

DIPLOMADO DE PROFUNDIZACIÓN CISCO
PRUEBA DE HABILIDADES PRÁCTICAS CCNP

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA – UNAD
ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA - ECBTI
INGENIERÍA TELECOMUNICACIONES
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Diplomado de opción de grado presentado para optar el título de
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2022

NOTA DE ACEPTACIÓN

Firma del Presidente del Jurado

Firma del Jurado

Firma del Jurado

BUCARAMANGA, 25 de junio de 2022

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CONTENIDO

AGRADECIMIENTOS	4
LISTA DE TABLAS	6
LISTA DE FIGURAS	6
GLOSARIO	7
RESUMEN	8
ABSTRACT	8
INTRODUCCIÓN	9
DESARROLLO ESCENARIO	10
Escenario Propuesto	10
PARTE 1 - Construir la red y configurar los ajustes básicos de cada dispositivo y el direccionamiento de las interfaces	11
PARTE 2 - Configurar VRF y rutas estáticas	16
PARTE 3 – Configuración capa 2	24
PARTE 4 – Configuración seguridad	32
CONCLUSIONES	46
REFERENCIAS	47

LISTA DE TABLAS

Tabla 1 Tabla de direccionamiento propuesto	10
Tabla 2 Tabla de direccionamiento aplicado.....	11

LISTA DE FIGURAS

Figura 1 Topología de la Red.....	10
Figura 2 Cableado de la red según la topología del escenario.	12
Figura 3 Configuración de los ajustes básicos para cada dispositivo	12
Figura 4 Configuración de las IP de los equipos.....	16
Figura 5 Comprobación de configuración Router #1.....	21
Figura 6 Comprobación de configuración Router #2.....	21
Figura 7 Comprobación de configuración Router #3.....	22
Figura 8 Comprobación de configuración	22
Figura 9 Comprobación de configuración	22
Figura 10 Comprobación de configuración	22
Figura 11 Comprobación de configuración	23
Figura 12 Comprobación de configuración	23
Figura 13 Verificación interfaces switch D1	27
Figura 14 Verificación interfaces switch D1	27
Figura 15 Verificación interfaces switch D2	28
Figura 16 Verificación interfaces switch D1	28
Figura 17 Verificación interfaces switch D1	28
Figura 18 Verificación interfaces switch D2	29
Figura 19 Verificación interfaces switch A1	29
Figura 20 Verificación interfaces switch A1	30
Figura 21 Verificación interfaces switch A1	30
Figura 22 Verificación de comunicación por medio de PING entre PC1 y PC2 y sin acceso a PC3 y PC4.....	31
Figura 23 Verificación de comunicación por medio de PING entre PC2 y PC1 y sin acceso a PC3 y PC4.....	31
Figura 24 Verificación de seguridad aplicada D1	33
Figura 25 Verificación de seguridad aplicada D2.....	33
Figura 26 Verificación de seguridad aplicada A1	34
Figura 27 Verificación de seguridad aplicada R1	35
Figura 28 Verificación de seguridad aplicada R2.....	35
Figura 29 Verificación de seguridad aplicada R3.....	35

GLOSARIO

CCNP: *Cisco Certified Network Professional*, por sus siglas en inglés, es una certificación de Cisco en temas de switching, routing, tecnología inalámbrica y temas de seguridad. (Cisco, 2010).

CISCO: Cisco Systems es una empresa global con sede en San José, California, Estados Unidos, principalmente dedicada a la fabricación, venta, mantenimiento y consultoría de equipos de telecomunicaciones (Wikipedia, 2022).

CONMUTACIÓN: En las redes de comunicaciones, forma de establecer un camino entre dos puntos, un transmisor y un receptor a través de nodos o equipos de transmisión. La conmutación permite la entrega de la señal desde el origen hasta el destino requerido. (EcuRed, 2022).

ELECTRÓNICA: La electrónica es una rama de la física aplicada que comprende la física, la ingeniería, la tecnología y las aplicaciones que tratan con la emisión, el flujo y el control de los electrones —u otras partículas cargadas eléctricamente— en el vacío y la materia. [...] trata con circuitos eléctricos que involucran componentes eléctricos activos como tubos de vacío, transistores, diodos, circuitos integrados, optoelectrónica y sensores, asociados con componentes eléctricos pasivos y tecnologías de interconexión. (Wikipedia, 2022)

ENRUTAMIENTO: El enrutamiento es el proceso de reenviar paquetes entre redes, siempre buscando la mejor ruta (la más corta). Para encontrar esa ruta más óptima, se debe tener en cuenta la tabla de enrutamiento y algunos otros parámetros como la métrica, la distancia administrativa, el ancho de banda, entre otros. (El Taller del Bit, s.f.)

REDES: Una red de computadoras (también llamada red de ordenadores o red informática) es un conjunto de equipos nodos y software conectados entre sí por medio de dispositivos físicos que envían y reciben impulsos eléctricos, ondas electromagnéticas o cualquier otro medio para el transporte de datos, con la finalidad de compartir información, recursos y ofrecer servicios. (Tanenbaum, 2003).

RESUMEN

El presente trabajo, a través de varios escenarios y pasos, tiene como objetivo construir una red y realizar la configuración básica de los dispositivos y el direccionamiento de las interfaces empleando protocolos de STP y de configuración VLAN, propios de una red convergente.

Se emplean comandos IOS de configuración avanzada para configurar VRF y las rutas estáticas en ambientes LAN y WAN y, estos escenarios son evaluados para garantizar el correcto funcionamiento, los estados de enlace y condiciones de seguridad, para identificar problemas en la conmutación y el enrutamiento para lograr un desempeño eficiente y una adecuada conectividad de la red.

Al finalizar todos los pasos, se pretende dar acceso a los dispositivos que pertenecen a las diferentes VLAN sin comunicarse entre ellas, con lo que se valida la efectividad de la configuración multi-VRF de la red.

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

ABSTRACT

This paper, through several scenarios and steps, aims to build a network and perform the basic configuration of devices and routing of interfaces using STP and VLAN configuration protocols, typical of a convergent network.

Advanced configuration IOS commands are used to configure VRF and static routes in LAN and WAN settings, and these scenarios are evaluated to ensure correct operation, link status and security conditions, to identify problems in switching and routing for efficient performance and proper network connectivity.

At the end of all the steps, it is intended to give access to the devices belonging to the different VLANs without communicating between them, thus validating the effectiveness of the multi-VRF configuration of the network.

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

INTRODUCCIÓN

El presente documento hace parte de la evaluación del Diplomado de Profundización CISCO CCNP, bajo la modalidad de “proyecto aplicado”. A través de escenarios con características y requerimientos específicos se busca realizar la configuración multi-VRF de una red con dos tipos de usuarios, “generales” y “especiales” quienes, al concluir el ejercicio deberán tener accesibilidad de extremo a extremo, pero no comunicación entre ambos grupos.

Para lo anterior, con los escenarios propuestos en la guía de actividades, se desarrollan las siguientes partes, (1) topología de la red y configuración de los ajustes básicos del dispositivo y el direccionamiento de la interfaz; (2) Configuración VRF y rutas estáticas; (3) configuración de capa 2; y, (4) configuración de seguridad.

Finalmente, se detalla el paso a paso desarrollado en cada una de las etapas, acompañado de comandos como ping, tracer, show ip route, entre otros, que evidencian la verificación de conectividad.

Como se mencionó al inicio, el desarrollo de esta actividad permite evidenciar el aprendizaje adquirido a lo largo del Diplomado, cuyo énfasis se centra en temas de switching, enrutamiento, tecnología inalámbrica y temas de seguridad.

DESARROLLO ESCENARIO

Escenario Propuesto

Figura 1 Topología de la Red

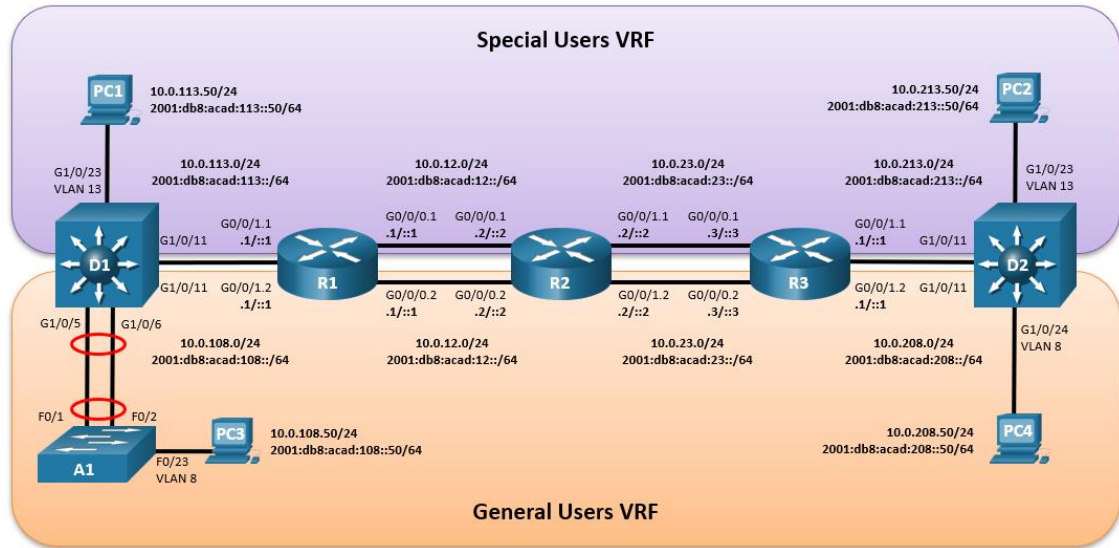


Tabla 1 Tabla de direccionamiento propuesto

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	G0/0/0.1	10.0.12.1/24	2001:db8:acad:12::1/64	fe80::1:1
R1	G0/0/0.2	10.0.12.1/24	2001:db8:acad:12::1/64	fe80::1:2
R1	G0/0/1.1	10.0.113.1/24	2001:db8:acad:113::1/64	fe80::1:3
R1	G0/0/1.2	10.0.108.1/24	2001:db8:acad:108::1/64	fe80::1:4
R2	G0/0/0.1	10.0.12.2/24	2001:db8:acad:12::2/64	fe80::2:1
R2	G0/0/0.2	10.0.12.2/24	2001:db8:acad:12::2/64	fe80::2:2
R2	G0/0/1.1	10.0.23.2/24	2001:db8:acad:23::2/64	fe80::2:3
R2	G0/0/1.2	10.0.23.2/24	2001:db8:acad:23::2/64	fe80::2:4
R3	G0/0/0.1	10.0.23.3/24	2001:db8:acad:23::3/64	fe80::3:1
R3	G0/0/0.2	10.0.23.3/24	2001:db8:acad:23::3/64	fe80::3:2

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R3	G0/0/1.1	10.0.213.1/24	2001:db8:acad:213::1/64	fe80::3:3
R3	G0/0/1.2	10.0.208.1/24	2001:db8:acad:208::1/64	fe80::3:4
PC1	NIC	10.0.113.50/24	2001:db8:acad:113::50/64	EUI-64
PC2	NIC	10.0.213.50/24	2001:db8:acad:213::50/64	EUI-64
PC3	NIC	10.0.108.50/24	2001:db8:acad:108::50/64	EUI-64
PC4	NIC	10.0.208.50/24	2001:db8:acad:208::50/64	EUI-64

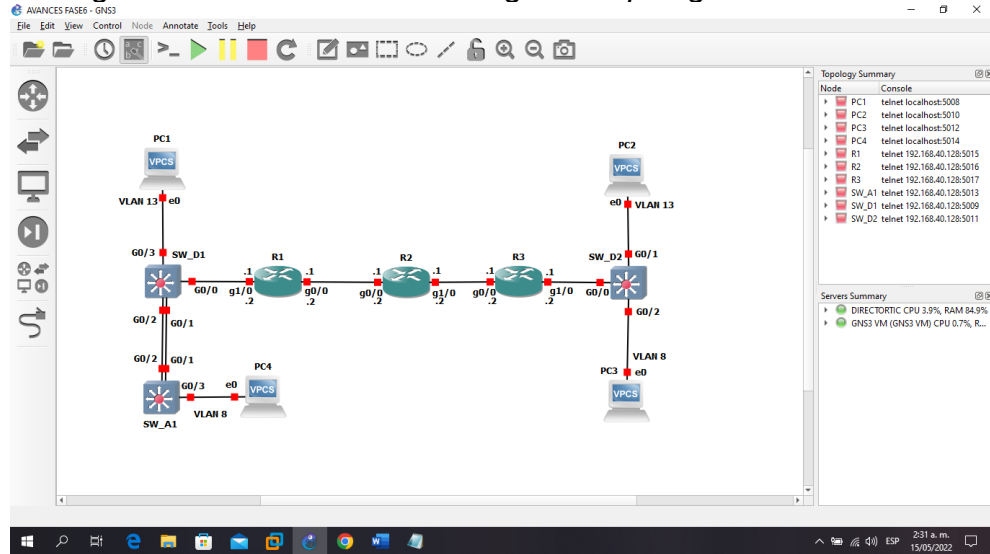
PARTE 1 - Construir la red y configurar los ajustes básicos de cada dispositivo y el direccionamiento de las interfaces

Tabla 2 Tabla de direccionamiento aplicado

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	G0/0.1	10.0.12.1/24	2001:db8:acad:12::1/64	fe80::1:1
R1	G0/0.2	10.0.12.1/24	2001:db8:acad:12::1/64	fe80::1:2
R1	G1/0.1	10.0.113.1/24	2001:db8:acad:113::1/64	fe80::1:3
R1	G1/0.2	10.0.108.1/24	2001:db8:acad:108::1/64	fe80::1:4
R2	G0/0.1	10.0.12.2/24	2001:db8:acad:12::2/64	fe80::2:1
R2	G0/0.2	10.0.12.2/24	2001:db8:acad:12::2/64	fe80::2:2
R2	G1/0.1	10.0.23.2/24	2001:db8:acad:23::2/64	fe80::2:3
R2	G1/0.2	10.0.23.2/24	2001:db8:acad:23::2/64	fe80::2:4
R3	G0/0.1	10.0.23.3/24	2001:db8:acad:23::3/64	fe80::3:1
R3	G0/0.2	10.0.23.3/24	2001:db8:acad:23::3/64	fe80::3:2
R3	G1/0.1	10.0.213.1/24	2001:db8:acad:213::1/64	fe80::3:3
R3	G1/0.2	10.0.208.1/24	2001:db8:acad:208::1/64	fe80::3:4
PC1	NIC	10.0.113.50/24	2001:db8:acad:113::50/64	EUI-64

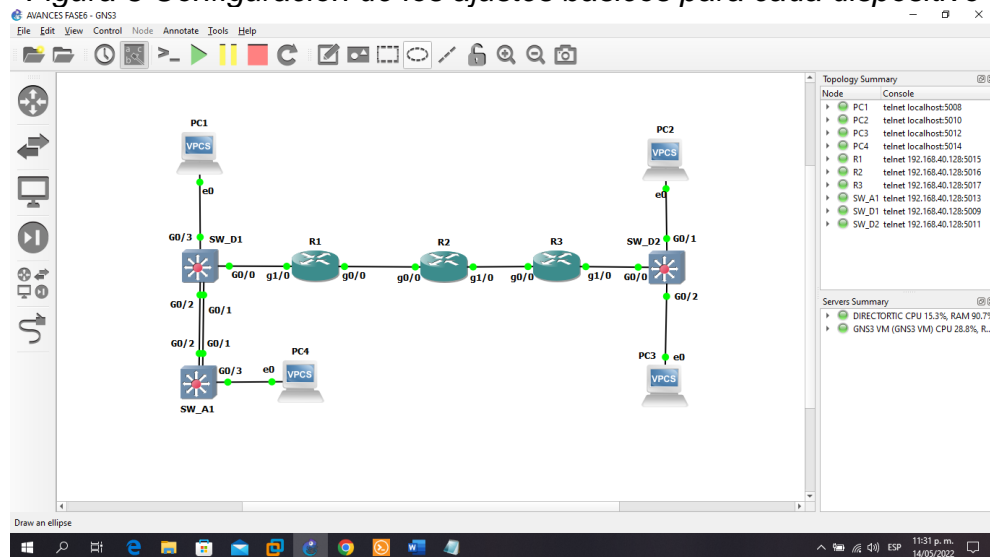
PC2	NIC	10.0.213.50/24	2001:db8:acad:213::50/64	EUI-64
PC3	NIC	10.0.108.50/24	2001:db8:acad:108::50/64	EUI-64
PC4	NIC	10.0.208.50/24	2001:db8:acad:208::50/64	EUI-64

Figura 2 Cableado de la red según la topología del escenario.



En la figura anterior, se puede observar el cableado de la red según la topología planteada en el escenario.

Figura 3 Configuración de los ajustes básicos para cada dispositivo



Código Parte 1

```
R1#  
R1#config terminal  
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#
```

```
R2#  
R2#config terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
R2(config)#hostname R2  
R2(config)#ipv6 unicast-routing  
R2(config)#no ip domain lookup  
R2(config)#banner motd # R2, ENCOR Skills Assessment, 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#  
*May 15 04:41:59.554: %SYS-5-CONFIG_I: Configured from console by console  
R2#wr  
Building configuration...  
[OK]  
R2#
```

```
R3#  
R3#config terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
R3(config)#hostname R3  
R3(config)#ipv6 unicast-routing  
R3(config)#no ip domain lookup  
R3(config)#banner motd # R3, ENCOR Skills Assessment, 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#
*May 14 22:00:17.163: %SYS-5-CONFIG_I: Configured from console by console
R3#wr
Building configuration...
[OK]
R3#
```

```
Switch>enable
Switch#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(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
D1#
```

```
*May 14 22:00:21.673: %SYS-5-CONFIG_I: Configured from console by console
D1#wr
Building configuration...
Compressed configuration from 3637 bytes to 1651 bytes[OK]
D1#
*May 14 22:00:31.413: %GRUB-5-CONFIG_WRITING: GRUB configuration is being
updated on disk. Please wait...
*May 14 22:00:32.156: %GRUB-5-CONFIG_WRITTEN: GRUB configuration was
written to disk successfully.
D1#
```

```
Switch>enable
Switch#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(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
D2#
*May 14 22:02:03.577: %SYS-5-CONFIG_I: Configured from console by console
D2#wr
Building configuration...
Compressed configuration from 3637 bytes to 1646 bytes[OK]
D2#
*May 14 22:02:12.006: %GRUB-5-CONFIG_WRITING: GRUB configuration is being
updated on disk. Please wait...
*May 14 22:02:12.717: %GRUB-5-CONFIG_WRITTEN: GRUB configuration was
written to disk successfully.
D2#
```

```
Switch>enable
Switch#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(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#
*May 14 22:04:24.720: %SYS-5-CONFIG_I: Configured from console by console
A1#wr
Building configuration...
Compressed configuration from 3637 bytes to 1651 bytes[OK]
```

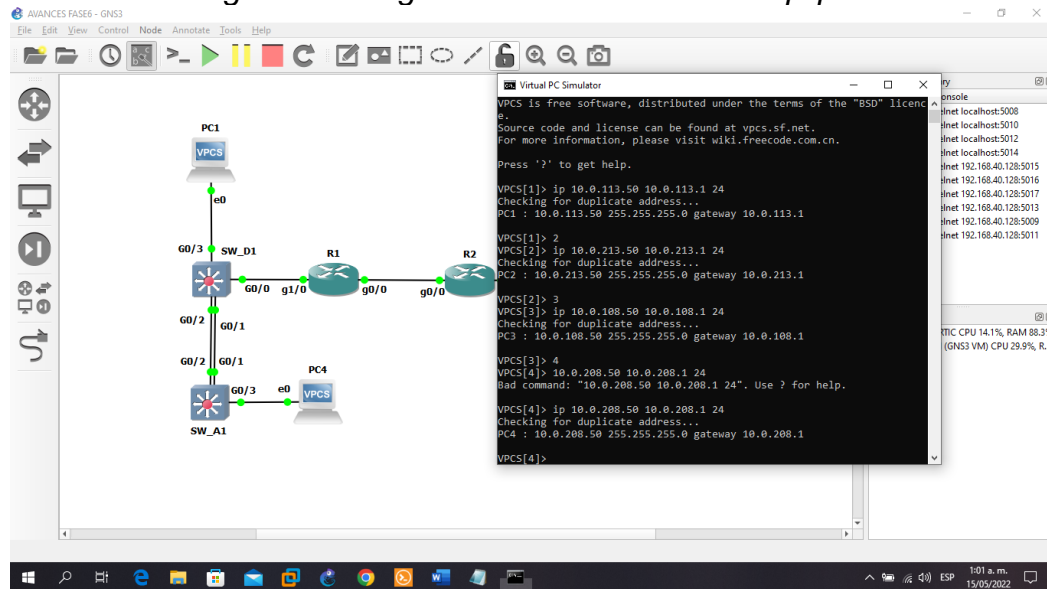
A1#

*May 14 22:04:45.834: %GRUB-5-CONFIG_WRITING: GRUB configuration is being updated on disk. Please wait...

*May 14 22:04:46.571: %GRUB-5-CONFIG_WRITTEN: GRUB configuration was written to disk successfully.

A1#

Figura 4 Configuración de las IP de los equipos



PARTE 2 - Configurar VRF y rutas estáticas

Código Parte 2

Router 1

R1#

R1#config 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

R1(config-vrf)# interface g0/0.1

R1(config-subif)# encapsulation dot1q 13

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

R1(config-subif)# ip address 10.0.12.1 255.255.255.0


```

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 g0/0.2
R1(config-subif)# encapsulation dot1q 8
R1(config-subif)# vrf forwarding General-Users
R1(config-subif)# ip address 10.0.12.1 255.255.255.0
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 g0/0
R1(config-if)# no ip address
R1(config-if)# no shutdown
R1(config-if)# exit
R1(config)# interface g1/0.1
R1(config-subif)# encapsulation dot1q 13
R1(config-subif)# vrf forwarding Special-Users
R1(config-subif)# ip address 10.0.113.1 255.255.255.0
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 g1/0.2
R1(config-subif)# encapsulation dot1q 8
R1(config-subif)# vrf forward General-Users
R1(config-subif)# ip address 10.0.108.1 255.255.255.0
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 g1/0
R1(config-if)# no ip address
R1(config-if)# no shutdown
R1(config-if)# exit
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
*May 15 06:13:03.661: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed
state to up
*May 15 06:13:04.113: %LINK-3-UPDOWN: Interface GigabitEthernet1/0, changed
state to up

```

```
*May 15 06:13:04.661: %LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0, changed state to up
R1(config)# end
*May 15 06:13:05.113: %LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/0, changed state to up
R1(config)# end
R1#
*May 15 06:13:20.317: %SYS-5-CONFIG_I: Configured from console by console
R1#wr
Building configuration...
[OK]
R1#
```

Router 2

```
R2#config 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 g0/0.1
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)# 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 g0/0.2
R2(config-subif)# encapsulation dot1q 8
R2(config-subif)# vrf forwarding General-Users
R2(config-subif)# ip address 10.0.12.2 255.255.255.0
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 g0/0
R2(config-if)# no ip address
R2(config-if)# no shutdown
R2(config-if)# exit
R2(config)# interface g1/0.1
```

```

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)# 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 g1/0.2
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::2:4 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 g1/0
R2(config-if)# no ip address
R2(config-if)# no shutdown
R2(config-if)# exit
R2(config)# ip route vrf Special-Users 10.0.113.0 255.255.255.0 10.0.12.1
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 10.0.12.1
R2(config)# ip route vrf General-Users 10.0.208.0 255.255.255.0 10.0.23.3
R2(config)# $ vrf General-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
R2#
*May 15 06:20:11.937: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed
state to up
*May 15 06:20:12.497: %LINK-3-UPDOWN: Interface GigabitEthernet1/0, changed
state to up
*May 15 06:20:12.937: %LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0, changed state to up
R2#
*May 15 06:20:13.497: %LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/0, changed state to up
*May 15 06:20:13.677: %SYS-5-CONFIG_: Configured from console by console
R2#wr
Building configuration...
[OK]
R2#

```

Router 3

R3#config term

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

R3(config)#

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 g0/0.1

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)# interface g0/0.2

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)# interface g0/0

R3(config-if)# no ip address

R3(config-if)# no shutdown

R3(config-if)# exit

R3(config)# interface g1/0.1

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 g1/0.2

R3(config-subif)# encapsulation dot1q 8

R3(config-subif)# vrf forward 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 g1/0
R3(config-if)# no ip address
R3(config-if)# no shutdown
R3(config-if)# exit
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 2001:db8:acad:23::2
R3(config)# ipv6 route vrf General-Users ::/0 2001:db8:acad:23::2
*May 15 06:24:35.473: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed
state to up
*May 15 06:24:35.929: %LINK-3-UPDOWN: Interface GigabitEthernet1/0, changed
state to up
*May 15 06:24:36.473: %LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0, changed state to up
R3(config)# ipv6 route vrf General-Users ::/0 2001:db8:acad:23::2
*May 15 06:24:36.929: %LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/0, changed state to up
R3(config)# ipv6 route vrf General-Users ::/0 2001:db8:acad:23::2
R3(config)#exit
R3#
*May 15 06:25:06.017: %SYS-5-CONFIG_I: Configured from console by console
R3#wr
Building configuration...
[OK]
R3#

```

Figura 5 Comprobación de configuración Router #1

```

R1#show ip vrf interfaces
Interface      IP-Address      VRF              Protocol
-----      -
Gi0/0.2       10.0.12.1       General-Users    up
Gi1/0.2       10.0.108.1      General-Users    up
Gi0/0.1       10.0.12.1       Special-Users    up
Gi1/0.1       10.0.113.1     Special-Users    up
R1#

```

Figura 6 Comprobación de configuración Router #2

```

R2#show ip vrf interfaces
Interface      IP-Address      VRF              Protocol
-----      -
Gi0/0.2       10.0.12.2       General-Users    up
Gi1/0.2       10.0.23.2      General-Users    up
Gi0/0.1       10.0.12.2       Special-Users    up
Gi1/0.1       10.0.23.2     Special-Users    up
R2#

```

Figura 7 Comprobación de configuración Router #3

```
R3#
R3#show ip vrf interfaces
Interface      IP-Address      VRF              Protocol
Gi0/0.2        10.0.23.3       General-Users    up
Gi1/0.2        10.0.208.1     General-Users    up
Gi0/0.1        10.0.23.3       Special-Users    up
Gi1/0.1        10.0.213.1     Special-Users    up
R3#
```

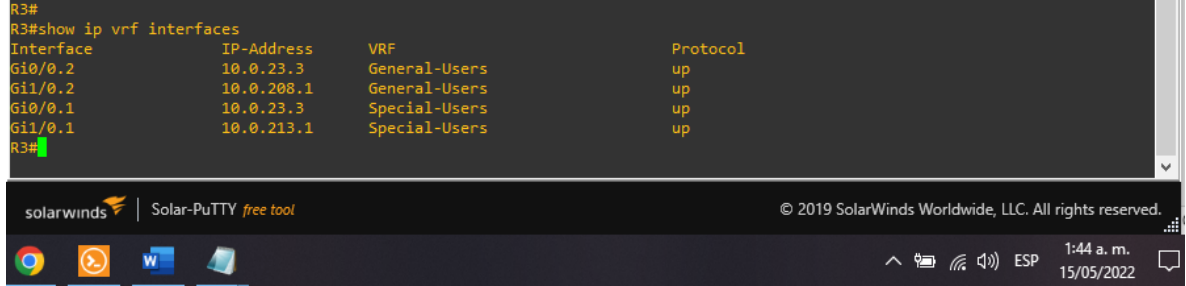


Figura 8 Comprobación de configuración

```
R1#
R1#show run | inc route
ip source-route
ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.12.2
ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.12.2
ipv6 route vrf General-Users ::/0 2001:DB8:ACAD:12::2
ipv6 route vrf Special-Users ::/0 2001:DB8:ACAD:12::2
R1#
```

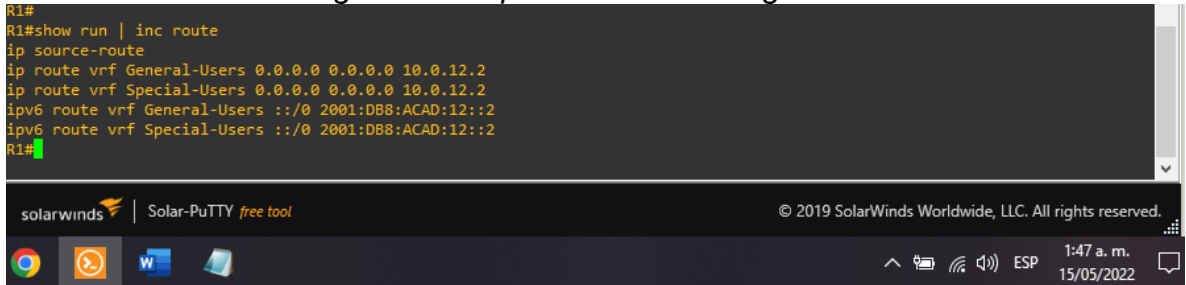


Figura 9 Comprobación de configuración

```
R2#
R2#show run | inc route
ip source-route
ip route vrf General-Users 10.0.108.0 255.255.255.0 10.0.12.1
ip route vrf General-Users 10.0.208.0 255.255.255.0 10.0.23.3
ip route vrf Special-Users 10.0.113.0 255.255.255.0 10.0.12.1
ip route vrf Special-Users 10.0.213.0 255.255.255.0 10.0.23.3
ipv6 route vrf General-Users 2001:DB8:ACAD:108::/64 2001:DB8:ACAD:12::1
ipv6 route vrf Special-Users 2001:DB8:ACAD:113::/64 2001:DB8:ACAD:12::1
ipv6 route vrf General-Users 2001:DB8:ACAD:208::/64 2001:DB8:ACAD:23::3
ipv6 route vrf Special-Users 2001:DB8:ACAD:213::/64 2001:DB8:ACAD:23::3
R2#
```

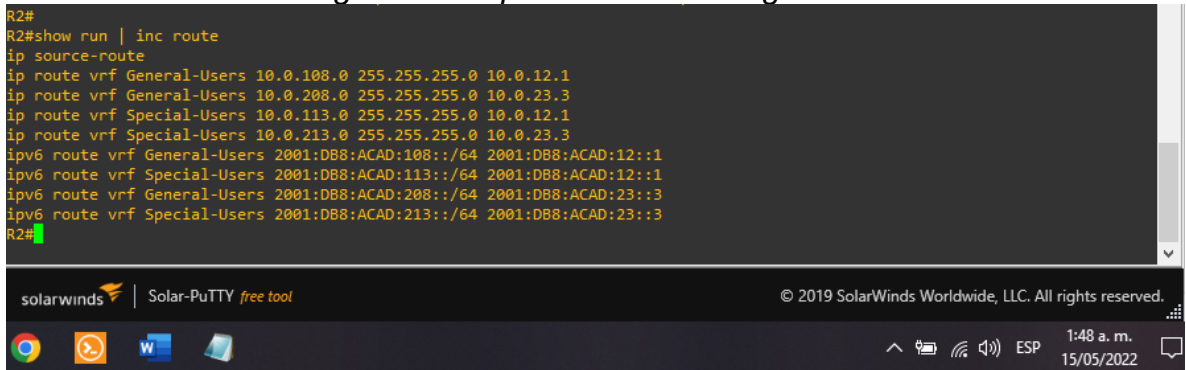


Figura 10 Comprobación de configuración

```
R3#
R3#show run | inc route
ip source-route
ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.23.2
ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.23.2
ipv6 route vrf General-Users ::/0 2001:DB8:ACAD:23::2
ipv6 route vrf Special-Users ::/0 2001:DB8:ACAD:23::2
R3#
```

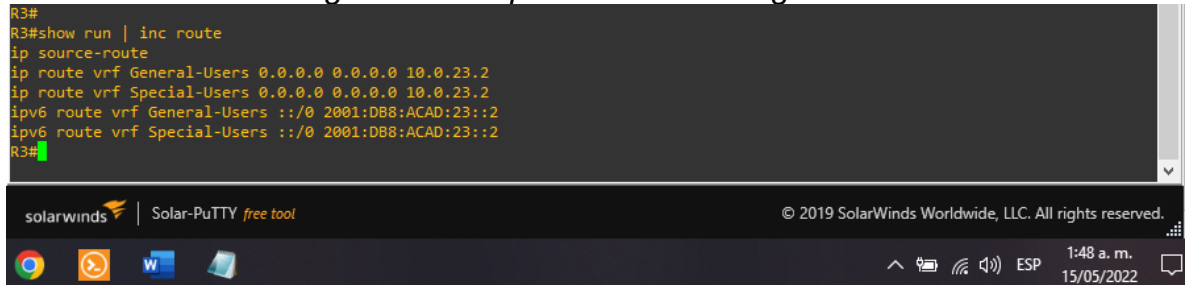


Figura 11 Comprobación de configuración

The screenshot shows a network simulation interface with a topology diagram on the left and a terminal window on the right. The topology includes a central router R1 connected to three switches: SW_D1, SW_D2, and SW_A1. SW_D1 is connected to PC1 (VPCS) and SW_D2. SW_D2 is connected to SW_A1. SW_A1 is connected to PC4 (VPCS). The terminal window displays the following configuration and verification steps:

```

R1#show ip vrf interfaces
Interface      IP-Address      VRF              Protocol
-----      -
Gi0/0.2        10.0.12.1       General-Users    up
Gi1/0.2        10.0.108.1      General-Users    up
Gi0/0.1        10.0.12.1       Special-Users    up
Gi1/0.1        10.0.113.1      Special-Users    up
R1#
R1#show run | inc route
ip source-route
ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.12.2
ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.12.2
ipv6 route vrf General-Users ::0 2001:DB8:ACAD:12::12
ipv6 route vrf Special-Users ::0 2001:DB8:ACAD:12::12
R1#
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 100 percent (5/5), round-trip min/avg/max = 16/24/36 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 = 24/40/84 ms
R1#
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 100 percent (5/5), round-trip min/avg/max = 20/25/36 ms
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 = 16/20/36 ms
R1#
    
```

Figura 12 Comprobación de configuración

The screenshot shows a terminal window with the following output:

```

R1#
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 100 percent (5/5), round-trip min/avg/max = 16/24/36 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 = 24/40/84 ms
R1#
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 100 percent (5/5), round-trip min/avg/max = 20/25/36 ms
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 = 16/20/36 ms
R1#
    
```

PARTE 3 – Configuración capa 2

Código Parte 3

Switch D1

D1#config terminal

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

D1(config)#interface range G0/0-3

D1(config-if-range)# shutdown

D1(config-if-range)# exit

D1(config)#interface range G1/0-3

D1(config-if-range)# shutdown

D1(config-if-range)# exit

D1(config)#interface range G2/0-3

D1(config-if-range)# shutdown

D1(config-if-range)# exit

D1(config)#interface range G3/0-3

D1(config-if-range)# shutdown

D1(config-if-range)# exit

D1(config)#interface G0/0

D1(config-if)# switchport trunk encapsulation dot1q

D1(config-if)# switchport mode trunk

D1(config-if)# no shutdown

D1(config-if)# exit

D1(config)#!

D1(config)#interface G0/3

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)#interface range G0/1-2

D1(config-if-range)# switchport trunk encapsulation dot1q

D1(config-if-range)# switchport mode trunk

D1(config-if-range)# channel-group 1 mode desirable

D1(config-if-range)# no shutdown

D1(config-if-range)# exit

D1(config)#!

*Jun 20 18:16:55.080: %LINK-3-UPDOWN: Interface Port-channel1, changed state to down

*Jun 20 18:16:56.080: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel1, changed state to down

D1(config)#!


```
*Jun 20 18:17:02.454: %LINK-3-UPDOWN: Interface Port-channel1, changed state
to up
D1(config)#!
*Jun 20 18:17:03.453: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-
channel1, changed s      tate to up
D1(config)#!
D1(config)#exit
```

Switch D2

```
D2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#interface range G0/0-3
D2(config-if-range)# shutdown
D2(config-if-range)# exit
D2(config)#interface range G1/0-3
D2(config-if-range)# shutdown
D2(config-if-range)# exit
D2(config)#interface range G2/0-3
D2(config-if-range)# shutdown
D2(config-if-range)# exit
D2(config)#interface range G3/0-3
D2(config-if-range)# shutdown
D2(config-if-range)# exit
D2(config)#interface G0/0
D2(config-if)# switchport trunk encapsulation dot1q
D2(config-if)# switchport mode trunk
D2(config-if)# no shutdown
D2(config-if)# exit
D2(config)#!
D2(config)#interface G0/1
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 G0/2
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
D2(config)#!
*Jun 20 17:40:05.324: %LINK-3-UPDOWN: Interface GigabitEthernet0/2, changed
state to down
D2(config)#!
```

```
D2(config)#
*Jun 20 17:40:08.085: %LINK-3-UPDOWN: Interface GigabitEthernet0/2, changed
state to up
D2(config)#exit
D2#
```

Switch A1

```
A1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#interface range G0/0-3
A1(config-if-range)# shutdown
A1(config-if-range)# exit
A1(config)#interface range G1/0-3
A1(config-if-range)# shutdown
A1(config-if-range)# exit
A1(config)#interface range G2/0-3
A1(config-if-range)# shutdown
A1(config-if-range)# exit
A1(config)#interface range G3/0-3
A1(config-if-range)# shutdown
A1(config-if-range)# exit
A1(config)#interface G0/3
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
A1(config)#interface range G0/1-2
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
A1(config)#
```

Figura 13 Verificación interfaces switch D1

```
D1#show interfaces trunk

Port      Mode      Encapsulation  Status      Native vlan
Gi0/0     on        802.1q         trunking    1
Po1       on        802.1q         trunking    1

Port      Vlans allowed on trunk
Gi0/0     1-4094
Po1       1-4094

Port      Vlans allowed and active in management domain
Gi0/0     1,8,13
Po1       1,8,13

Port      Vlans in spanning tree forwarding state and not pruned
Gi0/0     1,8,13
Po1       1,8,13
D1#
```

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Figura 14 Verificación interfaces switch 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        Gi0/1(P)  Gi0/2(P)
D1#
```

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Figura 15 Verificación interfaces switch D2

```
D2#show interfaces trunk

Port      Mode          Encapsulation  Status        Native vlan
Gi0/0     on            802.1q         trunking      1

Port      Vlans allowed on trunk
Gi0/0     1-4094

Port      Vlans allowed and active in management domain
Gi0/0     1,8,13

Port      Vlans in spanning tree forwarding state and not pruned
Gi0/0     1,8,13
D2#
```

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Figura 16 Verificación interfaces switch D1

```
D1#show run interface G0/3
Building configuration...

Current configuration : 151 bytes
!
interface GigabitEthernet0/3
 switchport access vlan 13
 switchport mode access
 media-type rj45
 negotiation auto
 spanning-tree portfast edge
end
D1#
```

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Figura 17 Verificación interfaces switch D1

```
D2#show run interface G0/2
Building configuration...

Current configuration : 150 bytes
!
interface GigabitEthernet0/2
 switchport access vlan 8
 switchport mode access
 media-type rj45
 negotiation auto
 spanning-tree portfast edge
end
D2#
```

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Figura 18 Verificación interfaces switch D2

```
D2#show run interface G0/1
Building configuration...

Current configuration : 151 bytes
!
interface GigabitEthernet0/1
 switchport access vlan 13
 switchport mode access
 media-type rj45
 negotiation auto
 spanning-tree portfast edge
end
D2#
```

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Figura 19 Verificación interfaces switch 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#
```

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Figura 20 Verificación interfaces switch 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        Gi0/1(P)  Gi0/2(P)

A1#
```

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Figura 21 Verificación interfaces switch A1

```
A1#
A1#show run interface G0/3
Building configuration...

Current configuration : 150 bytes
!
interface GigabitEthernet0/3
 switchport access vlan 8
 switchport mode access
 media-type rj45
 negotiation auto
 spanning-tree portfast edge
end

A1#
```

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Figura 22 Verificación de comunicación por medio de PING entre PC1 y PC2 y sin acceso a PC3 y PC4

```
PC1> ping 10.0.213.50
84 bytes from 10.0.213.50 icmp_seq=1 ttl=61 time=131.942 ms
84 bytes from 10.0.213.50 icmp_seq=2 ttl=61 time=56.400 ms
84 bytes from 10.0.213.50 icmp_seq=3 ttl=61 time=65.892 ms
84 bytes from 10.0.213.50 icmp_seq=4 ttl=61 time=37.821 ms
84 bytes from 10.0.213.50 icmp_seq=5 ttl=61 time=63.866 ms

PC1> ping 10.0.108.50
*10.0.12.2 icmp_seq=1 ttl=254 time=84.019 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.2 icmp_seq=2 ttl=254 time=27.108 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.2 icmp_seq=3 ttl=254 time=24.178 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.2 icmp_seq=4 ttl=254 time=33.941 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.12.2 icmp_seq=5 ttl=254 time=24.079 ms (ICMP type:3, code:1, Destination host unreachable)

PC1> █
```

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Figura 23 Verificación de comunicación por medio de PING entre PC2 y PC1 y sin acceso a PC3 y PC4

```
PC2> ping 10.0.113.50
84 bytes from 10.0.113.50 icmp_seq=1 ttl=61 time=37.779 ms
84 bytes from 10.0.113.50 icmp_seq=2 ttl=61 time=44.877 ms
84 bytes from 10.0.113.50 icmp_seq=3 ttl=61 time=39.079 ms
84 bytes from 10.0.113.50 icmp_seq=4 ttl=61 time=34.315 ms
84 bytes from 10.0.113.50 icmp_seq=5 ttl=61 time=43.027 ms

PC2> ping 10.0.208.50
*10.0.23.2 icmp_seq=1 ttl=254 time=31.267 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.2 icmp_seq=2 ttl=254 time=36.576 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.2 icmp_seq=3 ttl=254 time=32.517 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.2 icmp_seq=4 ttl=254 time=29.401 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.23.2 icmp_seq=5 ttl=254 time=25.778 ms (ICMP type:3, code:1, Destination host unreachable)

PC2> █
```

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PARTE 4 – Configuración seguridad

Switch D1

```
D1#
D1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#enable algorithm-type scrypt secret cisco12345cisco
D1(config)#$min privilege 15 algorithm-type scrypt secret cisco12345cisco
D1(config)#aaa new-model
D1(config)#aaa authentication login default local
D1(config)#end
D1#
*Jun 20 23:17:36.047: %SYS-5-CONFIG_I: Configured from console by console
D1#
```

Switch D2

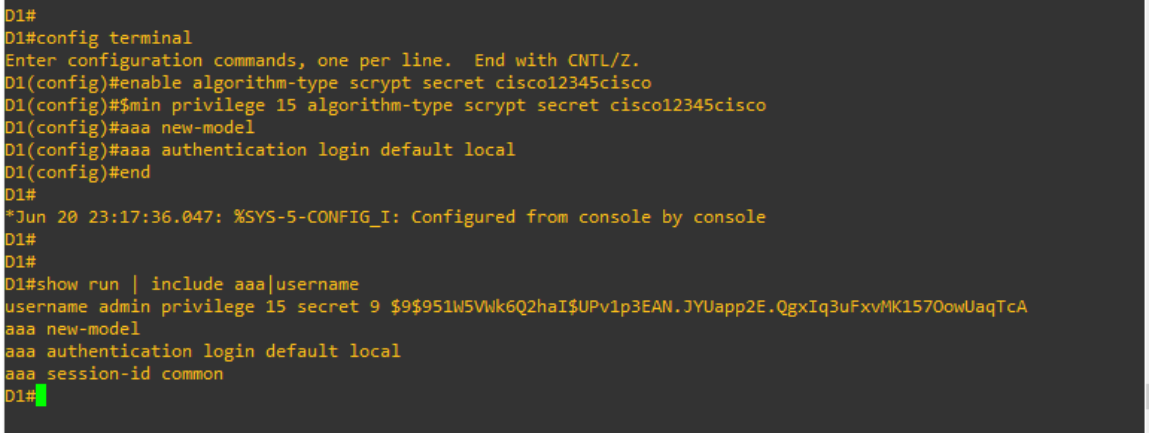
```
D2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#enable algorithm-type scrypt secret cisco12345cisco
D2(config)#$min privilege 15 algorithm-type scrypt secret cisco12345cisco
D2(config)#aaa new-model
D2(config)#aaa authentication login default local
D2(config)#end
D2#
```

Switch A1

```
A1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#enable algorithm-type scrypt secret cisco12345cisco
A1(config)#$min privilege 15 algorithm-type scrypt secret cisco12345cisco
A1(config)#aaa new-model
A1(config)#aaa authentication login default local
A1(config)#end
A1#
*Jun 20 23:19:39.331: %SYS-5-CONFIG_I: Configured from console by console
A1#
```


Figura 24 Verificación de seguridad aplicada D1

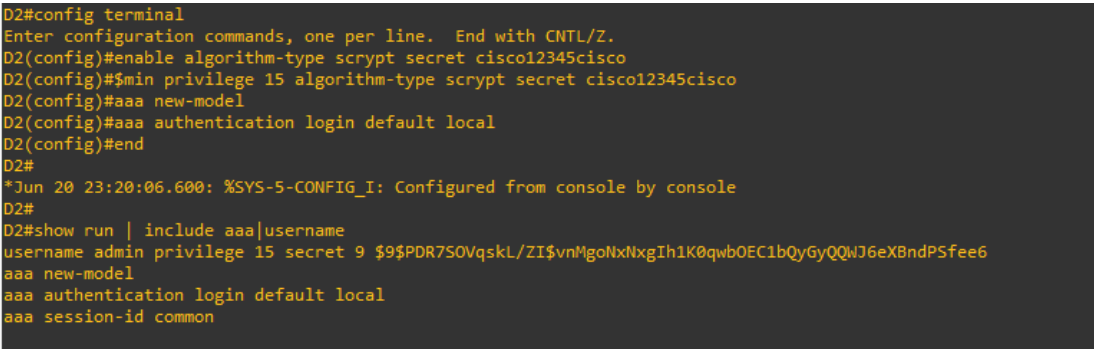
```
D1#
D1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#enable algorithm-type scrypt secret cisco12345cisco
D1(config)#$min privilege 15 algorithm-type scrypt secret cisco12345cisco
D1(config)#aaa new-model
D1(config)#aaa authentication login default local
D1(config)#end
D1#
*Jun 20 23:17:36.047: %SYS-5-CONFIG_I: Configured from console by console
D1#
D1#
D1#show run | include aaa|username
username admin privilege 15 secret 9 $9$951w5Vnk6Q2haI$UPv1p3EAN.JYUapp2E.QgxIq3uFvxMK1570owUaqTcA
aaa new-model
aaa authentication login default local
aaa session-id common
D1#
```



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Figura 25 Verificación de seguridad aplicada D2

```
D2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#enable algorithm-type scrypt secret cisco12345cisco
D2(config)#$min privilege 15 algorithm-type scrypt secret cisco12345cisco
D2(config)#aaa new-model
D2(config)#aaa authentication login default local
D2(config)#end
D2#
*Jun 20 23:20:06.600: %SYS-5-CONFIG_I: Configured from console by console
D2#
D2#show run | include aaa|username
username admin privilege 15 secret 9 $9$PDR7S0VqskL/ZI$vnMgoNxNngxIh1K0qwb0EC1bQyGyQQWJ6eXBndPSfee6
aaa new-model
aaa authentication login default local
aaa session-id common
```



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Figura 26 Verificación de seguridad aplicada A1

```
A1#
A1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#enable algorithm-type scrypt secret cisco12345cisco
A1(config)#$min privilege 15 algorithm-type scrypt secret cisco12345cisco
A1(config)#aaa new-model
A1(config)#aaa authentication login default local
A1(config)#end
A1#
*Jun 20 23:19:39.331: %SYS-5-CONFIG_I: Configured from console by console
A1#
A1#show run | include aaa|username
username admin privilege 15 secret 9 $9$.RTApkGg0zBcB2$zW8TzeEf5zq8y.c2Ioi7848IbGFDbIovoxb/x7m4qk6
aaa new-model
aaa authentication login default local
aaa session-id common
A1#
```

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Configuración de seguridad R1

```
R1(config)#enable secret cisco12345cisco
R1(config)#username admin privilege 15 secret cisco12345cisco
R1(config)#aaa new-model
R1(config)#aaa authentication login default local
R1(config)#end
R1#
```

Configuración de seguridad R2

```
R2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#enable secret cisco12345cisco
R2(config)#username admin privilege 15 secret cisco12345cisco
R2(config)#aaa new-model
R2(config)#aaa authentication login default local
R2(config)#end
R2#
*Jun 20 22:13:14.770: %SYS-5-CONFIG_I: Configured from console by console
```

Configuración de seguridad R3

```
R3#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#enable secret cisco12345cisco
R3(config)#username admin privilege 15 secret cisco12345cisco
R3(config)#aaa new-model
R3(config)#aaa authentication login default local
R3(config)#end
R3#
*Jun 20 22:25:18.618: %SYS-5-CONFIG_I: Configured from console by console
```

Figura 27 Verificación de seguridad aplicada R1

```
R1(config)#enable secret cisco12345cisco
R1(config)#username admin privilege 15 secret cisco12345cisco
R1(config)#aaa new-model
R1(config)#aaa authentication login default local
R1(config)#end
R1#
*Jun 20 22:27:27.602: %SYS-5-CONFIG_I: Configured from console by console
R1#show run | include aaa|username
aaa new-model
aaa authentication login default local
aaa session-id common
username admin privilege 15 secret 5 $1$pzlZ$xU3TgV963rqu3FfloqZE3r0
R1#
```

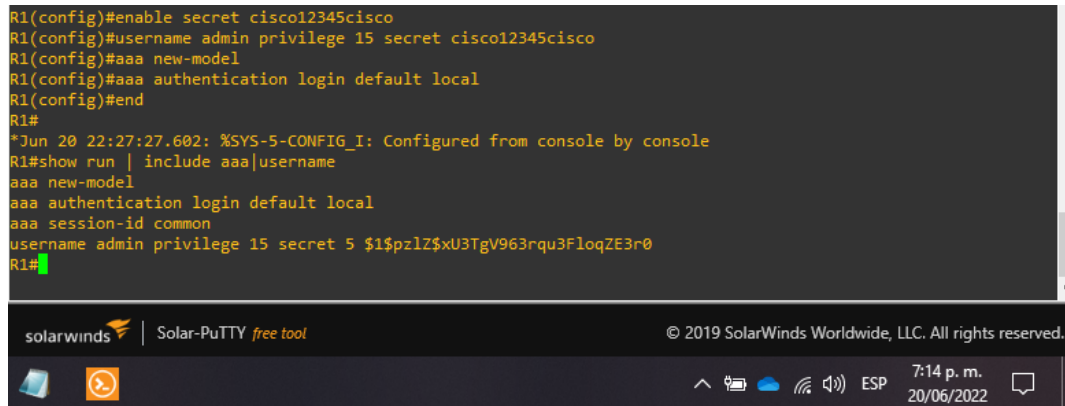


Figura 28 Verificación de seguridad aplicada R2

```
R2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#enable secret cisco12345cisco
R2(config)#username admin privilege 15 secret cisco12345cisco
R2(config)#aaa new-model
R2(config)#aaa authentication login default local
R2(config)#end
R2#
*Jun 20 22:13:14.770: %SYS-5-CONFIG_I: Configured from console by console
R2#show run | include aaa|username
aaa new-model
aaa authentication login default local
aaa session-id common
username admin privilege 15 secret 5 $1$EPpe$dF2EWZS5yUGgzFGxvfZ0U0
R2#
```

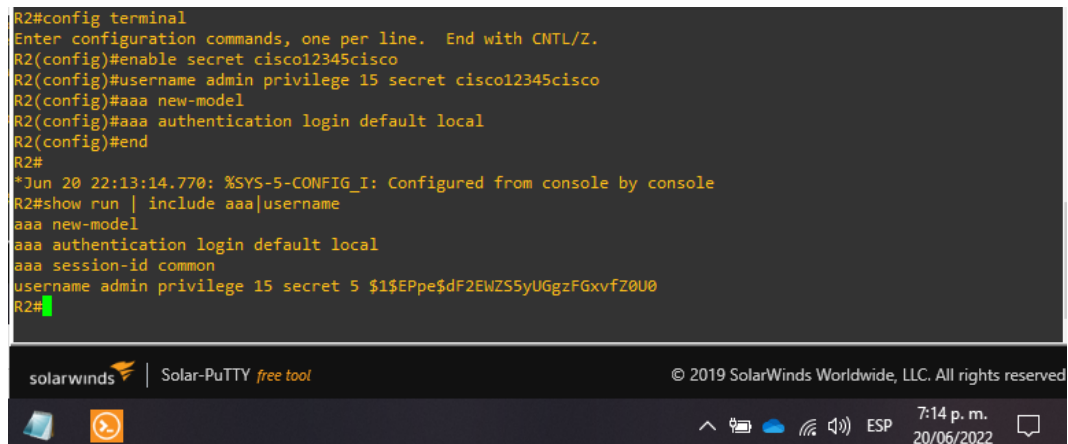
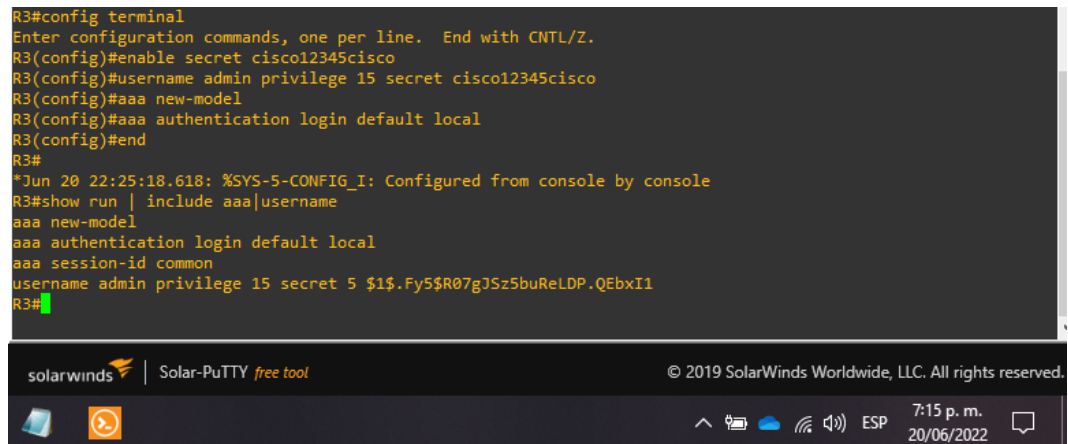


Figura 29 Verificación de seguridad aplicada R3

```
R3#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#enable secret cisco12345cisco
R3(config)#username admin privilege 15 secret cisco12345cisco
R3(config)#aaa new-model
R3(config)#aaa authentication login default local
R3(config)#end
R3#
*Jun 20 22:25:18.618: %SYS-5-CONFIG_I: Configured from console by console
R3#show run | include aaa|username
aaa new-model
aaa authentication login default local
aaa session-id common
username admin privilege 15 secret 5 $1$.Fy5$R07gJSz5buReLDP.QEbxI1
R3#
```



Nota: La configuración final de los routers se encuentra en los documentos adjuntos en la carpeta de simulación.

Código Final Configuración de los Switches

```
D1
D1#show run
Building configuration...
Current configuration: 4426 bytes
! Last configuration change at 23:17:36 UTC Mon Jun 20 2022
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service compress-config
hostname D1
boot-start-marker
boot-end-marker
enable secret 9
$9$t11Ge8WncverVY$G/vd1iGGWXCubyqVUq2EpcmMhvJ6lzLcENJ5qCvEdTk
username admin privilege 15 secret 9
$9$951W5VWk6Q2hai$UPv1p3EAN.JYUapp2E.Qgxlq3uF xvMK157OowUaqTcA
aaa new-model
aaa authentication login default local
aaa session-id common
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 GigabitEthernet0/0
switchport trunk encapsulation dot1q
switchport mode trunk
media-type rj45
negotiation auto
interface GigabitEthernet0/1
switchport trunk encapsulation dot1q
switchport mode trunk
media-type rj45
negotiation auto
channel-group 1 mode desirable
interface GigabitEthernet0/2
switchport trunk encapsulation dot1q
switchport mode trunk
```

```
media-type rj45
negotiation auto
channel-group 1 mode desirable
interface GigabitEthernet0/3
switchport access vlan 13
switchport mode access
media-type rj45
negotiation auto
spanning-tree portfast edge
interface GigabitEthernet1/0
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet1/1
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet1/2
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet1/3
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet2/0
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet2/1
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet2/2
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet2/3
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet3/0
shutdown
media-type rj45
negotiation auto
```

```

interface GigabitEthernet3/1
 shutdown
 media-type rj45
 negotiation auto
interface GigabitEthernet3/2
 shutdown
 media-type rj45
 negotiation auto
interface GigabitEthernet3/3
 shutdown
 media-type rj45
 negotiation auto
ip forward-protocol nd
no ip http server
no ip http secure-server
control-plane
banner exec ^C
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banner incoming ^C
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banner login ^C
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*****^C
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
end
D1#
```

```
D2#
D2#show run
Building configuration...
Current configuration : 4242 bytes
Last configuration change at 23:20:06 UTC Mon Jun 20 2022
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service compress-config
hostname D2
boot-start-marker
boot-end-marker
enable secret 9
$9$1tGUxwYXhIQPOY$cuU7vJTf6YgfKnM6GY7pEsS/g27p5cKlbPjSxm.ANRI
username admin privilege 15 secret 9
$9$PDR7SOVqskL/ZI$vnMgoNxNxlh1K0qwbOEC1bQyGyQQWJ6eXBndPSfee6
aaa new-model
aaa authentication login default local
aaa session-id common
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 GigabitEthernet0/0
switchport trunk encapsulation dot1q
switchport mode trunk
media-type rj45
negotiation auto
interface GigabitEthernet0/1
switchport access vlan 13
switchport mode access
media-type rj45
negotiation auto
spanning-tree portfast edge
```

```
interface GigabitEthernet0/2
switchport access vlan 8
switchport mode access
media-type rj45
negotiation auto
spanning-tree portfast edge
interface GigabitEthernet0/3
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet1/0
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet1/1
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet1/2
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet1/3
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet2/0
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet2/1
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet2/2
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet2/3
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet3/0
shutdown
media-type rj45
```



```

negotiation auto
interface GigabitEthernet3/1
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet3/2
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet3/3
shutdown
media-type rj45
negotiation auto
ip forward-protocol nd
no ip http server
no ip http secure-server
control-plane
banner exec ^C

```

```

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*****

```

```

*****^C
banner incoming ^C
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```

```

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banner login ^C
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```

```

*****^C
banner motd ^C D2, ENCORA Skills Assessment, Scenario 2 ^C

```

```
line con 0
  exec-timeout 0 0
  logging synchronous
line aux 0
line vty 0 4
end
D2#
```

```
A1#show run
Building configuration...
Current configuration : 4374 bytes
  Last configuration change at 23:19:39 UTC Mon Jun 20 2022
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service compress-config
hostname A1
boot-start-marker
boot-end-marker
enable secret 9
$9$J2cZJ1uKNLm9MY$iNPtELP.9.f8TnmhEpyjqv6ggIHozr9wTeZyq2Z836l
username admin privilege 15 secret 9
$9$.RTApkGg0zBcB2$zW8TzeEf5zqBy.c2loi784BibGFDblovxb/x7m4qk6
aaa new-model
aaa authentication login default local
aaa session-id common
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 GigabitEthernet0/0
  shutdown
  media-type rj45
  negotiation auto
interface GigabitEthernet0/1
  switchport trunk encapsulation dot1q
  switchport mode trunk
  media-type rj45
```

```
negotiation auto
channel-group 1 mode desirable
interface GigabitEthernet0/2
switchport trunk encapsulation dot1q
switchport mode trunk
media-type rj45
negotiation auto
channel-group 1 mode desirable
interface GigabitEthernet0/3
switchport access vlan 8
switchport mode access
media-type rj45
negotiation auto
spanning-tree portfast edge
interface GigabitEthernet1/0
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet1/1
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet1/2
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet1/3
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet2/0
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet2/1
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet2/2
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet2/3
shutdown
media-type rj45
```

```
negotiation auto
interface GigabitEthernet3/0
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet3/1
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet3/2
shutdown
media-type rj45
negotiation auto
interface GigabitEthernet3/3
shutdown
media-type rj45
negotiation auto
ip forward-protocol nd
no ip http server
no ip http secure-server
control-plane
banner exec ^C
```

```
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```

*****^C

```
banner incoming ^C
```

```
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```

*****^C

```
banner login ^C
```

```
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banner motd ^C A1, ENCOR Skills Assessment, Scenario 2 ^C

line con 0

exec-timeout 0 0

logging synchronous

line aux 0

line vty 0 4

end

A1#

CONCLUSIONES

Se alcanzaron los objetivos propuestos en el desarrollo de la actividad, mediante la construcción de la red y la configuración básica de cada dispositivo, junto con el direccionamiento de las interfaces.

Se realizó la configuración de las VRF y las rutas estáticas y se comprobó su adecuado funcionamiento, junto con la configuración de Capa 2 y la seguridad.

Finalmente, se validó el acceso de los dispositivos de diferentes VLAN *sin* comunicación entre redes, con lo que se comprobó la efectividad de la configuración multi-VRF de la red.

Lo anterior no solo permitió la transferencia del conocimiento teórico a la práctica, y evidencia lo aprendido durante el diplomado, sino que valida la importancia de comprender cómo operan las subredes y los beneficios de administrar dominios de broadcast independientes, en múltiples escenarios al interior de una red jerárquica convergente.

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