

INFORME DE AVANCE PRUEBAS DE HABILIDADES PRACTICAS

OSWALDO ENRIQUE PERCIA BLANCO

UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA -UNAD
ESCUELA DE CIENCIAS BASICAS, TECNOLOGÍA E INGENERÍA-ECBTI
INGENIERIA ELECTRÓNICA
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OSWALDO ENRIQUE PERCIA BLANCO

Diplomado de opción de grado presentado para optar el título
de ingeniería electrónica

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2022

NOTA DE ACEPTACION

Firma del presidente del Jurado

Firma del Jurado

Firma del Jurado

Atlántico, 19 de noviembre de 2022

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GLOSARIO

BGP: Es un protocolo escalable de Dynamic routing usado en la Internet por grupos de enrutadores para compartir información de enrutamiento. BGP usa parámetros de ruta o atributos para definir políticas de enrutamiento y crear un entorno de enrutamiento estable. Ese protocolo permite que divulgue más de un camino hacia y desde la Internet a su red y recursos, lo que le ofrece caminos redundantes y puede aumentar su tiempo de actividad.

ASN: Un sistema autónomo se define como “un grupo de redes IP que poseen una política de rutas propia e independiente”. Esta definición hace referencia a la característica fundamental de un Sistema Autónomo: realiza su propia gestión del tráfico que fluye entre él y los restantes Sistemas Autónomos que forman Internet.

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

VLAN: Es un método para crear redes lógicas independientes dentro de una misma red física. Varias VLAN pueden coexistir en un único conmutador físico o en una única red física.

PuTTY: Es un cliente SSH, Telnet, rlogin, y TCP raw con licencia libre. Disponible originalmente solo para Windows, ahora también está disponible en varias plataformas Unix, y se está desarrollando la versión para Mac OS clásico y Mac OS.

GNS3: Es un simulador gráfico de red lanzado en 2008, que te permite diseñar topologías de red complejas y poner en marcha simulaciones sobre ellos, permitiendo la combinación de dispositivos tanto reales como virtuales.

SWITCH: Trabaja esencialmente en la capa 2 de una red OSI, el enlace de datos, y utiliza direcciones MAC sin utilizar direcciones IP. Por su parte, el routers lo hace en la capa 3 y se encarga del enrutamiento utilizando direcciones IP.

RSTP: Es un protocolo de red de la segunda capa OSI, que gestiona enlaces redundantes. Especificado en IEEE 802.1w, es una evolución del Spanning tree Protocol, reemplazándolo en la edición 2004 del 802.1d.

LACP: Es un término que indica el establecimiento de una red de datos que describe cómo utilizar varios enlaces Ethernet full-dúplex en la comunicación entre dos equipos, repartiendo el tráfico entre ellos.

RESUMEN

Este documento está desarrollado en base a opción de grado de la facultad ingeniería electrónica, de la universidad abierta y a distancia.

Desarrollaremos las rutas del planteamiento para fortalecer habilidades y ejecutar las prácticas de habilidades CCNP, teniendo como escenario un protocolo de simulaciones que ejecutaremos gracias a las herramientas GNS3, donde plantearemos los montajes y la manipulación de las topologías utilizando el protocolo IOS de los dispositivos CISCO.

Los escenarios proponen, configurar un método de simulaciones de redes creando una topología de enrutamientos, esto va orientado a la programación del sistema de dispositivos existente en las actividades; en el laboratorio del escenarios, adoptaremos un planteamiento básico de comutación de redes de programación, teniendo como adaptadores programables, como son; swicht, routers y PC, estos dispositivos en interconexiones crean un sistema electrónico de comunicación, implementando un conjunto de funcionalidades mediante interfaces del programa, esto nos da una solución de respuestas logrando proporcionar acceso de verificación, con el objetivo de monitorear el estado de ejecución y configuración del sistema.

Palabra clave: CCNP, GNS3, CISCO, comutación, swicht, routers, PC.

ABSTRACT

This document is developed based on the degree option of the electronic engineering faculty, of the open and distance university.

We will develop the routes of the approach to strengthen skills and execute the CCNP skills practices, taking as a scenario a simulation protocol that we will execute thanks to the GNS3 tools, where we will propose the assemblies and manipulation of the topologies using the IOS protocol of the CISCO devices.

The scenarios propose configuring a method of network simulations creating a routing topology, this is oriented to the programming of the existing device system in the activities; In the laboratory of the scenarios, we will adopt a basic exposition of commutation of programming networks, having as programmable adapters, as they are; switch, rosters and PC, these devices in interconnections create an electronic communication system, implementing a set of functionalities through program interfaces, this gives us a response solution, managing to provide verification access, with the objective of monitoring the execution status and system configuration.

Keyword: CCNP, GNS3, CISCO, commutation, swicht, routers, PC.

INTRODUCCION

En el presente trabajo, desarrollaremos la actividad correspondiente al Diplomando Cisco CCNP, donde ejecutaremos la prueba de habilidades correspondiente al paso de prácticas de habilidad final del lineamiento del curso, este lleva como nombre; ENCOR Skills assessment (Escenario 1 y 2). Este escenario consta de una topología estructurada ya definida, permitiendo la comunicación de redes con los dispositivos a implementar, esta interacción de comunicación consta; routers, switch y PC; iniciaremos el paso a paso con la configuración de los programas o herramienta para trabajar en GNS3, implementaremos la metodología para la conmutación y enlace de los programas y sus diferentes interacciones, debemos crear en GNS3 una la máquina virtual, donde con ayudas de otros programas lograremos la ejecución el diseño de nuestra actividad.

En el siguiente paso implementaremos las configuraciones de las direcciones IP en cada uno de los dispositivos IPv4 y IPv6, desarrollaremos el cronograma de la experiencia instalando cada dispositivo y conmutando sus conexiones, manejando los protocolos de las diferentes características de cada uno de ellos, teniendo los enlaces de VLAN, LACP; OSPF, LAN y cada uno de los enrutamientos de BGP, para así ejecutar la experiencia práctica de habilidades.

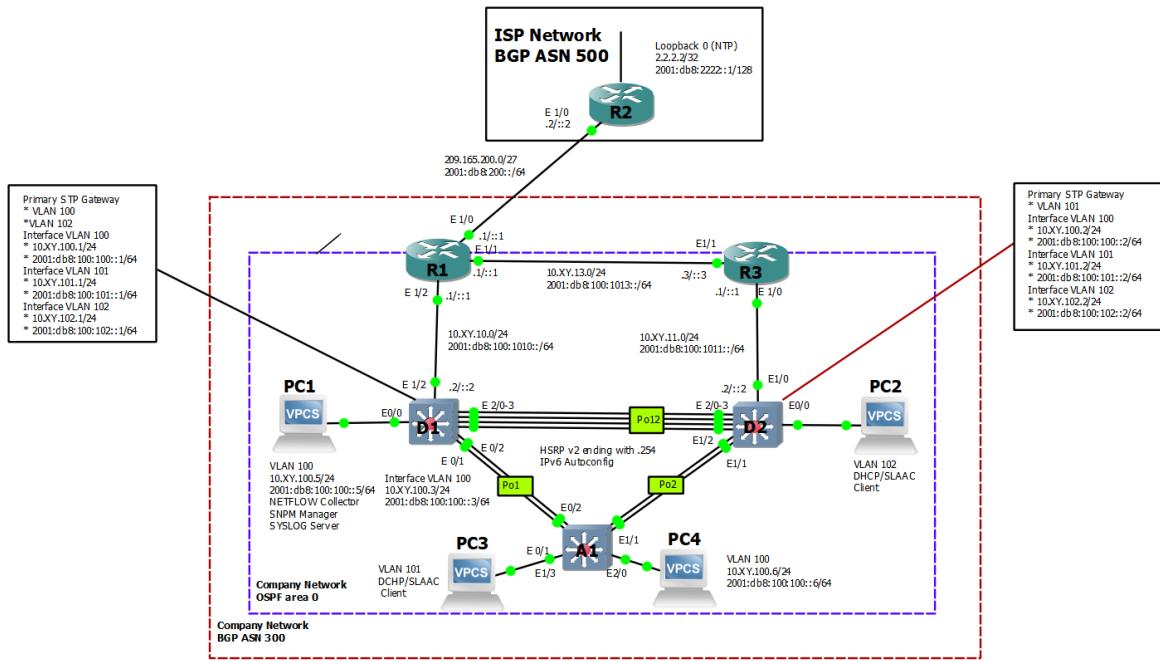
Por último, implementaremos las ejecución y verificación de los enlaces de cada uno de los dispositivos, donde nos muestra la respuesta en tiempo real, su funcionamiento y protocolo de respuesta del sistema de redes, esta experiencia corresponde a una serie de metodología interpuesta en toda la ejecución de la actividad de Cisco.

PARTE 1: ENCOR Skills assessment

(Escenario 1)

1.1. Topología

Figura 1. topología



Fuente: Guía UNAD CCNP - Escenario 1 Prueba de habilidades

Tabla de direccionamiento

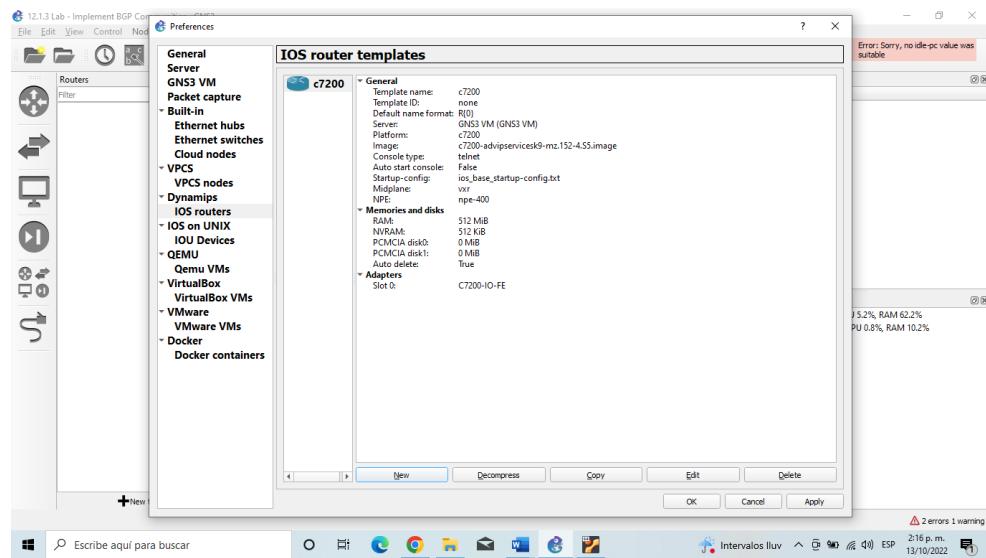
Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	E1/0	209.165.200.225/27	2001:db8:200::1/64	fe80::1:1
	E1/2	10.11.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	E1/1	10.11.13.1/24	2001:db8:100:1013::1/64	fe80::1:3
R2	E1/0	209.165.200.226/27	2001:db8:200::2/64	fe80::2:1
	Loopback0	2.2.2.2/32	2001:db8:2222::1/128	fe80::2:3
R3	E1/0	10.11.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
	E1/1	10.11.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	E1/2	10.11.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
	VLAN 100	10.11.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10.11.101.1/24	2001:db8:100:101::1/64	fe80::d1:3

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
	VLAN 102	10.11.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	E1/0	10.11.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10.11.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
	VLAN 101	10.11.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10.11.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.11.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.11.100.5/24	2001:db8:100:100::5/64	EUI-64
PC2	NIC	DHCP	SLAAC	EUI-64
PC3	NIC	DHCP	SLAAC	EUI-64
PC4	NIC	10.11.100.6/24	2001:db8:100:100::6/64	EUI-64

Recursos necesarios

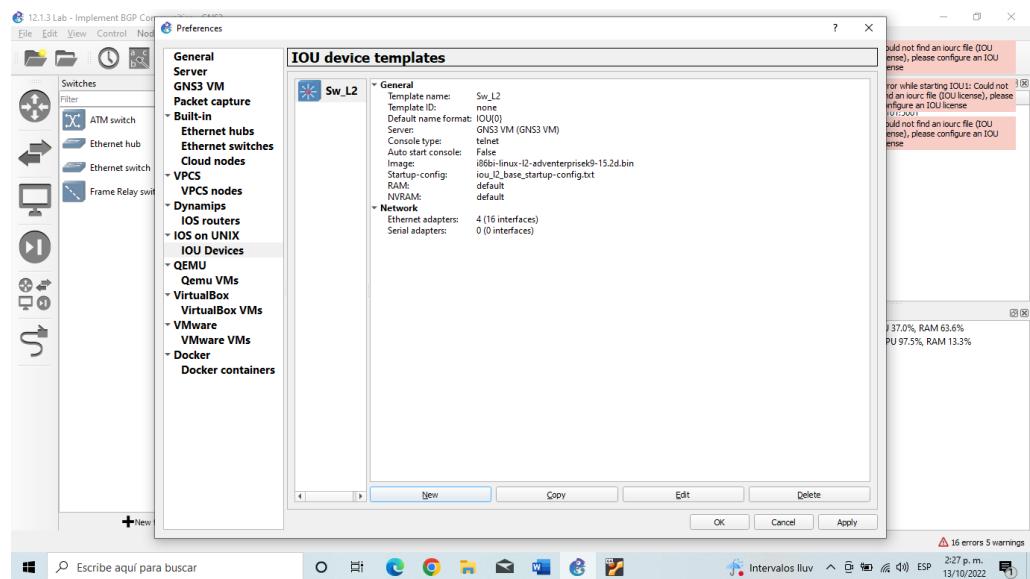
Routers (Cisco 7200). [Click on the download link of the images for GNS3.](#)

Figura 2. topología del Router



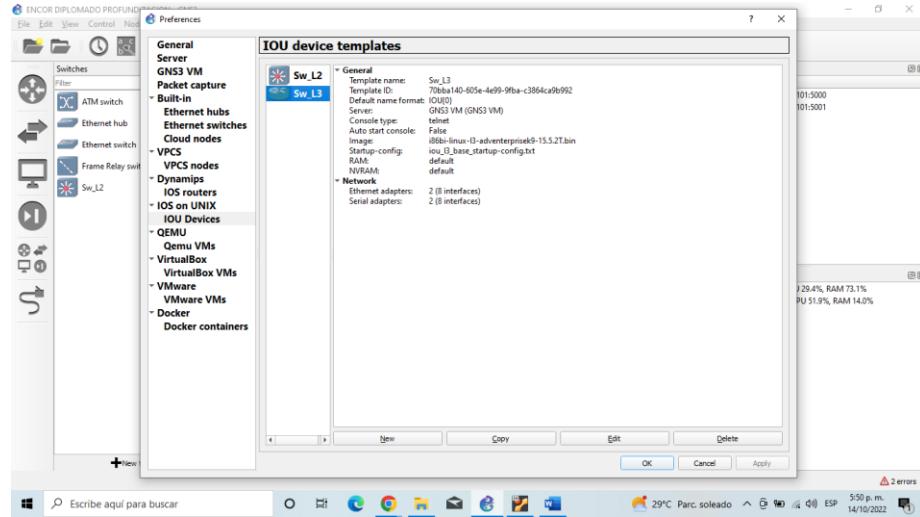
Switches (Cisco IOU L2). [Click on the download link of the images for GNS3.](#)

Figura 3. topología del switch Sw_L2



Cisco IOU L3

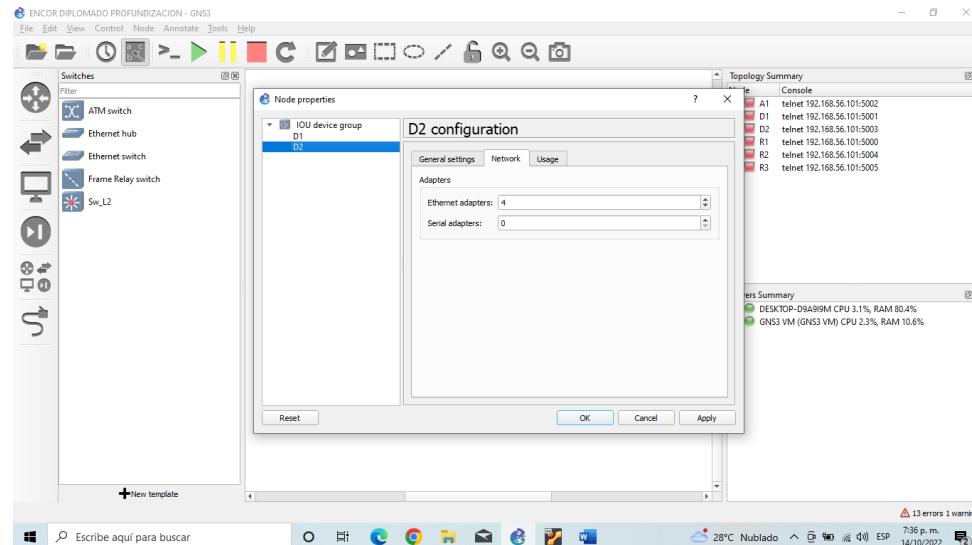
Figura 4. topologia del switch Sw_L3



4 PCs (Use the GNS3's VPCS)

After the configuration of devices in GNS3, the Slots of the network adapters of the SW must be configured as follows:

Figura 5. configuration switch D1



Configuración del programa putty

Figura 6. configuracion de licencia de los swicht

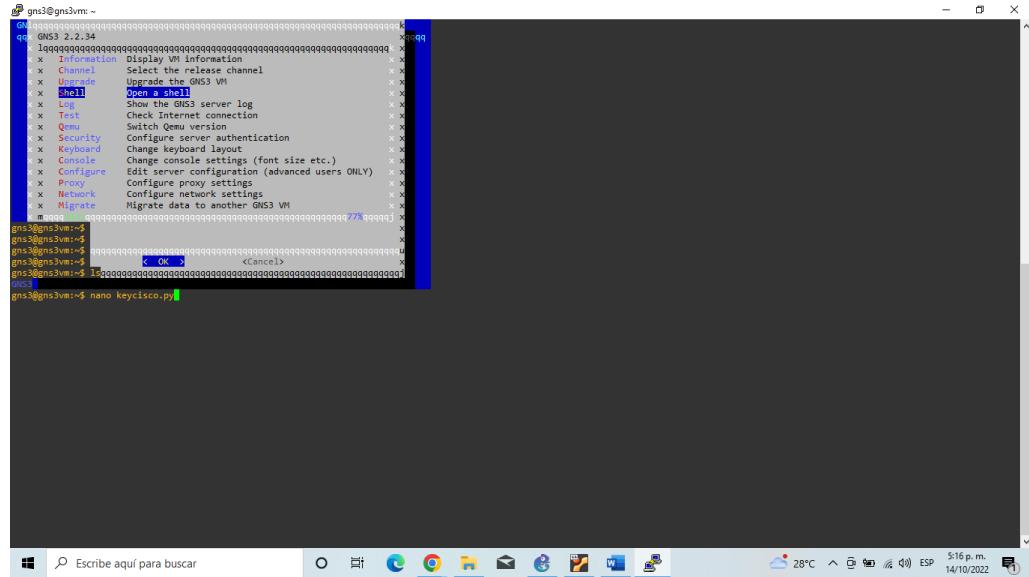


Figura 7. de configuracion de parametros Putty

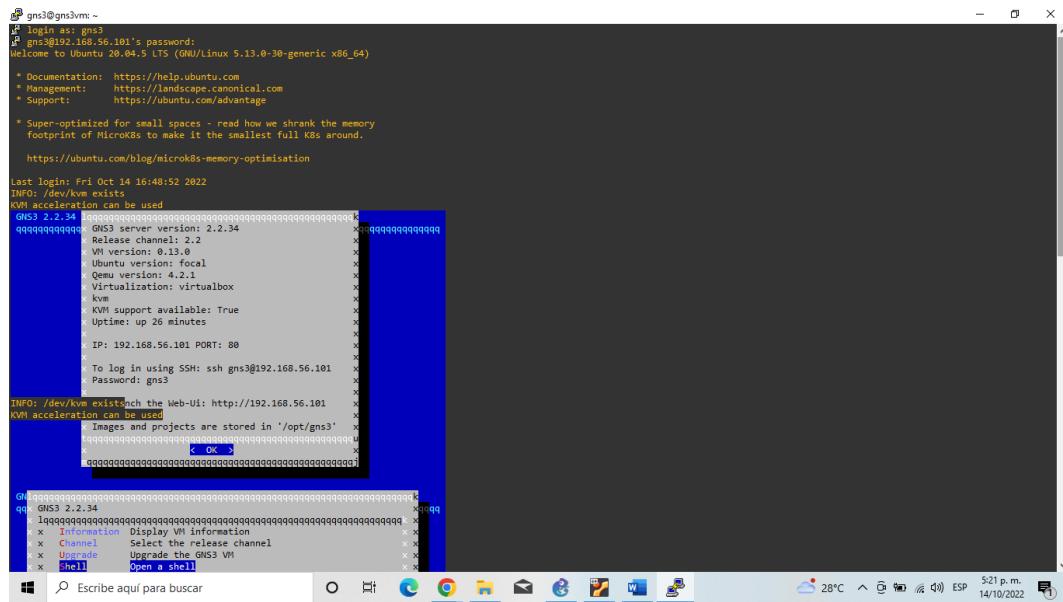


Figura 8. Configuracion de enlace de programacion Putty

Configuración de Reuters

Figura 9. configuracion Router c7200 R1

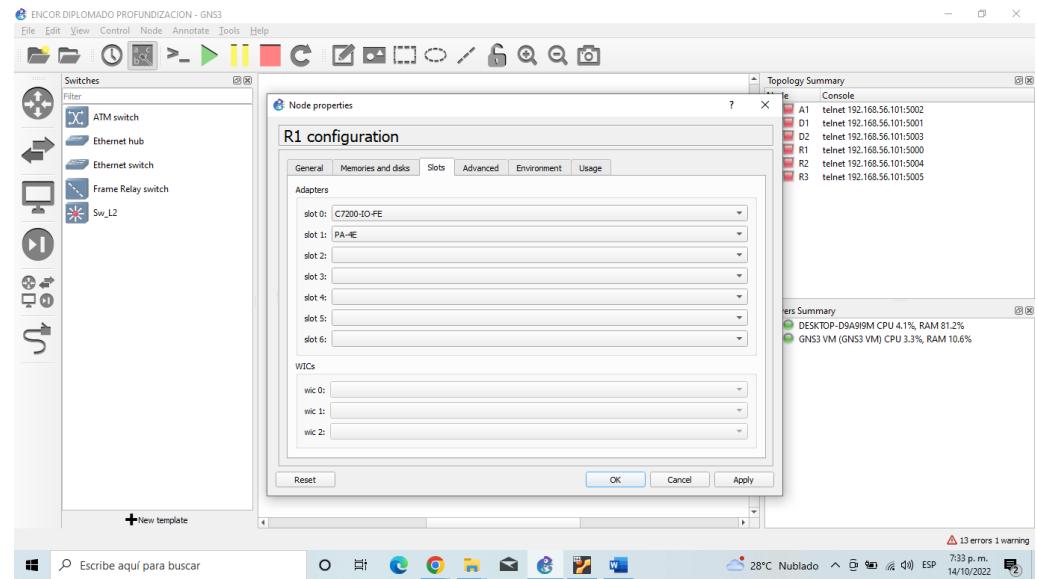


Figura 10. configuracion Router c7200 R2

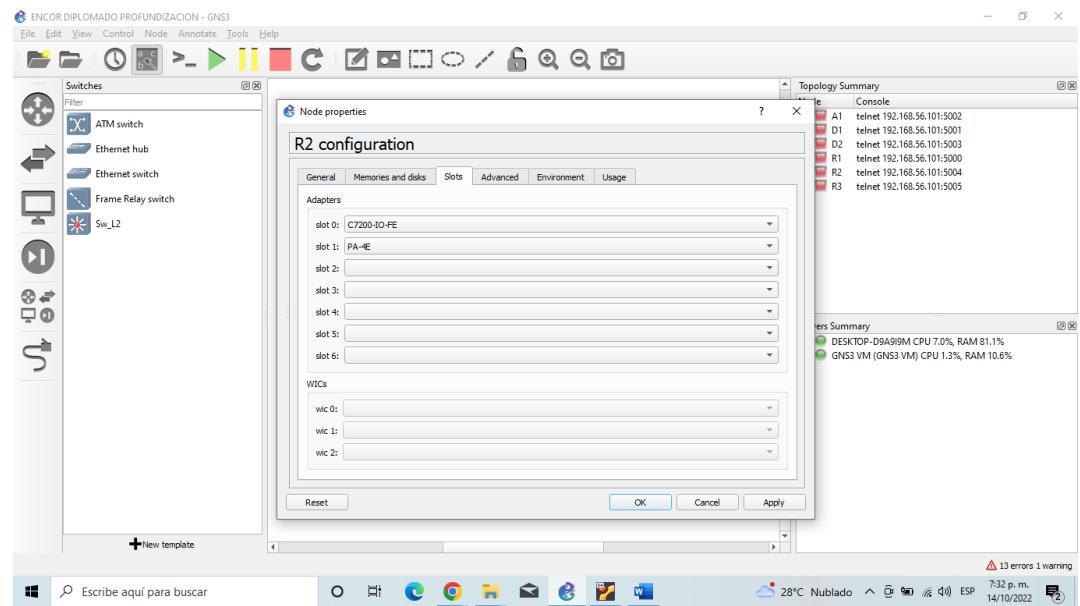
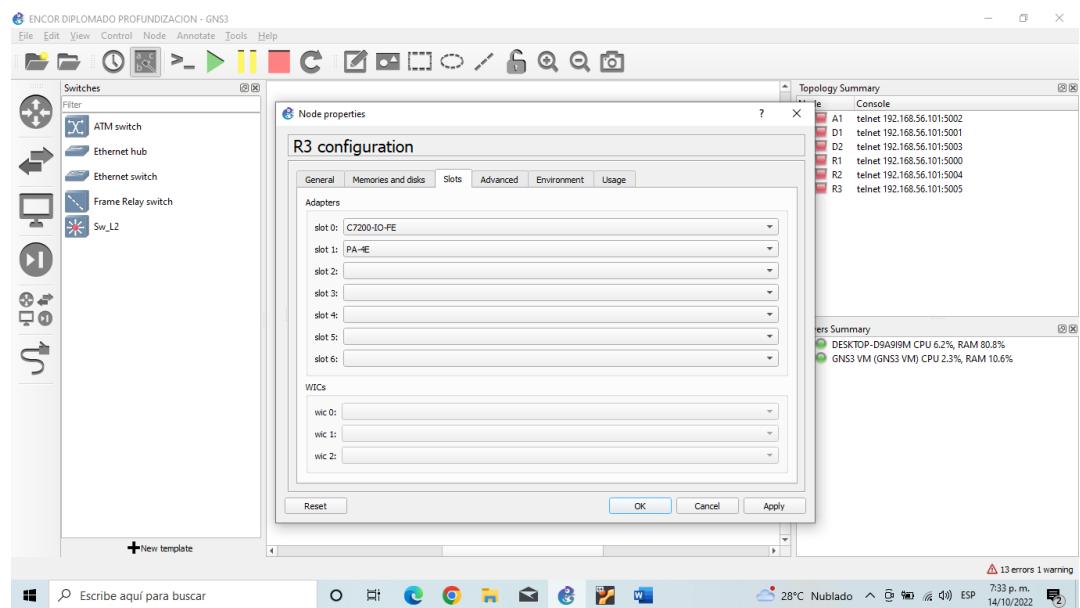


Figura 11. configuracion Router c7200 R3



1.2. Diseño de Topología programa GNS3

Figura 12. diseño de swicht y router

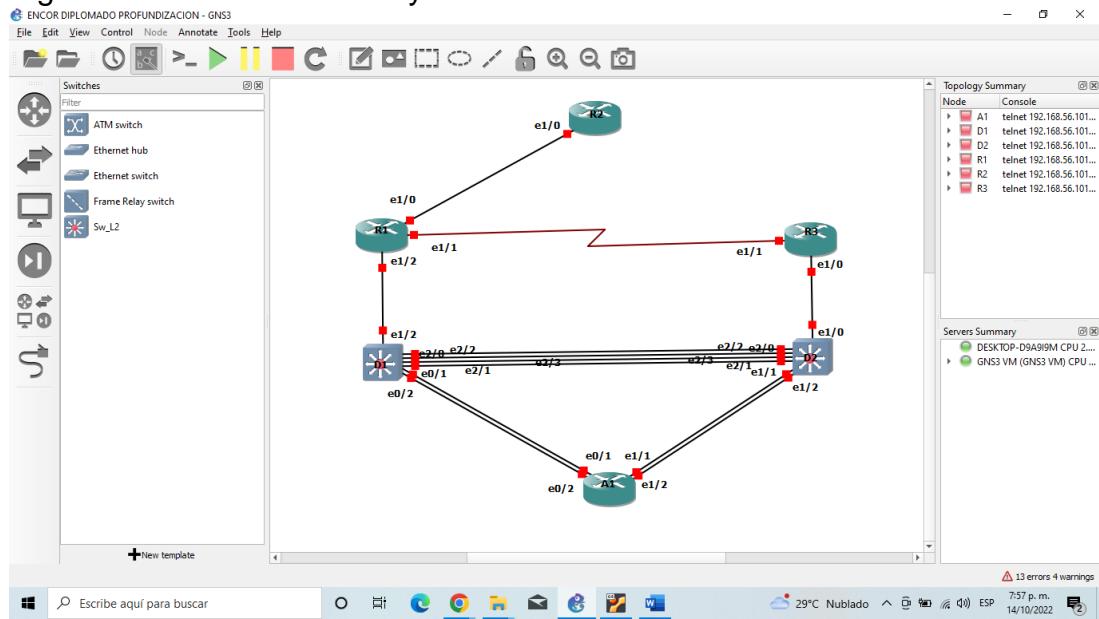
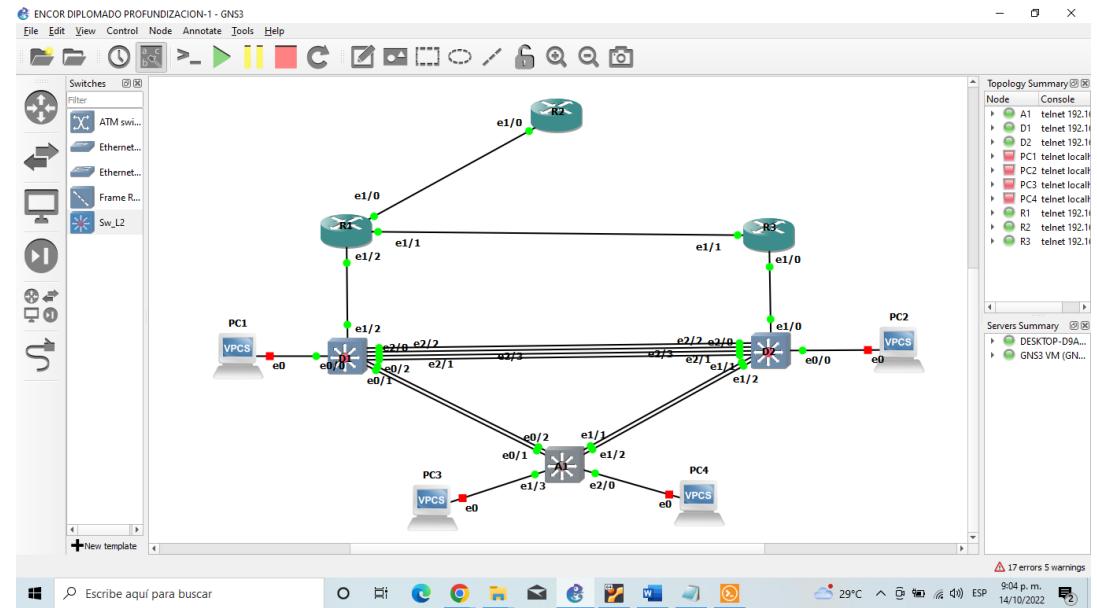


Figura 13. diseño de topología completa.



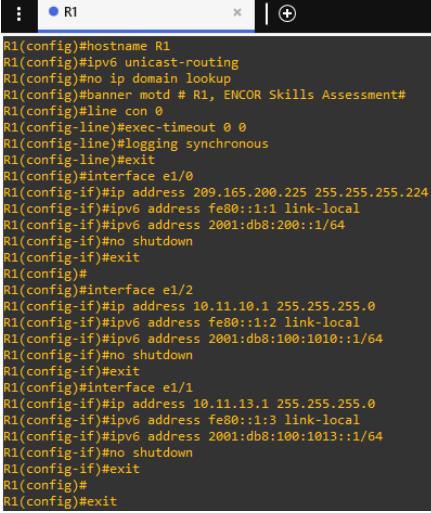
1.3. Configuraciones básicas de cada dispositivo

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

Router R1

```
hostname R1
ipv6 unicast-routing
no ip domain lookup
banner motd # R1, ENCOR Skills Assessment#
line con 0
exec-timeout 0 0
logging synchronous
exit
interface e1/0
ip address 209.165.200.225 255.255.255.224
ipv6 address fe80::1:1 link-local
ipv6 address 2001:db8:200::1/64
no shutdown
exit
interface e1/2
ip address 10.11.10.1 255.255.255.0
ipv6 address fe80::1:2 link-local
ipv6 address 2001:db8:100:1010::1/64
no shutdown
exit
interface e1/1
ip address 10.11.13.1 255.255.255.0
ipv6 address fe80::1:3 link-local
ipv6 address 2001:db8:100:1013::1/64
no shutdown
exit
```

Figura 14. configuracion Router R1



A terminal window titled 'R1' displaying configuration commands. The window has a standard OS X-style title bar with icons for minimize, maximize, and close. The text area contains the following configuration script:

```
R1(config)#hostname R1
R1(config)#ipv6 unicast-routing
R1(config)#no ip domain lookup
R1(config)#banner motd # R1, ENCOR Skills Assessment#
R1(config)#line con 0
R1(config-line)#exec-timeout 0 0
R1(config-line)#logging synchronous
R1(config-line)#exit
R1(config)#interface e1/0
R1(config-if)#ip address 209.165.200.225 255.255.255.224
R1(config-if)#ipv6 address fe80::1:1 link-local
R1(config-if)#ipv6 address 2001:db8:200::1/64
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#
R1(config)#interface e1/1
R1(config-if)#ip address 10.11.10.1 255.255.255.0
R1(config-if)#ipv6 address fe80::1:2 link-local
R1(config-if)#ipv6 address 2001:db8:100:1010::1/64
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#
R1(config)#exit
```

Router R2

```
hostname R2
ipv6 unicast-routing
no ip domain lookup
banner motd # R2, ENCOR Skills Assessment#
line con 0
exec-timeout 0 0
logging synchronous
exit
interface e1/0
ip address 209.165.200.226 255.255.255.224
ipv6 address fe80::2:1 link-local
ipv6 address 2001:db8:200::2/64
no shutdown
exit
interface Loopback 0
ip address 2.2.2.2 255.255.255.255
ipv6 address fe80::2:3 link-local
ipv6 address 2001:db8:2222::1/128
no shutdown
exit
```

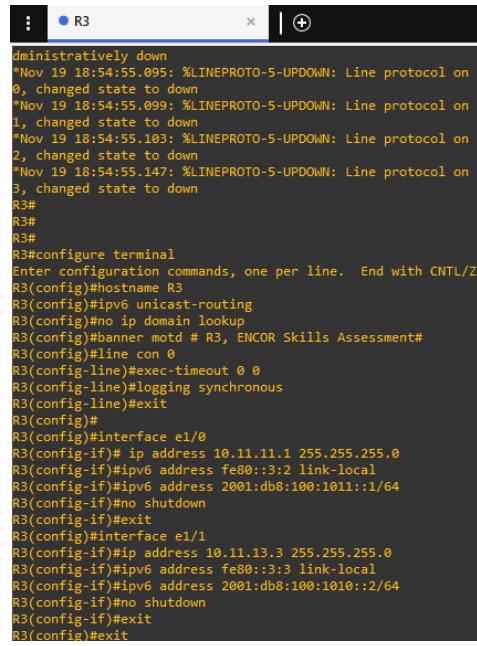
Figura 15. configuracion Router R2

```
R2#  
R2#  
R2#  
R2#  
R2#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
R2(config)#hostname R2  
R2(config)#ipv6 unicast-routing  
R2(config)#no ip domain lookup  
R2(config)#banner motd # R2, ENCOR Skills Assessment#  
R2(config)#line con 0  
R2(config-line)#exec-timeout 0 0  
R2(config-line)#logging synchronous  
R2(config-line)#exit  
R2(config)#  
R2(config)#interface e1/0  
R2(config-if)#ip address 209.165.200.226 255.255.255.224  
R2(config-if)#ipv6 address fe80::2:1 link-local  
R2(config-if)#ipv6 address 2001:db8:200::2/64  
R2(config-if)#no shutdown  
R2(config-if)#exit  
R2(config)#  
R2(config)#interface Loopback 0  
R2(config-if)#ip address 2.2.2.2 255.255.255.255  
R2(config-if)#ipv6 address fe80::2:3 link-local  
R2(config-if)#ipv6 address 2001:db8:2222::1/128  
R2(config-if)#no shutdown  
R2(config-if)#exit  
R2(config)#exit  
R2#
```

Router R3

```
hostname R3  
ipv6 unicast-routing  
no ip domain lookup  
banner motd # R3, ENCOR Skills Assessment#  
line con 0  
exec-timeout 0 0  
logging synchronous  
exit  
interface e1/0  
ip address 10.11.11.1 255.255.255.0  
ipv6 address fe80::3:2 link-local  
ipv6 address 2001:db8:100:1011::1/64  
no shutdown  
exit  
interface e1/1  
ip address 10.11.13.3 255.255.255.0  
ipv6 address fe80::3:3 link-local  
ipv6 address 2001:db8:100:1010::2/64  
no shutdown  
exit
```

Figura 16. configuracion Router R3



A terminal window titled 'R3' showing configuration logs. The logs include several 'LINEPROTO-5-UPDOWN' events indicating line protocol state changes between down and up. The configuration itself starts with 'configure terminal' and includes commands like 'hostname R3', 'ip unicast-routing', 'no ip domain lookup', 'banner motd', 'line con 0', 'exec-timeout 0 0', 'logging synchronous', and interface configurations for e1/0 and e1/1.

```
dministratively down
*Nov 19 18:54:55.095: %LINEPROTO-5-UPDOWN: Line protocol on I
0, changed state to down
*Nov 19 18:54:55.099: %LINEPROTO-5-UPDOWN: Line protocol on I
1, changed state to down
*Nov 19 18:54:55.103: %LINEPROTO-5-UPDOWN: Line protocol on I
2, changed state to down
*Nov 19 18:54:55.147: %LINEPROTO-5-UPDOWN: Line protocol on I
3, changed state to down
R3#
R3#
R3#
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#hostname R3
R3(config)#ipv6 unicast-routing
R3(config)#no ip domain lookup
R3(config)#banner motd # R3, ENCOR Skills Assessment#
R3(config)#line con 0
R3(config-line)#exec-timeout 0 0
R3(config-line)#logging synchronous
R3(config-line)#exit
R3(config)#
R3(config)#interface e1/0
R3(config-if)# ip address 10.11.11.1 255.255.255.0
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)#interface e1/1
R3(config-if)#ip address 10.11.13.3 255.255.255.0
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)#exit
```

Switch D1

```
hostname D1
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D1, ENCOR Skills Assessment#
line con 0
exec-timeout 0 0
logging synchronous
exit
vlan 100
name Management
exit
vlan 101
name UserGroupA
exit
vlan 102
name UserGroupB
exit
vlan 999
```

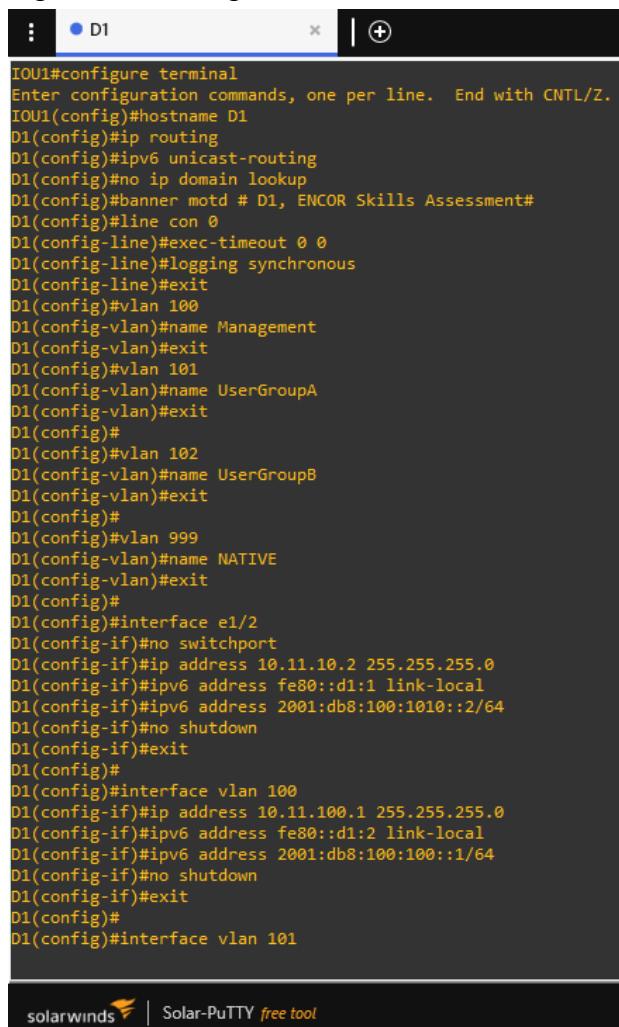
```
name NATIVE
exit
interface e1/2
no switchport
ip address 10.11.10.2 255.255.255.0
ipv6 address fe80::d1:1 link-local
ipv6 address 2001:db8:100:1010::2/64
no shutdown
exit
interface vlan 100
ip address 10.11.100.1 255.255.255.0
ipv6 address fe80::d1:2 link-local
ipv6 address 2001:db8:100:100::1/64
no shutdown
exit
interface vlan 101
ip address 10.11.101.1 255.255.255.0
ipv6 address fe80::d1:3 link-local
ipv6 address 2001:db8:100:101::1/64
no shutdown
exit
interface vlan 102
ip address 10.11.102.1 255.255.255.0
ipv6 address fe80::d1:4 link-local
ipv6 address 2001:db8:100:102::1/64
no shutdown
exit
ip dhcp excluded-address 10.11.101.1 10.11.101.109
ip dhcp excluded-address 10.11.101.141 10.11.101.254
ip dhcp excluded-address 10.11.102.1 10.11.102.109
ip dhcp excluded-address 10.11.102.141 10.11.102.254
ip dhcp pool VLAN-101
network 10.11.101.0 255.255.255.0
default-router 10.11.101.254
exit
ip dhcp pool VLAN-102
```

```

network 10.11.102.0 255.255.255.0
default-router 10.11.102.254
exit
interface range e0/0-3,e1/0-1,e1/3,e2/0-3,e3/0-3
shutdown
exit

```

Figura 17. configuracion Switch D1



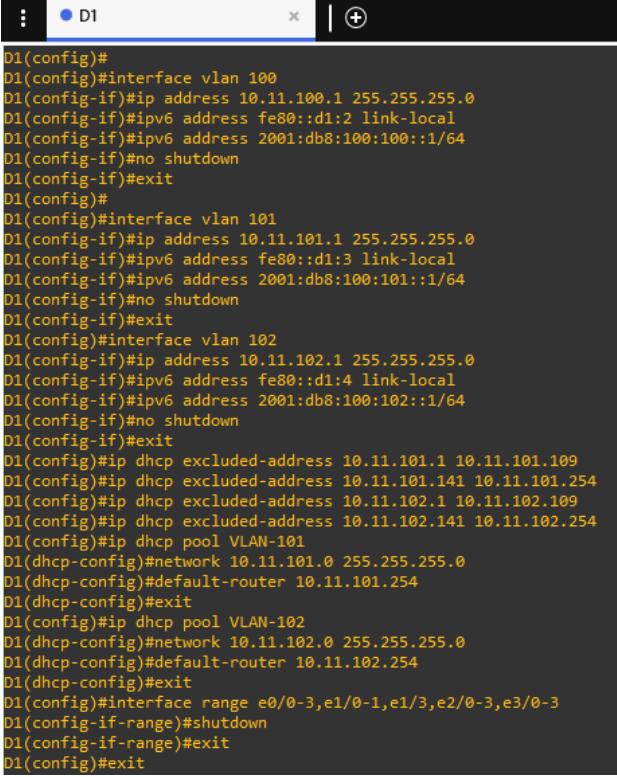
```

IOU1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
IOU1(config)#hostname D1
D1(config)#ip routing
D1(config)#ipv6 unicast-routing
D1(config)#no ip domain lookup
D1(config)#banner motd # D1, ENCOR Skills Assessment#
D1(config)#line con 0
D1(config-line)#exec-timeout 0 0
D1(config-line)#logging synchronous
D1(config-line)#exit
D1(config)#vlan 100
D1(config-vlan)#name Management
D1(config-vlan)#exit
D1(config)#vlan 101
D1(config-vlan)#name UserGroupA
D1(config-vlan)#exit
D1(config)#
D1(config)#vlan 102
D1(config-vlan)#name UserGroupB
D1(config-vlan)#exit
D1(config)#
D1(config)#vlan 999
D1(config-vlan)#name NATIVE
D1(config-vlan)#exit
D1(config)#
D1(config)#interface e1/2
D1(config-if)#no switchport
D1(config-if)#ip address 10.11.10.2 255.255.255.0
D1(config-if)#ipv6 address fe80::d1:1 link-local
D1(config-if)#ipv6 address 2001:db8:100:1010::2/64
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#
D1(config)#interface vlan 100
D1(config-if)#ip address 10.11.100.1 255.255.255.0
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)#
D1(config)#interface vlan 101

```

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Figura 18. configuracion Switch D1



A terminal window titled 'D1' showing the configuration commands for Switch D1. The window has a dark background with white text. The configuration includes setting up VLANs 100, 101, and 102 with their respective IP addresses and subnet masks. It also configures DHCP pools for each VLAN and sets default routers. Finally, it creates interface ranges for ports e0/0-3, e1/0-1, e1/3, e2/0-3, and e3/0-3.

```
D1(config)#interface vlan 100
D1(config-if)#ip address 10.11.100.1 255.255.255.0
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)#
D1(config)#interface vlan 101
D1(config-if)#ip address 10.11.101.1 255.255.255.0
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 10.11.102.1 255.255.255.0
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
D1(config-if)#exit
D1(config)#ip dhcp excluded-address 10.11.101.1 10.11.101.109
D1(config)#ip dhcp excluded-address 10.11.101.141 10.11.101.254
D1(config)#ip dhcp excluded-address 10.11.102.1 10.11.102.109
D1(config)#ip dhcp excluded-address 10.11.102.141 10.11.102.254
D1(config)#ip dhcp pool VLAN-101
D1(dhcp-config)#network 10.11.101.0 255.255.255.0
D1(dhcp-config)#default-router 10.11.101.254
D1(dhcp-config)#exit
D1(config)#ip dhcp pool VLAN-102
D1(dhcp-config)#network 10.11.102.0 255.255.255.0
D1(dhcp-config)#default-router 10.11.102.254
D1(dhcp-config)#exit
D1(config)#interface range e0/0-3,e1/0-1,e1/3,e2/0-3,e3/0-3
D1(config-if-range)#shutdown
D1(config-if-range)#exit
D1(config)#exit
```

Switch D2

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

```
name UserGroupB
exit
vlan 999
name NATIVE
exit
interface e1/0
no switchport
ip address 10.11.11.2 255.255.255.0
ipv6 address fe80::d1:1 link-local
ipv6 address 2001:db8:100:1011::2/64
no shutdown
exit
interface vlan 100
ip address 10.11.100.2 255.255.255.0
ipv6 address fe80::d2:2 link-local
ipv6 address 2001:db8:100:100::2/64
no shutdown
exit
interface vlan 101
ip address 10.11.101.2 255.255.255.0
ipv6 address fe80::d2:3 link-local
ipv6 address 2001:db8:100:101::2/64
no shutdown
exit
interface vlan 102
ip address 10.11.102.2 255.255.255.0
ipv6 address fe80::d2:4 link-local
ipv6 address 2001:db8:100:102::2/64
no shutdown
exit

ip dhcp excluded-address 10.11.101.1 10.11.101.209
ip dhcp excluded-address 10.11.101.241 10.11.101.254
ip dhcp excluded-address 10.11.102.1 10.11.102.209
ip dhcp excluded-address 10.11.102.241 10.11.102.254
ip dhcp pool VLAN-101
```

```

network 10.11.101.0 255.255.255.0
default-router 11.0.101.254
exit
ip dhcp pool VLAN-102
network 10.11.102.0 255.255.255.0
default-router 10.11.102.254
exit
interface range e0/0-3,e1/1-3,e2/0-3,e3/0-3
shutdown
exit

```

Figura 19. configuracion Switch D2

```

D2#configure terminal
Enter configuration commands, one per line. End with CNTL
D2(config)#hostname D2
D2(config)#ip routing
D2(config)#ipv6 unicast-routing
D2(config)#no ip domain lookup
D2(config)#banner motd # D2, ENCOR Skills Assessment#
D2(config)#line con 0
D2(config-line)#exec-timeout 0 0
D2(config-line)#logging synchronous
D2(config-line)#exit
D2(config)#
D2(config)#vlan 100
D2(config-vlan)#name Management
D2(config-vlan)#exit
D2(config)#
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)#
D2(config)#interface e1/0
D2(config-if)#no switchport
D2(config-if)#ip address 10.11.11.2 255.255.255.0
D2(config-if)#ipv6 address fe80::d1:1 link-local
D2(config-if)#ipv6 address 2001:db8:100:1011::2/64
D2(config-if)#no shutdown
D2(config-if)#exit
D2(config)#interface vlan 100
D2(config-if)#ip address 10.11.100.2 255.255.255.0
D2(config-if)#ipv6 address fe80::d2:2 link-local
D2(config-if)#ipv6 address 2001:db8:100:100::2/64
D2(config-if)#no shutdown
D2(config-if)#exit
D2(config)#
D2(config)#interface vlan 101
D2(config-if)#ip address 10.11.101.2 255.255.255.0

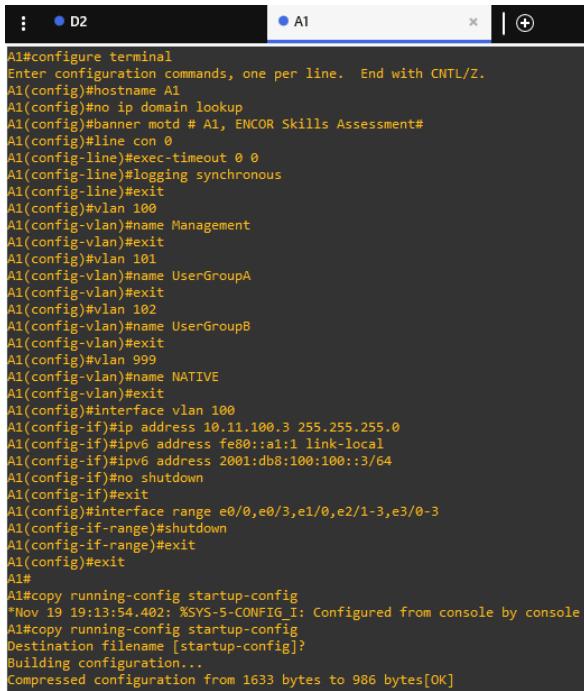
```

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Switch A1

```
hostname A1
no ip domain lookup
banner motd # A1, ENCOR Skills Assessment#
line con 0
exec-timeout 0 0
logging synchronous
exit
vlan 100
name Management
exit
vlan 101
name UserGroupA
exit
vlan 102
name UserGroupB
exit
vlan 999
name NATIVE
exit
interface vlan 100
ip address 10.11.100.3 255.255.255.0
ipv6 address fe80::a1:1 link-local
ipv6 address 2001:db8:100:100::3/64
no shutdown
exit
interface range e0/0,e0/3,e1/0,e2/1-3,e3/0-3
shutdown
exit
```

Figura 20. configuracion Switch A1

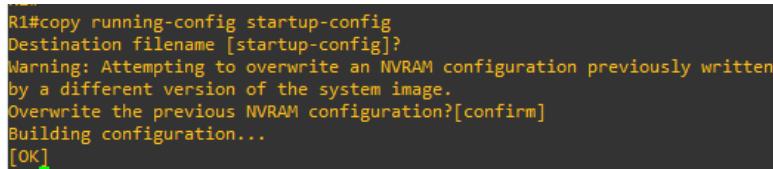


The screenshot shows a terminal window with two tabs: D2 and A1. The A1 tab is active and displays the following configuration script:

```
A1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#hostname A1
A1(config)#no ip domain lookup
A1(config)#banner motd # A1, ENCOR Skills Assessment#
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 10.11.100.3 255.255.255.0
A1(config-if)#ipv6 address fe80::a1:1 link-local
A1(config-if)#ipv6 address 2001:db8:100::3/64
A1(config-if)#no shutdown
A1(config-if)#exit
A1(config)#interface range e0/0,e0/3,e1/0,e2/1-3,e3/0-3
A1(config-if-range)#shutdown
A1(config-if-range)#exit
A1(config)#exit
A1#
A1#copy running-config startup-config
"Nov 19 19:13:54.402: %SYS-5-CONFIG_I: Configured from console by console"
A1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 1633 bytes to 986 bytes[OK]
```

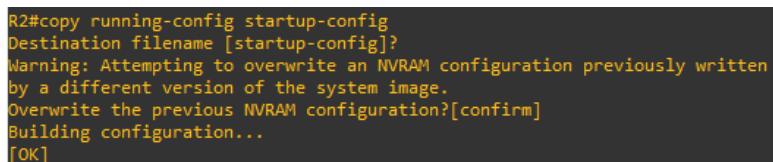
Guarde la configuración en ejecución en startup-config en todos los dispositivos.

Figura 21. configuracion startup-config R1



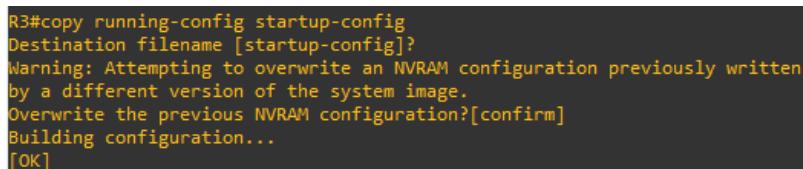
```
R1#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]
```

Figura 22.configuracion startup-config R2



```
R2#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...
[OK]
```

Figura 23. configuracion startup-config R3



```
R3#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...
[OK]
```

Figura 24. configuracion startup-config D1

```
IOU1#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 1361 bytes to 828 bytes[OK]
IOU1#
```

Figura 25. configuracion startup-config D2

```
D2#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 1359 bytes to 828 bytes[OK]
D2#
```

Figura 26. configuracion startup-config A1

```
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 1359 bytes to 828 bytes[OK]
A1#
```

Fuente: Aplicación GNS3(Autoría propia)

Para realizar el montaje del Escenario 1 fue necesario el uso de GNS3 y la máquina virtual VM. En este caso se hizo uso de 3 Reuters Cisco 7200 (R1, R2 Y R3) estos configurados previamente todos con Ethernet Adaptes, 3 suiches Cisco IOU L2 (D1, D2 Y A1) y 4 VPCS (PC1, PC2, PC3 Y PC4).

Una vez ubicado los elementos a usar se hicieron las respectivas conexiones teniendo en cuenta la Figura 1

Configure el direccionamiento de host de PC 1 y PC 4 como se muestra en la tabla de direccionamiento. Asigne una dirección de puerta de enlace predeterminada de 10.11.100.254, que será la dirección IP virtual de HSRP utilizada en la Parte 4.

Figura 27. direccionamiento del host PC1

```
PC1> ip 10.11.100.5/24 10.11.100.254
Checking for duplicate address...
PC1 : 10.11.100.5 255.255.255.0 gateway 10.11.100.254

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

Figura 28. direccionamiento del host PC2

```
PC4> ip 10.11.100.6/24 10.11.100.254
Checking for duplicate address...
PC1 : 10.11.100.6 255.255.255.0 gateway 10.11.100.254

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

El protocolo de los switch LAN es distribuir las tramas por medios de las capa 2, estos dispositivos ejecutan un host local de la red de ethernet. Las direcciones MAC del host que se verifican en red son asignado en esa dirección Mac a su propio puerto de switch Ethernet.

Configurar la red de capa 2 y la compatibilidad con el host, en esta parte de la evaluación de habilidades, completará la configuración de la red de capa 2 y configurará el soporte de host básico. Al final de esta parte, todos los interruptores deberían poder comunicarse. PC2 y PC3 deben recibir direccionamiento de DHCP y SLAAC, Sus tareas de configuración son las siguientes:

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

Switch D1

```
configure terminal  
interface range e2/0-3,e0/1-2  
switchport trunk encapsulation dot1q  
switchport mode trunk  
no shutdown  
exit
```

Figura 29. configuracion switch D1

```
D1#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
D1(config)#interface range e2/0-3,e0/1-2  
D1(config-if-range)#switchport trunk encapsulation dot1q  
D1(config-if-range)#switchport mode trunk  
D1(config-if-range)#no shutdown  
D1(config-if-range)#exit
```

Switch D2

```
configure terminal  
interface range e2/0-3,e1/1-2  
switchport trunk encapsulation dot1q  
switchport mode trunk  
no shutdown  
exit
```

Figura 30. configuracion switch D2

```
D2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#interface range e2/0-3,e1/1-2
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#no shutdown
D2(config-if-range)#exit
D2(config)#exit
```

Switch A1

```
configure terminal
interface range e0/1-2,e1/1-2
switchport trunk encapsulation dot1q
switchport mode trunk
no shutdown
exit
```

Figura 31. configuracion switch A1

```
A1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#interface range e0/1-2,e1/1-2
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#switchport mode trunk
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
A1(config)#exit
A1#
```

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

Switch D1

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

Figura 32. configuracion VLAN switch D1

```
I011#show int trunk

Port      Mode       Encapsulation  Status      Native vlan
Et0/1    on        802.1q         trunking   1
Et0/2    on        802.1q         trunking   1
Et2/0    on        802.1q         trunking   1
Et2/1    on        802.1q         trunking   1
Et2/2    on        802.1q         trunking   1
Et2/3    on        802.1q         trunking   1

Port      Vlans allowed on trunk
Et0/1    1-4094
Et0/2    1-4094
Et2/0    1-4094
Et2/1    1-4094
Et2/2    1-4094
Et2/3    1-4094

Port      Vlans allowed and active in management domain
Et0/1    1,100-102,999
Et0/2    1,100-102,999
Et2/0    1,100-102,999
Et2/1    1,100-102,999
Et2/2    1,100-102,999
--More--
```

Switch D2

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

Figura 33. configuracion VLAN switch D2

```
D2(config)#exit
D2#
D2#
D2#
D2#
D2#
Oct 14 20:23:05.600: %SYS-5-CONFIG_I: Configured from console by console
D2#show int trunk

Port      Mode       Encapsulation  Status      Native vlan
Et1/1    on        802.1q         trunking   1
Et1/2    on        802.1q         trunking   1
Et2/0    on        802.1q         trunking   1
Et2/1    on        802.1q         trunking   1
Et2/2    on        802.1q         trunking   1
Et2/3    on        802.1q         trunking   1

Port      Vlans allowed on trunk
Et1/1    1-4094
Et1/2    1-4094
Et2/0    1-4094
Et2/1    1-4094
Et2/2    1-4094
Et2/3    1-4094

Port      Vlans allowed and active in management domain
Et1/1    1,100-102,999
Et1/2    1,100-102,999
Et2/0    1,100-102,999
Et2/1    1,100-102,999
Et2/2    1,100-102,999
--More--
```

Switch A1

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

Figura 34. configuracion VLAN switch A1

```
A1(config)#exit
A1#
A1#
A1#
A1#
Oct 14 20:23:58.802: %SYS-5-CONFIG_I: Configured from console by console
A1#
A1#show int trunk
Port      Mode          Encapsulation  Status      Native vlan
Et0/1    on           802.1q        trunking   1
Et0/2    on           802.1q        trunking   1
Et1/1    on           802.1q        trunking   1
Et1/2    on           802.1q        trunking   1

Port      Vlans allowed on trunk
Et0/1    1-4994
Et0/2    1-4994
Et1/1    1-4994
Et1/2    1-4994

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

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

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

Switch D1

configure terminal

Spanning-tree mode rapid-pvst

Exit

Figura 35. configuracion Spanning-Tree Protocol switch D1

```
D1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
D1(config)#Spanning-tree mode rapid-pvst
D1(config)#exit
D1#
```

Switch D2

configure terminal

Spanning-tree mode rapid-pvst

Exit

Figura 36. configuracion Spanning-Tree Protocol switch D2

```
D2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
D2(config)#Spanning-tree mode rapid-pvst
D2(config)#exit
D2#
```

Switch A1

configure terminal

Spanning-tree mode rapid-pvst

Exit

Figura 37. configuracion Spanning-Tree Protocol switch A1

```
A1#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
A1(config)#Spanning-tree mode rapid-pvst  
A1(config)#exit  
A1#
```

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.

Switch D1

```
configure terminal  
spanning-tree vlan 100,102 root primary  
spanning-tree vlan 101 root secondary  
exit
```

Figura 38. configuracion RSTP switch D1

```
D1#configure terminal  
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)#exit
```

Switch D2

```
configure terminal  
spanning-tree vlan 101,100 root primary  
spanning-tree vlan 102 root secondary  
exit
```

Figura 39. configuracion RSTP switch D2

```
D2#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
D2(config)#spanning-tree vlan 101,100 root primary  
D2(config)#spanning-tree vlan 102 root secondary  
D2(config)#exit  
D2#
```

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

Switch D1

configure terminal

interface range e2/0-3

channel-protocol lacp

channel-group 12 mode active

no shutdown

exit

interfac port-channel 12

switchport trunk encapsulation dot1q

switchport mode trunk

switchport trunk native vlan 999

switchport trunk allowed vlan 100-102

exit

interface range e0/1-2

channel-protocol lacp

channel-group 1 mode active

no shutdown

exit

interfac port-channel 1

switchport trunk encapsulation dot1q

switchport mode trunk

switchport trunk native vlan 999

switchport trunk allowed vlan 100-102

exit

Figura 40. configuracion LACP switch D1

I0U1#conf term Enter configuration commands, One per line. End with CNTL/Z. I0U1(config)#interface range e2/0-3 I0U1(config-if-range)#channel-protocol lacp I0U1(config-if-range)#channel-group 12 mode active Creating a port-channel interface Port-channel 12 I0U1(config-if-range)#no shutdown I0U1(config-if-range)#exit I0U1(config)#interfac port-channel 12 I0U1(config-if-range)#switchport trunk encapsulation dot1q I0U1(config-if-range)#switchport mode trunk I0U1(config-if-range)#switchport trunk native vlan 999 I0U1(config-if-range)#switchport trunk allowed vlan 100-102 I0U1(config-if-range)#exit I0U1(config-if-range)#interface range e0/1-2 I0U1(config-if-range)#channel-protocol lacp I0U1(config-if-range)#channel-group 1 mode active Creating a port-channel interface Port-channel 1 I0U1(config-if-range)#no shutdown I0U1(config-if-range)#exit I0U1(config)#interfac port-channel 1 I0U1(config-if-range)#switchport trunk encapsulation dot1q I0U1(config-if-range)#switchport mode trunk I0U1(config-if-range)#switchport trunk native vlan 999 I0U1(config-if-range)#switchport trunk allowed vlan 100-102 I0U1(config-if-range)#exit	I0U1#show int trunk Port Mode Encapsulation Status Native vlan Et0/1 on 802.1q trunking 1 Et0/2 on 802.1q trunking 1 Et2/0 on 802.1q trunking 1 Et2/1 on 802.1q trunking 1 Et2/2 on 802.1q trunking 1 Et2/3 on 802.1q trunking 1 Port Vlans allowed on trunk Et0/1 none Et0/2 none Et2/0 none Et2/1 none Et2/2 none Et2/3 none Port Vlans allowed and active in management domain Et0/1 none Et0/2 none Et2/0 none Et2/1 none Et2/2 none Et2/3 none --More--
--	--

Switch D2

configure terminal

interface range e2/0-3

channel-protocol lacp

channel-group 12 mode active

no shutdown

exit

interfac port-channel 12

switchport trunk encapsulation dot1q

switchport mode trunk

switchport trunk native vlan 999

switchport trunk allowed vlan 100-102

exit

interface range e1/1-2

channel-protocol lacp

channel-group 2 mode active

no shutdown

exit

interfac port-channel 2

switchport trunk encapsulation dot1q

switchport mode trunk

switchport trunk native vlan 999

switchport trunk allowed vlan 100-102

Figura 41. configuracion LACP switch D2

D2(config-if)#exit	Port	Mode	Encapsulation	Status	Native vlan
D2(config)#	E1/1	on	802.1q	trunking	1
D2(config)#interface range e2/0-3	E1/2	on	802.1q	trunking	1
D2(config-if-range)#channel-protocol lacp	E2/0	on	802.1q	trunking	1
D2(config-if-range)#channel-group 12 mode active	E2/1	on	802.1q	trunking	1
D2(config-if-range)#no shutdown	E2/2	on	802.1q	trunking	1
D2(config-if-range)#exit	E2/3	on	802.1q	trunking	1
D2(config)#interface port-channel 12	Port		Vlans allowed on trunk		
D2(config-if)#switchport trunk encapsulation dot1q	E1/1		1-4094		
D2(config-if)#switchport mode trunk	E1/2		1-4094		
D2(config-if)#switchport trunk native vlan 999	E2/0		none		
D2(config-if)#switchport trunk allowed vlan 100-102	E2/1		none		
D2(config-if)#exit	E2/2		none		
D2(config)#interface range e0/1-2	E2/3		none		
D2(config-if-range)#channel-protocol lacp	Port		Vlans allowed and active in management domain		
D2(config-if-range)#channel-group 1 mode active	E1/1		1,100-102,999		
D2(config-if-range)#no shutdown	E1/2		1,100-102,999		
D2(config-if-range)#exit	E2/0		none		
D2(config)#interface port-channel 1	E2/1		none		
D2(config-if)#switchport trunk encapsulation dot1q	E2/2		none		
D2(config-if)#switchport mode trunk	--More--				
D2(config-if)#switchport trunk native vlan 999					
D2(config-if)#switchport trunk allowed vlan 100-102					
D2(config-if)#exit					
D2(config)#interface range e1/1-2					
D2(config-if-range)#channel-protocol lacp					
D2(config-if-range)#channel-group 2 mode passive					
D2(config-if-range)#no shutdown					
D2(config-if-range)#exit					
D2(config)#interface port-channel 2					
D2(config-if)#switchport mode trunk					
D2(config-if)#switchport trunk native vlan 999					
D2(config-if)#switchport trunk allowed vlan 100-102					
D2(config-if)#exit					

Switch A1

```

configure terminal
interface range e0/1-2
channel-protocol lacp
channel-group 1 mode passive
no shutdown
exit
interfac port-channel 1
switchport mode trunk
switchport trunk native vlan 999
switchport trunk allowed vlan 100-102
exit
interface range e1/1-2
channel-protocol lacp
channel-group 2 mode passive
no shutdown
interfac port-channel 2
switchport mode trunk
switchport trunk native vlan 999
switchport trunk allowed vlan 100-102
exit

```

Figura 42. configuracion LACP switch A1

```

A1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#interface range e0/0
A1(config-if)#switchport mode trunk
A1(config-if-range)#channel-group 1 mode passive
Creating a port-channel interface Port-channel 1
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
A1(config)#interface port-channel 1
A1(config-if)#switchport mode trunk
Command rejected: An interface whose trunk encapsulation is "Auto"
A1(config-if)#switchport trunk native vlan 999
A1(config-if)#switchport trunk allowed vlan 100-102
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
A1(config)#interface range e1/1-2
A1(config-if-range)#channel-group 2 mode passive
Creating a port-channel interface Port-channel 2
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
A1(config)#interface port-channel 2
A1(config-if)#switchport mode trunk
Command rejected: An interface whose trunk encapsulation is "Auto"
A1(config-if)#switchport trunk native vlan 999
A1(config-if)#switchport trunk allowed vlan 100-102
A1(config-if)#exit
A1(config)#exit
A1#
A1#show int trunk
   Port      Mode      Encapsulation  Status      Native vlan
   Et0/1    on       802.1q        trunking   1
   Et0/2    on       802.1q        trunking   1
   Et1/1    on       802.1q        trunking   1
   Et1/2    on       802.1q        trunking   1
   Port      Vlans allowed on trunk
   Et0/1    none
   Et0/2    none
   Et1/1    none
   Et1/2    none
   Port      Vlans allowed and active in management domain
   Et0/1    none
   Et0/2    none
   Et1/1    none
   Et1/2    none
   Port      Vlans in spanning tree forwarding state and not pruned
   Et0/2    none
   Et1/1    none
   --More--
A1#

```

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

Switch D1

```

configure terminal
interface e0/0
switchport mode acces
switchport acces vlan 100
spanning-tree portfast
no shutdown
exit
exit

```

Figura 43. configuracion host ports connecting switch D1

```

IOU1#
IOU1#conf term
Enter configuration commands, one per line. End with CNTL/Z.
IOU1(config)#interface e0/0
IOU1(config-if)#switchport mode acces
IOU1(config-if)#switchport acces vlan 100
IOU1(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.
IOU1(config-if)#no shutdown
IOU1(config-if)#exit
IOU1(config)#exit

```

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

Figura 44. configuracion host ports connecting switch D2

```
D2#conf term
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#interface e0/0
D2(config-if)#switchport mode acces
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
D2(config)#exit
```

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

Figura 45. configuracion host

```
A1#
A1#conf term
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#interface e1/3
A1(config-if)#switchport mode acces
A1(config-if)#switchport acces 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 e2/0
A1(config-if)#switchport mode acces
A1(config-if)#switchport acces 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
```

2.7 Verify IPv4 DHCP services.

PC2

IP 10.11.102.210/24

Figura 46. configuracion IPv4 DHCP PC2

```
PC1> ip 10.11.102.210/24
Checking for duplicate address...
PC1 : 10.11.102.210 255.255.255.0
```

PC3

IP dhcp

Figura 47. configuracion IP DHCP PC3

```
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
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

PC3> ip dhcp
DDORA IP 10.11.101.110/24 GW 10.11.101.254
```

2.8 Verify local LAN connectivity.

Figura 48. configuracion LAN

The screenshot shows the SolarWinds Network Configuration interface for a PC1 interface. The interface is configured with an IP address of 192.168.0.9, a subnet mask of 255.255.255.0, and a gateway of 192.168.0.8. The MAC address is 00:0B:79:16:00:01. The interface is assigned to port 100000 and has a link layer type of 1000Base-T. The MTU is set to 1500 bytes. The interface is currently active (UP) and has a speed of 1000 Mbps. The duplex mode is full-duplex. The interface is associated with a virtual port named "PC1". The configuration includes options for Quality of Service (QoS), traffic shaping, and security settings like IPsec and MACsec.

Figura 49. configuracion LAN

The screenshot shows the SolarWinds Network Configuration interface for a PC2 interface. The interface is configured with an IP address of 192.168.0.10, a subnet mask of 255.255.255.0, and a gateway of 192.168.0.8. The MAC address is 00:0B:79:16:00:02. The interface is assigned to port 100001 and has a link layer type of 1000Base-T. The MTU is set to 1500 bytes. The interface is currently active (UP) and has a speed of 1000 Mbps. The duplex mode is full-duplex. The interface is associated with a virtual port named "PC2". The configuration includes options for Quality of Service (QoS), traffic shaping, and security settings like IPsec and MACsec.

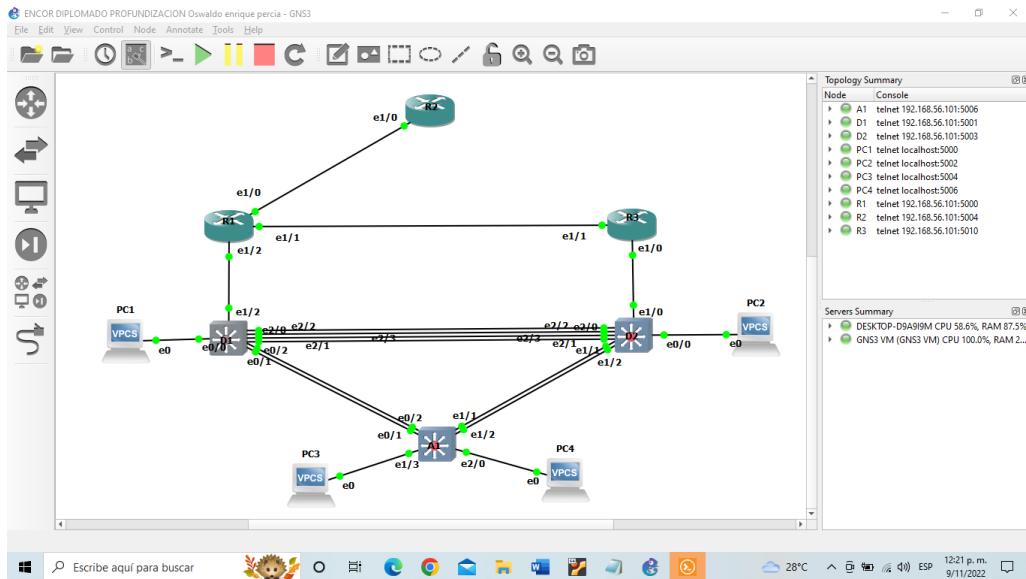
Figura 50. configuracion LAN

The screenshot shows the SolarWinds Network Configuration interface for a PC3 interface. The interface is configured with an IP address of 192.168.0.11, a subnet mask of 255.255.255.0, and a gateway of 192.168.0.8. The MAC address is 00:0B:79:16:00:03. The interface is assigned to port 100002 and has a link layer type of 1000Base-T. The MTU is set to 1500 bytes. The interface is currently active (UP) and has a speed of 1000 Mbps. The duplex mode is full-duplex. The interface is associated with a virtual port named "PC3". The configuration includes options for Quality of Service (QoS), traffic shaping, and security settings like IPsec and MACsec.

ENCOR Skills Assessment (scenario 2)

Continuación del escenario #1

Figura #51 topología del escenario #2



Configure Routing Protocols

In this part, you will configure IPv4 and IPv6 routing protocols. At the end of this part, the network should be fully converged. IPv4 and IPv6 pings to the Loopback 0 interface from D1 and D2 should be successful.

Note: Pings from the hosts will not be successful because their default gateways are pointing to the HSRP address which will be enabled in Part 4.

Your configuration tasks are as follows:

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

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

Task#	Task	Specification	Points
3.3	On R2 in the “ISP Network”, configure MP-BGP.	<p>Configure two default static routes via interface Loopback 0:</p> <ul style="list-style-type: none"> • An IPv4 default static route. • An IPv6 default static route. <p>Configure R2 in BGP ASN 500 and use the router-id 2.2.2.2.</p> <p>Configure and enable an IPv4 and IPv6 neighbor relationship with R1 in ASN 300.</p> <p>In IPv4 address family, advertise:</p> <ul style="list-style-type: none"> • The Loopback 0 IPv4 network (/32). • The default route (0.0.0.0/0). <p>In IPv6 address family, advertise:</p> <ul style="list-style-type: none"> • The Loopback 0 IPv4 network (/128). • The default route (::/0). 	4

Task#	Task	Specification	Points
3.4	On R1 in the “ISP Network”, configure MP-BGP.	<p>Configure two static summary routes to interface Null 0:</p> <ul style="list-style-type: none"> • A summary IPv4 route for 10.11.0.0/8. • A summary IPv6 route for 2001:db8:100::/48. <p>Configure R1 in BGP ASN 300 and use the router-id 1.1.1.1.</p> <p>Configure an IPv4 and IPv6 neighbor relationship with R2 in ASN 500.</p> <p>In IPv4 address family:</p> <ul style="list-style-type: none"> • Disable the IPv6 neighbor relationship. • Enable the IPv4 neighbor relationship. • Advertise the 10.11.0.0/8 network. <p>In IPv6 address family:</p> <ul style="list-style-type: none"> • Disable the IPv4 neighbor relationship. • Enable the IPv6 neighbor relationship. • Advertise the 2001:db8:100::/48 network. 	4

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

Routers 1

```
R1(config)#router ospf 4
```

```
R1(config-router)#router-id 0.0.4.1
```

```
R1(config-router)#network 10.11.10.0 0.0.0.255 area 0
```

```
R1(config-router)#network 10.11.13.0 0.0.0.255 area 0  
R1(config-router)#default-information originate  
R1(config-router)#exit
```

Figura 52. configuracion OSPV2 Router R1

```
R1#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
R1(config)#router ospf 4  
R1(config-router)#router-id 0.0.4.1  
R1(config-router)#network 10.11.10.0 0.0.0.255 area 0  
R1(config-router)#network 10.11.13.0 0.0.0.255 area 0  
R1(config-router)#default-information originate  
R1(config-router)#exit
```

Routers 3

```
R3(config)#router ospf 4  
R3(config-router)#router-id 0.0.4.3  
R3(config-router)#network 10.11.11.0 0.0.0.255 area 0  
R3(config-router)#network 10.11.13.0 0.0.0.255 area 0  
R3(config-router)#exit
```

Figura 53. configuracion OSPV2 Router R2

```
R3#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
R3(config)#router ospf 4  
R3(config-router)#router-id 0.0.4.3  
R3(config-router)#network 10.11.11.0 0.0.0.255 area 0  
R3(config-router)#network 10.11.13.0 0.0.0.255 area 0  
R3(config-router)#exit
```

Switch D1

```
D1(config)#router ospf 4  
D1(config-router)#router-id 0.0.4.131  
D1(config-router)#network 10.11.100.0 0.0.0.255 area 0  
D1(config-router)#network 10.11.101.0 0.0.0.255 area 0  
D1(config-router)#network 10.11.102.0 0.0.0.255 area 0  
D1(config-router)#network 10.11.10.0 0.0.0.255 area 0  
D1(config-router)#passive-interface default  
D1(config-router)#no passive-interface e1/2  
D1(config-router)#exit
```

Figura 54. configuracion OSPV2 Switch D1

```
D1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#router ospf 4
D1(config-router)#router-id 0.0.4.131
D1(config-router)#network 10.11.100.0 0.0.0.255 area 0
D1(config-router)#network 10.11.101.0 0.0.0.255 area 0
D1(config-router)#network 10.11.102.0 0.0.0.255 area 0
D1(config-router)#network 10.11.10.0 0.0.0.255 area 0
D1(config-router)#passive-interface default
D1(config-router)#no passive-interface e1/2
D1(config-router)#exit
```

Switch D2

```
D2(config)#router ospf 4
D2(config-router)#router-id 0.0.4.132
D2(config-router)#network 10.11.100.0 0.0.0.255 area 0
D2(config-router)#network 10.11.101.0 0.0.0.255 area 0
D2(config-router)#network 10.11.102.0 0.0.0.255 area 0
D2(config-router)#network 10.11.11.0 0.0.0.255 area 0
D2(config-router)#passive-interface default
D2(config-router)#no passive-interface e1/0
D2(config-router)#exit
```

Figura 55. configuracion OSPV2 Switch D2

```
D2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#router ospf 4
D2(config-router)#router-id 0.0.4.132
D2(config-router)#network 10.11.100.0 0.0.0.255 area 0
D2(config-router)#network 10.11.101.0 0.0.0.255 area 0
D2(config-router)#network 10.11.102.0 0.0.0.255 area 0
D2(config-router)#network 10.11.11.0 0.0.0.255 area 0
D2(config-router)#passive-interface default
D2(config-router)#no passive-interface e1/0
D2(config-router)#exit
```

3.2 En la "Red de la empresa" (es decir, R1, R3, D1 y D2), configure OSPFv3 clásico de área única en el área 0.

Routers 1

```
R1(config)#ipv6 router ospf 6
R1(config-rtr)#router-id 0.0.6.1
R1(config-rtr)#default-information originate
```

```

R1(config-rtr)#exit
R1(config)#interface e1/2
R1(config-if)#ipv6 ospf 6 area 0
R1(config-if)#exit
R1(config)#interface e1/1
R1(config-if)#ipv6 ospf 6 area 0
R1(config-if)#exit

```

Figura 56. configuracion OSPFv3 Router R1

```

R1#Configure terminal
Enter configuration commands, one per
R1(config)#ipv6 router ospf 6
R1(config-rtr)#
*Nov 19 20:08:06.015: %SYS-5-CONFIG_I:
R1(config-rtr)#default-information ori
R1(config-rtr)#exit
R1(config)#Interface e1/2
R1(config-if)#ipv6 ospf 6 area 0
R1(config-if)#exit
R1(config)#Interface e1/1
R1(config-if)#ipv6 ospf 6 area 0
R1(config-if)#exit
R1(config)#

```

Routers 3

```

R3(config)#ipv6 router ospf 6
R3(config-rtr)#router-id 0.0.6.3
R3(config-rtr)#exit
R3(config)#interface e1/0
R3(config-if)#ipv6 ospf 6 area 0
R3(config-if)#exit
R3(config)#interface e1/1
R3(config-if)#ipv6 ospf 6 area 0
R3(config-if)#exit

```

Figura 57.configuracion OSPFv3 Router R3

```

R3#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#ipv6 router ospf 6
R3(config-rtr)#router-id 0.0.6.3
R3(config-rtr)#exit
R3(config)#interface e1/0
R3(config-if)#ipv6
*Nov 19 20:08:03.431: %SYS-5-CONFIG_I: Configured from console
R3(config-if)#exit
R3(config)#interface e1/1
R3(config-if)#ipv6 ospf 6 area 0
R3(config-if)#exit
*Nov 19 20:08:06.035: %OSPFV3-5-ADJCHG: Process 6, Nbr 0.0.6.1
R3(config-if)#exit

```

Switch D1

```
D1(config)#ipv6 router ospf 6
D1(config-rtr)#router-id 0.0.6.131
D1(config-rtr)#passive-interface default
D1(config-rtr)#no passive-interface e1/2
D1(config-rtr)#exit
D1(config)#interface e1/2
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#exit
D1(config)#interface vlan 100
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#exit
D1(config)#interface vlan 101
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#exit
D1(config)#interface vlan 102
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#exit
```

Figura 58. configuracion OSPFv3 switch D1

```
D1#configure terminal
Enter configuration commands, one per line.
D1(config)#ipv6 router ospf 6
D1(config-rtr)#router-id 0.0.6.131
D1(config-rtr)#passive-interface default
D1(config-rtr)#no passive-interface e1/2
D1(config-rtr)#exit
D1(config)#interface e1/2
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#exit
D1(config)#interface vlan 100
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#exit
D1(config)#interface vlan 101
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#exit
D1(config)#interface vlan 102
D1(config-if)#ipv6 ospf 6 area 0
D1(config-if)#exit
```

Switch D2

```
D2(config)#ipv6 router ospf 6
D2(config-rtr)#router-id 0.0.6.132
D2(config-rtr)#passive-interface default
```

```

D2(config-rtr)#no passive-interface e1/0
D2(config-rtr)#exit
D2(config)#interface e1/0
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit
D2(config)#interface vlan 100
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit
D2(config)#interface vlan 101
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit
D2(config)#interface vlan 102
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit

```

Figura 59. configuracion OSPFv3 switch D2

```

D2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#ipv6 router ospf 6
D2(config-rtr)#router-id 0.0.6.132
D2(config-rtr)#passive-interface default
D2(config-rtr)#no passive-interface e1/0
D2(config-rtr)#exit
D2(config)#interface e1/0
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit
D2(config)#interface vlan 100
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit
D2(config)#interface vlan 101
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit
D2(config)#interface vlan 102
D2(config-if)#ipv6 ospf 6 area 0
D2(config-if)#exit

```

3.3 En R2 en la "Red ISP", configure MP-BGP.

Routers 2

```

R2(config)#ip route 0.0.0.0 0.0.0.0 loopback 0
R2(config)#router bgp 500
R2(config-router)#bgp router-id 2.2.2.2
R2(config-router)#neighbor 209.165.200.225 remote-as 300
R2(config-router)#neighbor 2001:db8:200::1 remote-as 300
R2(config-router)#address-family ipv4
R2(config-router)#neighbor 209.165.200.225 activate

```

```

R2(config-router)#no neighbor 2001:db8:200::1 activate
R2(config-router)#network 2.2.2.2 mask 255.255.255.255
R2(config-router)#network 0.0.0.0
R2(config-router)#exit-address-family
R2(config)#address-family ipv6
R2(config-router)#no neighbor 209.165.200.225 activate
R2(config-router)#neighbor 2001:db8:200::1 activate
R2(config-router)#network 2001:db8:2222::/128
R2(config-router)#network ::/0
R2(config-router)#exit-address-family

```

Figura 60. configuracion MP-BGP Router R₂

```

R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ip route 0.0.0.0 0.0.0.0 loopback 0
%Default route without gateway, if not a point-to-point interface
R2(config)#ipv6 route ::/0 loopback 0
R2(config)#router bgp 500
R2(config-router)#bgp router-id 2.2.2.2
R2(config-router)#neighbor 209.165.200.225 remote-as 300
R2(config-router)#neighbor 2001:db8:200::1 remote-as 300
R2(config-router)#address-family 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
R2(config-router)#address-family ipv6
R2(config-router-af)#no neighbor 209.165.200.225 activate
R2(config-router-af)#neighbor 2001:db8:200::1 activate
R2(config-router-af)#network 2001:db8:2222::/128
R2(config-router-af)#network ::/0
R2(config-router-af)#exit-address-family
R2(config-router)#exit
R2(config)#exit

```

3.4 En R1 en la "Red ISP", configure MP-BGP.

Routers 1

```

R1(config)#ip route 10.0.0.0 255.0.0.0 null0
R1(config)#ipv6 route 2001:db8:100::/48 null0
R1(config)#router bgp 300
R1(config-router)#bgp router-id 1.1.1.1
R1(config-router)#neighbor 209.165.200.226 remote-as 500
R1(config-router)#{%BGP-5-ADJCHANGE: neighbor 209.165.200.226 Up
R1(config-router)#neighbor 2001:db8:200::2 remote-as 500
R1(config-router)#address-family ipv4 unicast
R1(config-router)#neighbor 209.165.200.226 activate
R1(config-router)#no neighbor 2001:db8:200::2 activate

```

```
R1(config-router)#network 10.0.0.0 mask 255.0.0.0
R1(config-router)#exit-address-family
R1(config-router)#address-family ipv6 unicast
R1(config-router)#no neighbor 209.165.200.226 activate
R1(config-router)#neighbor 2001:db8:200::2 activate
R1(config-router)#network 2001:db8:100::/48
R1(config-router)#exit-address-family
```

Figura 61. configuracion MP-BGP Router R1

```
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z
R1(config)#ip route 10.0.0.0 255.0.0.0 null0
R1(config)#ipv6 route 2001:db8:100::/48 null0
R1(config)#router bgp 300
R1(config-router)#bgp router-id 1.1.1.1
R1(config-router)#neighbor 209.165.200.226 remote-as 500
R1(config-router)#neighbor 2001:db8:200::2 remote-as 500
R1(config-router)#address-family ipv4 unicast
R1(config-router-af)#neighbor 209.165.200.226 activate
R1(config-router-af)#no neighbor 2001:db8:200::2 activate
R1(config-router-af)#network 10.0.0.0 mask 255.0.0.0
R1(config-router-af)#exit-address-family
R1(config-router)#address-family ipv6 unicast
R1(config-router-af)#no neighbor 2009.165.200.226 activate
% Specify remote-as or peer-group commands first
R1(config-router-af)#neighbor 2001:db8:200::2 activate
R1(config-router-af)#neighbor 2001:db8:100::/48 activate
% Specify remote-as or peer-group commands first
R1(config-router-af)#exit-address-family
R1(config-router)#exit
```

3.5 verificación de ruta IPv4

Figura 62. configuracion IPv4 switch D1

Figura 63. configuracion IPv4 Router R1

```

Nov 19 20:22:54.023: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not half duplex), with D1 Ethernet1/2 (half duplex).
R1(config-router)#exit
*Nov 19 20:22:58.899: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not half duplex), with D1 Ethernet1/2 (half duplex).
R1(config-router)#exit
R1(config)#
R1#
R1#
R1#
R1#
*Nov 19 20:22:28.047: %SYS-5-CONFIG_I: Configured from console by console
R1#
R1#
R1#
R1#
R1#show ip routes
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
      D - OSPF, EX - EIGRP external, O - OSPF, IA - OSPF Inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2
      I1 - IS-IS level-1, I2 - IS-IS level-2
      L1 - ISIS neighbor, L2 - candidate default, L3 - per-user static route
      o - ODR, P - periodic downloaded static route, H - NHRP, L - LISP
      + - replicated route, * - next hop override

Gateway of last resort is 209.165.200.226 to network 0.0.0.0

* 0.0.0.0/0 [20/0] via 209.165.200.226, 00:05:28
  2.0.0.0/32 is subnetted, 1 subnets
    C 2.0.0.0/32 is directly connected, Ethernet1/2
  10.0.0.0/8 is variably subnetted, 9 subnets, 3 masks
    S 10.0.0.0/8 is directly connected, Null0
    C 10.11.10.0/24 is directly connected, Ethernet1/2
    10.11.11.0/24 is directly connected, Ethernet1/2
    b 10.11.11.0/24 [110/20] via 10.11.13.3, 00:05:24, Ethernet1/1
    c 10.11.13.0/24 is directly connected, Ethernet1/1
    L 10.11.13.1/32 is directly connected, Ethernet1/1
    10.11.10.0/24 [110/1] via 10.11.10.2, 00:22:04, Ethernet1/2
  0--More--*
*Nov 19 20:22:47.655: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not half duplex), with D1 Ethernet1/2 (half duplex).
--More--*

```

Figura 64. configuracion IPv4 switchD2

```

D2(config-if)#exit
Nov 19 20:18:58.532: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
D2(config-if)#exit
D2(config)#
D2(config)#
D2(config)#
D2#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
      D - OSPF, EX - EIGRP external, O - OSPF, IA - OSPF Inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2
      I1 - IS-IS level-1, I2 - IS-IS level-2
      L1 - ISIS neighbor, L2 - candidate default, U - per-user static route
      o - ODR, P - periodic downloaded static route, H - NHRP, L - LISP
      a - application route, * - next hop override

Gateway of last resort is 10.11.11.1 to network 0.0.0.0

*E2 0.0.0.0/0 [110/1] via 10.11.11.1, 00:01:45, Ethernet1/0
  10.0.0.0/8 is variably subnetted, 10 subnets, 3 masks
    C 10.0.0.0/8 is directly connected, Ethernet1/0
    C 10.11.11.0/24 is directly connected, Ethernet1/0
    L 10.11.11.0/24 [110/20] via 10.11.11.1, 00:15:51, Ethernet1/0
    10.11.13.0/24 is directly connected, Vlan100
    10.11.10.0/24 is directly connected, Vlan100
    C 10.11.10.0/24 is directly connected, Vlan101
    L 10.11.10.0/24 [110/1] via 10.11.11.1, 00:15:51, Ethernet1/0
  0--More--*
*Nov 19 20:19:17.671: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
--More--*
*Nov 19 20:20:13.582: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
--More--*
*Nov 19 20:21:05.040: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not full duplex), with R3 Ethernet1/0 (full duplex).
--More--*

```

Figura 65. configuracion IPv4 Router R3

```

Nov 19 20:16:23.595: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not half duplex), with D2 Ethernet1/0 (half duplex).
R3(config-if)exit
Nov 19 20:19:20.251: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not half duplex), with D2 Ethernet1/0 (half duplex).
R3(config-if)exit
Nov 19 20:20:18.107: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not half duplex), with D2 Ethernet1/0 (half duplex).
R3(config-if)exit
Nov 19 20:21:12.719: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not half duplex), with D2 Ethernet1/0 (half duplex).
R3(config-if)exit
Nov 19 20:22:10.967: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/0 (not half duplex), with D2 Ethernet1/0 (half duplex).
R3(config)#
R3(config)#
R3(config)exit
R3#
R3#
R3#
R3#
R3#show ip route
Nov 19 20:22:52.043: %SYS-5-CONFIG_I: Configured from console by console
R3#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
          E1 - EIGRP external, 0 - OSPF, 1A - OSPF interarea
          N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
          E1 - OSPF external type 1, E2 - OSPF external type 2
          i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
          ia - IS-IS inter area, * - candidate default, U - per-user static route
          o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
          + - replicated route, % - next hop override

Gateway of last resort is 10.11.13.1 to network 0.0.0.0

*E2 0.0.0.0/0 [110/1] via 10.11.13.1, 00:05:38, Ethernet1/1
  10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
  0.0.0.0/24 [110/20] via 10.11.13.1, 00:24:35, Ethernet1/1
  10.11.13.0/24 [110/10] via 10.11.13.1, 00:24:35, Ethernet1/1
  10.11.13.1/32 is directly connected, Ethernet1/1
  10.11.13.3/32 is directly connected, Ethernet1/1
  10.11.13.3/32 is directly connected, Ethernet1/1
  10.11.100.0/24 [110/11] via 10.11.11.2, 00:19:42, Ethernet1/0
  0.0.0.0/0 [110/11] via 10.11.11.2, 00:19:42, Ethernet1/0
  10.11.102.0/24 [110/11] via 10.11.11.2, 00:19:42, Ethernet1/0
  0.0.0.0/0 [110/11] via 10.11.11.2, 00:19:42, Ethernet1/0
R3#

```

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Ping de D1,D2 hacia loopback 0

Figura 66. configuracion loopback switch D1

```

D1#ping 2.2.2.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2.2.2.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 21/23/32 ms
D1#

```

Figura 67. configuracion loopback switch D2

```

D2#ping 2.2.2.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2.2.2.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 52/53/55 ms
D2#

```

Configure First Hop Redundancy

In this part, you will configure HSRP version 2 to provide first-hop redundancy for hosts in the “Company Network”.

Your configuration tasks are as follows:

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

Task#	Task	Specification	Points
4.3	On D1, configure HSRPv2.	<p>D1 is the primary router for VLANs 100 and 102; therefore, their priority will also be changed to 150.</p> <p>Configure HSRP version 2.</p> <p>Configure IPv4 HSRP group 104 for VLAN 100:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.11.100.254. • Set the group priority to 150. • Enable preemption. • Track object 4 and decrement by 60. <p>Configure IPv4 HSRP group 114 for VLAN 101:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.11.101.254. • Enable preemption. • Track object 4 to decrement by 60. <p>Configure IPv4 HSRP group 124 for VLAN 102:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.11.102.254. • Set the group priority to 150. • Enable preemption. • Track object 4 to decrement by 60. <p>Configure IPv6 HSRP group 106 for VLAN 100:</p> <ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Set the group priority to 150. • Enable preemption. • Track object 6 and decrement by 60. <p>Configure IPv6 HSRP group 116 for VLAN 101:</p> <ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Enable preemption. • Track object 6 and decrement by 60. <p>Configure IPv6 HSRP group 126 for VLAN 102:</p> <ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Set the group priority to 150. • Enable preemption. • Track object 6 and decrement by 60. 	8

Task#	Task	Specification	Points
	On D2, configure HSRPv2.	<p>D2 is the primary router for VLAN 101; therefore, the priority will also be changed to 150.</p> <p>Configure HSRP version 2.</p> <p>Configure IPv4 HSRP group 104 for VLAN 100:</p> <ul style="list-style-type: none"> Assign the virtual IP address 10.11.100.254. Enable preemption. Track object 4 and decrement by 60. <p>Configure IPv4 HSRP group 114 for VLAN 101:</p> <ul style="list-style-type: none"> Assign the virtual IP address 10.11.101.254. Set the group priority to 150. Enable preemption. Track object 4 to decrement by 60. <p>Configure IPv4 HSRP group 124 for VLAN 102:</p> <ul style="list-style-type: none"> Assign the virtual IP address 10.11.102.254. Enable preemption. Track object 4 to decrement by 60. <p>Configure IPv6 HSRP group 106 for VLAN 100:</p> <ul style="list-style-type: none"> Assign the virtual IP address using ipv6 autoconfig. Enable preemption. Track object 6 and decrement by 60. <p>Configure IPv6 HSRP group 116 for VLAN 101:</p> <ul style="list-style-type: none"> Assign the virtual IP address using ipv6 autoconfig. Set the group priority to 150. Enable preemption. Track object 6 and decrement by 60. <p>Configure IPv6 HSRP group 126 for VLAN 102:</p> <ul style="list-style-type: none"> Assign the virtual IP address using ipv6 autoconfig. Enable preemption. Track object 6 and decrement by 60. 	

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

```
D1(config)#ip sla 4
D1(config-ip-sla)#icmp-echo 10.11.10.1
D1(config-ip-sla-echo)#frequency 5
D1(config-ip-sla-echo)#exit
D1(config)#ip sla 6
D1(config-ip-sla)#icmp-echo 2001:db8:100:1010::1
D1(config-ip-sla-echo)#frequency 5
D1(config-ip-sla-echo)#exit
D1(config)#ip sla schedule 4 life forever start-time now
D1(config)#ip sla schedule 6 life-forever start-time now
D1(config)#track 4 ip sla 4
D1(config-track)#delay down 10 up 15
D1(config-track)#exit
D1(config)#track 6 ip sla 6
D1(config-track)#delay down 10 up 15
D1(config-track)#exit
```

Figura 68. configuracion IP SLA swicht D1

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

```
D2(config)#ip sla 4
D2(config-ip-sla)#icmp-echo 10.11.11.1
D2(config-ip-sla-echo)#frequency 5
D2(config-ip-sla-echo)#exit
D2(config)#ip sla 6
D2(config-ip-sla)#icmp-echo 2001:db8:100:1011::1
D2(config-ip-sla-echo)#frequency 5
D2(config-ip-sla-echo)#exit
D2(config)#ip sla schedule 4 life forever start-time now
D2(config)#ip sla schedule 6 life forever start-time now
D2(config)#track 4 ip sla 4
D2(config-track)#delay down 10 up 15
D2(config-track)#exit
D2(config)#track 6 ip sla 6
D2(config-track)#delay down 10 up 15
D2(config-track)#exit
```

Figura 69. configuracion IP SLA swicht D2

```
D2(config-ip-sla-echo)#frequency 5
D2(config-ip-sla-echo)#exit
D2(config)#ip sla 6
D2(config-ip-sla)#icmp-echo 2001:db8:100:1011::1
D2(config-ip-sla-echo)#frequency 5
D2(config-ip-sla-echo)#exit
D2(config)#ip sla schedule 4 life forever start-time now
D2(config)#ip sla schedule 6 life forever start-time now
D2(config)#track 4 ip sla 4
D2(config-track)#delay down 10 up 15
D2(config-track)#exit
D2(config)#track 6 ip sla 6
D2(config-track)#delay down 10 up 15
D2(config-track)#exit
```

solarwinds  | Solar-PuTTY *free tool*

Figura 70. configuracion IP SLA swicht D

Figura 71. configuracion IP SLA swicht D1

```
R1 R3 R2 D1 D2 A1 PC1 PC4 PC2 PC3

D1#config#ip sla echo#exit
D1(config)#ip sla schedule 4 life forever start-time now
D1(config)#ip sla schedule 6 life forever start-time now
D1(config)#ip track ip sla 4
D1(config)track ip track 4
D1(config)track ip track 6 life down 10 up 15
D1(config)track#exit
D1(config)track 6 ip sla 6
D1(config)track 6 delay down 10 up 15
D1(config)track#exit
D1(config)#
D1(config)exit

*Dow 11 22:48:47.798: NSYS-5-CONFIG_I: Configured from console by console
D1#
*Dow 11 22:49:05.798: XCDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1
(/2 (full duplex).
D1#
*Dow 11 22:50:05.213: XCDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1
(/2 (full duplex).
D1#
*Dow 11 22:50:55.171: XCDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1
(/2 (full duplex).
D1#
*Dow 11 22:51:53.591: XCDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Ethernet1/2 (not full duplex), with R1 Ethernet1
(/2 (full duplex).
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
ip sla 6
ip sla 6-echo 10.0.10.1
frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
ip sla 6-echo 2001:008:100::1010::1
frequency 5
ip sla schedule 6 life forever start-time now
D1#
```

4.3 En D1, configure HSRPv2.

```
D1(config)#interface vlan 100
D1(config-if)#standby version 2
D1(config-if)#standby 104 ip 10.0.100.254
D1(config-if)#standby 104 priority 150
D1(config-if)#standby 104 preempt
```

```
D1(config-if)#standby 104 track 4 decrement 60
D1(config-if)#standby 106 ipv6 autoconfig
D1(config-if)#standby 106 priority 150
D1(config-if)#standby 106 preempt
D1(config-if)#standby 106 track 6 decrement 60
D1(config-if)#exit
D1(config)#interface vlan 101
D1(config-if)#standby version 2
D1(config-if)#standby 114 ip 10.11.101.254
D1(config-if)#standby 114 preempt
D1(config-if)#standby 114 track 4 decrement 60
D1(config-if)#standby 116 ipv6 autoconfig
D1(config-if)#standby 116 preempt
D1(config-if)#standby 116 track 6 decrement 60
D1(config-if)#exit
D1(config)#interface vlan 102
D1(config-if)#standby version 2
D1(config-if)#standby 124 ip 10.0.102.254
D1(config-if)#standby 124 priority 150
D1(config-if)#standby 124 preempt
D1(config-if)#standby 124 track 4 decrement 60
D1(config-if)#standby 126 ipv6 autoconfig
D1(config-if)#standby 126 priority 150
D1(config-if)#standby 126 priority 150
D1(config-if)#standby 126 preempt
D1(config-if)#standby 126 track 6 decrement 60
D1(config-if)#exit
D1(config)#end
```

Figura 72. configuracion HSRPv2 swicht D1

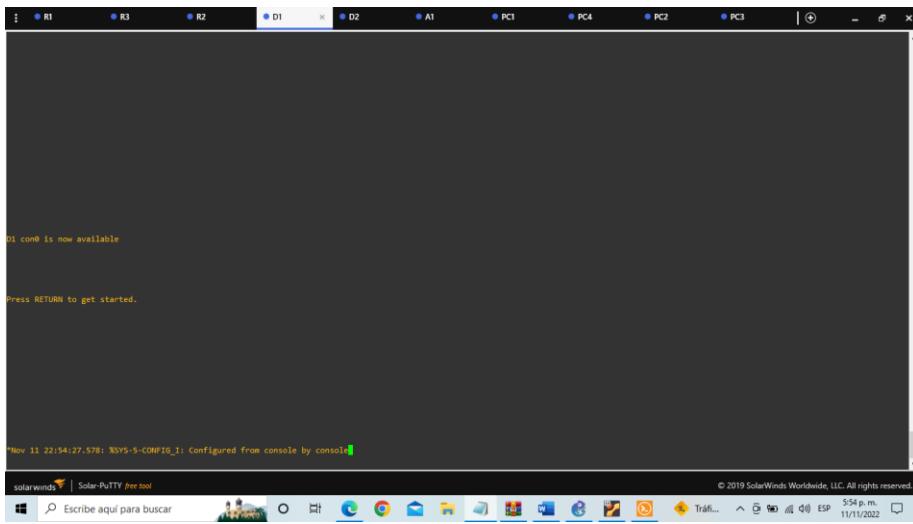
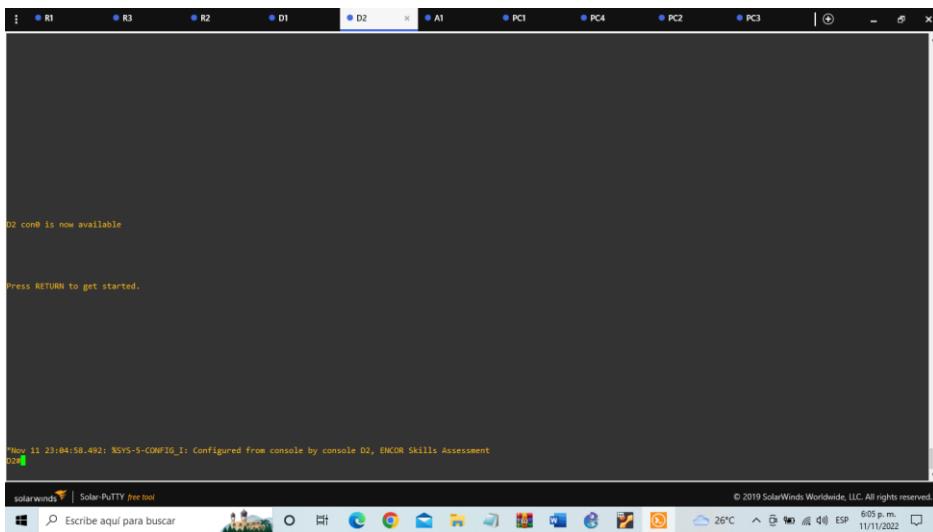


Figura 73. configuracion HSRPv2 swicht D2



CONCLUSIONES

Implementamos el escenario y protocolo propuesto en la topología de la actividad de curso de profundización Cisco CCNP, utilizando las configuraciones LACP y el manejo teórico de la diferentes switch y sus características principales en la visión de instalar el diseño del que corresponde por capa 2 y 3. La plataforma Cisco es una estructura académica de redes, donde tiene como modelo las representaciones gráficas y programable de las configuración de los dispositivo de redes, teniendo como principal característica el estado de tiempo de ejecución de la topología, enlazando y analizando los componentes de software y hardware.

En este orden de idea, implementamos una topología escenario uno donde ejecutamos una tabla de direcciones para enlazar los diferentes dispositivos y realizar una conmutación con repuesta; BGP, ASN, HRSP, VLAN, IP SLA, HSRPv2, etc. De acuerdo a los pasos implementamos, los protocolos de enrutamiento se guardaron en cada uno de sus sistemas de programación interna con la configuración el modelo copy running-config startup-config, es la abreviatura de copy run start. Esto permite copiar la configuración activa del routers de la RAM a la NVRAM.

Ejecutamos y realizamos verificación de la configuración de red de capa 2 y la compatibilidad con el host, en esta parte de la evaluación de habilidades, completará la configuración de la red de capa 2 y configurará el soporte de host básico. Al final de esta parte, todos los interruptores deberían poder comunicarse. PC2 y PC3 deben recibir direccionamiento de DHCP y SLAAC, en el protocolo de la actividad nos muestra la implementación y la respuesta satisfactoria de cada ping y del diseño ejecutable final.

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