

**DIPLOMADO DE PROFUNDIZACION CISCO
PRUEBA DE HABILIDADES PRÁCTICAS CCNP**

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**UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA - UNAD
ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA – ECBTI
INGENIERÍA ELECTRÓNICA
NEIVA
2021**

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**Diplomado de opción de grado presentado para optar
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NOTA DE ACEPTACIÓN

Firma del Presidente del Jurado

Firma del Jurado

Firma del Jurado

NEIVA, diciembre 5 de 2021

AGRADECIMIENTOS

Este logro académico no sería posible sin el arduo esfuerzo que ello implicó, en especial en medio de una coyuntura como la vivida en el último año. No obstante el apoyo de mi familia fue un factor decisivo en la consecución del presente logro. Por su puesto no podría dejar de lado a todos los docentes que hicieron posible la apropiación de los nuevos conceptos y su aplicabilidad.

Ramiro Alvarado Jaimez

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GLOSARIO

Protocolo de red Los protocolos de red definen un formato y un conjunto de reglas comunes para intercambiar mensajes entre dispositivos. Algunos de los protocolos de red más comunes son Hypertext Transfer Protocol (HTTP), el protocolo de control de transmisión (TCP) y el protocolo de Internet (IP).

Capa de Internet: El propósito de la capa de Internet es enviar paquetes origen desde cualquier red en la internet y que estos paquetes lleguen a su destino independientemente de la ruta y de las redes que recorrieron para llegar hasta allí.

Protocolo: Para que los paquetes de datos puedan viajar desde el origen hasta su destino a través de una red, es importante que todos los dispositivos de la red hablen el mismo lenguaje o protocolo. Un protocolo es un conjunto de reglas que hacen que la comunicación en una red sea más eficiente.

Capa 2: La capa de enlace de datos proporciona tránsito de datos confiable a través de un enlace físico. Al hacerlo, la capa de enlace de datos se ocupa del direccionamiento físico (comparado con el lógico) , la topología de red, el acceso a la red, la notificación de errores, entrega ordenada de tramas y control de flujo. Si desea recordar la Capa 2 en la menor cantidad de palabras posible, piense en tramas y control de acceso al medio.

Modelo TCP IP: El modelo TCP/IP tiene cuatro capas: la capa de aplicación, la capa de transporte, la capa de Internet y la capa de acceso de red. Es importante observar que algunas de las capas del modelo TCP/IP poseen el mismo nombre que las capas del modelo OSI.

RESUMEN

Dentro del contexto de la electrónica resulta ineludible hablar de las comunicaciones y, a su vez, dentro de la misma, de sistemas de conmutación, los cuales son propios de la rama antes mencionada. De hecho las comunicaciones están reguladas a través de la organización internacional IEEE, la cual ha definido la normativa y estándares para los campos en mención. De esta manera en el campo de las redes se destacan, por ejemplo de esta el estándar IEEE 802. No obstante, además de organizaciones como IEEE, empresas como Cisco Comunicaciones ofrecen desarrollo e innovaciones en un campo que presenta nuevos y complejos retos en la actual era de las comunicaciones. Al igual que IEEE, Cisco brinda capacitación con certificaciones como el CCNP. Siendo ambas, (organización y empresa) fuente de desarrollo dentro del campo las comunicaciones.

Palabras clave : Cisco, CCNP, Conmutación, Enrutamiento, Redes, Electrónica.

ABSTRACT

Within the context of electronics, it is unavoidable to speak of communications and, in turn, within it, of switching systems, which are typical of the aforementioned branch. In fact, communications are regulated through the international organization - IEEE-, which has defined the regulations and standards for the fields in question. In this way, in the field of networks, the IEEE 802 standard stands out, for example stake. However, in addition to organizations such as IEEE, companies such as Cisco Communications offer development and innovations in a field that present new and complex challenges in today's world. era of communications. Like IEEE, Cisco provides training with certifications like the CCNP. Both being (organization and company) a source of development within the communications field.

Keywords: CISCO, CCNP, Routing, Swicthing, Networking, Electronics

INTRODUCCIÓN

Las comunicaciones poseen una alta relevancia en la era moderna a raíz de que no solo se limitan a la transferencia de voz como fuera en otrora. Sin embargo la modernidad ha demandado nuevos empaquetados, protocolos mejorados, encriptados inescrutables y modelos más óptimos de un campo que avanza convulsionadamente con los desarrollos tecnológicos.

No obstante no resulta suficiente generar nuevos desarrollos sin poseer un dominio avanzado de las actuales ventajas de los equipos y sistemas de comunicación como los ofrecidos por Cisco o aquellos que resultan alternos pero que poseen una misma arquitectura de funcionamiento. El aspecto a resaltar redundante en la amplia necesidad de abordar las diversas bondades que ofrece el manejo del modelo OSI o el TCP/IP, afines de algún modo, para la eliminación o atenuación de factores de falla que suelen dar ese matiz ya naturalizado del recurrente daño o ralentización de los equipos en la prestación de servicios alrededor de las comunicaciones (voz o datos).

No cabe duda, que aún queda bastante por mejorar, comenzando por la universalización de estándares, el acceso a capacitación y la exigencia de certificaciones por parte del personal y los equipos.

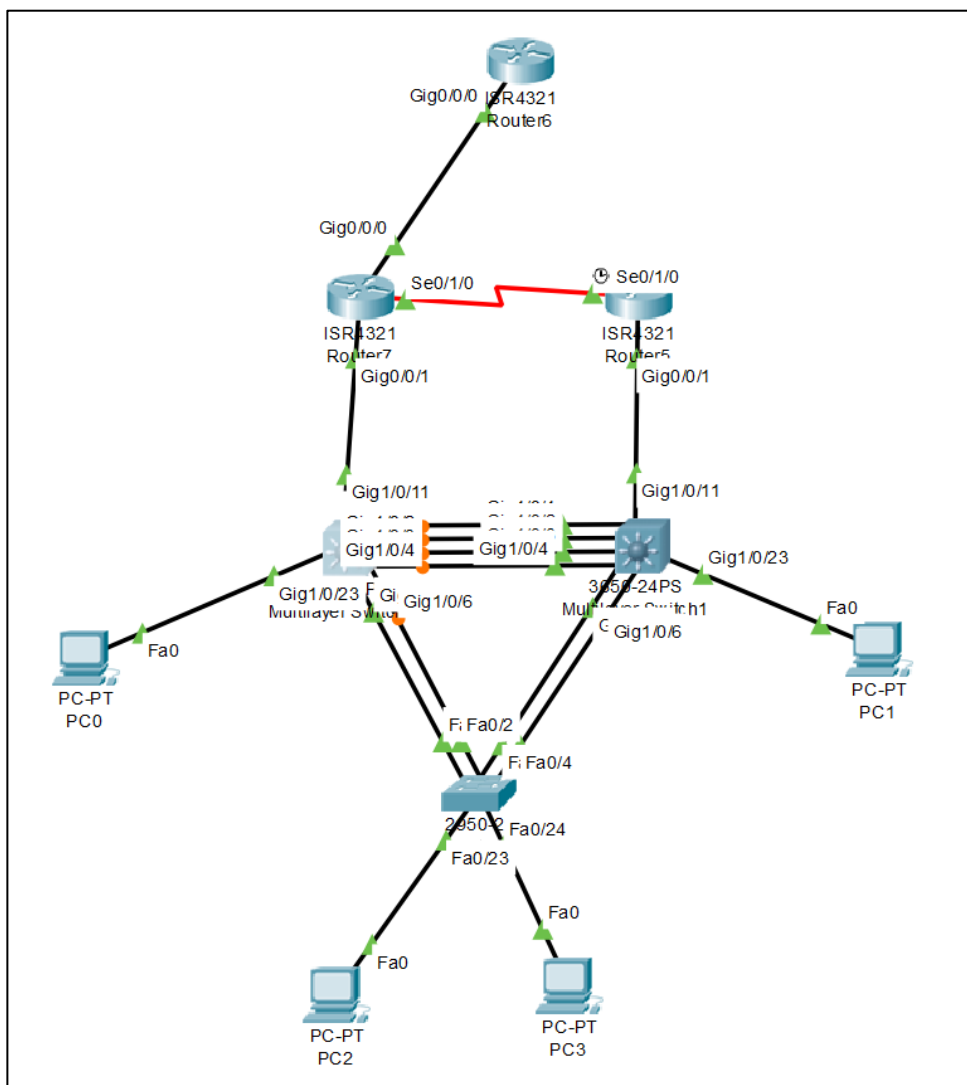
En este orden de ideas, la práctica dentro del ámbito académico adquiere un valor contextualizador para obtener una mejor aproximación a las necesidades y las alternativas que se presentan in situ.

PRUEBA DE HABILIDADES PRÁCTICAS CCNP

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.



Gráfica 1: Topología en Packet Tracer

Paso 2: Configurar los parámetros básicos para cada dispositivo:

Mediante una conexión de consola ingrese en cada dispositivo, entre al modo de configuración global y aplique los parámetros básicos.

Router R1

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R1
R1(config)#no ip domain lookup
R1(config)#banner motd # R1, ENCOR Skills Assessment, Scenario 1 #
R1(config)#line con 0
R1(config-line)#exec-timeout 0 0
R1(config-line)#logging synchronous
R1(config-line)#exit
R1(config)#interface g0/0/0
R1(config-if)#ip address 209.165.200.225 255.255.255.224
R1(config-if)#ipv6 address fe80::1:1 link-local
R1(config-if)#ipv6 address 2001:db8:200::1/64
R1(config-if)#no shutdown
R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up
R1(config-if)#exit
R1(config)#interface s0/0/1
R1(config-if)#ip address 10.0.13.1 255.255.255.0
R1(config-if)#ipv6 address fe80::1:3 link-local
R1(config-if)#ipv6 address 2001:db8:100:1013::1/64
R1(config-if)#no shutdown
R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up

R1(config-if)#exit
R1(config)#interface g0/0/1
R1(config-if)#ip address 10.0.10.1 255.255.255.0
R1(config-if)#ipv6 address fe80::1:2 link-local
R1(config-if)#ipv6 address 2001:db8:100:1010::1/64
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#
R1(config)#end
```

R1(config-if)#

Router R2

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(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)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up
R2(config-if)#exit
R2(config)#interface Loopback 0
R2(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

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)#

```

Router R3

```

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R3
R3(config)#ipv6 unicast-routing
R3(config)#no ip domain lookup
R3(config)#banner motd # R3, ENCOR Skills Assessment, Scenario 1 #
R3(config)#line con 0
R3(config-line)#exec-timeout 0 0
R3(config-line)#logging synchronous
R3(config-line)#exit
R3(config)#interface g0/0/1
R3(config-if)#ip address 10.0.11.1 255.255.255.0
R3(config-if)#ipv6 address fe80::3:2 link-local
R3(config-if)#ipv6 address 2001:db8:100:1011::1/6
R3(config-if)#no shutdown

R3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up

R3(config-if)#exit
R3(config)#
R3#
%SYS-5-CONFIG_I: Configured from console by console

```

Switch D1

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname D1
D1(config)#ip routing
D1(config)#ipv6 unicast-routing
D1(config)#no ip domain lookup
D1(config)#banner motd # D1, ENCOR Skills Assessment, Scenario 1 #
D1(config)#line con 0
D1(config-line)#exec-timeout 0 0
D1(config-line)#logging synchronous
D1(config-line)#exit
D1(config)#vlan 100
D1(config-vlan)#name Management
D1(config-vlan)#exit
D1(config)#vlan 101
D1(config-vlan)#name UserGroupA
D1(config-vlan)#exit
D1(config)#vlan 102
D1(config-vlan)#name UserGroupB
D1(config-vlan)#exit
D1(config)#vlan 999
D1(config-vlan)#name NATIVE
D1(config-vlan)#exit
D1(config)#interface g1/0/11
D1(config-if)#no switchport
D1(config-if)#ip address 10.0.10.2 255.255.255.0
D1(config-if)#ipv6 address fe80::d1:1 link-local
D1(config-if)#ipv6 address 2001:db8:100:1010::2/64
D1(config-if)#no shutdown
D1(config-if)#exit
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0/11, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0/11, changed state to up
D1(config-if)#exit
D1(config)#interface vlan 100
D1(config-if)#ip address 10.0.100.1 255.255.255.0
D1(config-if)#ipv6 address fe80::d1:2 link-local
D1(config-if)#ipv6 address 2001:db8:100:100::1/64
D1(config-if)#no shutdown
D1(config-if)#exit
%LINK-5-CHANGED: Interface Vlan100, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state to up
D1(config-if)#exit
D1(config)#interface vlan 101
D1(config-if)#ip address 10.0.101.1 255.255.255.0
D1(config-if)#ipv6 address fe80::d1:3 link-local
D1(config-if)#ipv6 address 2001:db8:100:101::1/64
D1(config-if)#no shutdown
D1(config-if)#exit
%LINK-5-CHANGED: Interface Vlan101, changed state to up
```

```

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan101, changed state to up
D1(config-if)#exit
D1(config)#interface vlan 102
D1(config-if)#ip address 10.0.102.1 255.255.255.0
D1(config-if)#ipv6 address fe80::d1:4 link-local
D1(config-if)#ipv6 address 2001:db8:100:102::1/64
D1(config-if)#no shutdown
D1(config-if)#exit
%LINK-5-CHANGED: Interface Vlan102, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan102, changed state to up
D1(config-if)#exit
D1(config)#ip dhcp excluded-address 10.0.101.1 10.0.101.109
D1(config)#ip dhcp excluded-address 10.0.101.141 10.0.101.254
D1(config)#ip dhcp excluded-address 10.0.102.1 10.0.102.109
D1(config)#ip dhcp excluded-address 10.0.102.141 10.0.102.254
D1(config)#ip dhcp pool VLAN-101
D1(dhcp-config)#network 10.0.101.0 255.255.255.0
D1(dhcp-config)#default-router 10.0.101.254
D1(dhcp-config)#exit
D1(config)#ip dhcp pool VLAN-102
D1(dhcp-config)#network 10.0.102.0 255.255.255.0
D1(dhcp-config)#default-router 10.0.102.254
D1(dhcp-config)#exit
D1(config)#interface range g1/0/1-10
D1(config-if-range)#interface range g1/0/12-24
D1(config-if-range)#interface range g1/1/1-4
D1(config-if-range)#shutdown
%LINK-5-CHANGED: Interface GigabitEthernet1/1/1, changed state to administratively down
%LINK-5-CHANGED: Interface GigabitEthernet1/1/2, changed state to administratively down
%LINK-5-CHANGED: Interface GigabitEthernet1/1/3, changed state to administratively down
%LINK-5-CHANGED: Interface GigabitEthernet1/1/4, changed state to administratively down
D1(config-if-range)#exit
D1(config)#
D1#
%SYS-5-CONFIG_I: Configured from console by console
D1#

```

Switch D2

```

Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname D2
D2(config)#ip routing
D2(config)#ipv6 unicast-routing
D2(config)#no ip domain lookup
D2(config)#banner motd # D2, ENCOR Skills Assessment, Scenario 1 #
D2(config)#line con 0
D2(config-line)#exec-timeout 0 0
D2(config-line)#logging synchronous
D2(config-line)#exit
D2(config)#vlan 100

```



```

D2(config-vlan)#name Management
D2(config-vlan)#exit
D2(config)#vlan 101
D2(config-vlan)#name UserGroupA
D2(config-vlan)#exit
D2(config)#vlan 102
D2(config-vlan)#name UserGroupB
D2(config-vlan)#exit
D2(config)#vlan 999
D2(config-vlan)#name NATIVE
D2(config-vlan)#exit
D2(config)#interface g1/0/11
D2(config-if)#no switchport
D2(config-if)#ip address 10.0.11.2 255.255.255.0
D2(config-if)#ipv6 address fe80::d1:1 link-local
D2(config-if)#ipv6 address 2001:db8:100:1011::2/64
D2(config-if)#no shutdown
D2(config-if)#exit
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0/11, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0/11, changed state to up
D2(config-if)#exit
D2(config)#interface vlan 100
D2(config-if)#ip address 10.0.100.2 255.255.255.0
D2(config-if)#ipv6 address fe80::d2:2 link-local
D2(config-if)#ipv6 address 2001:db8:100:100::2/64
D2(config-if)#no shutdown
D2(config-if)#exit
%LINK-5-CHANGED: Interface Vlan100, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state to up
D2(config-if)#exit
D2(config)#interface vlan 101
D2(config-if)#ip address 10.0.101.2 255.255.255.0
D2(config-if)#ipv6 address fe80::d2:3 link-local
D2(config-if)#ipv6 address 2001:db8:100:101::2/64
D2(config-if)#no shutdown
D2(config-if)#exit
%LINK-5-CHANGED: Interface Vlan101, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan101, changed state to up
D2(config-if)#exit
D2(config)#interface vlan 102
D2(config-if)#ip address 10.0.102.2 255.255.255.0
D2(config-if)#ipv6 address fe80::d2:4 link-local
D2(config-if)#ipv6 address 2001:db8:100:102::2/64
D2(config-if)#no shutdown
D2(config-if)#exit
%LINK-5-CHANGED: Interface Vlan102, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan102, changed state to up
D2(config-if)#exit
D2(config)#ip dhcp excluded-address 10.0.101.1 10.0.101.209
D2(config)#ip dhcp excluded-address 10.0.101.241 10.0.101.254
D2(config)#ip dhcp excluded-address 10.0.102.1 10.0.102.209
D2(config)#ip dhcp excluded-address 10.0.102.241 10.0.102.254

```

```

D2(config)#ip dhcp pool VLAN-101
D2(dhcp-config)#network 10.0.101.0 255.255.255.0
D2(dhcp-config)#default-router 10.0.101.254
D2(dhcp-config)#exit
D2(config)#ip dhcp pool VLAN-102
D2(dhcp-config)#network 10.0.102.0 255.255.255.0
D2(dhcp-config)#default-router 10.0.102.254
D2(dhcp-config)#exit
D2(config)#interface range g1/0/1-10
D2(config-if-range)#interface range g1/0/12-24
D2(config-if-range)#interface range g1/1/1-4
D2(config-if-range)#shutdown
%LINK-5-CHANGED: Interface GigabitEthernet1/1/1, changed state to administratively down
%LINK-5-CHANGED: Interface GigabitEthernet1/1/2, changed state to administratively down
%LINK-5-CHANGED: Interface GigabitEthernet1/1/3, changed state to administratively down
%LINK-5-CHANGED: Interface GigabitEthernet1/1/4, changed state to administratively down
D2(config-if-range)#exit
D2(config)#

```

Switch A1

```

Switch>enable
Switch#configure terminal
Switch(config)#hostname A1
A1(config)#no ip domain lookup
A1(config)#banner motd # A1, ENCOR Skills Assessment, Scenario 1 #
A1(config)#line con 0
A1(config)#exec-timeout 0 0
A1(config)#logging synchronous
A1(config)#exit
A1(config)#vlan 100
A1(config-vlan)#name Management
A1(config-vlan)#exit
A1(config)#vlan 101
A1(config-vlan)#name UserGroupA
A1(config-vlan)#exit
A1(config)#vlan 102
A1(config-vlan)#name UserGroupB
A1(config)#exit
A1(config)#vlan 999
A1(config-vlan)#name NATIVE
A1(config-vlan)#exit
A1(config)#interface vlan 100
20
A1(config)#ip address 10.0.100.3 255.255.255.0
A1(config)#ipv6 address fe80::a1:1 link-local
A1(config)#ipv6 address 2001:db8:100:100::3/64
A1(config)#no shutdown
A1(config)#exit
A1(config)#interface range f0/5-22
A1(config)#shutdown
A1(config)#exit

```

PARTE 2: CONFIGURAR LA CAPA 2 DE LA RED Y EL SOPORTE HOST.

Tarea 2.1: Habilite enlaces trunk 802.1Q entre:

D1 and D2

D1 and A1

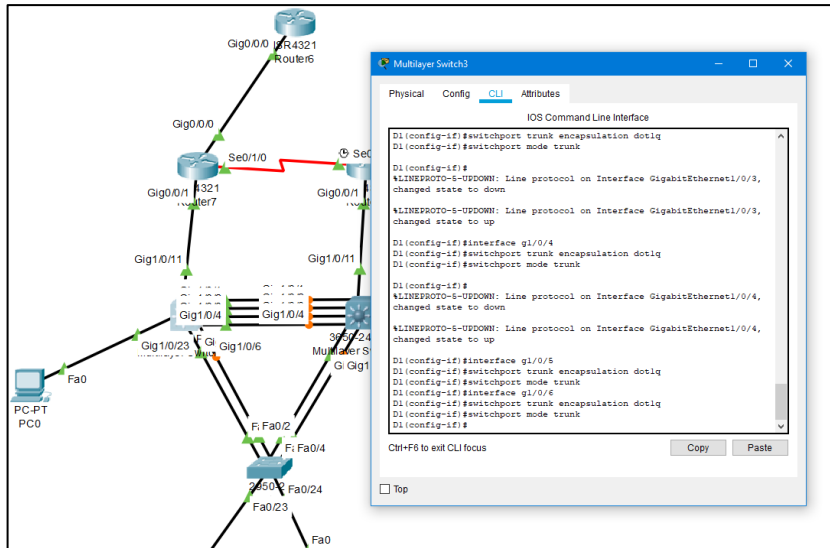
D2 and A1

Solución:

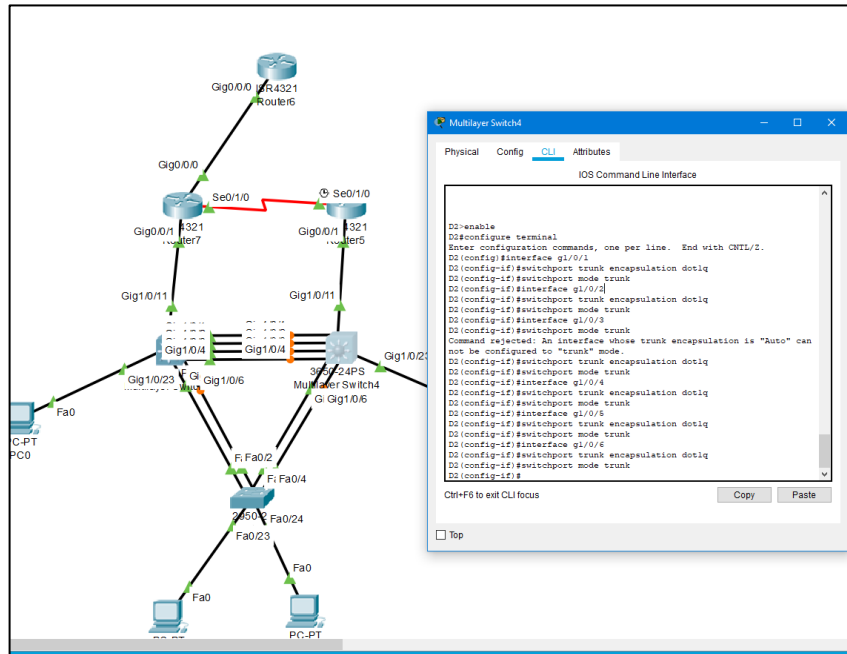
Tabla 1: Enlaces trunk entre SW

En el Switch D1	En el Switch D2	En el Switch A1
D1>enable D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#interface g1/0/1 D1(config-if)#switchport trunk encapsulation dot1q D1(config-if)#switchport mode trunk D1(config-if)# D1(config-if)#interface g1/0/2 D1(config-if)#switchport trunk encapsulation dot1q D1(config-if)#switchport mode trunk D1(config-if)# D1(config-if)#interface g1/0/3 D1(config-if)#switchport trunk encapsulation dot1q D1(config-if)#switchport mode trunk D1(config-if)# D1(config-if)#interface g1/0/4 D1(config-if)#switchport trunk encapsulation dot1q D1(config-if)#switchport mode trunk D1(config-if)# D1(config-if)#interface g1/0/5 D1(config-if)#switchport trunk encapsulation dot1q D1(config-if)#switchport mode trunk D1(config-if)#interface g1/0/6 D1(config-if)#switchport trunk encapsulation dot1q D1(config-if)#switchport mode trunk	D2>enable D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#interface g1/0/1 D2(config-if)#switchport trunk encapsulation dot1q D2(config-if)#switchport mode trunk D2(config-if)#interface g1/0/2 D2(config-if)#switchport trunk encapsulation dot1q D2(config-if)#switchport mode trunk D2(config-if)#interface g1/0/3 D2(config-if)#switchport trunk encapsulation dot1q D2(config-if)#switchport mode trunk D2(config-if)#interface g1/0/4 D2(config-if)#switchport trunk encapsulation dot1q D2(config-if)#switchport mode trunk D2(config-if)#interface g1/0/5 D2(config-if)#switchport trunk encapsulation dot1q D2(config-if)#switchport mode trunk D2(config-if)#interface g1/0/6 D2(config-if)#switchport trunk encapsulation dot1q D2(config-if)#switchport mode trunk D2(config-if)#	A1>enable A1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. A1(config)#interface F0/1 A1(config-if)#switchport mode trunk A1(config-if)#interface F0/2 A1(config-if)#switchport mode trunk A1(config-if)#interface F0/3 A1(config-if)#switchport mode trunk A1(config-if)#interface F0/4 A1(config-if)#switchport mode trunk A1(config-if)# A1# %SYS-5-CONFIG_I: Configured from console by console A1#

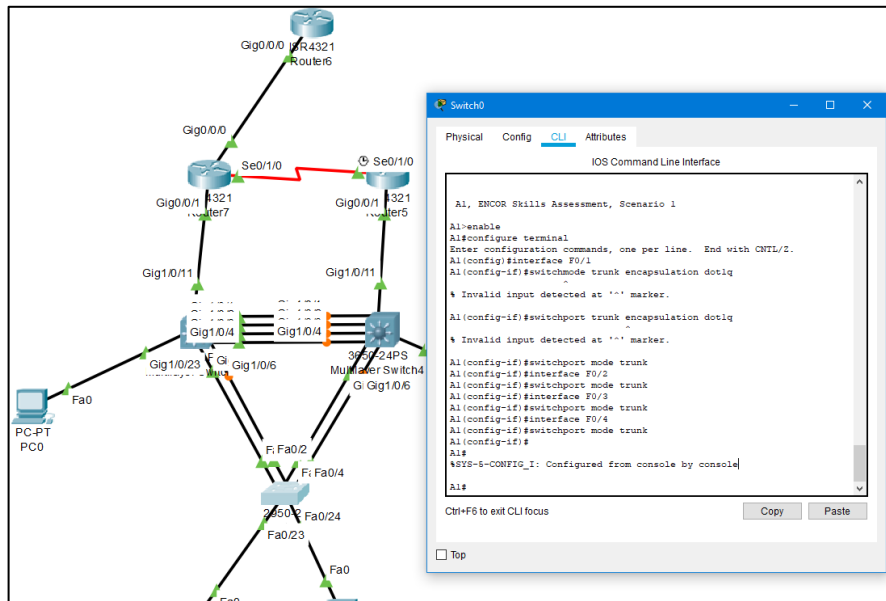
D1(config-if)#



Grafica 2: Interfaces troncales D1



Grafica 3: Interfaces troncales D2



Gráfica 4: Interfaces troncales A1

Tarea 2.2: Use VLAN 999 como la VLAN nativa

Tabla 2: Usar VLAN 999 como Nativa

En el Switch D1	En el Switch D2	En el Switch A1
<pre>D1#enable D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#interface g1/0/1 D1(config-if)#switchport trunk native vlan 999 D1(config-if)#interface g1/0/2 D1(config-if)#switchport trunk native vlan 999 D1(config-if)#interface g1/0/3 D1(config-if)#switchport trunk native vlan 999 D1(config-if)#interface g1/0/4 D1(config-if)#switchport trunk native vlan 999 D1(config-if)#interface g1/0/5 D1(config-if)#switchport trunk native vlan 999 D1(config-if)#interface g1/0/6 D1(config-if)#switchport trunk native vlan 999 D1(config-if)#</pre>	<pre>D2#enable D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#interface g1/0/1 D2(config-if)#switchport trunk native vlan 999 D2(config-if)#interface g1/0/2 D2(config-if)#switchport trunk native vlan 999 D2(config-if)#interface g1/0/3 D2(config-if)#switchport trunk native vlan 999 D2(config-if)#interface g1/0/4 D2(config-if)#switchport trunk native vlan 999 D2(config-if)#interface g1/0/5 D2(config-if)#switchport trunk native vlan 999 D2(config-if)#interface g1/0/6 D2(config-if)#switchport trunk native vlan 999 D2(config-if)#</pre>	<pre>A1>enable A1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. A1(config)#interface f0/1 A1(config-if)#interface f0/1 A1(config-if)#switchport trunk native vlan 999 A1(config-if)#interface f0/2 A1(config-if)#switchport trunk native vlan 999 A1(config-if)#interface f0/3 A1(config-if)#switchport trunk native vlan 999 A1(config-if)#interface f0/4 A1(config-if)#switchport trunk native vlan 999 A1(config-if)#</pre>

Tarea 2.3: Use Rapid Spanning Tree (RSPT).

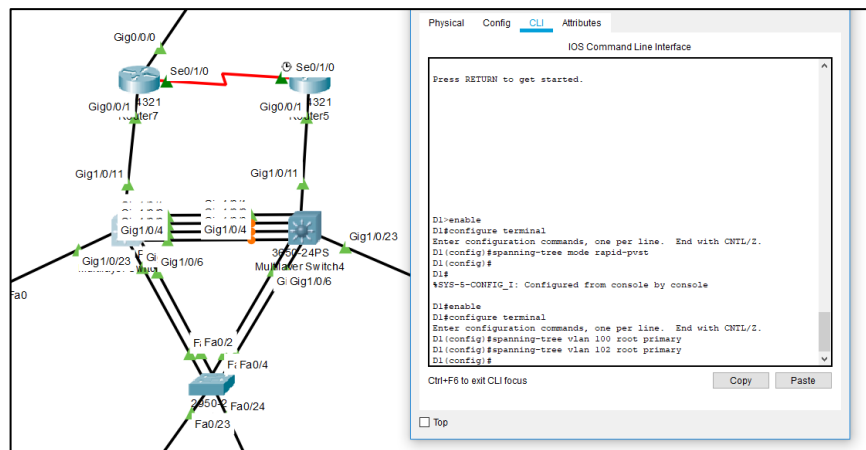
Tabla 3: Use RSPT

En el Switch D1	En el Switch D2	En el Switch A1
<pre>D1>enable D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#spanning-tree mode rapid-pvst D1(config)# D1#</pre>	<pre>D2#enable D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#spanning-tree mode rapid-pvst D2(config)#</pre>	<pre>A1#enable A1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. A1(config)#spanning-tree mode rapid-pvst A1(config)#</pre>

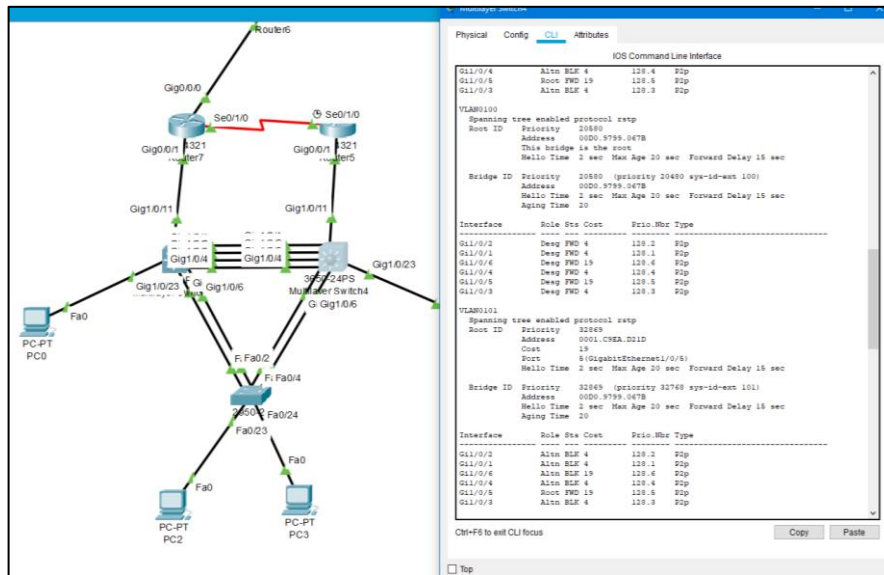
Tarea 2.4: Configure D1 y D2 como raíz (root) para las VLAN apropiadas, con prioridades de apoyo mutuo en caso de falla del switch.

Tabla 4: Root VLAN D1 y D2

En el Switch D1	En el Switch D2
<pre>D1#enable D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#spanning-tree vlan 100 root primary D1(config)#spanning-tree vlan 102 root primary D1(config)#</pre>	<pre>D2>enable D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#spanning-tree vlan 100 root primary D2(config)#</pre>



Gráfica 8: Puente raíz RSTP- D1



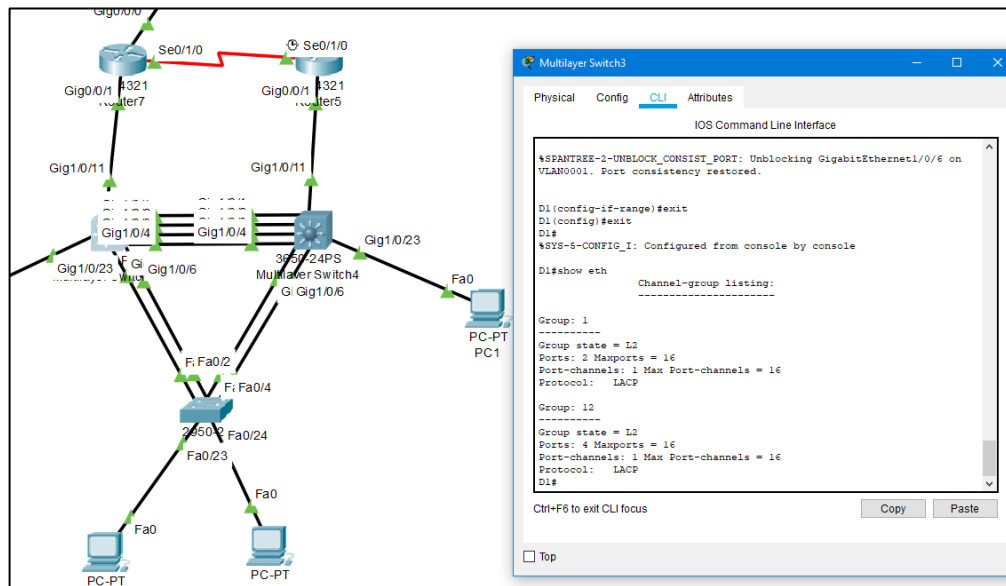
Gráfica 11: Root bridge D2

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

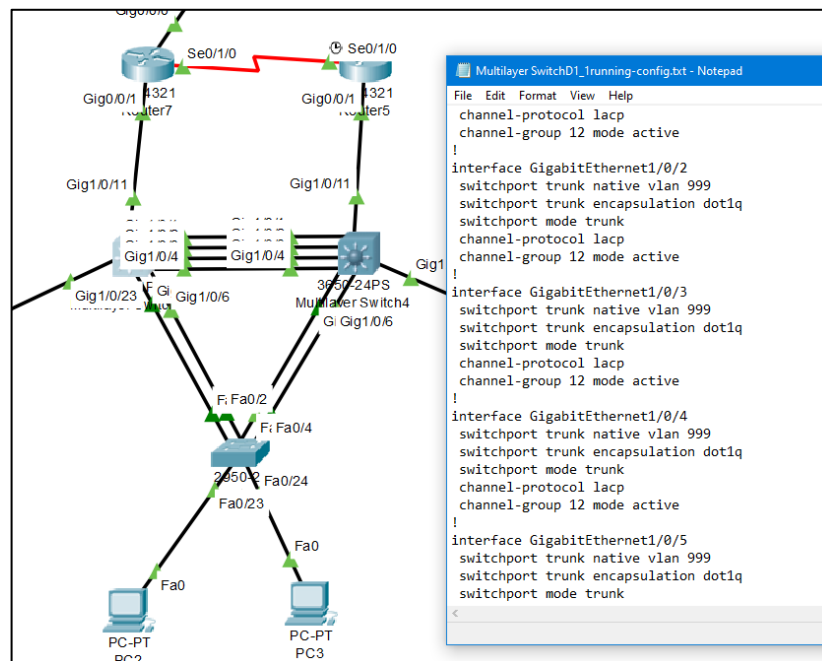
Tabla 5: EtherChannels SW

En el Switch D1	En el Switch D2	En el Switch A1
<pre>D1>enable D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#interface range g1/0/1-4 D1(config-if-range)#switchport trunk native vlan 1 D1(config-if-range)#channel- protocol lacp D1(config-if-range)#channel-group 12 mode active D1(config-if-range)# Creating a port-channel interface Port-channel 12 D1(config-if-range)#switchport trunk native vlan 999 D1(config-if-range)#interface range g1/0/5-6 D1(config-if-range)#switchport trunk native vlan 1 D1(config-if-range)#channel- protocol lacp D1(config-if-range)#channel-group 1 mode active D1(config-if-range)#</pre>	<pre>D2>enable D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#interface range g1/0/1-4 D2(config-if-range)#switchport trunk native vlan 1 D2(config-if-range)#channel- protocol lacp D2(config-if-range)#channel-group 12 mode active D2(config-if-range)# Creating a port-channel interface Port-channel 12 D2(config-if-range)#switchport trunk native vlan 999 D2(config-if-range)#interface range g1/0/5-6 D2(config-if-range)#switchport trunk native vlan 1 D2(config-if-range)#channel- protocol lacp D2(config-if-range)#channel- protocol lacp D2(config-if-range)#channel-group 2 mode active</pre>	<pre>A1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. A1(config)#interface range f0/1-2 A1(config-if-range)#switchport trunk native vlan 1 A1(config-if-range)#channel- protocol lacp A1(config-if-range)#channel-group 1 mode active A1(config-if-range)# Creating a port-channel interface Port-channel 1 A1(config-if-range)#switchport trunk native vlan 999 A1(config-if-range)#interface range f0/3-4 A1(config-if-range)#switchport trunk native vlan 1 A1(config-if-range)# A1(config-if-range)#channel- protocol lacp A1(config-if-range)#channel-group 2 mode active A1(config-if-range)# Creating a port-channel interface Port-channel 2</pre>

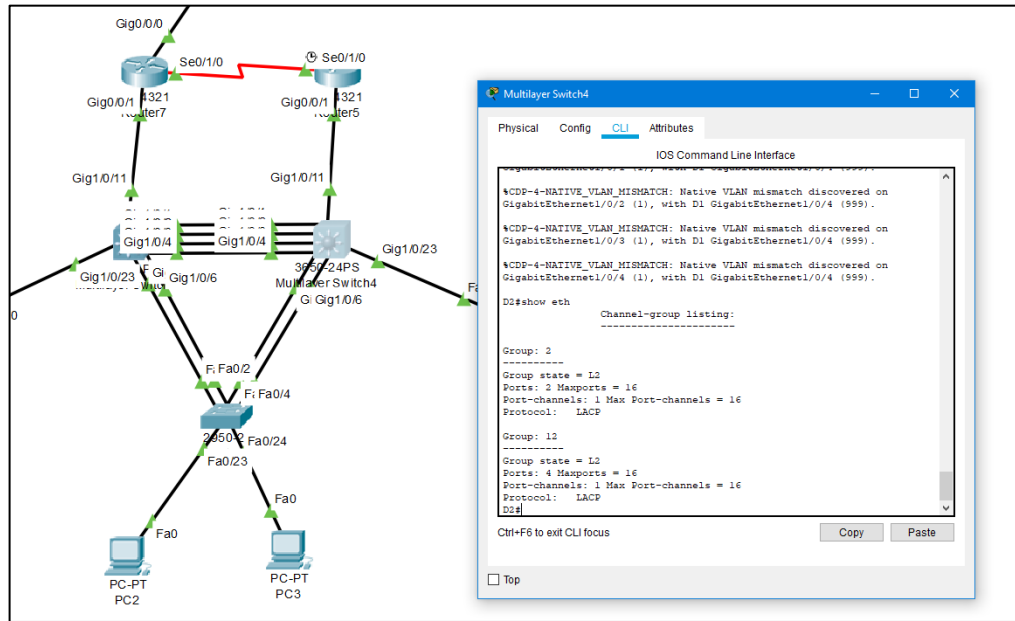
<p>Creating a port-channel interface Port-channel 1</p> <p>D1(config-if-range)#switchport trunk native vlan 999</p>	<p>D2(config-if-range)# Creating a port-channel interface Port-channel 2</p> <p>D2(config-if-range)#switchport trunk native vlan 999</p> <p>D2(config-if-range)#</p>	<p>A1(config-if-range)#switchport trunk native vlan 999</p> <p>A1(config-if-range)#</p>
---	--	---



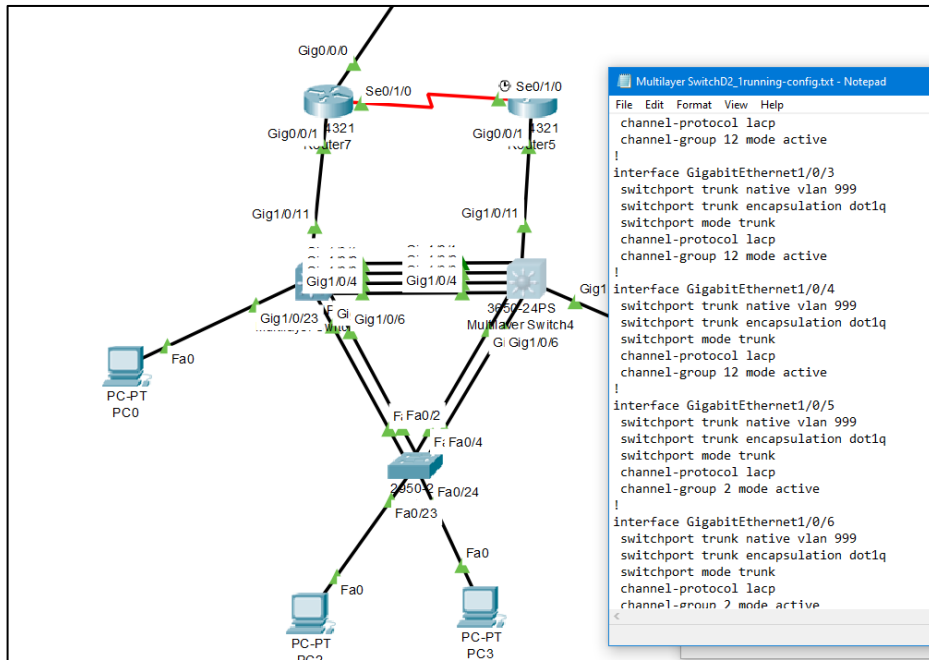
Gráfica 12: EtherChannels LACP D1



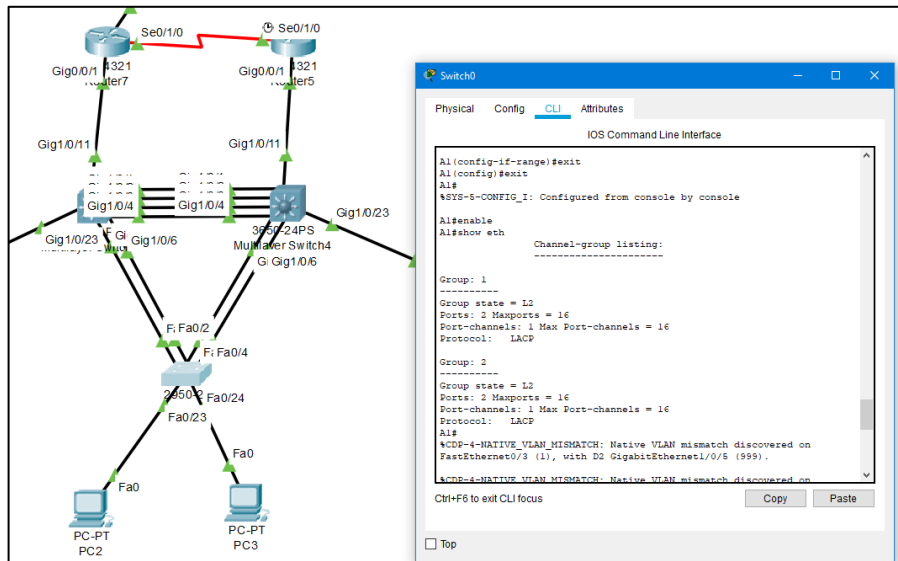
Gráfica 13: EtherChannels D1



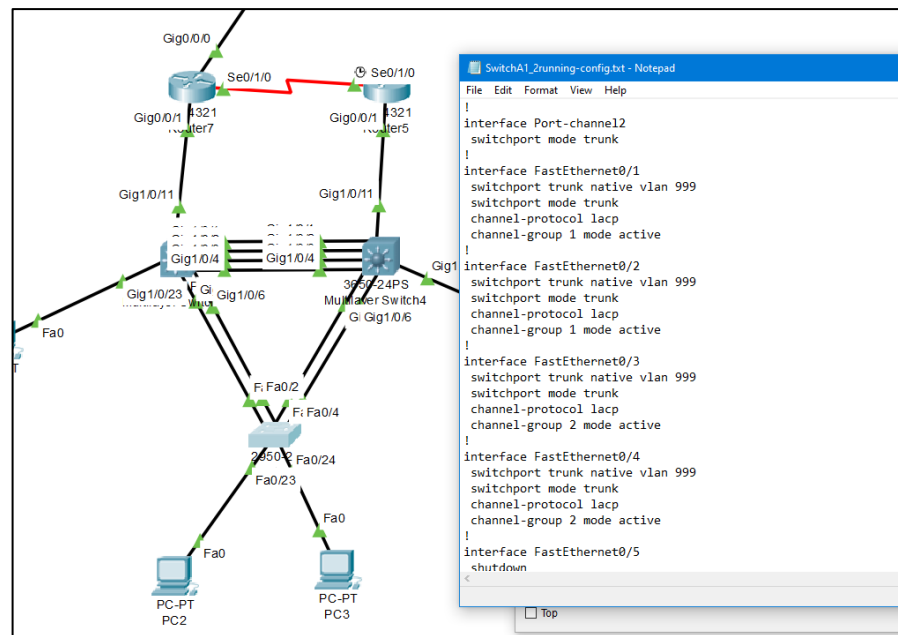
Gráfica 14: EtherChannels LACP D2



Gráfica 15: EtherChannels D2



Gráfica 16: EtherChannels LACP A1

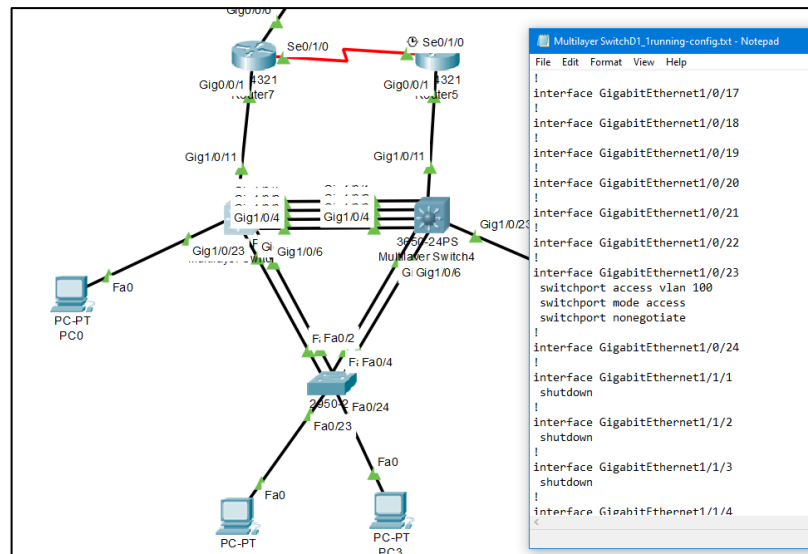


Gráfica 17: EtherChannels A1

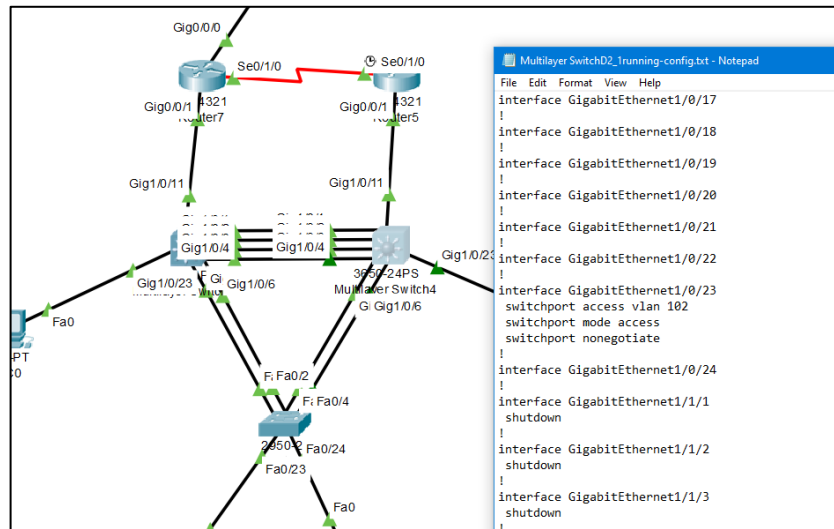
Tarea 2.6: En todos los switches, configure los puertos de acceso del host (host access port) que se conectan a PC1, PC2, PC3 y PC4

Tabla 6: Configuración Puertos acceso

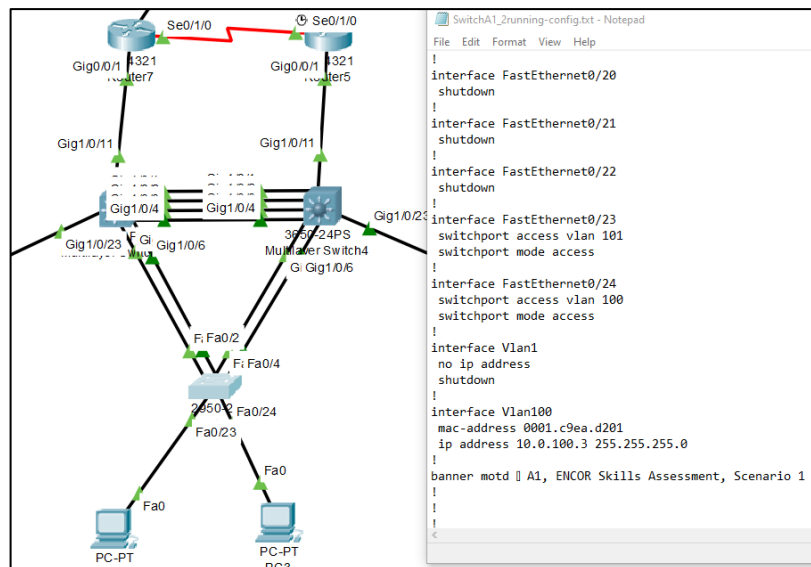
En el Switch D1	En el Switch D2	En el Switch A1
<pre>D1>enable D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#interface g1/0/23 D1(config-if)#switchport mode Access D1(config-if)#switchport access vlan 100 D1(config-if)#no shutdown D1(config-if)#</pre>	<pre>D2>enable D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)# D2(config)#interface g1/0/23 D2(config-if)#switchport mode Access D2(config-if)#switchport access vlan 102 D2(config-if)#no shutdown D2(config-if)#</pre>	<pre>A1> enable A1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. A1(config)#interface f0/23 A1(config-if)#switchport mode Access A1(config-if)#switchport access vlan 101 A1(config-if)#no shutdown A1(config-if)#interface f0/24 A1(config-if)#switchport mode Access A1(config-if)#switchport access vlan 100 A1(config-if)#no shutdown</pre>



Gráfica 18: Puerto de acceso al host- D1

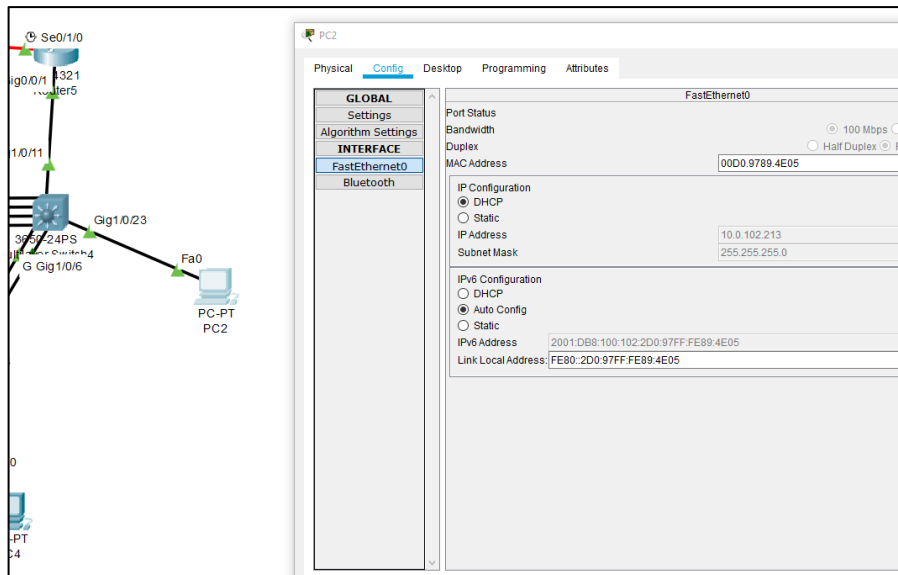


Gráfica 19: Puerto de acceso al host - D2

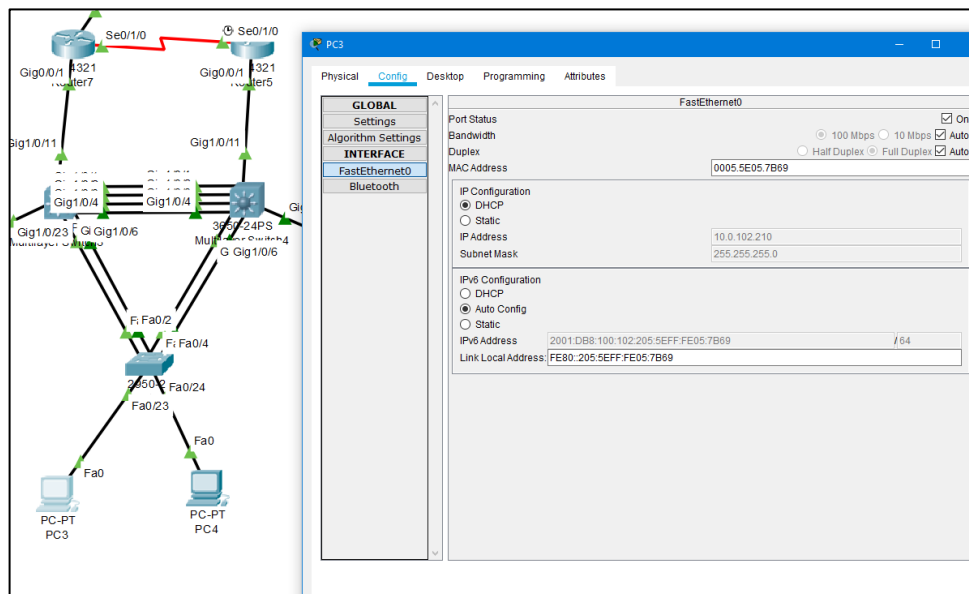


Gráfica 20: Puertos de acceso al host - A1

Tarea 2.7: Verifique los servicios DHCP IPv4.

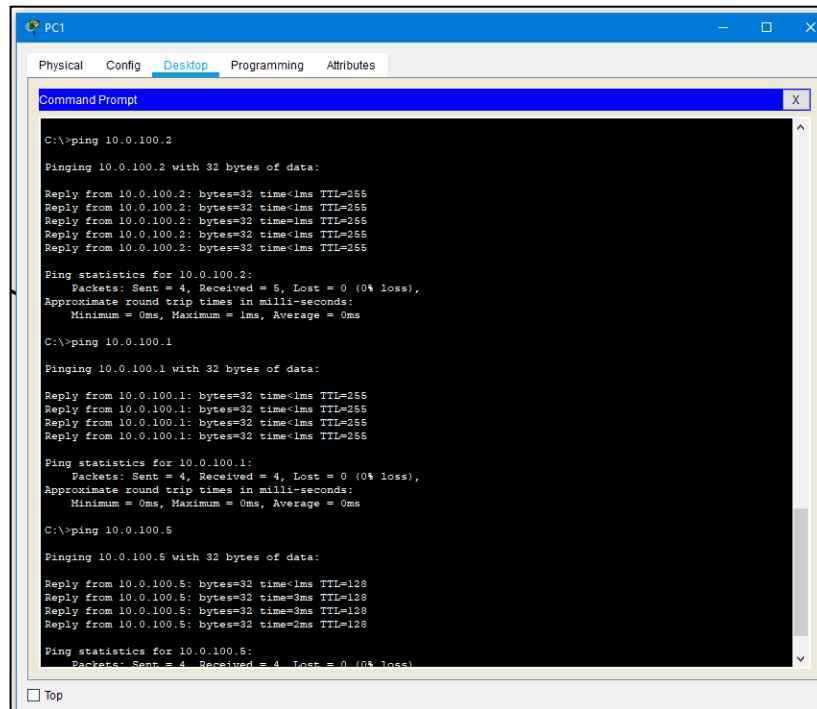


Gráfica 21: Dirección IP PC2- DHCP



Gráfica 22: Dirección IP PC3- DHCP

Tarea 2.8: Verifique la conectividad de la LAN local



```
PC1
Physical Config Desktop Programming Attributes
Command Prompt
C:\>ping 10.0.100.2

Pinging 10.0.100.2 with 32 bytes of data:

Reply from 10.0.100.2: bytes=32 time<1ms TTL=255
Reply from 10.0.100.2: bytes=32 time<1ms TTL=255
Reply from 10.0.100.2: bytes=32 time<1ms TTL=255
Reply from 10.0.100.2: bytes=32 time<1ms TTL=255
Reply from 10.0.100.2: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.100.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 10.0.100.1

Pinging 10.0.100.1 with 32 bytes of data:

Reply from 10.0.100.1: bytes=32 time<1ms TTL=255
Reply from 10.0.100.1: bytes=32 time<1ms TTL=255
Reply from 10.0.100.1: bytes=32 time<1ms TTL=255
Reply from 10.0.100.1: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.100.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

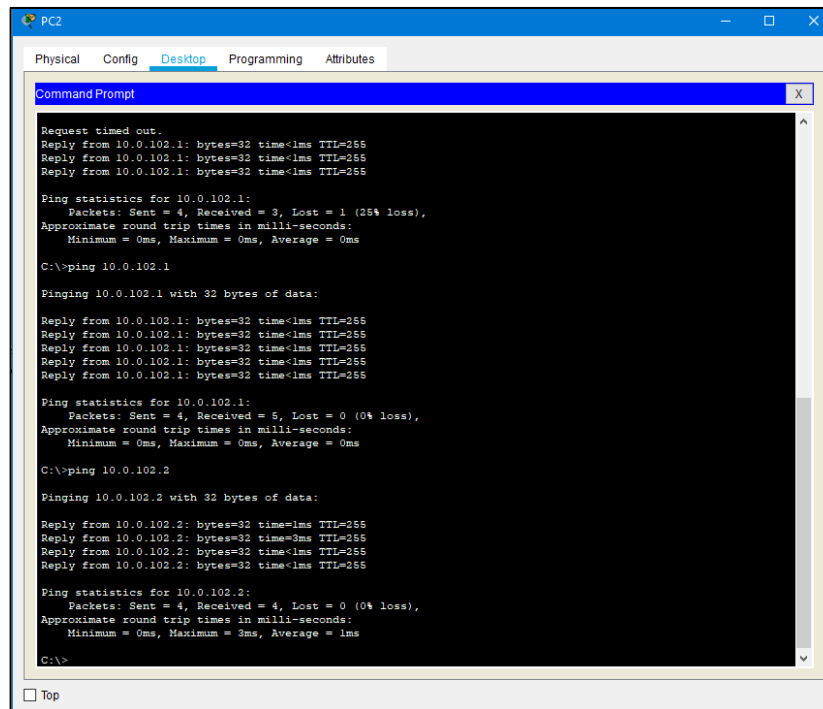
C:\>ping 10.0.100.5

Pinging 10.0.100.5 with 32 bytes of data:

Reply from 10.0.100.5: bytes=32 time<1ms TTL=128
Reply from 10.0.100.5: bytes=32 time=3ms TTL=128
Reply from 10.0.100.5: bytes=32 time=3ms TTL=128
Reply from 10.0.100.5: bytes=32 time=2ms TTL=128

Ping statistics for 10.0.100.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)
```

Gráfica 23: PING en PC1 a D1, D2 y PC4



```
PC2
Physical Config Desktop Programming Attributes
Command Prompt
Request timed out.
Reply from 10.0.102.1: bytes=32 time<1ms TTL=255
Reply from 10.0.102.1: bytes=32 time<1ms TTL=255
Reply from 10.0.102.1: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.102.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.0.102.1

Pinging 10.0.102.1 with 32 bytes of data:

Reply from 10.0.102.1: bytes=32 time<1ms TTL=255
Reply from 10.0.102.1: bytes=32 time<1ms TTL=255
Reply from 10.0.102.1: bytes=32 time<1ms TTL=255
Reply from 10.0.102.1: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.102.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.0.102.2

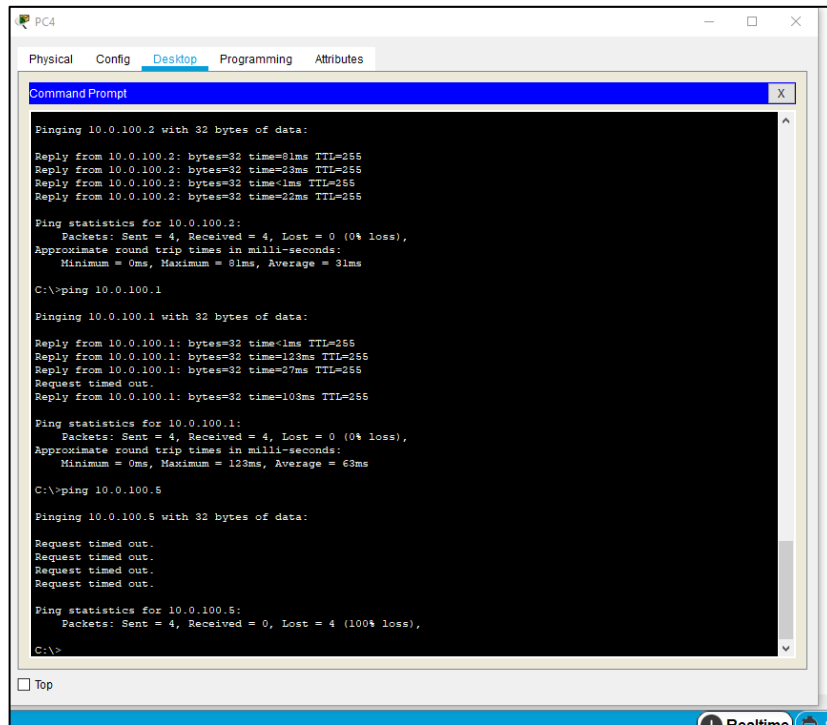
Pinging 10.0.102.2 with 32 bytes of data:

Reply from 10.0.102.2: bytes=32 time=1ms TTL=255
Reply from 10.0.102.2: bytes=32 time=3ms TTL=255
Reply from 10.0.102.2: bytes=32 time<1ms TTL=255
Reply from 10.0.102.2: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.102.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 1ms

C:\>
```

Gráfica 24: PING desde PC2 a D1 y D2



Gráfica 25: PING desde PC4 a D1, D2 y PC1

PARTE 3: CONFIGURAR LOS PROTOCOLOS DE ENRUTAMIENTO

Tarea 3.1 En la “Red de la Compañía” (es decir, R1, R3, D1, y D2), configure single-area OSPFv2 en área 0.

Tabla 7: Configuración de single-area OSPFv2 en area 0 en R1 y R3

En Router R1	En Router R3
<pre> R1>enable R1#configure terminal 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# </pre>	<pre> R3>enable R3#configure terminal 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)# 12:07:49: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Serial0/1/0 from LOADING to FULL, Loading Done R3(config-router)# R3# </pre>

```

Router7
Physical Config CLI Attributes
IOS Command Line Interface
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#show ip protocol
^
% Invalid input detected at '^' marker.

R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#enable
R1#show ip protocol

Routing Protocol is "ospf 4"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 0.0.4.1
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    10.0.10.0 0.0.0.255 area 0
    10.0.13.0 0.0.0.255 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    0.0.4.1          110           00:12:05
    0.0.4.3          110           00:12:08
  Distance: (default is 110)

R1#

```

Gráfica 26: OSPFv2 en area 0 en R1

```

Router5
Physical Config CLI Attributes
IOS Command Line Interface
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)#
12:07:49: %OSPF-5-ADJCHG: Process 4, Nbr 0.0.4.1 on Serial0/1/0 from
LOADING to FULL, Loading Done

R3(config-router)#
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3# show ip protocol

Routing Protocol is "ospf 4"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 0.0.4.3
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    10.0.11.0 0.0.0.255 area 0
    10.0.13.0 0.0.0.255 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    0.0.4.1          110           00:06:11
    0.0.4.3          110           00:06:11
  Distance: (default is 110)

R3#

```

Gráfica 27: OSPFv2 en area 0 en R3.

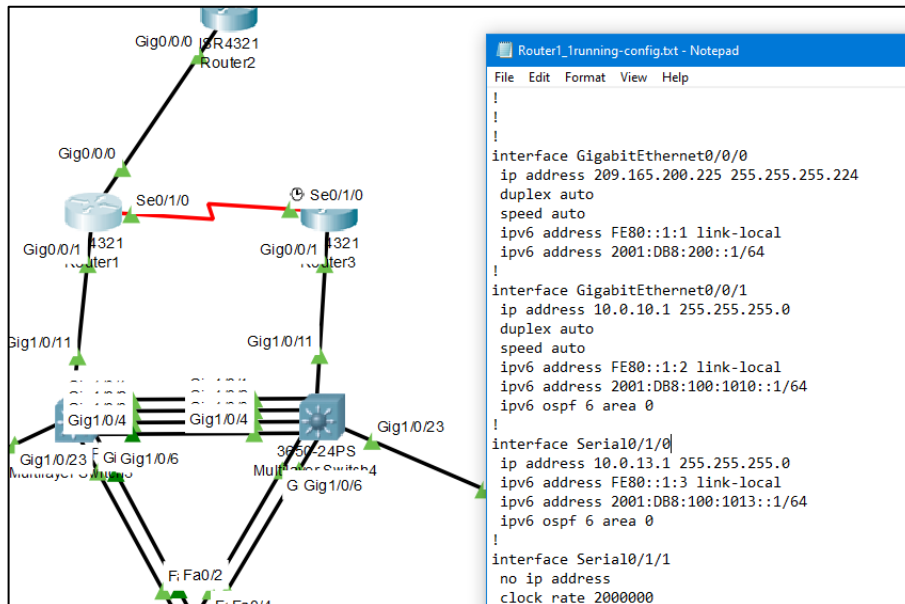
Tabla 8: Configuración de single-area OSPFv2 en area 0 en D1 y D2

En Switch D1	En Switch D2
<pre> D1#enable D1#configure terminal 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)#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 10.0.100.0 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)#passive-interface g1/0/1 D1(config-router)#passive-interface g1/0/2 D1(config-router)#passive-interface g1/0/3 D1(config-router)#passive-interface g1/0/4 D1(config-router)#passive-interface g1/0/5 D1(config-router)#passive-interface g1/0/6 D1(config-router)#passive-interface g1/0/7 D1(config-router)#passive-interface g1/0/8 D1(config-router)#passive-interface g1/0/9 D1(config-router)#passive-interface g1/0/10 D1(config-router)#passive-interface g1/0/12 D1(config-router)#passive-interface g1/0/13 D1(config-router)#passive-interface g1/0/14 D1(config-router)#passive-interface g1/0/15 D1(config-router)#passive-interface g1/0/16 D1(config-router)#passive-interface g1/0/17 D1(config-router)#passive-interface g1/0/18 D1(config-router)#passive-interface g1/0/19 D1(config-router)#passive-interface g1/0/20 D1(config-router)#passive-interface g1/0/21 D1(config-router)#passive-interface g1/0/22 D1(config-router)#passive-interface g1/0/23 D1(config-router)#passive-interface g1/0/24 D1(config-router)#passive-interface g1/1/1 D1(config-router)#passive-interface g1/1/2 D1(config-router)#passive-interface g1/1/3 D1(config-router)#passive-interface g1/1/4 D1(config-router)# </pre>	<pre> D2#enable D2#configure terminal 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)#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 10.0.100.0 0.0.0.255 area 0 Loading Done 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)# Loading Done D2(config-router)#passive-interface g1/0/1 D2(config-router)#passive-interface g1/0/1 Loading Done D2(config-router)#passive-interface g1/0/2 D2(config-router)#passive-interface g1/0/3 D2(config-router)#passive-interface g1/0/4 D2(config-router)#passive-interface g1/0/5 D2(config-router)#passive-interface g1/0/6 D2(config-router)#passive-interface g1/0/7 D2(config-router)#passive-interface g1/0/7 D2(config-router)#passive-interface g1/0/8 D2(config-router)#passive-interface g1/0/9 D2(config-router)#passive-interface g1/0/10 D2(config-router)#passive-interface g1/0/12 D2(config-router)#passive-interface g1/0/13 D2(config-router)#passive-interface g1/0/14 D2(config-router)#passive-interface g1/0/15 D2(config-router)#passive-interface g1/0/16 D2(config-router)#passive-interface g1/0/17 D2(config-router)#passive-interface g1/0/18 D2(config-router)#passive-interface g1/0/19 D2(config-router)#passive-interface g1/0/20 D2(config-router)#passive-interface g1/0/21 D2(config-router)#passive-interface g1/0/22 D2(config-router)#passive-interface g1/0/23 D2(config-router)#passive-interface g1/0/24 D2(config-router)#passive-interface g1/1/1 D2(config-router)#passive-interface g1/1/2 D2(config-router)#passive-interface g1/1/3 D2(config-router)#passive-interface g1/1/4 D2(config-router)# </pre>

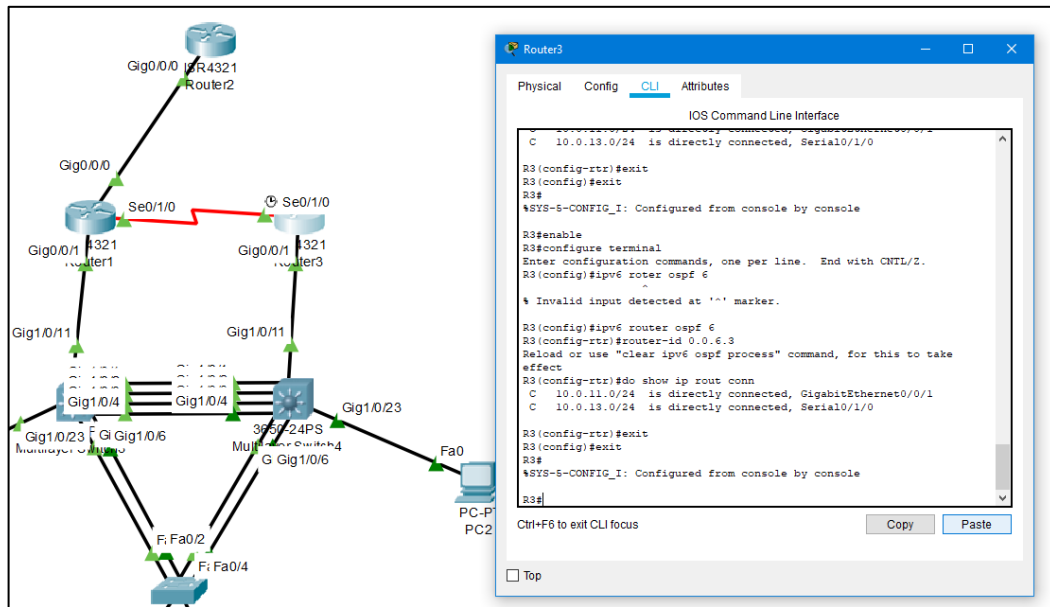
Tarea 3.2: En la “Red de la Compañía” (es decir, R1, R3, D1, y D2), configure classic single-area OSPFv3 en area 0.

Tabla 9: Configuración de classic single-area OSPFv3 en area 0 para R1 y R3

En Router R1	En Router R3
<pre> R1>enable R1#configure terminal 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)#interface s0/1/0 R1(config-if)#ipv6 ospf 6 area 0 R1(config-if)#exit R1(config)#exit R1# </pre>	<pre> R3>enable R3#configure terminal 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)#interface s0/1/0 R3(config-if)#ipv6 ospf 6 area 0 R3(config-if)# 15:53:03: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on Serial0/1/0 from LOADING to FULL, Loading Done R3(config-if)#exit R3(config)# </pre>



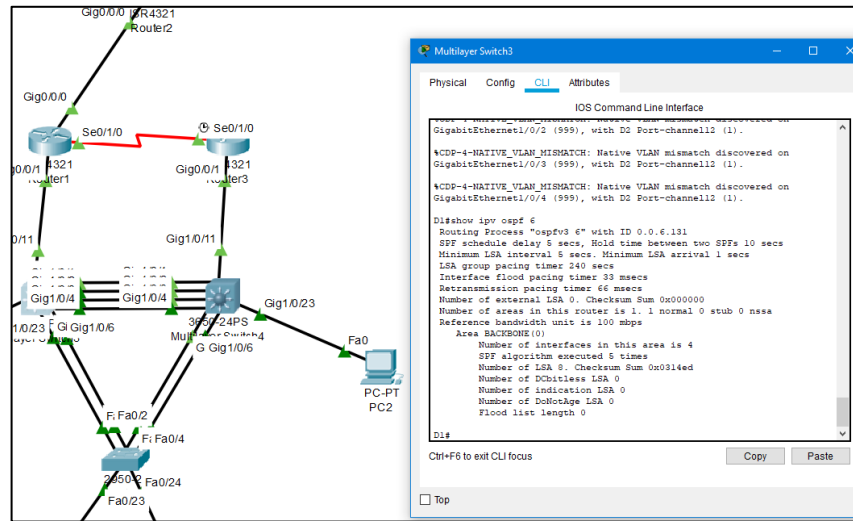
Gráfica 28: Classic single-area OSPFv3 en area 0 -R1



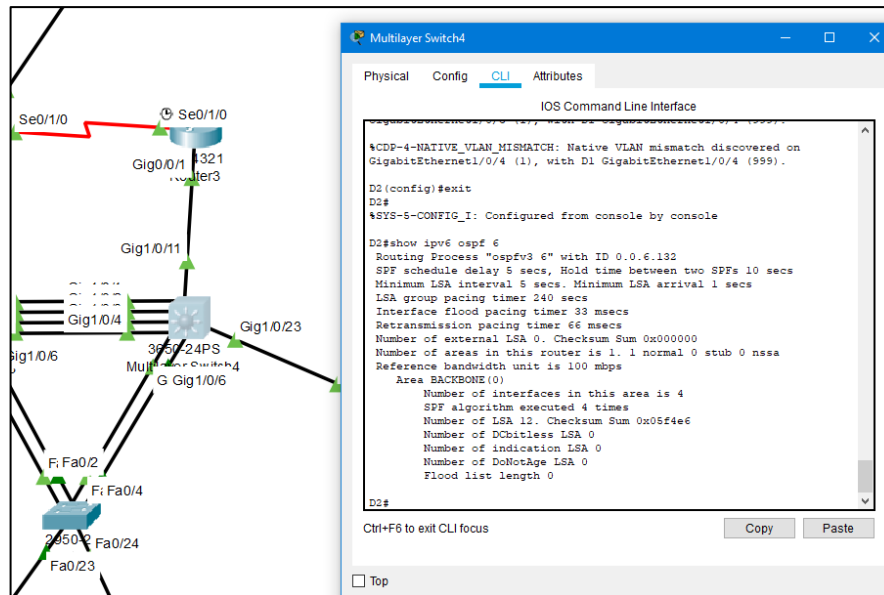
Gráfica 29: Classic single-area OSPFv3 en area 0 -R3

Tabla 10: Configuración de classic single-area OSPFv3 en area 0 para D1 y D2

En Switch D1	En Switch D2
<pre> D1>enable D1#configure terminal 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)#exit D1(config)#interface g1/0/11 D1(config-if)#ipv6 ospf 6 area 0 D1(config-if)#interface vlan100 D1(config-if)#ipv6 D1(config-if)#ipv6 ospf 6 area 0 D1(config-if)#interface vlan101 D1(config-if)#ipv6 ospf 6 area 0 D1(config-if)#interface vlan101 08:10:43: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.1 on GigabitEthernet1/0/11 from LOADING to FULL, Loading Done D1(config-if)#interface vlan102 D1(config-if)#ipv6 ospf 6 area 0 D1(config-if)# </pre>	<pre> D2>enable D2#configure terminal 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)#exit D2(config)# D2(config)#interface g1/0/11 D2(config-if)#ipv6 ospf 6 area 0 D2(config-if)#interface vlan100 D2(config-if)#ipv6 ospf 6 area 0 D2(config-if)#interface vlan101 D2(config-if)#ipv6 ospf 6 area 0 D2(config-if)#interface vlan102 D2(config-if)#ipv6 ospf 6 area 0 D2(config-if)# 08:39:04: %OSPFv3-5-ADJCHG: Process 6, Nbr 0.0.6.3 on GigabitEthernet1/0/11 from LOADING to FULL, Loading Done D2(config-if)# </pre>



Gráfica 30: Parámetros single-area OSPFv3 en D1



Gráfica 31: Parámetros single-area OSPFv3 en D2

Tarea 3.3: En R2 en la “Red ISP”, configure MP-BGP.

Tabla 11: Configurar MP-BGP en R2

Configure MP-BGP en R2
R2(config)#ip route 0.0.0.0 0.0.0.0 loopback 0
%Default route without gateway, if not a point-to-point interface, may impact performance
R2(config)#ipv6 route ::0 loopback 0
R2(config)#router bgp 500
R2(config-router)#bgp router-id 2.2.2.2
R2(config-router)#neighbor 209.165.200.225 remote-as 300
R2(config-router)#neighbor 2001:db8:200::1 remote-as 300

```
R2(config-router)#network 2.2.2.2 mask 255.255.255.255
R2(config-router)#network 0.0.0.0 mask 0.0.0.0
R2(config-router)#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)#
```

Tarea 3.4: En R1 en la “Red ISP”, configure MP-BGP.

Tabla 12: Configurar MP-BGP en R1

Configure MP-BGP en R1

```
R1>enable
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ip route 10.0.0.0 255.255.255.0 null 0
%Default route without gateway, if not a point-to-point interface, may
impact performance
R1(config)#router bgp 300
R1(config-router)#bgp router-id 1.1.1.1
R1(config-router)#neighbor 209.165.200.226 remote-as 500
R1(config-router)#%BGP-5-ADJCHANGE: neighbor 209.165.200.226 Up
R1(config-router)#
```

PARTE 4: CONFIGURAR LA REDUNDANCIA DEL PRIMER SALTO (FIRST HOP REDUNDANCY)

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

```
D1>enable
D1#configure terminal
D1(config)#ip sla 4
D1(config-ip-sla)#icmp-echo 10.0.10.1 source-interface g0/0/1
D1(config-ip-sla-echo)#exit
D1(config)#ip sla schedule 4 start-time now life forever
D1(config)#track 4 ip sla 4 state
D1(config-track)#delay up 10 down 15
D1(config-track)#exit
D1(config)#ip sla 6
D1(config-ip-sla)#icmp-echo 2001:db8:100:1010::1 source-interface e2/1
D1(config-ip-sla-echo)#exit
D1(config)#ip sla schedule 6 start-time now life forever
D1(config)#track 6 ip sla 6 state
D1(config-track)#delay up 10 down 15
D1(config-track)#exit
```

Tarea 4.2: En D2, cree IP SLAs que prueben la accesibilidad de la interfaz R3 G0/0/1

```
D2>enable
D2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#ip sla 4
D2(config-ip-sla)#icmp-echo 10.0.11.1 source-interface g0/0/1
D2(config-ip-sla-echo)#frequency 5
D2(config-ip-sla) #threshold 500
D2(config-ip-sla-echo)#exit
D2(config)#ip sla schedule 4 start-time now life forever
D2(config)#track 4 ip sla 4 state
D2(config-track)#delay up 10 down 15
D2(config-track)#exit
D2(config)#
D2(config)#ip sla 6
D2(config-ip-sla)#icmp-echo 2001:db8:100:1011::1 source-interface g0/0/1
D2(config-ip-sla-echo)#frequency 5
D2(config-ip-sla) #threshold 500
D2(config-ip-sla-echo)#exit
D2(config)#ip sla schedule 6 start-time now life forever
D2(config)#track 6 ip sla 6 state
D2(config-track)#delay up 10 down 15
D2(config-track)#exit
D2(config)#
```

Tarea 4.3: En D1 configure HSRPv2.

Tabla 13: Grupos por VLAN en D1

Grupo 104 - D1	Grupo 114 - D1	Grupo 124 - D1
<pre>D1>enable D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#interface vlan100 D1(config-if)# D1(config-if)#standby version 2 D1(config-if)#standby 104 priority 150 D1(config-if)#standby 104 timers 4 60 D1(config-if)#standby 104 ip 10.0.100.254 % Address 10.0.100.254 in group 104 D1(config-if)#standby 100 priority 104 D1(config-if)#</pre>	<pre>D1>enable D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#interface vlan 101 D1(config-if)#standby version 2 D1(config-if)#standby 114 ip 10.0.101.254 D1(config-if)#standby 114 preempt D1(config-if)#standby version 2 %HSRP-6-STATECHANGE: Vlan101 Grp 114 state Standby -> Active D1(config-if)#standby 114 timers 4 60 D1(config-if)#end D1# %SYS-5-CONFIG_I: Configured from console by console</pre>	<pre>D1>enable D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#interface vlan 102 D1(config-if)#standby version 2 D1(config-if)#standby 124 preempt D1(config-if)#standby 124 timers 4 60 D1(config-if)#standby 124 ip 10.0.102.254 D1(config-if)#end D1# %SYS-5-CONFIG_I: Configured from console by console</pre>

Tabla 14: Grupos por VLAN en D1

Grupo 106 - D1	Grupo 116 - D1	Grupo 126 - D1
<pre>D1>enable D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#interface vlan100 D1(config-if)# D1(config-if)#standby version 2 D1(config-if)#standby 106 priority 150 D1(config-if)#standby 106 timers 4 60 D1(config-if)#standby ipv6 autoconfig D1(config-if)#end D 1(config-if)#end D1# %SYS-5-CONFIG_I: Configured from console by console</pre>	<pre>D1>enable D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#interface vlan 101 D1(config-if)#standby version 2 D1(config-if)#standby 116 ipv6 autoconfig D1(config-if)#standby 116 preempt %HSRP-6-STATECHANGE: Vlan101 Grp 116 state Standby -> Active D1(config-if)#standby 116 timers 4 60 D1(config-if)#end D1# %SYS-5-CONFIG_I: Configured from console by console</pre>	<pre>D1>enable D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#interface vlan 102 D1(config-if)#standby version 2 D1(config-if)#standby 126 ipv6 autoconfig D1(config-if)#standby 126 preempt %HSRP-6- STATECHANGE: Vlan102 Grp 126 state Speak -> Standby %HSRP-6- STATECHANGE: Vlan102 Grp 126 state Standby -> Active D1(config-if)#standby 126 timers 4 60 D1(config-if)#end</pre>

		D1# %SYS-5-CONFIG_I: Configured from console by console
--	--	--

Tabla 15: Grupos por VLAN -D2

Grupo 104 – D2	Grupo 114 – D2	Grupo 124 – D2
D2>enable D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#interface vlan100 D2(config-if)# D2(config-if)#standby version 2 D2(config-if)#standby 104 priority 150 D2(config-if)#standby 104 timers 4 60 D2(config-if)#standby 104 ip 10.0.100.254 % Address 10.0.100.254 in group 104 D2(config-if)#standby 100 priority 104 D2(config-if)#end D2# %SYS-5-CONFIG_I: Configured from console by console D2# %HSRP-6-STATECHANGE: Vlan100 Grp 104 state Speak -> Standby	D2>enable D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#interface vlan 101 D2(config-if)#standby version 2 D2(config-if)#standby 114 ip 10.0.101.254 D2(config-if)# %HSRP-6-STATECHANGE: Vlan101 Grp 114 state Init -> Init D2(config-if)#standby 114 preempt D2(config-if)#standby version 2 %HSRP-6-STATECHANGE: Vlan101 Grp 114 state Standby -> Active D2(config-if)#standby 114 timers 4 60 D2(config-if)#end D2# %SYS-5-CONFIG_I: Configured from console by console	D2>enable D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#interface vlan 102 D2(config-if)#standby version 2 D2(config-if)#standby 124 preempt D2(config-if)#standby 124 timers 4 60 D2(config-if)#standby 124 ip 10.0.102.254 D2(config-if)#end D2# %SYS-5-CONFIG_I: Configured from console by console

Tabla 16: Grupos por VLAN -D2

Grupo 106 - D1	Grupo 116 - D1	Grupo 126 - D1
<pre> D2>enable D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#interface vlan100 D2(config-if)#standby version 2 D2(config-if)#standby 106 ipv6 autoconfig D2(config-if)#standby 106 priority 150 D2(config-if)#standby 106 timers 4 60 D2(config-if)#end D2# %SYS-5-CONFIG_I: Configured from console by console </pre>	<pre> D2>enable D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#interface vlan 101 D2(config-if)#standby version 2 D2(config-if)#standby 116 ipv6 autoconfig D2(config-if)#standby 116 preempt D2(config-if)#standby 116 preempt D2(config-if)# %HSRP-6-STATECHANGE: Vlan101 Grp 116 state Speak -> Standby D2(config-if)# %HSRP-6-STATECHANGE: Vlan101 Grp 116 state Standby -> Active D2(config-if)#standby 116 timers 4 60 D2(config-if)#end D2# %SYS-5-CONFIG_I: Configured from console by console </pre>	<pre> D2>enable D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#interface vlan 102 D2(config-if)#standby version 2 D2(config-if)#standby 126 ipv6 autoconfig D2(config-if)#standby 126 preempt D2(config-if)#standby 126 preempt D2(config-if)# %HSRP-6- STATECHANGE: Vlan102 Grp 126 state Speak -> Standby D2(config-if)# %HSRP-6- STATECHANGE: Vlan102 Grp 126 state Standby -> Active D2(config-if)#standby 126 timers 4 60 D2(config-if)#end D2# %SYS-5-CONFIG_I: Configured from console by console </pre>

PARTE 5: SEGURIDAD

Tarea 5.1: En todos los dispositivos, proteja el EXEC privilegiado usando el algoritmo de encriptación SCRYPT.

Tabla 17: Seguridad en dispositivos

Dispositivo	Seguridad
Router R1	<pre>R1>enable R1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R1(config)#enable secret cisco12345cisco R1(config)# R1# %SYS-5-CONFIG_I: Configured from console by console</pre>
Router R2	<pre>R2>enable R2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R2(config)#enable secret cisco12345cisco R2(config)# R2# %SYS-5-CONFIG_I: Configured from console by console</pre>
Router R3	<pre>R3>enable R3#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R3(config)#enable secret cisco12345cisco R3(config)#</pre>
Switch D1	<pre>D1>enable D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#enable secret cisco12345cisco D1(config)#</pre>
Switch D2	<pre>D2>enable D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#enable secret cisco12345cisco D2(config)#</pre>
Switch A1	<pre>A1#enable A1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. A1(config)#enable secret cisco12345cisco A1(config)# A1# %SYS-5-CONFIG_I: Configured from console by console</pre>

Tarea 5.2: En todos los dispositivos, cree un usuario local y protéjalo usando el algoritmo de encriptación SCRYPT.

Tabla 18: Usuario por dispositivo

Dispositivo	Usuario
Router R1	<pre>R1>enable Password: R1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R1(config)#username sadmin privilege 15 secret cisco12345cisco R1(config)#end R1# %SYS-5-CONFIG_I: Configured from console by console</pre>
Router R2	<pre>R2>enable Password: R2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R2(config)#username sadmin privilege 15 secret cisco12345cisco R2(config)#end R2# %SYS-5-CONFIG_I: Configured from console by console</pre>
Router R3	<pre>R3>enable Password: R3#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R3(config)#username sadmin privilege 15 secret cisco12345cisco R3(config)#end R3# %SYS-5-CONFIG_I: Configured from console by console</pre>
Switch D1	<pre>D1>enable Password: D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#username sadmin privilege 15 secret cisco12345cisco D1(config)#end D1# %SYS-5-CONFIG_I: Configured from console by console</pre>
Switch D2	<pre>D2>enable Password: D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#username sadmin privilege 15 secret cisco12345cisco D2(config)#end D2# %SYS-5-CONFIG_I: Configured from console by console</pre>
Switch A1	<pre>A1#enable Password: A1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. A1(config)#username sadmin privilege 15 secret cisco12345cisco A1(config)#end A1# %SYS-5-CONFIG_I: Configured from console by console.</pre>

Tarea 5.3: En todos los dispositivos (excepto R2), habilite AAA.

Tabla 19: Habilitado de AAA (no incluye R2)

Dispositivo	AAA
Router R1	<pre>R1>enable Password: R1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R1(config)#aaa new-model R1(config)#end R1# %SYS-5-CONFIG_I: Configured from console by console</pre>
Router R3	<pre>R3>enable Password: R3#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R3(config)#aaa new-model R3(config)#</pre>
Switch D1	<pre>D1>enable Password: D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#aaa new-model D1(config)#end D1# %SYS-5-CONFIG_I: Configured from console by console</pre>
Switch D2	<pre>D2>enable Password: D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#aaa new-model D2(config)#end D2# %SYS-5-CONFIG_I: Configured from console by console</pre>

Tarea 5.4: En todos los dispositivos (excepto R2), configure las especificaciones del servidor RADIUS.

Tabla 20: Especificaciones servidor RADIUS

Dispositivo	Especificaciones servidor RADIUS
Router R1	R1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R1(config)#radius-server host 10.0.100.6 R1(config)#radius-server port 1812 R1(config)#radius-server key \$strongPass R1(config)#end R1# %SYS-5-CONFIG_I: Configured from console by console
Router R3	R3#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R3(config)#radius-server host 10.0.100.6 R3(config)#radius-server port 1812 R3(config)#radius-server key \$strongPass R3(config)# R3# %SYS-5-CONFIG_I: Configured from console by consol

Tarea 5.5: En todos los dispositivos (excepto R2), configure la lista de métodos de autenticación AAA

Tabla 21: Autenticación AAA

Dispositivo	Autenticación AAA
Router R1	R1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R1(config)#AAA authentication login default group radius local R1(config)#end R1# %SYS-5-CONFIG_I: Configured from console by console
Router R3	R3#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R3(config)#AAA authentication login default group radius local R3(config)#end R3# %SYS-5-CONFIG_I: Configured from console by console
Switch D1	D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#AAA authentication login default group radius local D1(config)#end D1# %SYS-5-CONFIG_I: Configured from console by console
Switch D2	D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#AAA authentication login default group radius local D2(config)#end D2# %SYS-5-CONFIG_I: Configured from console by console

PARTE 6: Configure las funciones de Administración de Red

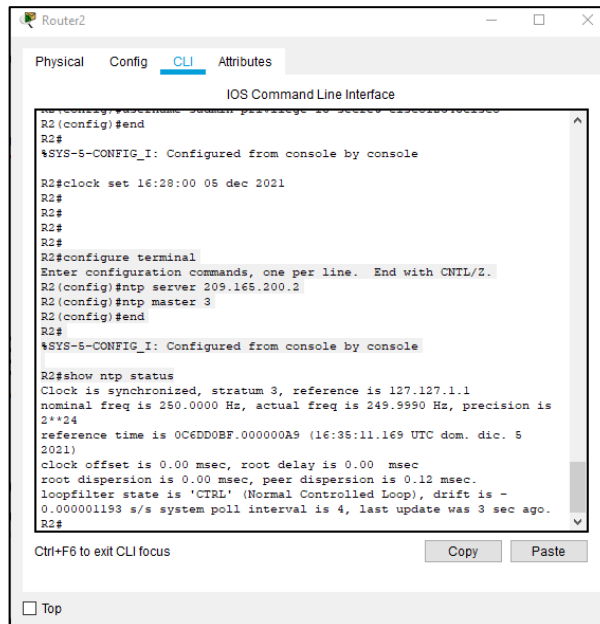
Tarea 6.1: En todos los dispositivos, configure el reloj local a la hora UTC actual.

Tabla 22: Configuración hora

Dispositivo	Config reloj
Router R1	R1#clock set 16:27:00 05 dec 2021 R1#
Router R2	R2#clock set 16:28:00 05 dec 2021 R2#
Router R3	R3#clock set 16:30:00 05 dec 2021 R3#
Switch D1	D1#clock set 16:31:00 05 dec 2021 D1#
Switch D2	D2#clock set 16:32:00 05 dec 2021 D2#
Switch A1	A1#clock set 16:32:00 05 dec 2021 A1#

Tarea 6.2: Configure R2 como un NTP maestro

```
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ntp server 209.165.200.2
R2(config)#ntp master 3
R2(config)#end
R2#
%SYS-5-CONFIG_I: Configured from console by console
R2#show ntp status
```



The screenshot shows the CLI interface of Router2. The user has entered the following commands and received the following output:

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

R2#clock set 16:28:00 05 dec 2021
R2#
R2#
R2#
R2#
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ntp server 209.165.200.2
R2(config)#ntp master 3
R2(config)#end
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#show ntp status
Clock is synchronized, stratum 3, reference is 127.127.1.1
nominal freq is 250.0000 Hz, actual freq is 249.9990 Hz, precision is 2**24
reference time is 0C6DD0BF.000000A9 (16:35:11.169 UTC dom. dic. 5 2021)
clock offset is 0.00 msec, root delay is 0.00 msec
root dispersion is 0.00 msec, peer dispersion is 0.12 msec
loopfilter state is 'CTRL' (Normal Controlled Loop), drift is -0.000001193 s/s system poll interval is 4, last update was 3 sec ago.
R2#
```

Gráfica 32: NTP Estado

Tarea 6.3: Configure NTP en R1, R3, D1, D2, y A1.

Tabla 23: Configuración NTP dispositivos

Dispositivo	NTP
Router R1	<pre>R1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R1(config)#ntp Server 209.165.200.2 R1(config)#ntp master 3 R1(config)#end R1# %SYS-5-CONFIG_I: Configured from console by console R1#show clock detail 16:47:43.687 UTC Sun Dec 5 2021 Time source is NTP R1#</pre>
Router R3	<pre>R3#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R3(config)#ntp Server 10.0.13.1 R3(config)#ntp master 3 R3(config)#end R3# %SYS-5-CONFIG_I: Configured from console by console R3#show clock detail 16:51:10.234 UTC Sun Dec 5 2021 Time source is NTP R3#</pre>
Switch D1	<pre>D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#ntp Server 10.0.10.1 D1(config)#ntp master D1(config)#end D1#show clock detail 16:54:1.431 UTC Sun Dec 5 2021 Time source is NTP D1#</pre>
Switch D2	<pre>D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#ntp Server 10.0.11.1 D2(config)#ntp master 3 D2(config)#end D2# %SYS-5-CONFIG_I: Configured from console by console D2#show clock detail 16:55:57.585 UTC Sun Dec 5 2021 Time source is NTP D2#</pre>
Switch A1	<pre>A1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. A1(config)#ntp Server 209.165.200.2 A1(config)#ntp master 3 A1(config)#end A1# %SYS-5-CONFIG_I: Configured from console by console A1#show clock detail 16:56:28.373 UTC Sun Dec 5 2021 Time source is NTP A1#</pre>

Tarea 6.4: Configure Syslog en todos los dispositivos excepto R2

Tabla 24: Configuración SysLog

Dispositivo	Sys Log
Router R1	<pre>R1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R1(config)#loggin host 10.0.100.5 R1(config)#service timestamps log datetime msec R1(config)#end *dic. 05, 16:59:05.5959: SYS-5-CONFIG_I: Configured from console by console *dic. 05, 16:59:05.5959: %SYS-6-LOGGINGHOST_STARTSTOP: Logging to host 10.0.100.5 port 514 started - CLI initiated R1#</pre>
Router R3	<pre>R3#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R3(config)#loggin host 10.0.100.5 R3(config)#service timestamps log datetime msec R3(config)#end *dic. 05, 17:03:08.033: SYS-5-CONFIG_I: Configured from console by console *dic. 05, 17:03:08.033: %SYS-6-LOGGINGHOST_STARTSTOP: Logging to host 10.0.100.5 port 514 started - CLI initiated R3#</pre>
Switch D1	<pre>D1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D1(config)#loggin host 10.0.100.5 D1(config)#service timestamps log datetime msec D1(config)#end *dic. 05, 17:05:08.055: SYS-5-CONFIG_I: Configured from console by console *dic. 05, 17:05:08.055: %SYS-6-LOGGINGHOST_STARTSTOP: Logging to host 10.0.100.5 port 514 started - CLI initiated D1#</pre>
Switch D2	<pre>D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#loggin host 10.0.100.5 D2(config)#service timestamps log datetime msec D2(config)#end *dic. 05, 17:07:04.077: SYS-5-CONFIG_I: Configured from console by console *dic. 05, 17:07:04.077: %SYS-6-LOGGINGHOST_STARTSTOP: Logging to host 10.0.100.5 port 514 started - CLI initiated D2#</pre>
Switch A1	<pre>A1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. A1(config)#loggin host 10.0.100.5 A1(config)#service timestamps log datetime msec A1(config)#end *dic. 05, 17:07:11.077: SYS-5-CONFIG_I: Configured from console by console *dic. 05, 17:07:11.077: %SYS-6-LOGGINGHOST_STARTSTOP: Logging to host 10.0.100.5 port 514 started - CLI initiated A1#</pre>

Tarea 6.5: Configure SNMPv2c en todos los dispositivos excepto R2

Tabla 25: Configuración SNMPv2c

Dispositivo	Config SNMPv2c
Router R1	<pre>R1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R1(config)#snmp-server community snmp-RamiroAlvaradoMejia rw %SNMP-5-WARMSTART: SNMP agent on host R1 is undergoing a warm start R1(config)#logging on R1(config)#logging 10.0.100.5 R1(config)#Logging trap debugging R1(config)#exit *dic. 05, 17:13:01.1313: SYS-5-CONFIG_I: Configured from console by console</pre>
Router R3	<pre>R3#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R3(config)#snmp-server community snmp-RamiroAlvaradoMejia rw %SNMP-5-WARMSTART: SNMP agent on host R3 is undergoing a warm start R3(config)#logging on R3(config)#logging 10.0.100.5 R3(config)#Logging trap debugging R3(config)#exit *dic. 05, 17:15:14.1515: SYS-5-CONFIG_I: Configured from console by console</pre>
Switch D1	<pre>D1(config)#snmp-server community snmp-RamiroAlvaradoMejia rw %SNMP-5-WARMSTART: SNMP agent on host D1 is undergoing a warm start D1(config)#logging on D1(config)#Logging trap debugging D1(config)#exit *dic. 05, 17:17:20.1717: SYS-5-CONFIG_I: Configured from console by console</pre>
Switch D2	<pre>D2#configure terminal Enter configuration commands, one per line. End with CNTL/Z. D2(config)#snmp-server community snmp-RamiroAlvaradoMejia rw %SNMP-5-WARMSTART: SNMP agent on host D2 is undergoing a warm start D2(config)#logging on D2(config)#Logging trap debugging D2(config)#exit *dic. 05, 17:20:23.2020: SYS-5-CONFIG_I: Configured from console by console</pre>
Switch A1	<pre>A1#configure terminal Enter configuration commands, one per line. End with CNTL/Z. A1(config)#snmp-server community snmp-RamiroAlvaradoMejia rw A1(config)#logging on A1(config)#Logging trap debugging A1(config)#exit A1# *dic. 05, 17:21:19.2121: SYS-5-CONFIG_I: Configured from console by console A1#</pre>

CONCLUSIONES

La configuración desde Capa 2 de una topología de red otorga ventajas que no resultan explotables desde la capa 7, generando un amplio espectro de posibilidades que se limita exclusivamente a las características del equipo y el manejo propio de las funciones de configuración.

El escenario propuesto otorga un alcance sustancial, dada su similitud con entornos que resultan comunes en edificios, oficinas o empresas ISP pequeñas. Permitiendo valorar las ventajas de trazar parámetros de seguimiento y respuesta de respaldo ante fallos.

El software empleado (Packet Tracer) para la simulación resulta excepcionalmente útil para la formulación preliminar de un proyecto antes de ser implementado, permitiendo determinar fallas de diseño o configuración de forma previa. No obstante, las opciones de equipos y configuración se limitan a equipos de la propia marca. Dejando opciones de personalización.

BIBLIOGRAFIA

Cisco “Capítulo 3: Protocolos y comunicación de red”. {En línea} {diciembre 4 de 2021} disponible en https://www.uv.mx/personal/angelperez/files/2019/02/CCNA_ITN_Chp3.pdf

Cisco “Configuración de AAA básico en un servidor de acceso” {En línea} {diciembre 4 de 2021} disponible en https://www.cisco.com/c/es_mx/support/docs/security-vpn/terminal-access-controller-access-control-system-tacacs-/10384-security.html

Cisco. “How Configure SNMP Community Strings”. {En línea}. {diciembre 4 de 2021} disponible en: <https://www.cisco.com/c/en/us/support/docs/ip/simple-network-management-protocol-snmp/7282-12.html>

UNAD “Diseño de topologías y solución de problemas de red LAN y WAN utilizando la herramienta de simulación de redes Packet Tracer” {En línea} {diciembre 4 de 2021} disponible en <https://repository.unad.edu.co/bitstream/handle/10596/25497/hquiñonezo.pdf?sequence=1&isAllowed=y>

Unicen “El Modelo OSI” {En línea} {diciembre 4 de 2021} disponible en <https://users.exa.unicen.edu.ar/catedras/comdat1/material/ElmodeloOSI.pdf>