DIPLOMADO DE PROFUNDIZACIÓN CISCO

PRUEBA DE HABILIDADES PRÁCTICAS CCNP

JUAN CARLOS PAVA MEZA

UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA - UNAD
ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA - ECBTI
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Diplomado de profundización cisco CCNP prueba de
Habilidades prácticas

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NOTA DE ACEPTACIÓN

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Presidente del Jurado

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Jurado

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Jurado

Yopal, 20 de noviembre de 2021

AGRADECIMIENTOS

Agradezco principal es a Dios y a todas las personas que me dieron el impulso para poder terminar mi proyecto educativo, especialmente a mi esposa que sin importar los inconvenientes siempre estuvo allí para darme fuerza y valor para seguir adelante, a todos los tutores y directores que con su conocimiento y las ganas de enseñarnos podemos lograr y tener este conocimiento que sin duda me servirá para la labor que cumplo en la empresa a la que pertenezco.

CONTENIDO

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LISTA DE ILUSTRACIONES

GLOSARIO

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

CCNP: EIGRP es un protocolo de encaminamiento de vector distancia, propiedad de Cisco Systems, que ofrece lo mejor de los algoritmos de vector de distancia. Se considera un protocolo avanzado que se basa en las características normalmente asociadas con los protocolos del estado de enlace.

OSPF: Es un protocolo de red para encaminamiento jerárquico de pasarela interior o Interior Gateway Protocol, que usa el algoritmo Dijkstra, para calcular la ruta más corta entre dos nodos.

LACP: también llamada trunking, es una característica de nivel 2, que une puertos físicos de la red en un único enlace de datos de gran ancho de banda; de este modo se aumenta la capacidad de ancho debanda y se crean enlaces redundantes y de alta disponibilidad. Si falla un enlace, la carga se redistribuye entre los enlaces restantes, con lo que el funcionamiento es continuo. Gracias a la capacidad de distributed multilink trunking (trunking distribuidopor pila), el fallo o la eliminación de una unidad de la pila no causará la caída de todo un trunk.

Canales Etherchanel: es una tecnología de Cisco construida de acuerdo con los estándares 802.3 full-duplex Fast Ethernet. Permite la agrupación lógica de varios enlaces físicos Ethernet, esta agrupación es tratada como un único enlace y permite sumar la velocidad nominal de cada puerto físico Ethernet usado y así obtener un enlace troncal de alta velocidad.

RESUMEN

En la actualidad la mayoría de las redes empresariales están evolucionando, esto lo que permite es la integración de diversos ambientes empresariales hacia el core de negocio; adicional se utilizan las redes para fortalecer y sostener la información que se procesa, efectuando la disponibilidad, confidencialidad y veracidad de esta.

Por lo anterior se hace de vital importancia los protocolos de enrutamiento como EIGRP, OSPF que permiten enrutamientos dinámicos, los cuales por medio de algoritmos nos permiten determinar cuáles son las rutas más favorables para el procesamiento de la información, EIGRP protocolo propietario que solo permite su funcionamiento en equipos Cisco, estos realizan la distribución de rutas hacia diferentes protocolos como OSPS los cuales sin son interoperable con otras marcas. Así se logra la integración de diferentes tecnologías.

De igual manera existen a nivel de Switchhing protocolos de Etherchanel que por medio de la LACP y PAgP, solucionan un inconveniente que puede presentar la tecnología ethernet, dado que permiten suma canales para generar redundancia de conexiones y más ancho de banda. Finalmente, con estos conceptos de switching y routing se logra obtener aspectos claros para aportar al core de cualquier negocio.

Palabras Clave: CISCO, CCNP, Redes.

ABSTRACT

Currently, most business networks are evolving, this allowing the integration of various business environments towards the core of business; Additionally, the networks are used to strengthen and sustain the information that is processed, making it available, confidential and accurate.

Therefore, routing protocols such as EIGRP, OSPF that allow dynamic routing are vitally important, which by means of algorithms allow us to determine which are the most favorable routes for information processing, EIGRP proprietary protocol that only allows its operation in Cisco equipment, these perform the distribution of routes to different protocols such as OSPS which are interoperable with other brands. This is how the integration of different technologies is achieved.

In the same way, there are Etherchanel protocols at the Switching level that, through LACP and PAgP, solve a problem that ethernet technology can present, since they allow adding channels to generate redundancy of connections and more bandwidth. Finally, with these concepts of switching and routing, it is possible to obtain clear aspects to contribute to the core of any business.

Keywords: CISCO, CCNP, Networking, Electronics.

INTRODUCCIÓN

Durante la realización de este trabajo se enfatizó en la configuración de dos protocolos de enrutamiento IPs versión 4 y versión 6, a través de configuraciones propias de sus protocolos y comportamientos. Con EIGRP y OSPF que son protocolos de enrutamiento interno, la integración se ejecutará con el objetivo de redistribuir las rutas entre dichos protocolos evidenciando la interoperabilidad entre diferentes protocolos.

Adicionalmente a nivel interno se tiene un entorno switching, el cual permite tratar la temática de canales ethernchane, los cuales admiten la adición de uno o varias interfaces, con el objetivo de tener redundancia e incrementar el ancho de banda a entregar mediante protocolos LACP o PAgP.

Escenario Propuesto

- **Topología de la Red:**

Ilustración 1: Topología de la red
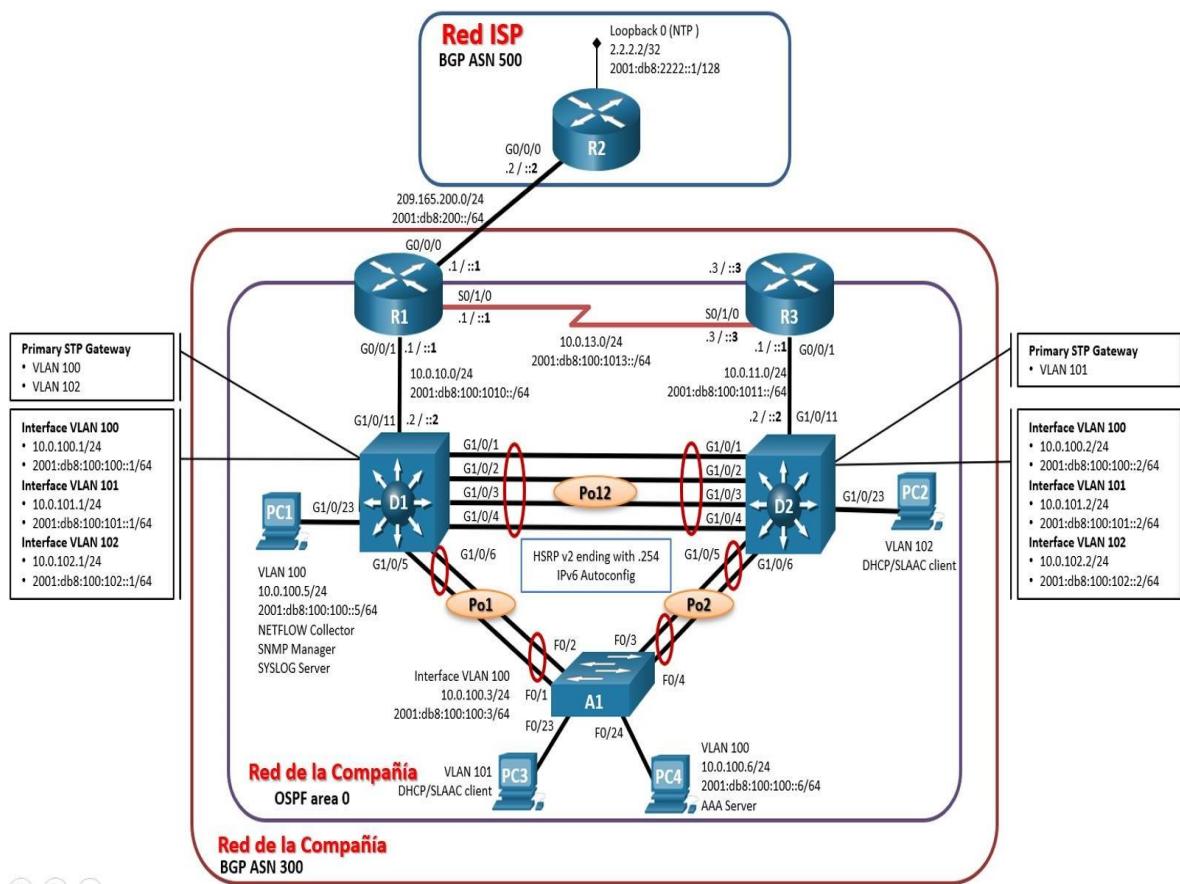
Tabla de direccionamiento.

Tabla 1:Direccionamiento

Dispositivo	Interfaz	Dirección IPv4	Dirección IPv6	IPv6 Link-Local
R1	G0/0/0	209.165.200.225/27	2001:db8:200::1/64	fe80::1:1
	G0/0/1	10.0.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	S0/1/0	10.0.13.1/24	2001:db8:100:1013::1/64	fe80::1:3
R2	G0/0/0	209.165.200.226/27	2001:db8:200::2/64	fe80::2:1
	Loopback 0	2.2.2.2/32	2001:db8:2222::1/128	fe80::2:3
R3	G0/0/1	10.0.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
	S0/1/0	10.0.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	G1/0/11	10.0.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
	VLAN 100	10.0.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10.0.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
	VLAN 102	10.0.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	G1/0/11	10.0.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10.0.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
	VLAN 101	10.0.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10.0.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.0.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.0.100.5/24	2001:db8:100:100::5/64	EUI-64
PC2	NIC	DHCP	SLAAC	EUI-64
PC3	NIC	DHCP	SLAAC	EUI-64
PC4	NIC	10.0.100.6/24	2001:db8:100:100::6/64	EUI-64

Parte 1: Construir la red y configurar los parámetros básicos de los dispositivos y el direccionamiento de las interfaces.

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

Conecte los dispositivos como se muestra en el diagrama de topología y conecte los cables según sea necesario.
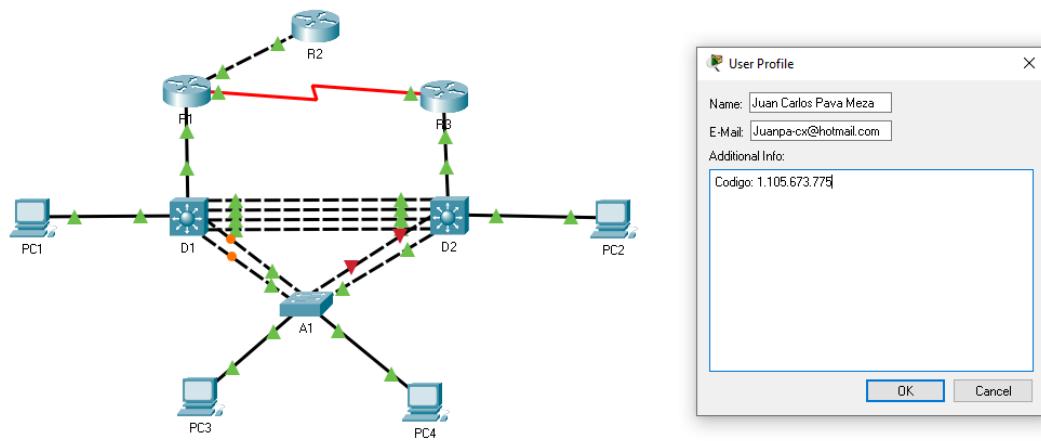
Ilustración 2: Topología en Packet Tracert

Paso 2: Configurar los parámetros básicos para cada dispositivo.

a. Mediante una conexión de consola ingrese en cada dispositivo, entre al modo de configuración global y aplique los parámetros básicos. Las configuraciones de inicio para cada dispositivo son suministradas a continuación:

Configuración R1

R1#sh run

Building configuration...

Current configuration : 1131 bytes

!

version 15.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

!

hostname R1

!

!

!

!

!

!

!

!

no ip cef

ipv6 unicast-routing

!

no ipv6 cef

!

!

!

!

!

!

!

!

!

!

no ip domain-lookup

!

!

spanning-tree mode pvst

!

!

!

!

!

```
!
interface GigabitEthernet0/0/0
ip address 209.165.200.225 255.255.255.224
duplex auto
speed auto
ipv6 address FE80::1:1 link-local
ipv6 address 2001:DB8:200::1/64
!
interface GigabitEthernet0/0/1
ip address 10.0.10.1 255.255.255.0
duplex auto
speed auto
ipv6 address FE80::1:2 link-local
ipv6 address 2001:BD8:100:1010::1/64
ipv6 address 2001:DB8:100:1010::1/64
!
interface Serial0/1/0
ip address 10.0.13.1 255.255.255.0
ipv6 address FE80::1:3 link-local
ipv6 address 2001:DB8:100:1013::1/64
clock rate 2000000
!
interface Serial0/1/1
no ip address
clock rate 2000000
shutdown
!
interface Vlan1
no ip address
```

shutdown

!

ip classless

!

ip flow-export version 9

!

!

!

banner motd ^C R1, ENCOR Skills Assessment, Scenario 1 ^C

!

!

!

!

!

line con 0

exec-timeout 0 0

logging synchronous

!

line aux 0

!

line vty 0 4

login

!

!

!

End

🔸 Configuración R2

```
R2#sh run
Building configuration...

Current configuration : 704 bytes
!
version 15.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R2
!
!
!
!
!
!
!
!
ip cef
no ipv6 cef
!
!
!
!
!
!
!
!
```

```
!
!
!
!
spanning-tree mode pvst
!
!
!
!
!
!
interface Loopback0
ip address 2.2.2.2 255.255.255.255
ipv6 address 2001:DB8:2222::1/128
!
interface GigabitEthernet0/0/0
ip address 209.165.200.226 255.255.255.224
duplex auto
speed auto
ipv6 address 2001:DB8:200::2/64
!
interface GigabitEthernet0/0/1
no ip address
duplex auto
speed auto
shutdown
!
interface Vlan1
no ip address
```

shutdown

!

ip classless

!

ip flow-export version 9

!

R2#conf ter

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 1 #

R2(config)#line con 0

R2(config-line)#exec-timeout 0 0

R2(config-line)#logging synchronous

R2(config-line)#exit

R2(config)#interface g0/0/0

R2(config-if)#ip address 209.165.200.226 255.255.255.224

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

R2(config-if)#ipv6 address 2001:db8:200::2/64

R2(config-if)#no shutdown

R2(config-if)#exit

R2(config)#interface Loopback 0

R2(config-if)#ip address 2.2.2.2 255.255.255.255

R2(config-if)#ipv6 address fe80::2:3 link-local

R2(config-if)#ipv6 address 2001:db8:2222::1/128

R2(config-if)#no shutdown

R2(config-if)#exit

```
R2(config)#
R2(config)#
R2(config)#
R2(config)#^Z
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#
R2#
R2#
R2#
R2#wr
Building configuration...
[OK]
R2#
R2#
R2#
R2#
R2#sh run
Building configuration...

Current configuration : 912 bytes
!
version 15.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R2
```

```
!
!
!
!
!
!
!
!
ip cef
ipv6 unicast-routing
!
no ipv6 cef
!
!
!
!
!
!
!
!
!
!
no ip domain-lookup
!
!
spanning-tree mode pvst
!
!
!
```

```
!
!
!
interface Loopback0
ip address 2.2.2.2 255.255.255.255
ipv6 address FE80::2:3 link-local
ipv6 address 2001:DB8:2222::1/128
!
interface GigabitEthernet0/0/0
ip address 209.165.200.226 255.255.255.224
duplex auto
speed auto
ipv6 address FE80::2:1 link-local
ipv6 address 2001:DB8:200::2/64
!
interface GigabitEthernet0/0/1
no ip address
duplex auto
speed auto
shutdown
!
interface Vlan1
no ip address
shutdown
!
ip classless
!
ip flow-export version 9
!
```

```
!
!
banner motd ^C R2, ENCOR Skills Assessment, Scenario 1 ^C
!
!
!
!
!
line con 0
exec-timeout 0 0
logging synchronous
!
line aux 0
!
line vty 0 4
login
!
!
!
End
```

🔲 **Configuración R3**

```
R3#sh run
Building configuration...

Current configuration : 1024 bytes
!
```

```
version 15.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R3
!
!
!
!
!
!
!
!
no ip cef
ipv6 unicast-routing
!
no ipv6 cef
!
!
!
!
!
!
!
!
!
!
no ip domain-lookup
```

```
!
!
spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet0/0/0
no ip address
duplex auto
speed auto
shutdown
!
interface GigabitEthernet0/0/1
ip address 10.0.11.1 255.255.255.0
duplex auto
speed auto
ipv6 address FE80::3:2 link-local
ipv6 address 2001:DB8:100:1011::1/64
!
interface Serial0/1/0
ip address 10.0.13.3 255.255.255.0
ipv6 address FE80::3:3 link-local
ipv6 address 2001:DB8:100:1010::2/64
ipv6 address 2001:DB8:100:1013::3/64
!
interface Serial0/1/1
```

no ip address

clock rate 2000000

shutdown

!

interface Vlan1

no ip address

shutdown

!

ip classless

!

ip flow-export version 9

!

!

!

banner motd ^C R3, ENCOR Skills Assessment, Scenario 1 ^C

!

!

!

!

!

line con 0

exec-timeout 0 0

logging synchronous

!

line aux 0

!

line vty 0 4

login

!

!

!

End

Configuración D1

Switch D1

hostname D1

ip routing

ipv6 unicast-routing

no ip domain lookup

banner motd # D1, ENCOR Skills Assessment, Scenario 1 #

line con 0

exec-timeout 0 0

logging synchronous

exit

vlan 100

name Management

exit

vlan 101

name UserGroupA

exit

vlan 102

name UserGroupB

exit

vlan 999

name NATIVE

exit

interface g1/0/11

no switchport

ip address 10.0.10.2 255.255.255.0

ipv6 address fe80::d1:1 link-local

ipv6 address 2001:db8:100:1010::2/64

no shutdown

exit

interface vlan 100

ip address 10.0.100.1 255.255.255.0

ipv6 address fe80::d1:2 link-local

ipv6 address 2001:db8:100:100::1/64

no shutdown

exit

interface vlan 101

ip address 10.0.101.1 255.255.255.0

ipv6 address fe80::d1:3 link-local

ipv6 address 2001:db8:100:101::1/64

no shutdown

exit

interface vlan 102

ip address 10.0.102.1 255.255.255.0

ipv6 address fe80::d1:4 link-local

ipv6 address 2001:db8:100:102::1/64

no shutdown

exit

ip dhcp excluded-address 10.0.101.1 10.0.101.109

ip dhcp excluded-address 10.0.101.141 10.0.101.254

ip dhcp excluded-address 10.0.102.1 10.0.102.109

ip dhcp excluded-address 10.0.102.141 10.0.102.254

ip dhcp pool VLAN-101

network 10.0.101.0 255.255.255.0

default-router 10.0.101.254

exit

ip dhcp pool VLAN-102

network 10.0.102.0 255.255.255.0

default-router 10.0.102.254

exit

interface range g1/0/1-10, g1/0/12-24, g1/1/1-4

shutdown

exit

⊹ **Configuración D2**

Switch D2

hostname D2

ip routing

ipv6 unicast-routing

no ip domain lookup

banner motd # D2, ENCOR Skills Assessment, Scenario 1 #

line con 0

exec-timeout 0 0

logging synchronous

exit

vlan 100

name Management

exit

vlan 101

name UserGroupA

exit

vlan 102

name UserGroupB

exit

vlan 999

name NATIVE

exit

interface g1/0/11

no switchport

ip address 10.0.11.2 255.255.255.0

ipv6 address fe80::d1:1 link-local

ipv6 address 2001:db8:100:1011::2/64

no shutdown

exit

interface vlan 100

ip address 10.0.100.2 255.255.255.0

ipv6 address fe80::d2:2 link-local

ipv6 address 2001:db8:100:100::2/64

no shutdown

exit

interface vlan 101

ip address 10.0.101.2 255.255.255.0

ipv6 address fe80::d2:3 link-local

ipv6 address 2001:db8:100:101::2/64

no shutdown

exit

interface vlan 102

ip address 10.0.102.2 255.255.255.0

ipv6 address fe80::d2:4 link-local

ipv6 address 2001:db8:100:102::2/64

no shutdown

exit

ip dhcp excluded-address 10.0.101.1 10.0.101.209

ip dhcp excluded-address 10.0.101.241 10.0.101.254

ip dhcp excluded-address 10.0.102.1 10.0.102.209

ip dhcp excluded-address 10.0.102.241 10.0.102.254

ip dhcp pool VLAN-101

network 10.0.101.0 255.255.255.0

default-router 10.0.101.254

exit

ip dhcp pool VLAN-102

network 10.0.102.0 255.255.255.0

default-router 10.0.102.254

exit

interface range g1/0/1-10, g1/0/12-24, g1/1/1-4

shutdown

exit

✦ Configuración A1

Switch A1

hostname A1

no ip domain lookup

banner motd # A1, ENCOR Skills Assessment, Scenario 1 #

line con 0

exec-timeout 0 0

logging synchronous

exit

vlan 100

```
name Management

exit

vlan 101

name UserGroupA

exit

vlan 102

name UserGroupB

exit

vlan 999

name NATIVE

exit

interface vlan 100

ip address 10.0.100.3 255.255.255.0

ipv6 address fe80::a1:1 link-local

ipv6 address 2001:db8:100:100::3/64

no shutdown

exit

interface range f0/5-22

shutdown

exit
```

b. Copie el archivo running-config al archivo startup-config en todos los dispositivos.

c. Configure el direccionamiento de los host PC 1 y PC 4 como se muestra en la tabla de direccionamiento. Asigne una dirección de puerta de enlace predeterminada de 10.0.100.254, la cual será la dirección IP virtual HSRP utilizada en la Parte 4.
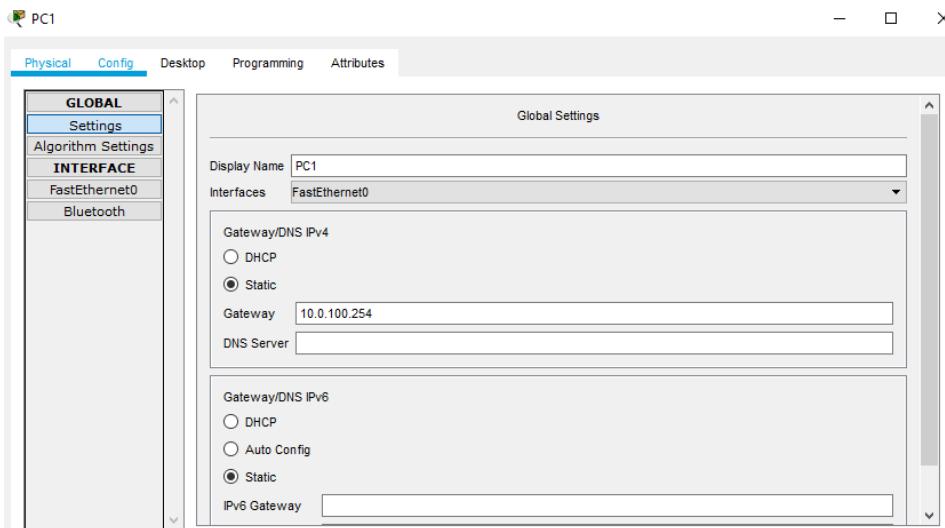
Ilustración 3: Configuración PC1
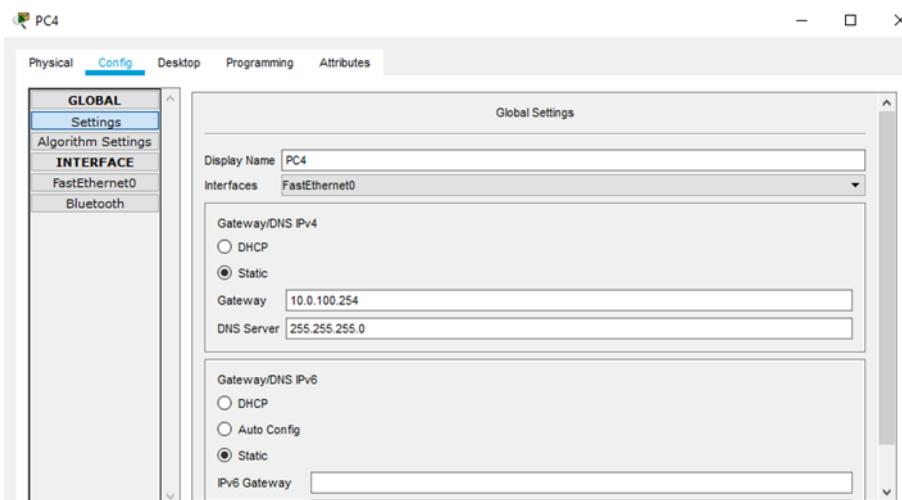
*Ilustración 4: Configuración PC4*

Parte 2: Configurar la capa 2 de la red y el soporte de Host

En esta parte de la prueba de habilidades, debe completar la configuración de la capa 2 de la red y establecer el soporte básico de host. Al final de esta parte, todos los switches deben poder comunicarse. PC2 y PC3 deben recibir direccionamiento de DHCP y SLAAC.

Las tareas de configuración son las siguientes:

2.1 En todos los switches configure interfaces troncales IEEE 802.1Q sobre los enlaces de interconexión entre switches.
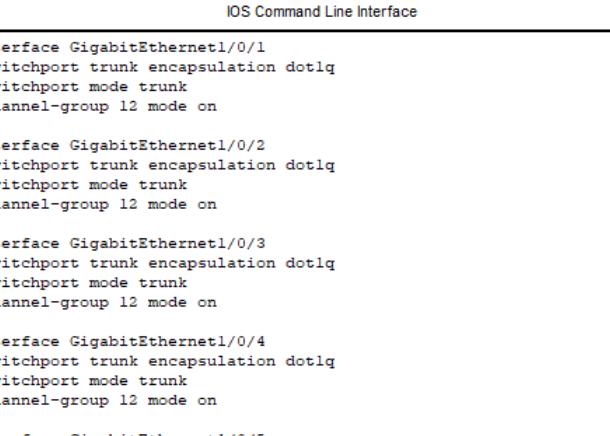
Ilustración 5: Configuración D1 IEEE802.1Q

Ilustración 6:Configuracion D2 IEEE802.1Q

```
switchport mode trunk
!
interface FastEthernet0/1
 switchport mode trunk
 channel-group 1 mode on
!
interface FastEthernet0/2
 switchport mode trunk
 channel-group 1 mode on
!
interface FastEthernet0/3
 switchport mode trunk
 channel-group 2 mode on
!
interface FastEthernet0/4
 switchport mode trunk
 channel-group 2 mode on
!
```

Ilustración 7:Configuraciòn A1 IEEE802.1Q

2.2 En todos los switches cambie la VLAN nativa en los enlaces troncales.


```
D1(config)#inter port-channel 1
D1(config-if)#sw
D1(config-if)#switchport tr
D1(config-if)#switchport trunk na
D1(config-if)#switchport trunk native v
D1(config-if)#switchport trunk native vlan 999
D1(config-if)#
D1(config-if)#
D1(config-if)#%SPANTREE-2-RECV_PVID_ERR: Received BPDU with inconsistent peer vlan id 1 on Port-channel1 VLAN999.

%SPANTREE-2-BLOCK_PVID_LOCAL: Blocking Port-channel1 on VLAN0999. Inconsistent local vlan.


D1(config-if)#inter port-channel 12
D1(config-if)#switchport trunk native vlan 999
D1(config-if)#%SPANTREE-2-RECV_PVID_ERR: Received BPDU with inconsistent peer vlan id 1 on Port-channel12 VLAN999.

%SPANTREE-2-BLOCK_PVID_LOCAL: Blocking Port-channel12 on VLAN0999. Inconsistent local vlan.
```

Ilustración 8: Configuración Vlan nativa D1

```
D2(config-if)#switchport trunk nati
D2(config-if)#switchport trunk native vlan 999
D2(config-if)#switchport trunk native vlan 999%SPANTREE-2-RECV_PVID_ERR: Received BPDU with inconsistent peer vlan id 1 on Port-channel2 VLAN999.

%SPANTREE-2-BLOCK_PVID_LOCAL: Blocking Port-channel2 on VLANinter port-channel 2
D2(config-if)#inter port-channel 12
D2(config-if)#switchport trunk native vlan 999
D2(config-if)#
```

Ilustración 9: Configuración Vlan nativa D2

```
A1(config)#interface port-channel 1
A1(config-if)#sw
A1(config-if)#switchport tr
A1(config-if)#switchport trunk na
A1(config-if)#switchport trunk native vlan 999
A1(config-if)#%SPANTREE-2-RECV_PVID_ERR: Received BPDU with inconsistent peer vlan id 999 on Port-channel2 VLAN1.

%SPANTREE-2-BLOCK_PVID_LOCAL: Blocking Port-channel2 on VLAN0001. Inconsistent local vlan.

A1(config-if)#interface port-channel 2
A1(config-if)#switchport trunk native vlan 999
A1(config-if)#
A1(config-if)#%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking Port-channel2 on VLAN0999. Port consistency restored.

%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking Port-channel2 on VLAN0001. Port consistency restored.
```

Ilustración 10: Configuración Vlan nativa A1

2.3. En todos los switches habilite el protocolo Rapid Spanning-Tree (RSTP)

```
D1#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
D1(config)#spanning-tree mode rapid-pvst
D1(config)#
```

Ilustración 11: Configuración Protocolo Spanning-Tree D1

```
D2#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
D2(config)#spanning-tree mode rapid-pvst
D2(config)#
```

Ilustración 12: Configuración Protocolo Spanning-Tree D2

```
A1#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
A1(config)#spa
A1(config)#spanning-tree mo
A1(config)#spanning-tree mode ?
  pvst        Per-Vlan spanning tree mode
  rapid-pvst  Per-Vlan rapid spanning tree mode
A1(config)#spanning-tree mode rap
A1(config)#spanning-tree mode rapid-pvst
A1(config)#
A1(config)#
```

Ilustración 13: Configuración Protocolo Spanning-Tree A1

2.5 En todos los switches, cree EtherChannels LACP como se muestra en el diagrama de topología.


```
 D1

 Physical    Config    CLI    Attributes


 !
 interface Port-channel1
  switchport trunk native vlan 999
  switchport trunk encapsulation dotlq
  switchport mode trunk
 !
 interface Port-channel2
  switchport trunk native vlan 999
  switchport trunk encapsulation dotlq
  switchport mode trunk
 !
```
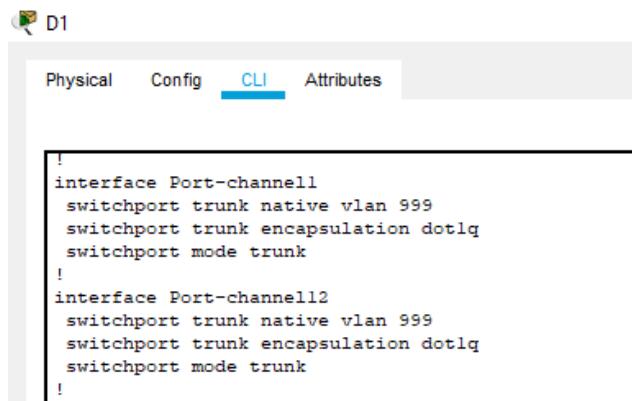
Ilustración 14: Configuración EtherChannel LACP D1


```
 D2

 Physical    Config    CLI    Attributes


 !
 !
 interface Port-channel2
  switchport trunk native vlan 999
  switchport trunk encapsulation dotlq
  switchport mode trunk
 !
 interface Port-channel2
  switchport trunk native vlan 999
  switchport trunk encapsulation dotlq
  switchport mode trunk
 !
```
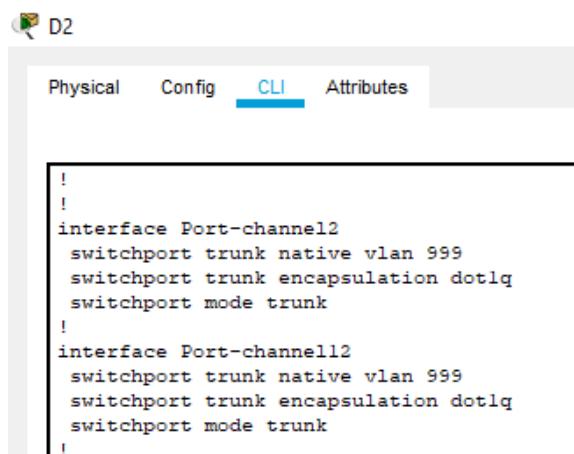
Ilustración 15: Configuración EtherChannel LACP D2
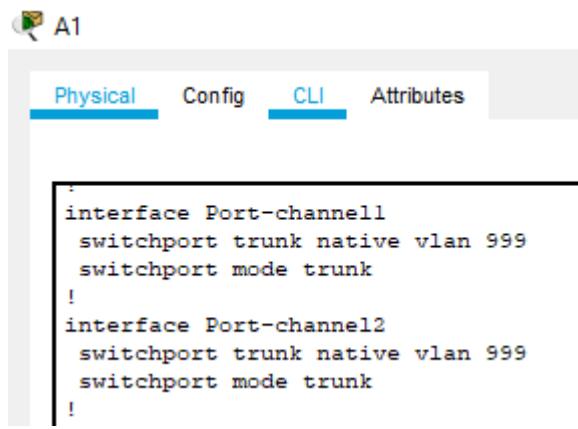
interface Port-channel1
 switchport trunk native vlan 999
 switchport mode trunk
!
interface Port-channel2
 switchport trunk native vlan 999
 switchport mode trunk
!

Ilustración 16: Configuración EtherChannel LACP A1

2.6 En todos los switches, configure los puertos de acceso del host (host access port) que se conectan a PC1, PC2, PC3 y PC4.


```
D1(config)#inter g1/0/23
D1(config-if)#switchport mode access
D1(config-if)#switchport access vlan 100
D1(config-if)#
```

Ilustración 17: Configuración Access Port D1


```
D2#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
D2(config)#inter g1/0/23
D2(config-if)#no sh
D2(config-if)#sw
D2(config-if)#switchport mode
D2(config-if)#switchport mode acc
D2(config-if)#switchport mode access
D2(config-if)#sw
D2(config-if)#switchport acc
D2(config-if)#switchport access vlan 102
D2(config-if)#
```

Ilustración 18:Configuracion Access Port D2

```
Al#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
Al(config)#inter f0/23
Al(config-if)#no sh
Al(config-if)#swi
Al(config-if)#switchport mode acc
Al(config-if)#switchport mode access
Al(config-if)#sw
Al(config-if)#switchport acc
Al(config-if)#switchport access vl
Al(config-if)#switchport access vlan 101
Al(config-if)#inter f0/24
Al(config-if)#no sh
Al(config-if)#switchport mode access
Al(config-if)#switchport access vlan 100
```

Ilustración 19: Configuración Access Port A1

2.7 Verifique los servicios DHCP IPv4.
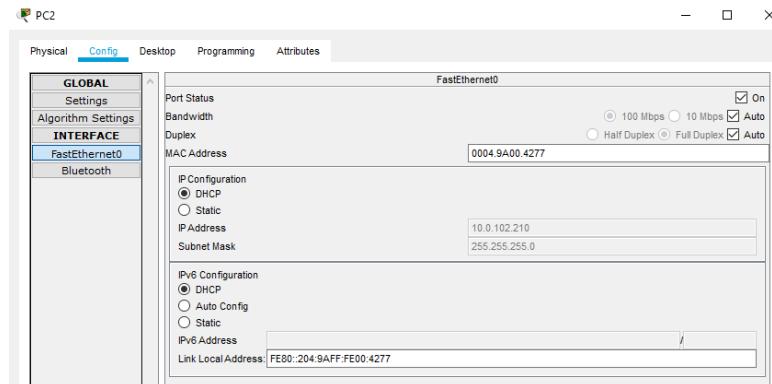
*Ilustración 20: Configuración DHCP PC2*
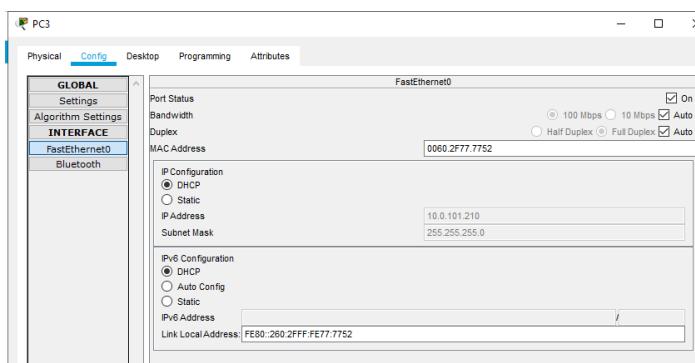

Ilustración 21: Configuración DHCP PC3

2.8 Verifique la conectividad de la LAN local

Ilustración 22:Prueba Ping PC1

Ilustración 23: Prueba Ping PC2

Ilustración 24: Prueba Ping PC3

Ilustración 25: Prueba Ping PC4

Parte 3: Configurar los protocolos de enrutamiento

En esta parte, debe configurar los protocolos de enrutamiento IPv4 e IPv6. Al final de esta parte, la red debería estar completamente convergente. Los pings de IPv4 e IPv6 a la interfaz Loopback 0 desde D1 y D2 deberían ser exitosos.

Nota: Los pings desde los hosts no tendrán éxito porque sus puertas de enlace predeterminadas apuntan a la dirección HSRP que se habilitará en la Parte 4.

Las tareas de configuración son las siguientes:

3.1 En la "Red de la Compañia" (es decir, R1, R3, D1, y D2), configure single-area OSPFv2 en area 0.

```
R1>en
R1#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#router ospf 4
R1(config-router)# router-id 0.0.4.1
R1(config-router)# network 10.0.10.0 0.0.0.255 area 0
R1(config-router)# network 10.0.13.0 0.0.0.255 area 0
R1(config-router)# default-information originate
R1(config-router)#
R1(config-router)#
R1(config-router)#
```

Ilustración 26: Configuración OSPFV2 R1

```
R3>en
R3#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#router ospf 4
R3(config-router)# router-id 0.0.4.3
R3(config-router)# network 10.0.11.0 0.0.0.255 area 0
R3(config-router)# network 10.0.13.0 0.0.0.255 area 0
R3(config-router)#
R3(config-router)#
00:11:08: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Serial0/1/0 from
LOADING to FULL, Loading Done
```

Ilustración 27:Configuracion OSPFV2 R3

```
D1>en
D1#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
D1(config)#router ospf 4
D1(config-router)# router-id 0.0.4.131
D1(config-router)# passive-interface default
D1(config-router)# no passive-interface GigabitEthernet1/0/11
D1(config-router)# network 10.0.10.0 0.0.0.255 area 0
D1(config-router)# network 10.0.100.0 0.0.0.255 area 0
D1(config-router)# network 10.0.101.0 0.0.0.255 area 0
D1(config-router)# network 10.0.102.0 0.0.0.255 area 0
D1(config-router)#
D1(config-router)#
D1(config-router)#^Z
D1#
%SYS-5-CONFIG_I: Configured from console by console
```

Ilustración 28:Configuracion OSPFV2 D1

```
D2>en
D2#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
D2(config)#router ospf 4
D2(config-router)# router-id 0.0.4.132
D2(config-router)# passive-interface default
D2(config-router)# no passive-interface GigabitEthernet1/0/11
D2(config-router)# network 10.0.11.0 0.0.0.255 area 0
D2(config-router)# network 10.0.100.0 0.0.0.255 area 0
D2(config-router)# network 10.0.101.0 0.0.0.255 area 0
D2(config-router)# network 10.0.102.0 0.0.0.255 area 0
D2(config-router)#
```

Ilustración 29: configuración OSPFV2 D2

3.2 En la "Red de la Compañia" (es decir, R1, R3, D1, y D2), configure classic single-area OSPFv3 en area 0.

```
R1#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ipv6 router ospf 6
R1(config-rtr)# router-id 0.0.6.1
R1(config-rtr)# default-information originate
R1(config-rtr)# exit
R1(config)#interface g0/0/1
R1(config-if)# ipv6 ospf 6 area 0
R1(config-if)# exit
R1(config)#interface s0/1/0
R1(config-if)# ipv6 ospf 6 area 0
R1(config-if)# exit
R1(config)#
```

Ilustración 30:configuración OSPFV3 R1

```
R3#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#ipv6 router ospf 6
R3(config-rtr)# router-id 0.0.6.3
R3(config-rtr)# exit
R3(config)#interface g0/0/1
R3(config-if)# ipv6 ospf 6 area 0
R3(config-if)# exit
R3(config)#interface s0/1/0
R3(config-if)# ipv6 ospf 6 area 0
R3(config-if)# exit
R3(config)#end
00:29:03: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Serial0/1/0
from LOADING to FULL, Loading Done

R3(config)#end
```

Ilustración 31:configuración OSPFV3 R3

```
D1#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
D1(config)#ipv6 router ospf 6
D1(config-rtr)# router-id 0.0.6.131
D1(config-rtr)# passive-interface default
D1(config-rtr)# no passive-interface g1/0/11
                                       ^
% Invalid input detected at '^' marker.

D1(config-rtr)# exit
D1(config)#interface g1/0/11
D1(config-if)# ipv6 ospf 6 area 0
D1(config-if)# exit
D1(config)#interface vlan 100
D1(config-if)# ipv6 ospf 6 area 0
D1(config-if)# exit
D1(config)#interface vlan 101
D1(config-if)# ipv6 ospf 6 area 0
D1(config-if)# exit
D1(config)#interface vlan 102
D1(config-if)# ipv6 ospf 6 area 0
D1(config-if)# exit
```

Ilustración 32:Configuracion OSPFV3 D1

```
D2#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
D2(config)#ipv6 router ospf 6
D2(config-rtr)# router-id 0.0.6.132
D2(config-rtr)# passive-interface default
D2(config-rtr)# no passive-interface gl/0/11
                                         ^
% Invalid input detected at '^' marker.

D2(config-rtr)# exit
D2(config)#interface gl/0/11
D2(config-if)# ipv6 ospf 6 area 0
D2(config-if)# exit
D2(config)#interface vlan 100
D2(config-if)# ipv6 ospf 6 area 0
D2(config-if)# exit
D2(config)#interface vlan 101
D2(config-if)# ipv6 ospf 6 area 0
D2(config-if)# exit
D2(config)#interface vlan 102
D2(config-if)# ipv6 ospf 6 area 0
D2(config-if)# exit
D2(config)#end
D2#
```

Ilustración 33:Configuracion OSPFV3 D2

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

R2

ip route 0.0.0.0 0.0.0.0 loopback 0

ipv6 route ::/0 loopback 0

router bgp 500

 bgp router-id 2.2.2.2

 neighbor 209.165.200.225 remote-as 300

 neighbor 2001:db8:200::1 remote-as 300

 address-family ipv4

  neighbor 209.165.200.225 activate

  no neighbor 2001:db8:200::1 activate

  network 2.2.2.2 mask 255.255.255.255

  network 0.0.0.0

  exit-address-family

```
address-family ipv6

 no neighbor 209.165.200.225 activate

 neighbor 2001:db8:200::1 activate

 network 2001:db8:2222::/128

 network ::/0

 exit-address-family
```

R1
```
ip route 10.0.0.0 255.0.0.0 null0

ipv6 route 2001:db8:100::/48 null0

!

router bgp 300

 bgp router-id 1.1.1.1

 neighbor 209.165.200.226 remote-as 500

 neighbor 2001:db8:200::2 remote-as 500

 address-family ipv4 unicast

  neighbor 209.165.200.226 activate

  no neighbor 2001:db8:200::2 activate

  network 10.0.0.0 mask 255.0.0.0

  exit-address-family

 address-family ipv6 unicast

  no neighbor 209.165.200.226 activate

  neighbor 2001:db8:200::2 activate

  network 2001:db8:100::/48

  exit-address-family
```

Parte 4: Configurar la Redundancia del Primer Salto (First Hop Redundancy)

En esta parte, debe configurar HSRP version 2 para proveer redundancia de primer salto para los host en la "Red de la Compañia".

Las tareas de configuración son las siguientes:

4.1 En D1, cree IP SLAs que prueben la accesibilidad de la interfaz R1 G0/0/1.

D1

ip sla 4

 icmp-echo 10.0.10.1

 frequency 5

 exit

ip sla 6

 icmp-echo 2001:db8:100:1010::1

 frequency 5

 exit

ip sla schedule 4 life forever start-time now

ip sla schedule 6 life-forever start-time now

track 4 ip sla 4

 delay down 10 up 15

 exit

track 6 ip sla 6

 delay down 10 up 15

 exit

interface vlan 100

 standby version 2

 standby 104 ip 10.0.100.254

 standby 104 priority 150

 standby 104 preempt

 standby 104 track 4 decrement 60

 standby 106 ipv6 autoconfig

 standby 106 priority 150

 standby 106 preempt

```
  standby 106 track 6 decrement 60
 exit
interface vlan 101
 standby version 2
 standby 114 ip 10.0.101.254
 standby 114 preempt
 standby 114 track 4 decrement 60
 standby 116 ipv6 autoconfig
 standby 116 preempt
 standby 116 track 6 decrement 60
 exit
interface vlan 102
 standby version 2
 standby 124 ip 10.0.102.254
 standby 124 priority 150
 standby 124 preempt
 standby 124 track 4 decrement 60
 standby 126 ipv6 autoconfig
 standby 126 priority 150
 standby 126 preempt
 standby 126 track 6 decrement 60
 exit
end
```

D2
```
ip sla 4
 icmp-echo 10.0.11.1
 frequency
exit
```

```
ip sla 6
 icmp-echo 2001:db8:100:1011::1
 frequency
exit
ip sla schedule 4 life forever start-time now
ip sla schedule 6 life forever start-time now
track 4 ip sla 4
 delay down 10 up 15
 exit
track 6 ip sla 6
 delay down 10 up 15
 exit
interface vlan 100
 standby version 2
 standby 104 ip 10.0.100.254
 standby 104 preempt
 standby 104 track 4 decrement 60
 standby 106 ipv6 autoconfig
 standby 106 preempt
 standby 106 track 6 decrement 60
 exit
interface vlan 101
 standby version 2
 standby 114 ip 10.0.101.254
 standby 114 priority 150
 standby 114 preempt
 standby 114 track 4 decrement 60
 standby 116 ipv6 autoconfig
 standby 116 priority 150
```

```
 standby 116 preempt
 standby 116 track 6 decrement 60
 exit
interface vlan 102
 standby version 2
 standby 124 ip 10.0.102.254
 standby 124 preempt
 standby 124 track 4 decrement 60
 standby 126 ipv6 autoconfig
 standby 126 preempt
 standby 126 track 6 decrement 60
 exit
end
```

Parte 5: Seguridad

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

Configuración Para R1 y R3

```
aaa new-model
radius server RADIUS
 address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
 key $trongPass
 exit
aaa authentication login default group radius local
end.
```

Parte 6: Configure las funciones de Administración de Red

En esta parte, debe configurar varias funciones de administración de red. Las tareas de configuración son las siguientes:

6. Funciones de Administración de Red

R2

ntp master 3

end

R1

ntp server 2.2.2.2

 logging trap warning

 logging host 10.0.100.5

 logging on

ip access-list standard SNMP-NMS

 permit host 10.0.100.5

 exit

 snmp-server contact Cisco Student

 snmp-server community ENCORSA ro SNMP-NMS

 snmp-server host 10.0.100.5 version 2c ENCORSA

 snmp-server ifindex persist

 snmp-server enable traps bgp

 snmp-server enable traps config

 snmp-server enable traps ospf

end

R3

ntp server 10.0.10.1

 logging trap warning

 logging host 10.0.100.5

 logging on

ip access-list standard SNMP-NMS

 permit host 10.0.100.5

```
 exit
 snmp-server contact Cisco Student
 snmp-server community ENCORSA ro SNMP-NMS
 snmp-server host 10.0.100.5 version 2c ENCORSA
 snmp-server ifindex persist
 snmp-server enable traps config
 snmp-server enable traps ospf
end


Switch D1
ntp server 10.0.10.1
 logging trap warning
 logging host 10.0.100.5
 logging on
ip access-list standard SNMP-NMS
  permit host 10.0.100.5
  exit
 snmp-server contact Cisco Student
 snmp-server community ENCORSA ro SNMP-NMS
 snmp-server host 10.0.100.5 version 2c ENCORSA
 snmp-server ifindex persist
 snmp-server enable traps config
 snmp-server enable traps ospf
end
Switch D2
ntp server 10.0.10.1
 logging trap warning
 logging host 10.0.100.5
```

```
 logging on
ip access-list standard SNMP-NMS
 permit host 10.0.100.5
 exit
 snmp-server contact Cisco Student
 snmp-server community ENCORSA ro SNMP-NMS
 snmp-server host 10.0.100.5 version 2c ENCORSA
 snmp-server enable traps config
 snmp-server enable traps ospf
end


Switch A1
ntp server 10.0.10.1
 logging trap warning
 logging host 10.0.100.5
 logging on
ip access-list standard SNMP-NMS
 permit host 10.0.100.5
 exit
 snmp-server contact Cisco Student
 snmp-server community ENCORSA ro SNMP-NMS
 snmp-server host 10.0.100.5 version 2c ENCORSA
 snmp-server ifindex persist
 snmp-server enable traps config
 snmp-server enable traps ospf
end
```

CONFIGURACIÓN FINAL POR EQUIPO COMANDO SHOW RUN:

- **Configuración Router R1**

R1# show run

Building configuration...

Current configuration : 3406 bytes

!

version 16.9

service timestamps debug datetime msec

service timestamps log datetime msec

platform qfp utilization monitor load 80

no platform punt-keepalive disable-kernel-core

!

hostname R1

!

boot-start-marker

boot-end-marker

!

enable   secret   9
$9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83VgqbO3rXBDuwo

!

aaa new-model

!

aaa authentication login default group radius local

!

aaa session-id common

!

```
no ip domain lookup
!
login on-success log
!
subscriber templating
!
ipv6 unicast-routing
multilink bundle-name authenticated
!
spanning-tree extend system-id
!
username        sadmin        privilege        15        secret        9
$9$XCO4pzqbRT.3EP$ymouLOQI5/o0FOkYDtA1ztejFra67MnkJJ5Y3bhyQe6
!
redundancy
 mode none
!
interface GigabitEthernet0/0/0
 ip address 209.165.200.225 255.255.255.224
 negotiation auto
 ipv6 address FE80::1:1 link-local
 ipv6 address 2001:DB8:200::1/64
!
interface GigabitEthernet0/0/1
 ip address 10.0.10.1 255.255.255.0
 negotiation auto
 ipv6 address FE80::1:2 link-local
 ipv6 address 2001:DB8:100:1010::1/64
 ipv6 ospf 6 area 0
!
```

```
interface Serial0/1/0
 ip address 10.0.13.1 255.255.255.0
 ipv6 address FE80::1:3 link-local
 ipv6 address 2001:DB8:100:1013::1/64
 ipv6 ospf 6 area 0
!
interface Serial0/1/1
 no ip address
!
router ospf 4
 router-id 0.0.4.1
 network 10.0.10.0 0.0.0.255 area 0
 network 10.0.13.0 0.0.0.255 area 0
 default-information originate
!
router bgp 300
 bgp router-id 1.1.1.1
 bgp log-neighbor-changes
 neighbor 2001:DB8:200::2 remote-as 500
 neighbor 209.165.200.226 remote-as 500
 !
 address-family ipv4
  network 10.0.0.0
  no neighbor 2001:DB8:200::2 activate
  neighbor 209.165.200.226 activate
 exit-address-family
 !
 address-family ipv6
  network 2001:DB8:100::/48
```

```
 neighbor 2001:DB8:200::2 activate
 exit-address-family
!
ip forward-protocol nd
no ip http server
ip http secure-server
ip route 10.0.0.0 255.0.0.0 Null0
!
ip access-list standard SNMP-NMS
 permit 10.0.100.5
logging trap warnings
logging host 10.0.100.5
ipv6 route 2001:DB8:100::/48 Null0
ipv6 router ospf 6
 router-id 0.0.6.1
 default-information originate
!
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
```

```
snmp-server enable traps config
snmp-server enable traps bgp
snmp-server host 10.0.100.5 version 2c ENCORSA
!
radius server RADIUS
 address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
 key $trongPass
!
control-plane
!
banner motd ^C R1, ENCOR Skills Assessment, Scenario 1 ^C
!
line con 0
 exec-timeout 0 0
 logging synchronous
 transport input none
 stopbits 1
line aux 0
 stopbits 1
line vty 0 4
!
ntp server 2.2.2.2
!
End
```

- **Configuración Final R2**

```
R2# show run
Building configuration...
```

Current configuration : 2029 bytes

!

version 16.9

service timestamps debug datetime msec

service timestamps log datetime msec

platform qfp utilization monitor load 80

no platform punt-keepalive disable-kernel-core

!

hostname R2

!

boot-start-marker

boot-end-marker

!

enable   secret   9
9kWM5eeaWgcjgDk$klw0rmhA2j9zzPN13oTIYc/.yk9aczrrDxNq4rUNf5c

!

no aaa new-model

!

no ip domain lookup

!

login on-success log

!

subscriber templating

!

ipv6 unicast-routing

multilink bundle-name authenticated

!

spanning-tree extend system-id

!

username sadmin privilege 15 secret 9
9xfCWZaD1xuZ5Q.$rje2SE7dafmrTg87ls/vn.PNtMXbaL3kfmN3Jr08yNU

!

redundancy
 mode none

!

interface Loopback0
 ip address 2.2.2.2 255.255.255.255
 ipv6 address FE80::2:3 link-local
 ipv6 address 2001:DB8:2222::1/128

!

interface GigabitEthernet0/0/0
 ip address 209.165.200.226 255.255.255.224
 negotiation auto
 ipv6 address FE80::2:1 link-local
 ipv6 address 2001:DB8:200::2/64

!

interface GigabitEthernet0/0/1
 no ip address
 negotiation auto

!

router bgp 500
 bgp router-id 2.2.2.2
 bgp log-neighbor-changes
 neighbor 2001:DB8:200::1 remote-as 300
 neighbor 209.165.200.225 remote-as 300

!

 address-family ipv4
  network 0.0.0.0

```
  network 2.2.2.2 mask 255.255.255.255
  no neighbor 2001:DB8:200::1 activate
  neighbor 209.165.200.225 activate
 exit-address-family
 !
 address-family ipv6
  network ::/0
  network 2001:DB8:2222::/128
  neighbor 2001:DB8:200::1 activate
 exit-address-family
!
ip forward-protocol nd
no ip http server
ip http secure-server
ip route 0.0.0.0 0.0.0.0 Loopback0
!
ipv6 route ::/0 Loopback0
!
control-plane
!
banner motd ^C R2, ENCOR Skills Assessment, Scenario 1 ^C
!
line con 0
 exec-timeout 0 0
 logging synchronous
 transport input none
 stopbits 1
line aux 0
 stopbits 1
```

line vty 0 4

 login

!

ntp master 3

!

End

- **Configuración Router R3**

R3# show run

Building configuration...

Current configuration : 2765 bytes

!

version 16.9

service timestamps debug datetime msec

service timestamps log datetime msec

platform qfp utilization monitor load 80

no platform punt-keepalive disable-kernel-core

!

hostname R3

!

boot-start-marker

boot-end-marker

!

enable   secret   9
9X1WR7NQHvbYXHY$HevkjyeTexlsUxwhnwaZWeh/VEB3CIoGxlPSJ9O.F6
o

!

aaa new-model

```
!
aaa authentication login default group radius local
!
aaa session-id common
!
no ip domain lookup
!
login on-success log
!
subscriber templating
!
ipv6 unicast-routing
multilink bundle-name authenticated
!
spanning-tree extend system-id
!
username        sadmin        privilege        15        secret        9
$9$y02cJ/kvRKO7DI$eYITN996n5QFlG2zu7OoHu2RLPwbw/8v8lO4nv/n8Aw
!
redundancy
 mode none
!
interface GigabitEthernet0/0/0
 no ip address
 negotiation auto
!
interface GigabitEthernet0/0/1
 ip address 10.0.11.1 255.255.255.0
 negotiation auto
 ipv6 address FE80::3:2 link-local
```

```
 ipv6 address 2001:DB8:100:1011::1/64
 ipv6 ospf 6 area 0
!
interface Serial0/1/0
 ip address 10.0.13.3 255.255.255.0
 ipv6 address FE80::3:3 link-local
 ipv6 address 2001:DB8:100:1010::2/64
 ipv6 ospf 6 area 0
!
interface Serial0/1/1
 no ip address
!
router ospf 4
 router-id 0.0.4.3
 network 10.0.11.0 0.0.0.255 area 0
 network 10.0.13.0 0.0.0.255 area 0
!
ip forward-protocol nd
no ip http server
ip http secure-server
!
ip access-list standard SNMP-NMS
 permit 10.0.100.5
logging trap warnings
logging host 10.0.100.5
ipv6 router ospf 6
 router-id 0.0.6.3
!
snmp-server community ENCORSA RO SNMP-NMS
```

```
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA
!
radius server RADIUS
 address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
 key $trongPass
!
control-plane
!
banner motd ^C R3, ENCOR Skills Assessment, Scenario 1 ^C
!
line con 0
 exec-timeout 0 0
 logging synchronous
 transport input none
 stopbits 1
line aux 0
 stopbits 1
```

```
line vty 0 4
!
ntp server 10.0.10.1
!
end
```

Configuración Final Switch D1

```
D1# show run
Building configuration...

Current configuration : 8260 bytes
!
version 16.9
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no platform punt-keepalive disable-kernel-core
!
hostname D1
!
vrf definition Mgmt-vrf
 !
 address-family ipv4
 exit-address-family
 !
 address-family ipv6
 exit-address-family
 !
```

```
enable                          secret                          9
$9$RWOFeoZQQ/zqJk$rEnKpZ9Dx6asfA/16o3cPHR3hYQvn2gFiZuybdaFo82
!
aaa new-model
!
aaa authentication login default group radius local
!
aaa session-id common
switch 1 provision ws-c3650-24ps
!
ip routing
!
no ip domain lookup
ip dhcp excluded-address 10.0.101.1 10.0.101.109
ip dhcp excluded-address 10.0.101.141 10.0.101.254
ip dhcp excluded-address 10.0.102.1 10.0.102.109
ip dhcp excluded-address 10.0.102.141 10.0.102.254
!
ip dhcp pool VLAN-101
 network 10.0.101.0 255.255.255.0
 default-router 10.0.101.254
!
ip dhcp pool VLAN-102
 network 10.0.102.0 255.255.255.0
 default-router 10.0.102.254
!
login on-success log
ipv6 unicast-routing
!
license boot level ipservicesk9
```

!

diagnostic bootup level minimal

!

spanning-tree mode rapid-pvst

spanning-tree extend system-id

spanning-tree vlan 100,102 priority 24576

spanning-tree vlan 101 priority 28672

!

username   sadmin   privilege   15   secret   9
9yBNV4PYk3Zdpak$N2uvIju4cfG5jQsynRkIv0EHas6ivCZRAtkztAnLiVo

!

redundancy

 mode sso

!

transceiver type all

 monitoring

!

track 4 ip sla 4

 delay down 10 up 15

!

track 6 ip sla 6

 delay down 10 up 15

!

class-map match-any system-cpp-police-topology-control

  description Topology control

class-map match-any system-cpp-police-sw-forward

  description Sw forwarding, L2 LVX data, LOGGING

class-map match-any system-cpp-default

  description Inter FED, EWLC control, EWLC data

class-map match-any system-cpp-police-sys-data

description Learning cache ovfl, High Rate App, Exception, EGR Exception, NFLSAMPLED DATA, RPF Failed

class-map match-any system-cpp-police-punt-webauth

  description Punt Webauth

class-map match-any system-cpp-police-l2lvx-control

  description L2 LVX control packets

class-map match-any system-cpp-police-forus

  description Forus Address resolution and Forus traffic

class-map match-any system-cpp-police-multicast-end-station

  description MCAST END STATION

class-map match-any system-cpp-police-multicast

  description Transit Traffic and MCAST Data

class-map match-any system-cpp-police-l2-control

  description L2 control

class-map match-any system-cpp-police-dot1x-auth

  description DOT1X Auth

class-map match-any system-cpp-police-data

  description ICMP redirect, ICMP_GEN and BROADCAST

class-map match-any system-cpp-police-stackwise-virt-control

  description Stackwise Virtual

class-map match-any non-client-nrt-class

class-map match-any system-cpp-police-routing-control

  description Routing control and Low Latency

class-map match-any system-cpp-police-protocol-snooping

  description Protocol snooping

class-map match-any system-cpp-police-dhcp-snooping

  description DHCP snooping

class-map match-any system-cpp-police-system-critical

  description System Critical and Gold Pkt

!

```
policy-map system-cpp-policy
!
!
interface Port-channel1
 switchport trunk native vlan 999
 switchport mode trunk
!
interface Port-channel12
 switchport trunk native vlan 999
 switchport mode trunk
!
interface GigabitEthernet0/0
 vrf forwarding Mgmt-vrf
 no ip address
 negotiation auto
!
interface GigabitEthernet1/0/1
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 12 mode active
!
interface GigabitEthernet1/0/2
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 12 mode active
!
interface GigabitEthernet1/0/3
 switchport trunk native vlan 999
 switchport mode trunk
```

```
 channel-group 12 mode active
!
interface GigabitEthernet1/0/4
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 12 mode active
!
interface GigabitEthernet1/0/5
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 1 mode active
!
interface GigabitEthernet1/0/6
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 1 mode active
!
interface GigabitEthernet1/0/7
 shutdown
!
interface GigabitEthernet1/0/8
 shutdown
!
interface GigabitEthernet1/0/9
 shutdown
!
interface GigabitEthernet1/0/10
 shutdown
!
```

```
interface GigabitEthernet1/0/11
 no switchport
 ip address 10.0.10.2 255.255.255.0
 ipv6 address FE80::D1:1 link-local
 ipv6 address 2001:DB8:100:1010::2/64
 ipv6 ospf 6 area 0
!
interface GigabitEthernet1/0/12
 shutdown
!
interface GigabitEthernet1/0/13
 shutdown
!
interface GigabitEthernet1/0/14
 shutdown
!
interface GigabitEthernet1/0/15
 shutdown
!
interface GigabitEthernet1/0/16
 shutdown
!
interface GigabitEthernet1/0/17
 shutdown
!
interface GigabitEthernet1/0/18
 shutdown
!
interface GigabitEthernet1/0/19
```

```
 shutdown
!
interface GigabitEthernet1/0/20
 shutdown
!
interface GigabitEthernet1/0/21
 shutdown
!
interface GigabitEthernet1/0/22
 shutdown
!
interface GigabitEthernet1/0/23
 switchport access vlan 100
 switchport mode access
 spanning-tree portfast
!
interface GigabitEthernet1/0/24
 shutdown
!
interface GigabitEthernet1/1/1
 shutdown
!
interface GigabitEthernet1/1/2
 shutdown
!
interface GigabitEthernet1/1/3
 shutdown
!
interface GigabitEthernet1/1/4
```

```
 shutdown
!
interface Vlan1
 no ip address
!
interface Vlan100
 ip address 10.0.100.1 255.255.255.0
 standby version 2
 standby 104 ip 10.0.100.254
 standby 104 priority 150
 standby 104 preempt
 standby 104 track 4 decrement 60
 standby 106 ipv6 autoconfig
 standby 106 priority 150
 standby 106 preempt
 standby 106 track 6 decrement 60
 ipv6 address FE80::D1:2 link-local
 ipv6 address 2001:DB8:100:100::1/64
 ipv6 ospf 6 area 0
!
interface Vlan101
 ip address 10.0.101.1 255.255.255.0
 standby version 2
 standby 114 ip 10.0.101.254
 standby 114 preempt
 standby 114 track 4 decrement 60
 standby 116 ipv6 autoconfig
 standby 116 preempt
 standby 116 track 6 decrement 60
```

```
 ipv6 address FE80::D1:3 link-local
 ipv6 address 2001:DB8:100:101::1/64
 ipv6 ospf 6 area 0
!
interface Vlan102
 ip address 10.0.102.1 255.255.255.0
 standby version 2
 standby 124 ip 10.0.102.254
 standby 124 priority 150
 standby 124 preempt
 standby 124 track 4 decrement 60
 standby 126 ipv6 autoconfig
 standby 126 priority 150
 standby 126 preempt
 standby 126 track 6 decrement 60
 ipv6 address FE80::D1:4 link-local
 ipv6 address 2001:DB8:100:102::1/64
 ipv6 ospf 6 area 0
!
router ospf 4
 router-id 0.0.4.131
 passive-interface default
 no passive-interface GigabitEthernet1/0/11
 network 10.0.10.0 0.0.0.255 area 0
 network 10.0.100.0 0.0.0.255 area 0
 network 10.0.101.0 0.0.0.255 area 0
 network 10.0.102.0 0.0.0.255 area 0
!
ip forward-protocol nd
```

```
ip http server
ip http secure-server
!
ip access-list standard SNMP-NMS
 permit 10.0.100.5
!
ip sla 4
 icmp-echo 10.0.10.1
 frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
 icmp-echo 2001:DB8:100:1010::1
 frequency 5
ip sla schedule 6 life forever start-time now
logging trap warnings
logging host 10.0.100.5
ipv6 router ospf 6
 router-id 0.0.6.131
 passive-interface default
 no passive-interface GigabitEthernet1/0/11
!
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
```

```
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA
snmp ifmib ifindex persist
!
radius server RADIUS
 address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
 key $trongPass
!
control-plane
 service-policy input system-cpp-policy
!
banner motd ^C D1, ENCOR Skills Assessment, Scenario 1 ^C
!
line con 0
 exec-timeout 0 0
 logging synchronous
 stopbits 1
line aux 0
 stopbits 1
line vty 5 15
!
ntp server 10.0.10.1
!
End
```

- **Configuración Switch D2**

D2# show run

Building configuration...

Current configuration : 8208 bytes

!

version 16.9

no service pad

service timestamps debug datetime msec

service timestamps log datetime msec

no platform punt-keepalive disable-kernel-core

!

hostname D2

!

vrf definition Mgmt-vrf

 !

 address-family ipv4

 exit-address-family

 !

 address-family ipv6

 exit-address-family

!

enable   secret   9
9CQubYNwHPhsPpE$QWfTfAlfzmWD3ELHkcFNzlDlp24FkpjLnGBRMPbUN
ow

!

aaa new-model

!

aaa authentication login default group radius local

!

```
aaa session-id common
switch 1 provision ws-c3650-24ps
!
ip routing
!
no ip domain lookup
ip dhcp excluded-address 10.0.101.1 10.0.101.209
ip dhcp excluded-address 10.0.101.241 10.0.101.254
ip dhcp excluded-address 10.0.102.1 10.0.102.209
ip dhcp excluded-address 10.0.102.241 10.0.102.254
!
ip dhcp pool VLAN-101
 network 10.0.101.0 255.255.255.0
 default-router 10.0.101.254
!
ip dhcp pool VLAN-102
 network 10.0.102.0 255.255.255.0
 default-router 10.0.102.254
!
login on-success log
ipv6 unicast-routing
!
license boot level ipservicesk9
!
diagnostic bootup level minimal
!
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
```

spanning-tree vlan 101 priority 24576

!

username sadmin privilege 15 secret 9 $9$0bnG9yhbASQv9k$geQoMT2qxu1ItBXC5pl/SOR2YeWhqDOW0lsMIsicQDw

!

redundancy

 mode sso

!

transceiver type all

 monitoring

!

track 4 ip sla 4

 delay down 10 up 15

!

track 6 ip sla 6

 delay down 10 up 15

!

class-map match-any system-cpp-police-topology-control

  description Topology control

class-map match-any system-cpp-police-sw-forward

  description Sw forwarding, L2 LVX data, LOGGING

class-map match-any system-cpp-default

  description Inter FED, EWLC control, EWLC data

class-map match-any system-cpp-police-sys-data

  description Learning cache ovfl, High Rate App, Exception, EGR Exception, NFLSAMPLED DATA, RPF Failed

class-map match-any system-cpp-police-punt-webauth

  description Punt Webauth

class-map match-any system-cpp-police-l2lvx-control

description L2 LVX control packets

class-map match-any system-cpp-police-forus

    description Forus Address resolution and Forus traffic

class-map match-any system-cpp-police-multicast-end-station

    description MCAST END STATION

class-map match-any system-cpp-police-multicast

    description Transit Traffic and MCAST Data

class-map match-any system-cpp-police-l2-control

    description L2 control

class-map match-any system-cpp-police-dot1x-auth

    description DOT1X Auth

class-map match-any system-cpp-police-data

    description ICMP redirect, ICMP_GEN and BROADCAST

class-map match-any system-cpp-police-stackwise-virt-control

    description Stackwise Virtual

class-map match-any non-client-nrt-class

class-map match-any system-cpp-police-routing-control

    description Routing control and Low Latency

class-map match-any system-cpp-police-protocol-snooping

    description Protocol snooping

class-map match-any system-cpp-police-dhcp-snooping

    description DHCP snooping

class-map match-any system-cpp-police-system-critical

    description System Critical and Gold Pkt

!

policy-map system-cpp-policy

!

interface Port-channel2

 switchport trunk native vlan 999

```
 switchport mode trunk
!
interface Port-channel12
 switchport trunk native vlan 999
 switchport mode trunk
!
interface GigabitEthernet0/0
 vrf forwarding Mgmt-vrf
 no ip address
 negotiation auto
!
interface GigabitEthernet1/0/1
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 12 mode active
!
interface GigabitEthernet1/0/2
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 12 mode active
!
interface GigabitEthernet1/0/3
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 12 mode active
!
interface GigabitEthernet1/0/4
 switchport trunk native vlan 999
 switchport mode trunk
```

```
 channel-group 12 mode active
!
interface GigabitEthernet1/0/5
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 2 mode active
!
interface GigabitEthernet1/0/6
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 2 mode active
!
interface GigabitEthernet1/0/7
 shutdown
!
interface GigabitEthernet1/0/8
 shutdown
!
interface GigabitEthernet1/0/9
 shutdown
!
interface GigabitEthernet1/0/10
 shutdown
!
interface GigabitEthernet1/0/11
 no switchport
 ip address 10.0.11.2 255.255.255.0
 ipv6 address FE80::D1:1 link-local
 ipv6 address 2001:DB8:100:1011::2/64
```

```
 ipv6 ospf 6 area 0
!
interface GigabitEthernet1/0/12
 shutdown
!
interface GigabitEthernet1/0/13
 shutdown
!
interface GigabitEthernet1/0/14
 shutdown
!
interface GigabitEthernet1/0/15
 shutdown
!
interface GigabitEthernet1/0/16
 shutdown
!
interface GigabitEthernet1/0/17
 shutdown
!
interface GigabitEthernet1/0/18
 shutdown
!
interface GigabitEthernet1/0/19
 shutdown
!
interface GigabitEthernet1/0/20
 shutdown
!
```

```
interface GigabitEthernet1/0/21
 shutdown
!
interface GigabitEthernet1/0/22
 shutdown
!
interface GigabitEthernet1/0/23
 switchport access vlan 102
 switchport mode access
 spanning-tree portfast
!
interface GigabitEthernet1/0/24
 shutdown
!
interface GigabitEthernet1/1/1
 shutdown
!
interface GigabitEthernet1/1/2
 shutdown
!
interface GigabitEthernet1/1/3
 shutdown
!
interface GigabitEthernet1/1/4
 shutdown
!
interface Vlan1
 no ip address
!
```

```
interface Vlan100
 ip address 10.0.100.2 255.255.255.0
 standby version 2
 standby 104 ip 10.0.100.254
 standby 104 preempt
 standby 104 track 4 decrement 60
 standby 106 ipv6 autoconfig
 standby 106 preempt
 standby 106 track 6 decrement 60
 ipv6 address FE80::D2:2 link-local
 ipv6 address 2001:DB8:100:100::2/64
 ipv6 ospf 6 area 0
!
interface Vlan101
 ip address 10.0.101.2 255.255.255.0
 standby version 2
 standby 114 ip 10.0.101.254
 standby 114 priority 150
 standby 114 preempt
 standby 114 track 4 decrement 60
 standby 116 ipv6 autoconfig
 standby 116 priority 150
 standby 116 preempt
 standby 116 track 6 decrement 60
 ipv6 address FE80::D2:3 link-local
 ipv6 address 2001:DB8:100:101::2/64
 ipv6 ospf 6 area 0
!
interface Vlan102
```

```
  ip address 10.0.102.2 255.255.255.0
  standby version 2
  standby 124 ip 10.0.102.254
  standby 124 preempt
  standby 124 track 4 decrement 60
  standby 126 ipv6 autoconfig
  standby 126 preempt
  standby 126 track 6 decrement 60
  ipv6 address FE80::D2:4 link-local
  ipv6 address 2001:DB8:100:102::2/64
  ipv6 ospf 6 area 0
!
router ospf 4
 router-id 0.0.4.132
 passive-interface default
 no passive-interface GigabitEthernet1/0/11
 network 10.0.11.0 0.0.0.255 area 0
 network 10.0.100.0 0.0.0.255 area 0
 network 10.0.101.0 0.0.0.255 area 0
 network 10.0.102.0 0.0.0.255 area 0
!
ip forward-protocol nd
ip http server
ip http secure-server
!
ip access-list standard SNMP-NMS
 permit 10.0.100.5
!
ip sla 4
```

```
 icmp-echo 10.0.11.1
 frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
 icmp-echo 2001:DB8:100:1011::1
 frequency 5
ip sla schedule 6 life forever start-time now
logging trap warnings
logging host 10.0.100.5
ipv6 router ospf 6
 router-id 0.0.6.132
 passive-interface default
 no passive-interface GigabitEthernet1/0/11
!
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA
!
```

```
radius server RADIUS
 address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
 key $trongPass
!
control-plane
 service-policy input system-cpp-policy
!
banner motd ^C D2, ENCOR Skills Assessment, Scenario 1 ^C
!
line con 0
 exec-timeout 0 0
 logging synchronous
 stopbits 1
line aux 0
 stopbits 1
line vty 5 15
!
ntp server 10.0.10.1
!
End
```

- **Configuración Switch A1**

A1# show run
Building configuration...

Current configuration : 3102 bytes
!

version 15.2

no service pad

service timestamps debug datetime msec

service timestamps log datetime msec

no service password-encryption

!

hostname A1

!

boot-start-marker

boot-end-marker

!

enable secret 9 9W4yJyY0jfUFGt3$hgWzRhouqq81DGKiSw3oN3ICGIRFKI1TF9C4Qo2BoG k

!

username sadmin privilege 15 secret 9 9rIz/oiC6xETwLL$4MFl7ezehKgosutkpnwabhdf83xQOcDXYyW.dvyoneY

aaa new-model

!

aaa authentication login default group radius local

!

aaa session-id common

system mtu routing 1500

!

no ip domain-lookup

!

spanning-tree mode rapid-pvst

spanning-tree extend system-id

!

vlan internal allocation policy ascending

```
!
interface Port-channel1
 switchport trunk native vlan 999
 switchport mode trunk
!
interface Port-channel2
 switchport trunk native vlan 999
 switchport mode trunk
!
interface FastEthernet0/1
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 1 mode active
!
interface FastEthernet0/2
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 1 mode active
!
interface FastEthernet0/3
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 2 mode active
!
interface FastEthernet0/4
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 2 mode active
!
```

```
interface FastEthernet0/5
 shutdown
!
interface FastEthernet0/6
 shutdown
!
interface FastEthernet0/7
 shutdown
!
interface FastEthernet0/8
 shutdown
!
interface FastEthernet0/9
 shutdown
!
interface FastEthernet0/10
 shutdown
!
interface FastEthernet0/11
 shutdown
!
interface FastEthernet0/12
 shutdown
!
interface FastEthernet0/13
 shutdown
!
interface FastEthernet0/14
 shutdown
```

```
!
interface FastEthernet0/15
 shutdown
!
interface FastEthernet0/16
 shutdown
!
interface FastEthernet0/17
 shutdown
!
interface FastEthernet0/18
 shutdown
!
interface FastEthernet0/19
 shutdown
!
interface FastEthernet0/20
 shutdown
!
interface FastEthernet0/21
 shutdown
!
interface FastEthernet0/22
 shutdown
!
interface FastEthernet0/23
 switchport access vlan 101
 switchport mode access
 spanning-tree portfast edge
```

```
!
interface FastEthernet0/24
 switchport access vlan 100
 switchport mode access
 spanning-tree portfast edge
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
 no ip address
 shutdown
!
interface Vlan100
 ip address 10.0.100.3 255.255.255.0
 ipv6 address FE80::A1:1 link-local
 ipv6 address 2001:DB8:100:100::3/64
!
ip default-gateway 10.0.100.254
ip http server
ip http secure-server
!
ip access-list standard SNMP-NMS
 permit 10.0.100.5
!
logging trap warnings
logging host 10.0.100.5
!
```

```
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA
!
radius server RADIUS
 address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
 key $trongPass
!
banner motd ^C A1, ENCOR Skills Assessment, Scenario 1 ^C
!
line con 0
 exec-timeout 0 0
 logging synchronous
line vty 5 15
!
ntp server 10.0.10.1
end
```

CONCLUSIONES

Los comandos utilizados en la configuración del proyecto fueron los vistos en toda la carrera destacando los principales como la configuración de las interfaces para la conexión de cada dispositivo y poder verse entre sí.

En la actividad seleccione packet tracert debido a que presente problemas en GSN3, los comando utilizamos fueron de gran ayuda para entender el desarrollo de la actividad.

Unos del comando más importante que pude conocer en esta practica fue el comando Show Run, con este comando podemos revisar toda la configuración que tiene el Router o los swicth configurados.

A nivel de Switching se pudo realizar la integración entre dispositivos core L3 y Dispositivos de agregación para poder realizar una administración centralizada de VLANs, entre todo ellos a través de VTP, donde nos permite a través de un dispositivo crear VLANs y propagarlas hacia los demás. Por medio de STP, protocolo de protección de bucles, podemos a nivel de VLANs, determinar quién es el root bridge principal y secundario para poder determinar y evitar loops en los dominios de colisión segmentados.

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