

DIPLOMADO DE PROFUNDIZACION CISCO PRUEBA DE
HABILIDADES

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SOLUCIÓN A DOS ESCENARIOS PRESENTES BAJO EL USO DEL
SIMULADOR GNS3

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Diplomado de opción de grado presentado para obtener el título de
INGENIERO ELECTRONICO

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NOTA DE ACEPTACIÓN

Firma del presidente del jurado

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GLOSARIO

GATEWAY: Este concepto se aplica en comunicación enfocado a la frontera que permite o no la comunicación con otras redes y dispositivos. Se conoce también como puerta de enlace o pasarela y permite la interacción también de protocolos.

GNS3: Software especializado de uso libre para modelar redes de manera virtual mediante el uso de IOS de equipos CISCO que simulan su funcionamiento como si se trataran de equipos reales. Este software fue lanzado en 2008 desarrollado por GNS3, por otra parte, este software permite la interacción entre equipos reales y virtuales.

HOST: Es un equipo, ordenador o computador que funciona como punto de inicio o de fin del proceso de transferencia de datos. Estos equipos requieren de una configuración mínima de direccionamiento para permitir el intercambio de datos.

VIRTUAL MACHINE: Es un software que presta la función de simular un sistema operativo de un equipo de cómputo y que permite flexibilizar con diversos sistemas operativos en cuanto a versión o fabricantes. Esta instalación se realiza sobre un dispositivo físico que incluso permite la interacción entre el virtual y real.

ENRUTAMIENTO: Es el proceso de envío de paquetes en redes de comunicación con gran cantidad de conectividad entre los dispositivos que la conforman. Como punto fundamental este proceso optimiza e identifica la ruta mas óptima para llevar a cabo la comunicación. Este proceso genera tablas de enrutamiento y aplica parámetro como distancia administrativa, métrica, ancho de banda y uso de protocolos.

RESUMEN

El diplomado de profundización CISCO contiene habilidades prácticas que son consideradas una serie de características para el aprendizaje y enrutamiento de diagnóstico, se basa principalmente en potencializar las características de los equipos que componen la topología de la red a través de los conceptos estudiados a lo largo del curso CCNP de CISCO mediante la implementación de comandos lógicos apoyados en el desarrollo en softwares especializados

Los ingenieros electrónicos deben ser capaces de realizar un diagnóstico configuran dispositivos como conmutadores, enrutadores y ordenadores apoyados en los conceptos de redes integrando desempeño, seguridad, redundancia, direccionamiento, manejo de áreas de operación entre otros conceptos, los cuales contribuyen a aumentar el rendimiento y confiabilidad de las redes ya que esto nos permitirá brindar soluciones y respuestas a los diversos problemas que las redes de información, electrónicas y de datos puedan presentar.

De acuerdo con los dos escenarios que se presentan en la prueba de habilidades, se debe seleccionar uno de ellos para realizar el proceso de configuración de redes, utilizando GNS3.

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

ABSTRACT

The CISCO in-depth diploma contains practical skills that are considered a series of characteristics for learning and diagnostic routing, it is mainly based on potentiating the characteristics of the equipment that make up the network topology through the concepts studied throughout the course. CISCO CCNP course through the implementation of logical commands supported by the development of specialized software

Electronic engineers must be able to carry out a diagnosis, configure devices such as switches, routers and computers supported by the concepts of networks integrating performance, security, redundancy, addressing, management of areas of operation, among other concepts, which contribute to increasing performance and reliability of the networks since this will allow us to provide solutions and answers to the various problems that information, electronic and data networks may present.

According to the two scenarios that are presented in the skills test, one of them must be selected to carry out the network configuration process, using GNS3.

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

INTRODUCCIÓN

Una red representa la interconexión de un conjunto determinado de computadores, a través de dispositivos alámbricos o inalámbricos que, gracias a impulsos eléctricos, ondas electromagnéticas u otros medios físicos, pueden enviar y recibir información relevante en paquetes de datos, como también, compartir sus recursos y actuar como un conjunto organizado.

A continuación, se desarrollará la actividad mediante la herramienta GNS2 la cual permitirá realizar la simulación de la actividad con el fin de afianzar los conocimientos actuales sobre el manejo y configuración de dispositivos de red.

Se presenta la implementación y desarrollo sobre la topología de red propuesta en la cual se llevan a cabo los diferentes pasos de la actividad. En este documento se consignan los comandos utilizados para cada uno de los diferentes pasos propuestos, así como las evidencias tomadas a través de imágenes de las diferentes CLI de los equipos entre ellos, routers, switches y host.

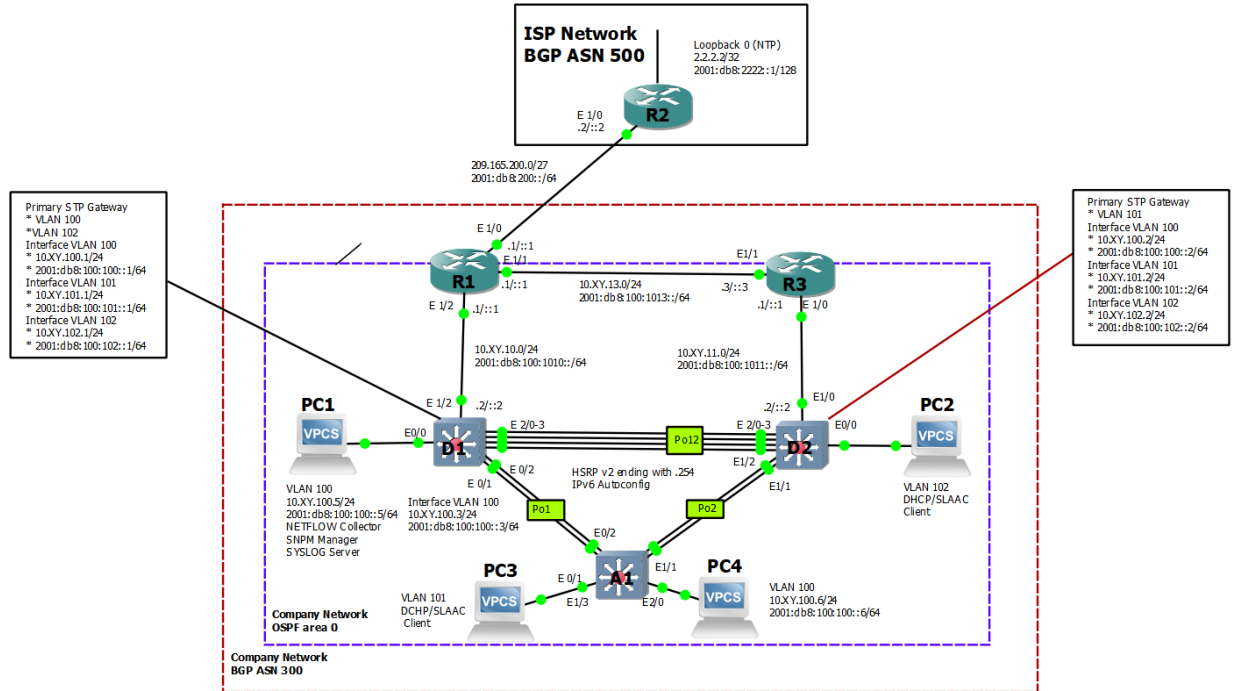
La Universidad Nacional Abierta y a Distancia (UNAD) en el diplomado de profundización CISCO para obtener el título de Ingeniero electrónico, incluye el aprendizaje de configuración de redes donde se da aplicabilidad a todos los conceptos y temáticas estudiadas y aprendidas a lo largo del proceso de aprendizaje de la carrera, entre los cuales podemos mencionar: CCNA, CCNP, interacción entre varias redes e internet, comandos utilizados para la protección de acceso, conceptos aplicables para la configuración de redes mediante los protocolos y protocolos de seguridad entre otros.

1. Descripción de escenarios propuestos para la prueba de habilidades

Escenario 1

Topología

Figura 1. Topología escenario 1

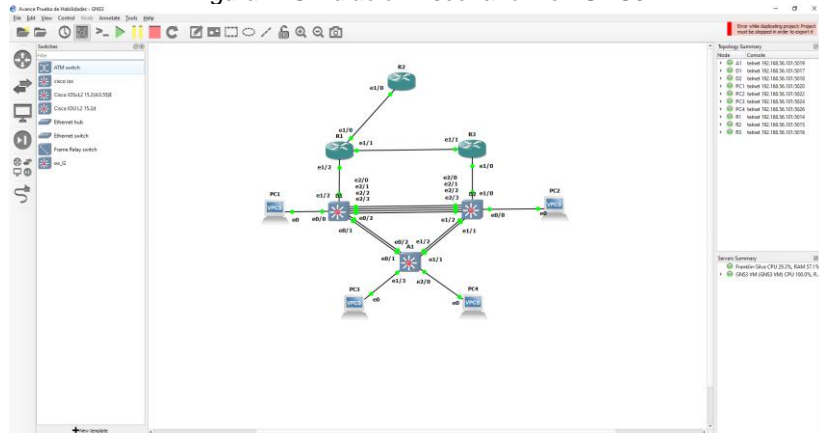


Fuente: Documento Cisco

En este primer escenario se configurarán los dispositivos de una red. Aplique las configuraciones iniciales y los protocolos de enrutamiento para los routers R1, R2, R3, D1, D2 Y A1 según el diagrama. No asigne passwords en los routers. Configurar las interfaces con las direcciones que se muestran en la topología de red.

Se realiza la simulación en GNS3.

Figura 2. Simulación Escenario 1 en GNS3



Fuente: Autor

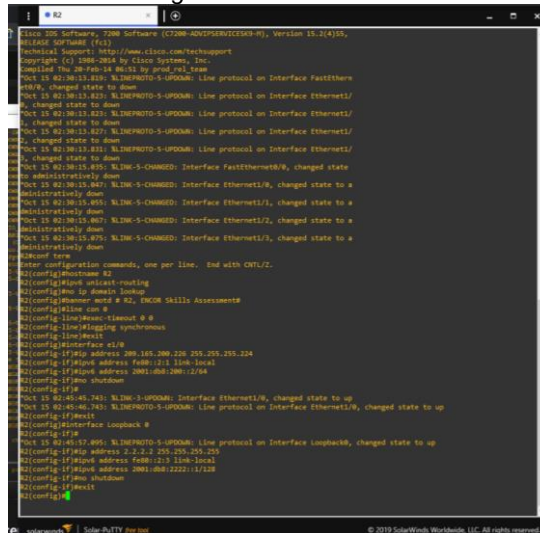
Tabla 1. Direccionamiento

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	E1/0	209.165.200.225/27	2001:db8:200::1/64	fe80::1:1
	E1/2	10.05.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	E1/1	10.05.13.1/24	2001:db8:100:1013::1/64	fe80::1:3
R2	E1/0	209.165.200.226/27	2001:db8:200::2/64	fe80::2:1
	Loopback0	2.2.2.2/32	2001:db8:2222::1/128	fe80::2:3
R3	E1/0	10.05.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
	E1/1	10.05.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	E1/2	10.05.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
	VLAN 100	10.05.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10.05.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
	VLAN 102	10.05.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	E1/0	10.05.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10.05.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
	VLAN 101	10.05.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10.05.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.05.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.05.100.5/24	2001:db8:100:100::5/64	EUI-64
PC2	NIC	DHCP	SLAAC	EUI-64
PC3	NIC	DHCP	SLAAC	EUI-64
PC4	NIC	10.05.100.6/24	2001:db8:100:100::6/64	EUI-64

Router R1

```
hostname R1
ipv6 unicast-routing
no ip domain lookup
banner motd # R1, ENCOR Skills Assessment#
line con 0
exec-timeout 0 0
logging synchronous
exit
interface e1/0
ip address 209.165.200.225 255.255.255.224
ipv6 address fe80::1:1 link-local
ipv6 address 2001:db8:200::1/64
no shutdown
exit
interface e1/2
ip address 10.05.10.1 255.255.255.0
ipv6 address fe80::1:2 link-local
ipv6 address 2001:db8:100:1010::1/64
no shutdown
exit
interface e1/1
ip address 10.05.13.1 255.255.255.0
ipv6 address fe80::1:3 link-local
ipv6 address 2001:db8:100:1013::1/64
no shutdown
exit
```


Figura 4. Simulación R2

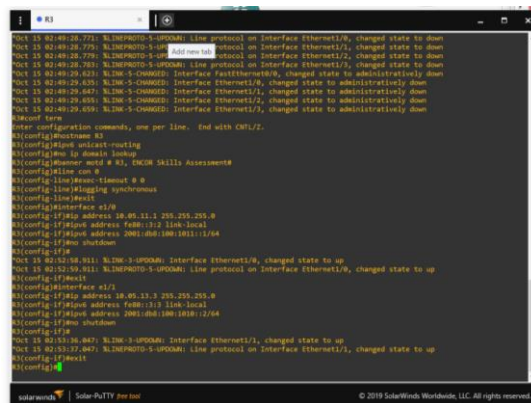


Fuente: Autor

Router R3

```
hostname R3
ipv6 unicast-routing
no ip domain lookup
banner motd # R3, ENCOR Skills Assessment#
line con 0
exec-timeout 0 0
logging synchronous
exit
interface e1/0
ip address 10.05.11.1 255.255.255.0
ipv6 address fe80::3:2 link-local
ipv6 address 2001:db8:100:1011::1/64
no shutdown
exit
interface e1/1
ip address 10.05.13.3 255.255.255.0
ipv6 address fe80::3:3 link-local
ipv6 address 2001:db8:100:1010::2/64
no shutdown
exit
```

Figura 5. Simulación R3



Fuente: Autor

Switch D1

hostname D1

ip routing

ipv6 unicast-routing

no ip domain lookup

banner motd # D1, ENCOR Skills Assessment#

line con 0

exec-timeout 0 0

logging synchronous

exit

vlan 100

name Management

exit

vlan 101

name UserGroupA

exit

vlan 102

name UserGroupB

exit

vlan 999

name NATIVE

exit


```
interface e1/2
no switchport
ip address 10.05.10.2 255.255.255.0
ipv6 address fe80::d1:1 link-local
ipv6 address 2001:db8:100:1010::2/64
no shutdown
exit

interface vlan 100
ip address 10.05.100.1 255.255.255.0
ipv6 address fe80::d1:2 link-local
ipv6 address 2001:db8:100:100::1/64
no shutdown
exit

interface vlan 101
ip address 10.05.101.1 255.255.255.0
ipv6 address fe80::d1:3 link-local
ipv6 address 2001:db8:100:101::1/64
no shutdown
exit

interface vlan 102
ip address 10.05.102.1 255.255.255.0
ipv6 address fe80::d1:4 link-local
ipv6 address 2001:db8:100:102::1/64
no shutdown
exit

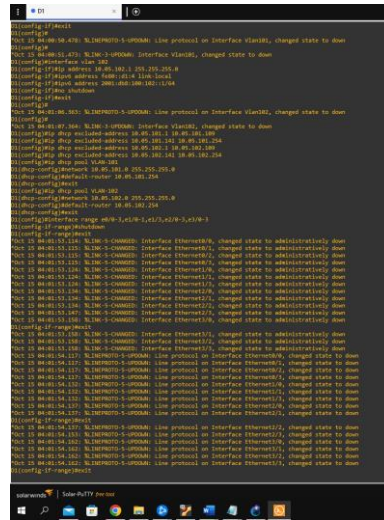
ip dhcp excluded-address 10.05.101.1 10.05.101.109
ip dhcp excluded-address 10.05.101.141 10.05.101.254
ip dhcp excluded-address 10.05.102.1 10.05.102.109
ip dhcp excluded-address 10.05.102.141 10.05.102.254
ip dhcp pool VLAN-101
network 10.05.101.0 255.255.255.0
default-router 10.05.101.254
exit
```

```

ip dhcp pool VLAN-102
network 10.05.102.0 255.255.255.0
default-router 10.05.102.254
exit
interface range e0/0-3,e1/0-1,e1/3,e2/0-3,e3/0-3
shutdown
exit

```

Figura 6. Simulación Switch D1



Fuente: Autor

Switch D2

```

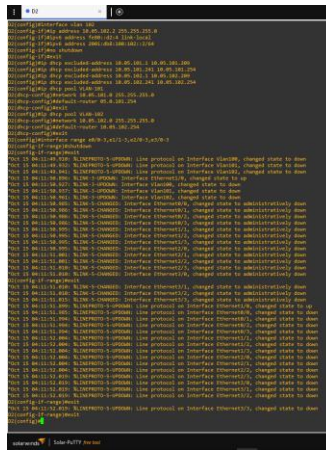
hostname D2
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D2, ENCOR Skills Assessment#
line con 0
exec-timeout 0 0
logging synchronous
exit
vlan 100

```

```
name Management
exit
vlan 101
name UserGroupA
exit
vlan 102
name UserGroupB
exit
vlan 999
name NATIVE
exit
interface e1/0
no switchport
ip address 10.05.11.2 255.255.255.0
ipv6 address fe80::d1:1 link-local
ipv6 address 2001:db8:100:1011::2/64
no shutdown
exit
interface vlan 100
ip address 10.05.100.2 255.255.255.0
ipv6 address fe80::d2:2 link-local
ipv6 address 2001:db8:100:100::2/64
no shutdown
exit
interface vlan 101
ip address 10.05.101.2 255.255.255.0
ipv6 address fe80::d2:3 link-local
ipv6 address 2001:db8:100:101::2/64
no shutdown
```

```
exit
interface vlan 102
ip address 10.05.102.2 255.255.255.0
ipv6 address fe80::d2:4 link-local
ipv6 address 2001:db8:100:102::2/64
no shutdown
exit
ip dhcp excluded-address 10.05.101.1 10.05.101.209
ip dhcp excluded-address 10.05.101.241 10.05.101.254
ip dhcp excluded-address 10.05.102.1 10.05.102.209
ip dhcp excluded-address 10.05.102.241 10.05.102.254
ip dhcp pool VLAN-101
network 10.05.101.0 255.255.255.0
default-router 05.0.101.254
exit
ip dhcp pool VLAN-102
network 10.05.102.0 255.255.255.0
default-router 10.05.102.254
exit
interface range e0/0-3,e1/1-3,e2/0-3,e3/0-3
shutdown
exit
```

Figura 7. Simulación Switch D2



```
SwitchA1#configure terminal
SwitchA1(config)#hostname A1
SwitchA1(config)#banner motd # A1, ENCOR Skills Assessment#
SwitchA1(config)#line con 0
SwitchA1(config)#exec-timeout 0 0
SwitchA1(config)#logging synchronous
SwitchA1(config)#exit
SwitchA1(config)#vlan 100
SwitchA1(config-vlan)#name Management
SwitchA1(config-vlan)#exit
SwitchA1(config)#vlan 101
SwitchA1(config-vlan)#name UserGroupA
SwitchA1(config-vlan)#exit
SwitchA1(config)#vlan 102
SwitchA1(config-vlan)#name UserGroupB
SwitchA1(config-vlan)#exit
SwitchA1(config)#vlan 999
SwitchA1(config-vlan)#name NATIVE
SwitchA1(config-vlan)#exit
SwitchA1(config)#interface vlan 100
SwitchA1(config-if)#ip address 10.05.100.3 255.255.255.0
SwitchA1(config-if)#ipv6 address fe80::a1:1 link-local
SwitchA1(config-if)#ipv6 address 2001:db8:100:100::3/64
SwitchA1(config-if)#no shutdown
SwitchA1(config-if)#exit
SwitchA1(config)#interface range e0/0,e0/3,e1/0,e2/1-3,e3/0-3
SwitchA1(config-if-range)#shutdown
SwitchA1(config-if-range)#exit
SwitchA1#
```

Fuente: Autor

Switch A1

hostname A1

no ip domain lookup

banner motd # A1, ENCOR Skills Assessment#

line con 0

exec-timeout 0 0

logging synchronous

exit

vlan 100

name Management

exit

vlan 101

name UserGroupA

exit

vlan 102

name UserGroupB

exit

vlan 999

name NATIVE

exit

interface vlan 100

ip address 10.05.100.3 255.255.255.0

ipv6 address fe80::a1:1 link-local

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

no shutdown

exit

interface range e0/0,e0/3,e1/0,e2/1-3,e3/0-3

shutdown

Tabla 2. Tareas de configuración Parte 1

Task#	Task	Specification	Points
2.1	On all switches, configure IEEE 802.1Q trunk interfaces on interconnecting switch links	Enable 802.1Q trunk links between: <ul style="list-style-type: none"> • D1 and D2 • D1 and A1 • D2 and A1 	6
2.2	On all switches, change the native VLAN on trunk links.	Use VLAN 999 as the native VLAN.	6
2.3	On all switches, enable the Rapid Spanning-Tree Protocol.	Use Rapid Spanning Tree.	3
2.4	On D1 and D2, configure the appropriate RSTP root bridges based on the information in the topology diagram. D1 and D2 must provide backup in case of root bridge failure.	Configure D1 and D2 as root for the appropriate VLANs with mutually supporting priorities in case of switch failure.	2
2.5	On all switches, create LACP EtherChannels as shown in the topology diagram.	Use the following channel numbers: <ul style="list-style-type: none"> • D1 to D2 – Port channel 12 • D1 to A1 – Port channel 1 • D2 to A1 – Port channel 2 	3
2.6	On all switches, configure host access ports connecting to PC1, PC2, PC3, and PC4.	Configure access ports with appropriate VLAN settings as shown in the topology diagram. Host ports should transition immediately to forwarding state.	4
2.7	Verify IPv4 DHCP services.	PC2 and PC3 are DHCP clients and should be receiving valid IPv4 addresses.	1

Task#	Task	Specification	Points
2.8	Verify local LAN connectivity.	PC1 should successfully ping: <ul style="list-style-type: none"> • D1: 10.05.100.1 • D2: 10.05.100.2 • PC4: 10.XY.100.6 PC2 should successfully ping: <ul style="list-style-type: none"> • D1: 10.05.102.1 • D2: 10.05.102.2 PC3 should successfully ping: <ul style="list-style-type: none"> • D1: 10.05.101.1 • D2: 10.05.101.2 PC4 should successfully ping: <ul style="list-style-type: none"> • D1: 10.05.100.1 • D2: 10.05.100.2 • PC1: 10.05.100.5 	1

Switch D1

```

interface range e2/0-3
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999
channel-group 12 mode active
no shutdown
exit
interface range e0/1-2
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999
channel-group 1 mode active
no shutdown
exit
spanning-tree mode rapid-pvst
spanning-tree vlan 100,102 root primary
spanning-tree vlan 101 root secondary
interface e0/0
switchport mode access
switchport access vlan 100

```



```

switchport access vlan 102
spanning-tree portfast
no shutdown
exit
end

```

Figura 10. Configuración D2

```

D2
D2(config)#interface range s2/9-2
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 1 mode active
D2(config)#port-channel interface Port-channel 12
D2(config)#no shutdown
D2(config-if-range)#no shutdown
D2(config-if-range)#exit
D2(config)#interface range e0/1-2
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
D2(config)#port-channel interface Port-channel 1
D2(config)#no shutdown
D2(config-if-range)#no shutdown
D2(config-if-range)#exit
D2(config)#spanning-tree mode rapid-pvst
D2(config)#spanning-tree vlan 102 root primary
D2(config)#spanning-tree vlan 100,102 root secondary
D2(config)#interface e0/0
D2(config)#switchport mode access
D2(config-if)#switchport access vlan 102
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 Ethernet0/0 but will only
have effect when the interface is in a non-trunking mode.
D2(config-if)#no shutdown
D2(config-if)#exit
D2(config)#end
Port 15 05:10:55.347: NLINK-3-UPDOWN: Interface Ethernet2/9, changed state to up
Port 15 05:10:55.351: NLINK-3-UPDOWN: Interface Ethernet2/2, changed state to up
Port 15 05:10:55.357: NLINK-3-UPDOWN: Interface Ethernet2/2, changed state to up
Port 15 05:10:55.373: NLINK-3-UPDOWN: Interface Ethernet2/2, changed state to up
Port 15 05:10:55.371: NLINK-3-UPDOWN: Interface Ethernet0/1, changed state to up
Port 15 05:10:55.371: NLINK-3-UPDOWN: Interface Ethernet0/2, changed state to up
Port 15 05:10:55.381: NLINK-3-UPDOWN: Interface Ethernet0/0, changed state to up
Port 15 05:10:55.396: NLINK-3-UPDOWN: Interface Vlan100, changed state to up
D2(config)#end
Port 15 05:10:56.385: NLINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to up
Port 15 05:10:56.390: NLINEPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state to up
Port 15 05:10:57.402: NLINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/3, changed state to up
Port 15 05:10:57.402: NLINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to up
Port 15 05:10:57.402: NLINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/8, changed state to up
D2(config)#end
Port 15 05:11:01.480: NLINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel12, changed state to up
D2(config)#end
Port 15 05:11:04.114: NLINK-3-UPDOWN: Interface Vlan100, changed state to up
D2(config)#end
Port 15 05:11:04.214: NIC-5-300WTRM2L2: t0/1 suspended: LACP currently not enabled on the remote port.
Port 15 05:11:04.113: NLINEPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state to up
D2(config)#end
Port 15 05:11:05.309: NIC-5-300WTRM2L2: t0/2 suspended: LACP currently not enabled on the remote port.
D2(config)#end
Port 15 05:11:17.866: SVS-5-COMP30.1: Configured from console by console
D2

```

Fuente: Autor

Switch A1

```

spanning-tree mode rapid-pvst
interface range e0/1-2
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999
channel-group 1 mode active
no shutdown
exit
interface range e1/1-2
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999
channel-group 2 mode active
no shutdown
exit
interface range e1/3
switchport mode access
switchport access vlan 101
spanning-tree portfast

```


Escenario 2

Tabla 3. Tareas de configuración Parte 2

Task#	Task	Specification	Points
3.1	On the “Company Network” (i.e., R1, R3, D1, and D2), configure single-area OSPFv2 in area 0.	<p>Use OSPF Process ID 4 and assign the following router-IDs:</p> <ul style="list-style-type: none"> • R1: 0.0.4.1 • R3: 0.0.4.3 • D1: 0.0.4.131 • D2: 0.0.4.132 <p>On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0.</p> <ul style="list-style-type: none"> • On R1, do not advertise the R1 – R2 network. • On R1, propagate a default route. Note that the default route will be provided by BGP. <p>Disable OSPFv2 advertisements on:</p> <ul style="list-style-type: none"> • D1: All interfaces except E1/2 • D2: All interfaces except E1/0 	8
3.2	On the “Company Network” (i.e., R1, R3, D1, and D2), configure classic single-area OSPFv3 in area 0.	<p>Use OSPF Process ID 6 and assign the following router-IDs:</p> <ul style="list-style-type: none"> • R1: 0.0.6.1 • R3: 0.0.6.3 • D1: 0.0.6.131 • D2: 0.0.6.132 <p>On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0.</p> <ul style="list-style-type: none"> • On R1, do not advertise the R1 – R2 network. • On R1, propagate a default route. Note that the default route will be provided by BGP. <p>Disable OSPFv3 advertisements on:</p> <ul style="list-style-type: none"> • D1: All interfaces except E1/2 • D2: All interfaces except E1/0 	8

Task#	Task	Specification	Points
3.3	On R2 in the "ISP Network", configure MP-BGP.	<p>Configure two default static routes via interface Loopback 0:</p> <ul style="list-style-type: none"> • An IPv4 default static route. • An IPv6 default static route. <p>Configure R2 in BGP ASN 500 and use the router-id 2.2.2.2.</p> <p>Configure and enable an IPv4 and IPv6 neighbor relationship with R1 in ASN 300.</p> <p>In IPv4 address family, advertise:</p> <ul style="list-style-type: none"> • The Loopback 0 IPv4 network (/32). • The default route (0.0.0.0/0). <p>In IPv6 address family, advertise:</p> <ul style="list-style-type: none"> • The Loopback 0 IPv4 network (/128). • The default route (::/0). 	4
3.4	On R1 in the "ISP Network", configure MP-BGP.	<p>Configure two static summary routes to interface Null 0:</p> <ul style="list-style-type: none"> • A summary IPv4 route for 10.05.0.0/8. • A summary IPv6 route for 2001:db8:100::/48. <p>Configure R1 in BGP ASN 300 and use the router-id 1.1.1.1.</p> <p>Configure an IPv4 and IPv6 neighbor relationship with R2 in ASN 500.</p> <p>In IPv4 address family:</p> <ul style="list-style-type: none"> • Disable the IPv6 neighbor relationship. • Enable the IPv4 neighbor relationship. • Advertise the 10.05.0.0/8 network. <p>In IPv6 address family:</p> <ul style="list-style-type: none"> • Disable the IPv4 neighbor relationship. • Enable the IPv6 neighbor relationship. • Advertise the 2001:db8:100::/48 network. 	4

Router R1

```
router ospf 4
router-id 0.0.4.1
network 10.05.10.0 0.0.0.255 area 0
network 10.05.13.0 0.0.0.255 area 0
default-information originate
exit

ipv6 router ospf 4
router-id 0.0.6.1
default-information originate
exit

interface e1/2
ipv6 ospf 6 area 0
exit

interface e1/1
ipv6 ospf 6 area 0
exit

ip route 10.05.0.0 255.0.0.0 nullo
ipv6 route 2001:db8:100::/48 nullo

router bgp 300
bgp router-id 1.1.1.1
neighbor 209.165.200.226 remote-as 500
neighbor 2001:db8:200::2 remote-as 500
address-family ipv4 unicast
neighbor 209.165.200.226 activate
no neighbor 2001:db8:200::2 activate
network 10.05.0.0 mask 255.0.0.0
```

```

exit-address-family
address-family ipv6 unicast
no neighbor 209.165.200.226 activate
neighbor 2001:db8:200::2 activate
network 2001:db8:100::/48 activate
exit-address-family

```

Figura 13. Configuración router R1

```

R1
line aux 0
  exec-timeout 0 0
  privilege level 15
  logging synchronous
  stopbits 1
line vty 0 4
  login
!
end

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)# exit
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 g1/0
R1(config-if)# ipv6 ospf 6 area 0
R1(config-if)# exit
R1(config)#interface s3/0
R1(config-if)# ipv6 ospf 6 area 0
R1(config-if)# exit
R1(config)#
R1(config)#ip route 10.0.0.0 255.0.0.0 null0
R1(config)#ipv6 route 2001:db8:100::/48 null0
R1(config)#
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 10.0.0.0 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)#

```

Fuente: Autor

Router 2

```

ip route 0.0.0.0 0.0.0.0 loopback 0
ipv6 router::/0 loopback 0
router bgp 500
bgp router-id 2.2.2.2
neighbor 209.165.200.225 remote-as 300
neighbor 2001:db8:200::1 remote-as 300
address-family ipv4
neighbor 209.165.200.225 activate
no neighbor 2001:db8:200::1 activate

```


network 2.2.2.2 mask 255.255.255.255

network 0.0.0.0

exit-address-family

address-family ipv6

no neighbor 209.165.200.255 activate

neighbor 2001:db8:2222::/128

network::/0

exit-address-family

Figura 14. Configuración router R2

```
R2#
R2#conf term
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#hostname R2
R2(config)#ipv6 unicast-routing
R2(config)#no ip domain lookup
R2(config)#banner motd # R2, ENCOR Skills Assessment, Scenario 1 #
R2(config)#line con 0
R2(config-line)#exec-timeout 0 0
R2(config-line)#logging synchronous
R2(config-line)#exit
R2(config)#interface g0/0
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:db8:2000::2/64
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#interface Loopback 0
R2(config-if)#ip address 2.2.2.2 255.255.255.255
R2(config-if)#ipv6 address fe80::2:3 link-local
R2(config-if)#ipv6 address 2001:db8:2222::1/128
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#
*Oct 29 07:28:01.859: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
R2(config)#
*Oct 29 07:28:03.619: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
*Oct 29 07:28:04.619: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
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:db8:2000::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:db8:2000::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:db8:2000::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)#
```

Fuente: Autor

Router R3

router ospf 4

router-id 0.0.4.3

network 10.05.11.0.0.0.0.255 area 0

network 10.05.13.0.0.0.0.255 area 0

exit

ipv6 router ospf 6

router-id 0.0.6.3

```

exit

interface e1/0

ipv6 ospf 6 area 0

exit

interface e1/1

ipv6 ospf 6 area 0

exit

end

```

Figura 15. Configuración router R3

```

Oct 29 07:40:36.591: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Giga
b0), with Switch GigabitEthernet1/1 (half duplex).
R3(config)#
Oct 29 07:40:38.083: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Giga
b0), with Switch GigabitEthernet1/1 (half duplex).
R3(config)#
Oct 29 07:40:39.971: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Giga
b0), with Switch GigabitEthernet1/1 (half duplex).
R3(config)#
Oct 29 07:40:42.015: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Giga
b0), with Switch GigabitEthernet1/1 (half duplex).
R3(config)#
Oct 29 07:40:43.927: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Giga
b0), with Switch GigabitEthernet1/1 (half duplex).
R3(config)#
Oct 29 07:40:47.579: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Giga
b0), with Switch GigabitEthernet1/1 (half duplex).
R3(config)#
Oct 29 07:40:49.395: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Giga
b0), with Switch GigabitEthernet1/1 (half duplex).
R3(config)#
Oct 29 07:40:51.039: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Giga
b0), with Switch GigabitEthernet1/1 (half duplex).
R3(config)#
Oct 29 07:42:02.095: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on Giga
b0), with Switch GigabitEthernet1/1 (half duplex).
R3(config)#
R3(config)#
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)# exit
R3(config)#ipv6 router ospf 6
R3(config-rtr)# router-id 0.0.6.3
R3(config-rtr)# exit
R3(config)#interface g1/0
R3(config-if)# ipv6 ospf 6 area 0
R3(config-if)# exit
R3(config)#interface s3/0
R3(config-if)# ipv6 ospf 6 area 0
R3(config-if)# exit
R3(config)#end
R3#

```

Fuente: Autor

Switch D1

```

router ospf 4

router-id 0.0.4.131

network 10.05.100.0 0.0.0.255 area 0

network 10.05.101.0 0.0.0.255 area 0

network 10.05.102.0 0.0.0.255 area 0

network 10.05.10.0.0 0.0.255 area 0

```

```

passive-interface default
no passive-interface e1/2
exit
ipv6 router ospf 6
router-id 0.0.6.131
passive-interface default
no passive-interface e1/2
exit
interface e1/2
ipv6 ospf 6 area 0
exit
interface vlan 100
ipv6 ospf 6 area 0
exit
interface vlan 101
ipv6 ospf 6 area 0
exit
interface vlan 102

```

Figura 16. Configuración Switch D1

```

spanning-tree vlan 100,102 priority 24576
spanning-tree vlan 101 priority 25672
spanning-tree portfast edge
D1#show run int g2/3
Building configuration...

Current configuration : 152 bytes
!
interface GigabitEthernet2/3
switchport access vlan 100
switchport mode access
media-type sfp45
negotiation auto
spanning-tree portfast edge
end

D1#conf term
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 10.0.100.0 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)# network 10.0.10.0 0.0.0.255 area 0
D1(config-router)# passive-interface default
D1(config-router)# no passive-interface gi/1
D1(config-router)# exit
D1(config)#ipv6 router ospf 6

% Invalid input detected at '^' marker.

D1(config)# router-id 0.0.6.131
% Invalid input detected at '^' marker.

D1(config)# passive-interface default
% Invalid input detected at '^' marker.

D1(config)# no passive-interface gi/1
% Invalid input detected at '^' marker.

D1(config)# exit
D1#interface gi/1

```

Fuente: Autor

Tabla 4. Tareas de configuración Parte 3

Task#	Task	Specification	Points
4.1	On D1, create IP SLAs that test the reachability of R1 interface E1/2.	<p>Create two IP SLAs.</p> <ul style="list-style-type: none"> • Use SLA number 4 for IPv4. • Use SLA number 6 for IPv6. <p>The IP SLAs will test availability of R1 E1/2 interface every 5 seconds.</p> <p>Schedule the SLA for immediate implementation with no end time.</p> <p>Create an IP SLA object for IP SLA 4 and one for IP SLA 6.</p> <ul style="list-style-type: none"> • Use track number 4 for IP SLA 4. • Use track number 6 for IP SLA 6. <p>The tracked objects should notify D1 if the IP SLA state changes from down to up after 10 seconds, or from up to down after 15 seconds.</p>	2
4.2	On D2, create IP SLAs that test the reachability of R3 interface E1/0.	<p>Create two IP SLAs.</p> <ul style="list-style-type: none"> • Use SLA number 4 for IPv4. • Use SLA number 6 for IPv6. <p>The IP SLAs will test availability of R3 E1/0 interface every 5 seconds.</p> <p>Schedule the SLA for immediate implementation with no end time.</p> <p>Create an IP SLA object for IP SLA 4 and one for IP SLA 6.</p> <ul style="list-style-type: none"> • Use track number 4 for IP SLA 4. • Use track number 6 for IP SLA 6. <p>The tracked objects should notify D1 if the IP SLA state changes from down to up after 10 seconds, or from up to down after 15 seconds.</p>	2
4.3	On D1, configure HSRPv2.	<p>D1 is the primary router for VLANs 100 and 102; therefore, their priority will also be changed to 150.</p> <p>Configure HSRP version 2.</p> <p>Configure IPv4 HSRP group 104 for VLAN 100:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.05.100.254. • Set the group priority to 150. • Enable preemption. • Track object 4 and decrement by 60. <p>Configure IPv4 HSRP group 114 for VLAN 101:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.05.101.254. • Enable preemption. • Track object 4 to decrement by 60. <p>Configure IPv4 HSRP group 124 for VLAN 102:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.05.102.254. • Set the group priority to 150. 	8

Task#	Task	Specification	Points
		<ul style="list-style-type: none"> • Enable preemption. • Track object 4 to decrement by 60. <p>Configure IPv6 HSRP group 106 for VLAN 100:</p> <ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Set the group priority to 150. • Enable preemption. • Track object 6 and decrement by 60. <p>Configure IPv6 HSRP group 116 for VLAN 101:</p> <ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Enable preemption. • Track object 6 and decrement by 60. <p>Configure IPv6 HSRP group 126 for VLAN 102:</p> <ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Set the group priority to 150. • Enable preemption. • Track object 6 and decrement by 60. 	
	<p>On D2, configure HSRPv2.</p>	<p>D2 is the primary router for VLAN 101; therefore, the priority will also be changed to 150.</p> <p>Configure HSRP version 2.</p> <p>Configure IPv4 HSRP group 104 for VLAN 100:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.05.100.254. • Enable preemption. • Track object 4 and decrement by 60. <p>Configure IPv4 HSRP group 114 for VLAN 101:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.05.101.254. • Set the group priority to 150. • Enable preemption. • Track object 4 to decrement by 60. <p>Configure IPv4 HSRP group 124 for VLAN 102:</p> <ul style="list-style-type: none"> • Assign the virtual IP address 10.05.102.254. • Enable preemption. • Track object 4 to decrement by 60. <p>Configure IPv6 HSRP group 106 for VLAN 100:</p> <ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Enable preemption. • Track object 6 and decrement by 60. <p>Configure IPv6 HSRP group 116 for VLAN 101:</p> <ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Set the group priority to 150. • Enable preemption. • Track object 6 and decrement by 60. <p>Configure IPv6 HSRP group 126 for VLAN 102:</p>	

Task#	Task	Specification	Points
		<ul style="list-style-type: none"> • Assign the virtual IP address using ipv6 autoconfig. • Enable preemption. • Track object 6 and decrement by 60. 	

Switch d1

```

ip sla 4
icmp-echo 10.0.10.1
frequency 5
exit
ip sla 6
icmp-echo 2001:db8:100:1010::1
frequency 5
exit
ip sla schedule 4 life forever start:time now
ip sla schedule 6 life forever start:time now
track 4 ip sla 4
delay down 10 up 15
exit
track 6 ip sla 6
delay down 10 up 15
exit
interface vlan 100
standby version 2
standby 104 ip 10.05.100.254
standby 104 priority 150
standby 104 preempt
standby 104 track 4 decrement 60
standby 106 ipv6 autoconfig
standby 106 priority 150
standby 106 preempt
standby 106 track 6 decrement 60
exit
interface vlan 101
standby version 2
standby 114 ip 10.05.101.254
standby 114 preempt
standby 114 track 4 decrement 60
standby 116 ipv6 autoconfig
standby 116 preempt
standby 116 track 6 decrement 60
exit
interface vlan 102
standby version 2
standby 124 ip 10.05.102.254
standby 124 priority 150
standby 124 preempt
standby 124 track 4 decrement 60

```

```
standby 126 ipv6 autoconfig
standby 126 priority 150
standby 126 preempt
standby 126 track 6 decrement 60
exit
end
```

Figura 18. Creación ip Switch D1

```

S1(config-if)#exit
S1(config)#
Nov 24 23:48:07.000: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state to down
S1(config)#interface vlan 101
S1(config-if)#standby version 2 interface vlan 101
% Small input detected at "" marker.
S1(config-if)#standby version 2
S1(config-if)#
Nov 24 23:48:27.036: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan101, changed state to down
S1(config-if)#standby version 2
S1(config-if)#standby 114 ip 10.05.100.254
% Warning: address is not within a subnet on this interface
S1(config-if)#standby 114 preempt
S1(config-if)#standby 114 track 4 decrement 60
S1(config-if)#standby 116 ipv6 autoconfig
S1(config-if)#standby 116 preempt
S1(config-if)#standby 116 track 5 decrement 60
S1(config-if)#exit
S1(config)#interface vlan 102
S1(config-if)#standby version 2
S1(config-if)#standby 124 ip 10.05.100.254
% Warning: address is not within a subnet on this interface
S1(config-if)#standby 124 priority 150
S1(config-if)#standby 124 preempt
S1(config-if)#standby 124 track 4 decrement 60
S1(config-if)#standby 126 ipv6 autoconfig
S1(config-if)#standby 126 preempt
S1(config-if)#standby 126 track 6 decrement 60
S1(config)#end
S1
Nov 24 23:49:43.684: %SYS-5-COMP10.1: Configured from console by console
Nov 24 23:49:43.875: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan102, changed state to down

```

Fuente: Autor

Switch D2

```
ip sla 4
icmp-echo 10.05.11.1
frequency 5
exit
ip sla 6
icmp-echo 2001:db8:100:100:1011::1
frequency 5
exit
ip sla schedule 4 life forever start-time now
ip sla schedule 6 life forever start-time now
track 4 ip sla 4
delay down 10 up 15
exit
track 6 ip sla 6
delay down 10 up 15
exit
interface vlan 100
standby version 2
standby 104 ip 10.05.100.254
standby 104 preempt
```


CONCLUSIONES

Con el presente trabajo se comprende la manera en cómo se configuran los dispositivos de red para que funcionen de forma correcta ya que es necesario el conocimiento y manejo de habilidades para poder configurar y brindar solución, a todo lo relacionado con el manejo de redes de datos.

Al realizar los 2 escenarios propuestos ponemos en practica todas las habilidades y destrezas aprendidas en los capítulos de cisco para poder configurar y brindar una solución a lo propuesto.

Para finalizar, se aprende y entiende que las redes son algo muy importante en la actualidad, pues permiten el contacto en todo el mundo ya que de ellas depende la comunicación dentro de empresas, casas, etc., por tanto, es de gran relevancia que se conozca su complejidad y desarrollo

BIBLIOGRAFÍA

<http://eve-ingsistemas-u.blogspot.com/2012/10/protocolos-de-enrutamiento-ospf-parte-1.html>

https://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst3750x_3560x/software/release/12-2_55_se/configuration/guide/3750xscg/swsdm.html

https://www.cisco.com/c/es_mx/support/docs/asynchronous-transfer-modeatm/permanent-virtual-circuits-pvc-switched-virtual-circuits-svc/6337atmloopback.html

<https://es.slideshare.net/oswaldomonsalvo/protocolos-de-enrutamiento-285331871>

<https://www.w0lff4ng.org/configuracion-basica-ipv6router-cisco/>

<https://community.cisco.com/t5/blogs-routing-y-switching/habilitar-ipv6-en-routers/bap/3099868>

<https://www.itesa.edu.mx/netacad/switching/course/module8/8.1.1.2/8.1.1.2.html>