

DIPLOMADO DE PROFUNDIZACION CISCO
PRUEBA DE HABILIDADES PRACTICAS

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA - UNAD
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INGIENERÍA ELECTRONICA
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GLOSARIO

CONFIGURACION DE RED: Consiste en asignar protocolos de comunicación y controles de red a los dispositivos como switch, router, host que conforman una red. Desde un administrador central se pueden hacer las gestiones de configuraciones de manera automática para el mantenimiento de la red, reinicio de dispositivos, enrutamientos, seguimientos de información de paquetes de datos o realizar informes.

DIRECCIONAMIENTO: Es asignar a cada dispositivo de la red una única dirección para que no se pierda el flujo de datos en la red tanto para la transmisión como para la recepción. En redes se utiliza el protocolo IP que son bits de asignación que permiten identificar cada dispositivo y diferenciarlos entre sí.

ENRUTAMIENTO: Consiste en trazar la ruta para enviar y recibir paquetes de datos buscando siempre la ruta más corta utilizando la tabla de enrutamiento y los parámetros como métrica, ancho de banda, distancia administrativa, convergencia, bucle de enrutamiento. Esto se realiza en los dispositivos enrutadores.

INTERFACES: En redes para que exista o se realice el enrutamiento y acceso remoto del servidor con los dispositivos de una red a través de redes públicas o privadas es necesario la utilización de las interfaces porque son la encargada de la relación del enrutamiento y acceso remoto tanto en el hardware físico como adaptador de red y configuración de las interfaces.

IPV4: (Internet Protocol Version) Versión de protocolo de internet con un espacio de direcciones de 32 bits utilizados para identificar los dispositivos de una red.

IPV6: Nueva versión de protocolo de internet con un espacio de direcciones de 128 bits, cuatro veces más amplia que IPV4 utilizados para identificar los dispositivos de una red.

VLAN: (Virtual Local Area Network) Los Switches permiten la comunicación entre los hosts de una red mediante cableado. Una vlan es una segmentación lógica menor dentro de una red cableada mayor, esto es posible siempre y cuando pertenezcan a la misma LAN y los Switches puedan soportar o sean compatibles con vlan.

VRF: (Virtual Routing and Forwarding) Es un tipo de configuración que permite convertir un router en varios routers de forma virtual, donde cada router tiene su propia tabla de enrutamiento e independiente y no comparten información utilizando el mismo direccionamiento IP en interfaces diferentes del mismo router, funcionan parecidos a las vlan de capa 2, pero en la capa 3.

RESUMEN

En esta evaluación de habilidades, el escenario a implementar es la configuración multi-VRF de una red que admite "Usuarios generales" y "Usuarios especiales", se configura una topología de red que permite accesibilidad completa de un extremo a otro y los dos grupos no se comunican entre sí. Se implementaron todos los conocimientos adquiridos en el desarrollo del diplomado y los cursos de redes de CISCO anteriores configurando cada uno de los dispositivos de acuerdo a la topología que requiere la prueba de habilidades.

Se verifica que las configuraciones cumplan con las especificaciones proporcionadas y que los dispositivos funcionen según lo requerido. Para esto se usan los comandos especiales de verificación y confirmación.

Este trabajo se desarrolla en el emulador GNS3 utilizando la máquina virtual de Virtual Box, este emulador trae consigo una serie de retos desde la instalación hasta su uso donde se exponen problemas o errores de conexión que nos permiten una experiencia más real comparado con otros programas como el simulador como es Pcket-Tracer.

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

ABSTRACT

In this skills assessment, the scenario to be implemented is the multi-VRF configuration of a network that supports "General Users" and "Special Users", a network topology is configured that allows full accessibility from one end to the other and the two groups they do not communicate with each other. All the knowledge acquired in the development of the diploma and the previous CISCO network courses were implemented, configuring each of the devices according to the topology required by the skills test.

It is verified that the configurations comply with the specifications provided and that the devices work as required. For this, the special verification and confirmation commands are used.

This work is developed in the GNS3 emulator using the Virtual Box virtual machine, this emulator brings with it a series of challenges from installation to its use where connection problems or errors are exposed that allow us a more real experience compared to other programs such as the simulator as it is Pocket-Tracer.

Keywords: CISCO, CCNP, Switching, Routing, Networks, Electronics.

INTRODUCCIÓN

El mundo de las telecomunicaciones virtuales es amplio, existen muchos tipos de protocolos para permitir la comunicación entre los dispositivos de una red, esto es posible gracias al avance exponencial de la electrónica y la programación.

A continuación, en este trabajo encontraremos la configuración de una red multi-VRF que permite “Usuarios generales” y “Usuarios especiales”. En LA primera parte de este trabajo se configuran las VRF, direcciones estáticas en cada uno de los routers y se levantan las interfaces, sub interfaces respectivas en los routers según tabla de direccionamiento, se comprueba la conectividad entre routers de la red multi-VRF utilizando protocolo ipv4 e ipv6. Cabe notar que no habrá comunicación entre la red de “Usuarios Generales” y “Usuarios especiales”.

En la segunda parte de este trabajo se configuran todos los Switches para el soporte de la conectividad a los dispositivos finales, para tal caso se configuran las interfaces truncales, etherchannel usando PAgP, puertos de acceso en modo Portfast, así mismo se configuran los mecanismos de seguridad de la topología agregando User y password, nivel de privilegio y AAA autenticación.

Se realizan las configuraciones de cada uno de los dispositivos utilizados poniendo en práctica lo aprendido durante el desarrollo del curso CCNP utilizando el emulador GNS3 y virtual Box como máquina virtual.

Se encontrarán los comandos utilizados en las configuraciones de los dispositivos y las imágenes de cada configuración.

DESARROLLO

1. ESCENARIO PROPUESTO

Figura 1. Topología de red

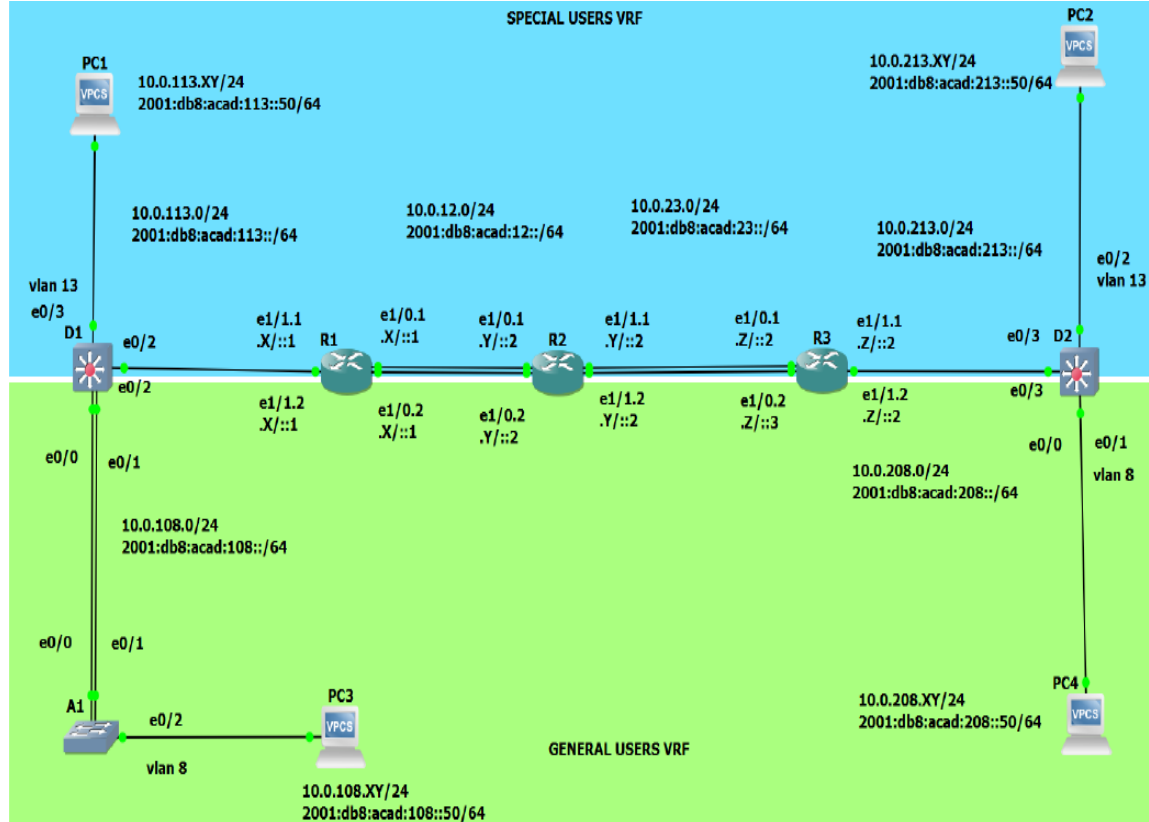


Tabla 1. Tabla de direccionamiento

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	E1/2.1	10.0.12.3/24	2001:db8:acad:12::1/64	fe80::1:1
	E1/2.2	10.0.12.3/24	2001:db8:acad:12::1/64	fe80::1:2
	E1/0.1	10.0.113.3/24	2001:db8:acad:113::1/64	fe80::1:3
	E1/0.2	10.0.108.3/24	2001:db8:acad:108::1/64	fe80::1:4
R2	E1/2.1	10.0.12.1/24	2001:db8:acad:12::2/64	fe80::2:1
	E1/2.2	10.0.12.1/24	2001:db8:acad:12::2/64	fe80::2:2
	E1/0.1	10.0.23.1/24	2001:db8:acad:23::2/64	fe80::2:3
	E1/0.2	10.0.23.1/24	2001:db8:acad:23::2/64	fe80::2:4
R3	E1/2.1	10.0.23.3/24	2001:db8:acad:23::3/64	fe80::3:1
	E1/2.2	10.0.23.3/24	2001:db8:acad:23::3/64	fe80::3:2

	E1/0.1	10.0.213.3/24	2001:db8:acad:213::1/64	fe80::3:3
	E1/0.2	10.0.208.3/24	2001:db8:acad:208::1/64	fe80::3:4
PC1	NIC	10.0.113.30/24	2001:db8:acad:113::50/64	EUI-64
PC2	NIC	10.0.213.30/24	2001:db8:acad:213::50/64	EUI-64
PC3	NIC	10.0.108.30/24	2001:db8:acad:108::50/64	EUI-64
PC4	NIC	10.0.208.30/24	2001:db8:acad:208::50/64	EUI-64

Nota: Se cambia el número 0 segundo dígito de los tres últimos números de mi cedula por el número 1, ya que al momento de configurar las vrf me generaba error en la máscara de red (Bad mask /24 for address 10.0.23.0). Al ser dirección de broadcast se genera conflicto por ser mi penúltimo dígito de la cedula 0.

2. RECURSOS REQUERIDOS

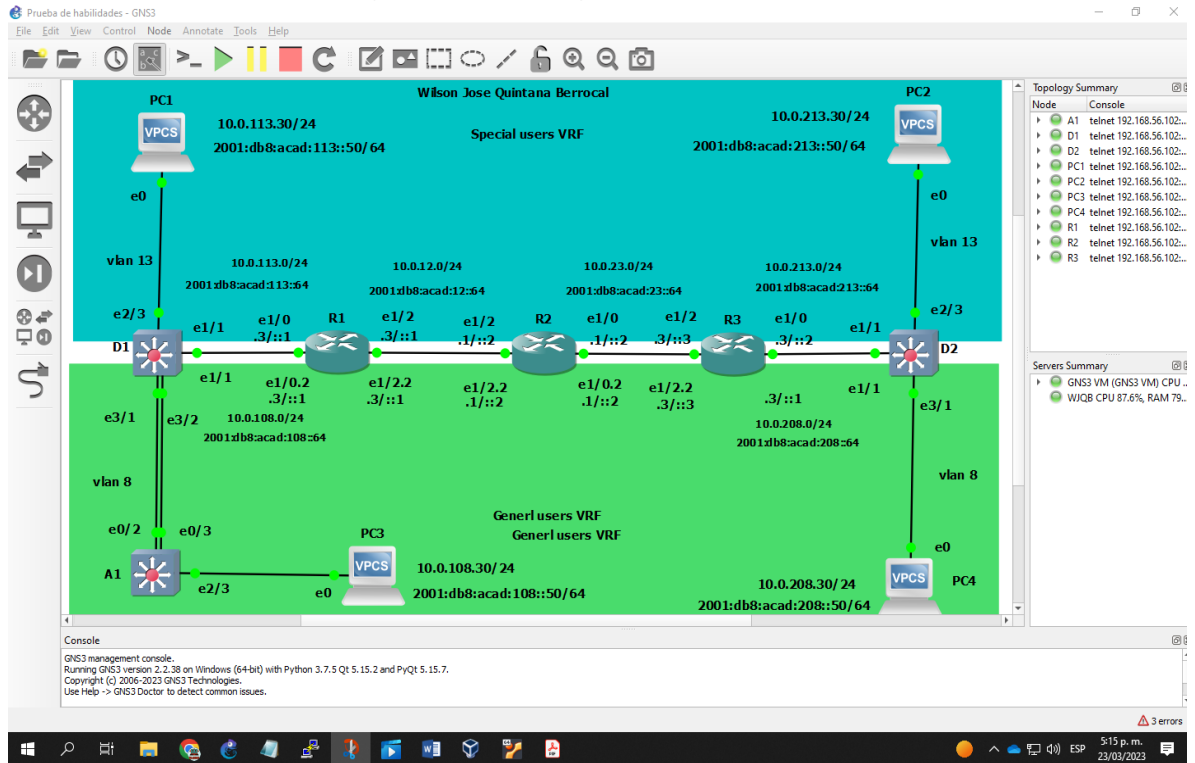
- 3 Routers (Cisco 7200). Click on the download link of the images for GNS3.
- 3 Switches (Cisco IOU L2). Click on the download link of the images for GNS3.
- 4 PCs (Use the GNS3's VPCS)

3. INSTRUCCIONES Y DESARROLLO

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

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

Figura 2. Topología de red diseñada



Observemos que entre R1, R2 y R3 solo realizo una conexión de interfase, ya que es la misma interfase física con dos sub interfaces virtuales. Es decir, existe un solo enlace.

Utilizo los puertos que me ofrece los dispositivos descargados para gns3 y se configuran según guía de la prueba.

3.1.1 Paso 2: Configure los ajustes básicos para cada dispositivo.

Ingrese al modo de configuración global en cada uno de los dispositivos y aplique la configuración básica. Las configuraciones de inicio para cada dispositivo se proporcionan a continuación.

3.1.1.1 Comandos de configuración router R1

Comando	Comentario
hostname R1	%Comando para cambiar el nombre de host.
ipv6 unicast-routing	%Habilitar enrutamiento IPV6
no ip domain lookup	% Sin búsqueda de dominio

```

banner motd # R1, ENCOR Skills Assessment, Scenario 2 # % Mensaje
line con 0          % linea de consola
exec-timeout 0 0    % sin tiempo de termino
logging synchronous % prevenir interrupción de linea de comandos
exit

```

Figura 3. Configuración inicial R1

```

R1
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Thu 20-Feb-14 06:51 by prod_rel_team
*Mar 17 05:03:34.019: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to down
*Mar 17 05:03:34.027: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to down
*Mar 17 05:03:34.031: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
*Mar 17 05:03:34.035: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to down
*Mar 17 05:03:34.039: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/3, changed state to down
R1#confi term
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#hostname R1
R1(config)#ipv6 unicast-routing
R1(config)#no ip domain lookup
R1(config)#banner motd # R1, ENCOR Skills Assessment, Scenario 2 #
R1(config)#line con 0
R1(config-line)#exec-timeout 0 0
R1(config-line)#logging synchronous
R1(config-line)#exit
R1(config)#

```

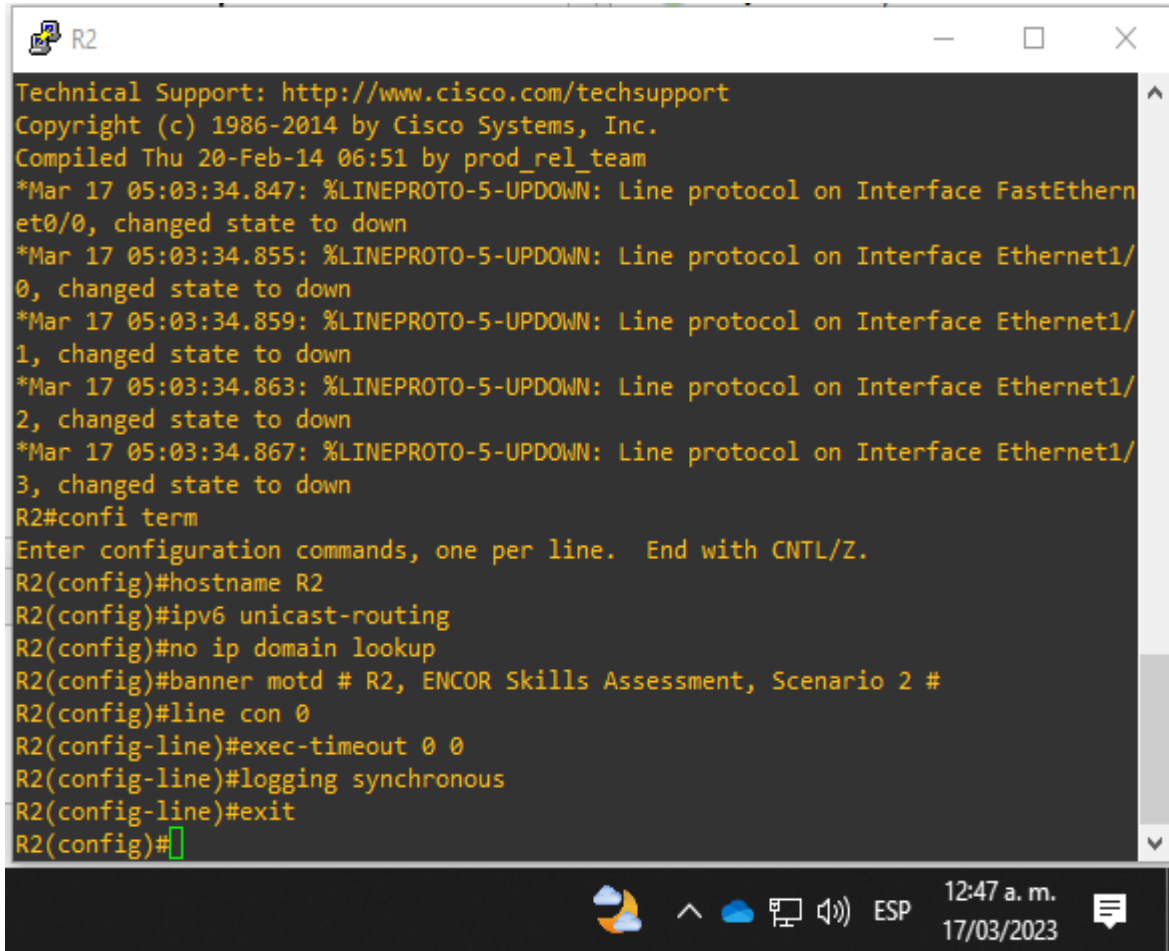
3.1.1.2 Comandos de configuración router R2

```

hostname R2          % Cambiar nombre de host
ipv6 unicast-routing %Habilitar enrutamiento IPV6
no ip domain lookup  % Sin búsqueda de dominio
banner motd # R2, ENCOR Skills Assessment, Scenario 2 # %Mensaje
line con 0          % linea de consola
exec-timeout 0 0    % sin tiempo de termino
logging synchronous % prevenir interrupción de linea de comandos
exit

```

Figura 4. Configuración inicial R2

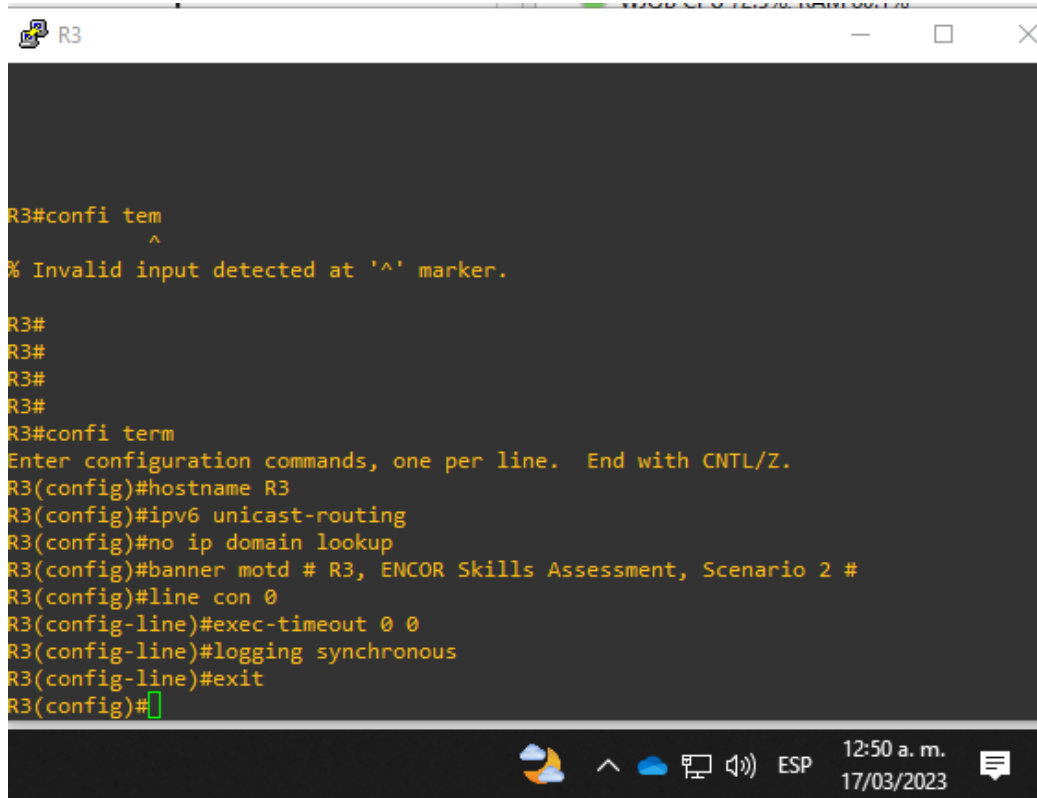


```
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Thu 20-Feb-14 06:51 by prod_rel_team
*Mar 17 05:03:34.847: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to down
*Mar 17 05:03:34.855: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to down
*Mar 17 05:03:34.859: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
*Mar 17 05:03:34.863: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to down
*Mar 17 05:03:34.867: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/3, changed state to down
R2#confi term
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, Scenario 2 #
R2(config)#line con 0
R2(config-line)#exec-timeout 0 0
R2(config-line)#logging synchronous
R2(config-line)#exit
R2(config)#
```

3.1.1.3 Comandos de configuración router R3

hostname R3	<i>% Cambiar nombre de host</i>
ipv6 unicast-routing	<i>%Habilitar enrutamiento IPV6</i>
no ip domain lookup	<i>% Sin búsqueda de dominio</i>
banner motd # R3, ENCOR Skills Assessment, Scenario 2 #	<i>% Mensaje</i>
line con 0	<i>% línea de consola</i>
exec-timeout 0 0	<i>% sin tiempo de termino</i>
logging synchronous	<i>% prevenir interrupción de línea de comandos</i>
exit	

Figura 5. Configuración inicial R3



```
R3#confi tem
      ^
% Invalid input detected at '^' marker.

R3#
R3#
R3#
R3#
R3#confi term
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#hostname R3
R3(config)#ipv6 unicast-routing
R3(config)#no ip domain lookup
R3(config)#banner motd # R3, ENCOR Skills Assessment, Scenario 2 #
R3(config)#line con 0
R3(config-line)#exec-timeout 0 0
R3(config-line)#logging synchronous
R3(config-line)#exit
R3(config)#
```

3.1.1.4 Comandos de configuración switch D1

hostname D1	<i>% Cambiar nombre al host</i>
ip routing	<i>% Activar las funciones de capa 3</i>
ipv6 unicast-routing	<i>%Habilitar enrutamiento IPV6</i>
no ip domain lookup	<i>% Sin búsqueda de dominio</i>
banner motd # D1, ENCOR Skills Assessment, Scenario 2 #	<i>% Mensaje</i>
line con 0	<i>% línea de consola</i>
exec-timeout 0 0	<i>% sin tiempo de termino</i>
logging synchronous	<i>% prevenir interrupción de línea de comandos</i>
exit	
vlan 8	<i>% Activar vilan 8</i>

```

name General-Users      % Nombre vlan 8
exit
vlan 13                 % Activar vlan 13
name Special-Users     % Nombre vlan 13
exit

```

Figura 6. Configuración inicial D1

```

192.168.56.103 - PuTTY
IOU1#confi term
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, Scenario 2 #
D1(config)#line con 0
D1(config-line)#exec-timeout 0 0
D1(config-line)#logging synchronous
D1(config-line)#exit
D1(config)#vlan 8
D1(config-vlan)#name General-Users
D1(config-vlan)#exit
D1(config)#vlan 13
D1(config-vlan)#name Special-Users
D1(config-vlan)#exit
D1(config)#

```

3.1.1.5 Comandos de configuración switch D2

```

hostname D2             % cambiar nombre de host
ip routing              % Activar funciones de capa 3
ipv6 unicast-routing   %Habilitar enrutamiento IPV6
no ip domain lookup    % Sin búsqueda de dominio
banner motd # D2, ENCOR Skills Assessment, Scenario 2 # % Mensaje
line con 0             % Sin tiempo de termino

```

```

exec-timeout 0 0          % Sin tiempo de termino
logging synchronous      % prevenir interrupción de linea de comandos
exit

vlan 8   % Activar vlan 8
name General-Users      % Nombre de vlan
exit

vlan 13          % Activar vilan 13
name Special-Users     % Nombre de vilan
exit

```

Figura 7. Configuración inicial D2

```

192.168.56.103 - PuTTY
*Mar 17 05:02:36.071: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/
2, changed state to up
*Mar 17 05:02:36.071: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/
3, changed state to up
*Mar 17 05:02:36.425: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, cha
nged state to down
*Mar 17 05:02:37.434: %LINK-5-CHANGED: Interface Vlan1, changed state to adminis
tratively down
IOU2#confi term
Enter configuration commands, one per line.  End with CNTL/Z.
IOU2(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 2 #
D2(config)#line con 0
D2(config-line)#exec-timeout 0 0
D2(config-line)#logging synchronous
D2(config-line)#exit
D2(config)#vlan 8
D2(config-vlan)#vlan 8
D2(config-vlan)#name General-Users
D2(config-vlan)# exit
D2(config)#

```

3.1.1.6 Comandos de configuración switch A1

```

hostname A1
ipv6 unicast-routing      %Habilitar enrutamiento IPV6
no ip domain lookup      % Sin búsqueda de dominio
banner motd # A1, ENCOR Skills Assessment, Scenario 2 #
line con 0

```

```

exec-timeout 0 0      % Sin tiempo de termino
logging synchronous  % prevenir interrupción de linea de comandos
exit
vlan 8                % Activar vlan 8
name General-Users   % Nombre de vlan
exit

```

Figura 8. Configuración inicial A1

```

192.168.56.103 - PuTTY
*Mar 17 05:03:04.591: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/
1, changed state to up
*Mar 17 05:03:04.591: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/
2, changed state to up
*Mar 17 05:03:04.591: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/
3, changed state to up
*Mar 17 05:03:05.000: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, cha
nged state to down
*Mar 17 05:03:06.000: %LINK-5-CHANGED: Interface Vlan1, changed state to adminis
tratively down
IOU3#confi term
Enter configuration commands, one per line.  End with CNTL/Z.
IOU3(config)#hostname A1
A1(config)#ipv6 unicast-routing
A1(config)#no ip domain lookup
A1(config)#banner motd # A1, ENCOR Skills Assessment, Scenario 2 #
A1(config)#line con 0
A1(config-line)#exec-timeout 0 0
A1(config-line)#logging synchronous
A1(config-line)#exit
A1(config)#vlan 8
A1(config-vlan)#name General-Users
A1(config-vlan)# exit
A1(config)#

```

3.1.2 Guarde las configuraciones en cada uno de los dispositivos.

Se guarda la configuración con el comando **copy running-config startup-config**.

3.1.2.1 Comandos para guardar configuración en 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.

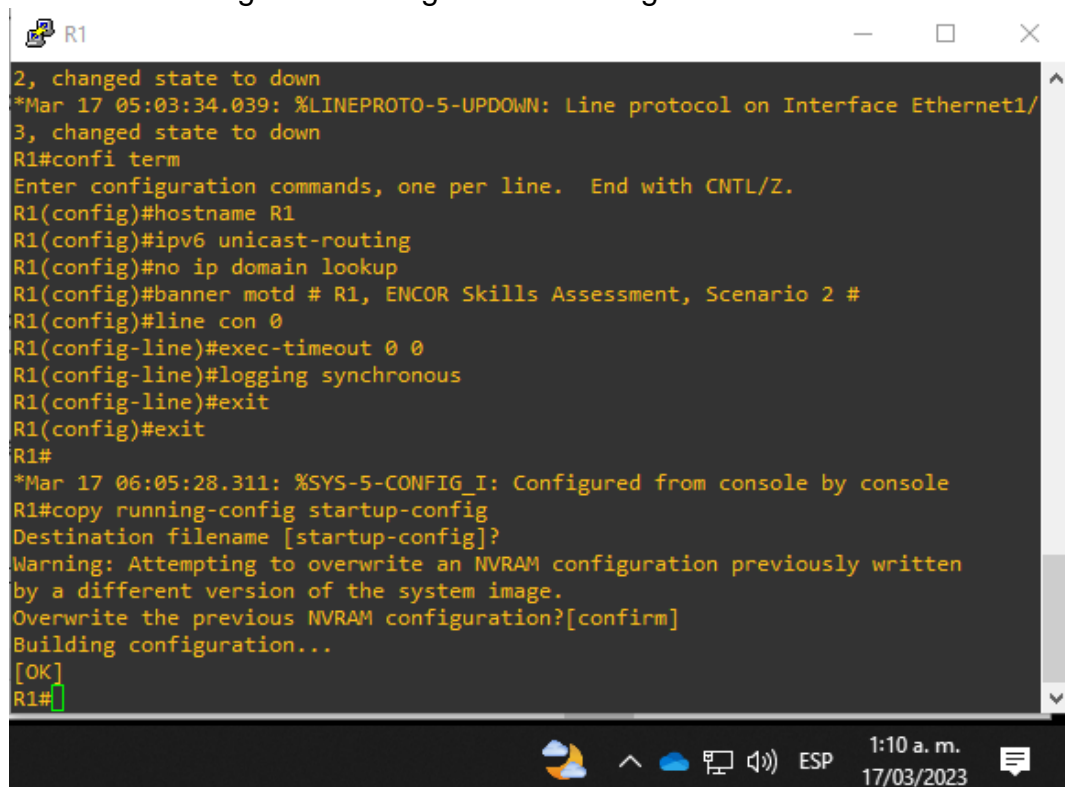
Overwrite the previous NVRAM configuration?[confirm]

Building configuration...

[OK]

R1#

Figura 9. Configuración inicial guardada en R1



```
R1
2, changed state to down
*Mar 17 05:03:34.039: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
3, changed state to down
R1#confi term
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#hostname R1
R1(config)#ipv6 unicast-routing
R1(config)#no ip domain lookup
R1(config)#banner motd # R1, ENCOR Skills Assessment, Scenario 2 #
R1(config)#line con 0
R1(config-line)#exec-timeout 0 0
R1(config-line)#logging synchronous
R1(config-line)#exit
R1(config)#exit
R1#
*Mar 17 06:05:28.311: %SYS-5-CONFIG_I: Configured from console by console
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]
R1#
```

3.1.2.2 Comandos para guardar configuración en 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.

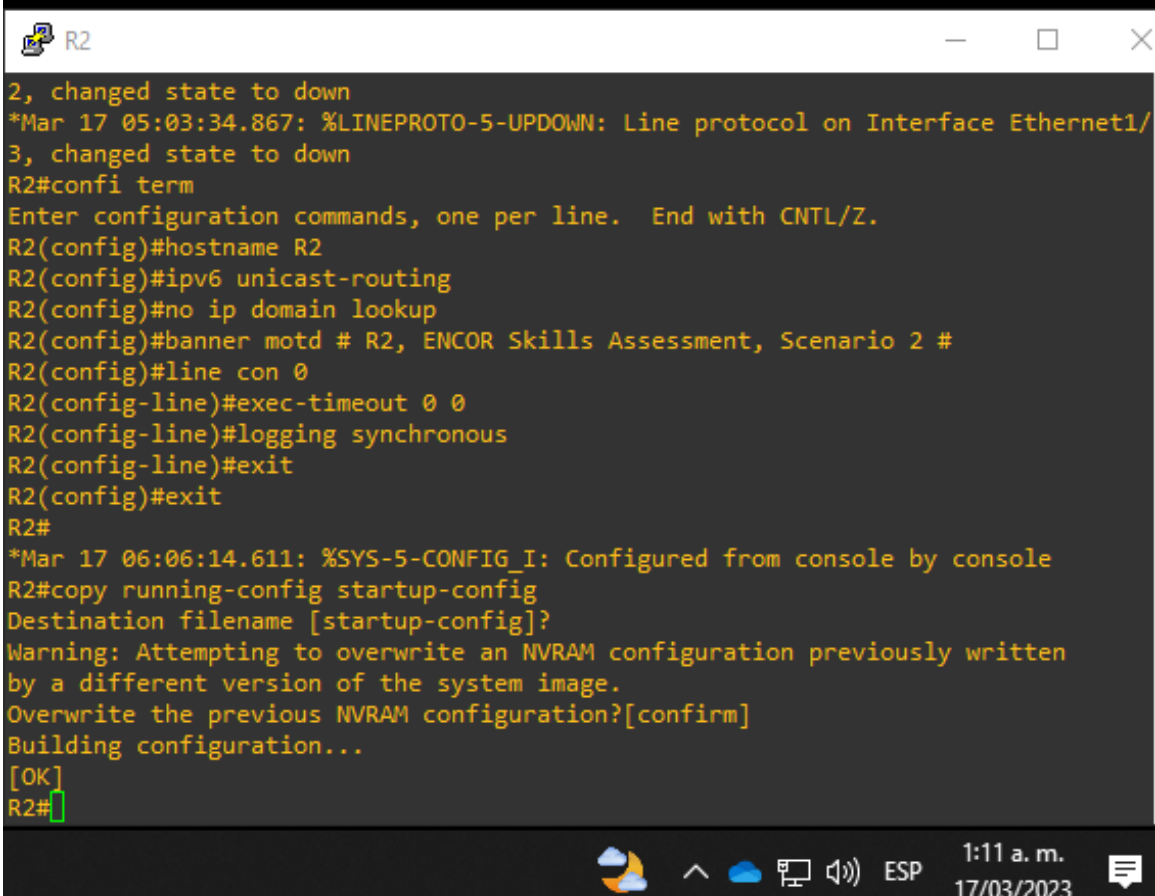
Overwrite the previous NVRAM configuration?[confirm]

Building configuration...

[OK]

R2#

Figura 10. Configuración inicial guardada en R2



```
R2
2, changed state to down
*Mar 17 05:03:34.867: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
3, changed state to down
R2#confi term
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, Scenario 2 #
R2(config)#line con 0
R2(config-line)#exec-timeout 0 0
R2(config-line)#logging synchronous
R2(config-line)#exit
R2(config)#exit
R2#
*Mar 17 06:06:14.611: %SYS-5-CONFIG_I: Configured from console by console
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]
R2#
```

3.1.2.3 Comandos para guardar configuración en 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.

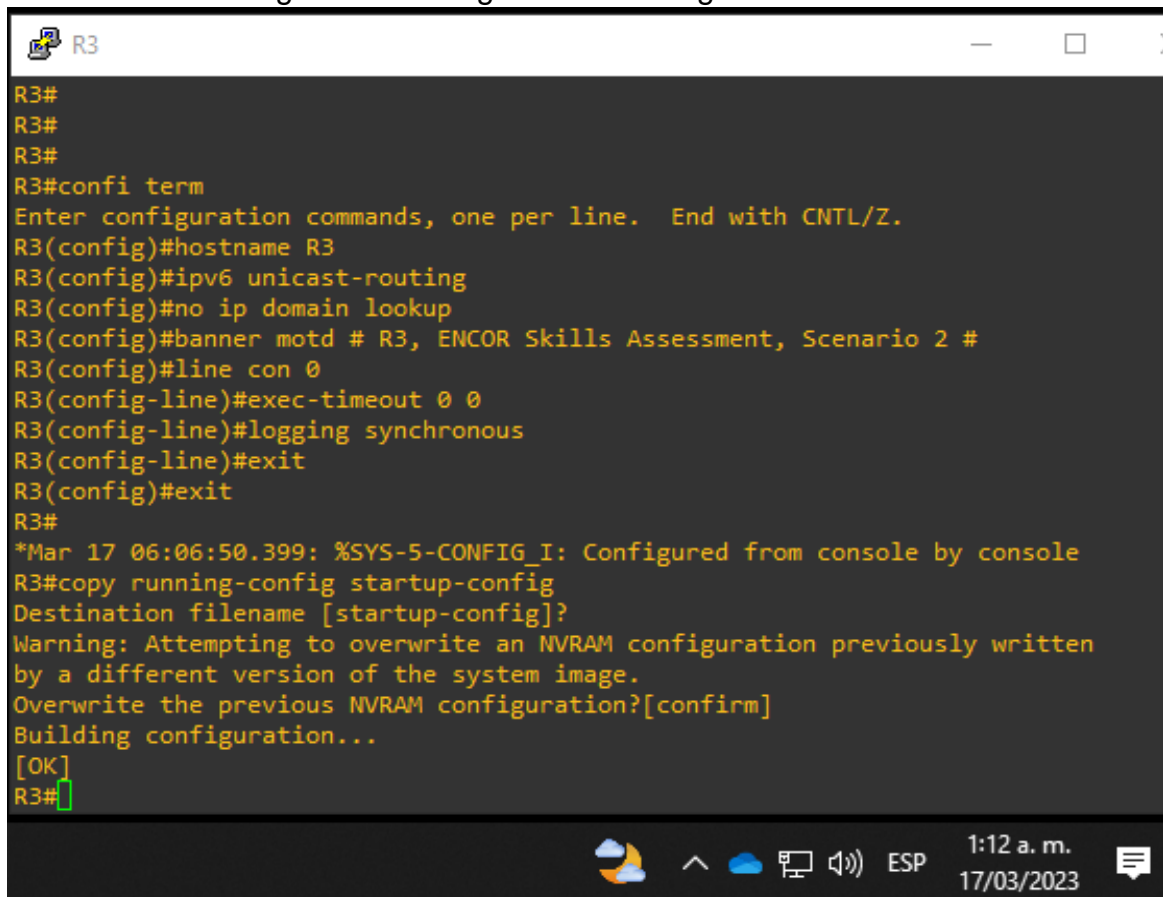
Overwrite the previous NVRAM configuration?[confirm]

Building configuration...

[OK]

R3#

Figura 11. Configuración inicial guardada en R3



```
R3#
R3#
R3#
R3#confi term
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#hostname R3
R3(config)#ipv6 unicast-routing
R3(config)#no ip domain lookup
R3(config)#banner motd # R3, ENCOR Skills Assessment, Scenario 2 #
R3(config)#line con 0
R3(config-line)#exec-timeout 0 0
R3(config-line)#logging synchronous
R3(config-line)#exit
R3(config)#exit
R3#
*Mar 17 06:06:50.399: %SYS-5-CONFIG_I: Configured from console by console
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]
R3#
```

3.1.2.4 Comandos para guardar configuración en D1

D1#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.

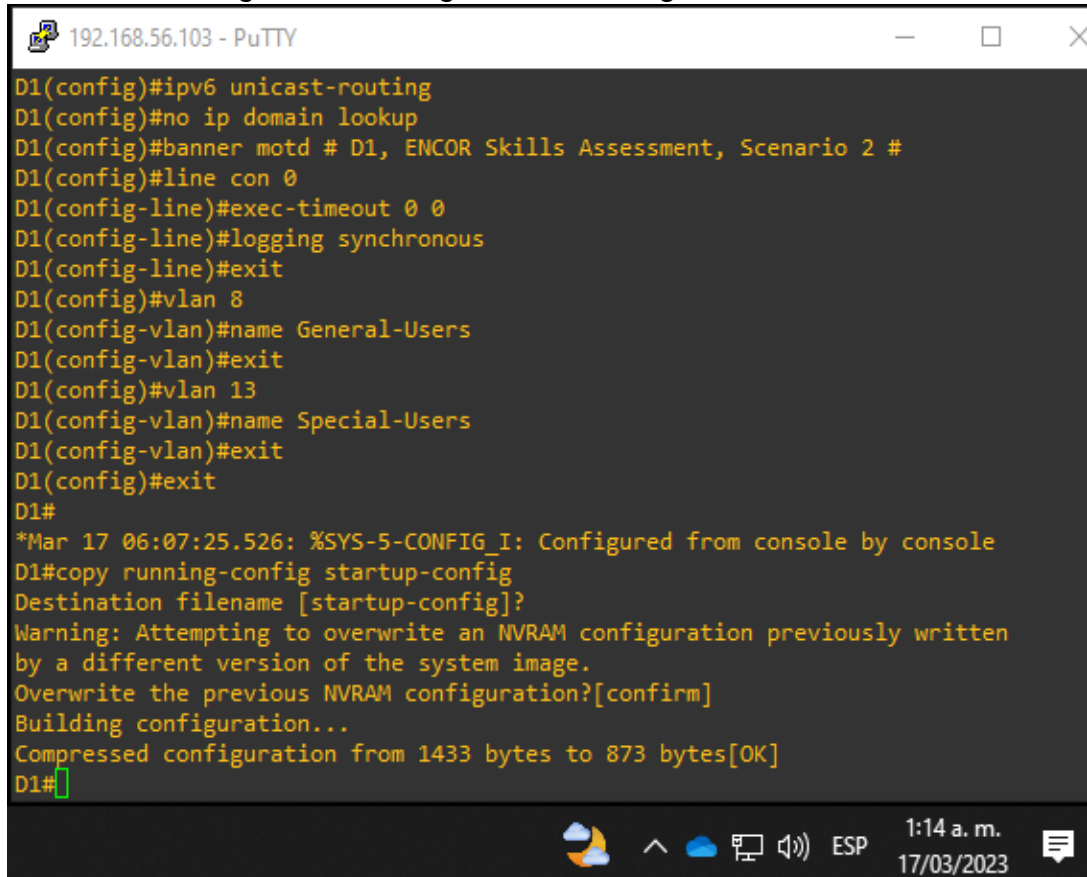
Overwrite the previous NVRAM configuration?[confirm]

Building configuration...

Compressed configuration from 1433 bytes to 873 bytes[OK]

D1#

Figura 12. Configuración inicial guardada en D1



```
192.168.56.103 - PuTTY
D1(config)#ipv6 unicast-routing
D1(config)#no ip domain lookup
D1(config)#banner motd # D1, ENCOR Skills Assessment, Scenario 2 #
D1(config)#line con 0
D1(config-line)#exec-timeout 0 0
D1(config-line)#logging synchronous
D1(config-line)#exit
D1(config)#vlan 8
D1(config-vlan)#name General-Users
D1(config-vlan)#exit
D1(config)#vlan 13
D1(config-vlan)#name Special-Users
D1(config-vlan)#exit
D1(config)#exit
D1#
*Mar 17 06:07:25.526: %SYS-5-CONFIG_I: Configured from console by console
D1#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 1433 bytes to 873 bytes[OK]
D1#
```

3.1.2.5 Comandos para guardar configuración en 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.

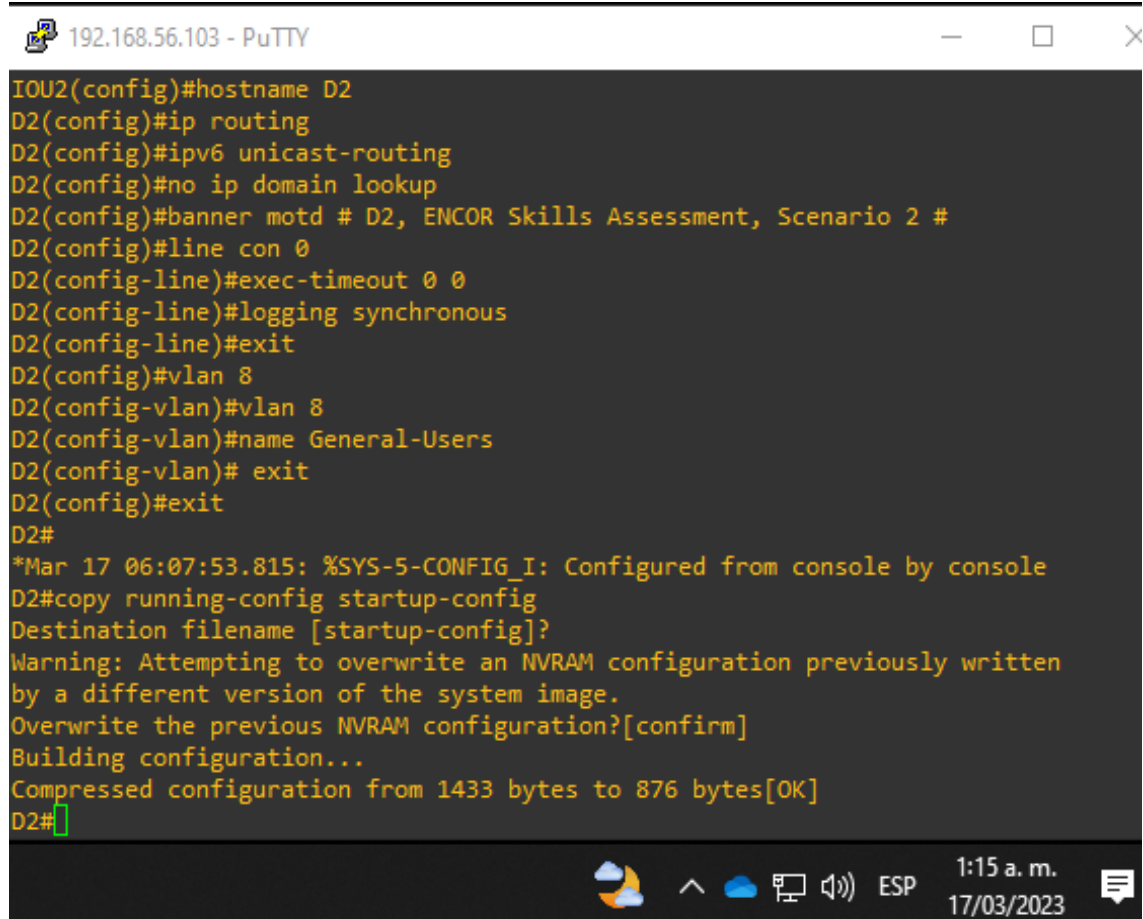
Overwrite the previous NVRAM configuration?[confirm]

Building configuration...

Compressed configuration from 1433 bytes to 876 bytes[OK]

D2#

Figura 13. Configuración inicial guardada en D2



```
192.168.56.103 - PuTTY
IOU2(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 2 #
D2(config)#line con 0
D2(config-line)#exec-timeout 0 0
D2(config-line)#logging synchronous
D2(config-line)#exit
D2(config)#vlan 8
D2(config-vlan)#vlan 8
D2(config-vlan)#name General-Users
D2(config-vlan)# exit
D2(config)#exit
D2#
*Mar 17 06:07:53.815: %SYS-5-CONFIG_I: Configured from console by console
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 1433 bytes to 876 bytes[OK]
D2#
```

3.1.2.6 Comandos para guardar configuración en A1

A1#copy running-config startup-config

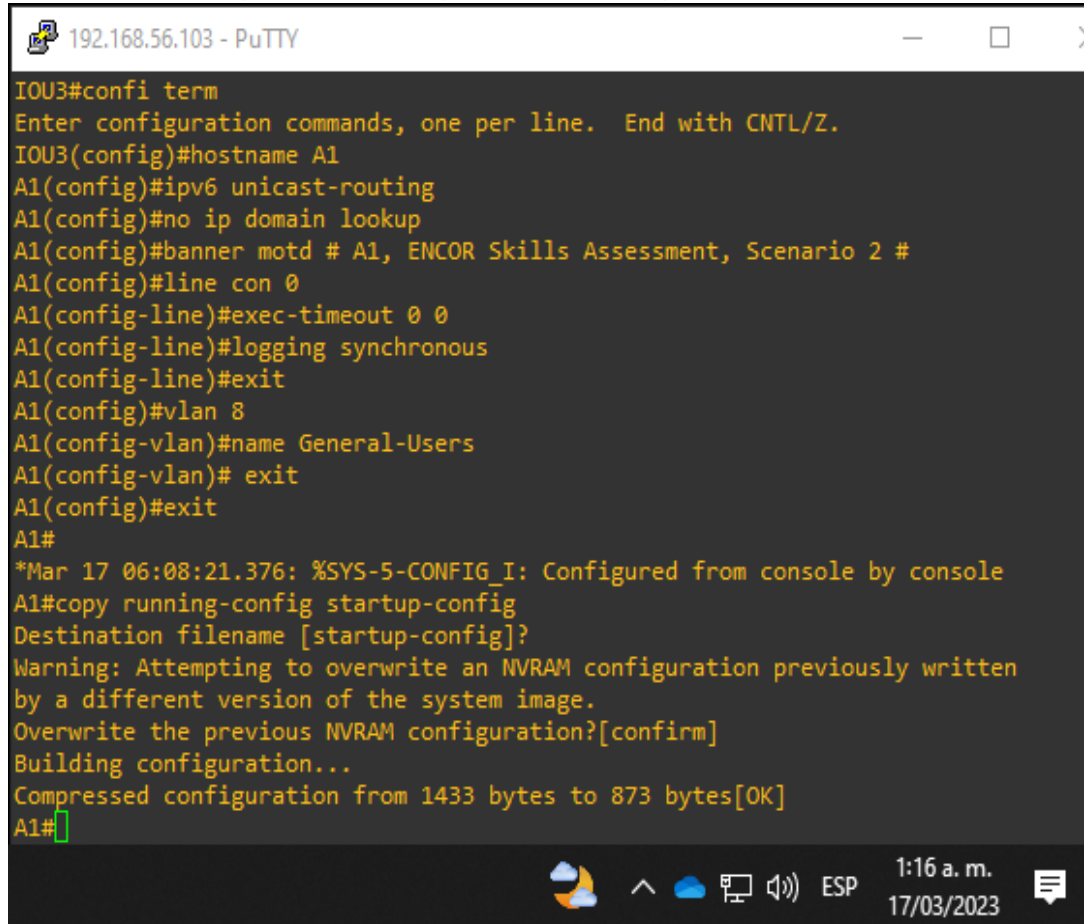
Destination filename [startup-config]?

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...

Figura 14. Configuración inicial guardada en A1



```
192.168.56.103 - PuTTY
IOU3#confi term
Enter configuration commands, one per line. End with CNTL/Z.
IOU3(config)#hostname A1
A1(config)#ipv6 unicast-routing
A1(config)#no ip domain lookup
A1(config)#banner motd # A1, ENCOR Skills Assessment, Scenario 2 #
A1(config)#line con 0
A1(config-line)#exec-timeout 0 0
A1(config-line)#logging synchronous
A1(config-line)#exit
A1(config)#vlan 8
A1(config-vlan)#name General-Users
A1(config-vlan)# exit
A1(config)#exit
A1#
*Mar 17 06:08:21.376: %SYS-5-CONFIG_I: Configured from console by console
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 1433 bytes to 873 bytes[OK]
A1#
```

3.1.3. Configure los PC1, PC2, PC3 y PC4 de acuerdo con la tabla de direccionamiento.

Configuración PC1

PC1> ip 10.0.113.30/24 10.0.113.1 % Configurar direccion ip

PC1> ip 2001:db8:acad:213::50/64 % Configurar direccion ipv6

PC1> save % Guardar la configuración

PC1> sh ip % Mostrar la configuración

Figura 15. Configuración PC1

```
192.168.56.103 - PuTTY
Press '?' to get help.
Executing the startup file

PC1> ip 10.0.113.30/24 10.0.113.1
Checking for duplicate address...
PC1 : 10.0.113.30 255.255.255.0 gateway 10.0.113.1

PC1> ip 2001:db8:acad:213::50/64
PC1 : 2001:db8:acad:213::50/64

PC1> sh ip
NAME          : PC1[1]
IP/MASK       : 10.0.113.30/24
GATEWAY       : 10.0.113.1
DNS           :
MAC           : 00:50:79:66:68:00
LPORT        : 20038
RHOST:PORT    : 127.0.0.1:20039
MTU           : 1500

PC1> █
```

Configuración PC 2

```
PC2> ip 10.0.213.30/24 10.0.213.1
PC2> ip 2001:db8:acad:213::50/64
PC2> save
PC2> sh ip
```

Figura 16. Configuración PC2

```
192.168.56.103 - PuTTY
Press '?' to get help.
Executing the startup file

PC2> ip 10.0.213.30/24 10.0.213.1
Checking for duplicate address...
PC2 : 10.0.213.30 255.255.255.0 gateway 10.0.213.1

PC2> ip 2001:db8:acad:213::50/64
PC1 : 2001:db8:acad:213::50/64

PC2> sh ip
NAME          : PC2[1]
IP/MASK       : 10.0.213.30/24
GATEWAY       : 10.0.213.1
DNS           :
MAC           : 00:50:79:66:68:01
LPORT        : 20032
RHOST:PORT    : 127.0.0.1:20033
MTU           : 1500

PC2> █
```

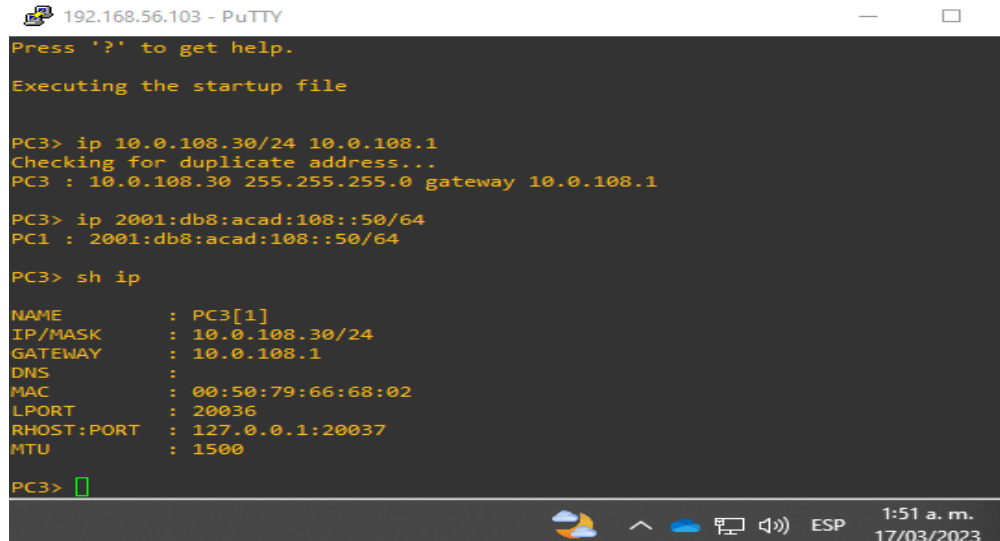
Configuración PC 3

```
PC3> ip 10.0.108.30/24 10.0.108.1
```

PC3> ip 2001:db8:acad:108::50/64

PC3> save

Figura 17. Configuración PC3



```
192.168.56.103 - PuTTY
Press '?' to get help.
Executing the startup file

PC3> ip 10.0.108.30/24 10.0.108.1
Checking for duplicate address...
PC3 : 10.0.108.30 255.255.255.0 gateway 10.0.108.1

PC3> ip 2001:db8:acad:108::50/64
PC1 : 2001:db8:acad:108::50/64

PC3> sh ip
NAME          : PC3[1]
IP/MASK       : 10.0.108.30/24
GATEWAY       : 10.0.108.1
DNS           :
MAC           : 00:50:79:66:68:02
LPORT        : 20036
RHOST:PORT    : 127.0.0.1:20037
MTU           : 1500

PC3> █
```

Configuración PC4

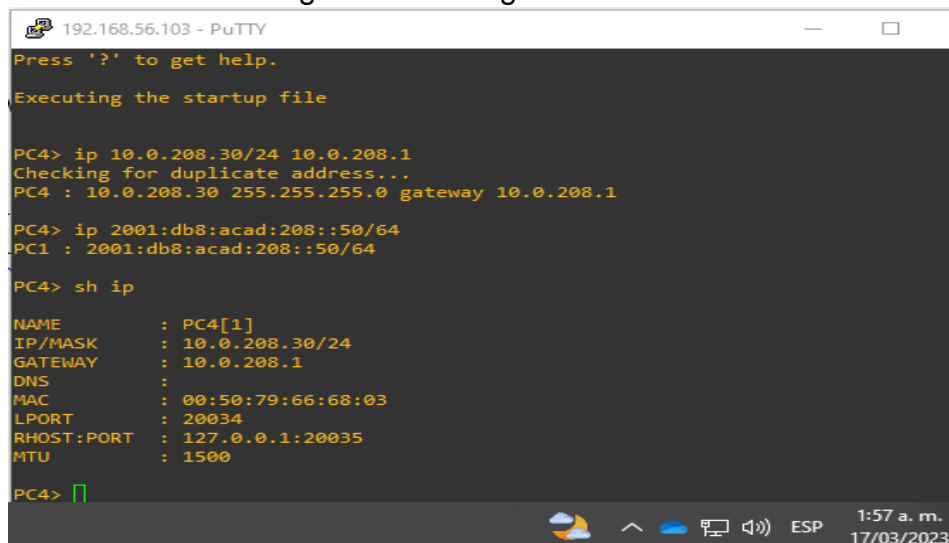
PC4> ip 10.0.208.30/24 10.0.208.1

PC4> ip 2001:db8:acad:208::50/64

PC4> save

PC4> sh ip

Figura 18. Configuración PC4



```
192.168.56.103 - PuTTY
Press '?' to get help.
Executing the startup file

PC4> ip 10.0.208.30/24 10.0.208.1
Checking for duplicate address...
PC4 : 10.0.208.30 255.255.255.0 gateway 10.0.208.1

PC4> ip 2001:db8:acad:208::50/64
PC1 : 2001:db8:acad:208::50/64

PC4> sh ip
NAME          : PC4[1]
IP/MASK       : 10.0.208.30/24
GATEWAY       : 10.0.208.1
DNS           :
MAC           : 00:50:79:66:68:03
LPORT        : 20034
RHOST:PORT    : 127.0.0.1:20035
MTU           : 1500

PC4> █
```

3.2 Parte 2: configurar VRF y enrutamiento estático

En esta parte de la evaluación de habilidades, configurará VRF-Lite en los tres enrutadores y las rutas estáticas adecuadas para admitir la accesibilidad de un extremo a otro. Al final de esta parte, R1 debería poder hacer ping a R3 en cada VRF.

Tabla 2. Tabla de tareas de configuración 1

Task#	Task	Specification
2.1	On R1, R2, and R3, configure VRF-Lite VRFs as shown in the topology diagram.	Configure two VRFs: <ul style="list-style-type: none"> • General-Users • Special-Users The VRFs must support IPv4 and IPv6.
2.2	On R1, R2, and R3, configure IPv4 and IPv6 interfaces on each VRF as detailed in the addressing table above.	All routers will use Router-On-A-Stick on their G0/0/1.x interfaces to support separation of the VRFs. Sub-interface 1: <ul style="list-style-type: none"> • In the Special Users VRF • Use dot1q encapsulation 13 • IPv4 and IPv6 GUA and link-local addresses • Enable the interfaces Sub-interface 2: <ul style="list-style-type: none"> • In the General Users VRF • Use dot1q encapsulation 8 • IPv4 and IPv6 GUA and link-local addresses • Enable the interfaces
2.3	On R1 and R3, configure default static routes pointing to R2.	Configure VRF static routes for both IPv4 and IPv6 in both VRFs.
2.4	Verify connectivity in each VRF.	From R1, verify connectivity to R3: <ul style="list-style-type: none"> • ping vrf General-Users 10.0.208.3 • ping vrf General-Users 2001:db8:acad:208::1 • ping vrf Special-Users 10.0.213.3 • ping vrf Special-Users 2001:db8:acad:213::1

Nota: R1 no estará habilitado para realizar ping entre PC2 o PC4 con la configuración de las Partes 1 y 2.

3.2.1 Comandos de Configuración VRF en R1

Comando	Comentario
R1#confi term	
Enter configuration commands, one per line. End with CNTL/Z.	
R1(config)#vrf definition General-Users	<i>% Configuracion vrf para general users</i>
R1(config-vrf)#address-family ipv4	<i>% Direcccionamiento para ipv4</i>
R1(config-vrf-af)#address-family ipv6	<i>% Dirreccionamiento para ipv6</i>
R1(config-vrf-af)#exit	
R1(config-vrf)#vrf definition Special-Users	<i>% Configuracion vrf para special users</i>
R1(config-vrf)#address-family ipv4	<i>% Direcccionamiento para ipv4</i>
R1(config-vrf-af)#address-family ipv6	<i>% Dirreccionamiento para ipv6</i>
R1(config-vrf-af)#exit	
R1(config-vrf)#interface e1/2.1	<i>% Configuracion primera subinterfase para special users</i>
R1(config-subif)#encapsulation dot1q 13	<i>% Configuracion enlace 802.1Q</i>
R1(config-subif)#vrf forwarding Special-Users	
R1(config-subif)#ip address 10.0.12.3 255.255.255.0	<i>% Direccion ip y mascara</i>
R1(config-subif)#ipv6 address fe80::1:1 link-local	<i>% Direccion local</i>
R1(config-subif)#ipv6 address 2001:db8:acad:12::1/64	<i>% direccion ipv6</i>
R1(config-subif)#no shutdown	<i>% Levantamiento de la subinterfase</i>
R1(config-subif)#exit	
R1(config)#interface e1/2.2	<i>%Configuracion segunda subinterfase para special users</i>
R1(config-subif)#encapsulation dot1q 13	<i>% Configuracion enlace 802.1Q</i>
R1(config-subif)#vrf forwarding Special-Users	

R1(config-subif)#ip address 10.0.12.3 255.255.255.0 *%Direccion ip y mascara*

R1(config-subif)#ipv6 address fe80::1:2 link-local *% Direccion local*

R1(config-subif)#ipv6 address 2001:db8:acad:12::1/64 *% Direccion ipv6*

R1(config-subif)#no shutdown *% Levantamiento de la subinterfase*

R1(config-subif)#exit

R1(config)#interface e1/2 *% Configuracion interfase fisica*

R1(config-if)#no ip address *% Configuracion sin direccion ip*

R1(config-if)#no shutdown *% Levantamiento de la interfase fisica*

R1(config-if)#exit

R1(config)#

R1(config)#interface e1/0.1 *% Configuracion primera subinterfase para general users*

R1(config-subif)#encapsulation dot1q 8 *% Configuracion enlace 802.1Q* R1(config-subif)#vrf forwarding General-Users

R1(config-subif)#ip address 10.0.113.3 255.255.255.0

R1(config-subif)#ipv6 address fe80::1:3 link-local

R1(config-subif)#ipv6 address 2001:db8:acad:113::3/64

R1(config-subif)#no shutdown

R1(config-subif)#exit

R1(config)#exit

R1#

R1(config)#interface e1/0.2 *% Configuracion segunda subinterfase para general users*

R1(config-subif)#encapsulation dot1q 8 *% Configuracion enlace 802.1Q*

R1(config-subif)#vrf forwarding General-Users

R1(config-subif)#ip address 10.0.108.3 255.255.255.0 *%Direccion ip y mascara*

R1(config-subif)#ipv6 address fe80::1:4 link-local *% Direccion local*

```
R1(config-subif)#ipv6 address 2001:db8:acad:108::1/64 % Direccion ipv6
R1(config-subif)#no shutdown % Levantamiento de la subinterfase
R1(config-subif)#exit
R1(config)#
R1(config)#interface e1/0 % Configuracion interfase fisica
R1(config-if)#no ip address
R1(config-if)#no shutdown % Levantamiento interfase fisica
R1(config-if)#exit
R1(config)#
```

%Configuracion de direcciones estaticas%

```
R1(config)#ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.12.1
R1(config)#ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.12.1
R1(config)#ipv6 route vrf Special-Users ::/0 2001:db8:acad:12::2
R1(config)#ipv6 route vrf General-Users ::/0 2001:db8:acad:12::2
R1(config)#end
R1#
R1#show running-config %Se guarda configuración en la memoria
Building configuration...
R1#copy running-config startup-config % Se confirma configuracion guardada
Destination filename [startup-config]?
Building configuration...
[OK]
R1#
```

3.2.2 Comandos de configuración VRF en R2

R2#confi term

Enter configuration commands, one per line. End with CNTL/Z.

R2(config)#vrf definition General-Users

R2(config-vrf)#address-family ipv4

R2(config-vrf-af)#address-family ipv6

R2(config-vrf-af)#exit

R2(config-vrf)#vrf definition Special-Users

R2(config-vrf)#address-family ipv4

R2(config-vrf-af)#address-family ipv6

R2(config-vrf-af)#exit

R2(config-vrf)#interface e1/2.1

R2(config-subif)#encapsulation dot1q 13

R2(config-subif)#vrf forwarding Special-Users

R2(config-subif)#ip address 10.0.12.0 255.255.255.0

Bad mask /24 for address 10.0.12.0

R2(config-subif)#ipv6 address fe80::2:1 link-local

R2(config-subif)#ipv6 address 2001:db8:acad:12::2/64

R2(config-subif)#no shutdown

R2(config-subif)#exit

R2(config)#

R2(config)#interface e1/2.2

R2(config-subif)#encapsulation dot1q 8

R2(config-subif)#vrf forwarding General-Users

R2(config-subif)#ip address 10.0.12.0 255.255.255.0

Bad mask /24 for address 10.0.12.0

```
R2(config-subif)#ipv6 address fe80::2:2 link-local
R2(config-subif)#ipv6 address 2001:db8:acad:12::2/64
R2(config-subif)#no shutdown
R2(config-subif)#exit
R2(config)#
R2(config)#interface e1/2
R2(config-if)#no ip address
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#
R2(config)#interface e1/0.1
R2(config-subif)#encapsulation dot1q 13
R2(config-subif)#vrf forwarding Special-Users
R2(config-subif)#ip address 10.0.23.0 255.255.255.0
Bad mask /24 for address 10.0.23.0
R2(config-subif)#ipv6 address fe80::2:3 link-local
R2(config-subif)#ipv6 address 2001:db8:acad:23::2/64
R2(config-subif)#no shutdown
R2(config-subif)#exit
R2(config)#
R2(config)#interface e1/0.2
R2(config-subif)#encapsulation dot1q 8
R2(config-subif)#vrf forwarding General-Users
R2(config-subif)#ip address 10.0.23.0 255.255.255.0
Bad mask /24 for address 10.0.23.0
R2(config-subif)#ipv6 address fe80::2:4 link-local
R2(config-subif)#ipv6 address 2001:db8:acad:23::2/64
```

```
R2(config-subif)#no shutdown
```

```
R2(config-subif)#exit
```

```
R2(config)#
```

```
R2(config)#interface e1/0
```

```
R2(config-if)#no ip address
```

```
R2(config-if)#no shutdown
```

```
R2(config-if)#exit
```

%Configuracion de rutas para las estaciones remotas%

```
R2#confi term
```

```
R2(config)#
```

```
R2(config)#ip route vrf Special-Users 10.0.113.0 255.255.255.0 10.0.12.3
```

```
R2(config)#ip route vrf Special-Users 10.0.213.0 255.255.255.0 10.0.23.3
```

```
R2(config)#$vrf Special-Users 2001:db8:acad:113::/64 2001:db8:acad:12::1
```

```
R2(config)#$vrf Special-Users 2001:db8:acad:213::/64 2001:db8:acad:23::3
```

```
R2(config)#ip route vrf General-Users 10.0.108.0 255.255.255.0 10.0.12.3
```

```
R2(config)#ip route vrf General-Users 10.0.208.0 255.255.255.0 10.0.23.3
```

```
R2(config)#ipv6 route vrf General-Users 2001:db8:acad:108::/64  
2001:db8:acad:12::1
```

```
R2(config)#ipv6 route vrf General-Users 2001:db8:acad:208::/64  
2001:db8:acad:23::3
```

```
R2(config)#end
```

```
R2#
```

```
R2#confi term
```

Enter configuration commands, one per line. End with CNTL/Z.

```
R2(config)#interface e1/2.1
```

```
R2(config-subif)#ip address 10.0.12.1 255.255.255.0
```

```
R2(config-subif)#exit
```

```
R2(config)#interface e1/2.2
```

```
R2(config-subif)#ip address 10.0.12.1 255.255.255.0
```

```
R2(config-subif)#exit
```

```
R2(config)#interface e1/0.1
```

```
R2(config-subif)#ip address 10.0.23.0 255.255.255.0
```

```
Bad mask /24 for address 10.0.23.0
```

```
%% Error de mascara se corrige cambiando a ip 10.0.23.1%%
```

```
R2(config-subif)#exit
```

```
R2(config)#interface e1/0.2
```

```
R2(config-subif)#ip address 10.0.23.1 255.255.255.0
```

```
R2(config-subif)#exit
```

```
R2(config)#exit
```

```
R2#
```

```
*Mar 23 01:30:17.447: %SYS-5-CONFIG_I: Configured from console by console
```

```
R2#show running-config
```

```
Building configuration...
```

```
R2#copy running-config startup-config
```

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

```
Building configuration...
```

```
[OK]
```

```
R2#
```

3.2.3 Comandos de configuración VRF en R3

```
R3#confi term
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
R3(config)#vrf definition General-Users
R3(config-vrf)#address-family ipv4
R3(config-vrf-af)#address-family ipv6
R3(config-vrf-af)#exit
R3(config-vrf)#vrf definition Special-Users
R3(config-vrf)#address-family ipv4
R3(config-vrf-af)#address-family ipv6
R3(config-vrf-af)#exit
R3(config-vrf)#interface e1/2.1
R3(config-subif)#encapsulation dot1q 13
R3(config-subif)#vrf forwarding Special-Users
R3(config-subif)#ip address 10.0.23.3 255.255.255.0
R3(config-subif)#ipv6 address fe80::3:1 link-local
R3(config-subif)#ipv6 address 2001:db8:acad:23::3/64
R3(config-subif)#no shutdown
R3(config-subif)#exit
R3(config)#
R3(config)#interface e1/2.2
R3(config-subif)#encapsulation dot1q 8
R3(config-subif)#vrf forwarding General-Users
R3(config-subif)#ip address 10.0.23.3 255.255.255.0
R3(config-subif)#ipv6 address fe80::3:2 link-local
R3(config-subif)#ipv6 address 2001:db8:acad:23::3/64
R3(config-subif)#no shutdown
R3(config-subif)#exit
R3(config)#
R3(config)#interface e1/2
```

```
R3(config-if)#no ip address
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#
R3(config)#interface e1/0.1
R3(config-subif)#encapsulation dot1q 13
R3(config-subif)#vrf forwarding Special-Users
R3(config-subif)#ip address 10.0.213.3 255.255.255.0
R3(config-subif)#ipv6 address fe80::3:3 link-local
R3(config-subif)#ipv6 address 2001:db8:acad:213::1/64
R3(config-subif)#no shutdown
R3(config-subif)#exit
R3(config)#
R3(config)#interface e1/0.2
R3(config-subif)#encapsulation dot1q 8
R3(config-subif)#vrf forwarding General-Users
R3(config-subif)#ip address 10.0.208.3 255.255.255.0
R3(config-subif)#ipv6 address fe80::3:4 link-local
R3(config-subif)#ipv6 address 2001:db8:acad:208::1/64
R3(config-subif)#no shutdown
R3(config-subif)#exit
R3(config)#
R3(config)#interface e1/0
R3(config-if)#no ip address
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#
```

% Configuración direcciones estaticas%

```
R3(config)#ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.23.1
```

```
R3(config)#ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.23.1
```

```
R3(config)#ipv6 route vrf Special-Users ::/0 2001:db8:acad:23::2
```

```
R3(config)#ipv6 route vrf Special-Users ::/0 2001:db8:acad:23::2
```

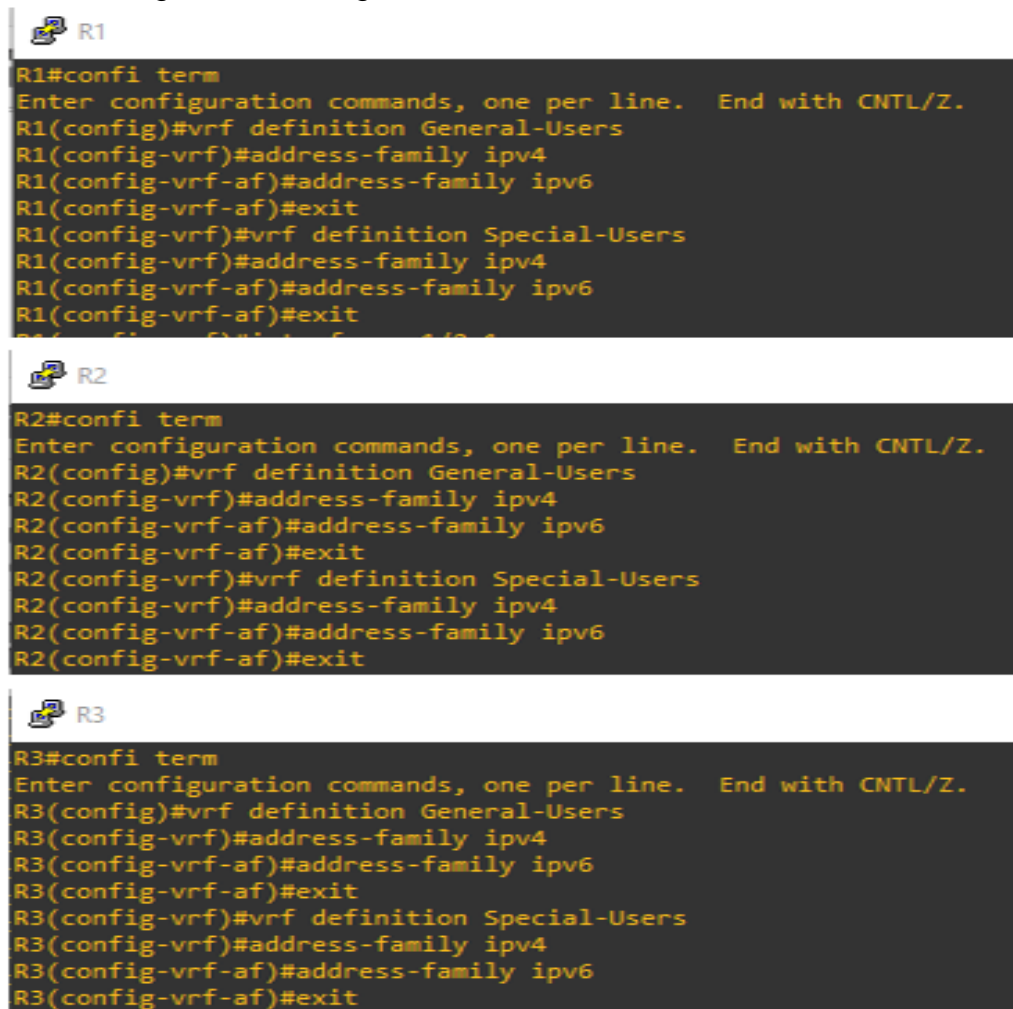
```
R3(config)#end
```

```
R3#copy running-config startup-config % Guardar configuración en memoria
```

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

```
Building configuration...
```

Figura 19. Configuración VRF-Lite On R1, R2, and R3.



```
R1
R1#confi term
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#vrf definition General-Users
R1(config-vrf)#address-family ipv4
R1(config-vrf-af)#address-family ipv6
R1(config-vrf-af)#exit
R1(config-vrf)#vrf definition Special-Users
R1(config-vrf)#address-family ipv4
R1(config-vrf-af)#address-family ipv6
R1(config-vrf-af)#exit

R2
R2#confi term
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#vrf definition General-Users
R2(config-vrf)#address-family ipv4
R2(config-vrf-af)#address-family ipv6
R2(config-vrf-af)#exit
R2(config-vrf)#vrf definition Special-Users
R2(config-vrf)#address-family ipv4
R2(config-vrf-af)#address-family ipv6
R2(config-vrf-af)#exit

R3
R3#confi term
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#vrf definition General-Users
R3(config-vrf)#address-family ipv4
R3(config-vrf-af)#address-family ipv6
R3(config-vrf-af)#exit
R3(config-vrf)#vrf definition Special-Users
R3(config-vrf)#address-family ipv4
R3(config-vrf-af)#address-family ipv6
R3(config-vrf-af)#exit
```

Figura 20 Configuración IPv4 and IPv6 interfaces on each VRF On R1.

```
R1
R1(config-vrf)#interface e1/2.1
R1(config-subif)#encapsulation dot1q 13
R1(config-subif)#vrf forwarding Special-Users
R1(config-subif)#ip address 10.0.12.3 255.255.255.0
R1(config-subif)#ipv6 address fe80::1:1 link-local
R1(config-subif)#ipv6 address 2001:db8:acad:12::1/64
R1(config-subif)#no shutdown
R1(config-subif)#exit
R1(config)#interface e1/2.2
R1(config-subif)#encapsulation dot1q 13

%Configuration of multiple subinterfaces of the same main
interface with the same VID (13) is not permitted.
This VID is already configured on Ethernet1/2.1.

R1(config-subif)#vrf forwarding Special-Users
R1(config-subif)#ip address 10.0.12.3 255.255.255.0

% Configuring IP routing on a LAN subinterface is only allowed if that
subinterface is already configured as part of an IEEE 802.1Q, IEEE 802.1Q,
or ISL VLAN.

R1(config-subif)#ipv6 address fe80::1:2 link-local
R1(config-subif)#ipv6 address 2001:db8:acad:12::1/64
%Ethernet1/2.2: Error: 2001:DB8:ACAD:12::1/64 is in use on Ethernet1/2.1
R1(config-subif)#no shutdown
R1(config-subif)#exit
R1(config)#interface e1/2
R1(config-if)#no ip address
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#
R1(config)#interface e1/0.1
R1(config-subif)#encapsulation dot1q 13
R1(config-subif)#vrf forwarding Special-Users
R1(config-subif)#ip address 10.0.113.3 255.255.255.0
R1(config-subif)#ipv6 address fe80::1:3 link-local
R1(config-subif)#ipv6 address 2001:db8:acad:113::1/64
R1(config-subif)#no shutdown
R1(config-subif)#exit
R1(config)#
R1(config)#interface e1/0.2
R1(config-subif)#encapsulation dot1q 8
R1(config-subif)#vrf forwarding General-Users
R1(config-subif)#ip address 10.0.108.3 255.255.255.0
R1(config-subif)#ipv6 address fe80::1:4 link-local
R1(config-subif)#ipv6 address 2001:db8:acad:108::1/64
R1(config-subif)#no shutdown
R1(config-subif)#exit
R1(config)#
R1(config)#interface e1/0
R1(config-if)#no ip address
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#
```

Figura 21 Configuración IPv4 and IPv6 interfaces on each VRF On R2.

 R2

```
R2(config-vrf-af)#exit
R2(config-vrf)#interface e1/2.1
R2(config-subif)#encapsulation dot1q 13
R2(config-subif)#vrf forwarding Special-Users
R2(config-subif)#ip address 10.0.12.0 255.255.255.0
Bad mask /24 for address 10.0.12.0
R2(config-subif)#ipv6 address fe80::2:1 link-local
R2(config-subif)#ipv6 address 2001:db8:acad:12::2/64
R2(config-subif)#no shutdown
R2(config-subif)#exit
R2(config)#
R2(config)#interface e1/2.2
R2(config-subif)#encapsulation dot1q 8
R2(config-subif)#vrf forwarding General-Users
R2(config-subif)#ip address 10.0.12.0 255.255.255.0
Bad mask /24 for address 10.0.12.0
R2(config-subif)#ipv6 address fe80::2:2 link-local
R2(config-subif)#ipv6 address 2001:db8:acad:12::2/64
R2(config-subif)#no shutdown
R2(config-subif)#exit
R2(config)#
R2(config)#interface e1/2
R2(config-if)#no ip address
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#
R2(config)#interface e1/0.1
R2(config-subif)#encapsulation dot1q 13
R2(config-subif)#vrf forwarding Special-Users
R2(config-subif)#ip address 10.0.23.0 255.255.255.0
Bad mask /24 for address 10.0.23.0
R2(config-subif)#ipv6 address fe80::2:3 link-local
R2(config-subif)#ipv6 address 2001:db8:acad:23::2/64
R2(config-subif)#no shutdown
R2(config-subif)#exit
R2(config)#
R2(config)#interface e1/0.2
R2(config-subif)#encapsulation dot1q 8
R2(config-subif)#vrf forwarding General-Users
R2(config-subif)#ip address 10.0.23.0 255.255.255.0
Bad mask /24 for address 10.0.23.0
R2(config-subif)#ipv6 address fe80::2:4 link-local
R2(config-subif)#ipv6 address 2001:db8:acad:23::2/64
R2(config-subif)#no shutdown
R2(config-subif)#exit
R2(config)#
R2(config)#interface e1/0
R2(config-if)#no ip address
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#
```

Como se observa en la imagen se presenta error en la máscara de red (Bad mask /24 for address 10.0.23.0)

Al ser dirección de broadcast se genera conflicto por ser mi penúltimo dígito de la cédula 0. Por esta razón se cambia entonces a 1 para evitar el error, la dirección quedaría así 10.0.23.1

Figura 22. Corrección dirección ip para la máscara de sub-red

```
R2
R2(config)#interface e1/2.1
R2(config-subif)#ip address 10.0.12.1 255.255.255.0
R2(config-subif)#exit
R2(config)#interface e1/2.2
R2(config-subif)#ip address 10.0.12.1 255.255.255.0
R2(config-subif)#exit
R2(config)#interface e1/0.1
R2(config-subif)#ip address 10.0.23.0 255.255.255.0
Bad mask /24 for address 10.0.23.0
R2(config-subif)#ip address 10.0.23.0 255.255.255.0
Bad mask /24 for address 10.0.23.0
R2(config-subif)#ip address 10.0.23.0 255.255.255.0
Bad mask /24 for address 10.0.23.0
R2(config-subif)#ip address 10.0.23.0 255.255.255.0
Bad mask /24 for address 10.0.23.0
R2(config-subif)#ip address 10.0.23.1 255.255.255.0
R2(config-subif)#exit
R2(config)#interface e1/0.2
R2(config-subif)#ip address 10.0.23.1 255.255.255.0
R2(config-subif)#exit
R2(config)#exit
R2#
```

Figura 23. Configuración IPv4 and IPv6 interfaces on each VRF on R3.

```
R3(config-vrf)#interface e1/2.1
R3(config-subif)#encapsulation dot1q 13
R3(config-subif)#vrf forwarding Special-Users
R3(config-subif)#ip address 10.0.23.3 255.255.255.0
R3(config-subif)#ipv6 address fe80::3:1 link-local
R3(config-subif)#ipv6 address 2001:db8:acad:23::3/64
R3(config-subif)#no shutdown
R3(config-subif)#exit
R3(config)#
R3(config)#interface e1/2.2
R3(config-subif)#encapsulation dot1q 8
R3(config-subif)#vrf forwarding General-Users
R3(config-subif)#ip address 10.0.23.3 255.255.255.0
R3(config-subif)#ipv6 address fe80::3:2 link-local
R3(config-subif)#ipv6 address 2001:db8:acad:23::3/64
R3(config-subif)#no shutdown
R3(config-subif)#exit
R3(config)#
R3(config)#interface e1/2
R3(config-if)#no ip address
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#
R3(config)#interface e1/0.1
R3(config-subif)#encapsulation dot1q 13
R3(config-subif)#vrf forwarding Special-Users
R3(config-subif)#ip address 10.0.213.3 255.255.255.0
R3(config-subif)#ipv6 address fe80::3:3 link-local
R3(config-subif)#ipv6 address 2001:db8:acad:213::1/64
R3(config-subif)#no shutdown
R3(config-subif)#exit
R3(config)#
R3(config)#interface e1/0.2
R3(config-subif)#encapsulation dot1q 8
R3(config-subif)#vrf forwarding General-Users
R3(config-subif)#ip address 10.0.208.3 255.255.255.0
R3(config-subif)#ipv6 address fe80::3:4 link-local
R3(config-subif)#ipv6 address 2001:db8:acad:208::1/64
R3(config-subif)#no shutdown
R3(config-subif)#exit
R3(config)#
R3(config)#interface e1/0
R3(config-if)#no ip address
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#
```

Figura 24. On R1, configure default static routes pointing to R2.

```
R1
R1(config)#
R1(config)#ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.12.0
R1(config)#ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.12.0
R1(config)#ipv6 route vrf Special-Users ::/0 2001:db8:acad:12::2
R1(config)#ipv6 route vrf General-Users ::/0 2001:db8:acad:12::2
R1(config)#end

R1
R1#confi term
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.12.1
R1(config)#ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.12.1
R1(config)#exit
R1#
*Mar 23 06:38:59.937: %SYS-5-CONFIG_I: Configured from console by console
```

Figura 25. On R3, configure default static routes pointing to R2.

```
R3
R3(config)#
R3(config)#ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.23.0
R3(config)#ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.23.0
R3(config)#ipv6 route vrf Special-Users ::/0 2001:db8:acad:23::2
R3(config)#ipv6 route vrf Special-Users ::/0 2001:db8:acad:23::2
R3(config)#end

R3
R3#confi term
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.23.0
R3(config)#ipv6 route vrf General-Users ::/0 2001:db8:acad:23::2
R3(config)#end
R3#
```

Figura 26. On R2, configure default static routes externals.

```
R2
R2(config)#
R2(config)#ip route vrf Special-Users 10.0.113.0 255.255.255.0 10.0.12.3
R2(config)#ip route vrf Special-Users 10.0.213.0 255.255.255.0 10.0.23.3
R2(config)#vrf Special-Users 2001:db8:acad:113::/64 2001:db8:acad:12::1
R2(config)#vrf Special-Users 2001:db8:acad:213::/64 2001:db8:acad:23::3
R2(config)#ip route vrf General-Users 10.0.108.0 255.255.255.0 10.0.12.3
R2(config)#ip route vrf General-Users 10.0.208.0 255.255.255.0 10.0.23.3
R2(config)#ipv6 route vrf General-Users 20
*Mar 22 23:00:32.179: %LINK-3-UPDOWN: Interface Ethernet1/2, changed state to up
*Mar 22 23:00:33.187: %LINEPROTO-5-UPDOWN: Line protocol on Interface E$vrf Gene
ral-Users 2001:db8:acad:108::/64 2001:db8:acad:12::1
R2(config)#vrf General-Users 2001:db8:acad:208::/64 2001:db8:acad:23::3
R2(config)#end
*Mar 22 23:00:33.615: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Mar 22 23:00:34.615: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
0, changed state to up
R2(config)#end
R2#
```

Se identificaron los errores usando el comando **show running-config** y se confirman la corrección de los errores usando el mismo comando, todas las configuraciones se salvaron con el comando **copy running-config startup-config**.

Figura 27. Verify connectivity in each VRF.

```
R1
R1#
R1#ping vrf General-Users 10.0.208.3
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.208.3, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 12/61/164 ms
R1#
R1#ping vrf General-Users 2001:db8:acad:208::1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:208::1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 16/60/164 ms
R1#
R1#
R1#ping vrf Special-Users 10.0.213
% Unrecognized host or address, or protocol not running.

R1#ping vrf Special-Users 10.0.213.3
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.213.3, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 28/106/224 ms
R1#
R1#
R1#ping vrf Special-Users 2001:db8:acad:213::1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:213::1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/64/184 ms
R1#
```

Podemos observar en la imagen como se comprueba la conectividad entre R1 y R3, 100% de los paquetes enviados fueron recibidos en la versión IPV4 e IPV6.

3.2.4 Comandos de verificación de conectividad

```
R1#ping vrf General-Users 10.0.208.3
```

```
R1# ping vrf General-Users 2001:db8:acad:208::1
```

```
R1# ping vrf Special-Users 10.0.213.3
```

```
R1#ping vrf Special-Users 2001:db8:acad:213::1
```

Figura 28. Verify no connectivity between R1, PC2 Y PC4.

```
R1
R1#ping vrf General-Users 10.0.208.3
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.208.3, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 28/105/324 ms
R1#ping vrf General-Users 2001:db8:acad:213::50
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:213::50, timeout is 2 seconds:
UUUUU
Success rate is 0 percent (0/5)
R1#
R1#
R1#ping vrf General-Users 2001:db8:acad:108::50
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:108::50, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
R1#
R1#
R1#
R1#ping vrf General-Users 2001:db8:acad:208::50
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:208::50, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
R1#
R1#
R1#ping vrf General-Users 10.0.208.30
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.208.30, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
R1#
R1#
R1#ping vrf General-Users 10.0.213.30
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.213.30, timeout is 2 seconds:
U.U.U
Success rate is 0 percent (0/5)
R1#
R1#
R1#ping vrf Special-Users 2001:db8:acad:113::50
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:113::50, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
R1#
R1#
R1#ping vrf Special-Users 10.0.113.30
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.113.30, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
R1#
```

Podemos observar en la imagen la confirmación de que no hay conectividad entre R1, PC2 y PC4, así mismo tampoco hay conectividad entre los pc de la red, debido a que no han sido configurado aun los Switches para los dispositivos finales.

3.2.5 Comandos de verificación de no conectividad

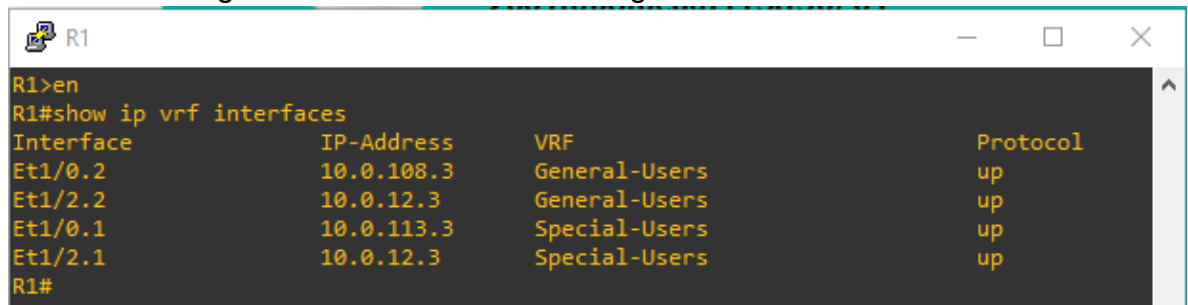
R1#ping vrf General-Users 2001:db8:acad:108::50

R1#ping vrf General-Users 2001:db8:acad:208::50

R1#ping vrf Special-Users 2001:db8:acad:113::50

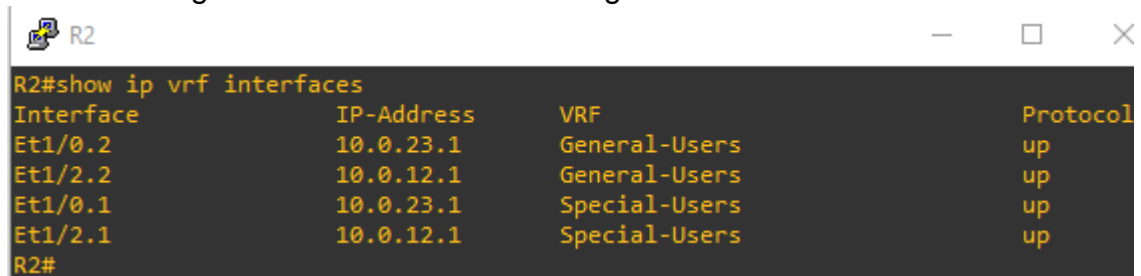
R1#ping vrf Special-Users 10.0.113.30

Figura 29. Verificación de configuración de las VRF en R1.



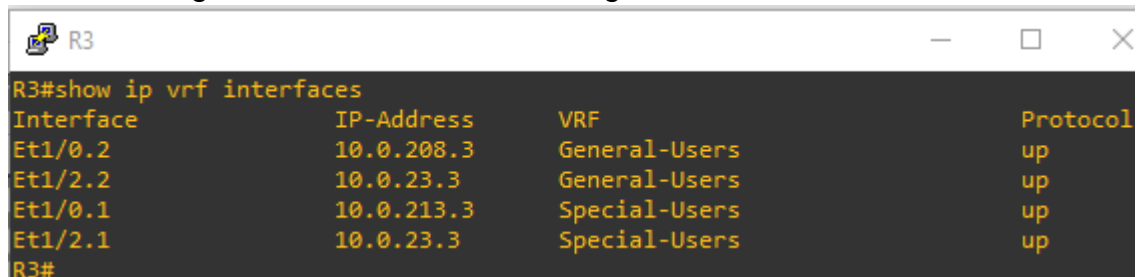
```
R1>en
R1#show ip vrf interfaces
Interface          IP-Address      VRF              Protocol
Et1/0.2            10.0.108.3     General-Users    up
Et1/2.2            10.0.12.3      General-Users    up
Et1/0.1            10.0.113.3     Special-Users    up
Et1/2.1            10.0.12.3      Special-Users    up
R1#
```

Figura 30. Verificación de configuración de las VRF en R2.



```
R2#show ip vrf interfaces
Interface          IP-Address      VRF              Protocol
Et1/0.2            10.0.23.1      General-Users    up
Et1/2.2            10.0.12.1      General-Users    up
Et1/0.1            10.0.23.1      Special-Users    up
Et1/2.1            10.0.12.1      Special-Users    up
R2#
```

Figura 31. Verificación de configuración de las VRF en R3.



```
R3#show ip vrf interfaces
Interface          IP-Address      VRF              Protocol
Et1/0.2            10.0.208.3     General-Users    up
Et1/2.2            10.0.23.3      General-Users    up
Et1/0.1            10.0.213.3     Special-Users    up
Et1/2.1            10.0.23.3      Special-Users    up
R3#
```

Podemos observar la configuración de las VRF, 2 interfaces para general users E1/0.2, E1/2.2 y 2 interfaces para special users E1/0.1, E1/2.1. en cada uno de los routers.

3.3 Parte 3. Configurar Capa 2

En esta parte, tendrá que configurar los Switches para soportar la conectividad con los dispositivos finales. Las tareas de configuración, son las siguientes:

Tabla 3. Tabla de tareas de configuración 2

Task#	Task	Specification
3.1	On D1, D2, and A1, disable all interfaces	On D1 and D2, shutdown E0/0-3, E1/0-3, E2/0-3 y E3/0-3. On A1, shutdown E0/0-3, E1/0-3, E2/0-3 y E3/0-3.
3.2	On D1 and D2, configure the trunk links to R1 and R3.	Configure and enable the E1/1 link as a trunk link.
3.3	On D1 and A1, configure the EtherChannel.	On D1, configure and enable: <ul style="list-style-type: none"> • Interface E3/1 and E3/2 • Port Channel 1 using PAgP On A1, configure enable: <ul style="list-style-type: none"> • Interface E0/2 and E0/3 • Port Channel 1 using PAgP
3.4	On D1, D2, and A1, configure access ports for PC1, PC2, PC3, and PC4.	Configure and enable the access ports as follows: <ul style="list-style-type: none"> • On D1, configure interface E2/3 as an access port in VLAN 13 and enable Portfast. • On D2, configure interface G2/3 as an access port in VLAN 13 and enable Portfast. • On D2, configure interface G3/1 as an access port in VLAN 8 and enable Portfast. • On A1, configure interface F2/3 as an access port in VLAN 8 and enable Portfast.
3.5	Verify PC to PC connectivity.	From PC1, verify IPv4 and IPv6 connectivity to PC2. From PC3, verify IPv4 and IPv6 connectivity to PC4.

3.3.1 Comandos de Configuración en D1

```
D1#confi term    % Configuración en modo global
Enter configuration commands, one per line.  End with CNTL/Z.
D1(config)#interface range e0/0-3,e1/0-3,e2/0-3,e3/0-3    %Rango de interfaces a
deshabilitar
D1(config-if-range)#shutdown    % Comando para deshabilitar las interfaces
D1(config-if-range)#exit
D1(config)#
D1(config)#interface e1/1    %Configuración interface e1/1
D1(config-if)#switchport trunk encapsulation dot1q    % Configuración enlace 802.1Q
D1(config-if)#switchport mode trunk    %Configuración del Puerto en modo troncal
D1(config-if)#no shutdown    % Levantamiento de la interface
D1(config-if)#exit
*Apr 11 11:05:45.252: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to
up
D1(config-if)#exit
*Apr 11 11:05:47.267: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet1/1, changed state to up
D1(config)#
D1(config)#interface e2/3    %Configuración interface e2/3
D1(config-if)#switchport mode access    %Configuración del Puerto en modo acceso
D1(config-if)#switchport access vlan 13    %Activación vlan 13 como Puerto de acceso
D1(config-if)#spanning-tree Portfast    % Activación Portfast
D1(config-if)#no shutdown    % Levantamiento de la interface
D1(config-if)#exit
D1(config)#
D1(config)#interface range e3/1-2    %Configuración rango de interfaces para port
channel
```

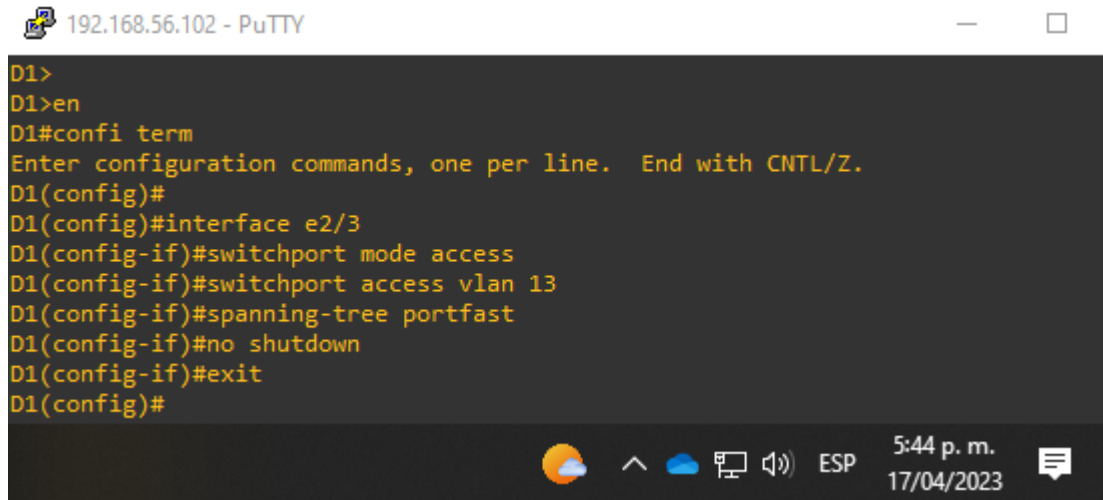
```
D1(config-if-range)#switchport trunk encapsulation dot1q    % Configuracion enlace
802.1Q
D1(config-if-range)#switchport mode trunk    %Configuracion del Puerto en modo troncal
D1(config-if-range)#channel-group 1 mode desirable
Creating a port-channel interface Port-channel 1
D1(config-if-range)#no shutdown
D1(config-if-range)#exit
D1(config)#
*Apr 11 11:11:20.662: %LINK-3-UPDOWN: Interface Ethernet3/1, changed state to
up
*Apr 11 11:11:20.673: %LINK-3-UPDOWN: Interface Ethernet3/2, changed state to
up
*Apr 11 11:11:31.361: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet3/1, changed state to up
*Apr 11 11:11:32.235: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet3/2, changed state to up
D1#show interfaces trunk    %verificar configuracion interfaces troncales
D1#show etherchannel summary    % ver Configuración eterchannel
D1#show run    % ver configuracion del switche
```

Figura 32. Interfaces deshabilitadas en D1.

192.168.56.102 - PuTTY

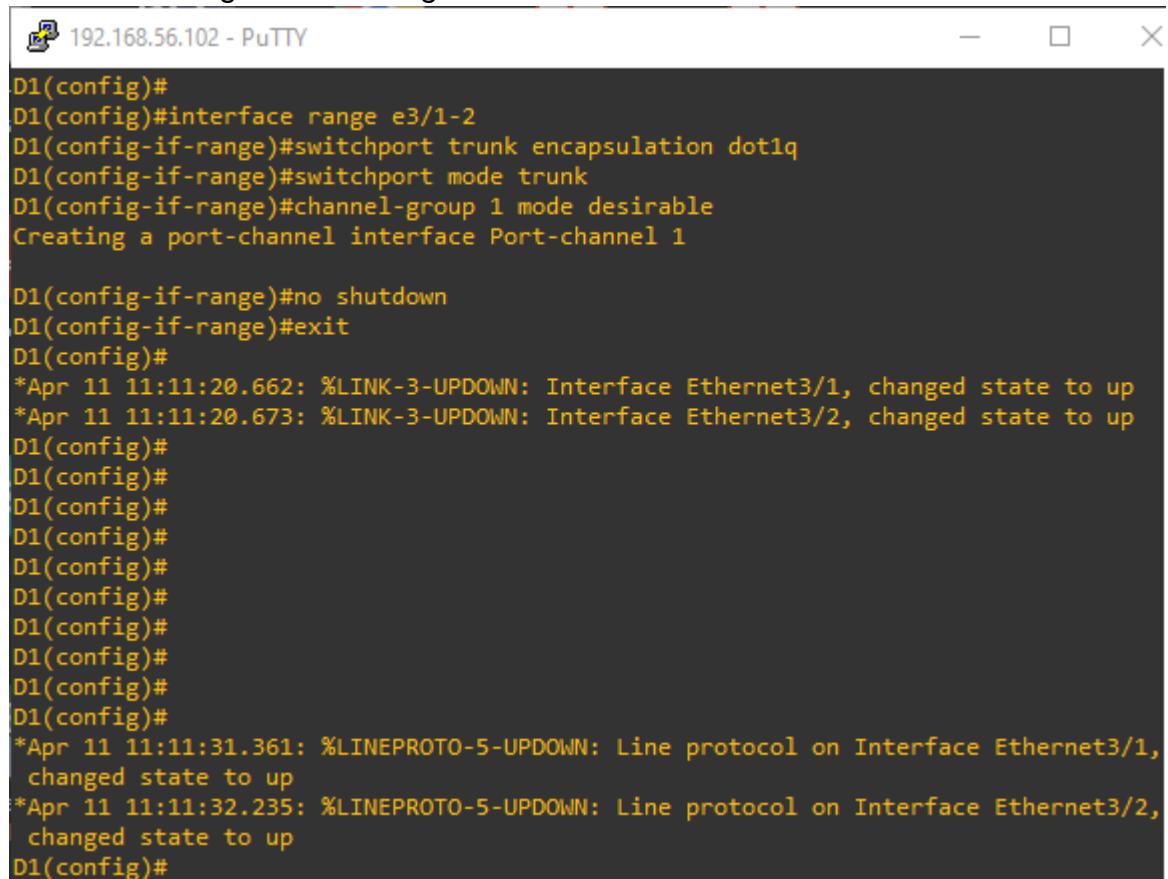
```
D1>en
D1#confi term
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#interface range e0/0-3,e1/0-3,e2/0-3,e3/0-3
D1(config-if-range)#shutdown
D1(config-if-range)#exit
*Apr 11 10:58:34.723: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to a
dministratively down
*Apr 11 10:58:34.723: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to a
dministratively down
*Apr 11 10:58:34.723: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to a
dministratively down
*Apr 11 10:58:34.724: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to a
dministratively down
*Apr 11 10:58:34.729: %LINK-5-CHANGED: Interface Ethernet1/0, changed state to a
dministratively down
*Apr 11 10:58:34.729: %LINK-5-CHANGED: Interface Ethernet1/1, changed state to a
dministratively down
*Apr 11 10:58:34.738: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to a
dministratively down
*Apr 11 10:58:34.738: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to a
dministratively down
*Apr 11 10:58:34.738: %LINK-5-CHANGED: Interface Ethernet2/0, changed state to a
dministratively down
*Apr 11 10:58:34.738: %LINK-5-CHANGED: Interface Ethernet2/1, changed state to a
dministratively down
D1(config-if-range)#exit
*Apr 11 10:58:35.725: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
0, changed state to down
*Apr 11 10:58:35.725: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
1, changed state to down
*Apr 11 10:58:35.725: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
2, changed state to down
*Apr 11 10:58:35.726: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
3, changed state to down
*Apr 11 10:58:35.730: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
0, changed state to down
*Apr 11 10:58:35.730: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
1, changed state to down
*Apr 11 10:58:35.739: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
2, changed state to down
*Apr 11 10:58:35.739: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
3, changed state to down
*Apr 11 10:58:35.739: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/
0, changed state to down
*Apr 11 10:58:35.739: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/
1, changed state to down
D1(config-if-range)#exit
D1(config)#
```

Figura 33. Configuración interface como puerto de acceso en D1.



```
D1>
D1>en
D1#confi term
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#
D1(config)#interface e2/3
D1(config-if)#switchport mode access
D1(config-if)#switchport access vlan 13
D1(config-if)#spanning-tree portfast
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#
```

Figura 34. Configuración interfase EtherChannel en D1.



```
D1(config)#
D1(config)#interface range e3/1-2
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#switchport mode trunk
D1(config-if-range)#channel-group 1 mode desirable
Creating a port-channel interface Port-channel 1

D1(config-if-range)#no shutdown
D1(config-if-range)#exit
D1(config)#
*Apr 11 11:11:20.662: %LINK-3-UPDOWN: Interface Ethernet3/1, changed state to up
*Apr 11 11:11:20.673: %LINK-3-UPDOWN: Interface Ethernet3/2, changed state to up
D1(config)#
D1(config)#
D1(config)#
D1(config)#
D1(config)#
D1(config)#
D1(config)#
D1(config)#
D1(config)#
D1(config)#
D1(config)#
*Apr 11 11:11:31.361: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/1,
changed state to up
*Apr 11 11:11:32.235: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/2,
changed state to up
D1(config)#
```

Figura 35. Verificación configuración interfaces troncales en D1.

```

192.168.56.102 - PuTTY
D1#
D1#show interfaces trunk

Port      Mode      Encapsulation  Status      Native vlan
Et1/1     on        802.1q         trunking    1
Po1       on        802.1q         trunking    1

Port      Vlans allowed on trunk
Et1/1     1-4094
Po1       1-4094

Port      Vlans allowed and active in management domain
Et1/1     1,8,13
Po1       1,8,13

Port      Vlans in spanning tree forwarding state and not pruned
Et1/1     1,8,13
Po1       1,8,13
D1#
D1#
D1#
D1#show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone   s - suspended
       H - Hot-standby (LACP only)
       R - Layer3       S - Layer2
       U - in use       N - not in use, no aggregation
       f - failed to allocate aggregator

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

       A - formed by Auto LAG

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

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----+-----+-----
1      Po1(SU)       PAgP        Et0/2(D)  Et0/3(D)  Et3/1(P)
                          Et3/2(P)
D1#

```

Figura 36. Verificación configuración D1.

192.168.56.102 - PuTTY

```
!  
interface Ethernet3/0  
  shutdown  
!  
interface Ethernet3/1  
  switchport trunk encapsulation dot1q  
  switchport mode trunk  
  channel-group 1 mode desirable  
!  
interface Ethernet3/2  
  switchport trunk encapsulation dot1q  
  switchport mode trunk  
  channel-group 1 mode desirable  
!  
interface Ethernet3/3  
  shutdown  
!  
ip forward-protocol nd  
!  
!  
no ip http server  
no ip http secure-server  
!  
!  
!  
!  
control-plane  
!  
banner motd ^C D1, ENCOR Skills Assessment, Scenario 2 ^C  
!  
line con 0  
  exec-timeout 0 0  
  logging synchronous  
line aux 0  
line vty 0 4  
  login  
!  
!  
end  
D1#
```

3.3.2 Comandos de Configuración en D2

```
D2>en
```

```
D2#confi term
```

Enter configuration commands, one per line. End with CNTL/Z.

```
D2(config)#
```

```
D2(config)#interface range e0/0-3,e1/0-3,e2/0-3,e3/0-3
```

```
D2(config-if-range)#shutdown
```

```
D2(config-if-range)#exit
```

```
D2(config)#
```

```
D2(config)#interface e1/1
```

```
D2(config-if)#switchport trunk encapsulation dot1q
```

```
D2(config-if)#switchport mode trunk
```

```
D2(config-if)#no shutdown
```

```
D2(config-if)#exit
```

```
D2(config)#
```

```
*Apr 11 11:17:25.725: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
```

```
D2(config)#
```

```
*Apr 11 11:17:27.745: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
```

```
D2(config)#interface e2/3
```

```
D2(config-if)#switchport mode access
```

```
D2(config-if)#switchport access vlan 13
```

```
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 Ethernet2/3 but will only have effect when the interface is in a non-trunking mode.

```
D2(config-if)#no shutdown
```

```
D2(config-if)#exit
```

```
*Apr 11 11:19:27.375: %LINK-3-UPDOWN: Interface Ethernet2/3, changed state to up
```

```
*Apr 11 11:19:28.379: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to up
```

```
D2(config-if)#exit
```

```
D2(config)#
```

```
D2(config)#interface e3/1
```

```
D2(config-if)#switchport mode access
```

```
D2(config-if)#switchport access vlan 8
```

```
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 Ethernet3/1 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)#
```

```
*Apr 11 11:21:32.443: %LINK-3-UPDOWN: Interface Ethernet3/1, changed state to up
```

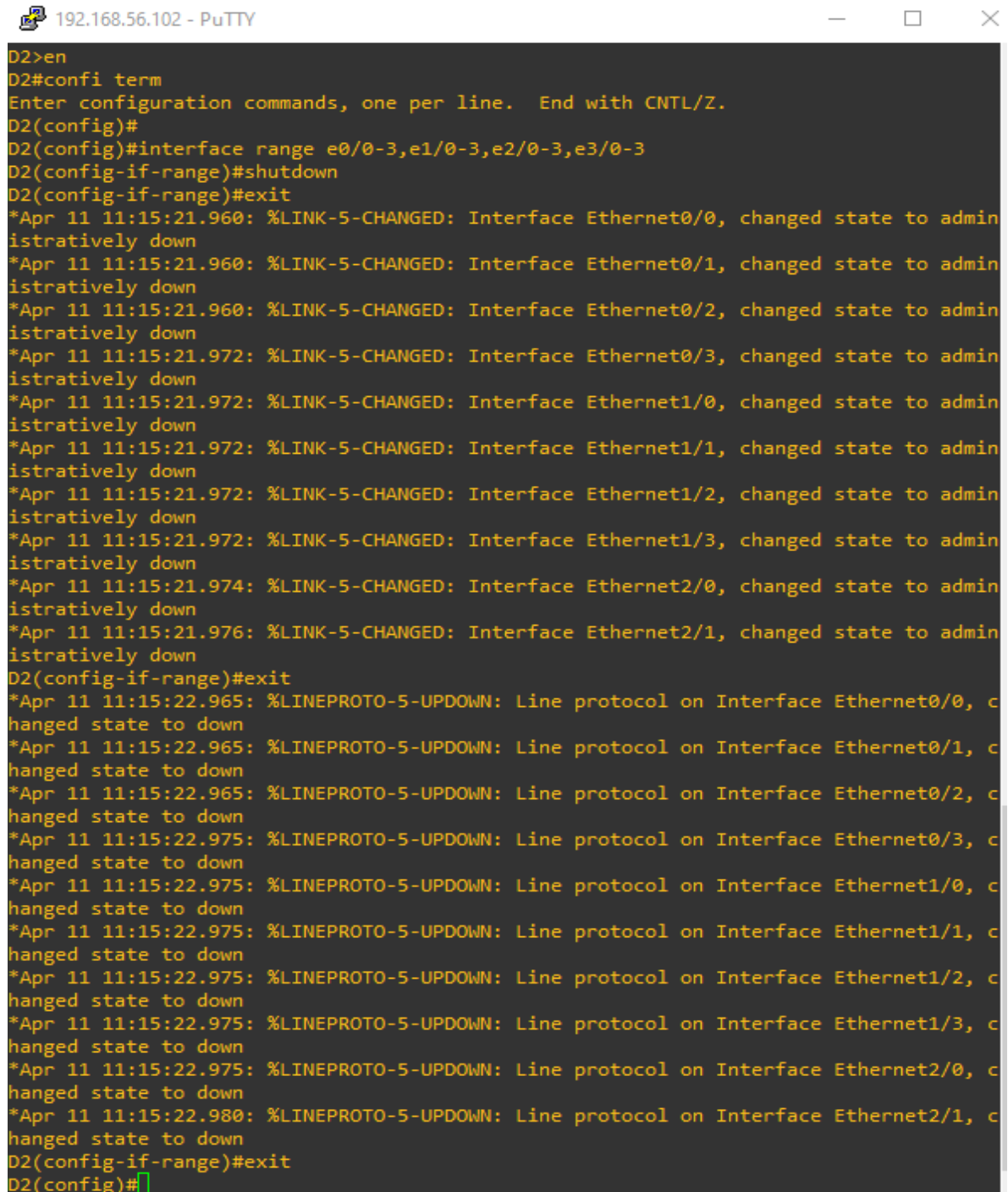
```
*Apr 11 11:21:33.450: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/1, changed state to up
```

D2#show interfaces trunk

D2#show etherchannel summary

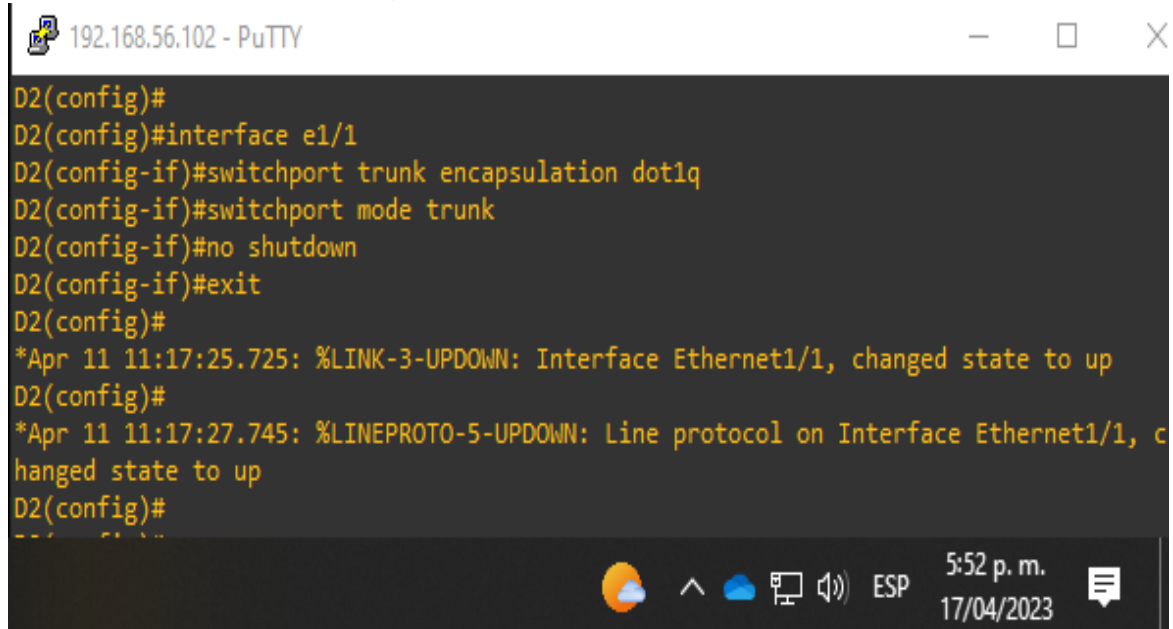
D2#show run

Figura 37. Interfaces deshabilitadas en D2.



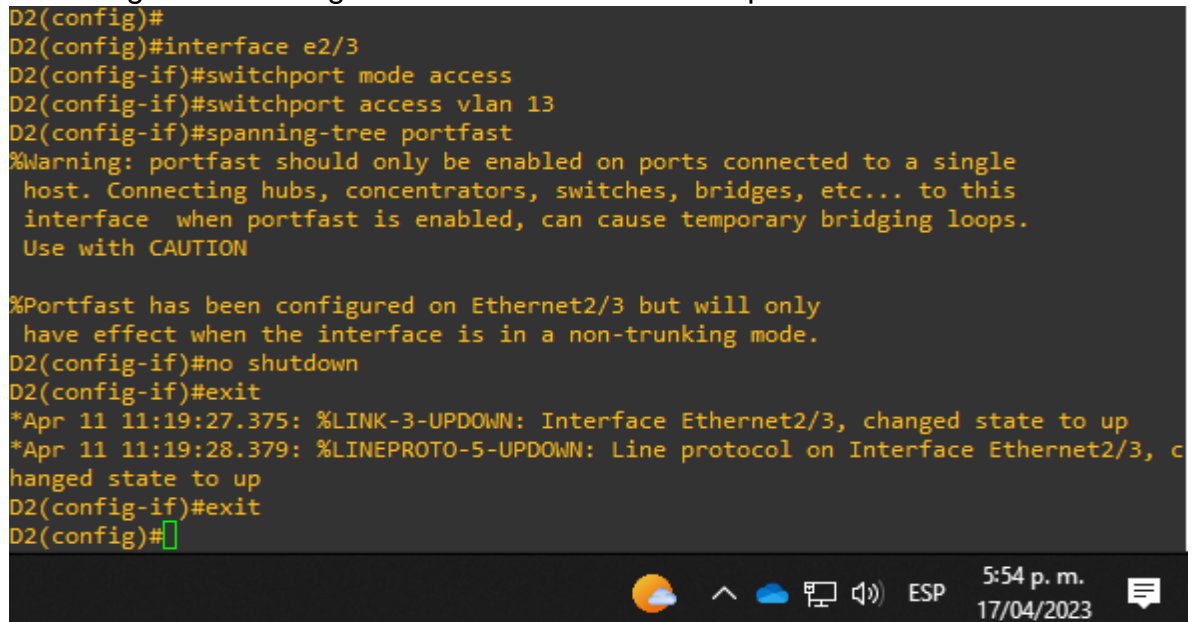
```
D2>en
D2#confi term
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#
D2(config)#interface range e0/0-3,e1/0-3,e2/0-3,e3/0-3
D2(config-if-range)#shutdown
D2(config-if-range)#exit
*Apr 11 11:15:21.960: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to administratively down
*Apr 11 11:15:21.960: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively down
*Apr 11 11:15:21.960: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to administratively down
*Apr 11 11:15:21.972: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to administratively down
*Apr 11 11:15:21.972: %LINK-5-CHANGED: Interface Ethernet1/0, changed state to administratively down
*Apr 11 11:15:21.972: %LINK-5-CHANGED: Interface Ethernet1/1, changed state to administratively down
*Apr 11 11:15:21.972: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to administratively down
*Apr 11 11:15:21.972: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to administratively down
*Apr 11 11:15:21.974: %LINK-5-CHANGED: Interface Ethernet2/0, changed state to administratively down
*Apr 11 11:15:21.976: %LINK-5-CHANGED: Interface Ethernet2/1, changed state to administratively down
D2(config-if-range)#exit
*Apr 11 11:15:22.965: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to down
*Apr 11 11:15:22.965: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*Apr 11 11:15:22.965: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
*Apr 11 11:15:22.975: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to down
*Apr 11 11:15:22.975: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to down
*Apr 11 11:15:22.975: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
*Apr 11 11:15:22.975: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to down
*Apr 11 11:15:22.975: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/3, changed state to down
*Apr 11 11:15:22.975: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to down
*Apr 11 11:15:22.980: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to down
D2(config-if-range)#exit
D2(config)#
```

Figura 38. Configuración enlaces troncales a R1 y R3 en D2.



```
192.168.56.102 - PuTTY
D2(config)#
D2(config)#interface e1/1
D2(config-if)#switchport trunk encapsulation dot1q
D2(config-if)#switchport mode trunk
D2(config-if)#no shutdown
D2(config-if)#exit
D2(config)#
*Apr 11 11:17:25.725: %LINK-3-UPDOWN: Interface Ethernet1/1, changed state to up
D2(config)#
*Apr 11 11:17:27.745: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, c
hanged state to up
D2(config)#
---
```

Figura 39. Configuración interface e2/3 como puerto de acceso en D2.



```
D2(config)#
D2(config)#interface e2/3
D2(config-if)#switchport mode access
D2(config-if)#switchport access vlan 13
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 Ethernet2/3 but will only
  have effect when the interface is in a non-trunking mode.
D2(config-if)#no shutdown
D2(config-if)#exit
*Apr 11 11:19:27.375: %LINK-3-UPDOWN: Interface Ethernet2/3, changed state to up
*Apr 11 11:19:28.379: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, c
hanged state to up
D2(config-if)#exit
D2(config)#
```

Figura 40. Configuración interface e3/1 como puerto de acceso en D2.

```
D2(config)#
D2(config)#interface e3/1
D2(config-if)#switchport mode access
D2(config-if)#switchport access vlan 8
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 Ethernet3/1 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)#
*Apr 11 11:21:32.443: %LINK-3-UPDOWN: Interface Ethernet3/1, changed state to up
*Apr 11 11:21:33.450: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet3/1, c
  hanged state to up
D2(config)#
```

Figura 41. Verificación configuración interfaces troncales en D2.

```
D2#show interfaces trunk

Port      Mode          Encapsulation  Status        Native vlan
Et1/1     on            802.1q         trunking      1

Port      Vlans allowed on trunk
Et1/1     1-4094

Port      Vlans allowed and active in management domain
Et1/1     1,8,13

Port      Vlans in spanning tree forwarding state and not pruned
Et1/1     1,8,13
D2#
D2#
D2#show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone   s - suspended
       H - Hot-standby (LACP only)
       R - Layer3       S - Layer2
       U - in use       N - not in use, no aggregation
       f - failed to allocate aggregator

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

       A - formed by Auto LAG

Number of channel-groups in use: 0
Number of aggregators:          0

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----
D2#
```

Figura 42. Verificación configuración D2.

```
switchport trunk encapsulation dot1q
switchport mode trunk
!
interface Ethernet1/2
shutdown
!
interface Ethernet1/3
shutdown
!
interface Ethernet2/0
shutdown
!
interface Ethernet2/1
shutdown
!
interface Ethernet2/2
shutdown
!
interface Ethernet2/3
switchport access vlan 13
switchport mode access
spanning-tree portfast edge
!
interface Ethernet3/0
shutdown
!
interface Ethernet3/1
switchport access vlan 8
switchport mode access
spanning-tree portfast edge
!
interface Ethernet3/2
shutdown
!
interface Ethernet3/3
shutdown
!
ip forward-protocol nd
!
!
no ip http server
no ip http secure-server
!
!
!
!
control-plane
!
banner motd ^C D2, ENCOR Skills Assessment, Scenario 2 ^C
!
line con 0
exec-timeout 0 0
logging synchronous
line aux 0
```

3.3.3 Comandos de Configuración en A1

```
A1#confi term
```

Enter configuration commands, one per line. End with CNTL/Z.

```
A1(config)#
```

```
A1(config)#interface range e0/0-3,e1/0-3,e2/0-3,e3/0-3
```

```
A1(config-if-range)#shutdown
```

```
A1(config-if-range)#exit
```

```
A1(config-if-range)#exit
```

```
A1(config)#
```

```
A1(config)#interface e2/3
```

```
A1(config-if)#switchport mode access
```

```
A1(config-if)#switchport access vlan 8
```

```
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 Ethernet2/3 but will only  
have effect when the interface is in a non-trunking mode.
```

```
A1(config-if)#no shutdown
```

```
A1(config-if)#exit
```

```
*Apr 11 11:26:55.612: %LINK-3-UPDOWN: Interface Ethernet2/3, changed state to  
up
```

```
*Apr 11 11:26:56.615: %LINEPROTO-5-UPDOWN: Line protocol on Interface  
Ethernet2/3, changed state to up
```

```
A1(config-if)#exit
```

```
A1(config)#
```

```
A1(config)#interface range e0/2-3
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#switchport mode trunk
A1(config-if-range)#channel-group 1 mode desirable
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
*Apr 11 11:38:23.443: %EC-5-CANNOT_BUNDLE2: Et0/2 is not compatible with
Et0/3 and will be suspended (trunk encap of Et0/2 is dot1q, Et0/3 is auto)
*Apr 11 11:38:23.447: %EC-5-COMPATIBLE: Et0/2 is compatible with port-channel
members
*Apr 11 11:38:24.443: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet0/2, changed state to down
A1(config-if-range)#exit
*Apr 11 11:38:25.452: %LINK-3-UPDOWN: Interface Port-channel1, changed state
to down
A1(config-if-range)#exit
*Apr 11 11:38:25.464: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet0/2, changed state to up
*Apr 11 11:38:26.459: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-
channel1, changed state to down
A1(config-if-range)#exit
*Apr 11 11:38:30.363: %LINK-3-UPDOWN: Interface Port-channel1, changed state
to up
*Apr 11 11:38:31.378: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-
channel1, changed state to up
A1(config-if-range)#exit
A1(config)#
A1#show interfaces trunk
A1#show etherchannel summary
A1#show run
```

Figura 43. Interfaces deshabilitadas en A1.

```
192.168.56.102 - PuTTY
A1>en
A1#confi term
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#
A1(config)#interface range e0/0-3,e1/0-3,e2/0-3,e3/0-3
A1(config-if-range)#shutdown
A1(config-if-range)#exit
*Apr 11 11:24:38.773: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to a
dministratively down
*Apr 11 11:24:38.773: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to a
dministratively down
*Apr 11 11:24:38.773: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to a
dministratively down
*Apr 11 11:24:38.779: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to a
dministratively down
*Apr 11 11:24:38.779: %LINK-5-CHANGED: Interface Ethernet1/0, changed state to a
dministratively down
*Apr 11 11:24:38.788: %LINK-5-CHANGED: Interface Ethernet1/1, changed state to a
dministratively down
*Apr 11 11:24:38.788: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to a
dministratively down
*Apr 11 11:24:38.789: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to a
dministratively down
*Apr 11 11:24:38.789: %LINK-5-CHANGED: Interface Ethernet2/0, changed state to a
dministratively down
*Apr 11 11:24:38.789: %LINK-5-CHANGED: Interface Ethernet2/1, changed state to a
dministratively down
A1(config-if-range)#exit
*Apr 11 11:24:39.777: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
0, changed state to down
*Apr 11 11:24:39.778: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
1, changed state to down
*Apr 11 11:24:39.778: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
2, changed state to down
*Apr 11 11:24:39.787: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
3, changed state to down
*Apr 11 11:24:39.787: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
0, changed state to down
*Apr 11 11:24:39.788: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
1, changed state to down
*Apr 11 11:24:39.788: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
2, changed state to down
*Apr 11 11:24:39.789: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
3, changed state to down
*Apr 11 11:24:39.789: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/
0, changed state to down
*Apr 11 11:24:39.789: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/
1, changed state to down
A1(config-if-range)#exit
A1(config)#
```

Figura 44. Configuración interface como puerto de acceso en A1.

```
A1(config)#
A1(config)#interface e2/3
A1(config-if)#switchport mode access
A1(config-if)#switchport access vlan 8
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 Ethernet2/3 but will only
  have effect when the interface is in a non-trunking mode.
A1(config-if)#no shutdown
A1(config-if)#exit
*Apr 11 11:26:55.612: %LINK-3-UPDOWN: Interface Ethernet2/3, changed state to up
*Apr 11 11:26:56.615: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/
3, changed state to up
A1(config-if)#exit
A1(config)#
```

Figura 45. Configuración interfase EtherChannel en A1.

```
192.168.56.102 - PuTTY
A1(config)#
A1(config)#interface range e0/2-3
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#switchport mode trunk
A1(config-if-range)#channel-group 1 mode desirable
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
*Apr 11 11:38:23.443: %EC-5-CANNOT_BUNDLE2: Et0/2 is not compatible with Et0/3 a
nd will be suspended (trunk encap of Et0/2 is dot1q, Et0/3 is auto)
*Apr 11 11:38:23.447: %EC-5-COMPATIBLE: Et0/2 is compatible with port-channel me
mbers
*Apr 11 11:38:24.443: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
2, changed state to down
A1(config-if-range)#exit
*Apr 11 11:38:25.452: %LINK-3-UPDOWN: Interface Port-channel1, changed state to
down
A1(config-if-range)#exit
*Apr 11 11:38:25.464: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
2, changed state to up
*Apr 11 11:38:26.459: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-chann
el1, changed state to down
A1(config-if-range)#exit
*Apr 11 11:38:30.363: %LINK-3-UPDOWN: Interface Port-channel1, changed state to
up
*Apr 11 11:38:31.378: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-chann
el1, changed state to up
A1(config-if-range)#exit
A1(config)#
```

Figura 46. Verificación configuración interfaces troncales en A1.

```

A1#
A1#show interfaces trunk

Port      Mode           Encapsulation  Status        Native vlan
Po1       on             802.1q         trunking      1

Port      Vlans allowed on trunk
Po1       1-4094

Port      Vlans allowed and active in management domain
Po1       1,8

Port      Vlans in spanning tree forwarding state and not pruned
Po1       1,8
A1#
A1#
A1#show etherchannel summary
Flags: D - down          P - bundled in port-channel
       I - stand-alone   s - suspended
       H - Hot-standby (LACP only)
       R - Layer3       S - Layer2
       U - in use       N - not in use, no aggregation
       f - failed to allocate aggregator

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

       A - formed by Auto LAG

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

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----
1      Po1(SU)       PAgP        Et0/2(P)  Et0/3(P)
A1#

```

Figura 47. Verificación configuración A1.

192.168.56.102 - PuTTY

```
!  
!  
no ip domain-lookup  
ip cef  
ipv6 unicast-routing  
ipv6 cef  
!  
!  
spanning-tree mode rapid-pvst  
spanning-tree extend system-id  
!  
vlan internal allocation policy ascending  
!
```

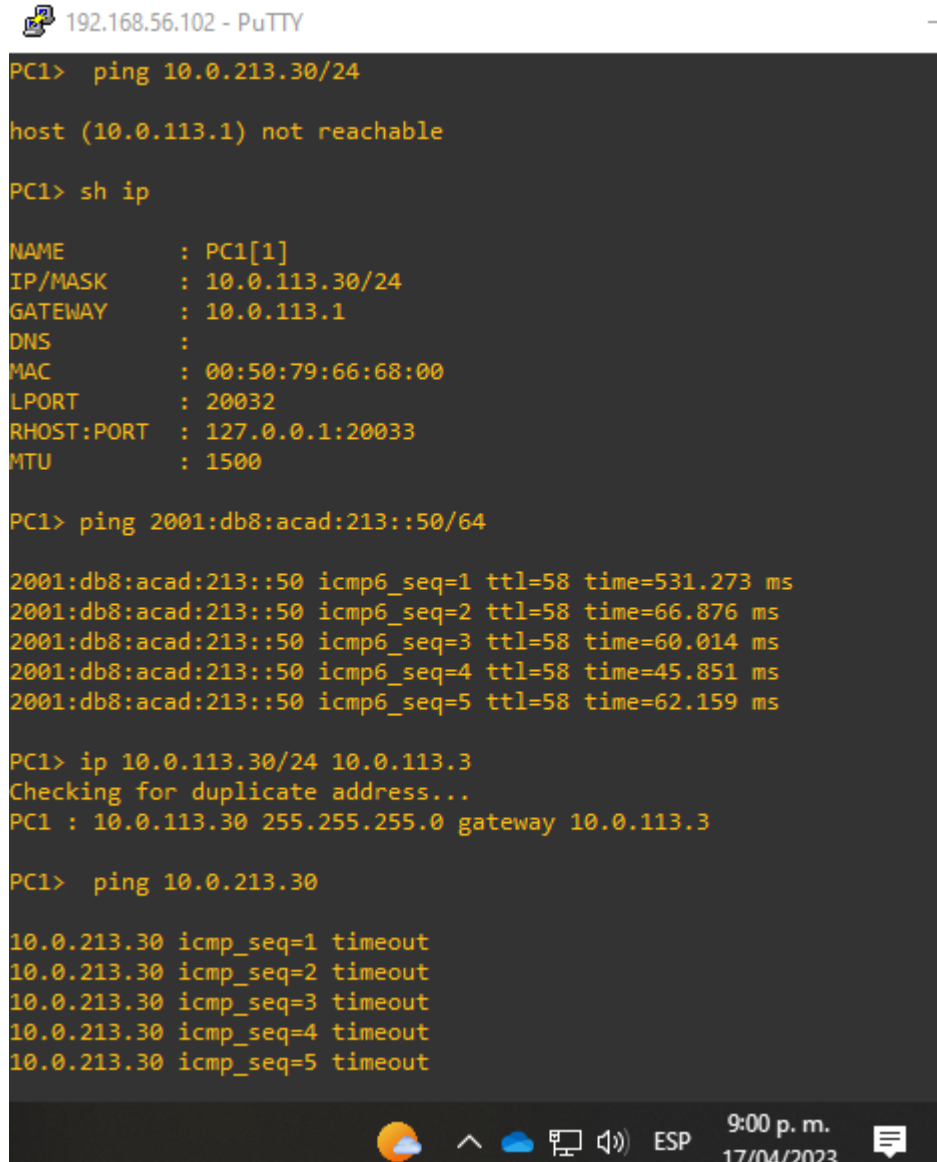
```
!  
interface Port-channel1  
  switchport trunk encapsulation dot1q  
  switchport mode trunk  
!  
interface Ethernet0/0  
  shutdown  
!  
interface Ethernet0/1  
  shutdown  
!  
interface Ethernet0/2  
  switchport trunk encapsulation dot1q  
  switchport mode trunk  
  channel-group 1 mode desirable  
!  
interface Ethernet0/3  
  switchport trunk encapsulation dot1q  
  switchport mode trunk  
  channel-group 1 mode desirable  
!  
interface Ethernet1/0  
  shutdown  
!  
interface Ethernet1/1  
  shutdown  
!  
interface Ethernet1/2
```

```
!  
interface Ethernet2/0  
  shutdown  
!  
interface Ethernet2/1  
  shutdown  
!  
interface Ethernet2/2  
  shutdown  
!  
interface Ethernet2/3  
  switchport access vlan 8  
  switchport mode access  
  spanning-tree portfast edge  
!  
interface Ethernet3/0  
  shutdown
```

3.3.4 Verificación de conectividad de PC a PC

Con el comando ping se revisa la conectividad en cada uno de los PC de la red en las respectivas VRF.

Figura 48. Verificación conectividad PC1 a PC2



```
192.168.56.102 - PuTTY
PC1> ping 10.0.213.30/24
host (10.0.113.1) not reachable
PC1> sh ip
NAME       : PC1[1]
IP/MASK    : 10.0.113.30/24
GATEWAY    : 10.0.113.1
DNS        :
MAC        : 00:50:79:66:68:00
LPORT     : 20032
RHOST:PORT : 127.0.0.1:20033
MTU       : 1500
PC1> ping 2001:db8:acad:213::50/64
2001:db8:acad:213::50 icmp6_seq=1 ttl=58 time=531.273 ms
2001:db8:acad:213::50 icmp6_seq=2 ttl=58 time=66.876 ms
2001:db8:acad:213::50 icmp6_seq=3 ttl=58 time=60.014 ms
2001:db8:acad:213::50 icmp6_seq=4 ttl=58 time=45.851 ms
2001:db8:acad:213::50 icmp6_seq=5 ttl=58 time=62.159 ms
PC1> ip 10.0.113.30/24 10.0.113.3
Checking for duplicate address...
PC1 : 10.0.113.30 255.255.255.0 gateway 10.0.113.3
PC1> ping 10.0.213.30
10.0.213.30 icmp_seq=1 timeout
10.0.213.30 icmp_seq=2 timeout
10.0.213.30 icmp_seq=3 timeout
10.0.213.30 icmp_seq=4 timeout
10.0.213.30 icmp_seq=5 timeout
```

Figura 49. Verificación conectividad PC3 a Pc4

```
192.168.56.102 - PuTTY
Checking for duplicate address...
PC3 : 10.0.108.30 255.255.255.0 gateway 10.0.108.1

PC1 : 2001:db8:acad:108::50/64

PC3> ip 10.0.108.30/24 10.0.108.3
Checking for duplicate address...
PC3 : 10.0.108.30 255.255.255.0 gateway 10.0.108.3

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

PC3> sh ip

NAME          : PC3[1]
IP/MASK       : 10.0.108.30/24
GATEWAY      : 10.0.108.3
DNS          :
MAC          : 00:50:79:66:68:02
LPORT       : 20036
RHOST:PORT   : 127.0.0.1:20037
MTU          : 1500

PC3> ping 10.0.208.30/24

84 bytes from 10.0.208.30 icmp_seq=1 ttl=61 time=63.965 ms
84 bytes from 10.0.208.30 icmp_seq=2 ttl=61 time=54.688 ms
84 bytes from 10.0.208.30 icmp_seq=3 ttl=61 time=63.928 ms
84 bytes from 10.0.208.30 icmp_seq=4 ttl=61 time=82.710 ms
84 bytes from 10.0.208.30 icmp_seq=5 ttl=61 time=57.642 ms

PC3>
PC3>
PC3> ping 2001:db8:acad:208::50/64

2001:db8:acad:208::50 icmp6_seq=1 ttl=58 time=309.894 ms
2001:db8:acad:208::50 icmp6_seq=2 ttl=58 time=65.964 ms
2001:db8:acad:208::50 icmp6_seq=3 ttl=58 time=62.954 ms
2001:db8:acad:208::50 icmp6_seq=4 ttl=58 time=56.128 ms
2001:db8:acad:208::50 icmp6_seq=5 ttl=58 time=62.851 ms

PC3>
```

Figura 50. Verificación conectividad PC2 a PC1

```
192.168.56.102 - PuTTY

Checking for duplicate address...
PC2 : 10.0.213.30 255.255.255.0 gateway 10.0.213.1

PC1 : 2001:db8:acad:213::50/64

PC2> sh ip

NAME          : PC2[1]
IP/MASK       : 10.0.213.30/24
GATEWAY      : 10.0.213.1
DNS          :
MAC          : 00:50:79:66:68:01
LPORT       : 20034
RHOST:PORT   : 127.0.0.1:20035
MTU         : 1500

PC2> ip 10.0.213.30/24 10.0.213.3
Checking for duplicate address...
PC2 : 10.0.213.30 255.255.255.0 gateway 10.0.213.3

PC2> ping 10.0.113.30/24

84 bytes from 10.0.113.30 icmp_seq=1 ttl=61 time=119.289 ms
84 bytes from 10.0.113.30 icmp_seq=2 ttl=61 time=61.168 ms
84 bytes from 10.0.113.30 icmp_seq=3 ttl=61 time=67.411 ms
84 bytes from 10.0.113.30 icmp_seq=4 ttl=61 time=66.119 ms
84 bytes from 10.0.113.30 icmp_seq=5 ttl=61 time=49.449 ms

PC2> ping 2001:db8:acad:113::50/64

2001:db8:acad:113::50 icmp6_seq=1 ttl=58 time=197.085 ms
2001:db8:acad:113::50 icmp6_seq=2 ttl=58 time=64.757 ms
2001:db8:acad:113::50 icmp6_seq=3 ttl=58 time=65.096 ms
2001:db8:acad:113::50 icmp6_seq=4 ttl=58 time=63.038 ms
2001:db8:acad:113::50 icmp6_seq=5 ttl=58 time=74.966 ms

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

PC2> sh ip

NAME          : PC2[1]
IP/MASK       : 10.0.213.30/24
GATEWAY      : 10.0.213.3
DNS          :
MAC          : 00:50:79:66:68:01
LPORT       : 20034
RHOST:PORT   : 127.0.0.1:20035
MTU         : 1500

PC2> █

9:07 p. m.
17/04/2023
```

Figura 51. Verificación conectividad PC4 a PC3

```
192.168.56.102 - PuTTY
Checking for duplicate address...
PC4 : 10.0.208.30 255.255.255.0 gateway 10.0.208.1

PC1 : 2001:db8:acad:208::50/64

PC4> ip 10.0.208.30/24 10.0.208.3
Checking for duplicate address...
PC4 : 10.0.208.30 255.255.255.0 gateway 10.0.208.3

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

PC4> ping 10.0.108.30/24

84 bytes from 10.0.108.30 icmp_seq=1 ttl=61 time=66.122 ms
84 bytes from 10.0.108.30 icmp_seq=2 ttl=61 time=63.103 ms
84 bytes from 10.0.108.30 icmp_seq=3 ttl=61 time=63.627 ms
84 bytes from 10.0.108.30 icmp_seq=4 ttl=61 time=66.843 ms
84 bytes from 10.0.108.30 icmp_seq=5 ttl=61 time=62.011 ms

PC4>
PC4> ping 2001:db8:acad:108::50/64

2001:db8:acad:108::50 icmp6_seq=1 ttl=58 time=72.991 ms
2001:db8:acad:108::50 icmp6_seq=2 ttl=58 time=50.430 ms
2001:db8:acad:108::50 icmp6_seq=3 ttl=58 time=52.357 ms
2001:db8:acad:108::50 icmp6_seq=4 ttl=58 time=64.159 ms
2001:db8:acad:108::50 icmp6_seq=5 ttl=58 time=58.950 ms

PC4>
```

Se verifica la no conectividad entre pc de distintas vrf

Figura 52. Verificación no conectividad entre PC1 y PC3, PC4 en IPV4

```
192.168.56.102 - PuTTY
Checking for duplicate address...
PC1 : 10.0.113.30 255.255.255.0 gateway 10.0.113.3
PC1 : 2001:db8:acad:113::50/64
PC1> ping 10.0.108.30/24
*10.0.12.1 icmp_seq=1 ttl=254 time=151.651 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.1 icmp_seq=2 ttl=254 time=50.804 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.1 icmp_seq=3 ttl=254 time=37.895 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.1 icmp_seq=4 ttl=254 time=27.417 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.1 icmp_seq=5 ttl=254 time=32.626 ms (ICMP type:3, code:1, Destination host unreachable)
PC1>
PC1>
PC1> ping 10.0.208.30/24
*10.0.12.1 icmp_seq=1 ttl=254 time=32.124 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.1 icmp_seq=2 ttl=254 time=29.862 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.1 icmp_seq=3 ttl=254 time=30.178 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.1 icmp_seq=4 ttl=254 time=32.160 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.1 icmp_seq=5 ttl=254 time=30.949 ms (ICMP type:3, code:1, Destination host unreachable)
PC1>
```

```
192.168.56.102 - PuTTY
PC1> ping 2001:db8:acad:108::50/64
*2001:db8:acad:12::2 icmp6_seq=1 ttl=63 time=243.953 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=2 ttl=63 time=34.413 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=3 ttl=63 time=21.361 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=4 ttl=63 time=17.189 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=5 ttl=63 time=25.100 ms (ICMP type:1, code:0, No route to destination)
PC1> 2001:db8:acad:208::50/64
Bad command: "2001:db8:acad:208::50/64". Use ? for help.
PC1> ping 2001:db8:acad:208::50/64
*2001:db8:acad:12::2 icmp6_seq=1 ttl=63 time=29.290 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=2 ttl=63 time=33.981 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=3 ttl=63 time=30.447 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=4 ttl=63 time=36.637 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=5 ttl=63 time=28.988 ms (ICMP type:1, code:0, No route to destination)
```

Figura 53. Verificación no conectividad entre PC2 y PC3, PC4 en IPV6

192.168.56.102 - PuTTY

```
PC2> ping 10.0.108.30/24

10.0.108.30 icmp_seq=1 timeout
*10.0.23.1 icmp_seq=2 ttl=254 time=31.868 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.1 icmp_seq=3 ttl=254 time=37.991 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.1 icmp_seq=4 ttl=254 time=26.859 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.1 icmp_seq=5 ttl=254 time=33.167 ms (ICMP type:3, code:1, Destination host unreachable)

PC2> ping 10.0.208.30/24

*10.0.23.1 icmp_seq=1 ttl=254 time=26.253 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.1 icmp_seq=2 ttl=254 time=30.778 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.1 icmp_seq=3 ttl=254 time=14.211 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.1 icmp_seq=4 ttl=254 time=31.449 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.1 icmp_seq=5 ttl=254 time=32.040 ms (ICMP type:3, code:1, Destination host unreachable)

PC2>
PC2> 2001:db8:acad:108::50/64
Bad command: "2001:db8:acad:108::50/64". Use ? for help.

PC2> ping 2001:db8:acad:108::50/64

*2001:db8:acad:23::2 icmp6_seq=1 ttl=63 time=105.137 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=2 ttl=63 time=33.194 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=3 ttl=63 time=37.639 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=4 ttl=63 time=34.457 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=5 ttl=63 time=31.779 ms (ICMP type:1, code:0, No route to destination)

PC2> ping 2001:db8:acad:208::50/64

*2001:db8:acad:23::2 icmp6_seq=1 ttl=63 time=42.048 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=2 ttl=63 time=29.812 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=3 ttl=63 time=31.875 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=4 ttl=63 time=34.770 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=5 ttl=63 time=31.805 ms (ICMP type:1, code:0, No route to destination)
```

Figura 54. Verificación no conectividad entre PC3 y PC1, PC2 en IPV6

```
192.168.56.102 - PuTTY

PC3> pin 10.0.113.30/2410.0.113.30/24

10.0.113.30 icmp_seq=1 timeout
*10.0.12.1 icmp_seq=2 ttl=254 time=32.758 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.1 icmp_seq=3 ttl=254 time=37.012 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.1 icmp_seq=4 ttl=254 time=24.290 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.1 icmp_seq=5 ttl=254 time=30.534 ms (ICMP type:3, code:1, Destination host unreachable)

PC3> ping 10.0.213.30/24

*10.0.12.1 icmp_seq=1 ttl=254 time=37.902 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.1 icmp_seq=2 ttl=254 time=28.539 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.1 icmp_seq=3 ttl=254 time=30.505 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.1 icmp_seq=4 ttl=254 time=31.250 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.1 icmp_seq=5 ttl=254 time=26.492 ms (ICMP type:3, code:1, Destination host unreachable)

PC3> ping 2001:db8:acad:113::50/64

*2001:db8:acad:12::2 icmp6_seq=1 ttl=63 time=53.682 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=2 ttl=63 time=33.549 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=3 ttl=63 time=35.096 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=4 ttl=63 time=39.564 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=5 ttl=63 time=35.345 ms (ICMP type:1, code:0, No route to destination)

PC3> 2001:db8:acad:213::50/64
Bad command: "2001:db8:acad:213::50/64". Use ? for help.

PC3> ping 2001:db8:acad:213::50/64

*2001:db8:acad:12::2 icmp6_seq=1 ttl=63 time=29.701 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=2 ttl=63 time=31.934 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=3 ttl=63 time=34.317 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=4 ttl=63 time=28.493 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:12::2 icmp6_seq=5 ttl=63 time=31.487 ms (ICMP type:1, code:0, No route to destination)
```

Figura 55. Verificación no conectividad entre PC4 y PC1, PC2 en IPV6

```
192.168.56.102 - PuTTY
PC4> ping 10.0.113.30/24
*10.0.23.1 icmp_seq=1 ttl=254 time=32.147 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.1 icmp_seq=2 ttl=254 time=28.856 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.1 icmp_seq=3 ttl=254 time=31.975 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.1 icmp_seq=4 ttl=254 time=30.519 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.1 icmp_seq=5 ttl=254 time=34.423 ms (ICMP type:3, code:1, Destination host unreachable)

PC4> ping 10.0.213.30/24
*10.0.23.1 icmp_seq=1 ttl=254 time=35.427 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.1 icmp_seq=2 ttl=254 time=39.532 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.1 icmp_seq=3 ttl=254 time=36.092 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.1 icmp_seq=4 ttl=254 time=34.646 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.1 icmp_seq=5 ttl=254 time=34.089 ms (ICMP type:3, code:1, Destination host unreachable)

PC4> ping 2001:db8:acad:213::50/64
*2001:db8:acad:23::2 icmp6_seq=1 ttl=63 time=56.296 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=2 ttl=63 time=29.943 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=3 ttl=63 time=33.715 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=4 ttl=63 time=32.943 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=5 ttl=63 time=34.816 ms (ICMP type:1, code:0, No route to destination)

PC4> ping 2001:db8:acad:113::50/64
*2001:db8:acad:23::2 icmp6_seq=1 ttl=63 time=68.318 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=2 ttl=63 time=37.265 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=3 ttl=63 time=36.014 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=4 ttl=63 time=33.890 ms (ICMP type:1, code:0, No route to destination)
*2001:db8:acad:23::2 icmp6_seq=5 ttl=63 time=25.431 ms (ICMP type:1, code:0, No route to destination)
```

3.4 Parte 4. Configure Security

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

Tabla 4. Tabla de tareas de configuración 3

Task#	Task	Specification
4.1	On all devices, secure privileged EXEC mode.	Configure an enable secret as follows: <ul style="list-style-type: none">• Algorithm type: SCRYPT• Password: wilsonquintana303
4.2	On all devices, create a local user account.	Configure a local user: <ul style="list-style-type: none">• Name: admin• Privilege level: 15• Algorithm type: SCRYPT• Password: wilsonquintana303
4.3	On all devices, enable AAA and enable AAA authentication.	Enable AAA authentication using the local database on all lines.

3.4.1 Comandos de Configuración de seguridad en D1

D1#

D1#confi term

Enter configuration commands, one per line. End with CNTL/Z.

D1(config)#enable algorithm-type scrypt secret wilsonquintana303

D1(config)#\$min privilege 15 algorithm-type secret wilsonquintana303

^

% Invalid input detected at '^' marker.

```
D1(config)#enable secret wilsonquintana303
D1(config)#username admin privilege 15 secret wilsonquintana303
D1(config)#aaa new-model
D1(config)#aaa authentication login default local
D1(config)#end
```

3.4.2 Comandos de Configuración de seguridad en D2

```
D2#confi term
D2(config)#enable secret wilsonquintana303
D2(config)#username admin privilege 15 secret wilsonquintana303
D2(config)#aaa new-model
D2(config)#aaa authentication login default local
D2(config)#end
```

3.4.3 Comandos de Configuración de seguridad en A1

```
A1#
A1#confi term
A1(config)#enable secret wilsonquintana303
A1(config)#username admin privilege 15 secret wilsonquintana303
A1(config)#aaa new-model
A1(config)#aaa authentication login default local
A1(config)#end
```

3.4.4 Comandos de Configuración de seguridad en R1

```
R1>en
R1#confi term
R1(config)#enable secret wilsonquintana303
R1(config)#username admin privilege 15 secret wilsonquintana303
R1(config)#aaa new-model
R1(config)#aaa authentication login default local
R1(config)#end
```

3.4.5 Comandos de Configuración de seguridad en R2

```
R2>en
R2#confi term
R2(config)#enable secret wilsonquintana303
R2(config)#username admin privilege 15 secret wilsonquintana303
R2(config)#aaa new-model
R2(config)#aaa authentication login default local
R2(config)#end
```

3.4.6 Comandos de Configuración de seguridad en R3

```
R3>en
R3#confi term
R3(config)#enable secret wilsonquintana303
R3(config)#username admin privilege 15 secret wilsonquintana303
R3(config)#aaa new-model
R3(config)#aaa authentication login default local
R3(config)#end
```

Figura 56. Configuración de seguridad en D1

```
192.168.56.102 - PuTTY
D1#
D1#confi term
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#enable algorithm-type scrypt secret wilsonquintana303
D1(config)#$min privilege 15 algorithm-type secret wilsonquintana303
                                     ^
% Invalid input detected at '^' marker.

D1(config)#aaa new-model
D1(config)#aaa authentication login default local
D1(config)#
D1(config)#
D1(config)#enable secret wilsonquintana303
D1(config)#username admin privilege 15 secret wilsonquintana303
D1(config)#aaa new-model
D1(config)#aaa authentication login default local
D1(config)#end
D1#
*Apr 11 16:37:14.810: %SYS-5-CONFIG_I: Configured from console by console
D1#exit
```

Figura 57. Verificación de la configuración de seguridad en D1

```
192.168.56.102 - PuTTY
Press RETURN to get started.

D1, ENCOR Skills Assessment, Scenario 2

User Access Verification

Username: admin
Password:

D1>en
Password:
D1#
D1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 2028 bytes to 1154 bytes[OK]
D1#
```

Figura 58. Configuración de seguridad en D2

```
192.168.56.102 - PuTTY
D2#
D2#confi term
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#enable secret wilsonquintana303
D2(config)#username admin privilege 15 secret wilsonquintana303
D2(config)#aaa new-model
D2(config)#aaa authentication login default local
D2(config)#end
D2#
*Apr 11 16:38:44.991: %SYS-5-CONFIG_I: Configured from console by console
D2#exit
```

Figura 59. Verificación de la configuración de seguridad en D2

```
192.168.56.102 - PuTTY
Press RETURN to get started.

D2, ENCOR Skills Assessment, Scenario 2

User Access Verification

Username: admin
Password:

% Authentication failed

Username: admin
Password:

D2>en
Password:
D2#
D2#
D2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 1658 bytes to 993 bytes[OK]
D2#
```

Figura 60. Configuración de seguridad en A1

```
192.168.56.102 - PuTTY
A1#
A1#confi term
Enter configuration commands, one per line.  End with CNTL/Z.
A1(config)#enable secret wilsonquintana303
A1(config)#username admin privilege 15 secret wilsonquintana303
A1(config)#aaa new-model
A1(config)#aaa authentication login default local
A1(config)#end
A1#
```

Figura 61. Verificación de la configuración de seguridad en A1

```
192.168.56.102 - PuTTY
Press RETURN to get started.

A1, ENCOR Skills Assessment, Scenario 2

User Access Verification


Username: wilsonquintana303
Password:

% Authentication failed

Username: admin
Password:


A1>en
Password:
A1#
A1#
A1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 1790 bytes to 1058 bytes[OK]
A1#
```

Figura 62. Configuración de seguridad en R1

 R1

```
R1(config)#
R1(config)#enable secret wilsonquintana303
R1(config)#username admin privilege 15 secret wilsonquintana303
R1(config)#aaa new-model
R1(config)#aaa authentication login default local
R1(config)#end
R1#
*Apr 11 16:41:56.099: %SYS-5-CONFIG_I: Configured from console by console
R1#exit
```

Figura 63. Verificación de la configuración de seguridad en R1

 R1

```
Press RETURN to get started.

R1, ENCOR Skills Assessment, Scenario 2

User Access Verification

Username: admin
Password:

R1>en
Password:
R1#
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]
R1#
```

Figura 64. Configuración de seguridad en R2

```
R2
R2>en
R2#confi term
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#enable secret wilsonquintana303
R2(config)#username admin privilege 15 secret wilsonquintana303
R2(config)#aaa new-model
R2(config)#aaa authentication login default local
R2(config)#end
R2#
*Apr 11 16:44:20.327: %SYS-5-CONFIG_I: Configured from console by console
R2#exit
```

Figura 65. Verificación de la configuración de seguridad en R2

```
R2
Press RETURN to get started.

R2, ENCOR Skills Assessment, Scenario 2

User Access Verification

Username: admin
Password:

R2>
R2>en
Password:
R2#
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]
R2#
```

Figura 66. Configuración de seguridad en R3

```
R3>en
R3#confi term
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#enable secret wilsonquintana303
R3(config)#username admin privilege 15 secret wilsonquintana303
R3(config)#aaa new-model
R3(config)#aaa authentication login default local
R3(config)#enable secret wilsonquintana303
      ^
% Invalid input detected at '^' marker.

R3(config)#username admin privilege 15 secret wilsonquintana303
R3(config)#aaa new-model
R3(config)#aaa authentication login default local
R3(config)#end
R3#
*Apr 11 16:47:09.879: %SYS-5-CONFIG_I: Configured from console by console
R3#exit
```

Figura 67. Verificación de la configuración de seguridad en R3

```
R3
Press RETURN to get started.

R3, ENCOR Skills Assessment, Scenario 2

User Access Verification

Username: admin
Password:

R3>en
Password:
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]
R3#
```

CONCLUSIONES

Una de las configuraciones que permite reducir el consumo de hardware de dispositivo es VRF, ya que permite la configuración de subinterfaces virtuales muy útil para comunicar diferentes tablas de direccionamiento independientes en un dispositivo sin causar conflicto.

VRF (del inglés *Virtual Routing and Forwarding*, enrutamiento virtual y reenvío). Además de reducir el consumo de hardware aumenta la seguridad en las redes ya que cada router dentro de la red participa en el entorno de enrutamiento virtual. VRF Lite permite a un proveedor de servicios ISP implementar distintas VPN, dentro de las cuales las direcciones IP se pueden superponer.

Las VLAN (del inglés *Virtual Local Area Network*) son importantes en la construcción de VRFS por que los Switches de capa 2 permiten el flujo de información de distintas VRF sin mezclar la información hacia los dispositivos finales evitando así la comunicación de dispositivos finales de dos VRF distintas. De igual modo se debe configurar enlaces truncales entre los switch y los routers para asegurar la ruta de transporte de la información a las VRF.

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