4
  delay down 10 up 15
track 6 ip sla 6
  delay down 10 up 15
ip sla 4
  icmp-echo 10.0.11.1
  frequency 5
ip sla schedule 4 life forever start-time now

ip sla 6
  icmp-echo 2001:DB8:100:1011::1
  frequency 5
ip sla schedule 6 life forever start-time now
```

```

D2#show run | section ip sla
track 4 ip sla 4
  delay down 10 up 15
track 6 ip sla 6
  delay down 10 up 15
ip sla 4
  icmp-echo 10.0.11.1
  frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
  icmp-echo 2001:DB8:100:1011::1
  frequency 5
ip sla schedule 6 life forever start-time now
D2#

```

Figura 46. show run | section ip sla D2

### 4.3 En D1 configure HSRPv2. En D2, configure HSRPv2

D1# show standby brief

P indicates configured to preempt.

Interface	Grp	Pri	P	State	Active	Standby	Virtual IP
VI100	100	140	P	Active	FE80::5:73FF:FEA0:6A		
VI100	104	90	P	Active	10.0.102.254		
VI100	106	90	P	Active	FE80::5:73FF:FEA0:6A		
VI101	114	40	P	Active	10.0.102.254		
VI101	116	40	P	Active	FE80::5:73FF:FEA0:74		
VI102	124	90	P	Active	10.0.102.254		
VI102	126	90	P	Active	FE80::5:73FF:FEA0:7E		
VI110	114	110	P	Active	FE80::5:73FF:FEA0:72		

```

D1#
D1#
D1#
D1#show standby brief
      P indicates configured to preempt.
      |
Interface  Grp  Pri  P  State  Active          Standby          Virtual IP
Vl100     100  104  P  Init   unknown        unknown        FE80::5:73FF:FEA0:64
Vl100     104  90   P  Init   unknown        unknown        10.0.100.254
Vl100     106  90   P  Init   unknown        unknown        FE80::5:73FF:FEA0:6A
Vl101     114  40   P  Init   unknown        unknown        10.0.101.254
Vl101     116  40   P  Init   unknown        unknown        FE80::5:73FF:FEA0:74
Vl102     124  90   P  Init   unknown        unknown        10.0.102.254
Vl102     126  90   P  Init   unknown        unknown        FE80::5:73FF:FEA0:7E
Vl110     114  110  P  Init   unknown        unknown        FE80::5:73FF:FEA0:72
D1#

```

Figura 47. show standby brief D1

P indicates configured to preempt.

Interface	Grp	Pri	P	State	Active	Standby	Virtual IP
VI100	104	40	P	Active	10.0.102.254		
VI100	106	40	P	Active	FE80::5:73FF:FEA0:6A		
VI101	114	90	P	Active	10.0.102.254		
VI101	116	90	P	Active	FE80::5:73FF:FEA0:74		
VI102	124	40	P	Active	10.0.102.254		
VI102	126	40	P	Active	FE80::5:73FF:FEA0:7E		

```
D2#show standby brief
P indicates configured to preempt.
|
Interface Grp Pri P State Active Standby Virtual IP
VI100 104 40 P Listen unknown unknown 10.0.100.254
VI100 106 40 P Listen unknown unknown FE80::5:73FF:FEA0:6A
VI101 114 90 P Listen unknown unknown 10.0.101.254
VI101 116 90 P Listen unknown unknown FE80::5:73FF:FEA0:74
VI102 124 40 P Listen unknown unknown 10.0.102.254
VI102 126 40 P Listen unknown unknown FE80::5:73FF:FEA0:7E
D2#
```

Figura 48. show standby brief D2

**Parte 5: Seguridad** En esta parte debe configurar varios mecanismos de seguridad en los dispositivos de la topología. Las tareas de configuración son las siguientes:

**5.1** En todos los dispositivos, proteja el EXEC privilegiado usando el algoritmo de encriptación **SCRYPT**.

Usuario: sadmin

Contraseña: cisco12345cisco

Enable

Contraseña: cisco12345cisco

R1# show run | include secret

enable secret 9

\$9\$0C3pnVdgrnhnY9\$uzGA.WZfcLg5lhuyJu22mlf.YyZ/83VgqbO3rXBDuwo

username sadmin privilege 15 secret 9

\$9\$XCO4pzqbRT.3EP\$mouLOQI5/oFOkYDtA1ztejFra67MnkJJ5Y3bhYQe6

```
R1#show run | include secret
enable secret 9 $9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83VgqbO3rXBDuwo
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouLOQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
R1#
```

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Figura 49. show run | include secret R1

```
R2# show run | include secret
enable secret 9
$9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83VgqbO3rXBDuwo
username sadmin privilege 15 secret 9
$9$XC04pzqbRT.3EP$ymouLOQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
```

```
R2#
R2#show run | include secret
enable secret 9 $9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83VgqbO3rXBDuwo
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouLOQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
R2#
```

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Figura 50. show run | include secret D1

```
R3# show run | include secret
enable secret 9
$9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83VgqbO3rXBDuwo
username sadmin privilege 15 secret 9
$9$XC04pzqbRT.3EP$ymouLOQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
```

```
R3#show run | include secret
enable secret 9 $9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83VgqbO3rXBDuwo
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouLOQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
R3#
```

Figura 51. show run | include secret D1

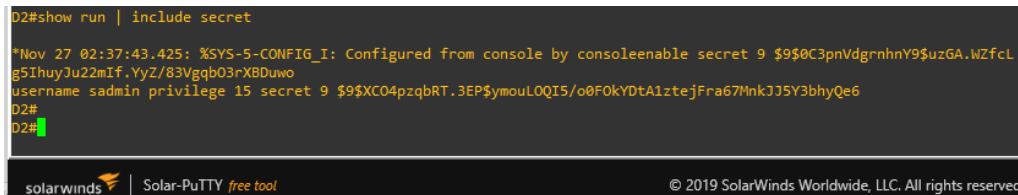
```
D1# show run | include secret
enable secret 9
$9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83VgqbO3rXBDuwo
username sadmin privilege 15 secret 9
$9$XC04pzqbRT.3EP$ymouLOQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
```

```
D1#show run | include secret
enable secret 9 $9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83VgqbO3rXBDuwo
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouLOQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
D1#
D1#
```

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Figura 52. show run | include secret D1

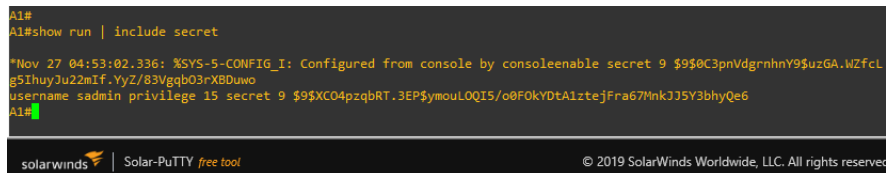
```
D2# show run | include secret
enable secret 9
$9$0C3pnVdgrnhnY9$uzGA.WZfcLg5lhuyJu22mIf.YyZ/83VgqbO3rXBDuwo
username sadmin privilege 15 secret 9
$9$XC04pzqbRT.3EP$ymouLOQI5/o0FOkYDtA1ztejFra67MnkJJ5Y3bhyQe6
D2#
```



```
D2#show run | include secret
*Nov 27 02:37:43.425: %SYS-5-CONFIG_I: Configured from console by consoleenable secret 9 $9$0C3pnVdgrnhnY9$uzGA.WZfcLg5lhuyJu22mIf.YyZ/83VgqbO3rXBDuwo
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouLOQI5/o0FOkYDtA1ztejFra67MnkJJ5Y3bhyQe6
D2#
```

Figura 53. show run | include secret D2

```
A1# show run | include secret
enable secret 9
$9$0C3pnVdgrnhnY9$uzGA.WZfcLg5lhuyJu22mIf.YyZ/83VgqbO3rXBDuwo
username sadmin privilege 15 secret 9
$9$XC04pzqbRT.3EP$ymouLOQI5/o0FOkYDtA1ztejFra67MnkJJ5Y3bhyQe6
A1#
```



```
A1#
A1#show run | include secret
*Nov 27 04:53:02.336: %SYS-5-CONFIG_I: Configured from console by consoleenable secret 9 $9$0C3pnVdgrnhnY9$uzGA.WZfcLg5lhuyJu22mIf.YyZ/83VgqbO3rXBDuwo
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouLOQI5/o0FOkYDtA1ztejFra67MnkJJ5Y3bhyQe6
A1#
```

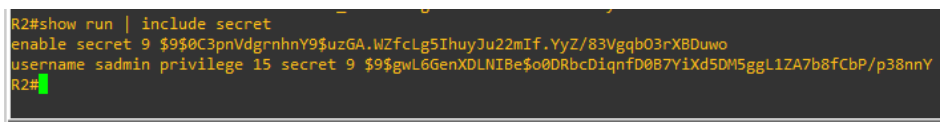
Figura 54. show run | include secret A1

## 5.2 En todos los dispositivos, cree un usuario local y protéjalo usando el algoritmo de encriptación SCRYPT.

Usuario: sadmin

Contraseña: cisco12345cisco

```
R2# username sadmin privilege 15 algorithm-type SCRYPT secret
cisco12345cisco
```



```
R2#show run | include secret
enable secret 9 $9$0C3pnVdgrnhnY9$uzGA.WZfcLg5lhuyJu22mIf.YyZ/83VgqbO3rXBDuwo
username sadmin privilege 15 algorithm-type SCRYPT secret cisco12345cisco
R2#
```

Figura 55. show run | include secret

R3# username sadmin privilege 15 algorithm-type SCRYPT secret  
cisco12345cisco

```
enable secret 9 $9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83Vgqb03rXBDuwo
username sadmin privilege 15 secret 9 $9$LjQWQVrHUofI9K$j1qYi7I9pgIgm.th7z05iizDxs.6I7DYQM0W/XiRK6
R3#
```

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Figura 56. show run | include secret

A1# username sadmin privilege 15 algorithm-type SCRYPT secret  
cisco12345cisco

```
A1#show run | include secret
enable secret 9 $9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83Vgqb03rXBDuwo
username sadmin privilege 15 secret 9 $9$0oyQ0JLxQ.ovGN$BLXGMjscVb1eF9TMqTn1Z5zy/pfQ.7wx2drmsiJSSaI
A1#
```

Figura 57. show run | include secret

D1# username sadmin privilege 15 algorithm-type SCRYPT secret  
cisco12345cisco

```
D1#show run | include secret
*Nov 28 05:18:23.644: %SYS-5-CONFIG_I: Configured from console by sadmin on console
enable secret 9 $9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83Vgqb03rXBDuwo
username sadmin privilege 15 secret 9 $9$V0aL9tDxJwCAeG$w8620TWN.SFpJdNHI/My3.Uo1io9w10D4Mmk6Ci0B1o
D1#
```

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Figura 58. show run | include secret D1

D2# username sadmin privilege 15 algorithm-type SCRYPT secret  
cisco12345cisco

```
D2#show run | incl
*Nov 28 05:14:32.218: %SYS-5-CONFIG_I: Configured from console by sadmin on console
enable secret 9 $9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83Vgqb03rXBDuwo
username sadmin privilege 15 secret 9 $9$g0HIngXeySg8PW$o00aL8MTJB.oQ6nK3qaN2I2kLZz3M/cqz89RZN1gnaQ
D2#
```

Figura 59. show run | include secret D2

### 5.3 En todos los dispositivos (excepto R2), habilite AAA.

A1# aaa new-model

```
A1(config)#
A1(config)#aaa new-model
A1(config)#
```

Figura 60. aaa new-model

R2# aaa new-model

```
R2(config)#aaa new-model
R2(config)#
```

Figura 61. aaa new-model

R3# aaa new-model

```
R3(config)#
R3(config)#aaa new-model
R3(config)#
```

Figura 62. aaa new-model

D1# aaa new-model

```
D1(config)#
D1(config)#aaa new-model
D1(config)#
```

Figura 63. aaa new-model

D1# aaa new-model

```
D2(config)#aaa new-model
D2(config)#
```

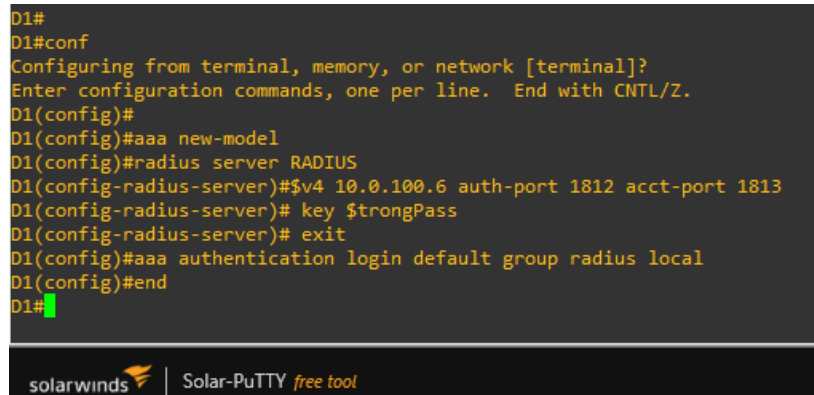
Figura 64. aaa new-model

#### 5.4 En todos los dispositivos (excepto R2), configure las especificaciones del servidor RADIUS.

```
D1#
aaa new-model
radius server RADIUS
address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
key $strongPass
exit
aaa authentication login default group radius local
```

end

```
D1#
D1#conf
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#
D1(config)#aaa new-model
D1(config)#radius server RADIUS
D1(config-radius-server)#v4 10.0.100.6 auth-port 1812 acct-port 1813
D1(config-radius-server)# key $strongPass
D1(config-radius-server)# exit
D1(config)#aaa authentication login default group radius local
D1(config)#end
D1#
```

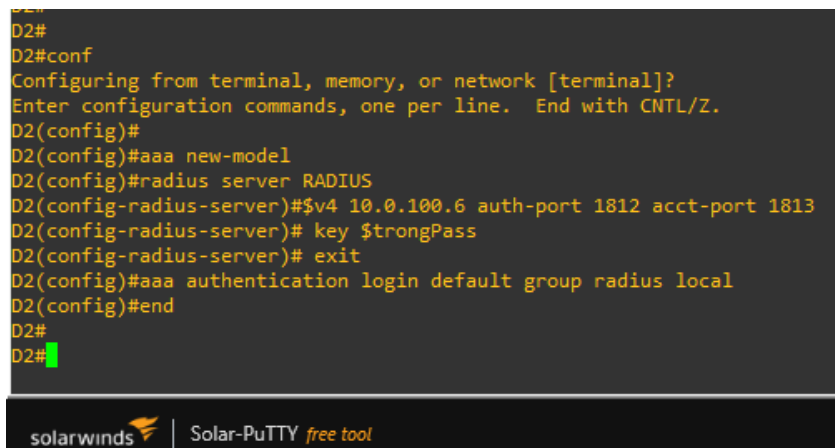


*Figura 65. RADIUS D1*

D#2

```
aaa new-model
radius server RADIUS
address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
key $strongPass
exit
aaa authentication login default group radius local
end
```

```
D2#
D2#conf
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#
D2(config)#aaa new-model
D2(config)#radius server RADIUS
D2(config-radius-server)#v4 10.0.100.6 auth-port 1812 acct-port 1813
D2(config-radius-server)# key $strongPass
D2(config-radius-server)# exit
D2(config)#aaa authentication login default group radius local
D2(config)#end
D2#
D2#
```



*Figura 66. RADIUS D2*

A1#

```
aaa new-model
radius server RADIUS
address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
key $strongPass
exit
aaa authentication login default group radius local
```

end

```
A1#
A1#conf
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#aaa new-model
A1(config)#radius server RADIUS
A1(config-radius-server)#$v4 10.0.100.6 auth-port 1812 acct-port 1813
A1(config-radius-server)# key $strongPass
A1(config-radius-server)# exit
A1(config)#aaa authentication login default group radius local
A1(config)#end
A1#
A1#
```

*Figura 67. RADIUS A1*

```
R3#
aaa new-model
radius server RADIUS
address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
key $strongPass
exit
aaa authentication login default group radius local
end
```

```
R3#conf
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#
R3(config)#aaa new-model
R3(config)#
R3(config)#aaa new-model
R3(config)#radius server RADIUS
R3(config-radius-server)#$v4 10.0.100.6 auth-port 1812 acct-port 1813
R3(config-radius-server)# key $strongPass
R3(config-radius-server)# exit
R3(config)#aaa authentication login default group radius local
R3(config)#end
R3#
*Nov 28 03:46:13.331: %SYS-5-CONFIG_I: Configured from console by console
R3#
```

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*Figura 68. RADIUS R3*

```
R3#
aaa new-model
radius server RADIUS
address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
key $strongPass
exit
```

```
aaa authentication login default group radius local
end
```

```
R1(config)#
R1(config)#aaa new-model
R1(config)#radius server RADIUS
R1(config-radius-server)#$v4 10.0.100.6 auth-port 1812 acct-port 1813
R1(config-radius-server)# key $trongPass
R1(config-radius-server)# exit
R1(config)#aaa authentication login default group radius local
R1(config)#end
R1#
*Nov 28 03:53:55.063: %SYS-5-CONFIG_I: Configured from console by console
R1#
```

Figura 69. RADIUS R1

### 5.5 En todos los dispositivos (excepto R2), configure la lista de métodos de autenticación AAA

```
R1# show run aaa | exclude!
aaa authentication login default group radius local
username sadmin privilege 15 secret 9
$9$XCO4pzqbRT.3EP$ymouLOQI5/o0FOkYDtA1ztejFra67MnkJJ5Y3bhYQe6
aaa new-model
aaa session-id common
```

```
R1#show run aaa | exclude !
username sadmin privilege 15 secret 9 $9$XCO4pzqbRT.3EP$ymouLOQI5/o0FOkYDtA1ztejFra67MnkJJ5Y3bhYQe6
aaa new-model
aaa session-id common
R1#
```

Figura 70. show run aaa | exclude ! R1

```
R3# show run aaa | exclude!
aaa authentication login default group radius local
username sadmin privilege 15 secret 9
$9$XCO4pzqbRT.3EP$ymouLOQI5/o0FOkYDtA1ztejFra67MnkJJ5Y3bhYQe6
aaa new-model
aaa session-id common
```

```
R3#show run aaa | exclude !
!
aaa authentication login default group radius local
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouLOQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
!
```

*Figura 71. show run aaa | exclude ! R3*

```
D1# show run aaa | exclude !
aaa authentication login default group radius local
username sadmin privilege 15 secret 9
$9$XC04pzqbRT.3EP$ymouLOQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
aaa new-model
aaa session-id common
```

```
D1#show run aaa | exclude !
*Nov 27 03:34:11.576: %SYS-5-CONFIG_I: Configured from console by console
D1#show run aaa | exclude !
aaa authentication login default group radius local
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouLOQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
radius server RADIUS
  address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
  key $strongPass
aaa new-model
aaa session-id common
D1#
```

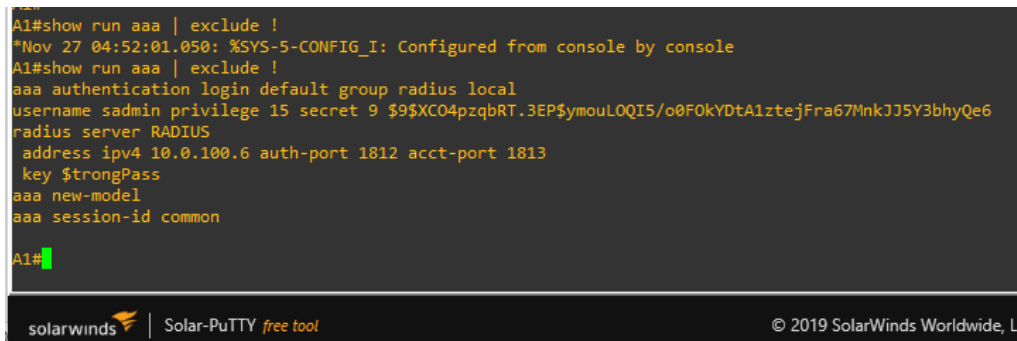
*Figura 72. show run aaa | exclude ! D1*

```
D2# show run aaa | exclude !
aaa authentication login default group radius local
username sadmin privilege 15 secret 9
$9$XC04pzqbRT.3EP$ymouLOQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
aaa new-model
aaa session-id common
```

```
D2#show run aaa | exclude !
aaa authentication login default group radius local
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouLOQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
radius server RADIUS
  address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
  key $strongPass
aaa new-model
aaa session-id common
D2#
*Nov 27 02:35:24.757: %SYS-5-CONFIG_I: Configured from console by console
D2#
```

*Figura 73. show run aaa | exclude ! D2*

```
A1# show run aaa | exclude !
aaa authentication login default group radius local
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouLQI5/o0FOkYDtA1ztejFra67MnkJJ5Y3bhyQe6
aaa new-model
aaa session-id common
```




```
A1#show run aaa | exclude !
*Nov 27 04:52:01.050: %SYS-5-CONFIG_I: Configured from console by console
A1#show run aaa | exclude !
aaa authentication login default group radius local
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouLQI5/o0FOkYDtA1ztejFra67MnkJJ5Y3bhyQe6
radius server RADIUS
  address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
  key $trongPass
aaa new-model
aaa session-id common

A1#
```

Figura 74. show run aaa | exclude ! A1

## 5.6 Verifique el servicio AAA en todos los dispositivos (except R2).



```
A1#show run aaa
!
aaa authentication login default group radius local
!
!
!
!
!
!
!
!
!
!
radius server RADIUS
  address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
  key $trongPass
!
!
aaa new-model
aaa session-id common
!
!
A1#
```

Figura 75. show run aaa A1

```
D2#show run aaa
!
aaa authentication login default group radius local
!
!
!
!
!
!
radius server RADIUS
  address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
  key $strongPass
!
!
aaa new-model
aaa session-id common
!
!
D2#
```

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Figura 76. show run aaa D2

```
D1#show run aaa
!
aaa authentication login default group radius local
!
!
!
!
!
!
radius server RADIUS
  address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
  key $strongPass
!
!
aaa new-model
aaa session-id common
!
!
D1#
```

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Figura 77. show run aaa D1



```
R2#  
R2#show run | include ntp  
ntp master 3  
R2#
```

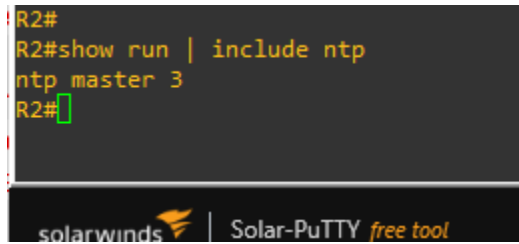


Figura 80. show run | include ntp R2

### 6.3 Configure NTP en R1, R3, D1, D2, y A1.

R1# ntp server 2.2.2.2

```
R1#show ntp sta  
Clock is unsynchronized, stratum 16, no reference clock  
nominal freq is 250.0000 Hz, actual freq is 250.0000 Hz, precision is 2**19  
ntp uptime is 155800 (1/100 of seconds), resolution is 4000  
reference time is 00000000.00000000 (00:00:00.000 UTC Mon Jan 1 1900)  
clock offset is 0.0000 msec, root delay is 0.00 msec  
root dispersion is 23.33 msec, peer dispersion is 0.00 msec  
loopfilter state is 'NSET' (Never set), drift is 0.000000000 s/s  
system poll interval is 8, never updated.  
R1#
```

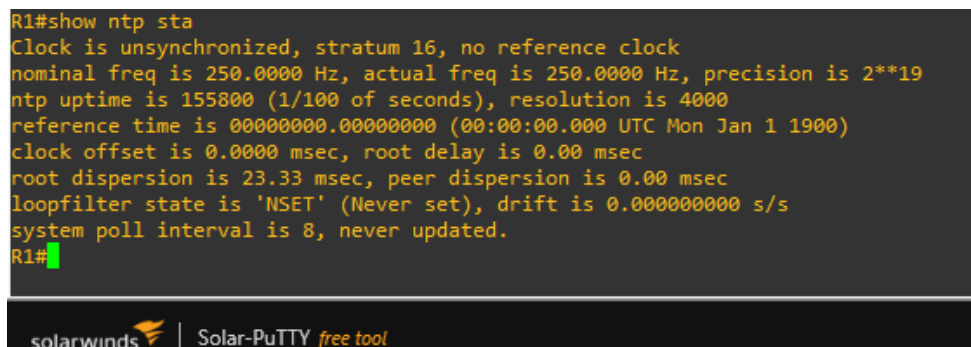


Figura 81. NTP R1

D1# ntp server 10.0.10.1

```
D1#show ntp status | include stratum  
Clock is unsynchronized, stratum 16, no reference clock  
D1#show ntp status  
Clock is unsynchronized, stratum 16, no reference clock  
nominal freq is 1000.0003 Hz, actual freq is 1000.0003 Hz, precision is 2**14  
ntp uptime is 5000 (1/100 of seconds), resolution is 1000  
reference time is 00000000.00000000 (00:00:00.000 UTC Mon Jan 1 1900)  
clock offset is 0.0000 msec, root delay is 0.00 msec  
root dispersion is 0.74 msec, peer dispersion is 0.00 msec  
loopfilter state is 'FSET' (Drift set from file), drift is 0.000000000 s/s  
system poll interval is 8, never updated.  
D1#
```

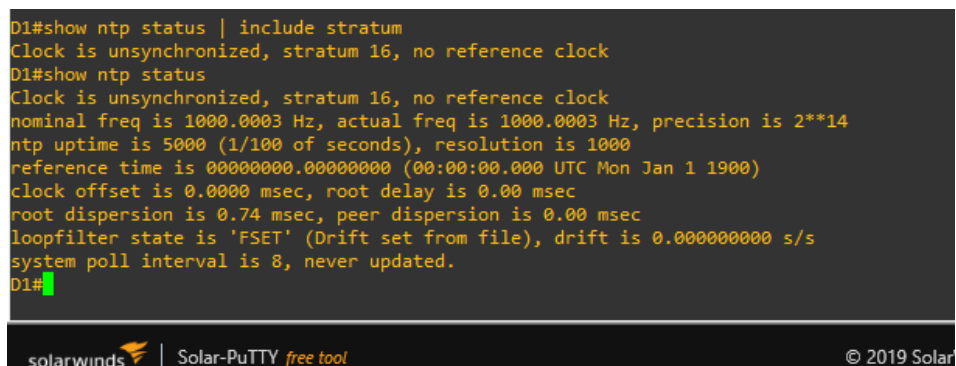


Figura 82. NTP D1

D2# ntp server 10.0.10.1

```

D2#conf
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#ntp server 10.0.10.1
D2(config)#exit
D2#show ntp status
*Nov 27 02:10:00.008: %SYS-5-CONFIG_I: Configured from console by console
D2#show ntp status
Clock is unsynchronized, stratum 16, no reference clock
nominal freq is 1000.0003 Hz, actual freq is 1000.0003 Hz, precision is 2**14
ntp uptime is 400 (1/100 of seconds), resolution is 1000
reference time is 00000000.00000000 (00:00:00.000 UTC Mon Jan 1 1900)
clock offset is 0.0000 msec, root delay is 0.00 msec
root dispersion is 0.05 msec, peer dispersion is 0.00 msec
loopfilter state is 'FSET' (Drift set from file), drift is 0.000000000 s/s
system poll interval is 8, never updated.
D2#

```

Figura 83. NTP D2

A1# ntp server 10.0.10.1

```

A1#sh
*Nov 27 04:49:40.878: %SYS-5-CONFIG_I: Configured from console by console
A1#sh ntp status
Clock is unsynchronized, stratum 16, no reference clock
nominal freq is 1000.0003 Hz, actual freq is 1000.0003 Hz, precision is 2**14
ntp uptime is 1800 (1/100 of seconds), resolution is 1000
reference time is 00000000.00000000 (00:00:00.000 UTC Mon Jan 1 1900)
clock offset is 0.0000 msec, root delay is 0.00 msec
root dispersion is 0.25 msec, peer dispersion is 0.00 msec
loopfilter state is 'FSET' (Drift set from file), drift is 0.000000000 s/s
system poll interval is 8, never updated.
A1#

```

Figura 84. NTP A1

R3# ntp server 10.0.10.1

```

R3#show ntp st
Clock is unsynchronized, stratum 16, no reference clock
nominal freq is 250.0000 Hz, actual freq is 250.0000 Hz, precision is 2**18
ntp uptime is 53400 (1/100 of seconds), resolution is 4000
reference time is 00000000.00000000 (00:00:00.000 UTC Mon Jan 1 1900)
clock offset is 0.0000 msec, root delay is 0.00 msec
root dispersion is 8.00 msec, peer dispersion is 0.00 msec
loopfilter state is 'NSET' (Never set), drift is 0.000000000 s/s
system poll interval is 8, never updated.
R3#

```

Figura 85. NTP A1

R2# ntp server 10.0.10.1

```
R2#sh ntp st
Clock is unsynchronized, stratum 3, reference is 127.127.1.1
nominal freq is 250.0000 Hz, actual freq is 250.0000 Hz, precision is 2**19
ntp uptime is 10600 (1/100 of seconds), resolution is 4000
reference time is E54D9304.C6AAA10B (05:32:52.776 UTC Sun Nov 28 2021)
clock offset is 0.0000 msec, root delay is 0.00 msec
root dispersion is 62.80 msec, peer dispersion is 62.72 msec
loopfilter state is 'FREQ' (Drift being measured), drift is 0.000000000 s/s
system poll interval is 16, last update was 6 sec ago.
R2#
```

Figura 86. NTP A1

#### 6.4 Configure Syslog en todos los dispositivos excepto R2

R1#  
logging host 10.0.100.5  
logging trap warning  
logging on

```
R1#Show run | include logging
logging trap warnings
logging host 10.0.100.5
logging synchronous
logging synchronous
R1#
```

Figura 87. Show run | include logging R1

R3#  
logging host 10.0.100.5  
logging trap warning  
logging on

```
R3#Show run | include logging
logging trap warnings
logging host 10.0.100.5
logging synchronous
logging synchronous
R3#
```

Figura 88. Show run | include logging R3

A1#  
logging host 10.0.100.5  
logging trap warning  
logging on

```
A1#Show run | include logging
logging trap warnings
logging host 10.0.100.5
 logging synchronous
 logging synchronous
 logging synchronous
A1#
```

Figura 89. Show run | include logging A1

```
D1#
logging host 10.0.100.5
logging trap warning
logging on
```

```
D1#Show run | include logging
*Nov 28 05:22:07.004: %SYS-5-CON
logging host 10.0.100.5
 logging synchronous
 logging synchronous
 logging synchronous
D1#
```

Figura 90. Show run | include logging D1

```
D2#
logging host 10.0.100.5
logging trap warning
logging on
```

```
D2#Show run | include logging
logging trap warnings
logging host 10.0.100.5
 logging synchronous
 logging synchronous
 logging synchronous
D2#
```

Figura 91. Show run | include logging D2

## 6.5 Configure SNMPv2c en todos los dispositivos excepto R2

```
R1# show run | include snmp
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
```

```

snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server enable traps bgp
snmp-server host 10.0.100.5 version 2c ENCORSA

```



```

R1#
*Nov 22 15:22:57.975: %SYS-5-CONFIG_I: Configured from console by console
R1#show run | include snmp
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps entity-sensor threshold
snmp-server enable traps bgp
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA
R1#

```

*Figura 92. show run | include snmp R1*

```

R3# show run | include snmp
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA

```

```
R3#show run | include snmp
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps entity-sensor threshold
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA
R3#
```

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*Figura 93. show run | include snmp R3*

```
D1# show run | include snmp
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA
```

```
D1#
D1#show run | include snmp
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server chassis-id
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server host 10.0.100.5 version 2c ENCORSA
D1#
```

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*Figura 94. show run | include snmp*

```
D2# show run | include snmp
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA
```

```
*Nov 22 04:13:22.264: %SYS-5-CONFIG_I: Configured from console by console
D1#~
% Unknown command or computer name, or unable to find computer address
D1#
D1#show run | include snmp
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server chassis-id
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server host 10.0.100.5 version 2c ENCORSA
D1#
```

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*Figura 95. show run | include snmp*

```
A1# show run | include snmp
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server chassis-id
snmp-server host 10.0.100.5 version 2c ENCORSA
```

```
A1#show run | include snmp
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server chassis-id
snmp-server host 10.0.100.5 version 2c ENCORSA
A1#
```

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*Figura 96. show run | include snmp A1*

## 7. CONCLUSIONES

Utilicé el simulador Packet Tracer y permitió realizar diferentes análisis y pruebas, observando el comportamiento de cada dispositivo, con los diversos protocolos y comandos para el desarrollo de la actividad.

Se configuraron los Router y switches dados en la guía, donde se mostró en al final del escenario una red convergente.

Adquirí habilidades en la parte de gestion de redes, profundizando más mis conocimientos, implementado e interpretando la problemática.

Es importante diseñar e implementar administraciones con este tipo de topologías que comparten datos, ya que a menudo nos encontramos con empresas que buscan fortalecer y dar soluciones de seguridad y redes.

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