

INFORME – PRUEBA DE HABILIDADES PRACTICA

NELSON ANDRES SANDOVAL CAYCEDO

UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA - UNAD
ESCUELA DE CIENCIAS BÁSICAS, TECNOLOGÍA E INGENIERÍA - ECBTI
INGENIERÍA ELECTRONICA
FACATATIVA
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DIPLOMADO DE OPCIÓN DE GRADO PRESENTADO PARA OPTAR EL
TÍTULO DE:
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GERARDO GRANADOS ACUÑA

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NOTA DE ACEPTACIÓN

Firma del presidente del Jurado

Firma del Jurado

Firma del Jurado

DEDICATORIA

Dedico este trabajo primero que todo a Dios, que me ha servido de bastón para mantenerme intacto en mi actuar y darme todas las fuerzas que son necesarias para superar los obstáculos que han sido puestos durante mi camino, por darme la salud suficiente para continuar en este camino. Agradezco a mi familia, mi padre Nelson Sandoval Roa, mi madre Dalia Eldy Caycedo Conde, mi hermana Paula Alejandra Sandoval Caycedo, por ser mi apoyo incondicional y que son un soporte demasiado fuerte para mantener los lazos entre el amor y fraternidad. Agradezco a mi novia Yennifer Steffi Velandia Soto por estar en este proceso, que ha sido un duro camino, pero pese a todo me ha enseñado que no existe nada imposible, a su hermano Camilo Velandia Soto y a su familia. A los profesores que con su experiencia han guiado de forma correcta todos los procesos de aprendizaje.

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GLOSARIO

CISCO programa global de educación en ciberseguridad y TI que se asocia con instituciones de aprendizaje de todo el mundo

TOPOLOGÍA configuración de las conexiones entre nodos.

RED LAN grupo de computadoras y dispositivos que comparten una línea de comunicaciones común o un enlace inalámbrico.

PROTOCOLO DE RED incluyen mecanismos para que los dispositivos se identifiquen y establezcan conexiones entre sí.

STP Spanning Tree deshabilita los enlaces redundantes quedando así una red libre de loops.

CONMUTACIÓN acción de establecer una vía, un camino, de extremo a extremo entre dos puntos, un emisor y un receptor a través de nodos o equipos de transmisión.

RESUMEN

Por medio del siguiente trabajo se pretende generar un procedimiento de configuración mediante un protocolo de enrutamiento siguiendo la tabla de direccionamiento y suministrada por los últimos dos dígitos del documento de identidad en él. Lo anterior se desarrollará a través del entorno GNS3 en el cual se monta la red y se configuran las interfaces de conexión. Mediante la consola iniciamos con la configuración inicial entre R1, R2, R3, D1, D2 y A2. Después de configurados de manera inicial se procederá a crear la capa 2 a través de los enlaces troncales entre los Router, esto se hará mediante el direccionamiento de DHCP y SLACC que permitirán un adecuado direccionamiento de PC2 y PC3.

Palabras clave: router, switch, topología, protocolo, ipv4, ipv6, red, DHCP.

ABSTRACT

By means of the following work, it is intended to generate a configuration procedure through a routing protocol following the addressing table and supplied by the last two digits of the identity document in it. The above will be developed through the GNS3 environment in which the network is set up and the connection interfaces are configured. Through the console we start with the initial configuration between R1, R2, R3, D1, D2 and A2. After initially configured, layer 2 will be created through the trunk links between the Routers, this will be done through DHCP and SLACC addressing that will allow an adequate addressing of PC2 and PC3.

Keywords: routers, switches, topology, protocole, ipv4, ipv6, network, DHCP.

PARTE 1 CONSTRUIR LA RED Y CONFIGURAR LOS AJUSTES BÁSICOS DEL DISPOSITIVO Y EL DIRECCIONAMIENTO DE LA INTERFAZ

Figura 1. Escenario 1 ejemplo.

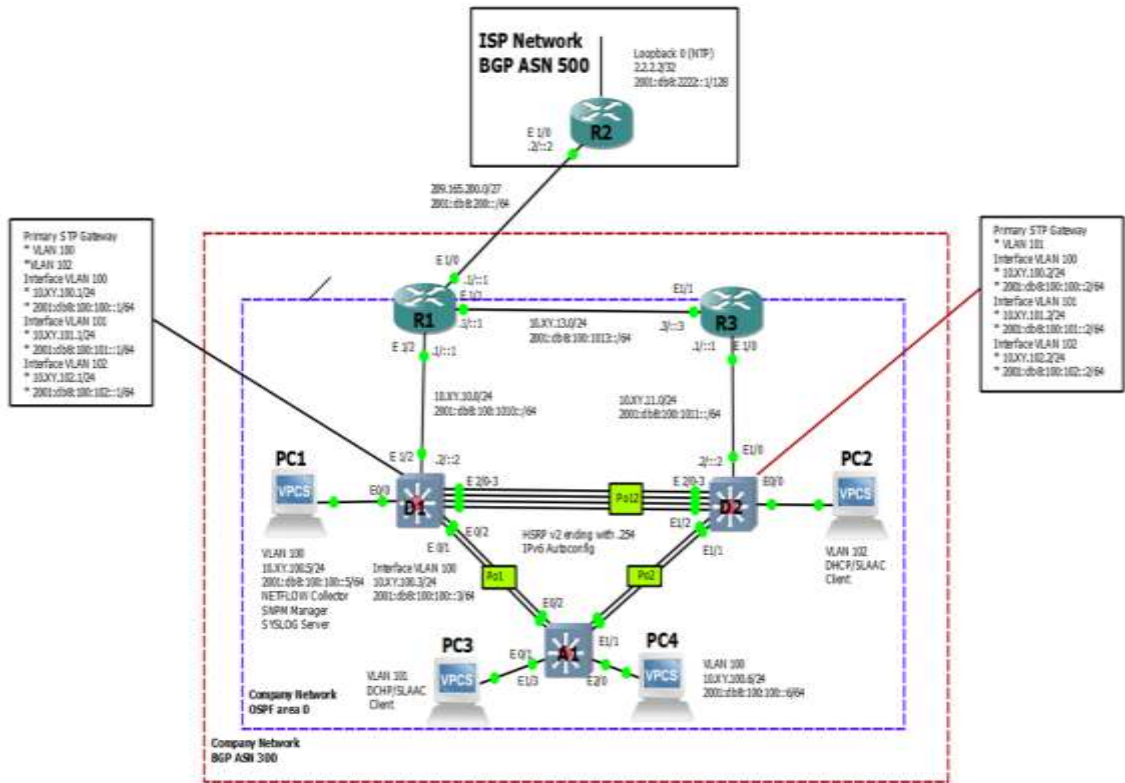


Figura 2. Escenario 1 simulación Nelson Sandoval

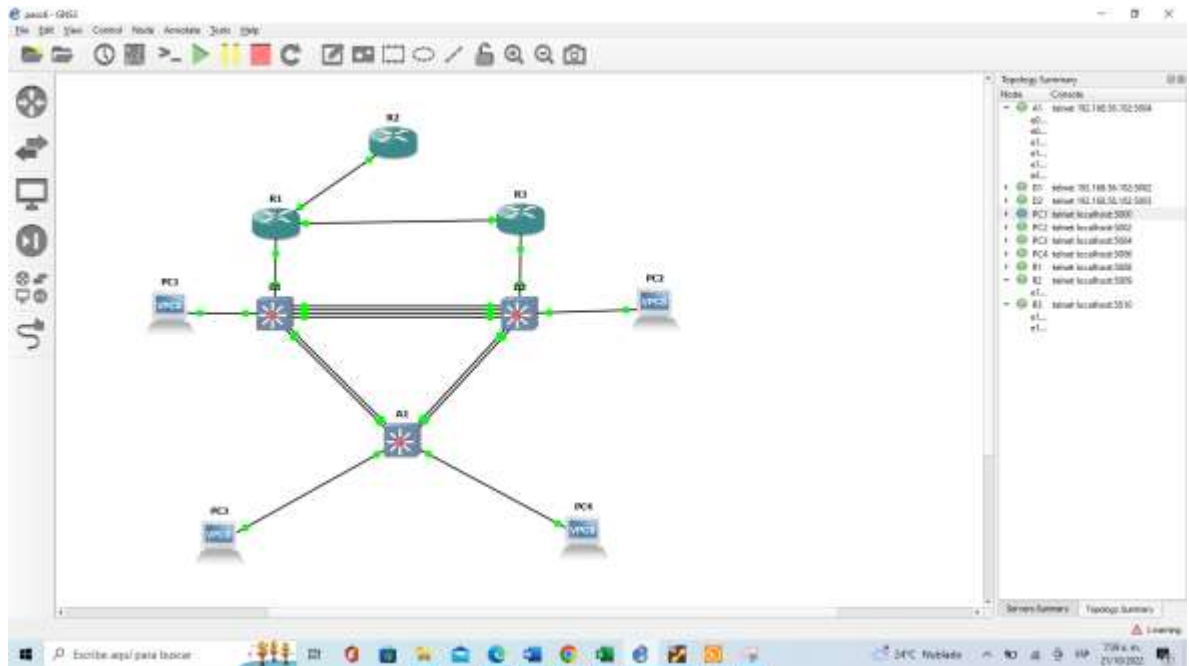


Tabla 1. Direccionamiento de direccionamiento.

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	E1/0	209.165.200.2 25/27	2001:db8:200::1/64	fe80::1:1
R1	E1/2	10.92.10.1/24	2001:db8:100:1010:: 1/64	fe80::1:2
R1	E1/1	10.92.13.1/24	2001:db8:100:1013:: 1/64	fe80::1:3
R2	E1/0	209.165.200.2 26/27	2001:db8:200::2/64	fe80::2:1
R2	Loopback0	2.2.2.2/32	2001:db8:2222::1/12 8	fe80::2:3
R3	E1/0	10.92.11.1/24	2001:db8:100:1011:: 1/64	fe80::3:2

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R3	E1/1	10. 92.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	E1/2	10. 92.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
D1	VLAN 100	10. 92.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
D1	VLAN 101	10.92.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
D1	VLAN 102	10.92.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	E1/0	10.92.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
D2	VLAN 100	10.92.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
D2	VLAN 101	10.92.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
D2	VLAN 102	10.92.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.92.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.92.100.5/24	2001:db8:100:100::5/64	EUI-64
PC2	NIC	DHCP	SLAAC	EUI-64
PC3	NIC	DHCP	SLAAC	EUI-64
PC4	NIC	10.92.100.6/24	2001:db8:100:100::6/64	EUI-64

Se configura de manera inicial toda la red indicando que para este caso XY será reemplazados por los dígitos 92 dada la tabla de asignación propuesta de manera anterior para R1, R2, R3, D1, D2, A1, PC1 y PC4. Como se puede observar a continuación según la topología de red mencionada anteriormente.

Configuración de Router 1

```
Router>
Router>enable
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#hostname R1
R1(config)#ipv6 unicast-routing
R1(config)#no ip domain lookup
R1(config)#banner motd # R1, ENCOR Skills Assessment#
R1(config)#line con 0
R1(config-line)#exec-timeout 0 0
R1(config-line)#logging synchronous
R1(config-line)#exit
R1(config)#interface e1/0
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)#ei
*Oct 17 09:16:23.043: %LINK-3-UPDOWN: Interface Ethernet1/0, changed
state to up
*Oct 17 09:16:24.043: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet1/0, changed state to up
R1(config-if)#exit
R1(config)#interface e1/2
R1(config-if)#ip address 10.92.10.1 255.255.255.0
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
```

Figura 3. Configuración de R1.

```
Port 17: 0000:00:00:00:00:00:00:00
R1#configure terminal
R1(config)#interface e1/0
R1(config-e1/0)#ip address 2001:db8:1::1/64
R1(config-e1/0)#no shutdown
R1(config-e1/0)#exit
R1(config)#interface e2/0
R1(config-e2/0)#ip address 2001:db8:2::1/64
R1(config-e2/0)#no shutdown
R1(config-e2/0)#exit
R1(config)#interface e3/0
R1(config-e3/0)#ip address 2001:db8:3::1/64
R1(config-e3/0)#no shutdown
R1(config-e3/0)#exit
R1#write memory
R1#copy running-config startup-config
R1#
```

Configuración de Router 2

R2#enable

R2#configure terminal

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

R2(config)#hostname R2

R2(config)#ipv6 unicast-routing

R2(config)#no ip domain lookup

R2(config)#banner motd # R2, ENCOR Skills Assessment#

R2(config)#line con 0

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

R2(config-line)#logging synchronous

R2(config-line)#exit

R2(config)#interface e1/0


```
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)#intera
*Oct 17 09:23:21.315: %LINK-3-UPDOWN: Interface Ethernet1/0, changed
state to up
*Oct 17 09:23:22.315: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet1/0, changed state to up
R2(config)#interface Loopback 0
R2(config-if)#ip
*Oct 17 09:23:38.003: %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
```



```
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 e1/2
D1(config-if)#no switchport
D1(config-if)#ip address 10.92.10.2 255.255.255.0
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
D1(config)#interface vlan 100
D1(config-if)#ip address 10.92.100.1 255.255.255.0
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)#no shutdown
D1(config-if)#exit
D1(config)#interface vlan 101
D1(config-if)#ip address 10.92.101.1 255.255.255.0
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
D1(config)#interface vlan 102
D1(config-if)#ip address 10.92.102.1 255.255.255.0
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
D1(config)#ip dhcp excluded-address 10.92.101.1 10.92.101.109
D1(config)#ip dhcp excluded-address 10.92.101.141 10.92.101.254
D1(config)#ip dhcp excluded-address 10.92.102.1 10.92.102.109
D1(config)#ip dhcp excluded-address 10.92.102.141 10.92.102.254
D1(config)#ip dhcp pool VLAN-101
```


Figura 7 Configuración del switch D1-2



```
Switch1:~#configure terminal
Switch1(config)#interface gigabitEthernet 0/24
Switch1(config-if)#ip address 192.168.1.100 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/23
Switch1(config-if)#ip address 192.168.1.101 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/22
Switch1(config-if)#ip address 192.168.1.102 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/21
Switch1(config-if)#ip address 192.168.1.103 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/20
Switch1(config-if)#ip address 192.168.1.104 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/19
Switch1(config-if)#ip address 192.168.1.105 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/18
Switch1(config-if)#ip address 192.168.1.106 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/17
Switch1(config-if)#ip address 192.168.1.107 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/16
Switch1(config-if)#ip address 192.168.1.108 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/15
Switch1(config-if)#ip address 192.168.1.109 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/14
Switch1(config-if)#ip address 192.168.1.110 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/13
Switch1(config-if)#ip address 192.168.1.111 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/12
Switch1(config-if)#ip address 192.168.1.112 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/11
Switch1(config-if)#ip address 192.168.1.113 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/10
Switch1(config-if)#ip address 192.168.1.114 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/9
Switch1(config-if)#ip address 192.168.1.115 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/8
Switch1(config-if)#ip address 192.168.1.116 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/7
Switch1(config-if)#ip address 192.168.1.117 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/6
Switch1(config-if)#ip address 192.168.1.118 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/5
Switch1(config-if)#ip address 192.168.1.119 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/4
Switch1(config-if)#ip address 192.168.1.120 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/3
Switch1(config-if)#ip address 192.168.1.121 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/2
Switch1(config-if)#ip address 192.168.1.122 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/1
Switch1(config-if)#ip address 192.168.1.123 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#interface gigabitEthernet 0/0
Switch1(config-if)#ip address 192.168.1.124 255.255.255.0
Switch1(config-if)#no shutdown
Switch1(config-if)#exit
Switch1(config)#vlan 100
Switch1(config-vlan)#name Management
Switch1(config-vlan)#exit
Switch1(config)#vlan 101
Switch1(config-vlan)#name UserGroupA
Switch1(config-vlan)#exit
Switch1(config)#vlan 102
Switch1(config-vlan)#name UserGroupB
Switch1(config-vlan)#exit
Switch1(config)#vlan 999
Switch1(config-vlan)#exit
Switch1(config)#end
Switch1#
```

Switch D2

```
D2#enable
D2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#hostname D2
D2(config)#ip routing
D2(config)#ipv6 unicast-routing
D2(config)#no ip domain lookup
D2(config)#banner motd # D2, EncorSkills Assessment#
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 e1/0
D2(config-if)#no switchport
D2(config-if)#ip address 10.92.11.2 255.255.255.0
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
D2(config)#interface vlan 100
D2(config-if)#ip address 10.92.100.2 255.255.255.0
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
D2(config)#interface vlan 101
D2(config-if)#ip address 10.92.101.2 255.255.255.0
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
D2(config)#interface vlan 102
D2(config-if)#
D2(config-if)#ip address 10.92.102.2 255.255.255.0
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
D2(config)#ip dhcp excluded-address 10.92.101.1 10.92.101.209
D2(config)#ip dhcp excluded-address 10.92.101.241 10.92.101.254
D2(config)#ip dhcp excluded-address 10.92.102.1 10.92.102.209
D2(config)#ip dhcp excluded-address 10.92.102.241 10.92.102.254
D2(config)#ip dhcp pool VLAN-101
D2(dhcp-config)#network 10.92.101.0 255.255.255.0
D2(dhcp-config)#default-router 92.0.101.254
D2(dhcp-config)#exit
D2(config)#ip dhcp pool VLAN-102
D2(dhcp-config)#network 10.92.102.0 255.255.255.0
D2(dhcp-config)#default-router 10.92.102.254
D2(dhcp-config)#exit
D2(config)#interface range e0/0-3,e1/1-3,e2/0-3,e3/0-3
D2(config-if-range)#shutdown
D2(config-if-range)#exit
```


Switch A1

```
D3#ENABLE
```

```
D3#configure terminal
```

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

```
D3(config)#hostname A1
```

```
A1(config)#no ip domain lookup
```

```
A1(config)#banner motd #A!, ENCOR Skills Assessment#
```

```
A1(config)#line con 0
```

```
A1(config-line)#exec-timeout 0 0
```

```
A1(config-line)#logging synchronous
```

```
A1(config-line)#exit
```

```
A1(config)#vlan 100
```

```
A1(config-vlan)#name Management
```

```
A1(config-vlan)#exit
```

```
A1(config)#vlan 102
```

```
A1(config-vlan)#name UserGroupA
```

```
A1(config-vlan)#exit
```

```
A1(config)#vlan 101
```

```
A1(config-vlan)#name UserGroupA
```

VLAN #101 and #102 have an identical name: UserGroupA

```
A1(config-vlan)#exit
```

```
A1(config)#vlan 102
```

```
A1(config-vlan)#name UserGroupB
```

```
A1(config-vlan)#exit
```

```
A1(config)#interface vlan 100
```

```
A1(config-if)#ip address 10.92.100.3 255.255.255.0
```

```
A1(config-if)#ipv6 address fe80::a1:1 link-local
```

```
A1(config-if)#ipv6 address 2001:db8:100:100::3/64
```

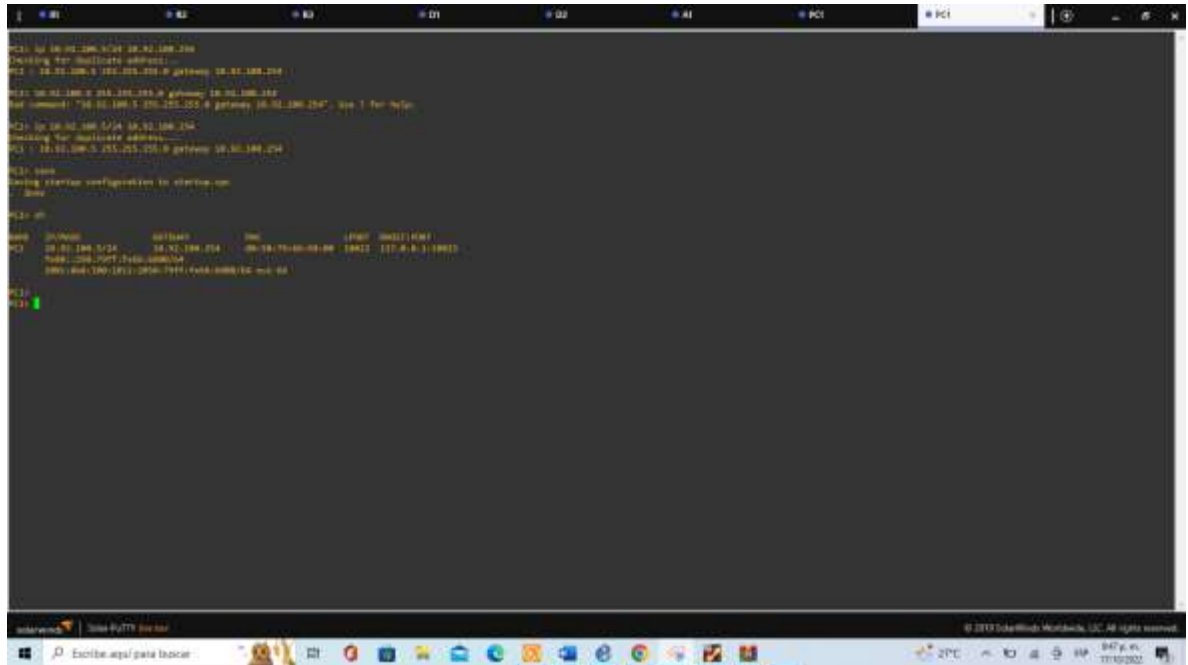
```
A1(config-if)#no shutdown
```


PC1 10.92.100.5/24 10.92.100.254 00:50:79:66:68:00 10022
127.0.0.1:10023

fe80::250:79ff:fe66:6800/64

2001:db8:100:1011:2050:79ff:fe66:6800/64 eui-64

Figura 11. Configuración del PC1.



PC4

PC4

PC4> ip 10.92.100.6/24 10.92.100.254

Checking for duplicate address...

PC1 : 10.92.100.6 255.255.255.0 gateway 10.92.100.254

PC4> save

Saving startup configuration to startup.vpc. done

PC4> sh

NAME	IP/MASK	GATEWAY	MAC	LPORT	RHOST:PORT
------	---------	---------	-----	-------	------------

```

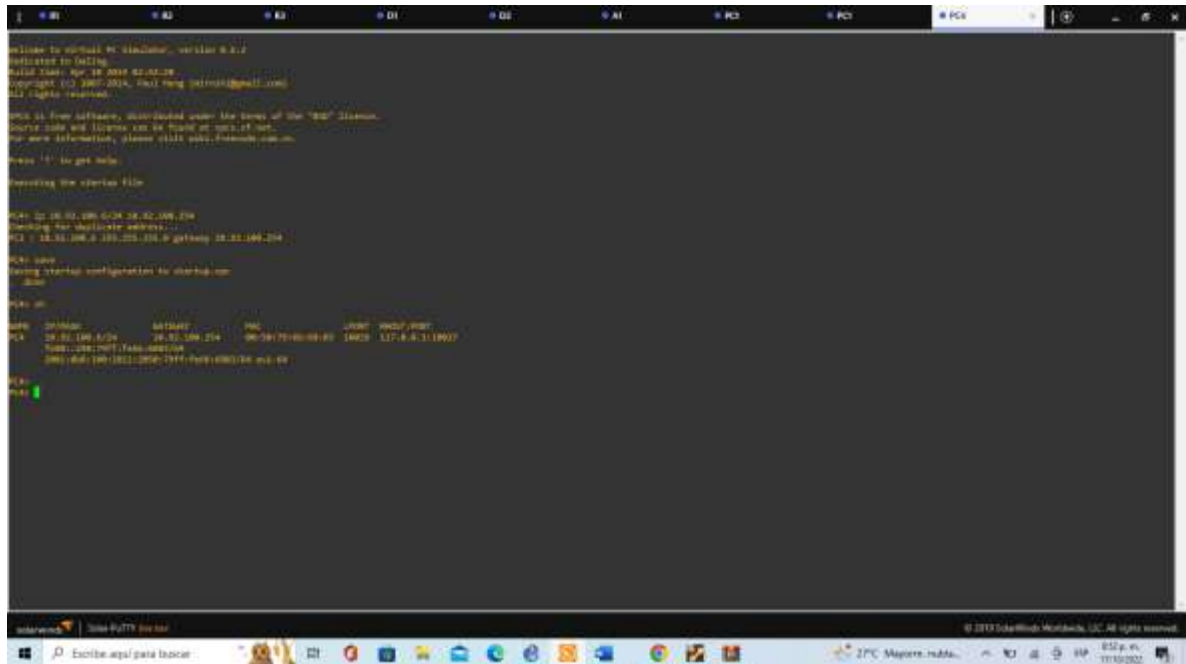
PC4    10.92.100.6/24          10.92.100.254      00:50:79:66:68:03  10026
127.0.0.1:10027

fe80::250:79ff:fe66:6803/64

2001:db8:100:1011:2050:79ff:fe66:6803/64 eui-64

```

Figura 12. Configuración del PC4.



PARTE 2: CONFIGURAR LA RED DE CAPA 2 Y LA COMPATIBILIDAD CON EL HOST

Ahora se configura la red de la capa 2 y se creará el soporte básico del Host, para finalmente revisar se probará la comunicación entre PC2 y PC3 a través de su direccionamiento DHCP y SLAAC. Para esto es necesario habilitar los enlaces troncales 802.1Q entre D1 y D2, D1 y A1 y D2 y A1.

2.1 Configuraciones de las interfaces troncales IEEE 802.1Q para los enlaces de conmutación que están interconectados.

En esta parte del ejercicio se generaran las configuraciones necesarias para los enlaces troncales IEEE802.1q en D1, según la topología de red asignada para este caso.

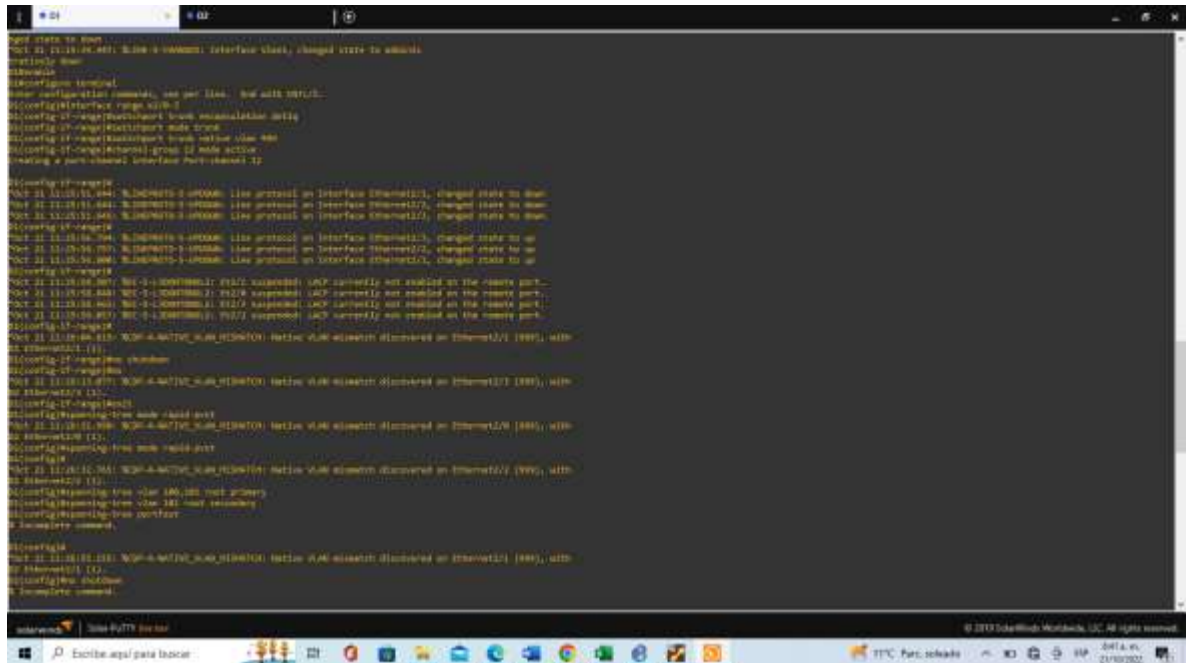
Switch D1

```
D1#enable
D1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
D1(config)#interface range e2/0-3
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#switchport mode trunk
D1(config-if-range)#switchport trunk native vlan 999
D1(config-if-range)#channel-group 12 mode active
Creating a port-channel interface Port-channel 12
D1(config-if-range)#no shutdown
D1(config-if-range)#ex
D1(config-if-range)#exit
D1(config)#spanning-tree mode rapid-pvst
D1(config)#spanning-tree mode rapid-pvst
D1(config)#spanning-tree vlan 100,102 root primary
D1(config)#spanning-tree vlan 101 root secondary
D1(config)#spanning-tree portfast
D1(config)#
*Oct 21 11:26:55.155: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN
mismatch discovered on Ethernet2/1 (999), with
D2 Ethernet2/1 (1).
D1(config)#no shutdown
% Incomplete command.
D1(config)#ex
```

```
*Oct 21 11:27:05.571: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/3 (999), with D2 Ethernet2/3 (1).
```

```
D1(config)#exit
```

Figura 13. Configuración capa 2 switch D1



Switch D2

```
D2#enable
```

```
D2#configure terminal
```

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

```
D2(config)#
```

```
*Oct 21 11:31:08.639: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/0 (1), with D1 Ethernet2/0 (999).
```

```
D2(config)#interface range e2/0-3
```

```
D2(config-if-range)#switchport trunk encapsulation dot1q
```

```
D2(config-if-range)#switchport mode trunk
```

```
D2(config-if-range)#
```

```
*Oct 21 11:31:35.267: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet2/2 (1), with D1 Ethernet2/2 (999).
```

```
D2(config-if-range)#
```

```

*Oct 21 11:31:37.393: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN
mismatch discovered on Ethernet2/3 (1), with D1 Ethernet2/3 (999).
D2(config-if-range)#switchport trunk native vlan 999
D2(config-if-range)#channel-group 12 mode active
Creating a port-channel interface Port-channel 12

D2(config-if-range)#no s
*Oct 21 11:31:54.965: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Port-channel12, changed state to up
D2(config-if-range)#no shutdown
D2(config-if-range)#exit
D2(config)#interface range e1/1-2
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#switchport trunk native vlan 999
D2(config-if-range)#
*Oct 21 11:32:38.187: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN
mismatch discovered on Ethernet1/2 (999), with D3 Ethernet1/2 (1).
D2(config-if-range)#channel-group 2 mode active
Creating a port-channel interface Port-channel 2

D2(config-if-range)#
*Oct 21 11:32:46.842: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet1/2, changed state to down
D2(config-if-range)#no sut
*Oct 21 11:32:52.032: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet1/2, changed state to up
D2(config-if-range)#no shuw
*Oct 21 11:32:53.844: %EC-5-L3DONTBNL2: Et1/1 suspended: LACP
currently not enabled on the remote port.
*Oct 21 11:32:54.002: %EC-5-L3DONTBNL2: Et1/2 suspended: LACP
currently not enabled on the remote port.
D2(config-if-range)#no shutdown
D2(config-if-range)#exit
D2(config)#spanning-tree mode rapid-pvst
D2(config)#spanning-tree vlan 101 root primary
D2(config)#
*Oct 21 11:33:33.329: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN
mismatch discovered on Ethernet1/1 (999), with D3 Ethernet1/1 (1).
*Oct 21 11:33:33.939: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN
mismatch discovered on Ethernet1/2 (999), with D3 Ethernet1/2 (1).
D2(config)#spanning-tree vlan 100,102 root secondary
D2(config)#interface e0/0
D2(config-if)#witchport mode access

```


Switch A1

```
D3#enable
```

```
D3#configure terminal
```

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

```
D3(config)#interface range e0/1-2
```

```
D3(config-if-range)#switchport trunk encapsulation dot1q
```

```
D3(config-if-range)#switchport mode trunk
```

```
D3(config-if-range)#
```

```
*Oct 21 11:43:48.381: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet1/2 (1), with D2 Ethernet1/2 (999).
```

```
D3(config-if-range)#
```

```
*Oct 21 11:43:50.513: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet1/1 (1), with D2 Ethernet1/1 (999).
```

```
D3(config-if-range)#switchport trunk native vlan 999
```

```
D3(config-if-range)#
```

```
*Oct 21 11:43:59.289: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (999), with D1 Ethernet0/1 (1).
```

```
*Oct 21 11:43:59.290: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2 (999), with D1 Ethernet0/2 (1).
```

```
*Oct 21 11:44:00.300: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (999), with D1 Ethernet0/1 (1).
```

```
*Oct 21 11:44:00.307: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2 (999), with D1 Ethernet0/2 (1).
```

```
D3(config-if-range)#
```

```
*Oct 21 11:44:01.303: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (999), with D1 Ethernet0/1 (1).
```

```
*Oct 21 11:44:01.305: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2 (999), with D1 Ethernet0/2 (1).
```

```
*Oct 21 11:44:02.314: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (999), with D1 Ethernet0/1 (1).
```

```
*Oct 21 11:44:02.318: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2 (999), with D1 Ethernet0/2 (1).
```

```
D3(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1
```

```
D3(config-if-range)#
```

```
*Oct 21 11:44:10.362: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet0/1, changed state to down
```

```
*Oct 21 11:44:10.363: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet0/2, changed state to down
```

```
D3(config-if-range)#
```

```
*Oct 21 11:44:11.659: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet0/2, changed state to up
```

```
*Oct 21 11:44:11.664: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Ethernet0/1, changed state to up
```

```
D3(config-if-range)#no shutdown
```

```
D3(config-if-range)#exit
```

```
*Oct 21 11:44:17.872: %EC-5-L3DONTBNL2: Et0/1 suspended: LACP
currently not enabled on the remote port.
```

```
*Oct 21 11:44:18.024: %EC-5-L3DONTBNL2: Et0/2 suspended: LACP
currently not enabled on the remote port.
```

```
D3(config-if-range)#exit
```

```
D3(config)#interface range e1/1-2
```

```
D3(config-if-range)#switchport trunk encapsulation dot1q
```

```
D3(config-if-range)#
```

```
*Oct 21 11:44:45.561: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN
mismatch discovered on Ethernet1/2 (1), with D2 Ethernet1/2 (999).
```

```
D3(config-if-range)#
```

```
*Oct 21 11:44:49.596: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN
mismatch discovered on Ethernet1/1 (1), with D2 Ethernet1/1 (999).
```

```
D3(config-if-range)#switchport mode trunk
```

```
D3(config-if-range)#
```

```
*Oct 21 11:44:57.598: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN
mismatch discovered on Ethernet0/2 (999), with D1 Ethernet0/2 (1).
```

```
D3(config-if-range)#
```

*Oct 21 11:45:02.269: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (999), with D1 Ethernet0/1 (1).

D3(config-if-range)#switchport trunk native vlan 999

D3(config-if-range)#channel-group 2 mode active

Creating a port-channel interface Port-channel 2

D3(config-if-range)#

*Oct 21 11:45:30.165: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel2, changed state to up

D3(config-if-range)#no shutdown

D3(config-if-range)#exit

D3(config)#

*Oct 21 11:45:56.620: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2 (999), with D1 Ethernet0/2 (1).

*Oct 21 11:45:57.053: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (999), with D1 Ethernet0/1 (1).

D3(config)#spanning-tree mode rapid-pvst

D3(config)#interface e1/3

D3(config-if)#switchport mode access

D3(config-if)#

*Oct 21 11:46:53.876: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2 (999), with D1 Ethernet0/2 (1).

D3(config-if)#

*Oct 21 11:46:54.956: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (999), with D1 Ethernet0/1 (1).

D3(config-if)#

D3(config-if)#switchport access vlan 101

D3(config-if)#spanning-tree portfast

%Warning: portfast should only be enabled on ports connected to a single host. Connecting hubs, concentrators, switches, bridges, etc... to this interface when portfast is enabled, can cause temporary bridging loops.

Use with CAUTION

%Portfast has been configured on Ethernet1/3 but will only have effect when the interface is in a non-trunking mode.

```
D3(config-if)#no shutdown
```

```
D3(config-if)#spanning-tree portfas
```

```
D3(config-if)#exit
```

```
D3(config)#
```

```
*Oct 21 11:47:43.099: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/1 (999), with D1 Ethernet0/1 (1).
```

```
D3(config)#
```

```
*Oct 21 11:47:44.211: %CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on Ethernet0/2 (999), with D1 Ethernet0/2 (1).
```

```
D3(config)#interface e2/0
```

```
D3(config-if)#switchport mode access
```

```
D3(config-if)#switchport access vlan 100
```

```
D3(config-if)#spanning-tree portfast
```

%Warning: portfast should only be enabled on ports connected to a single host. Connecting hubs, concentrators, switches, bridges, etc... to this interface when portfast is enabled, can cause temporary bridging loops.

Use with CAUTION

%Portfast has been configured on Ethernet2/0 but will only have effect when the interface is in a non-trunking mode.

```
D3(config-if)#no shutdown
```

```
D3(config-if)#exit
```

```
D3(config)#end
```

2.2 Generación de enlaces troncales para D1, D2 y A1

A continuación, a través del comando `interface range`, los cuales están incluidos anteriormente en los comandos ejecutados en cada Switch

D1

```
D1(config)#interface range e2/0-3
D1(config-if-range)#switchport trunk native vlan 999
D1(config)#interface range e0/1-2
D1(config-if-range)#switchport trunk native vlan 999
Switch D2
D2(config)#interface range e2/0-3
D2(config-if-range)#switchport trunk native vlan 999
D2(config)#interface range e1/1-2
D2(config-if-range)#switchport trunk native vlan 999
Switch A1
A1(config)#interface range e0/1-2
A1(config-if-range)#switchport trunk native vlan 999
```

2.3. Uso del protocolo Rapid Spanning-tree en cada uno de los switch

```
Switch D1
D1(config)#spanning-tree mode rapid-pvst
Switch D2
D2(config)#spanning-tree mode rapid-pvst
Switch A1
A1(config)#spanning-tree mode rapid-pvs
```

2.4: configuración de los puentes RSTP

```
Switch D1
D1(config)#spanning-tree vlan 100,102 root primary
D1(config)#spanning-tree vlan 101 root secondary
Switch D2
D2(config)#spanning-tree vlan 101 root primary
```

```
D2(config)#spanning-tree vlan 100,102 root secondary
```

2.5: Desarrollo de la LACP en EtherChannels

D1

```
D1(config-if-range)#channel-group 12 mode active
Creating a port-channel interface Port-channel 12
D1(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1
```

D2

```
D2(config-if-range)#channel-group 12 mode active
Creating a port-channel interface Port-channel 12
D2(config-if-range)#no shutdown
D2(config-if-range)#channel-group 2 mode active
Creating a port-channel interface Port-channel 2
```

A1

```
A1(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1
A1(config-if-range)#channel-group 2 mode active
Creating a port-channel interface Port-channel 2
```

Switch D1

```
D1(config-if-range)#channel-group 12 mode active
Creating a port-channel interface Port-channel 12
D1(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1
```



```
D1(config-if-range)#no shutdown
D1(config-if-range)#exit
D1(config)#interface range e0/1-2
D1(config-if-range)#Switchport trunk encapsulation dot1q
D1(config-if-range)#switchport mode trunk
D1(config-if-range)#switchport trunk native vlan 999
D1(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1
D1(config-if-range)#no shutdown
D1(config-if-range)#exit
D1(config)#spanning-tree mode rapid-pvst
D1(config)#spanning-tree vlan 100,102 root primary
D1(config)#spanning-tree vlan 101 root secondary
D1(config)#interface e0/0
D1(config-if)#switchport mode access
D1(config-if)#switchport access vlan 100
```

D2

```
D2(config)#interface e0/0
D2(config-if)#switchport mode access
D2#enable
D2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
D2(config)#interface range e2/0-3
D2(config-if-range)#Switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#switchport trunk native vlan 999
D2(config-if-range)#channel-group 12 mode active
Creating a port-channel interface Port-channel 12
D2(config-if-range)#no shutdown
```



```
D2(config-if-range)#exit
D2(config)#interface range e1/1-2
D2(config-if-range)#Switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#switchport trunk native vlan 999
D2(config-if-range)#channel-group 2 mode active
Creating a port-channel interface Port-channel 2
D2(config-if-range)#no shutdown
D2(config-if-range)#exit
D2(config)#!
D2(config)#spanning-tree mode rapid-pvst
D2(config)#spanning-tree vlan 101 root primary
D2(config)#spanning-tree vlan 100,102 root secondary
D2(config)#!
D2(config)#interface e0/0
D2(config-if)#switchport mode access
D2(config-if)#switchport access vlan 102
D2(config-if)#spanning-tree portfast
D2(config-if)#no shutdown
D2(config-if)#exit
D2(config)#end
```

A1

```
A1(config)#interface e1/3
Acceso al modo A1(config-if)#switchport mode access
A1(config-if)#switchport access vlan 101
A1(config-if)#spanning-tree portfast
A1(config-if)#no shutdown
A1(config-if)#exit
A1(config)#interface e2/0
```

```
Acceso al modo A1(config-if)#switchport mode access
35
A1(config-if)#switchport access vlan 100
A1(config-if)#spanning-tree portfast
A1(config-if)#no shutdown
A1(config-if)#exit
A1#Enable
A1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
A1(config)#spanning-tree mode rapid-pvst
A1(config)#interface range e0/1-2
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#switchport mode trunk
A1(config-if-range)#switchport trunk native vlan 999
A1(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
A1(config)#interface range e1/1-2
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#switchport mode trunk
A1(config-if-range)#switchport trunk native vlan 999
A1(config-if-range)#channel-group 2 mode active
Creating a port-channel interface Port-channel 2
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
A1(config)#interface e1/3
A1(config-if)#switchport mode access
A1(config-if)#switchport access vlan 101
A1(config-if)#spanning-tree portfast
```

```
A1(config-if)#no shutdown
A1(config-if)#exit
A1(config)#interface e2/0
A1(config-if)#switchport mode access
A1(config-if)#switchport access vlan 100
A1(config-if)#spanning-tree portfast
A1(config-if)#no shutdown
A1(config-if)#exit
```

2.7 Comprobar funcionamiento en los servicios DHCP.

```
PC2> ip dhcp
DDORA IP 10.89.102.110/24 GW 10.89.102.254
PC2> save
```

2.8 Revisión de conectividad entre los Pcs.

Figura 16 Comprobar servicio DHCP para la PC2

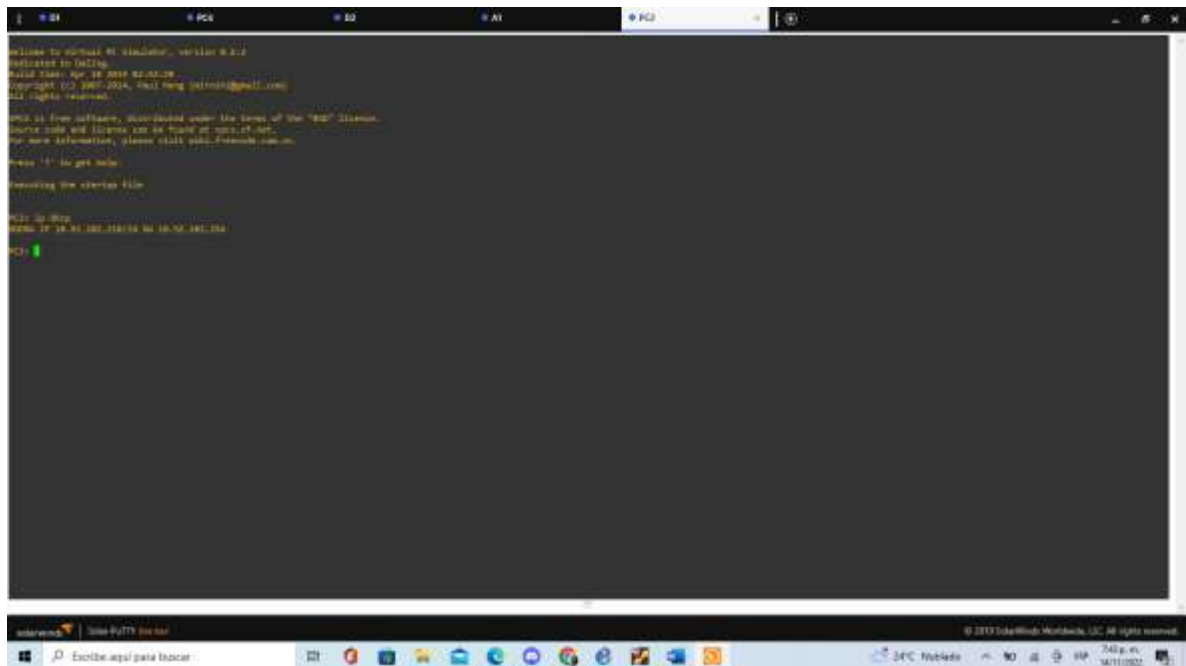


Figura 17: Comprobar conectividad LAN en PC1

```
PC1> ping 10.0.1.100
Pong received: "ping 10.0.1.100", size 8, time 0.01s.

PC1> ping 10.0.1.100.1
Pong bytes: From 10.0.1.100.1: icmp_seq=1 ttl=64 time=0.100 ms
Pong bytes: From 10.0.1.100.2: icmp_seq=2 ttl=64 time=0.100 ms
Pong bytes: From 10.0.1.100.3: icmp_seq=3 ttl=64 time=0.100 ms
Pong bytes: From 10.0.1.100.4: icmp_seq=4 ttl=64 time=0.100 ms
Pong bytes: From 10.0.1.100.5: icmp_seq=5 ttl=64 time=0.100 ms

PC1> ping 10.0.1.100.2
Pong bytes: From 10.0.1.100.2: icmp_seq=1 ttl=64 time=0.100 ms
Pong bytes: From 10.0.1.100.2: icmp_seq=2 ttl=64 time=0.100 ms
Pong bytes: From 10.0.1.100.2: icmp_seq=3 ttl=64 time=0.100 ms
Pong bytes: From 10.0.1.100.2: icmp_seq=4 ttl=64 time=0.100 ms
Pong bytes: From 10.0.1.100.2: icmp_seq=5 ttl=64 time=0.100 ms

PC1> ping 10.0.1.100.8
Pong bytes: From 10.0.1.100.8: icmp_seq=1 ttl=64 time=0.100 ms
Pong bytes: From 10.0.1.100.8: icmp_seq=2 ttl=64 time=0.100 ms
Pong bytes: From 10.0.1.100.8: icmp_seq=3 ttl=64 time=0.100 ms
Pong bytes: From 10.0.1.100.8: icmp_seq=4 ttl=64 time=0.100 ms
Pong bytes: From 10.0.1.100.8: icmp_seq=5 ttl=64 time=0.100 ms

PC1>
```

Figura 18: Comprobar conectividad LAN en PC2

```
PC2> ping 10.0.1.100.1
Pong bytes: From 10.0.1.100.1: icmp_seq=1 ttl=64 time=0.077 ms
Pong bytes: From 10.0.1.100.2: icmp_seq=2 ttl=64 time=0.100 ms
Pong bytes: From 10.0.1.100.3: icmp_seq=3 ttl=64 time=0.097 ms
Pong bytes: From 10.0.1.100.4: icmp_seq=4 ttl=64 time=0.093 ms
Pong bytes: From 10.0.1.100.5: icmp_seq=5 ttl=64 time=0.088 ms

PC2> ping 10.0.1.100.2
Pong bytes: From 10.0.1.100.2: icmp_seq=1 ttl=64 time=0.087 ms
Pong bytes: From 10.0.1.100.2: icmp_seq=2 ttl=64 time=0.100 ms
Pong bytes: From 10.0.1.100.2: icmp_seq=3 ttl=64 time=0.098 ms
Pong bytes: From 10.0.1.100.2: icmp_seq=4 ttl=64 time=0.100 ms
Pong bytes: From 10.0.1.100.2: icmp_seq=5 ttl=64 time=0.098 ms

PC2>
```



```

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
D1(config)#exit

```

Figura 26: D1 en OSPFv2

```

D1#configure terminal
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
D1(config)#exit

```

D2

```

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)#passive-interface default

```

```

D2(config-rtr)#no passive-interface e1/0
D2(config-rtr)#exit
D2(config)#interface e1/0
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)#exit
D2#

```

Figura 27: D2 en OSPFv2

```

D2# configure terminal
D2(config)# router ospf 6
D2(config-router)# no passive-interface e1/0
D2(config-router)# exit
D2(config)# interface e1/0
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)# exit
D2#

```

3.3 Configuración de R2 en ISP Network usando MP-BGP

Router R2

```
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
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)#address-family ipv4
R2(config-router-af)#neighbor 209.165.200.225 activate
R2(config-router-af)#no neighbor 2001:db8:200::1 activate
R2(config-router-af)#network 2.2.2.2 mask 255.255.255.255
R2(config-router-af)#network 0.0.0.0
R2(config-router-af)#exit-address-family
R2(config-router)#address-family ipv6
R2(config-router-af)#no neighbor 209.165.200.225 activate
R2(config-router-af)#neighbor 2001:db8:200::1 activate
R2(config-router-af)#network 2001:db8:2222::/128
R2(config-router-af)#network ::/0
R2(config-router-af)#exit-address-family
R2(config-router)#exit
R2(config)#exit
```

Figura 28: R2 en ISP



3.4 Configuración en R1 ISP NETWORK usando MP-BGP

R1

```
R1#configure terminal
```

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

```
R1(config)#ip route 10.92.0.0 255.0.0.0 null0
```

%Inconsistent address and mask

```
R1(config)#ipv6 route 2001:db8:100::/48 null0
```

```
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)#neighbor 2001:db8:200::2 remote-as 500
```

```
R1(config-router)#address-family ipv4 unicast
```

```
R1(config-router-af)#neighbor 209.165.200.226 activate
```

```
R1(config-router-af)#no neighbor 2001:db8:200::2 activate
```

```

R1(config-router-af)#network 10.92.0.0 mask 255.0.0.0
R1(config-router-af)#exit-address-family
R1(config-router)#address-family ipv6 unicast
R1(config-router-af)#no neighbor 209.165.200.226 activate
R1(config-router-af)#neighbor 2001:db8:200::2 activate
R1(config-router-af)#network 2001:db8:100::/48
R1(config-router-af)#exit-address-family
R1(config-router)#exit
R1(config)#exit
*Nov 25 10:50:34.431: %BGP-5-ADJCHANGE: neighbor 2001:DB8:200::2 Up
R1(config)#exit
*Nov 25 10:50:36.343: %BGP-5-ADJCHANGE: neighbor 209.165.200.226 Up
R1(config)#exit
R1#

```

Figura 29: R1 en ISP



PARTE 4: CONFIGURAR LA REDUNDANCIA DE PRIMER SALTO

Configurar la versión numero 2 de HSRP para generar la redundancia de primer salto para los host.

4.1 Configurar la SLA IP en D1 que apruebe la accesibilidad de la interfaz R1 E1/2.

D1

```
D1(config)#ip sla 4
D1(config-ip-sla)#icmp-echo 10.89.10.1
D1(config-ip-sla-echo)#frequency 5
D1(config-ip-sla-echo)#exit
D1(config)#ip sla 6
D1(config-ip-sla)#icmp-echo 2001:db8:100:1010::1
D1(config-ip-sla-echo)#frequency 5
D1(config-ip-sla-echo)#exit
D1(config)#ip sla schedule 4 life forever start-time now
D1(config)#ip sla schedule 6 life forever start-time now
D1(config)#track 4 ip sla 4
D1(config-track)#delay down 10 up 15
D1(config-track)#exit
D1(config)#track 6 ip sla 6
D1(config-track)#delay down 10 up 15
D1(config-track)#exit
```

4.2 Configurar la SLA IP en D1 que apruebe la accesibilidad de la interfaz R1 E1/2.

D2

```
D2(config)#ip sla 4
D2(config-ip-sla)#icmp-echo 10.92.11.1
```

```
D2(config-ip-sla-echo)#frequency 5
D2(config-ip-sla-echo)#exit
D2(config)#ip sla 6
D2(config-ip-sla)#icmp-echo 2001:db8:100:1011::1
D2(config-ip-sla-echo)#frequency 5
D2(config-ip-sla-echo)#exit
D2(config)#ip sla schedule 4 life forever start-time now
D2(config)#ip sla schedule 6 life forever start-time now
D2(config)#track 4 ip sla 4
D2(config-track)#delay down 10 up 15
D2(config-track)#exit
D2(config)#track 6 ip sla 6
D2(config-track)#delay down 10 up 15
D2(config-track)#exit
D2(config)#
```

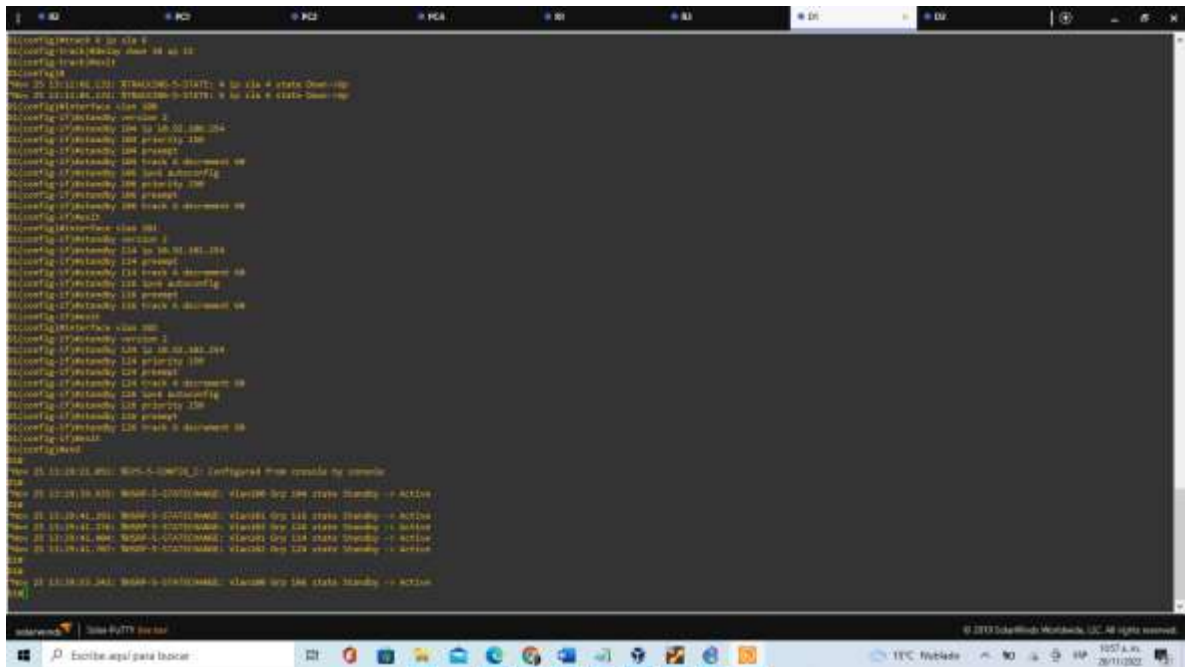
4.3 Configurar el HSRP versión 2 en el switch D1

Switch D1

```
D1(config)#interface vlan 100
D1(config-if)#standby version 2
D1(config-if)#standby 104 ip 10.92.100.254
D1(config-if)#standby 104 priority 150
D1(config-if)#standby 104 preempt
D1(config-if)#standby 104 track 4 decrement 60
D1(config-if)#standby 106 ipv6 autoconfig
D1(config-if)#standby 106 priority 150
D1(config-if)#standby 106 preempt
D1(config-if)#standby 106 track 6 decrement 60
D1(config-if)#exit
```

```
D1(config)#interface vlan 101
D1(config-if)#standby version 2
D1(config-if)#standby 114 ip 10.92.101.254
D1(config-if)#standby 114 preempt
D1(config-if)#standby 114 track 4 decrement 60
D1(config-if)#standby 116 ipv6 autoconfig
D1(config-if)#standby 116 preempt
D1(config-if)#standby 116 track 6 decrement 60
D1(config-if)#exit
D1(config)#interface vlan 102
D1(config-if)#standby version 2
D1(config-if)#standby 124 ip 10.92.102.254
D1(config-if)#standby 124 priority 150
D1(config-if)#standby 124 preempt
D1(config-if)#standby 124 track 4 decrement 60
D1(config-if)#standby 126 ipv6 autoconfig
D1(config-if)#standby 126 priority 150
D1(config-if)#standby 126 preempt
D1(config-if)#standby 126 track 6 decrement 60
D1(config-if)#exit
D1(config)#end
```

Figura 30: Configurar la SLA IP en D1



Switch D2

```
D2(config)#interface vlan 100
D2(config-if)#standby version 2
D2(config-if)#standby 104 ip 10.92.100.254
D2(config-if)#standby 104 preempt
D2(config-if)#standby 104 track 4 decrement 60
D2(config-if)#standby 106 ipv6 autoconfig
D2(config-if)#standby 106 preempt
D2(config-if)#standby 106 track 6 decrement 60
D2(config-if)#exit
D2(config)#interface vlan 101
D2(config-if)#standby version 2
D2(config-if)#standby 114 ip 10.92.101.254
D2(config-if)#standby 114 priority 150
```

```
D2(config-if)#standby 114 preempt
D2(config-if)#standby 114 track 4 decrement 60
D2(config-if)#standby 116 ipv6 autoconfig
D2(config-if)#standby 116 priority 150
D2(config-if)#standby 116 preempt
D2(config-if)#standby 116 track 6 decrement 60
D2(config-if)#exit
D2(config)#interface vlan 102
D2(config-if)#standby version 2
D2(config-if)#standby 124 ip 10.92.102.254
D2(config-if)#standby 124 preempt
D2(config-if)#standby 124 track 4 decrement 60
D2(config-if)#standby 126 ipv6 autoconfig
D2(config-if)#standby 126 preempt
D2(config-if)#standby 126 track 6 decrement 60
D2(config-if)#exit
D2(config)#end
D2(config)#end
```


CONCLUSIONES

Con el desarrollo de la red anterior se comprendió que GNS3 es un entorno muy bueno para la generación y enrutamiento de redes con herramientas robustas y precisas para este mismo, es importante reconocer que por medio de los comandos correctos y accediendo a las interfaces correctas se puede generar el éxito de la red.

Mediante GNS3 se puede diseñar soluciones de redes conmutadas en, mediante el uso de los protocolos DHCP y SLAAC, adicional en el ejercicio por medio de los enlaces troncales de D1, D2 y A1 fueron asignados las direcciones IPV6 de los PC1 y PC3 de manera automática mediante el protocolo DHCP Y SLAAC.

Se logra estructurar redes conmutadas con el uso de GNS3 mediante el uso del protocolo STP y configuración VLANS, logrando comprender las características de una infraestructura de red jerárquica convergente, además Se diseña soluciones de red escalables mediante la configuración básica y avanzada de protocolos de enrutamiento para la debida implementación de servicios IP con calidad de servicio en ambientes de red empresariales LAN y WAN.

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