

DIPLOMADO DE PROFUNDIZACION CISCO PRUEBA DE HABILIDADES PRÁCTICAS CCNP

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DIPLOMADO DE OPCIÓN DE GRADO PRESENTADO PARA OPTAR EL TÍTULO DE
INGENIERO TELECOMUNICACIONES

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Nota de Aceptación

Presidente del Jurado

Jurado

Jurado

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Agradezco a Dios, a todas las personas que me apoyaron para sacar adelante mi carrera profesional, a la mayor inspiradora de este logro mi madre, a mi esposa que estuvo allí cuando desfalecí y me alentó para continuar y cumplir la meta, y a mi hijo para ser el mayor ejemplo que pueda brindarle, a mis amigos y compañeros quienes siempre dieron de su tiempo para apoyarme y ayudarme cuando tuve dificultades, a mi padre y hermano por ser un ejemplo para mí.

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GLOSARIO

VRF: (del inglés *Virtual Routing and Forwarding*, enrutamiento virtual y reenvío), tecnología que permite varias instancias independientes de una tabla de enrutamiento puedan coexistir en el mismo router al mismo tiempo.

Router o enrutador: Un router o enrutador, dispositivo que conecta dos o más redes o subredes; el cual cumple dos funciones principales: gestionar el tráfico entre estas redes mediante el reenvío de paquetes de datos a sus direcciones IP previstas, y permite que varios dispositivos utilicen la misma conexión a Internet.

Enrutamiento Estático: Enrutamiento estático es en el cual el administrador de red configura manualmente cada router que la conforman. Al realizar este tipo de enrutamiento es necesario acceder a cada router, realizar su configuración de forma individual, y enseñarle cada una de las rutas existentes.

Este enrutamiento hace más fácil mantener tablas de enrutamiento en redes pequeñas en previamente se sabe que no va a haber un aumento significativo de la misma.

RESUMEN

En el presente trabajo, se reconocerán los conceptos tratados en el curso, en el cual el profesional de TI tendrá la capacidad de implementar escenarios similares a los sugeridos en el documento, con recursos limitados e infraestructuras existentes en el sitio donde se vaya a ser implementado. Se mostrará la configuración de 2 redes con una topología única en las cuales solo responderán las solicitudes únicamente los equipos que se encuentran en cada una de las VRF configuradas, las VRF's serán SPECIAL USERS VRF, GENERAL USERS VRF.

PALABRAS CLAVE: CISCO, CCNP, Conmutación, Enrutamiento, Redes, Electrónica, VRF, Rutas Estáticas, Routers, Switch.

ABSTRACT

In this work, the concepts covered in the course will be recognized, in which the IT professional will have the ability to implement scenarios like those suggested in the document, with limited resources and existing infrastructure at the site where it will be implemented. It will be shown the configuration of 2 networks with a unique topology in which only the devices that are in each of the configured VRF's will answer the requests, the VRF's will be SPECIAL USERS VRF, GENERAL USERS VRF.

KEYWORDS: CISCO, CCNP, Switching, Routing, Networking, Electronics, VRF, Static Routes, Routers, Switchs.

INTRODUCCIÓN

El presente trabajo tiene como fin demostrar los conocimientos adquiridos a través de las diferentes temáticas tratadas en el curso, en este caso puntual se ha entregado un escenario con una topología propuesta en la cual se debe configurar las VRF, y un canal etherchannel, utilizando las interfaces de acuerdo con la tabla de enrutamiento, y configurar los dispositivos en cada una de las VLAN requeridas en la topología de red.

También se reconocerán algunos conceptos clave y estar en la capacidad de implementar la seguridad en los dispositivos de acuerdo con cada uno de los requerimientos de seguridad requeridos en la red para cada uno de ellos.

También se reconocerá el funcionamiento de 2 redes y pruebas de conectividad entre los dispositivos con cada una de las VFR configuradas, demostrando así que se puede implementar en infraestructura limitada, y no se podrán ver entre dispositivos que no pertenezcan a cada una de las redes.

2. OBJETIVOS

2.1 OBJETIVO GENERAL

Diseñar y estructurar soluciones de red, mediante protocolos STP Y configuración de VLAN´s; logrando la escalabilidad de esta, mediante configuraciones básicas y avanzadas de protocolos de enrutamiento.

2.2 OBJETIVOS ESPECÍFICOS

Estructurar redes conmutadas mediante el uso del protocolo STP y la configuración de VLAN´s, donde el logro es comprender las características de una infraestructura de red de forma jerárquica convergente.

Diseñar soluciones de red escalables; a través de realizar configuración básica y avanzada de protocolos de enrutamiento para lograr la implementación de servicios IP con calidad de servicio en ambientes de red empresariales LAN y WAN.

3 DESARROLLO DEL PROYECTO

De acuerdo con el escenario propuesto la configuración de las VLAN y el enrutamiento VRF, hacen que se pueda optimizar la infraestructura y hacer menos propenso a fallos la red.

Escenario 1.

Figura 1. Topología de red:

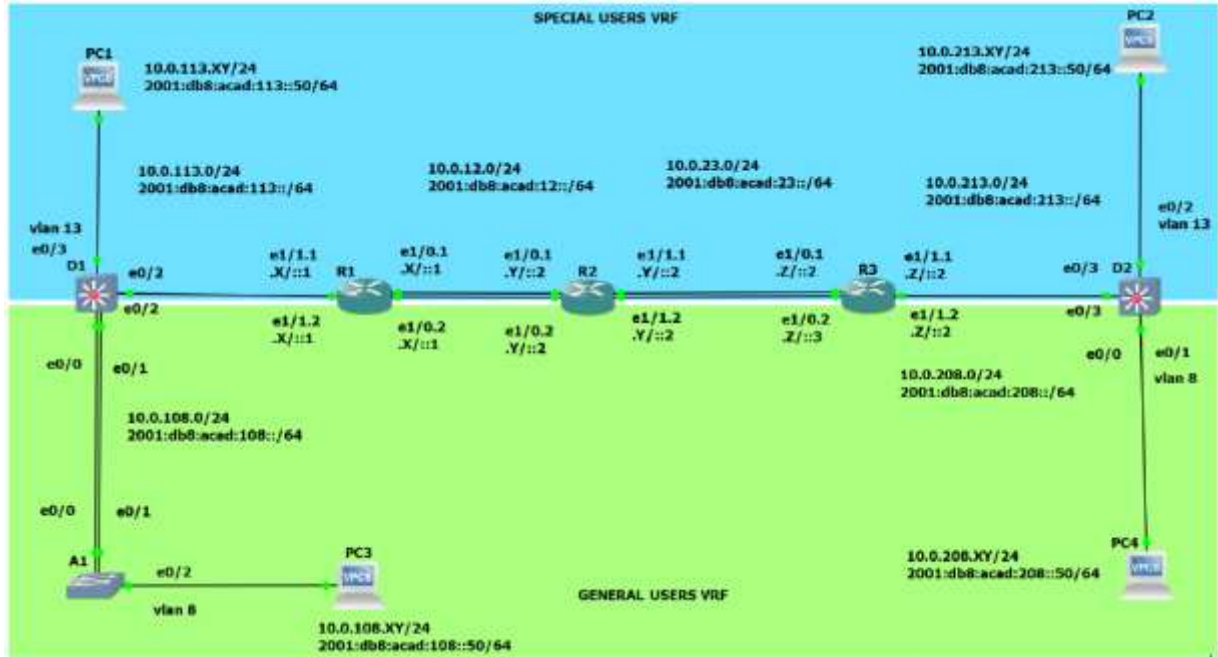
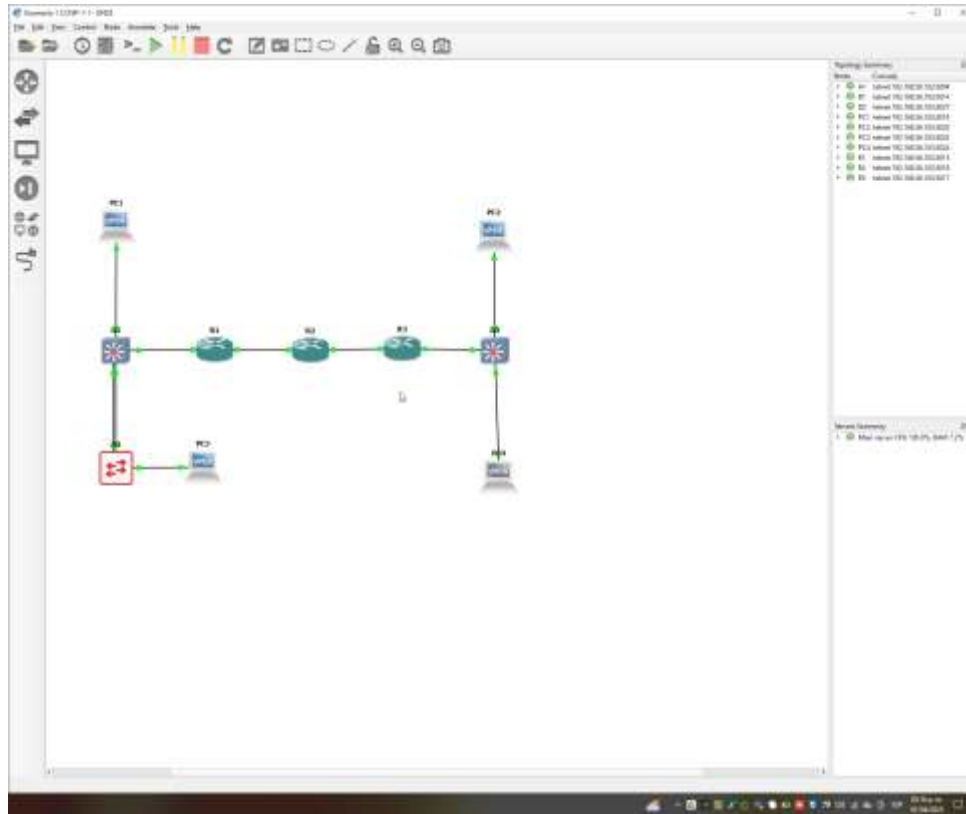


Tabla 1. Direccionamiento IP

Device	VRF	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	SPECIAL_USERS_VRF	E1/0.1	10.0.12.3/24	2001:db8:acad:12::1/64	fe80::1:1
	GENERAL_USERS_VRF	E1/0.2	10.0.12.3/24	2001:db8:acad:12::1/64	fe80::1:2
	SPECIAL_USERS_VRF	E1/1.1	10.0.113.3/24	2001:db8:acad:113::1/64	fe80::1:3
	GENERAL_USERS_VRF	E1/1.2	10.0.108.3/24	2001:db8:acad:108::1/64	fe80::1:4
R2	SPECIAL_USERS_VRF	E1/0.1	10.0.12.2/24	2001:db8:acad:12::2/64	fe80::2:1
	GENERAL_USERS_VRF	E1/0.2	10.0.12.2/24	2001:db8:acad:12::2/64	fe80::2:2
	SPECIAL_USERS_VRF	E1/1.1	10.0.23.2/24	2001:db8:acad:23::2/64	fe80::2:3
	GENERAL_USERS_VRF	E1/1.2	10.0.23.2/24	2001:db8:acad:23::2/64	fe80::2:4
R3	SPECIAL_USERS_VRF	E1/0.1	10.0.23.8/24	2001:db8:acad:23::3/64	fe80::3:1
	GENERAL_USERS_VRF	E1/0.2	10.0.23.8/24	2001:db8:acad:23::3/64	fe80::3:2
	SPECIAL_USERS_VRF	E1/1.1	10.0.213.8/24	2001:db8:acad:213::1/64	fe80::3:3
	GENERAL_USERS_VRF	E1/1.2	10.0.208.8/24	2001:db8:acad:208::1/64	fe80::3:4
PC1	SPECIAL_USERS_VRF	NIC	10.0.113.32/24	2001:db8:acad:113::50/64	EUI-64
PC2	SPECIAL_USERS_VRF	NIC	10.0.213.32/24	2001:db8:acad:213::50/64	EUI-64
PC3	GENERAL_USERS_VRF	NIC	10.0.108.32/24	2001:db8:acad:108::50/64	EUI-64
PC4	GENERAL_USERS_VRF	NIC	10.0.208.32/24	2001:db8:acad:208::50/64	EUI-64

Nota: en la tabla de direccionamiento presentada en la guía las letras XYZ, fueron reemplazadas por los últimos dígitos de la cedula del estudiante X=3, Y=2, Z=8.

Figura 2. Simulación del escenario



A continuación, se muestra el script con el cual se configuró el Router 1
Router 1

```
hostname R1
!  
boot-start-marker  
boot-end-marker  
!  
!  
vrf definition GENERAL_USERS_VRF  
!  
address-family ipv4  
exit-address-family  
!  
address-family ipv6  
exit-address-family  
!  
vrf definition SPECIAL_USERS_VRF  
!  
address-family ipv4  
exit-address-family  
!
```

```
address-family ipv6
exit-address-family
!
!
no aaa new-model
no ip icmp rate-limit unreachable
ip cef
!
!
!
!
!
!
no ip domain lookup
ipv6 unicast-routing
ipv6 cef
!
!
multilink bundle-name authenticated
!
!
!
!
!
!
!
!
!
!
ip tcp synwait-time 5
!
!
!
!
!
!
!
!
!
!
interface FastEthernet0/0
no ip address
shutdown
duplex full
!
```

```

interface Ethernet1/0
  no ip address
  duplex full
!
interface Ethernet1/0.1
  description Link R1-E1/0.1 VRF SPECIAL_USERS_VRF - R2-E1/0.1 VRF
  SPECIAL_USERS_VRF
  encapsulation dot1Q 13
  vrf forwarding SPECIAL_USERS_VRF
  ip address 10.0.12.3 255.255.255.0
  ipv6 address FE80::1:1 link-local
  ipv6 address 2001:DB8:ACAD:12::1/64
  no cdp enable
!
interface Ethernet1/0.2
  description Link R1-E1/0.2 VRF GENERAL_USERS_VRF - R2-E1/0.2 VRF
  GENERAL_USERS_VRF
  encapsulation dot1Q 8
  vrf forwarding GENERAL_USERS_VRF
  ip address 10.0.12.3 255.255.255.0
  ipv6 address FE80::1:2 link-local
  ipv6 address 2001:DB8:ACAD:12::1/64
  no cdp enable
!
interface Ethernet1/1
  no ip address
  duplex full
!
interface Ethernet1/1.1
  encapsulation dot1Q 13
  vrf forwarding SPECIAL_USERS_VRF
  ip address 10.0.113.3 255.255.255.0
  ipv6 address FE80::1:3 link-local
  ipv6 address 2001:DB8:ACAD:113::1/64
  no cdp enable
!
interface Ethernet1/1.2
  encapsulation dot1Q 8
  vrf forwarding GENERAL_USERS_VRF
  ip address 10.0.108.3 255.255.255.0
  ipv6 address FE80::1:4 link-local
  ipv6 address 2001:DB8:ACAD:108::1/64
  no cdp enable
!
interface Ethernet1/2

```

```

no ip address
shutdown
duplex full
!
interface Ethernet1/3
no ip address
shutdown
duplex full
!
ip forward-protocol nd
!
!
no ip http server
no ip http secure-server
ip route vrf GENERAL_USERS_VRF 10.0.23.0 255.255.255.0 10.0.12.2
ip route vrf GENERAL_USERS_VRF 10.0.208.0 255.255.255.0 10.0.12.2
ip route vrf SPECIAL_USERS_VRF 10.0.23.0 255.255.255.0 10.0.12.2
ip route vrf SPECIAL_USERS_VRF 10.0.213.0 255.255.255.0 10.0.12.2
!
no cdp run
ipv6 route vrf GENERAL_USERS_VRF 2001:DB8:ACAD:23::/64 2001:DB8:ACAD:12::2
ipv6 route vrf SPECIAL_USERS_VRF 2001:DB8:ACAD:23::/64 2001:DB8:ACAD:12::2
ipv6 route vrf GENERAL_USERS_VRF 2001:DB8:ACAD:208::/64 2001:DB8:ACAD:12::2
ipv6 route vrf SPECIAL_USERS_VRF 2001:DB8:ACAD:213::/64 2001:DB8:ACAD:12::2
!
!
control-plane
!
banner motd ^CC R1, ENCOR Skills Assessment, Scenario 2 ^C
!
line con 0
exec-timeout 0 0
privilege level 15
logging synchronous
stopbits 1
line aux 0
exec-timeout 0 0
privilege level 15
logging synchronous
stopbits 1
line vty 0 4
login
!
!
End

```

Figura 3. Interfaces configuradas en VRF de VLAN SPECIAL USERS VRF y GENERAL USERS VRF.



```
R1 x R2 R3 D1 D2 PC1 PC2 PC3 PC4 + - □ ×
*Apr 1 21:50:45.355: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
2, changed state to up
*Apr 1 21:50:45.359: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
3, changed state to up
*Apr 1 21:50:50.047: %LINK-5-CHANGED: Interface FastEthernet0/0, changed state
to administratively down
*Apr 1 21:50:53.743: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to a
dministratively down
*Apr 1 21:50:54.155: %SYS-5-CONFIG_I: Configured from memory by console
*Apr 1 21:50:54.683: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to a
dministratively down
*Apr 1 21:50:54.775: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
2, changed state to down
*Apr 1 21:50:56.035: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
3, changed state to down
*Apr 1 21:50:59.499: %SYS-5-RESTART: System restarted --
Cisco IOS Software, 7200 Software (C7200-ADVIPSERVICESK9-M), Version 15.2(4)S5,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Thu 20-Feb-14 C R1, ENCOR Skills Assessment, Scenario 2
R1#
R1#
R1#ena
R1#
R1#
R1#show ip interface brief
Interface          IP-Address      OK? Method Status      Protocol
FastEthernet0/0    unassigned     YES NVRAM   administratively down  down
Ethernet1/0        unassigned     YES NVRAM   up          up
Ethernet1/0.1      10.0.12.3      YES NVRAM   up          up
Ethernet1/0.2      10.0.12.3      YES NVRAM   up          up
Ethernet1/1        unassigned     YES NVRAM   up          up
Ethernet1/1.1      10.0.113.3     YES NVRAM   up          up
Ethernet1/1.2      10.0.108.3     YES NVRAM   up          up
Ethernet1/2        unassigned     YES NVRAM   administratively down  down
Ethernet1/3        unassigned     YES NVRAM   administratively down  down
R1#
```

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Figura 4. Interfaces asignadas a la VLAN Special Users

```
RELEASE SOFTWARE (f11)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Thu 20-Feb-14 C R1, ENCOR Skills Assessment, Scenario 1
R1#
R1#
R1#
R1#
R1#
R1# show ip interface brief
Interface              IP-Address      OK? Method Status      Protocol
FastEthernet0/0        unassigned     YES NVRAM  administratively down down
Ethernet0/0            unassigned     YES NVRAM  up          up
Ethernet0/0.1          10.0.12.1       YES NVRAM  up          up
Ethernet0/0.2          10.0.12.2       YES NVRAM  up          up
Ethernet1/1            unassigned     YES NVRAM  up          up
Ethernet1/1.1          10.0.113.1      YES NVRAM  up          up
Ethernet1/1.2          10.0.100.1      YES NVRAM  up          up
Ethernet1/2            unassigned     YES NVRAM  administratively down down
Ethernet1/3            unassigned     YES NVRAM  administratively down down
R1#
R1#
R1# show ip vrf interface Sp
R1# show ip vrf interface SPECIAL_USERS_VRF
Interface              IP-Address      VRF              Protocol
Et1/0.1                10.0.12.1       SPECIAL_USERS_VRF up
Et1/1.1                10.0.113.1      SPECIAL_USERS_VRF up
R1#
R1#
R1# show ip vrf brief
None
GENERAL_USERS_VRF     <not set>
SPECIAL_USERS_VRF    <not set>
Interfaces:
Et1/0.2
Et1/1.2
Et1/0.1
Et1/1.1
```

Figura 5. Muestra la configuración de las VLAN General Users y Special Users con sus interfaces virtuales asignadas.

```
RELEASE SOFTWARE (f11)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Thu 20-Feb-14 C R1, ENCOR Skills Assessment, Scenario 1
R1#
R1#
R1#
R1#
R1#
R1# show ip interface brief
Interface              IP-Address      OK? Method Status      Protocol
FastEthernet0/0        unassigned     YES NVRAM  administratively down down
Ethernet0/0            unassigned     YES NVRAM  up          up
Ethernet0/0.1          10.0.12.1       YES NVRAM  up          up
Ethernet0/0.2          10.0.12.2       YES NVRAM  up          up
Ethernet1/1            unassigned     YES NVRAM  up          up
Ethernet1/1.1          10.0.113.1      YES NVRAM  up          up
Ethernet1/1.2          10.0.100.1      YES NVRAM  up          up
Ethernet1/2            unassigned     YES NVRAM  administratively down down
Ethernet1/3            unassigned     YES NVRAM  administratively down down
R1#
R1#
R1# show ip vrf interface Sp
R1# show ip vrf interface SP
R1# show ip vrf interface SPECIAL_USERS_VRF
Interface              IP-Address      VRF              Protocol
Et1/0.1                10.0.12.1       SPECIAL_USERS_VRF up
Et1/1.1                10.0.113.1      SPECIAL_USERS_VRF up
R1#
R1#
R1# show ip vrf brief
None
GENERAL_USERS_VRF     <not set>
SPECIAL_USERS_VRF    <not set>
Interfaces:
Et1/0.2
Et1/1.2
Et1/0.1
Et1/1.1
```


Figura 8. Tabla de enrutamiento para R1 en VLAN General Users.

```

R1#
R1#
R1#show ip vrf interface GENERAL_USERS_VRF
Interface          IP-Address      VRF              Protocol
-----          -
Et1/0/2            10.0.12.3       GENERAL_USERS_VRF up
Et1/1/2            10.0.100.3      GENERAL_USERS_VRF up
R1#
R1#
R1#
R1#show ip route
R1#show ip route vrf GENERAL_USERS_VRF
R1#show ip route vrf GENERAL_USERS_VRF
Routing Table: GENERAL_USERS_VRF
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       I - IS-IS, su - IS-IS summary, ll - IS-IS level-1, ll2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       * - replicated route, % - next hop override

Gateway of last resort is not set.

 10.0.0.0/8 is variably subnetted, 6 subnets, 1 masks
C       10.0.12.0/24 is directly connected, Ethernet1/0/2
L       10.0.12.1/32 is directly connected, Ethernet1/0/2
C       10.0.22.0/24 [1/0] via 10.0.12.2
C       10.0.100.0/24 is directly connected, Ethernet1/1/2
L       10.0.100.3/32 is directly connected, Ethernet1/1/2
S       10.0.100.0/24 [1/0] via 10.0.12.2
R1#
R1#
R1#
R1#

```

Script de configuración R2

```

hostname R2
!
boot-start-marker
boot-end-marker
!
!
vrf definition GENERAL_USERS_VRF
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
vrf definition SPECIAL_USERS_VRF
!
address-family ipv4
exit-address-family
!
address-family ipv6

```

```
exit-address-family
!  
!  
no aaa new-model  
no ip icmp rate-limit unreachable  
ip cef  
!  
!  
!  
!  
!  
!  
no ip domain lookup  
ipv6 unicast-routing  
ipv6 cef  
!  
!  
multilink bundle-name authenticated  
!  
!  
!  
!  
!  
!  
!  
ip tcp synwait-time 5  
!  
!  
!  
!  
!  
!  
!  
!  
!  
!  
interface FastEthernet0/0  
no ip address  
shutdown  
duplex full  
!  
interface Ethernet1/0  
no ip address  
duplex full  
!
```

```

interface Ethernet1/0.1
  description Link R2-E1/0.1 VRF SPECIAL_USERS_VRF - R1-E1/0.1 VRF
  SPECIAL_USERS_VRF
  encapsulation dot1Q 13
  vrf forwarding SPECIAL_USERS_VRF
  ip address 10.0.12.2 255.255.255.0
  ipv6 address FE80::2:1 link-local
  ipv6 address 2001:DB8:ACAD:12::2/64
  no cdp enable
!
interface Ethernet1/0.2
  description Link R2-E1/0.2 VRF GENERAL_USERS_VRF - R1-E1/0.2 VRF
  GENERAL_USERS_VRF
  encapsulation dot1Q 8
  vrf forwarding GENERAL_USERS_VRF
  ip address 10.0.12.2 255.255.255.0
  ipv6 address FE80::2:2 link-local
  ipv6 address 2001:DB8:ACAD:12::2/64
  no cdp enable
!
interface Ethernet1/1
  no ip address
  duplex full
!
interface Ethernet1/1.1
  description Link R2-E1/1.1 VRF SPECIAL_USERS_VRF - R3-E1/0.1 VRF
  SPECIAL_USERS_VRF
  encapsulation dot1Q 13
  vrf forwarding SPECIAL_USERS_VRF
  ip address 10.0.23.2 255.255.255.0
  ipv6 address FE80::2:3 link-local
  ipv6 address 2001:DB8:ACAD:23::2/64
  no cdp enable
!
interface Ethernet1/1.2
  description Link R2-E1/1.2 VRF GENERAL_USERS_VRF - R3-E1/0.2 VRF
  GENERAL_USERS_VRF
  encapsulation dot1Q 8
  vrf forwarding GENERAL_USERS_VRF
  ip address 10.0.23.2 255.255.255.0
  ipv6 address FE80::2:4 link-local
  ipv6 address 2001:DB8:ACAD:23::2/64
  no cdp enable
!
interface Ethernet1/2

```

```

no ip address
shutdown
duplex full
!
interface Ethernet1/3
no ip address
shutdown
duplex full
!
ip forward-protocol nd
!
!
no ip http server
no ip http secure-server
ip route vrf GENERAL_USERS_VRF 10.0.108.0 255.255.255.0 10.0.12.3
ip route vrf GENERAL_USERS_VRF 10.0.208.0 255.255.255.0 10.0.23.8
ip route vrf SPECIAL_USERS_VRF 10.0.113.0 255.255.255.0 10.0.12.3
ip route vrf SPECIAL_USERS_VRF 10.0.213.0 255.255.255.0 10.0.23.8
!
no cdp run
ipv6 route vrf GENERAL_USERS_VRF 2001:DB8:ACAD:108::/64 2001:DB8:ACAD:12::1
ipv6 route vrf SPECIAL_USERS_VRF 2001:DB8:ACAD:113::/64 2001:DB8:ACAD:12::1
ipv6 route vrf GENERAL_USERS_VRF 2001:DB8:ACAD:208::/64 2001:DB8:ACAD:23::3
ipv6 route vrf SPECIAL_USERS_VRF 2001:DB8:ACAD:213::/64 2001:DB8:ACAD:23::3
!
!
!
control-plane
!
banner motd ^CC R2, ENCOR Skills Assessment, Scenario 2 ^C
!
line con 0
exec-timeout 0 0
privilege level 15
logging synchronous
stopbits 1
line aux 0
exec-timeout 0 0
privilege level 15
logging synchronous
stopbits 1
line vty 0 4
login
!
!

```

end

Figura 9. Interfaces configuradas en VRF de las VLAN's SPECIAL USERS Y GENERAL USERS

```
Apr 1 21:50:43.539: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
0, changed state to up
Apr 1 21:50:43.543: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
0, changed state to up
Apr 1 21:50:48.487: %LINK-5-CHANGED: Interface FastEthernet0/0, changed state
to administratively down
Apr 1 21:50:52.347: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to a
administratively down
Apr 1 21:50:52.781: %SYS-5-CONFIG: 1: Configured from memory by console
Apr 1 21:50:55.271: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to a
administratively down
Apr 1 21:50:55.359: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
2, changed state to down
Apr 1 21:50:54.595: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
0, changed state to down
Apr 1 21:50:58.579: %SYS-5-RESTART: System restarted --
Cisco IOS Software, 7200 Software (C7200-ADVIPSERVICESK9-K), Version 15.2(4)5S,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Thu 20-Feb-14 C R2, EBCOR Skills Assessment, Scenario 2
R2#
R2# show ip interface brief
Interface                IP-Address      OK? Method Status        Protocol
FastEthernet0/0         unassigned     YES NVRAM  administratively down down
Ethernet1/0             10.0.11.1      YES NVRAM  up            up
Ethernet1/0.1          10.0.11.1      YES NVRAM  up            up
Ethernet1/0.2          10.0.11.2      YES NVRAM  up            up
Ethernet1/1             unassigned     YES NVRAM  up            up
Ethernet1/1.1          10.0.21.1      YES NVRAM  up            up
Ethernet1/1.2          10.0.21.2      YES NVRAM  up            up
Ethernet1/2             unassigned     YES NVRAM  administratively down down
Ethernet1/3             unassigned     YES NVRAM  administratively down down
R2#
R2#
```

Figura 10. Interfaces asignadas a la VLAN Special Users USERS

```

R1 R2 R3 D1 D2 PC1 PC2 PC3 PC4
administratively down.
*Apr  1 21:50:52.711: XSYS-5-CMP10:1: Configured from memory by console
*Apr  1 21:50:53.271: XLINK-5-CHANGED: Interface Ethernet1/3, changed state to a
administratively down
*Apr  1 21:50:53.359: XLINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
3, changed state to down
*Apr  1 21:50:54.095: XLINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
3, changed state to down
*Apr  1 21:50:58.579: XSYS-5-RESTART: System restarted --
Cisco IOS Software, 7200 Software (C7200-ADVIPSERVICESK9-M), Version 15.2(4)SS,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Thu 20-Feb-14 C R2, ENCOR Skills Assessment, Scenario 2
R2#
R2#show ip interface brief
Interface            IP-Address      OK? Method Status      Protocol
FastEthernet0/0      unassigned      YES NVRAM  administratively down down
Ethernet1/0          unassigned      YES NVRAM  up          up
Ethernet1/0.1        10.0.11.2       YES NVRAM  up          up
Ethernet1/0.2        10.0.11.2       YES NVRAM  up          up
Ethernet1/1          unassigned      YES NVRAM  up          up
Ethernet1/1.1        10.0.21.2       YES NVRAM  up          up
Ethernet1/1.2        10.0.21.2       YES NVRAM  up          up
Ethernet1/2          unassigned      YES NVRAM  administratively down down
Ethernet1/3          unassigned      YES NVRAM  administratively down down
R2#
R2#
R2#show ip vrf interface SVE
R2#show ip vrf interface SPECIAL_USERS_VRF
Interface            IP-Address      VRF          Protocol
Et1/0.1              10.0.11.2       SPECIAL_USERS_VRF up
Et1/1.1              10.0.21.2       SPECIAL_USERS_VRF up
R2#
R2#
R2#
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```

Figura 11. Muestra la configuración de las VLAN General Users y Special Users con sus interfaces virtuales asignadas.

```

R1 R2 R3 D1 D2 PC1 PC2 PC3 PC4
*Apr  1 21:50:54.305: XLINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
3, changed state to down
*Apr  1 21:50:58.579: XSYS-5-RESTART: System restarted --
Cisco IOS Software, 7200 Software (C7200-ADVIPSERVICESK9-M), Version 15.2(4)SS,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Thu 20-Feb-14 C R2, ENCOR Skills Assessment, Scenario 2
R2#
R2#show ip interface brief
Interface            IP-Address      OK? Method Status      Protocol
FastEthernet0/0      unassigned      YES NVRAM  administratively down down
Ethernet1/0          unassigned      YES NVRAM  up          up
Ethernet1/0.1        10.0.11.2       YES NVRAM  up          up
Ethernet1/0.2        10.0.11.2       YES NVRAM  up          up
Ethernet1/1          unassigned      YES NVRAM  up          up
Ethernet1/1.1        10.0.21.2       YES NVRAM  up          up
Ethernet1/1.2        10.0.21.2       YES NVRAM  up          up
Ethernet1/2          unassigned      YES NVRAM  administratively down down
Ethernet1/3          unassigned      YES NVRAM  administratively down down
R2#
R2#
R2#show ip vrf interface SVE
R2#show ip vrf interface SPECIAL_USERS_VRF
Interface            IP-Address      VRF          Protocol
Et1/0.1              10.0.11.2       SPECIAL_USERS_VRF up
Et1/1.1              10.0.21.2       SPECIAL_USERS_VRF up
R2#
R2#
R2#show ip vrf brief
Name                Default RD      Interfaces
GENERAL_USERS_VRF  (not set)      Et1/0.2
                   Et1/1.2
SPECIAL_USERS_VRF  (not set)      Et1/0.1
                   Et1/1.1
R2#
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```


Figura 14. Tabla de enrutamiento para R2 en VLAN General Users.

```

R2#
R2#
R2# show ip vrf
R2# show ip vrf int
R2# show ip vrf interface ge
R2# show ip vrf interface
R2# show ip vrf interface GENERA
R2# show ip vrf interface GENERAL_USERS_VRF
Interface          IP-Address      VRF                Protocol
Et1/0.2            10.0.12.2       GENERAL_USERS_VRF up
Et1/1.2            10.0.23.2       GENERAL_USERS_VRF up
R2#
R2#
R2# show ip route vrf GENERAL_USERS_VRF
Routing Table: GENERAL_USERS_VRF
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       I - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       Ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
C       10.0.12.0/24 is directly connected, Ethernet1/0.2
L       10.0.12.2/32 is directly connected, Ethernet1/0.2
C       10.0.23.0/24 is directly connected, Ethernet1/1.2
L       10.0.23.2/32 is directly connected, Ethernet1/1.2
S       10.0.100.0/24 [1/0] via 10.0.12.3
S       10.0.200.0/24 [1/0] via 10.0.23.8
R2#
R2#
R2#

```

Script de configuración R3

```

hostname R3
!
boot-start-marker
boot-end-marker
!
!
vrf definition GENERAL_USERS_VRF
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
vrf definition SPECIAL_USERS_VRF
!
address-family ipv4
exit-address-family
!

```

```
address-family ipv6
exit-address-family
!
!
no aaa new-model
no ip icmp rate-limit unreachable
ip cef
!
!
!
!
!
!
no ip domain lookup
ipv6 unicast-routing
ipv6 cef
!
!
multilink bundle-name authenticated
!
!
!
!
!
!
!
!
!
ip tcp synwait-time 5
!
!
!
!
!
!
!
!
!
!
!
interface FastEthernet0/0
no ip address
shutdown
duplex full
!
interface Ethernet1/0
```

```

no ip address
duplex full
!
interface Ethernet1/0.1
description Link R3-E1/0.1 VRF SPECIAL_USERS_VRF - R2-E1/1.1 VRF
SPECIAL_USERS_VRF
encapsulation dot1Q 13
vrf forwarding SPECIAL_USERS_VRF
ip address 10.0.23.8 255.255.255.0
ipv6 address FE80::3:1 link-local
ipv6 address 2001:DB8:ACAD:23::3/64
no cdp enable
!
interface Ethernet1/0.2
description Link R3-E1/0.2 VRF GENERAL_USERS_VRF - R2-E1/1.2 VRF
GENERAL_USERS_VRF
encapsulation dot1Q 8
vrf forwarding GENERAL_USERS_VRF
ip address 10.0.23.8 255.255.255.0
ipv6 address FE80::3:2 link-local
ipv6 address 2001:DB8:ACAD:23::3/64
no cdp enable
!
interface Ethernet1/1
no ip address
duplex full
!
interface Ethernet1/1.1
encapsulation dot1Q 13
vrf forwarding SPECIAL_USERS_VRF
ip address 10.0.213.8 255.255.255.0
ipv6 address FE80::3:3 link-local
ipv6 address 2001:DB8:ACAD:213::1/64
no cdp enable
!
interface Ethernet1/1.2
encapsulation dot1Q 8
vrf forwarding GENERAL_USERS_VRF
ip address 10.0.208.8 255.255.255.0
ipv6 address FE80::3:4 link-local
ipv6 address 2001:DB8:ACAD:208::1/64
no cdp enable
!
interface Ethernet1/2
no ip address

```

```

shutdown
duplex full
!
interface Ethernet1/3
no ip address
shutdown
duplex full
!
ip forward-protocol nd
!
!
no ip http server
no ip http secure-server
ip route vrf GENERAL_USERS_VRF 10.0.12.0 255.255.255.0 10.0.23.2
ip route vrf GENERAL_USERS_VRF 10.0.108.0 255.255.255.0 10.0.23.2
ip route vrf SPECIAL_USERS_VRF 10.0.12.0 255.255.255.0 10.0.23.2
ip route vrf SPECIAL_USERS_VRF 10.0.113.0 255.255.255.0 10.0.23.2
!
no cdp run
ipv6 route vrf GENERAL_USERS_VRF 2001:DB8:ACAD:12::/64 2001:DB8:ACAD:23::2
ipv6 route vrf SPECIAL_USERS_VRF 2001:DB8:ACAD:12::/64 2001:DB8:ACAD:23::2
ipv6 route vrf GENERAL_USERS_VRF 2001:DB8:ACAD:108::/64 2001:DB8:ACAD:23::2
ipv6 route vrf SPECIAL_USERS_VRF 2001:DB8:ACAD:113::/64 2001:DB8:ACAD:23::2
!
!
!
control-plane
!
banner motd ^CC R3, ENCOR Skills Assessment, Scenario 2 ^C
!
line con 0
exec-timeout 0 0
privilege level 15
logging synchronous
stopbits 1
line aux 0
exec-timeout 0 0
privilege level 15
logging synchronous
stopbits 1
line vty 0 4
login
!
!
end

```

Figura 15. Interfaces configuradas en VRF de las VLAN's SPECIAL USERS Y GENERAL USERS

```

R1 R2 R3 D1 D2 PC1 PC2 PC3 PC4
*Apr  1 21:58:58.477: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
2, changed state to up
*Apr  1 21:58:58.483: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
3, changed state to up
*Apr  1 21:58:54.987: %LINK-5-CHANGED: Interface FastEthernet0/0, changed state
to administratively down
*Apr  1 21:58:52.288: %SYS-5-CONFIG_I: Configured from memory by console
*Apr  1 21:51:01.323: %SYS-5-RESTART: System restarted --
Cisco IOS Software, 7200 Software (C7200-ADVIPSERVICESK9-R), Version 15.2(4)5S,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Thu 28-Feb-14 06:51 by prod_rvl_1aaa
*Apr  1 21:51:02.365: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to a
administratively down
*Apr  1 21:51:02.367: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to a
administratively down
*Apr  1 21:51:04.655: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
2, changed state to down
*Apr  1 21:51:04.659: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
3, changed state to down
R3#
R3#
R3#
R3#
R3#
R3#show ip interface brief

```

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	unassigned	YES	NVRAM	administratively down	down
Ethernet1/0	unassigned	YES	NVRAM	up	up
Ethernet1/0.1	19.0.23.8	YES	NVRAM	up	up
Ethernet1/0.2	19.0.23.8	YES	NVRAM	up	up
Ethernet1/1	unassigned	YES	NVRAM	up	up
Ethernet1/1.1	19.0.213.8	YES	NVRAM	up	up
Ethernet1/1.2	19.0.288.8	YES	NVRAM	up	up
Ethernet1/2	unassigned	YES	NVRAM	administratively down	down
Ethernet1/3	unassigned	YES	NVRAM	administratively down	down

```

R3#
solarwinds Solar-PuTTY free tool © 2019 SolarWinds Worldwide, LLC. All rights reserved.

```

Figura 16. Interfaces asignadas a la VLAN SPECIAL USERS VRF

```

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Compiled Thu 20-Feb-14 06:51 by prod_ral_team
*Apr  1 21:51:02.363: %LINK-5-CHANGED: Interface Ethernet1/2, changed state to a
administratively down
*Apr  1 21:51:02.367: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to a
administratively down
*Apr  1 21:51:04.054: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
2, changed state to down
*Apr  1 21:51:04.059: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/
3, changed state to down
R3#
R3#
R3#
R3#
R3#
R3#show ip interface brief
Interface IP-Address OK? Method Status Protocol
FastEthernet0/0 unassigned YES NVRAM administratively down down
Ethernet1/0 unassigned YES NVRAM up up
Ethernet1/0.1 10.0.23.0 YES NVRAM up up
Ethernet1/0.2 10.0.23.0 YES NVRAM up up
Ethernet1/1 unassigned YES NVRAM up up
Ethernet1/1.1 10.0.213.0 YES NVRAM up up
Ethernet1/1.2 10.0.200.0 YES NVRAM up up
Ethernet1/2 unassigned YES NVRAM administratively down down
Ethernet1/3 unassigned YES NVRAM administratively down down
R3#
R3#
R3#show ip vrf interface S0/0/0
R3#show ip vrf interface SP
R3#show ip vrf interface SPECIAL_USERS_VRF
Interface IP-Address VRF Protocol
Et1/0.1 10.0.23.0 SPECIAL_USERS_VRF up
Et1/1.1 10.0.213.0 SPECIAL_USERS_VRF up
R3#
R3#
R3#

```

Figura 17. Muestra la configuración de las VLAN General Users y Special Users con sus interfaces virtuales asignadas.

```

*, changed state to down. R5, ENCOA Skills Assessment, Scenario 2
R3#
R3#
R3#
R3#
R3#
R3#show ip interface brief
Interface IP-Address OK? Method Status Protocol
FastEthernet0/0 unassigned YES NVRAM administratively down down
Ethernet1/0 unassigned YES NVRAM up up
Ethernet1/0.1 10.0.23.0 YES NVRAM up up
Ethernet1/0.2 10.0.23.0 YES NVRAM up up
Ethernet1/1 unassigned YES NVRAM up up
Ethernet1/1.1 10.0.213.0 YES NVRAM up up
Ethernet1/1.2 10.0.200.0 YES NVRAM up up
Ethernet1/2 unassigned YES NVRAM administratively down down
Ethernet1/3 unassigned YES NVRAM administratively down down
R3#
R3#
R3#
R3#show ip vrf interface S0/0/0
R3#show ip vrf interface SP
R3#show ip vrf interface SPECIAL_USERS_VRF
Interface IP-Address VRF Protocol
Et1/0.1 10.0.23.0 SPECIAL_USERS_VRF up
Et1/1.1 10.0.213.0 SPECIAL_USERS_VRF up
R3#
R3#
R3#show ip vrf brief
Name Default RD Interfaces
GENERAL_USERS_VRF out set Et1/0.2
SPECIAL_USERS_VRF out set Et1/1.2
Et1/0.1
Et1/1.1
R3#
R3#
R3#

```


Figura 20. Tabla de enrutamiento para R3 en VLAN General Users.

```

R3#
R3#
R3#show ip vrf 1
R3#show ip vrf in
R3#show ip vrf interface
R3#show ip vrf interfaces GENERAL_USERS_V
R3#show ip vrf interfaces GENERAL_USERS_VRF
Interface      IP-Address      VRF              Protocol
Et1/0/2        10.0.23.8       GENERAL_USERS_VRF up
Et1/1.2        10.0.208.8      GENERAL_USERS_VRF up
R3#
R3#
R3#
R3#show ip route vrf GENERAL_USERS_VRF
Routing Table: GENERAL_USERS_VRF
Codes: L - local, C - connected, S - static, H - RIP, M - mobile, B - BGP
        O - OSPF, EX - OSPF external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2
        I - IS-IS, Su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
        ia - IS-IS inter area, * - candidate default, U - per-user static route
        o - ODR, P - periodic downloaded static route, H - NHRP, I - ISIS
        + - replicated route, % - next hop override

Gateway of last resort is not set

  10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
S       10.0.12.0/24 [1/0] via 10.0.23.2
C       10.0.23.0/24 is directly connected, Ethernet1/0/2
L       10.0.23.0/32 is directly connected, Ethernet1/0/2
%       10.0.100.0/24 [1/0] via 10.0.23.2
C       10.0.208.0/24 is directly connected, Ethernet1/1.2
L       10.0.208.0/32 is directly connected, Ethernet1/1.2
R3#
R3#
R3#

```

Script de configuración Switch D1

```

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
!
!
logging discriminator EXCESS severity drops 6 msg-body drops EXCESSCOLL
logging buffered 50000
logging console discriminator EXCESS
!
no aaa new-model
!
!
!

```



```
description Link D1 Etherchannel E0/0-1 - A1 Etherchannel E0/0-1
switchport trunk encapsulation dot1q
switchport mode trunk
channel-protocol lacp
channel-group 1 mode active
!
interface Ethernet0/2
switchport trunk encapsulation dot1q
switchport mode trunk
!
interface Ethernet0/3
description Link D1 -> PC1
switchport access vlan 13
switchport mode access
!
interface Ethernet1/0
!
interface Ethernet1/1
!
interface Ethernet1/2
!
interface Ethernet1/3
!
interface Ethernet2/0
!
interface Ethernet2/1
!
interface Ethernet2/2
!
interface Ethernet2/3
!
interface Ethernet3/0
!
interface Ethernet3/1
!
interface Ethernet3/2
!
interface Ethernet3/3
!
interface Vlan1
no ip address
shutdown
!
ip forward-protocol nd
!
```

```
!  
no ip http server  
no ip http secure-server  
!  
!  
!  
!  
!  
control-plane  
!  
banner motd ^C D1, ENCOR Skills Assessment, Scenario 2 ^C  
!  
line con 0  
  exec-timeout 0 0  
  privilege level 15  
  logging synchronous  
line aux 0  
  exec-timeout 0 0  
  privilege level 15  
  logging synchronous  
line vty 0 4  
  login  
!  
!  
end
```


Figura 23 Configuración de VLAN's

```

R1#
R1#
R1#
R1#
R1#
R1# show ip route summary
IP routing table name is default (0x0)
IP routing table maximum-paths is 32
Route-Source Networks Subnets Replicates Overhead Memory (bytes)
connected 0 0 0 0 0
static 0 0 0 0 0
application 0 0 0 0 0
internal 0 0 0 0 20
Total 0 0 0 0 20
R1#
R1#
R1#
R1#
R1# show VLAN brief
-----
VLAN Name      Status      Ports
-----
1  default      active      Et1/0, Et1/1, Et1/2, Et1/3
              Et2/0, Et2/1, Et2/2, Et2/3
              Et3/0, Et3/1, Et3/2, Et3/3
8  General-Users active
13 Special-Users active      Et0/3
1002 fddi-default act/unsup
1003 token-ring-default act/unsup
1004 fddinet-default  act/unsup
1005 trnet-default   act/unsup
R1#
R1#
R1#

```

Figura 24. LACP

```

VLAN Name      Status      Ports
-----
1  default      active      Et1/0, Et1/1, Et1/2, Et1/3
              Et2/0, Et2/1, Et2/2, Et2/3
              Et3/0, Et3/1, Et3/2, Et3/3
8  General-Users active
13 Special-Users active      Et0/3
1002 fddi-default act/unsup
1003 token-ring-default act/unsup
1004 fddinet-default  act/unsup
1005 trnet-default   act/unsup
R1#
R1#
R1#
R1# show vlags
^
^ Invalid input detected at '^' marker.
R1#
R1#
R1# show vlags
No Virtual LANs configured.
R1#
R1# show lacp counters
-----
Port      Sent  Recv  Marker Sent  Marker Recv  Response  LACPDUs  Pkts Err
-----
Channel group: 1
Et0/0     325  321  0      0      0      0      0      0
Et0/1     326  322  0      0      0      0      0      0
R1#
R1#
R1#
R1#

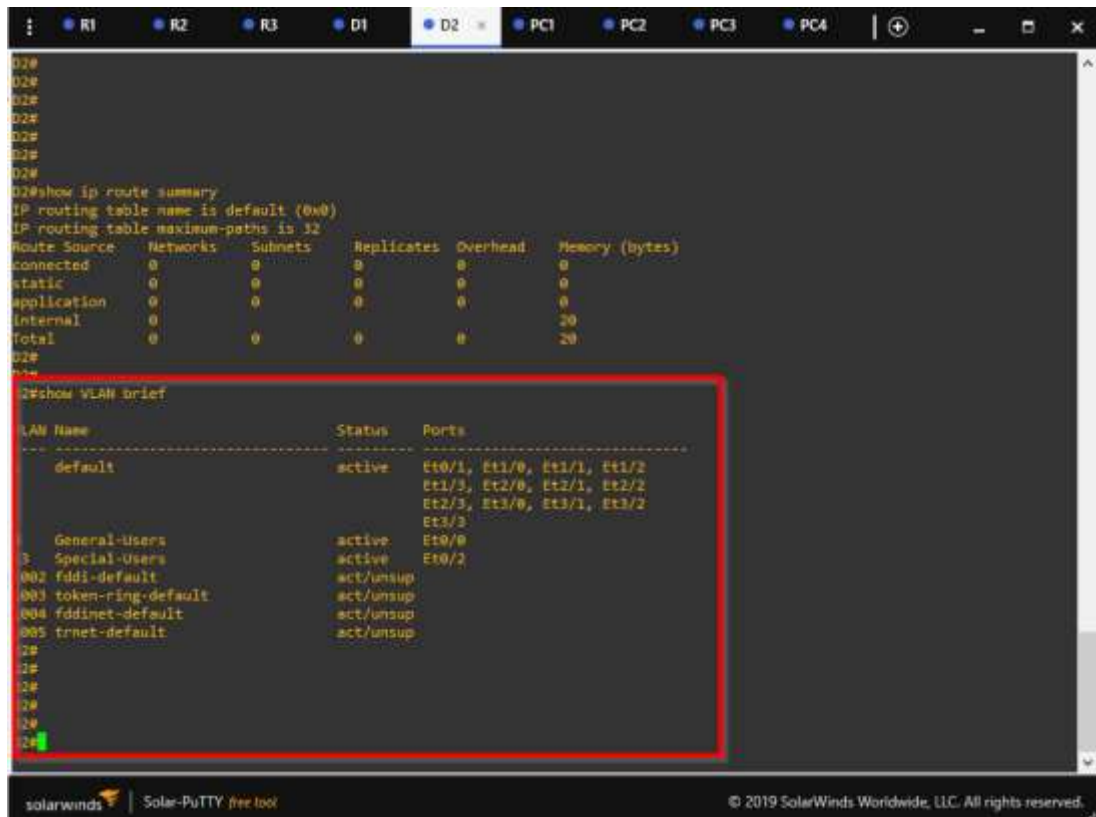
```



```
interface Ethernet1/1
!
interface Ethernet1/2
!
interface Ethernet1/3
!
interface Ethernet2/0
!
interface Ethernet2/1
!
interface Ethernet2/2
!
interface Ethernet2/3
!
interface Ethernet3/0
!
interface Ethernet3/1
!
interface Ethernet3/2
!
interface Ethernet3/3
!
interface Vlan1
  no ip address
  shutdown
!
ip forward-protocol nd
!
!
no ip http server
no ip http secure-server
!
!
!
!
!
control-plane
!
banner motd ^C D2, ENCOR Skills Assessment, Scenario 2 ^C
!
line con 0
  exec-timeout 0 0
  privilege level 15
  logging synchronous
line aux 0
```

```
exec-timeout 0 0
privilege level 15
logging synchronous
line vty 0 4
login
!
!
end
```

Figura 26. Configuración VLAN's



```
D2#
D2#
D2#
D2#
D2#
D2#
D2#
D2#
D2#
D2#
D2#
D2#show ip route summary
IP routing table name is default (0x0)
IP routing table maximum-paths is 32
Route Source      Networks  Subnets  Replicates  Overhead  Memory (bytes)
connected         0         0         0           0         0
static            0         0         0           0         0
application       0         0         0           0         0
internal          0         0         0           0         20
Total             0         0         0           0         20
D2#
D2#
D2#show VLAN brief
VLAN Name                Status    Ports
-----
  default                 active    Et0/1, Et1/0, Et1/1, Et1/2
                        Et1/3, Et2/0, Et2/1, Et2/2
                        Et2/3, Et3/0, Et3/1, Et3/2
                        Et3/3
  General-users           active    Et0/0
  3 Special-Users         active    Et0/2
  002 fddi-default        act/unsup
  003 token-ring-default  act/unsup
  004 fddinet-default     act/unsup
  005 trnet-default       act/unsup
D2#
D2#
D2#
D2#
D2#
```

Figura 27. Configuración Vlan´s

```

D2#
D2#show VLAN
-----
VLAN Name                Status    Ports
-----
1  default                 active    Et0/1, Et1/0, Et1/1, Et1/2
                               Et1/3, Et2/0, Et2/1, Et2/2
                               Et1/3, Et3/0, Et3/1, Et3/2
                               Et3/3
8  General-Users           active    Et0/0
13  Special-Users           active    Et0/2
1002 fddi-default          act/unsup
1003 token-ring-default   act/unsup
1004 fdnet-default        act/unsup
1005 trnet-default        act/unsup

VLAN Type  SAID    MTU    Parent RingNo BridgeNo Stp    BrdgpNode  Trans1  Trans2
-----
1  enet    100001  1500   -      -      -      -      -      0      0
8  enet    100008  1500   -      -      -      -      -      0      0
13  enet    100013  1500   -      -      -      -      -      0      0
1002 fddi    101002  1500   -      -      -      -      -      0      0
1003 tr      101003  1500   -      -      -      -      -      0      0
1004 fdnet  101004  1500   -      -      -      ieee  -      0      0
1005 trnet  101005  1500   -      -      -      ibm   -      0      0

Remote SPAN VLANs
-----

Primary Secondary Type          Ports
-----
D2#
D2#
D2#
D2#
D2#
solarwinds | Solar-PuTTY (vnc tool) | © 2019 SolarWinds Worldwide, LLC. All rights reserved.

```

Configuración Switch A1

```

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
!
!
logging discriminator EXCESS severity drops 6 msg-body drops EXCESSCOLL
logging buffered 50000
logging console discriminator EXCESS
!
no aaa new-model
!
!

```



```
description Link A1 Etherchannel E0/0-1 - D1 Etherchannel E0/0-1
switchport trunk encapsulation dot1q
switchport mode trunk
channel-protocol lacp
channel-group 1 mode active
!
interface Ethernet0/2
description Link E0/2 -> PC3
switchport access vlan 8
switchport mode access
!
interface Ethernet0/3
!
interface Ethernet1/0
!
interface Ethernet1/1
!
interface Ethernet1/2
!
interface Ethernet1/3
!
interface Ethernet2/0
!
interface Ethernet2/1
!
interface Ethernet2/2
!
interface Ethernet2/3
!
interface Ethernet3/0
!
interface Ethernet3/1
!
interface Ethernet3/2
!
interface Ethernet3/3
!
interface Vlan1
no ip address
shutdown
!
ip forward-protocol nd
!
!
no ip http server
```

```
no ip http secure-server
!
!
!
!
control-plane
!
banner motd ^C A1, ENCOR Skills Assessment, Scenario 2 ^C
!
line con 0
exec-timeout 0 0
privilege level 15
logging synchronous
line aux 0
exec-timeout 0 0
privilege level 15
logging synchronous
line vty 0 4
login
!
!
End
```


Figura 30. Ping vrf GENERAL_USERS_VRF desde R1 To R3 via interface E1/0.2

```

R1#
Apr 23 03:38:37.687: %SYS-5-CONFIG_I: Configured from memory by console
Apr 23 03:38:38.275: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to administratively down
Apr 23 03:38:38.763: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to down
Apr 23 03:38:39.447: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/3, changed state to down
Apr 23 03:38:39.667: %SYS-5-RESTART: System restarted --
Cisco IOS Software, 7200 Software (C7200-ADVIPSERVICESK9-M), Version 15.2(4)55, RELEASE SOFTWARE (fx)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Thu 20-Feb-14 06:51 by prod_rel_team R1, INCCOR Skills Assessment, Scenario 2
R1#
R1#
R1#ping GENERAL_USERS_VRF 10.0.23.8
Translating "GENERAL_USERS_VRF"

Translating "GENERAL_USERS_VRF"

R Invalid input detected at '^' marker.

R1#history
^
R Invalid input detected at '^' marker.

R1#
R1#
R1#
R1#ping vrf GENERAL_USERS_VRF 10.0.23.8
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.23.8, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 48/55/92 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.23.8, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 36/48/44 ms
R1#
R1#
R1#

```

Figura 31. Ping vrf SPECIAL_USERS_VRF desde R1 To R3 via interface E1/0.1

```

R1#
Apr 23 03:38:37.687: %SYS-5-CONFIG_I: Configured from memory by console
Apr 23 03:38:38.275: %LINK-5-CHANGED: Interface Ethernet1/3, changed state to administratively down
Apr 23 03:38:38.763: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to down
Apr 23 03:38:39.447: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/3, changed state to down
Apr 23 03:38:39.667: %SYS-5-RESTART: System restarted --
Cisco IOS Software, 7200 Software (C7200-ADVIPSERVICESK9-M), Version 15.2(4)55, RELEASE SOFTWARE (fx)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Thu 20-Feb-14 06:51 by prod_rel_team R1, INCCOR Skills Assessment, Scenario 2
R1#
R1#
R1#ping GENERAL_USERS_VRF 10.0.23.8
Translating "GENERAL_USERS_VRF"

Translating "GENERAL_USERS_VRF"

R Invalid input detected at '^' marker.

R1#history
^
R Invalid input detected at '^' marker.

R1#
R1#
R1#
R1#ping vrf GENERAL_USERS_VRF 10.0.23.8
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.23.8, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 48/55/92 ms
R1#ping vrf SPECIAL_USERS_VRF 10.0.23.8
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.23.8, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 36/48/44 ms
R1#
R1#
R1#

```

Figura 32. Ping vrf SPECIAL_USERS_VRF ipv6 desde R1 To R3 via interface E1/0.1

```
R1 con0 is now available.  
  
Press RETURN to get started.  
  
C R1, ENCOR Skills Assessment, Scenario 2  
R1#  
R1#  
R1#  
R1#  
R1#ping vrf SP  
R1#ping vrf SPECIAL_USERS_VRF ipv6 2001:db8:acad:23::3  
Type escape sequence to abort.  
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:23::3, timeout is 2 seconds:  
!!!!  
Success rate is 100 percent (5/5), round-trip min/avg/max = 48/44/48 ms  
Type escape sequence to abort.  
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:23::3, timeout is 2 seconds:  
!!!!  
Success rate is 100 percent (5/5), round-trip min/avg/max = 28/32/44 ms  
R1#
```

Figura 33. Ping vrf GENERAL_USERS_VRF ipv6 desde R1 To R3 via interface E1/0.2

```
R1 con0 is now available.  
  
Press RETURN to get started.  
  
C R1, ENCOR Skills Assessment, Scenario 2  
R1#  
R1#  
R1#  
R1#  
R1#ping vrf SP  
R1#ping vrf SPECIAL_USERS_VRF ipv6 2001:db8:acad:23::3  
Type escape sequence to abort.  
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:23::3, timeout is 2 seconds:  
!!!!  
Success rate is 100 percent (5/5), round-trip min/avg/max = 48/44/48 ms  
R1#ping vrf GENERAL_USERS_VRF ipv6 2001:db8:acad:23::3  
Type escape sequence to abort.  
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:23::3, timeout is 2 seconds:  
!!!!  
Success rate is 100 percent (5/5), round-trip min/avg/max = 28/32/44 ms  
R1#
```

Verificar rutas estáticas en R1, R2, R3.

Estas se verifican con el comando `show ip vrf interfaces`. También uede hacerlo con el comando `show run | inc route`.

Figura 34. Verificación de rutas estáticas en R1.

```
show ip vrf interfaces
Interface IP-Address VRF Protocol
R1/0/2 10.0.12.1 GENERAL_00045_VRF ip
R1/1/2 10.0.108.1 GENERAL_00045_VRF ip
R1/0/3 10.0.11.1 SPECIAL_00045_VRF ip
R1/1/1 10.0.111.1 SPECIAL_00045_VRF ip
```

Figura 35. Verificación de rutas estáticas en R2.

```
show ip vrf interfaces
Interface IP-Address VRF Protocol
R2/0/2 10.0.12.2 GENERAL_00045_VRF ip
R2/1/2 10.0.23.2 GENERAL_00045_VRF ip
R2/0/3 10.0.11.2 SPECIAL_00045_VRF ip
R2/1/1 10.0.23.2 SPECIAL_00045_VRF ip
```


Configurar y habilitar como troncal D1, D2, hacia R1 y R3.

Figura 40. Verificación puerto troncal en el switch D1 es e0/2.



```
interface Port-Channel1
  switchport trunk encapsulation dot1q
  switchport mode trunk

interface Ethernet0/0
  description Link D1-Ethernet0/0 - A1-Ethernet0/0-1
  switchport trunk encapsulation dot1q
  switchport mode trunk
  channel-protocol ppp
  channel-group 1 mode desirable

interface Ethernet0/1
  description Link D1-Ethernet0/1 - A1-Ethernet0/0-1
  switchport trunk encapsulation dot1q
  switchport mode trunk
  channel-protocol ppp
  channel-group 1 mode desirable

interface Ethernet0/2
  switchport trunk encapsulation dot1q
  switchport mode trunk

interface Ethernet0/3
  description Link D1 -> R1
  switchport access vlan 11
  switchport mode access
  spanning-tree portfast edge

interface Ethernet1/0

interface Ethernet1/1
  shutdown

interface Ethernet1/2
  --None--
```

Figura 41. Verificación puerto troncal en el switch D2.



```
interface Ethernet0/0
  description Link D2-Ethernet0/0 - PC4
  switchport access vlan 8
  switchport mode access
  spanning-tree portfast edge

interface Ethernet0/1
  shutdown

interface Ethernet0/2
  switchport trunk encapsulation dot1q
  switchport mode trunk

interface Ethernet0/3

interface Ethernet1/0

interface Ethernet1/1
  shutdown

interface Ethernet1/2
  shutdown

interface Ethernet1/3
  shutdown

--None--
```

Figura 42. Configuración puerto e0/3 en D1 VLAN 13 hacia PC 1



```
interface Port-channel1
switchport trunk encapsulation dot1q
switchport mode trunk

interface Ethernet0/0
description Link D1 Etherchannel E0/0-1 - A1 Etherchannel E0/0-1
switchport trunk encapsulation dot1q
switchport mode trunk
channel-protocol pagp
channel-group 1 mode desirable

interface Ethernet0/1
description Link D1 Etherchannel E0/0-1 - A1 Etherchannel E0/0-1
switchport trunk encapsulation dot1q
switchport mode trunk
channel-protocol pagp
channel-group 1 mode desirable

interface Ethernet0/2
switchport trunk encapsulation dot1q
switchport mode trunk

interface Ethernet0/3
description Link D1 -> PC1
switchport access vlan 13
switchport mode access
spanning-tree portfast edge

interface Ethernet1/0

interface Ethernet1/1
shutdown

interface Ethernet1/2
--More--
```

Figura 43. Configuración puerto e0/2 en D2 VLAN 13 hacia PC 2



```
interface Ethernet0/0
description link D2-Ethernet0/0 - PC4
switchport access vlan 8
switchport mode access
spanning-tree portfast edge

interface Ethernet0/1
shutdown

interface Ethernet0/2
switchport access vlan 13
switchport mode access
spanning-tree portfast edge

interface Ethernet0/3
switchport trunk encapsulation dot1q
switchport mode trunk

interface Ethernet1/0

interface Ethernet1/1
shutdown

interface Ethernet1/2
shutdown

interface Ethernet1/3
shutdown

interface Ethernet2/0
shutdown
```

Figura 44. Configuración Puerto e0/0 en D2 VLAN 8 Hacia PC 4



```

D1  D2  A1  R1  R2  R3
-----
Interface Ethernet0/0
description link D2-Ethernet0/0 - PC4
switchport access vlan 8
switchport mode access
spanning-tree portfast edge

Interface Ethernet0/1
shutdown

Interface Ethernet0/2
switchport access vlan 13
switchport mode access
spanning-tree portfast edge

Interface Ethernet0/3
switchport trunk encapsulation dot1q
switchport mode trunk

Interface Ethernet1/0

Interface Ethernet1/1
shutdown

Interface Ethernet1/2
shutdown

Interface Ethernet1/3
shutdown

Interface Ethernet1/6
shutdown

```

Figura 45. Configuración Puerto e0/2 en A1 VLAN 8 Hacia PC 3



```

D1  D2  A1  R1  R2  R3
-----
Interface Port-channel1
switchport trunk encapsulation dot1q
switchport mode trunk

Interface Ethernet0/0
description Link A1 Etherchannel E0/0-1 - D1 Etherchannel E0/0-1
switchport trunk encapsulation dot1q
switchport mode trunk
channel-protocol pagp
channel-group 1 mode desirable

Interface Ethernet0/1
description Link A1 Etherchannel E0/0-1 - D1 Etherchannel E0/0-1
switchport trunk encapsulation dot1q
switchport mode trunk
channel-protocol pagp
channel-group 1 mode desirable

Interface Ethernet0/2
description Link D2/2 -> PC3
switchport access vlan 8
switchport mode access
spanning-tree portfast edge

Interface Ethernet0/3
shutdown

Interface Ethernet1/0

Interface Ethernet1/1
--More--

```


Figura 48 - 49. Verificar conectividad con IPv4 e IPv6 entre PC3 Y PC4

PC 3.

```
PC3
vPCS is free software, distributed under the terms of the "BSD" license.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freemove.com.cn.

Press '?' to get help.

Executing the startup file.

Checking for duplicate address...
PC3 : 10.0.100.32 255.255.255.0 gateway 10.0.100.1

PC3> show

NAME  IP/MASK          GATEWAY      MAC          IPORT  RHOST:PORT
PC3   10.0.100.32/24   10.0.100.1   00:50:79:66:68:02 20036  127.0.0.1:20037
      fe80::7967:99ff:fe00:0002/64
      3001::db5:accd:100:2000:79ff:fe00:0002/04  sml-04

PC3> ping 10.0.100.32

64 bytes from 10.0.200.32 icmp_seq=1 ttl=61 time=72.812 ms
64 bytes from 10.0.200.32 icmp_seq=2 ttl=61 time=42.811 ms
64 bytes from 10.0.200.32 icmp_seq=3 ttl=61 time=40.443 ms
64 bytes from 10.0.200.32 icmp_seq=4 ttl=61 time=52.579 ms
64 bytes from 10.0.200.32 icmp_seq=5 ttl=61 time=56.962 ms

PC3> trace 10.0.100.32
Bad command: "trace 10.0.200.32". Use /? for help.

PC3> trace 10.0.200.32
Trace to 10.0.200.32, 0 hops max, press Ctrl+C to stop
 1  10.0.100.1  1.270 ms  1.098 ms  1.238 ms
 2  10.0.12.2  30.307 ms  10.004 ms  20.131 ms
 3  10.0.12.0  52.263 ms  51.113 ms  49.060 ms
 4  *10.0.200.32  52.044 ms (ICMP type=3, code=3, Destination port unreachable)

PC3>
```

PC 4.

```
PC4
vPCS is free software, distributed under the terms of the "BSD" license.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freemove.com.cn.

Press '?' to get help.

Executing the startup file.

Checking for duplicate address...
PC4 : 10.0.200.32 255.255.255.0 gateway 10.0.200.1

PC4 : 2001::db5:accd:2001:50/64

PC4> show

NAME  IP/MASK          GATEWAY      MAC          IPORT  RHOST:PORT
PC4   10.0.200.32/24   10.0.200.1   00:50:79:66:68:03 20038  127.0.0.1:20039
      fe80::7967:99ff:fe00:1003/64
      3001::db5:accd:2001:50/64

PC4> ping 10.0.100.32

64 bytes from 10.0.100.32 icmp_seq=1 ttl=61 time=57.007 ms
64 bytes from 10.0.100.32 icmp_seq=2 ttl=61 time=62.528 ms
64 bytes from 10.0.100.32 icmp_seq=3 ttl=61 time=40.319 ms
64 bytes from 10.0.100.32 icmp_seq=4 ttl=61 time=52.180 ms
64 bytes from 10.0.100.32 icmp_seq=5 ttl=61 time=50.223 ms

PC4> trace 10.0.100.32
Trace to 10.0.100.32, 0 hops max, press Ctrl+C to stop
 1  10.0.200.1  7.000 ms  10.271 ms  9.318 ms
 2  10.0.12.2  31.477 ms  10.363 ms  20.236 ms
 3  10.0.12.1  61.837 ms  51.215 ms  52.936 ms
 4  *10.0.100.32  68.275 ms (ICMP type=3, code=3, Destination port unreachable)

PC4>
```

Figuras 50 – 52. Configuración de la cuenta local, privilegios en los Switch D1, D2 y A1, con el comando `username admin algorithm-type script secret "clave"`.



Estas Configuraciones pueden ser verificadas con los comandos `show running-config | include aaa`, `show running-config | include admin`.

CONCLUSIONES

Es importante conocer que este tipo de enrutamiento ayuda a optimizar los recursos físicos de la red, permitiendo usar el direccionamiento de manera óptima y estable.

Además de hacer una red escalable, segura en la cual los usuarios no pueden acceder a otras redes en las cuales no deben tener acceso; permitiendo configurar más redes con los mismos dispositivos de una forma organizada y así tener un crecimiento con recursos limitados.

También se conoce como se deben establecer algunas políticas de seguridad en los dispositivos, entre ellas protocolos de encriptación para proteger los datos de la compañía, así no se hará vulnerable o que alguna persona no autorizada pueda ingresar a los dispositivos y pueda causar daños en la red, además del riesgo de pérdida de datos importantes en las compañías.

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