

DIPLOMADO DE PROFUNDIZACION CISCO PRUEBA DE HABILIDADES
PRÁCTICAS CCNP

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA - UNAD ESCUELA DE
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INGENIERÍA ELECTRONICA
CEAD DUITAMA
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CCNP

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Diplomado de opción de grado presentado para optar el título de INGENIERO
ELECTRONICO

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NOTA DE ACEPTACIÓN

Firma del presidente del Jurado

Firma del Jurado

Firma del Jurado

DUITAMA, 1 de mayo de 2023

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En primer lugar, le doy gracias a Dios por permitirme llegar a este punto de mi carrera académica, por ayudarme en este complejo camino, de la mano con mi padre y mi novia que siempre me han brindado su apoyo incondicional para cumplir todos mis objetivos personales y académicos, gracias a ese apoyo me ha permitido que nunca desista cuando las cosas se han tornado espesas.

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RESUMEN

El siguiente informe desarrolla el escenario propuesto en las pruebas consejos prácticos para profundizar el diplomado Cisco CCNP, aquí el documento se puede visualizar la solución al problema propuesto, en donde se puede demostrar mediante el software GNS3, que está conectado a una máquina virtual sobre la que genera habilidades para abordar situaciones relacionadas con la ingeniería electrónica y/o las telecomunicaciones y aplicarlas en la gestión de redes locales o profesionales.

En la parte 1 y la parte 2 se enfocan en configurar VRF y enrutamiento estático para cada router, lo que permite una comunicación libre, donde se envía información a los usuarios. En la sección 3 y sección 4 se configuran los conmutadores y las Vlan adecuados, los enlaces troncales y los puertos de acceso, maneja la configuración de Etherchannel, que permiten el acceso a la configuración de seguridad del dispositivo y autenticación correspondiente.

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

ABSTRACT

The following report develops the scenario proposed in the practical advice tests to deepen the Cisco CCNP diploma, here the document can display the solution to the proposed problem, where it can be demonstrated through the GNS3 software, which is connected to a virtual machine on the that generates skills to address situations related to electronic engineering and/or telecommunications and apply them in the management of local or professional networks.

In part 1 and part 2 they focus on configuring VRF and static routing for each router, which allows free communication, where information is sent to users. Section 3 and Section 4 configure the appropriate switches and VLANs, trunk links and access ports, handle the Etherchannel configuration, which allow access to the device's security settings and corresponding authentication.

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

INTRODUCCIÓN

El título de Cisco tiene como objetivo validar los conocimientos adquiridos y validar la adquisición de habilidades de planificación, ejecución, revisión y resolución de problemas en las diversas redes que puedan surgir en la evolución de la vida profesional, ya que las redes tecnológicas se unen en el tiempo valor agregado en la sociedad de transmisión de información en varios enrutadores y conectores que sirven para que el circule información de principio a fin a través de diversos medios, etc.

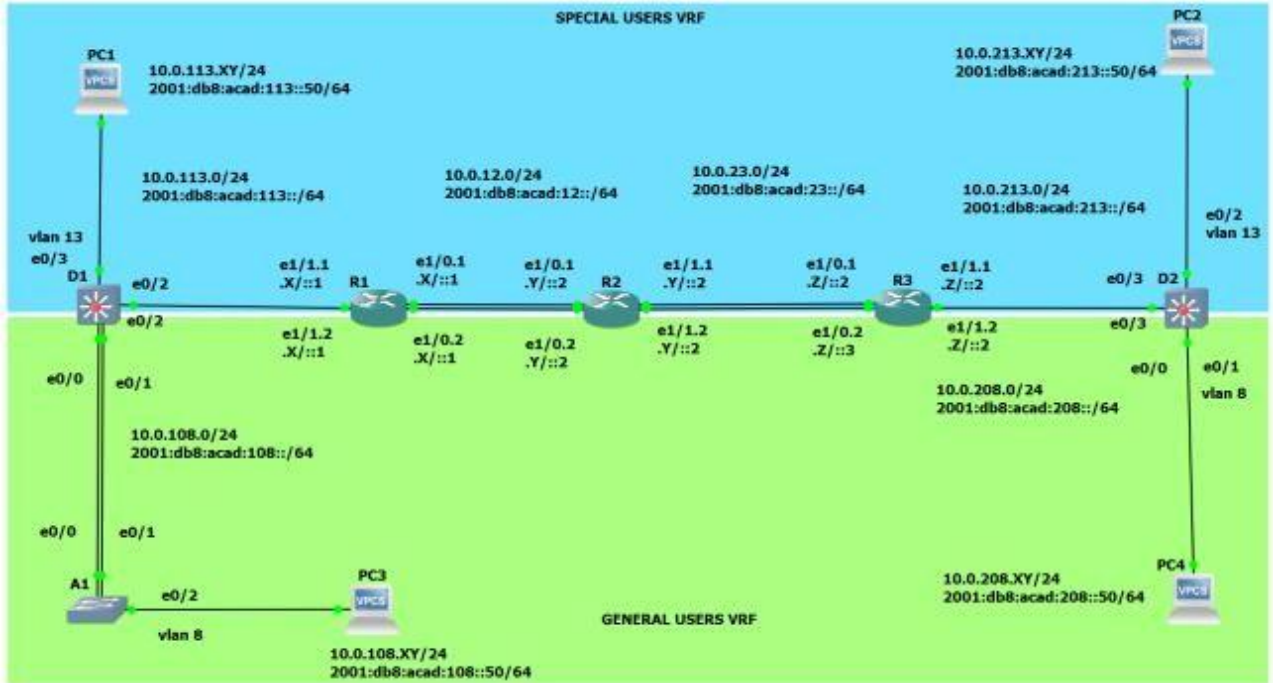
Por ejemplo, el siguiente informe expone para el diplomado de CISCO CCNP, configuración del enrutamiento virtual y el reenvío asociado, configuración de los diferentes dispositivos pertenecientes a la topología con adecuada implementación de seguridad en los dispositivos. La información de enrutamiento generada durante el desarrollo se muestra junto con una descripción detallada de las líneas de código necesarias para desarrollar la operación.

Para el Escenario 1 se revisaron 2 partes, las de la primera arquitectura de red con sus parámetros básicos aplicados a cada una dispositivos de topología con direccionamiento de interfaz correcto, la segunda parte se centró en la configuración de rutas VRF y estáticas, realizadas como usuarios generales y usuarios especiales. También está el escenario 2, en el que ambos lados se nombran igual. La tercera parte del trabajo se enfocó en diferentes configuraciones de capas para soportar la conectividad del endpoint, lado a lado con una configuración de PC con las respectivas VLAN.

DESARROLLO

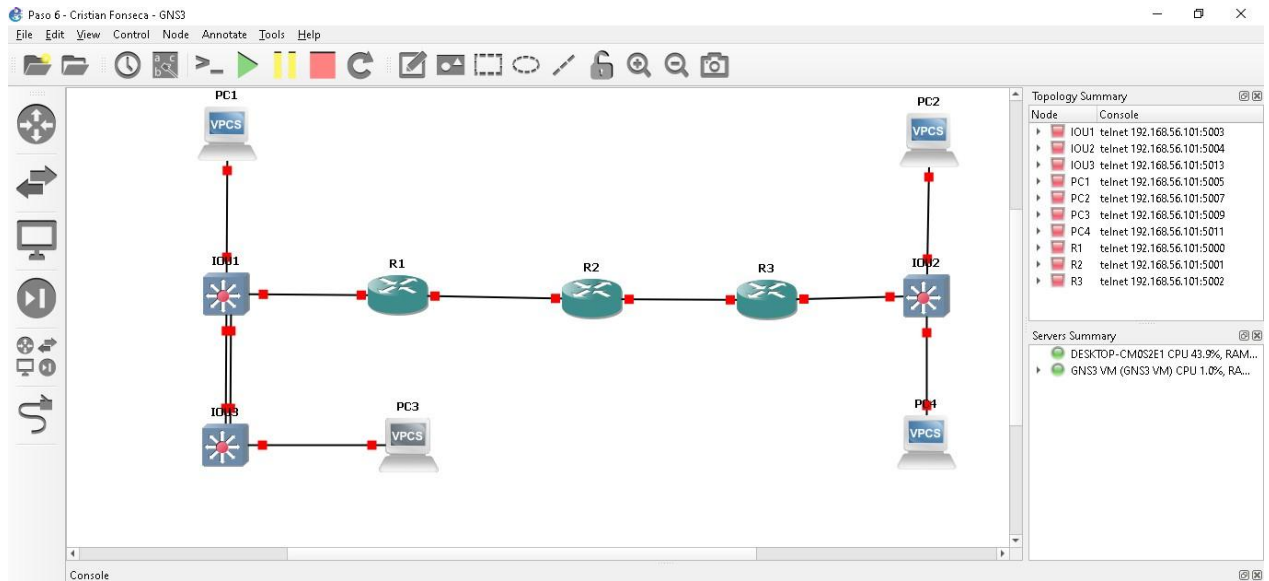
ESCENARIO 1

Ilustración 1 Escenario 1



Fuente: Autoría propia

Ilustración 2 Simulación de escenario 1



Autoría propia

Tabla 1 Tabla de direccionamiento

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	E1/0.1	10.0.12.6/24	2001:db8:acad:12::1/64	fe80::1:1
	E1/0.2	10.0.12.6/24	2001:db8:acad:12::1/64	fe80::1:2
	E1/1.1	10.0.113.6/24	2001:db8:acad:113::1/64	fe80::1:3
	E1/1.2	10.0.108.6/24	2001:db8:acad:108::1/64	fe80::1:4
R2	E1/0.1	10.0.12.2/24	2001:db8:acad:12::2/64	fe80::2:1
	E1/0.2	10.0.12.2/24	2001:db8:acad:12::2/64	fe80::2:2
	E1/1.1	10.0.23.2/24	2001:db8:acad:23::2/64	fe80::2:3
	E1/1.2	10.0.23.2/24	2001:db8:acad:23::2/64	fe80::2:4
R3	E1/0.1	10.0.23.1/24	2001:db8:acad:23::3/64	fe80::3:1
	E1/0.2	10.0.23.1/24	2001:db8:acad:23::3/64	fe80::3:2
	E1/1.1	10.0.213.1/24	2001:db8:acad:213::1/64	fe80::3:3
	E1/1.2	10.0.208.1/24	2001:db8:acad:208::1/64	fe80::3:4
PC1	NIC	10.0.113.62/24	2001:db8:acad:113::50/64	EUI-64
PC2	NIC	10.0.213.62/24	2001:db8:acad:213::50/64	EUI-64

PC3	NIC	10.0.108.62/24	2001:db8:acad:108::50/64	EUI-64
PC4	NIC	10.0.208.62/24	2001:db8:acad:208::50/64	EUI-64

Nota: las letras "X, Y, Z" corresponden a los últimos tres dígitos de su número de cédula. (Ejemplo, Pepito Pérez tiene como número de CC: 1356840, entonces X representa 8, Y representa 4 y Z representa 0). X=6, Y=2, Z=1

Objetivos

Parte 1: Construir la red y configurar los ajustes básicos de cada dispositivo y el direccionamiento de las interfaces

Parte 2: Configurar VRF y rutas estáticas.

Parte 3: Configurar Capa 2(se entrega finalizado el paso 6)

Parte 4: Configurar seguridad (se entrega finalizado el paso 6)

Escenario

En esta evaluación de habilidades, usted es responsable de completar la configuración multi-VRF de la red que admite "Usuarios generales" y "Usuarios especiales". Una vez finalizado, debería haber accesibilidad completa de un extremo a otro y los dos grupos no deberían poder comunicarse entre sí. Asegúrese de verificar que sus configuraciones cumplan con las especificaciones proporcionadas y que los dispositivos funcionen según lo requerido.

Instrucciones

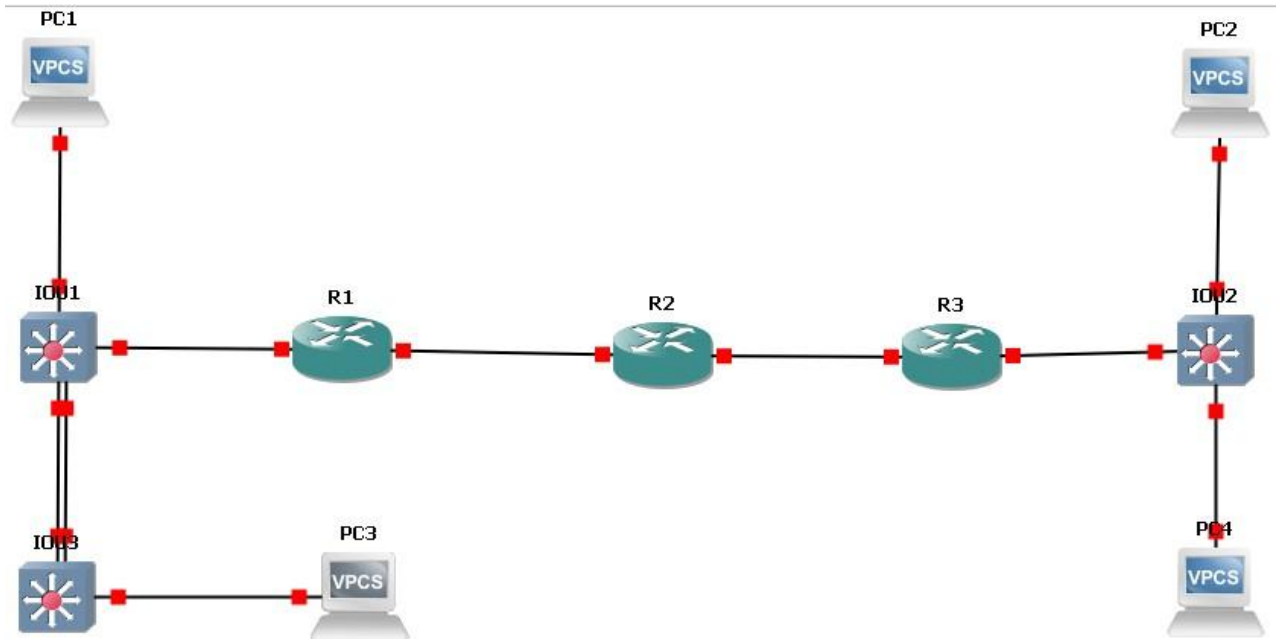
Parte 1: construir la red y configurar los ajustes básicos del dispositivo y el direccionamiento de la interfaz

En la Parte 1, configurará la topología de la red y configurará los ajustes básicos.

Paso 1: Cablee la red como se muestra en la topología.

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

Ilustración 3 Escenario formulado



Fuente: Autoría propia

Paso 2: Configure los ajustes básicos para cada dispositivo.

- a. 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.

Configuración básica R1

```
R1(config)#hostname R1
R1(config)#ipv6 unicast-routing
R1(config)#no ip domain lookup
R1(config)#banner motd #R1, ENCOR Skill Assesment, 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#wr
```

Configuración básica R2

```
R2#config t
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
```

Configuracion basica R3

```
R3#config t
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
```

Configuracion basica D1

```
IOU1#config t
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)#exit
```

Configuracion basica D2

```

IOU2#config t
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)#name General-Users
D2(config-vlan)#exit
D2(config)#vlan 13
D2(config-vlan)#name Special-Users
D2(config-vlan)#exit
D2(config)#exit

```

Configuración básica A1

```

A1(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)#exit
A1(config)#vlan 8
A1(config-vlan)#name General-Users
A1(config-vlan)#exit

```

Ilustración 4 Configuración ajustes básicos para cada dispositivo

<pre> R1(config)#hostname R1 R1(config)#ipv6 unicast-routing R1(config)#no ip domain lookup R1(config)#banner motd #R1, ENCOR Skill Assesment, 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 </pre>	<pre> R2#config t 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 </pre>
--	--

<pre> R3#config t 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)#nabber motd #R3, ENCOR Skills Assessment, Scenario 2 # ^ % Invalid input detected at '^' marker. 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 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)#name General-Users D2(config-vlan)#exit D2(config)#vlan 13 D2(config-vlan)#name Special-Users D2(config-vlan)#exit D2(config)#exit </pre>	<pre> IOU1#config t 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 A1#conf t Enter configuration commands, one per line. End with CNTL/Z. A1(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)#exit A1(config)#vlan 8 A1(config-vlan)#name General-Users A1(config-vlan)#exit A1(config)# </pre>
---	--

Fuente: Autoria propia

- b. Guarde las configuraciones en cada uno de los dispositivos.

Ilustración 5 Ejecución comando copy running-config startup-config para R1

```

R1#wr
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#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R1#

```

Fuente: Autoria propia

Ilustración 6 Ejecución comando copy running-config startup-config para R2

```
R2#wr
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#
R2#
R2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

Fuente: Autoria propia

Ilustración 7: Ejecución comando copy running-config startup-config para R3

```
R3#wr
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#copy running-config starup-config
Destination filename [starup-config]?
```

Fuente: Autoria propia

Ilustración 8 Ejecución comando copy running-config startup-config para D1

```
D1#erase nvram:
Erasing the nvram filesystem will remove all configuration files! Continue? [confirm]
[OK]
Erase of nvram: complete
D1#
*Mar 31 00:21:46.464: %SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
D1#copy run start
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 1433 bytes to 873 bytes[OK]
D1#
```

Fuente: Autoria propia

Ilustración 9 Ejecución comando copy running-config startup-config para D2

```
D2#wr
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 1432 bytes to 874 bytes[OK]
D2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 1432 bytes to 874 bytes[OK]
```

Fuente: Autoria propia

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

Ilustración 10 Configuración PC1

```
PC1> ip 10.0.113.62 255.255.255.0
Checking for duplicate address...
PC1 : 10.0.113.62 255.255.255.0

PC1> sh ip

NAME          : PC1[1]
IP/MASK       : 10.0.113.62/24
GATEWAY       : 255.255.255.0
DNS           :
MAC           : 00:50:79:66:68:00
LPORT        : 20002
RHOST:PORT    : 127.0.0.1:20003
MTU           : 1500
```

Fuente: Autoria propia

Ilustración 11 Configuración PC2

```
PC2> ip 10.0.213.62 255.255.255.0
Checking for duplicate address...
PC2 : 10.0.213.62 255.255.255.0

PC2> sh ip

NAME          : PC2[1]
IP/MASK       : 10.0.213.62/24
GATEWAY       : 255.255.255.0
DNS           :
MAC           : 00:50:79:66:68:01
LPORT        : 20004
RHOST:PORT    : 127.0.0.1:20005
MTU           : 1500
```

Fuente: Autoria propia

Ilustración 12 Configuración PC3

```

PC3> ip 10.0.108.62 255.255.255.0
Checking for duplicate address...
PC3 : 10.0.108.62 255.255.255.0

PC3> sh ip

NAME       : PC3[1]
IP/MASK    : 10.0.108.62/24
GATEWAY    : 255.255.255.0
DNS        :
MAC        : 00:50:79:66:68:02
LPORT     : 20006
RHOST:PORT : 127.0.0.1:20007
MTU        : 1500

```

Fuente: Autoria propia

Ilustración 13 Configuración PC4

```

PC4> ip 10.0.208.62 255.255.255.0
Checking for duplicate address...
PC4 : 10.0.208.62 255.255.255.0

PC4> sh ip

NAME       : PC4[1]
IP/MASK    : 10.0.208.62/24
GATEWAY    : 255.255.255.0
DNS        :
MAC        : 00:50:79:66:68:03
LPORT     : 20008
RHOST:PORT : 127.0.0.1:20009
MTU        : 1500

```

Fuente: Autoria propia

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 : Configurar VRF y enrutamiento estático

Task#	Task	Specification
-------	------	---------------

2.1	On R1, R2, and R3, configure VRF-Lite VRFs as shown in the topology diagram.	Configure two VRFs: 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 1/1.x interfaces to support separation of the VRFs. Sub-interface 1: In the Special Users VRF Use dot1q encapsulation IPv4 and IPv6 GUA and link-local addresses Enable the interfaces Sub-interface 2: In the General Users VRF Use dot1q encapsulation 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: ping vrf General-Users 10.0.208.Z ping vrf General-Users 2001:db8:acad:208::1 ping vrf Special-Users 10.0.213.Z ping vrf Special-Users 2001:db8:acad:213::1

2.1 En R1, R2 y R3, configure VRF-Lite VRF como se muestra en el diagrama de topología.

Configuración de las VRFs GeneralUser y SpecialUser en R1

```
R1#conf t
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
```

Configuración de las VRFs GeneralUser y SpecialUser en R2

```
R2#conf t
```

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
```

Configuración de las VRFs GeneralUser y SpecialUser en R3

```
R3#conf t
```

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
```

Ilustración 14 Configuración de las VRFs GeneralUser y SpecialUser

```
R1#config t
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)#vrf definition Special-Users
R1(config-vrf)#address-family ipv4
R1(config-vrf-af)#address-family ipv6
R1(config-vrf-af)#exit
[OK]
R2#conf t
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#config t
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

```

Fuente : Autoria propia

2.2 y En R1, R2 y R3, configure las interfaces IPv4 e IPv6 en cada VRF como se detalla en la tabla de direccionamiento anterior.

Interfaces IPv4 e IPv6 en cada VRF

Configuración interfaces IPv4 e IPv6 R1

```

R1(config-vrf)#interface E1/0.1
R1(config-subif)#encapsulation dot1q 13
R1(config-subif)#vrf forwarding Special-Users
R1(config-subif)#ip address 10.0.12.6 255.255.255.0
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 E1/0.2
R1(config-subif)#encapsulation dot1q 8
R1(config-subif)#vrf forwarding General-Users
R1(config-subif)#ip address 10.0.12.6 255.255.255.0
R1(config-subif)#ipv6 address fe80::1:2 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 E1/0
R1(config-if)#no ip address
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#interface E1/1.1
R1(config-subif)#encapsulation dot1q 13
R1(config-subif)#vrf forwarding Special-Users
R1(config-subif)#ip address 10.0.113.6 255.255.255.0
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)#interface E1/1.2
R1(config-subif)#encapsulation dot1q 8
R1(config-subif)#
R1(config-subif)#vrf forwarding General-Users
R1(config-subif)#ip address 10.0.108.6 255.255.255.0
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)#interface E1/0
R1(config-if)#exit
R1(config)#interface E1/1
R1(config-if)#no ip address
R1(config-if)#no shutdown
R1(config-if)#exit

```

Ilustración 15 : Configuración interfaces IPv4 e IPv6 R1

```

R1(config-vrf)#interface E1/0.1
R1(config-subif)#encapsulation dot1q 13
R1(config-subif)#vrf forwarding Special-Users
R1(config-subif)#ip address 10.0.12.6 255.255.255.0
R1(config-subif)#ipv6 address fe80::1:1 link-local
R1(config-subif)#ipv6 address 2001_db8:acad:12::1/64
% Incomplete command.

R1(config-subif)#ipv6 address 2001:db8:acad:12::1/64
R1(config-subif)#no shutdown
R1(config-subif)#exit
R1(config)#interface E1/0.2
R1(config-subif)#encapsulation dot1q 8
R1(config-subif)#vrf forwarding General-Users
R1(config-subif)#ip address 10.0.12.6 255.255.255.0
R1(config-subif)#ipv6 address fe80::1:2 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 E1/0
R1(config-if)#no ip address
R1(config-if)#no shutdown
R1(config-if)#exit
*Apr  1 15:49:38.115: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Apr  1 15:49:39.115: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
R1(config-if)#exit
R1(config)#interface E1/1.1
R1(config-subif)#encapsulation dot1q 13
R1(config-subif)#vrf forwarding Special-Users
R1(config-subif)#ip address 10.0.113.6 255.255.255.0
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)#interface E1/1.2
R1(config-subif)#encapsulation dot1q 8
R1(config-subif)#
R1(config-subif)#vrf forwarding General-Users

```

Fuente: Autoria propia

Configuración interfaces IPv4 e IPv6 R2

```
R2(config-vrf)#interface E1/0.1
R2(config-subif)#encapsulation dot1q 13
R2(config-subif)#vrf forwarding Special-Users
R2(config-subif)#ip address 10.0.12.2 255.255.255.0
R2(config-subif)#
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)#interface E1/0.2
R2(config-subif)#encapsulation dot1q 8
R2(config-subif)#vrf forwarding General-Users
R2(config-subif)#ip address 10.0.23.2 255.255.255.0
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)#interface E1/0
R2(config-if)#no ip address
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#interface E1/1.1
R2(config-subif)#encapsulation dot1q 13
R2(config-subif)#vrf forwarding Special-Users
R2(config-subif)#ip address 10.0.23.2 255.255.255.0
R2(config-subif)#
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)#interface E1/1.2
R2(config-subif)#interface E1/0.2
R2(config-subif)#encapsulation dot1q 8
R2(config-subif)#vrf forwarding General-Users
R2(config-subif)#ip address 10.0.23.7 255.255.255.0
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)#interface E1/1
R2(config-if)#no ip address
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#
```

```

R2(config)#interface E1/1.2
R2(config-subif)#vrf forwarding General-Users
R2(config-subif)#ip address 10.0.23.2 255.255.255.0
% 10.0.23.0 overlaps with Ethernet1/0.2
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)#interface E1/1
R2(config-if)#no ip address
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#exit

```

Ilustración 16 : Configuración interfaces IPv4 e IPv6 R2

```

R2(config-vrf)#interface E1/0.1
R2(config-subif)#encapsulation dot1q 13
R2(config-subif)#vrf forwarding Special-Users
R2(config-subif)#ip address 10.0.12.2 255.255.255.0
R2(config-subif)#
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)#interface E1/0.2
R2(config-subif)#vrf forwarding General-Users
R2(config-subif)#ip address 10.0.12.2 255.255.255.0

% Configuring IP routing on a LAN subinterface is only allowed if that
subinterface is already configured as part of an IEEE 802.10, IEEE 802.1Q,
or ISL vLAN.

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)#interface E1/0
R2(config-if)#no ip address
R2(config-if)#no shutdown
R2(config-if)#
*Apr  1 16:04:14.787: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Apr  1 16:04:15.787: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
R2(config-if)#exit
R2(config)#interface E1/1.1
R2(config-subif)#encapsulation dot1q 13
R2(config-subif)#vrf forwarding Special-Users
R2(config-subif)#ip address 10.0.23.2 255.255.255.0
R2(config-subif)#
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)#interface E1/1.2

```

Fuente: Aatoria propia

Configuración interfaces IPv4 e IPv6 R3

```

R3(config-vrf)#interface E1/0.1
R3(config-subif)#encapsulation dot1q 13
R3(config-subif)#vrf forwarding Special-Users
R3(config-subif)#ip address 10.0.23.1 255.255.255.0
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)#interface E1/0.2
R3(config-subif)#encapsulation dot1q 8
R3(config-subif)#vrf forwarding General-Users
R3(config-subif)#ip address 10.0.23.1 255.255.255.0
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)#interface E1/0
R3(config-if)#no ip address
R3(config-if)#no shutdown
R3(config-if)#exit
R3(config)#
R3(config)#interface E1/1.1
R3(config-subif)#encapsulation dot1q 13
R3(config-subif)#vrf forwarding Special-Users
R3(config-subif)#ip address 10.0.213.1 255.255.255.0
R3(config-subif)#ipv6 address fe80::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)#interface E1/1.2
R3(config-subif)#vrf forwarding General-Users
R3(config-subif)#ip address 10.0.208.1 255.255.255.0
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)#interface E1/1.1
R3(config-subif)#encapsulation dot1q 13
R3(config-subif)#vrf forwarding Special-Users
R3(config-subif)#ip address 10.0.213.1 255.255.255.0
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)#interface E1/1

```

```
R3(config-if)#no ip address
R3(config-if)#no shutdown
R3(config-if)#exit
```

Ilustración 17 : Configuración interfaces IPv4 e IPv6 R3

```
R3(config-vrf)#interface E1/0.1
R3(config-subif)#encapsulation dot1q 13
R3(config-subif)#vrf forwarding Special-Users
R3(config-subif)#ip address 10.0.23.1 255.255.255.0
R3(config-subif)#ipv6 address fe80::3:1 link-local
R3(config-subif)#^
% Invalid input detected at '^' marker.

R3(config-subif)#ipv6 address fe80::3:1 link-local
R3(config-subif)#ip v 6 address 2001_db8:acad:23::3/64
R3(config-subif)#^
% Invalid input detected at '^' marker.

R3(config-subif)#ipv6 address 2001_db8:acad:23::3/64
R3(config-subif)#% Incomplete command.

R3(config-subif)#ipv6 address 2001:db8:acad:23::3/64
R3(config-subif)#no shutdown
R3(config-subif)#exit
R3(config)#interface E1/0.2
R3(config-subif)#encapsulation dot1q 8
R3(config-subif)#vrf forwarding General-Users
R3(config-subif)#ip address 10.0.23.1 255.255.255.0
R3(config-subif)#ipv6 fe80::3:2 link local
R3(config-subif)#^
% Invalid input detected at '^' marker.

R3(config-subif)#ipv6 fe80::3:2 link-local
R3(config-subif)#^
% Invalid input detected at '^' marker.

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)#interface E1/0
R3(config-if)#no ip address
R3(config-if)#no shutdown
```

Fuente: Autoria propia

2.3 En R1 y R3, configure las rutas estáticas predeterminadas que apuntan a R2.

Configuración R1

R1#conf t

```
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.12.2
R1(config)#ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.12.2
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
```

Ilustración 18 Configuración ruta estática en R1

```
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.12.2
R1(config)#ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.12.2
R1(config)#ipv6 route vrf Special-Users ::/0 2001:db8:acad:12::2
      ^
% Invalid input detected at '^' marker.

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
```

Fuente: Autoria propia

Configuración R3

```
R3#config t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.23.2
R3(config)#ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.23.2
R3(config)#ipv6 route vrf Special-Users ::0/0 2002:db8:acad:23::2
R3(config)#ipv6 route vrf General-Users ::0/0 2002:db8:acad:23::2
R3(config)#end
```

Ilustración 19 Configuración ruta estática en R3

```
R3#config t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.23.2
R3(config)#ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.23.2
R3(config)#ipv6 route vrf Special-Users ::0/0 2002:db8:acad:23::2
R3(config)#ipv6 route vrf General-Users ::0/0 2002:db8:acad:23::2
R3(config)#end
```

Fuente Autoria propia

2.4 Verifique la conectividad en cada VRF.

```
R1#ping vrf General-Users 10.0.208.47
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.208.47, timeout is 2 seconds:
```

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:

R1#ping vrf Special-Users 10.0.213.47
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.213.47, timeout is 2 seconds:

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:

Ilustración 20 Ping VRF

```
R1#ping vrf General-Users 10.0.208.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.208.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
R1#ping vrf General-Users 10.0.23.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.23.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
R1#ping vrf Special-Users 10.0.213.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.213.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
R1#ping vrf General-Users 10.0.208.47
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.208.47, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
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 0 percent (0/5)
R1#ping Special-Users 10.0.213.47
Translating "Special-Users"

Translating "Special-Users"
^
% Invalid input detected at '^' marker.

R1#ping vrf Special-Users 10.0.213.47
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.213.47, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
R1#ping vrf Special-Users 2001:db8:acad:213::1
```

Fuente: Autoria propia

DESARROLLO

ESCENARIO 2

Parte 3. Configurar Capa 2

Tabla 3 Configurar Switch capa 2

Task#	Task	Specification
3.1	On D1, D2, and A1, disable all interfaces.	On D1 and D2, shutdown G1/0/1 to G1/0/24. On A1, shutdown F0/1 – F0/24, G0/1 – G0/2.
3.2	On D1 and D2, configure the trunk links to R1 and R3.	Configure and enable the G1/0/11 link as a trunk link.
3.3	On D1 and A1, configure the EtherChannel.	On D1, configure and enable: Interface G1/0/5 and G1/0/6 Port Channel 1 using PAgP On A1, configure enable: Interface F0/1 and F0/2 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: On D1, configure interface G1/0/23 as an access port in VLAN 13 and enable Portfast. On D2, configure interface G1/0/23 as an access port in VLAN 13 and enable Portfast. On D2, configure interface G1/0/24 as an access port in VLAN 8 and enable Portfast. On A1, configure interface F0/23 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.

En D1, D2 y A1, deshabilite todas las interfaces.

Switch D1.

```
D1(config)#hostname D1
D1(config)#ip 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)#interface range e0/0-3
D1(config)#shutdown
D1(config)#exit
```

Switch D2.

```
D2(config)#hostname D2
D2(config)#ip routing
D2(config)#ipv6 unicast-routing.
D2(config)#no ip domain lookup
D2(config)#banner motd # D2, ENCOR Skills Assessment, 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)# name General-Users
D2(config-vlan)# exit
D2(config)#vlan 13
D2(config-vlan)# name Special-Users
D2(config-vlan)# exit
D2(config)#interface range e0/0-3
D2(config)#shutdown
D2(config)#exit
```

Switch A1.

```
A1(config)#hostname A1
```

```

A1(config)#ip routing
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)#vlan 13
A1(config-vlan)# name Special-Users
A1(config-vlan)# exit
A1(config)#interface range e0/0-3
A1(config)#shutdown
A1(config)#exit

```

Ilustración 21 Desactivado de interfaces

```

D1(config)#hostname D1
D1(config)#ip 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)#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)#interface range e0/0-3
D1(config-if-range)#shutdown
D1(config-if-range)#exit
D1(config)#
*May 12 05:06:17.534: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to administratively down
*May 12 05:06:17.534: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively down
*May 12 05:06:17.534: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to administratively down
*May 12 05:06:17.535: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to administratively down
*May 12 05:06:18.538: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to down
*May 12 05:06:18.538: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*May 12 05:06:18.538: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
*May 12 05:06:18.538: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to down
D1(config)#ipv6 unicast-routing
D1(config)#no ip domain lookup
D1(config)#

D2, ENCOR Skills Assessment, Scenario 2
D2#hostname D2
D2#
% Invalid input detected at '^' marker.
D2#config t
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#hostname D2
D2(config)#ip routing
D2(config)#ipv6 unicast-routing
D2(config)#no ip domain lookup
D2(config)#banner motd #D2, ENCOR Skills Assessment, 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)#name General-Users
D2(config-vlan)#exit
D2(config)#vlan 13
D2(config-vlan)#name Special-Users
D2(config-vlan)#exit
D2(config)#interface range e0/0-3
D2(config-if-range)#shutdown
D2(config-if-range)#exit
D2(config)#
*May 12 05:12:115.195: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to administratively down
*May 12 05:12:115.195: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively down
*May 12 05:12:115.205: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to administratively down
*May 12 05:12:115.215: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to administratively down
*May 12 05:12:116.196: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to down
*May 12 05:12:116.196: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*May 12 05:12:116.211: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
*May 12 05:12:116.221: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to down
D2(config)#

```

Fuente: Autoria propia

```

D1 D2 AI
LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1
, changed state to down
*May 12 05:54:06.081: %LINK-5-CHANGED: Interface Vlan1, changed state to administratively down
AI, ENCOR Skills Assessment, Scenario 2
AI#conf t
Enter configuration commands, one per line. End with CNTL/Z.
AI(config)#hostname AI
AI(config)#ip routing
AI(config)#ipv6 unicast-routing
AI(config)#no ip domain lookup
AI(config)#banner motd # AI, ENCOR Skills Assessment, Scenario 2 #
AI(config-line)#exec-timeout 0 0
AI(config-line)#logging synchronous
AI(config-line)#exit
AI(config)#vlan 8
AI(config-vlan)#name General-Users
AI(config-vlan)#exit
AI(config)#vlan 13
AI(config-vlan)#name Special-Users
AI(config-vlan)#exit
AI(config)#interface range e0/0-3
AI(config-if-range)#shutdown
AI(config-if-range)#exit
AI(config)#
*May 12 05:15:14.527: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to administratively down
*May 12 05:15:14.527: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively down
*May 12 05:15:14.527: %LINK-5-CHANGED: Interface Ethernet0/2, changed state to administratively down
*May 12 05:15:14.537: %LINK-5-CHANGED: Interface Ethernet0/3, changed state to administratively down
*May 12 05:15:15.532: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to down
*May 12 05:15:15.532: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to down
*May 12 05:15:15.532: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2, changed state to down
*May 12 05:15:15.542: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/3, changed state to down
AI(config)#
solarwinds Solar-PuTTY free tool © 2019 SolarWinds Work

```

Fuente: Autoria propia

En D1 y D2, configure los enlaces troncales a R1 y R3.

Switch D1.

```

D1(config)#interface e0/1
D1(config-if)#switchport trunk encapsulation dot1q
D1(config-if)#switchport mode trunk
D1(config-if)#no shutdown
D1(config-if)#exit

```

Switch D2

```

D2(config)#interface e0/0
D2(config-if)#switchport trunk encapsulation dot1q
D2(config-if)#switchport mode trunk
D2(config-if)#no shutdown
D2(config-if)#exit

```

Ilustración 22 Configuración troncales

```

D1(config)#interface e1/1
D1(config-if)#switchport trunk encapsulation dot1q
D1(config-if)#switchport mode trunk
D1(config-if)#no shutdown
*May 12 05:27:43.065: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
D1(config-if)#no shutdown
D1(config-if)#
*May 12 05:27:46.071: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
D1(config-if)#exit
D1(config)#

```

```

D2(config)#interface e1/1
D2(config-if)#switchport trunk encapsulation dot1q
D2(config-if)#switchport mode trunk
D2(config-if)#no shutdown
*May 12 05:29:38.852: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
D2(config-if)#no shutdown
D2(config-if)#
*May 12 05:29:41.853: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to up
D2(config-if)#exit
D2(config)#

```

Fuente: Autoria propia

Se revisan las interfaces troncales.

Ilustración 23 Verificación enlaces troncales D1 – D2

```

D1#show interface trunk

Port      Mode           Encapsulation  Status        Native vlan
Et0/1     on             802.1q         trunking      1
Et1/1     on             802.1q         trunking      1

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

Port      Vlans allowed and active in management domain
Et0/1     1,8,13
Et1/1     1,8,13

Port      Vlans in spanning tree forwarding state and not pruned
Et0/1     1,8,13
Et1/1     1,8,13
D1#

D2#show interface 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#

```

Fuente: Autoria propia

En D1 y A1, configure el EtherChannel.

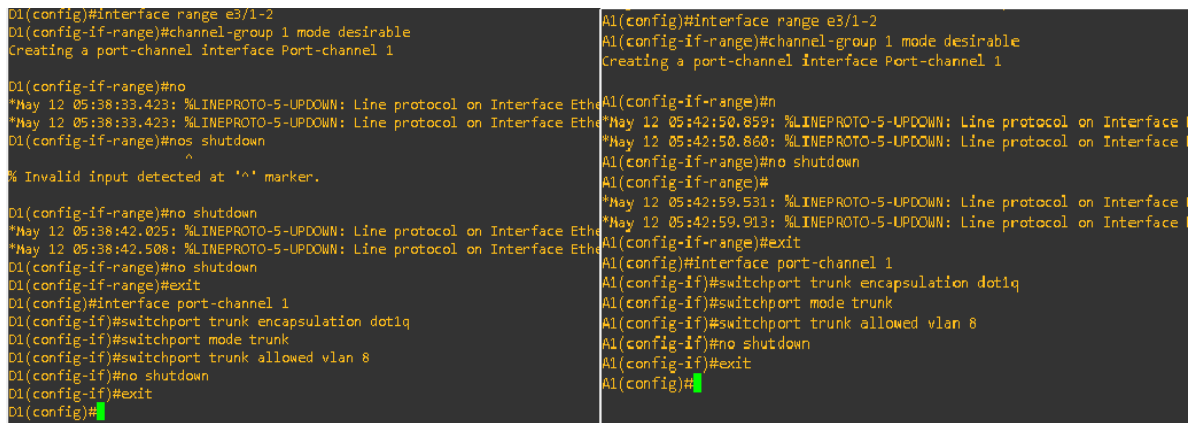
Switch D1

```
D1(config)#interface range e3/1-2
D1(config-if-range)#channel-group 1 mode desirable
D1(config-if-range)#no shutdown
D1(config-if-range)#exit
D1(config)#interface port-channel 1
D1(config-if)#switchport trunk encapsulation dot1q
D1(config-if)#switchport mode trunk
D1(config-if)#switchport trunk allowed vlan 8
D1(config-if)#no shutdown
D1(config-if)#exit
```

Switch A1

```
A1(config)#interface range e0/2-3
A1(config-if-range)#channel-group 1 mode desirable
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
A1(config)#interface port-channel 1
A1(config-if)#switchport trunk encapsulation dot1q
A1(config-if)#switchport mode trunk
A1(config-if)#switchport trunk allowed vlan 8
A1(config-if)#no shutdown
A1(config-if)#exit
```

Ilustración 24 Configuración EtherChannel en D1 – A1



```
D1(config)#interface range e3/1-2
D1(config-if-range)#channel-group 1 mode desirable
Creating a port-channel interface Port-channel 1
D1(config-if-range)#no
*May 12 05:38:33.423: %LINEPROTO-5-UPDOWN: Line protocol on Interface Eth
*May 12 05:38:33.423: %LINEPROTO-5-UPDOWN: Line protocol on Interface Eth
D1(config-if-range)#no shutdown
^
% Invalid input detected at '^' marker.
D1(config-if-range)#no shutdown
*May 12 05:38:42.025: %LINEPROTO-5-UPDOWN: Line protocol on Interface Eth
*May 12 05:38:42.508: %LINEPROTO-5-UPDOWN: Line protocol on Interface Eth
D1(config-if-range)#no shutdown
D1(config-if-range)#exit
D1(config)#interface port-channel 1
D1(config-if)#switchport trunk encapsulation dot1q
D1(config-if)#switchport mode trunk
D1(config-if)#switchport trunk allowed vlan 8
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#

A1(config)#interface range e3/1-2
A1(config-if-range)#channel-group 1 mode desirable
Creating a port-channel interface Port-channel 1
A1(config-if-range)#n
*May 12 05:42:50.859: %LINEPROTO-5-UPDOWN: Line protocol on Interface
*May 12 05:42:50.860: %LINEPROTO-5-UPDOWN: Line protocol on Interface
A1(config-if-range)#no shutdown
A1(config-if-range)#
*May 12 05:42:59.531: %LINEPROTO-5-UPDOWN: Line protocol on Interface
*May 12 05:42:59.913: %LINEPROTO-5-UPDOWN: Line protocol on Interface
A1(config-if-range)#exit
A1(config)#interface port-channel 1
A1(config-if)#switchport trunk encapsulation dot1q
A1(config-if)#switchport mode trunk
A1(config-if)#switchport trunk allowed vlan 8
A1(config-if)#no shutdown
A1(config-if)#exit
A1(config)#
```

Fuente: Autoria propia

Se verifica la configuración de Ethernet-Channel.
Mediante el comando **show etherchannel summary**

Ilustración 25 Verificación Port-Channel A1-D1.

```
D1#show
*May 10 03:43:36.013: %SYS-5-CONFIG_I: Configured from console by console et
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

       N - 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(SD)         PAgP        Et0/2(I)  Et0/3(I)

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

       N - 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(SD)         PAgP        Et0/2(I)  Et0/3(I)
```

Fuente: Autoria propia

En D1, D2 y A1, configure los puertos de acceso para PC1, PC2, PC3 y PC4.

Switch D1

```
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
```

Switch D2.

```
D2(config)#interface e2/3
D2(config-if)#switchport mode access
D2(config-if)#switchport access vlan 13
D2(config-if)#spanning-tree portfast
D2(config-if)#no shutdown
D2(config-if)#exit
D2(config)#interface e3/1
D2(config-if)#switchport mode access
D2(config-if)#switchport access vlan 8
D2(config-if)#spanning-tree portfast
D2(config-if)#no shutdown
D2(config-if)#exit
```

Switch A1.

```
A1(config)#interface e2/3
A1(config-if)#switchport mode access
A1(config-if)#switchport access vlan 8
A1(config-if)#spanning-tree portfast
A1(config-if)#no shutdown
A1(config-if)#exit
```

Ilustración 26 Configuración Vlans en D1 – D2 - A1

```
D1#config t
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#interface e2/3
D1(config-if)#switchport mode access
D1(config-if)#switchport access vlan 13
D1(config-if)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single
  host. Connecting hubs, concentrators, switches, bridges, etc... to this
  interface when portfast is enabled, can cause temporary bridging loops.
  Use with CAUTION

%Portfast has been configured on Ethernet2/3 but will only
  have effect when the interface is in a non-trunking mode.
D1(config-if)#no shutdown
D1(config-if)#exit
D1(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
A1(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
D2(config)#interface e3/1
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 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)#
```

Fuente: Autoria propia

Se utiliza el comando **spanning-tree portfast** para habilitar el portfast en las interfaces según lo requerido.

Se verifican las interfaces configuradas.

Mediante el comando **Show run interface** se verifica la configuración en cada interface.

Ilustración 27 Verificación de las interfaces en D1, D2, y A1.

```
D1#show run interface e0/0
Building configuration...

Current configuration : 109 bytes
!
interface Ethernet0/0
 switchport access vlan 13
 switchport mode access
 spanning-tree portfast edge
end

D2#show run interface e0/2
Building configuration...

Current configuration : 108 bytes
!
interface Ethernet0/2
 switchport access vlan 8
 switchport mode access
 spanning-tree portfast edge
end

A1#show interface e2/3
Ethernet2/3 is up, line protocol is up (connected)
 Hardware is AmdP2, address is aabb.cc00.0332 (bia aabb.cc00.0332)
  MTU 1500 bytes, BW 10000 Kbit/sec, DLY 1000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
 Encapsulation ARPA, loopback not set
 Keepalive set (10 sec)
 Auto-duplex, Auto-speed, media type is unknown
 input flow-control is off, output flow-control is unsupported
 ARP type: ARPA, ARP Timeout 04:00:00
 Last input never, output 00:00:01, output hang never
 Last clearing of "show interface" counters never
 Input queue: 0/2000/0/0 (size/max/drops/flushes); Total output drops: 0
 Queueing strategy: fifo
 Output queue: 0/0 (size/max)
 5 minute input rate 0 bits/sec, 0 packets/sec
 5 minute output rate 0 bits/sec, 0 packets/sec
   0 packets input, 0 bytes, 0 no buffer
   Received 0 broadcasts (0 multicasts)
   0 runts, 0 giants, 0 throttles
   0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
   0 input packets with dribble condition detected
 2513 packets output, 191478 bytes, 0 underruns
--More--
```

Fuente. Autoria propia

Parte 4. Configurar seguridad.

Las tareas de configuración son las siguientes:

Tabla 4 Configuración de seguridad

Task#	Task	Specification
4.1	On all devices, secure privileged EXE mode.	Configure an enable secret as follows: Algorithm type: SCRYPT Password: cristian621 .
4.2	On all devices, create a local user account.	Configure a local user: Name: admin Privilege level: 15 Algorithm type: SCRYPT Password: cristian621 .
4.3	On all devices, enable AAA and enable AAA authentication.	Enable AAA authentication using the local database on all lines.

En todos los dispositivos, modo EXE privilegiado seguro.

Se configura un password secreto mediante el comando *enable algorithm-type scrypt secret*.

Router R1.

```
R1(config)# enable algorithm-type scrypt secret cristian621
```

Router R2

```
R2(config)# enable algorithm-type scrypt secret cristian621
```

Router R3

```
R3(config)# enable algorithm-type scrypt secret cristian621
```

Switch D1

```
D1(config)# enable algorithm-type scrypt secret cristian621
```

Switch D2

```
D2(config)# enable algorithm-type scrypt secret cristian621
```

Switch A1

```
A1(config)# enable algorithm-type scrypt secret cristian621
```

En todos los dispositivos, cree una cuenta de usuario local.

Se crea el usuario y se le otorgan los privilegios mediante el comando *username admin privilege 15 algorithm-type scrypt secret cristian621*.

Router R1.

```
R1(config)#username admin privilege 15 algorithm-type scrypt secret cristian621
```

Router R2.

```
R2(config)#username admin privilege 15 algorithm-type scrypt secret cristian621
```

Router R3.

```
R3(config)#username admin privilege 15 algorithm-type scrypt secret cristian621
```

Switch D1.

```
D1(config)#username admin privilege 15 algorithm-type scrypt secret cristian621
```

Switch D2.

```
D2(config)#username admin privilege 15 algorithm-type scrypt secret cristian621
```

Switch A1.

```
A1(config)#username admin privilege 15 algorithm-type scrypt secret cristian621
```

Ilustración 28 Configuración de seguridad y usuario

```
R1(config)#enable algorithm-type scrypt secret cristian621
R1(config)#$min privilege 15 algorithm-type scrypt secret cristian621
```

```

R2(config)#enable algorithm-type scrypt secret cristian621
R2(config)#min privilege 15 algorithm-type scrypt secret cristian621
R3(config)#enable algorithm-type scrypt secret cristian621
R3(config)#min privilege 15 algorithm-type scrypt secret cristian621
D1(config)#secret cristian621enable algorithm-type scrypt secret cristian621
D1(config)#min privilege 15 algorithm-type scrypt secret cristian621
D2(config)#enable algorithm-type scrypt secret cristian621
D2(config)#min privilege 15 algorithm-type scrypt secret cristian621
A1(config)#enable algorithm-type scrypt secret cristian621
A1(config)#min privilege 15 algorithm-type scrypt secret cristian621 ~

```

Fuente. Autoria propia

En todos los dispositivos, habilite AAA y habilite la autenticación AAA.

Se habilita la autenticación AAA mediante los comandos *aaa new-model -aaa authentication login default local*.

Router R1.

```

R1(config)#aaa new-model
R1(config)#aaa authentication login default local

```

Router R2.

```

R2(config)#aaa new-model
R2(config)#aaa authentication login default local

```

Router R3.

```

R3(config)#aaa new-model
R3(config)#aaa authentication login default local

```

Switch D1.

```

D1(config)#aaa new-model
D1(config)#aaa authentication login default local

```

Switch D2.

```

D2(config)#aaa new-model
D2(config)#aaa authentication login default local

```

Switch A1.

```

A1(config)#aaa new-model
A1(config)#aaa authentication login default local

```

Ilustración 29 Habilidad configuración AAA

```

R1(config)#aaa new-model
R1(config)#aaa authentication login default local
R2(config)#aaa new-model
R2(config)#aaa authentication login default local
R3(config)#aaa new-model
R3(config)#aaa authentication login default local
D1(config)#aaa new-model
D1(config)#aaa authentication login default local

```

```
D2(config)#aaa new-model
D2(config)#aaa authentication login default local
A1(config)#aaa new-model
A1(config)#aaa authentication login default local
```

Fuente. Autoria propia.

Se realiza la verificación de la configuración de seguridad aplicada mediante el comando **show run | include aaa|username**

Ilustración 30 Verificación show run | include aaa|username

```
Current configuration : 109 bytes
!
interface Ethernet2/3
  switchport access vlan 13
  switchport mode access
  spanning-tree portfast edge
end

D1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#%cret cristian621enable algorithm-type scrypt secret cristian621
D1(config)#%min privilege 15 algorithm-type scrypt secret cristian621
D1(config)#aaa new-model
D1(config)#aaa authentication login default local
D1(config)#exit
D1#
*May 12 06:37:49.522: %SYS-5-CONFIG_I: Configured from console by console
D1#show run | include aaa | username
% Invalid input detected at '^' marker.

D1#show run | include aaa | username
aaa new-model
aaa authentication login default local
aaa session-id common
D1#show run | include aaa|username
username admin privilege 15 secret 9 $9$OVmg8./rK9Pfgq$NNKLW./s7LstQm4tsUAFDdQU8Zkn2qvBD1MfQ8d.O/s
aaa new-model
aaa authentication login default local
aaa session-id common
D1#show run | include aaa|username
username admin privilege 15 secret 9 $9$OVmg8./rK9Pfgq$NNKLW./s7LstQm4tsUAFDdQU8Zkn2qvBD1MfQ8d.O/s
aaa new-model
aaa authentication login default local
aaa session-id common
D1#
D1#
```

Fuente. Autoria propia

CONCLUSIONES

Con el desarrollo anterior se logra la interpretación de la comunicación entre los 3 Router propuestos, todo ello debido a los direccionamientos realizados con la diversas aplicaciones de los diversos protocolos, que hacen que se formen direccionamientos de forma virtual aplicado en la interfaz.

Se denota la importancia de las VRFs en el enrutamiento con base en el reenvió de tablas de direccionamiento lógicas que logran la separación de las mismas.

Se logra definir rutas estáticas que realizan la comunicación entre los distintos usuarios de las VRFs (General-User y Special-User). Estableciendo una comunicación entre los Router de la red, mediante el reenvió de paquetes ICMP. Con lo cual evidenciamos la importancia de la configuración de estas rutas a la hora de la implementación de la topología propuesta para este diplomado.

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