

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 TELECOMUNICACIONES  
BOGOTA  
2022

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PARA OPTAR EL TÍTULO DE INGENIERO  
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INGENIERÍA TELECOMUNICACIONES  
BOGOTÁ  
2022

NOTA DE ACEPTACIÓN

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Firma del presidente del Jurado

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Firma del Jurado

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Firma del Jurado

BOGOTA, 29 de noviembre de 2022

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Agradezco a mi esposa, por ser la guía y motivación para terminar este proyecto, a mis compañeros de trabajo a quienes debo total admiración y a los docentes quienes han compartido su conocimiento.

## CONTENIDO

	Pág.
CONTENIDO .....	5
GLOSARIO .....	8
RESUMEN.....	9
ABSTRACT .....	9
ESCENARIO 1 .....	12
CONTINUATION OF THE SCENARIO 1.....	30
CONCLUSIONES.....	54
BIBLIOGRAFÍA .....	55

## LISTA DE TABLAS

	Pag.
Tabla 1. Tabla de direccionamiento	14
Tabla 2. Lista de tareas escenario 1	23
Tabla 3. Lista de tareas escenario 2	32
Tabla 4. Lista de tareas escenario 2	35

## LISTA DE FIGURAS

	Pág.
Figura 1. Escenario 1 1 _____	12
Figura 2. Topología simulada 1 _____	12
Figura 3. PC2 successfully ping: D1-D2 1 _____	25
Figura 4. Ping PC3 should successfully ping 1 _____	25
Figura 5. Ping PC1 - D1-D2-PC4 1 _____	26
Figura 6. Ping PC4 : D1-D2-PC1 1 _____	26
Figura 7. Interfaces troncales 1 _____	26
Figura 8. Interfaces troncales 1 _____	27
Figura 9. Interfaces troncales 1 _____	27
Figura 10. Vecinos OSPF configurados 1 _____	27
Figura 11. Vecinos OSPF configurados 1 _____	27
Figura 12. Vecinos OSPF configurados 1 _____	28
Figura 13. Vecinos OSPF configurados 1 _____	28
Figura 14. Rutas configuradas 1 _____	28
Figura 15. Rutas configuradas 1 _____	28
Figura 16. Rutas configuradas 1 _____	29
Figura 17. Rutas configuradas 1 _____	29
Figura 18. Rutas configuradas 1 _____	29

## GLOSARIO

HSRP: El Hot Standby Router Protocol es un protocolo propiedad de CISCO que permite el despliegue de enrutadores redundantes tolerantes de fallos en una red

VLAN: es una red de área local virtual que consiste en la agrupación o combinación de un conjunto de dispositivos que necesitan comunicarse entre sí.

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

IPv4: Es un protocolo de internet de cuarta generación, permite la conexión en red con un direccionamiento de 32 bits en 4 bloques o segmentos.

IPv6: Es el protocolo actualizado del IPv4, resuelve los inconvenientes de agotamiento de direcciones, teniendo como principio el internet sin límites.



## RESUMEN

Este proyecto está desarrollado con el fin de dar solución al escenario práctico propuesto en el Diplomado de Profundización CCNP CISCO, con las habilidades adquiridas en el transcurso del periodo académico y necesarias para resolver situaciones relacionadas a la ingeniería de telecomunicaciones en cuanto al manejo de redes locales y empresariales.

Al momento de crear y configurar la topología de red para dar solución al problema propuesto y obtener un correcto enrutamiento de los dispositivos en capa 2, parámetros de tipo OSPF y redundancia de primer salto para los hosts, así como los mecanismos de seguridad y funciones administrativas.

Esta actividad es desarrollada mediante el software GNS3, manejando una interfaz que permite la emulación y respectiva configuración dispositivos de redes virtuales y reales, al usar 3 Routers, 3 Switches y 4 PC de acuerdo a la guía suministrada en el desarrollo del periodo académico.

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

## ABSTRACT

This project is developed in order to provide a solution to the practical scenario proposed in the CCNP CISCO Deepening Diploma, with the skills acquired during the academic period and necessary to solve situations related to telecommunications engineering regarding the management of local networks. and business.

When creating and configuring the network topology to solve the proposed problem and obtain a correct routing of the devices in layer 2, OSPF type parameters and first hop

redundancy for the hosts, as well as the security mechanisms and administrative functions.

This activity is developed through the GNS3 software, managing an interface that allows the emulation and respective configuration of virtual and real network devices, using 3 Routers, 3 Switches and 4 PCs according to the guide provided in the development of the academic period.

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

## INTRODUCCIÓN

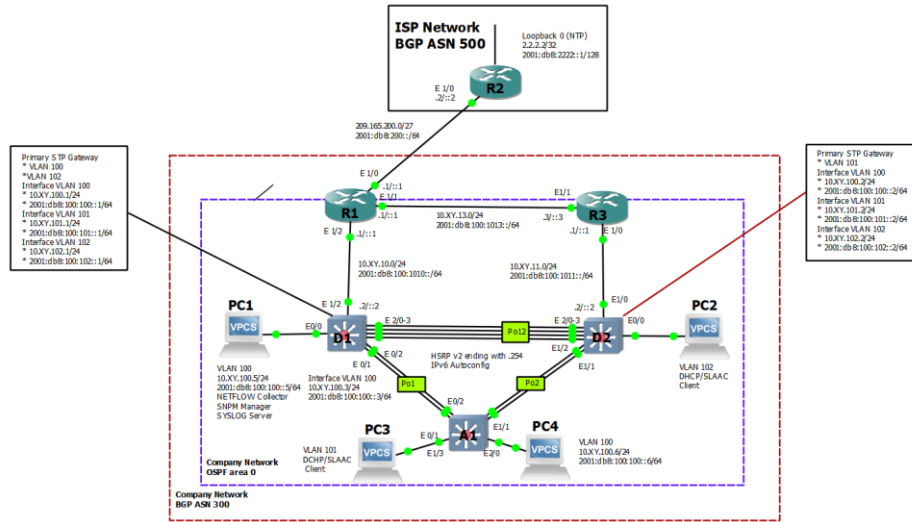
Esta actividad muestra el resultado de aprendizaje referente a estructuras redes conmutadas mediante el uso del protocolo STP y la configuración de VLANs, para comprender las características de una infraestructura de red jerárquica convergente.

Demostrando habilidades adquiridas para diseñar soluciones de red escalables mediante la configuración básica y avanzada de protocolos de enrutamiento para la implementación de servicios IP con calidad de servicio en ambientes de red empresariales LAN y WAN.

Demostrando competencias para planificar redes inalámbricas, de acceso remoto seguras mediante el análisis de escenarios simulados de infraestructuras de red empresariales con acceso seguro a través de la automatización y virtualización de la red para aplicar metodologías de solución de problemas en ambientes de red corporativos LAN y WAN

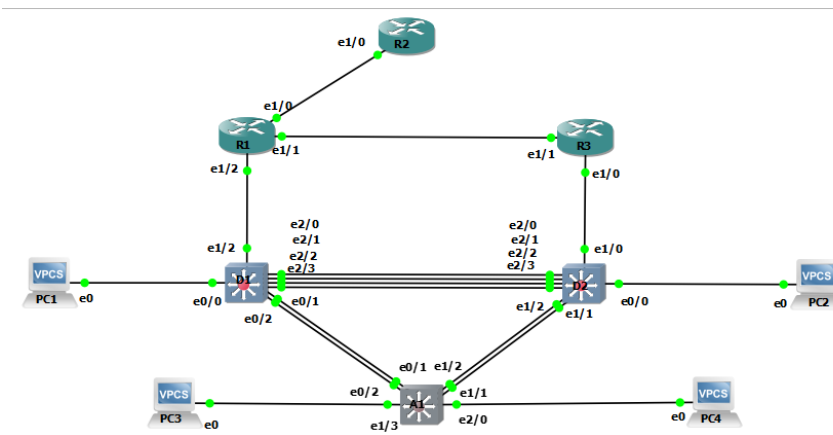
# ESCENARIO 1

Figura 1. Escenario 1 1



Fuente: elaboración propia

Figura 2. Topología simulada 1



Fuente: elaboración propia

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	10.74.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	E1/1	10.74.13.1/24	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	10.74.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
	E1/1	10.74.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	E1/2	10.74.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
	VLAN 100	10.74.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10.74.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
	VLAN 102	10.74.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	E1/0	10.74.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10.74.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
	VLAN 101	10.74.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10.74.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.74.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.74.100.5/24	2001:db8:100:100::5/64	EUI-64
PC2	NIC	DHCP	SLAAC	EUI-64

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
PC3	NIC	DHCP	SLAAC	EUI-64
PC4	NIC	10.74.100.6/24	2001:db8:100:100::6/64	EUI-64

Tabla 1. Tabla de direccionamiento

## ESCENARIO

In this skills assessment, you are responsible for completing the configuration of the network so there is full end-to-end reachability, so the hosts have reliable default gateway support, and so that management protocols are operational within the "Company Network" part of the topology. Be careful to verify that your configurations meet the provided specifications and that the devices perform as required.

**Note:** The routers used with CCNP hands-on labs are Cisco 7200 routers. The switches used in the labs are Cisco Catalyst L2 switches. Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from what is shown in the labs.

## ROUTER R1

```
hostname R1
```

```
- Configurar el nombre del dispositivo
```

```
ipv6 unicast-routing
```

```
no ip domain lookup
```

```
banner motd # R1, ENCOR Skills Assessment_Andres_Reina#
```

```
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 10.74.10.1 255.255.255.0
```

```
ipv6 address fe80::1:2 link-local
```

```
ipv6 address 2001:db8:100:1010::1/64
```

```
no shutdown
```

```
exit
```

```
interface e1/1
```

```
ip address 10.74.13.1 255.255.255.0
```

```
ipv6 address fe80::1:3 link-local
```

```
ipv6 address 2001:db8:100:1013::1/64
```

```
no shutdown
```

```
exit
```

## ROUTER R2

```
hostname R2
ipv6 unicast-routing
no ip domain lookup
banner motd # R2, ENCOR Skills Assessment_Andres_Reina#
line con 0
  exec-timeout 0 0
  logging synchronous
  exit
interface e1/0
  ip address 209.165.200.226 255.255.255.224
  ipv6 address fe80::2:1 link-local
  ipv6 address 2001:db8:200::2/64
  no shutdown
  exit
interface Loopback 0
  ip address 2.2.2.2 255.255.255.255
  ipv6 address fe80::2:3 link-local
  ipv6 address 2001:db8:2222::1/128
  no shutdown
  exit
```

## ROUTER R3

```
hostname R3
ipv6 unicast-routing
no ip domain lookup
banner motd # R3, ENCOR Skills Assessment_Andres_Reina#
line con 0
  exec-timeout 0 0
  logging synchronous
  exit
interface e1/0
  ip address 10.74.11.1 255.255.255.0
  ipv6 address fe80::3:2 link-local
  ipv6 address 2001:db8:100:1011::1/64
  no shutdown
  exit
interface e1/1
  ip address 10.74.13.3 255.255.255.0
  ipv6 address fe80::3:3 link-local
  ipv6 address 2001:db8:100:1010::2/64
  no shutdown
  exit
```



## SWITCH 1

```
hostname D1
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D1, ENCOR Skills Assessment_Andres_Reina#
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 10.74.10.2 255.255.255.0
  ipv6 address fe80::d1:1 link-local
  ipv6 address 2001:db8:100:1010::2/64
  no shutdown
  exit
interface vlan 100
  ip address 10.74.100.1 255.255.255.0
  ipv6 address fe80::d1:2 link-local
  ipv6 address 2001:db8:100:100::1/64
  no shutdown
  exit
interface vlan 101
  ip address 10.74.101.1 255.255.255.0
  ipv6 address fe80::d1:3 link-local
  ipv6 address 2001:db8:100:101::1/64
  no shutdown
  exit
interface vlan 102
  ip address 10.74.102.1 255.255.255.0
  ipv6 address fe80::d1:4 link-local
  ipv6 address 2001:db8:100:102::1/64
  no shutdown
```

```
exit
ip dhcp excluded-address 10.74.101.1 10.74.101.109
ip dhcp excluded-address 10.74.101.141 10.74.101.254
ip dhcp excluded-address 10.74.102.1 10.74.102.109
ip dhcp excluded-address 10.74.102.141 10.74.102.254
ip dhcp pool VLAN-101
network 10.74.101.0 255.255.255.0
default-router 10.74.101.254
exit
ip dhcp pool VLAN-102
network 10.74.102.0 255.255.255.0
default-router 10.74.102.254
exit
interface range e0/3,e1/0-1,e1/3,e3/0-3
shutdown
exit
```

## SWITCH 2

```
hostname D1
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D1, ENCOR Skills Assessment_Andres_Reina#
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 10.74.10.2 255.255.255.0
  ipv6 address fe80::d1:1 link-local
  ipv6 address 2001:db8:100:1010::2/64
  no shutdown
  exit
interface vlan 100
  ip address 10.74.100.1 255.255.255.0
  ipv6 address fe80::d1:2 link-local
  ipv6 address 2001:db8:100:100::1/64
  no shutdown
  exit
interface vlan 101
  ip address 10.74.101.1 255.255.255.0
  ipv6 address fe80::d1:3 link-local
  ipv6 address 2001:db8:100:101::1/64
  no shutdown
  exit
interface vlan 102
  ip address 10.74.102.1 255.255.255.0
  ipv6 address fe80::d1:4 link-local
  ipv6 address 2001:db8:100:102::1/64
```

```
no shutdown
exit
ip dhcp excluded-address 10.74.101.1 10.74.101.109
ip dhcp excluded-address 10.74.101.141 10.74.101.254
ip dhcp excluded-address 10.74.102.1 10.74.102.109
ip dhcp excluded-address 10.74.102.141 10.74.102.254
ip dhcp pool VLAN-101
network 10.74.101.0 255.255.255.0
default-router 10.74.101.254
exit
ip dhcp pool VLAN-102
network 10.74.102.0 255.255.255.0
default-router 10.74.102.254
exit
interface range e0/3,e1/0-1,e1/3,e3/0-3
shutdown
exit
```

### SWITCH 3

```
hostname A1
no ip domain lookup
banner motd # A1, ENCOR Skills Assessment_Andres_Reina#
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 10.74.100.3 255.255.255.0
  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,e1/3,e2/1-3,e3/0-3
  shutdown
  exit
```

PC1 configurar IP: 10.74.100.5 255.255.255.0 gateway 10.74.100.254

PC2 configurar direccionamiento dinamico (DHCP)

PC3 configurar direccionamiento dinamico (DHCP)

PC4 configurar IP: 10.74.100.6 255.255.255.0 gateway 10.74.100.254

<b>Task#</b>	<b>Task</b>	<b>Specification</b>	<b>Points</b>
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"> <li>• D1 and D2</li> <li>• D1 and A1</li> <li>• D2 and A1</li> </ul>	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"> <li>• D1 to D2 – Port channel 12</li> <li>• D1 to A1 – Port channel 1</li> <li>• D2 to A1 – Port channel 2</li> </ul>	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"> <li>• D1: 10.74.100.1</li> <li>• D2: 10.74.100.2</li> <li>• PC4: 10.74.100.6</li> </ul> PC2 should successfully ping: <ul style="list-style-type: none"> <li>• D1: 10.74.102.1</li> <li>• D2: 10.74.102.2</li> </ul> PC3 should successfully ping: <ul style="list-style-type: none"> <li>• D1: 10 74.101.1</li> <li>• D2: 10 74.101.2</li> </ul> PC4 should successfully ping: <ul style="list-style-type: none"> <li>• D1: 10.74.100.1</li> <li>• D2: 10 74.100.2</li> <li>• PC1: 10.74.100.5</li> </ul>	1

Tabla 2. Lista de tareas escenario 1

## PASO 2.1

Configuracion enlace truncal

Enable 802.1Q trunk links between:

- D1 and D2
- D1 and A1

D2 and A1

Usamos el comando:

```
switchport trunk encapsulation dot1q  
switchport mode trunk
```

## PASO 2.2

Use VLAN 999 as the native VLAN

Usamos el comando

```
switchport trunk native vlan 999
```

## PASO 2.3

Use Rapid Spanning Tree.

Usamos el comando: spanning-tree mode rapid-pvst

## PASO 2.4

Configure D1 and D2 as root for the appropriate VLANs with mutually supporting priorities in case of switch failure.

Usamos el comando: spanning-tree vlan xx root primary y spanning-tree vlan xx root secondary

## PASO 2.5

Use the following channel numbers:

- D1 to D2 – Port channel 12
- D1 to A1 – Port channel 1

Usamos el comando: channel-group xx mode active



## PASO 2.6

Configure access ports with appropriate VLAN settings as shown in the topology diagram.

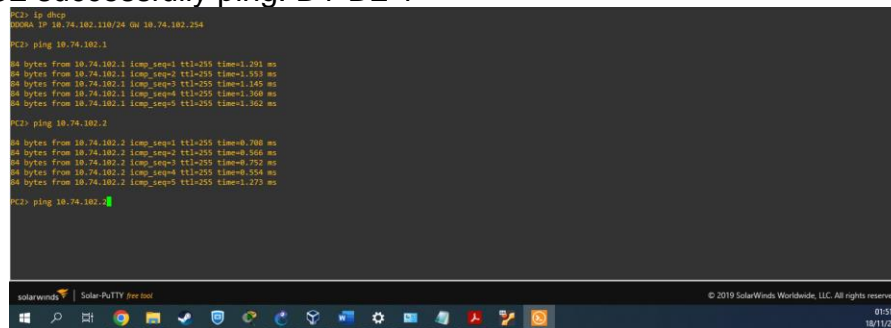
Host ports should transition immediately to forwarding state  
Ingresamos a la interfaz conectada al pc con: interface e0/0

Luego usamos el comando:

```
switchport mode access  
switchport access vlan 100  
spanning-tree portfast
```

## PASO 2.7

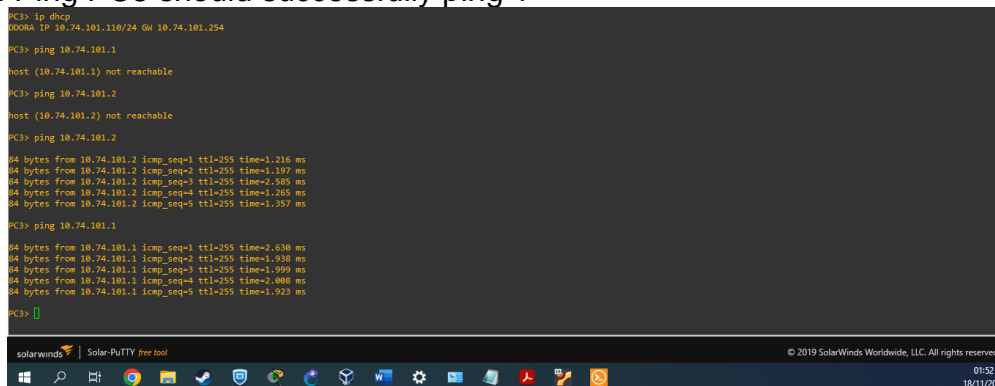
Figura 3. PC2 successfully ping: D1-D2 1



```
PC2> ip dhcp  
0000A IP 10.74.102.110/24 Gi 10.74.102.254  
PC2> ping 10.74.102.1  
64 bytes from 10.74.102.1: icmp_seq=1 ttl=255 time=1.291 ms  
64 bytes from 10.74.102.1: icmp_seq=2 ttl=255 time=1.553 ms  
64 bytes from 10.74.102.1: icmp_seq=3 ttl=255 time=1.145 ms  
64 bytes from 10.74.102.1: icmp_seq=4 ttl=255 time=1.260 ms  
64 bytes from 10.74.102.1: icmp_seq=5 ttl=255 time=1.362 ms  
PC2> ping 10.74.102.2  
64 bytes from 10.74.102.2: icmp_seq=1 ttl=255 time=0.788 ms  
64 bytes from 10.74.102.2: icmp_seq=2 ttl=255 time=0.566 ms  
64 bytes from 10.74.102.2: icmp_seq=3 ttl=255 time=0.752 ms  
64 bytes from 10.74.102.2: icmp_seq=4 ttl=255 time=0.558 ms  
64 bytes from 10.74.102.2: icmp_seq=5 ttl=255 time=1.273 ms  
PC2> ping 10.74.102.2
```

Fuente: elaboración propia

Figura 4. Ping PC3 should successfully ping 1



```
PC3> ip dhcp  
0000A IP 10.74.101.110/24 Gi 10.74.101.254  
PC3> ping 10.74.101.1  
host (10.74.101.1) not reachable  
PC3> ping 10.74.101.2  
host (10.74.101.2) not reachable  
PC3> ping 10.74.101.2  
64 bytes from 10.74.101.2: icmp_seq=1 ttl=255 time=1.216 ms  
64 bytes from 10.74.101.2: icmp_seq=2 ttl=255 time=1.197 ms  
64 bytes from 10.74.101.2: icmp_seq=3 ttl=255 time=2.585 ms  
64 bytes from 10.74.101.2: icmp_seq=4 ttl=255 time=1.265 ms  
64 bytes from 10.74.101.2: icmp_seq=5 ttl=255 time=1.357 ms  
PC3> ping 10.74.101.1  
64 bytes from 10.74.101.1: icmp_seq=1 ttl=255 time=2.638 ms  
64 bytes from 10.74.101.1: icmp_seq=2 ttl=255 time=1.938 ms  
64 bytes from 10.74.101.1: icmp_seq=3 ttl=255 time=1.999 ms  
64 bytes from 10.74.101.1: icmp_seq=4 ttl=255 time=2.888 ms  
64 bytes from 10.74.101.1: icmp_seq=5 ttl=255 time=1.923 ms  
PC3> |
```

Fuente: elaboración propia

## PASO 2.8

Figura 5. Ping PC1 - D1-D2-PC4 1

```
PC1> ping 10.74.100.1
64 bytes from 10.74.100.1 icmp_seq=1 ttl=255 time=0.537 ms
64 bytes from 10.74.100.1 icmp_seq=2 ttl=255 time=0.744 ms
64 bytes from 10.74.100.1 icmp_seq=3 ttl=255 time=0.583 ms
64 bytes from 10.74.100.1 icmp_seq=4 ttl=255 time=0.801 ms
64 bytes from 10.74.100.1 icmp_seq=5 ttl=255 time=0.868 ms

PC1> ping 10.74.100.2
64 bytes from 10.74.100.2 icmp_seq=1 ttl=255 time=2.366 ms
64 bytes from 10.74.100.2 icmp_seq=2 ttl=255 time=1.549 ms
64 bytes from 10.74.100.2 icmp_seq=3 ttl=255 time=1.854 ms
64 bytes from 10.74.100.2 icmp_seq=4 ttl=255 time=1.638 ms
64 bytes from 10.74.100.2 icmp_seq=5 ttl=255 time=1.432 ms

PC1> ping 10.74.100.6
64 bytes from 10.74.100.6 icmp_seq=1 ttl=64 time=1.718 ms
64 bytes from 10.74.100.6 icmp_seq=2 ttl=64 time=1.124 ms
64 bytes from 10.74.100.6 icmp_seq=3 ttl=64 time=1.738 ms
64 bytes from 10.74.100.6 icmp_seq=4 ttl=64 time=1.784 ms
64 bytes from 10.74.100.6 icmp_seq=5 ttl=64 time=1.888 ms

PC1> |
```

Fuente: elaboración propia

Figura 6. Ping PC4 : D1-D2-PC1 1

```
PC4> ping 10.74.100.1
64 bytes from 10.74.100.1 icmp_seq=1 ttl=255 time=1.388 ms
64 bytes from 10.74.100.1 icmp_seq=2 ttl=255 time=1.219 ms
64 bytes from 10.74.100.1 icmp_seq=3 ttl=255 time=1.144 ms
64 bytes from 10.74.100.1 icmp_seq=4 ttl=255 time=1.351 ms
64 bytes from 10.74.100.1 icmp_seq=5 ttl=255 time=1.222 ms

PC4> ping 10.74.100.2
64 bytes from 10.74.100.2 icmp_seq=1 ttl=255 time=2.860 ms
64 bytes from 10.74.100.2 icmp_seq=2 ttl=255 time=1.126 ms
64 bytes from 10.74.100.2 icmp_seq=3 ttl=255 time=1.951 ms
64 bytes from 10.74.100.2 icmp_seq=4 ttl=255 time=1.976 ms
64 bytes from 10.74.100.2 icmp_seq=5 ttl=255 time=1.721 ms

PC4> ping 10.74.100.5
64 bytes from 10.74.100.5 icmp_seq=1 ttl=64 time=1.407 ms
64 bytes from 10.74.100.5 icmp_seq=2 ttl=64 time=1.789 ms
64 bytes from 10.74.100.5 icmp_seq=3 ttl=64 time=2.452 ms
64 bytes from 10.74.100.5 icmp_seq=4 ttl=64 time=1.755 ms
64 bytes from 10.74.100.5 icmp_seq=5 ttl=64 time=5.761 ms

PC4> |
```

Fuente: elaboración propia

Figura 7. Interfaces troncales 1

```
!!show interfaces trunk
Nov 18 06:55:54.843: %SYS-5-COMF10_1: configured from console by console
!!show interfaces trunk

Port      Mode      Encapsulation  Status        Native vlan
Po12     on        802.1q         trunking     999

Port      Vlans allowed on trunk
Po1       1-4094
Po12     1-4094

Port      Vlans allowed and active in management domain
Po1       1,100-102,999
Po12     1,100-102,999

Port      Vlans in spanning tree forwarding state and not pruned
Po1       1,100-102,999
Po12     1,100-102,999
!!show run | include spanning-tree
spanning-tree mode rapid-pst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 24576
spanning-tree vlan 101 priority 20972
spanning-tree portfast edge
!!
```

Fuente: elaboración propia

Figura 8. Interfaces troncales 1

```
D2#show interfaces trunk
Port      Mode          Encapsulation  Status        Native vlan
Po2       on            802.1q         trunking     999
Po12      on            802.1q         trunking     999

Port      Vlans allowed on trunk
Po2       1-4094
Po12      1-4094

Port      Vlans allowed and active in management domain
Po2       1,100-102,999
Po12      1,100-102,999

Port      Vlans in spanning tree forwarding state and not pruned
Po2       1,100-102,999
Po12      1,100-102,999
D2#show run | include spanning-tree
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
spanning-tree vlan 101 priority 24576
spanning-tree portfast edge
D2#
```

Fuente: elaboración propia

Figura 9. Interfaces troncales 1

```
A1#show interfaces trunk
Nov 18 06:56:54.611: IOSV-5-CNF10_1: Configured from console by console
A1#show interfaces trunk
Port      Mode          Encapsulation  Status        Native vlan
Po1       on            802.1q         trunking     999
Po2       on            802.1q         trunking     999

Port      Vlans allowed on trunk
Po1       1-4094
Po2       1-4094

Port      Vlans allowed and active in management domain
Po1       1,100-102,999
Po2       1,100-102,999

Port      Vlans in spanning tree forwarding state and not pruned
Po1       100,102
Po2       1,101,999
A1#show run | include spanning-tree
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree portfast edge
spanning-tree portfast edge
spanning-tree portfast edge
spanning-tree portfast edge
A1#
```

Fuente: elaboración propia

Figura 10. Vecinos OSPF configurados 1

```
A4#show ip ospf ne
A1#show ip ospf neighbor
Neighbor ID     Pri   State           Dead Time   Address         Interface
0.0.4.3        1    FULL/DR         00:00:35   10.74.13.3     Ethernet1/1
0.0.4.131      1    FULL/DR         00:00:39   10.74.10.2     Ethernet1/2
A4#
```

Fuente: elaboración propia

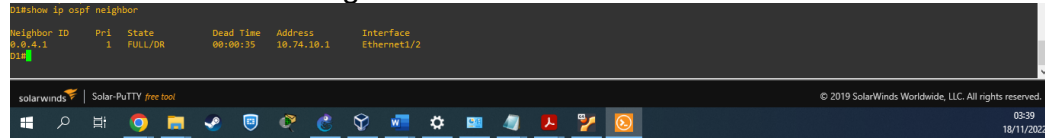
Figura 11. Vecinos OSPF configurados 1

```
A3#show ip ospf neighbor
Neighbor ID     Pri   State           Dead Time   Address         Interface
0.0.4.1        1    FULL/DR         00:00:39   10.74.13.1     Ethernet1/1
0.0.4.132     1    FULL/DR         00:00:32   10.74.11.2     Ethernet1/0
A3#
```

Fuente: elaboración propia

Figura 12. Vecinos OSPF configurados 1

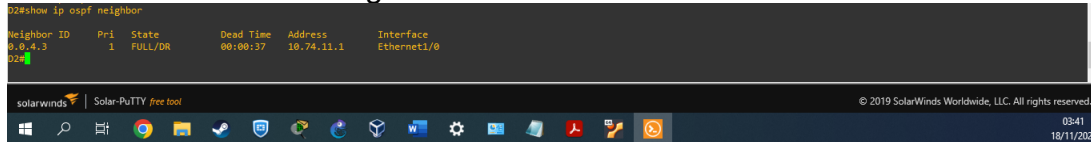
```
D2#show ip ospf neighbor
Neighbor ID Pri State Dead Time Address Interface
0.0.0.1 1 FULL/DR 00:00:35 10.74.10.1 Ethernet1/2
```



Fuente: elaboración propia

Figura 13. Vecinos OSPF configurados 1

```
D2#show ip ospf neighbor
Neighbor ID Pri State Dead Time Address Interface
0.0.0.3 1 FULL/DR 00:00:37 10.74.11.1 Ethernet1/0
```



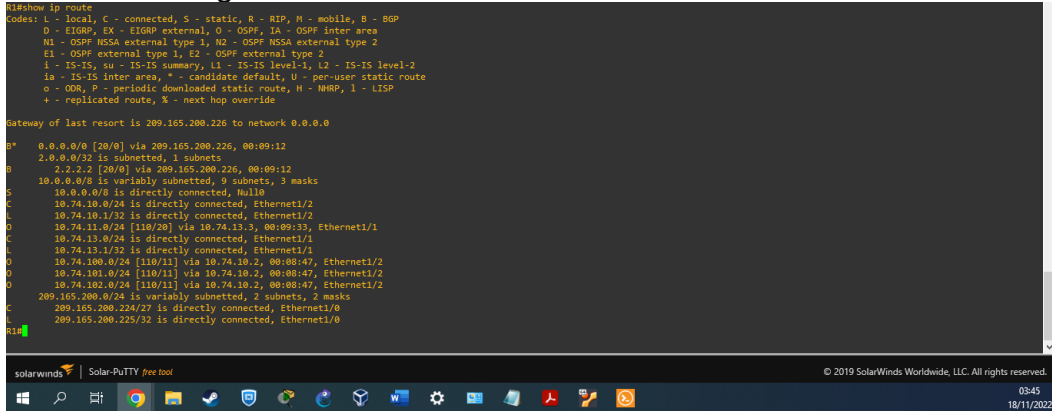
Fuente: elaboración propia

Figura 14. Rutas configuradas 1

```
R1#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
I - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
ia - IS-IS inter area, * - candidate default, U - per-user static route
o - ODR, P - periodic downloaded static route, H - NHRP, I - ISIS
* - replicated route, % - next hop override

Gateway of last resort is 209.165.200.226 to network 0.0.0.0

R1#
S* 0.0.0.0/0 [20/0] via 209.165.200.226, 00:09:12
C 2.0.0.0/32 is subnetted, 1 subnets
  2.2.2.2 [20/0] via 209.165.200.226, 00:09:12
C 10.0.0.0/8 is variably subnetted, 9 subnets, 3 masks
  10.0.0.0/8 is directly connected, Null0
  10.74.10.0/24 is directly connected, Ethernet1/2
  10.74.11.0/24 [110/0] via 10.74.13.2, 00:09:35, Ethernet1/1
  10.74.13.0/24 is directly connected, Ethernet1/1
  10.74.13.1/32 is directly connected, Ethernet1/1
  10.74.100.0/24 [110/11] via 10.74.10.2, 00:08:47, Ethernet1/2
  10.74.101.0/24 [110/11] via 10.74.10.2, 00:08:47, Ethernet1/2
  10.74.102.0/24 [110/11] via 10.74.10.2, 00:08:47, Ethernet1/2
C 209.165.200.0/24 is variably subnetted, 2 subnets, 2 masks
  209.165.200.224/27 is directly connected, Ethernet1/0
  209.165.200.225/32 is directly connected, Ethernet1/0
```



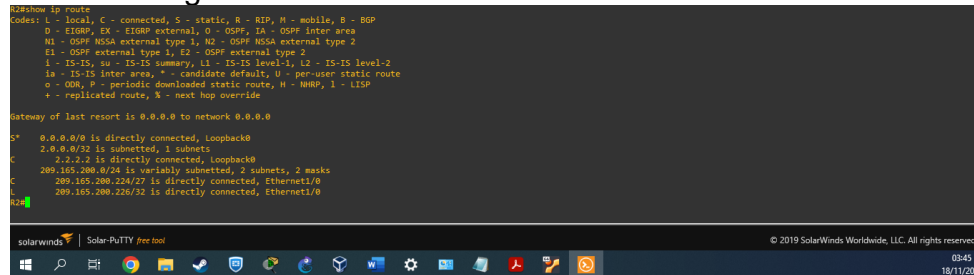
Fuente: elaboración propia

Figura 15. Rutas configuradas 1

```
R2#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
I - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
ia - IS-IS inter area, * - candidate default, U - per-user static route
o - ODR, P - periodic downloaded static route, H - NHRP, I - ISIS
* - replicated route, % - next hop override

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

R2#
S* 0.0.0.0/0 is directly connected, Loopback0
C 2.0.0.0/32 is subnetted, 1 subnets
  2.2.2.2 is directly connected, Loopback0
C 209.165.200.0/24 is variably subnetted, 2 subnets, 2 masks
  209.165.200.224/27 is directly connected, Ethernet1/0
  209.165.200.225/32 is directly connected, Ethernet1/0
```



Fuente: elaboración propia

Figura 16. Rutas configuradas 1

```
show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF Inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
I - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
Ia - IS-IS Inter area, * - candidate default, U - per-user static route
o - ODR, P - periodic downloaded static route, H - NHRP, l - lisp
+ - replicated route, % - next hop override

Gateway of last resort is 10.74.13.1 to network 0.0.0.0

O*E2 0.0.0.0/0 [110/1] via 10.74.13.1, 00:10:16, Ethernet1/1
O 10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
O 10.74.10.0/24 [110/20] via 10.74.13.1, 00:10:37, Ethernet1/1
C 10.74.11.0/24 is directly connected, Ethernet1/0
C 10.74.11.3/32 is directly connected, Ethernet1/0
C 10.74.13.0/24 is directly connected, Ethernet1/1
C 10.74.13.3/32 is directly connected, Ethernet1/1
O 10.74.100.0/24 [110/11] via 10.74.11.2, 00:09:22, Ethernet1/0
O 10.74.101.0/24 [110/11] via 10.74.11.2, 00:09:22, Ethernet1/0
O 10.74.102.0/24 [110/11] via 10.74.11.2, 00:09:22, Ethernet1/0
```

Fuente: elaboración propia

Figura 17. Rutas configuradas 1

```
show standby brief
          P indicates configured to preempt.
          |
Interface Grp Pri P State Active Standby Virtual IP
V1100     104 150 P Standby 10.74.100.2 local 10.74.100.254
V1100     106 90 P Standby FE80::D2:2 local FE80::5:73FF:FEA0:6A
V1101     114 100 P Standby 10.74.101.2 local 10.74.101.254
V1101     116 40 P Standby FE80::D2:3 local FE80::5:73FF:FEA0:74
V1102     124 150 P Active local 10.74.102.2
V1102     126 90 P Standby FE80::D2:4 local FE80::5:73FF:FEA0:7E
```

Fuente: elaboración propia

Figura 18. Rutas configuradas 1

```
D2#show stan
D2#show standby br
D2#show standby brief
          P indicates configured to preempt.
          |
Interface Grp Pri P State Active Standby Virtual IP
V1100     104 100 P Standby 10.74.100.1 local 10.74.100.254
V1100     106 100 P Active local FE80::D1:2 FE80::5:73FF:FEA0:6A
V1101     114 150 P Active local 10.74.101.1 10.74.101.254
V1101     116 150 P Active local FE80::D1:3 FE80::5:73FF:FEA0:74
V1102     124 100 P Standby 10.74.102.1 local 10.74.102.254
V1102     126 100 P Active local FE80::D1:4 FE80::5:73FF:FEA0:7E
```

Fuente: elaboración propia

## CONTINUATION OF THE SCENARIO 1

In this part, you will configure IPv4 and IPv6 routing protocols. At the end of this part, the network should be fully converged. IPv4 and IPv6 pings to the Loopback 0 interface from D1 and D2 should be successful.

**Note:** Pings from the hosts will not be successful because their default gateways are pointing to the HSRP address which will be enabled in Part 4.

Your configuration tasks are as follows:

Task#	Task	Specification	Points
3.1	On the “Company Network” (i.e., R1, R3, D1, and D2), configure single-area OSPFv2 in area 0.	Use OSPF Process ID 4 and assign the following router-IDs: R1: 0.0.4.1 R3: 0.0.4.3 D1: 0.0.4.131 D2: 0.0.4.132 On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0. 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. Disable OSPFv2 advertisements on: D1: All interfaces except E1/2 D2: All interfaces except E1/0	8

Task#	Task	Specification	Points
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:  R1: 0.0.6.1  R3: 0.0.6.3  D1: 0.0.6.131  D2: 0.0.6.132</p> <p>On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0.</p> <p>On R1, do not advertise the R1 – R2 network.</p> <p>On R1, propagate a default route. Note that the default route will be provided by BGP.</p> <p>Disable OSPFv3 advertisements on:  D1: All interfaces except E1/2  D2: All interfaces except E1/0</p>	8
3.3	On R2 in the “ISP Network”, configure MP-BGP.	<p>Configure two default static routes via interface Loopback 0:  An IPv4 default static route.  An IPv6 default static route.</p> <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:  The Loopback 0 IPv4 network (/32).  The default route (0.0.0.0/0).</p> <p>In IPv6 address family, advertise:  The Loopback 0 IPv4 network (/128).  The default route (::/0).</p>	4

Task#	Task	Specification	Points
3.4	On R1 in the "ISP Network", configure MP-BGP.	<p>Configure two static summary routes to interface Null 0:</p> <p>A summary IPv4 route for 10.XY.0.0/8.</p> <p>A summary IPv6 route for 2001:db8:100::/48.</p> <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> <p>Disable the IPv6 neighbor relationship.</p> <p>Enable the IPv4 neighbor relationship.</p> <p>Advertise the 10.XY.0.0/8 network.</p> <p>In IPv6 address family:</p> <p>Disable the IPv4 neighbor relationship.</p> <p>Enable the IPv6 neighbor relationship.</p> <p>Advertise the 2001:db8:100::/48 network.</p>	4

Tabla 3. Lista de tareas escenario 2

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> <p>Use SLA number <b>4</b> for IPv4.</p> <p>Use SLA number <b>6</b> for IPv6.</p> <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> <p>Use track number <b>4</b> for IP SLA 4.</p> <p>Use track number <b>6</b> for IP SLA 6.</p> <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



Task#	Task	Specification	Points
4.2	On D2, create IP SLAs that test the reachability of R3 interface E1/0.	<p>Create two IP SLAs.            Use SLA number <b>4</b> for IPv4.            Use SLA number <b>6</b> for IPv6.            The IP SLAs will test availability of R3 E1/0 interface every 5 seconds.            Schedule the SLA for immediate implementation with no end time.            Create an IP SLA object for IP SLA 4 and one for IP SLA 6.            Use track number <b>4</b> for IP SLA 4.            Use track number <b>6</b> for IP SLA 6.            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

Task#	Task	Specification	Points
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 <b>104</b> for VLAN 100:</p> <p>Assign the virtual IP address <b>10.XY.100.254</b>.</p> <p>Set the group priority to <b>150</b>.</p> <p>Enable preemption.</p> <p>Track object 4 and decrement by 60.</p> <p>Configure IPv4 HSRP group <b>114</b> for VLAN 101:</p> <p>Assign the virtual IP address <b>10.XY.101.254</b>.</p> <p>Enable preemption.</p> <p>Track object 4 to decrement by 60.</p> <p>Configure IPv4 HSRP group <b>124</b> for VLAN 102:</p> <p>Assign the virtual IP address <b>10.XY.102.254</b>.</p> <p>Set the group priority to <b>150</b>.</p> <p>Enable preemption.</p> <p>Track object 4 to decrement by 60.</p> <p>Configure IPv6 HSRP group <b>106</b> for VLAN 100:</p> <p>Assign the virtual IP address using <b>ipv6 autoconfig</b>.</p> <p>Set the group priority to <b>150</b>.</p> <p>Enable preemption.</p> <p>Track object 6 and decrement by 60.</p> <p>Configure IPv6 HSRP group <b>116</b> for VLAN 101:</p> <p>Assign the virtual IP address using <b>ipv6 autoconfig</b>.</p> <p>Enable preemption.</p> <p>Track object 6 and decrement by 60.</p> <p>Configure IPv6 HSRP group <b>126</b> for VLAN 102:</p> <p>Assign the virtual IP address using <b>ipv6 autoconfig</b>.</p> <p>Set the group priority to <b>150</b>.</p> <p>Enable preemption.</p> <p>Track object 6 and decrement by 60.</p>	8

Task#	Task	Specification	Points
	On D2, configure HSRPv2.	<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 <b>104</b> for VLAN 100:</p> <p>Assign the virtual IP address <b>10.XY.100.254</b>.</p> <p>Enable preemption.</p> <p>Track object 4 and decrement by 60.</p> <p>Configure IPv4 HSRP group <b>114</b> for VLAN 101:</p> <p>Assign the virtual IP address <b>10.XY.101.254</b>.</p> <p>Set the group priority to <b>150</b>.</p> <p>Enable preemption.</p> <p>Track object 4 to decrement by 60.</p> <p>Configure IPv4 HSRP group <b>124</b> for VLAN 102:</p> <p>Assign the virtual IP address <b>10.XY.102.254</b>.</p> <p>Enable preemption.</p> <p>Track object 4 to decrement by 60.</p> <p>Configure IPv6 HSRP group <b>106</b> for VLAN 100:</p> <p>Assign the virtual IP address using <b>ipv6 autoconfig</b>.</p> <p>Enable preemption.</p> <p>Track object 6 and decrement by 60.</p> <p>Configure IPv6 HSRP group <b>116</b> for VLAN 101:</p> <p>Assign the virtual IP address using <b>ipv6 autoconfig</b>.</p> <p>Set the group priority to <b>150</b>.</p> <p>Enable preemption.</p> <p>Track object 6 and decrement by 60.</p> <p>Configure IPv6 HSRP group <b>126</b> for VLAN 102:</p> <p>Assign the virtual IP address using <b>ipv6 autoconfig</b>.</p> <p>Enable preemption.</p> <p>Track object 6 and decrement by 60.</p>	

Tabla 4. Lista de tareas escenario 2



R1

```
router ospf 4
router-id 0.0.4.1
network 10.74.10.0 0.0.0.255 area 0
network 10.74.13.0 0.0.0.255 area 0
default-information originate
exit
```

- Configuramos ospf con ID 4
- Configuramos router-id 1 para R1
- notificamos las redes conectadas a R1 (descartar la conexión con el ISP)

R3

```
router ospf 4
router-id 0.0.4.3
network 10.74.11.0 0.0.0.255 area 0
network 10.74.13.0 0.0.0.255 area 0
exit
```

- Configuramos ospf con ID 4
- Configuramos router-id 3 para R3
- notificamos las redes conectadas a R3

D1

```
router ospf 4
router-id 0.0.4.131
network 10.74.100.0 0.0.0.255 area 0
network 10.74.101.0 0.0.0.255 area 0
network 10.74.102.0 0.0.0.255 area 0
network 10.74.10.0 0.0.0.255 area 0
passive-interface default
no passive-interface e1/2
exit
```

- Configuramos ospf con ID 4
- Configuramos router-id 131 para D1
- notificamos las redes conectadas a D1
- desactivar notificaciones OSPF, menos en interfaces e1/2

D2

```
router ospf 4
router-id 0.0.4.132
network 10.74.100.0 0.0.0.255 area 0
network 10.74.101.0 0.0.0.255 area 0
network 10.74.102.0 0.0.0.255 area 0
```

```
network 10.74.11.0 0.0.0.255 area 0
passive-interface default
no passive-interface e1/0
exit
```

- Configuramos ospf con ID 4
- Configuramos router-id 132 para D2
- notificamos las redes conectadas a D2
- desactivar notificaciones OSPF, menos en interfaces e1/0

### 3.2

#### R1

```
ipv6 router ospf 6
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
```

#### R3

```
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
```

#### D1

```
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
ipv6 ospf 6 area 0
exit
```

D2

```
ipv6 router ospf 6
router-id 0.0.6.132
passive-interface default
no passive-interface e1/2
exit
interface e1/0
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
ipv6 ospf 6 area 0
exit
```

3.3

R2

```
ip route 0.0.0.0 0.0.0.0 loopback 0
router bgp 500
bgp router-id 2.2.2.2
neighbor 209.165.200.225 remote-as 300
neighbor 2001:db8:200::1 remote-as 300
address-family ipv4
neighbor 209.165.200.225 activate
no neighbor 2001:db8:200::1 activate
network 2.2.2.2 mask 255.255.255.255
network 0.0.0.0
exit-address-family
address-family ipv6
no neighbor 209.165.200.225 activate
neighbor 2001:db8:200::1 activate
network 2001:db8:2222::/128
network ::/0
exit-address-family
```

- configurar MP-BGP en el ISP a través de la loopback 0; para IPv4 e IPv6
- configurar BGP en el ISP con sistema autónomo 500 con Id router 2;
- configurar los vecinos para IPv4 e IPv6 con sistema autónomo 300
- notificar la familia de direcciones IPv4 e IPv6 por defecto y loopback
- en IPv4 activar el vecino IPv4, desactivar vecino y en IPv6 activar el vecino IPv6
- salir de familia de direcciones

### 3.4

R1

```
ip route 10.0.0.0 255.0.0.0 null0
ipv6 route 2001:db8:100::/48 null0
router bgp 300
  bgp router-id 1.1.1.1
  neighbor 209.165.200.226 remote-as 500
  neighbor 2001:db8:200::2 remote-as 500
  address-family ipv4 unicast
    neighbor 209.165.200.226 activate
    no neighbor 2001:db8:200::2 activate
    network 10.74.0.0 mask 255.0.0.0
  exit-address-family
  address-family ipv6 unicast
    no neighbor 209.165.200.226 activate
    neighbor 2001:db8:200::2 activate
    network 2001:db8:100::/48
  exit-address-family
```

- configurar en ISP dos rutas sumarizadas estáticas null 0, tanto para IPv4 e IPv6
- configurar en ISP Bgp con sistema autónomo 300 y router id 1
- configurar la relación de vecinos con sistema autónomo 500
- configurar la familia de direcciones en IPv4, desactivando los vecinos IPv6
- notificar la red 10.74.0.0/8
- configurar la familia de direcciones en IPv6, desactivando los vecinos IPv4
- notificar la red 2001:db8:100::/48
- salir de familia de direcciones

\*\*\*\*\*

### 4.1

D1

```
ip sla 4
  icmp-echo 10.74.10.1
  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
```

- configurar SLAs IPv4 que prueben la accesibilidad de la interfaz R1 e1/2 cada 5 seg
- configurar SLAs IPv6 que prueben la accesibilidad de la interfaz R1 e1/2 cada 5 seg
- configurar SLAs IPv4 schedule 4 que prueben la accesibilidad de la interfaz R1 sin tiempo y que inicie ahora
- configurar SLAs IPv6 schedule 6 que prueben la accesibilidad de la interfaz R1 sin tiempo y que inicie ahora
- configurar un objeto SLAs IPv4 que notifique que el estado cambia cada determinado tiempo
- configurar un objeto SLAs IPv6 que notifique que el estado cambia cada determinado tiempo

## 4.2

### D2

```
ip sla 4
icmp-echo 10.74.11.1
frequency 5
exit 34
ip sla 6
icmp-echo 2001:db8:100:1011::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
```

- configurar SLAs IPv4 que prueben la accesibilidad de la interfaz R3 e1/0 cada 5 seg
- configurar SLAs IPv6 que prueben la accesibilidad de la interfaz R3 e1/0 cada 5 seg
- configurar SLAs IPv4 schedule 4 que prueben la accesibilidad de la interfaz R3 sin tiempo y que inicie ahora.
- configurar SLAs IPv6 schedule 6 que prueben la accesibilidad de la interfaz R3 sin tiempo y que inicie ahora.
- configurar un objeto SLAs IPv4 que notifique que el estado cambia cada determinado tiempo.
- configurar un objeto SLAs IPv6 que notifique que el estado cambia cada determinado tiempo.

tiempo

4.3

D1

```
interface vlan 100
standby version 2
standby 104 ip 10.74.100.254
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 10.74.101.254
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 10.74.102.254
standby 124 priority 150
standby 124 preempt
standby 124 track 4 decrement 60
standby 126 ipv6 autoconfig
standby 126 priority 150
standby 126 priority 150
standby 126 preempt
standby 126 track 6 decrement 60
exit
end
```

- Configurar en D1 como router primario, configurar HSRPv2 con grupo 104 para vlan 100 con prioridad 150
- asignar ip virtual 10.74.100.254
- configurar objeto 4 con decremento a 60
- Configurar en D1 configurar HSRPv2 con grupo 114 para vlan 101
- asignar ip virtual 10.74.101.254
- configurar objeto 4 con decremento a 60
- Configurar en D1 configurar HSRPv2 con grupo 124 para vlan 102 con prioridad 150
- asignar ip virtual 10.74.102.254

- configurar objeto 4 con decremento a 60
- Configurar en D1 configurar IPv6 HSRP con grupo 106 para vlan 100 con prioridad 150
- asignar autoconfiguracion
- configurar objeto 6 con decremento a 60
- Configurar en D1 configurar IPv6 HSRP con grupo 116 para vlan 101
- asignar autoconfiguracion
- configurar objeto 6 con decremento a 60
- Configurar en D1 configurar IPv6 HSRP con grupo 126 para vlan 102 con prioridad 150
- asignar autoconfiguracion
- configurar objeto 6 con decremento a 60

## D2

```

interface vlan 100
standby version 2
standby 104 ip 10.74.100.254
standby 104 preempt
standby 104 track 4 decrement 60
standby 106 ipv6 autoconfig
standby 106 preempt
standby 106 track 6 decrement 60
exit
interface vlan 101
standby version 2
standby 114 ip 10.74.101.254
standby 114 priority 150
standby 114 preempt
standby 114 track 4 decrement 60
standby 116 ipv6 autoconfig
standby 116 priority 150
standby 116 preempt
standby 116 track 6 decrement 60
exit
interface vlan 102
standby version 2
standby 124 ip 10.74.102.254
standby 124 preempt
standby 124 track 4 decrement 60
standby 126 ipv6 autoconfig
standby 126 preempt
standby 126 track 6 decrement 60
exit
end

```

- Configurar D2 como router primario, configurar HSRPv2 con grupo 104 para vlan 100
- asignar ip virtual 10.74.100.254
- configurar objeto 4 con decremento a 60
- Configurar en D2 configurar HSRPv2 con grupo 114 para vlan 101 con prioridad 150

- asignar ip virtual 10.74.101.254
- configurar objeto 4 con decremento a 60
- Configurar en D2 configurar HSRPv2 con grupo 124 para vlan 102
- asignar ip virtual 10.74.102.254
- configurar objeto 4 con decremento a 60
- Configurar en D2 configurar IPv6 HSRP con grupo 106 para vlan 100
- asignar autoconfiguracion
- configurar objeto 6 con decremento a 60
- Configurar en D2 configurar IPv6 HSRP con grupo 116 para vlan 101 con prioridad 150
- asignar autoconfiguracion
- configurar objeto 6 con decremento a 60
- Configurar en D2 configurar IPv6 HSRP con grupo 126 para vlan 102
- asignar autoconfiguración
- configurar objeto 6 con decremento a 60

## CONCLUSIONES

El área de backbone es un área especial que forma la parte central de la red a la que se encuentran conectadas el resto de las áreas de la misma red. Las rutas entre las diferentes áreas circulan siempre por el backbone, por lo tanto, todas las áreas deben conectar con el backbone. Si no es posible hacer una conexión directa con el backbone, se puede hacer un enlace virtual entre redes.

Todo el acceso al Router debe estar asegurado. El modo EXEC privilegiado proporciona al usuario acceso completo al dispositivo y su configuración. Por lo tanto, es el modo más importante para asegurar.

Los siguientes comandos aseguran el modo EXEC privilegiado y el modo EXEC del usuario, habilitan el acceso remoto Telnet y SSH, y cifran todas las contraseñas de texto sin formato (es decir, las líneas EXEC y VTY del usuario).

Si se configuraron los comandos anteriores y el Router accidentalmente perdió energía, todos los comandos configurados se perderían. Por eso es importante guardar la configuración cuando se implementan cambios. El siguiente comando guarda la configuración en NVRAM.

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