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CASO DE ESTUDIO CCNA1 Y CCNA2

GRUPO:

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MONOGRAFIA

PARA OPTAR AL TÍTULO DE: INGENIERO DE SISTEMAS

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DEDICATORIA

Dedico esta monografía primeramente a “Dios”

Por permitirme un logro más en la vida

A mí amada esposa Jackeline y

a mis hijos David, Johan y Michel

Por su apoyo incondicional en el transcurrir de la carrera.

.

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JUSTIFICACION

Las redes han transformado el desarrollo administrativo y tecnológico de las diferentes empresas, siendo una de las bases fundamentales en el desarrollo a nivel global, en este caso de estudio el autor aplicara todos los conocimientos adquiridos referentes a las redes LAN y WAN, teniendo como base la información suministrada por la empresa COMERCIANTES S.A., y se realizó la respectiva simulación en Packet Tracer, y se revisó la respectivas conexiones de los dispositivos instalados.

Es de anotar que dentro del proceso de aprendizaje se adquirieron conocimientos muy importantes, llevándonos al estudio de la gran red, el Internet; siendo esta una herramienta transcendental, y base de nuestro diario vivir.

Con el desarrollo del presente trabajo el autor aplicara los protocolos OSPF, donde es importante el traslado de PDU en la topología, como es en las redes LAN y las WAN.

OBJETIVOS

- Diseñar e implementar una red WAN conforme a los datos suministrados por la empresa COMERCIANTES S.A

- Realizar la configuración y funcionamiento de la red WAN virtual mediante la simulación teniendo como base Packet tracer.

- Comprobar el correcto funcionamiento de cada uno se los componentes de la red realizando pruebas de conexión en cada dispositivo.

- Realizar las pruebas correspondientes como los ping y trazas y sacar la información de cada uno de las configuraciones.

- Diseñar y documentar un esquema de direccionamiento según los requisitos.

- Aplicar una configuración básica a los dispositivos.

- Configurar una prioridad de routers y RID.

- Configurar el enrutamiento OSPF

- Desactivación de las actualizaciones de enrutamiento en las interfaces adecuadas.

- Verificación de la completa conectividad entre todos los dispositivos de la topología.

METODOLOGÍA

CASO DE ESTUDIO CCNA 1

Una empresa denominada COMERCIANTES S.A. desea implementar una red WAN acorde con la estructura que se ilustra en la siguiente figura.

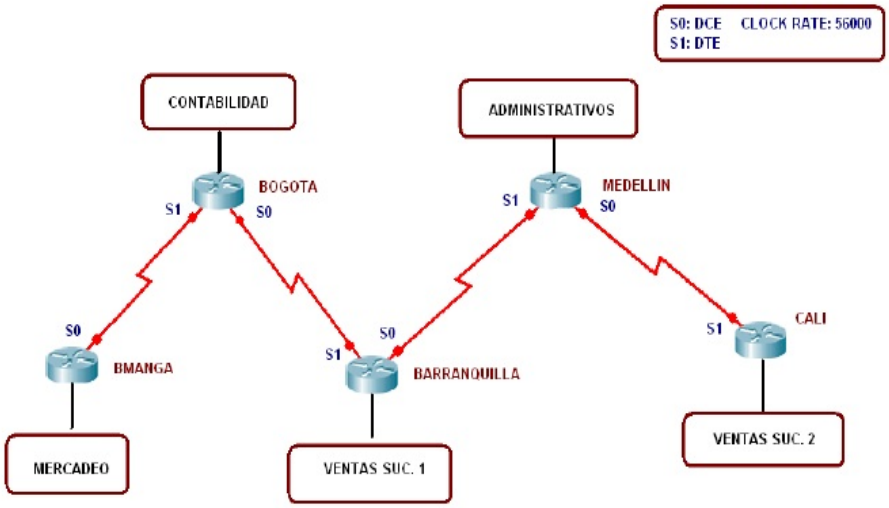

Ilustración 1. Red WAM caso de estudio CCNA1

La cantidad de host requeridos por cada una de las LAN es la siguiente:

Contabilidad: 15

Mercadeo: 10

Ventas Sucursal 1: 30

Ventas Sucursal 2: 40

Administrativos: 25

Se desea establecer cada uno de los siguientes criterios:

Protocolo de enrutamiento: RIP Versión 2

Todos los puertos seriales 0 (S0) son terminales DCE

Todos los puertos seriales 0 (S1) son terminales DTE

Definir la tabla de direcciones IP indicando por cada subred los siguientes elementos:

Por cada LAN

1. Dirección de Red
2. Dirección IP de Gateway
3. Dirección IP del Primer PC
4. Dirección IP del último PC
5. Dirección de Broadcast
6. Máscara de Subred

Por cada conexión serial

1. Dirección de Red
2. Dirección IP Serial 0 (Indicar a qué Router pertenece)
3. Dirección IP Serial 1 (Indicar a qué Router pertenece)
4. Dirección de Broadcast
5. Máscara de Subred

En cada Router configurar:

1. Nombre del Router (Hostname)
2. Direcciones IP de las Interfaces a utilizar
3. Por cada interface utilizada, hacer uso del comando DESCRIPTION con el fin de indicar la función que cumple cada interface. Ej. Interfaz de conexión con la red LAN Mercadeo.
4. Establecer contraseñas para: CON 0, VTY, ENABLE SECRET. Todas con el Password: CISCO
5. Protocolo de enrutamiento a utilizar: RIP Versión 2

Se debe realizar la configuración de la misma mediante el uso de Packet Tracer, los routers deben ser de referencia 1841 y los Switches 2950. Por cada subred se deben dibujar solamente dos Host identificados con las direcciones IP correspondientes al primer y último PC acorde con la cantidad de equipos establecidos por subred. El trabajo debe incluir toda la documentación correspondiente al diseño, copiar las configuraciones finales de cada router mediante el uso del comando Show Running-config, archivo de simulación en Packet Tracer y verificación de funcionamiento de la red mediante el uso de comandos: Ping y Traceroute.

SOLUCION DEL CASO DE ESTUDIO CCNA1

DIRECCIONAMIENTO LAN CCNA1

LAN	DIRECCIÓN DE RED	MÁSCARA DE SUBRED	GATEWAY	PRIMER HOST	ULTIMO HOST	DIRECCIÓN DE BROADCAST
Ventas Suc2	192.168.1.0	255.255.255.192	192.168.1.1	192.168.1.2	192.168.1.41	192.168.1.63
Ventas suc1	192.168.2.0	255.255.255.192	192.168.2.1	192.168.2.2	192.168.2.31	192.168.2.63
Administrativos	192.168.3.0	255.255.255.224	192.168.3.1	192.168.3.2	192.168.3.26	192.168.3.31
Contabilidad	192.168.4.0	255.255.255.224	192.168.4.1	192.168.4.2	192.168.4.16	192.168.4.31
Mercadeo	192.168.5.0	255.255.255.240	192.168.5.1	192.168.5.2	192.168.5.11	192.168.5.15

Tabla 1. Direccionamiento de red LAN

DIRECCIONAMIENTO CONEXIÓN SERIAL ENTRE SUBREDES 172.20.1.0

	IP serie 0	IP serie 1	Dirección de BROADCAST	Máscara de subred
B/manga-Bogotá	172.20.1.1	172.20.1.2	172.20.1.3	255.255.255.252
Bogotá-B/quilla	172.20.2.1	172.20.2.2	172.20.2.3	255.255.255.252
B/quilla- Medellín	172.20.3.1	172.20.3.2	172.20.3.3	255.255.255.252
Medellín-Cali	172.20.4.1	172.20.4.2	172.20.4.3	255.255.255.252

Tabla 2. Direccionamiento de red WAN

CONFIGURACIÓN ROUTER BUCARAMANGA

ROUTER BUCARAMANGA	
FastEthernetF0/0	**192.168.5.1**
Serial S 0/1/0	**172.20.1.1**
Serial S 0/1/1	

Tabla 3. Configuración Router Bucaramanga

CONFIGURACIÓN ROUTER BOGOTA

ROUTER BOGOTA	
FastEthernetF0/0	192.168.4.1
Serial S 0/1/0	172.20.2.1
Serial S 0/1/1	172.20.1.2

Tabla 4. Configuración Router Bogotá

CONFIGURACIÓN ROUTER BARRANQUILLA

ROUTER BARRANQUILLA	
FastEthernetF0/0	192.168.2.1
Serial S 0/1/0	172.20.3.1
Serial S 0/1/1	172.20.2.2

Tabla 5. Configuración Router Barranquilla

CONFIGURACIÓN ROUTER MEDELLIN

ROUTER MEDELLIN	
FastEthernetF0/0	192.168.3.1
Serial S 0/1/0	172.20.4.1
Serial S 0/1/1	172.20.3.2

Tabla 6. Configuración Router Medellin.

CONFIGURACIÓN ROUTER CALI

ROUTER CALI	
FastEthernetF0/0	192.168.1.1
Serial S 0/1/0	
Serial S 0/1/1	172.20.4.2

Tabla 7. Configuración Router Cali.

CONFIGURACIÓN EQUIPOS LAN MERCADEO

CONFIGURACION EQUIPOS LAN MERCADEO			
MERCADEO	**DIRECCION IP**	**MASCARA**	**GATEWAY**
Merc_pc1	192.168.5.2	255.255.255.240	192.168.5.1
Merc_pc10	192.168.5.11	255.255.255.240	192.168.5.1

Tabla 8. Configuración Equipos LAN mercadeo.

CONFIGURACIÓN EQUIPOS LAN CONTABILIDAD

CONFIGURACION EQUIPOS LAN CONTABILIDAD			
CONTABILIDAD	**DIRECCION IP**	**MASCARA**	**GATEWAY**
Conta_pc1	192.168.4.2	255.255.255.224	192.168.4.1
Conta_pc15	192.168.5.16	255.255.255.224	192.168.4.1

Tabla 9. Configuración Equipos Red LAN Contabilidad

CONFIGURACIÓN EQUIPOS LAN VENTAS SUCURSAL 1

CONFIGURACION EQUIPOS LAN VENTAS SUCURSAL 1			
SUCURSAL 1	**DIRECCION IP**	**MASCARA**	**GATEWAY**
Suc1_pc1	192.168.2.2	255.255.255.192	192.168.2.1
Suc1_pc30	192.168.2.31	255.255.255.192	192.168.2.1

Tabla 10. Configuración Equipos Red LAN ventas Sucursal 1

CONFIGURACIÓN EQUIPOS LAN ADMINISTRATIVOS

CONFIGURACION EQUIPOS LAN ADMINISTRATIVOS			
ADMINISTRATIVOS	**DIRECCION IP**	**MASCARA**	**GATEWAY**
Adm_pc1	192.168.3.2	255.255.255.224	192.168.3.1
Adm_pc25	192.168.3.26	255.255.255.224	192.168.3.1

Tabla 11. Configuración de Equipos Red LAN administrativos

CONFIGURACIÓN EQUIPOS LAN VENTAS SUCURSAL 2

CONFIGURACION EQUIPOS LAN VENTAS SUCURSAL 2			
SUCURSAL 2	**DIRECCION IP**	**MASCARA**	**GATEWAY**
suc2-pc 1	192.168.1.2	255.255.255.192	192.168.1.1
suc2-pc 40	192.168.1.41	255.255.255.192	192.168.1.1

Tabla 12. Configuración Equipos Red LAN Ventas sucursal 2

INFORMACION DE LOS ROUTER DE LA RED CASO DE ESTUDIO CCNA 1

ROUTER BUCARAMANGA

Bucaramanga#SHOW RUNNING-CONFIG

```
Building configuration...

Current configuration : 1077 bytes
!
version 12.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Bucaramanga
!
!
!
enable secret 5 $1$mERr$NJdjwh5wX8Ia/X8aC4RIu.
!
!
!
```

```
!
!
!
!
!
!
!
!
!
spanning-tree mode pvst
!
!
!
!
interface FastEthernet0/0
 description Interfaz de conexion de la red LAN Bucaramanga
 ip address 192.168.5.1 255.255.255.240
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/1/0
 description Interfaz de conexion de la red WAN con Bogota
 ip address 172.20.1.1 255.255.255.252
 clock rate 56000
```

```
!
interface Serial0/1/1
 no ip address
 clock rate 56000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 network 172.20.0.0
 network 192.168.5.0
!
ip classless
!
!
!
banner motd ^C
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
!!!!!!!ACCESO RESTRINGIDO POR EL AUTOR!!!!!!!!!!
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
^C
!
!
!
!
line con 0
 password CISCO
```

```
 login
line vty 0 4
 password CISCO
 login
!
!
!
end

Bucaramanga#
```

ROUTER BOGOTA

Bogota#SHOW RUNNING-CONFIG

```
Building configuration...

Current configuration : 1128 bytes
!
version 12.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Bogota
!
!
!
enable secret 5 $1$mERr$NJdjwh5wX8Ia/X8aC4RIu.
!
```

```
!
!
!
!
!
!
!
!
!
!
spanning-tree mode pvst
!
!
!
!
interface FastEthernet0/0
 description Interfaz de conexion de la red LAN Contabilidad
 ip address 192.168.4.1 255.255.255.224
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/1/0
 description Interfaz de conexion de la red WAN Barranquilla
```

```
 ip address 172.20.2.1 255.255.255.252
 clock rate 56000
!
interface Serial0/1/1
 description Interfaz de conexion de la red WAN Bucaramanga
 ip address 172.20.1.2 255.255.255.252
!
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 network 172.20.0.0
 network 192.168.4.0
!
ip classless
!
!
!
banner motd ^C
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
!!!!!!!!ACCESO RETRINGIDO POR EL AUTOR!!!!!!!!!
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
^C
!
!
!
line con 0
 password CISCO
```

```
 login
line vty 0 4
 password CISCO
 login
!
!
!
end

Bogota#
```

ROUTER BARRANQUILLA

Barranquilla#show running-config

```
Building configuration...

Current configuration : 1154 bytes
!
version 12.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Barranquilla
!
!
!
enable secret 5 $1$mERr$NJdjwh5wX8Ia/X8aC4RIu.
!
!
```

```
!
!
!
!
!
no ip domain-lookup
!
!
spanning-tree mode pvst
!
!
!
!
interface FastEthernet0/0
 description Interfaz de la conexion LAN Barranquilla Suc1
 ip address 192.168.2.1 255.255.255.192
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/1/0
 description interfaz de conexion con la red WAN de Medellin
 ip address 172.20.3.1 255.255.255.252
 clock rate 64000
!
```

```
interface Serial0/1/1
 description interfaz de conexion con la red WAN de Bogota
 ip address 172.20.2.2 255.255.255.252
!
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 network 172.20.0.0
 network 192.168.2.0
!
ip classless
!
!
!
banner motd ^C
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
!!!!!!!!ACCESO RESTRINGIDO POR EL AUTOR!!!!!!!!!
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
^C
!
!
!
!
line con 0
 password CISCO
 login
line vty 0 4
```

```
 password CISCO
 login
!
!
!
end


Barranquilla#
```

ROUTER MEDELLIN

Medellin#show running-config

```
Building configuration...

Current configuration : 1144 bytes
!
version 12.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Medellin
!
!
!
enable secret 5 $1$mERr$NJdjwh5wX8Ia/X8aC4RIu.
!
```

```
!
!
!
no ip domain-lookup
!
!
spanning-tree mode pvst
!
!
!
!
interface FastEthernet0/0
 description Interfaz de conexion con la red LAN Administrativos
 ip address 192.168.3.1 255.255.255.224
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/1/0
 description Interfaz de conexion con la WAN Cali
 ip address 172.20.4.1 255.255.255.252
 clock rate 56000
!
interface Serial0/1/1
 description Interfaz de conexion con la WAN Barranquilla
```

```
 ip address 172.20.3.2 255.255.255.252
!
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 network 172.20.0.0
 network 192.168.3.0
!
ip classless
!
!
!
banner motd ^C
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
!!!!!!!!ACCESO RESTRINGIDO POR EL AUTOR!!!!!!!!!
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
^C
!
!
!
!
line con 0
 password CISCO
 login
line vty 0 4
 password CISCO
 login
```

!

!

!

end

Medellin#

ROUTER CALI

cali#show running-config

Building configuration...

Current configuration : 1042 bytes

!

version 12.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

!

hostname cali

!

!

!

enable secret 5 1mERr$NJdjwh5wX8Ia/X8aC4RIu.

!

!

!

!

!

!

```
!
no ip domain-lookup
!
!
spanning-tree mode pvst
!
!
!
!
interface FastEthernet0/0
 description Interface con la LAN Ventas Suc 2
 ip address 192.168.1.1 255.255.255.192
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/1/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/1/1
 description Interface con la Wan Medellin
 ip address 172.20.4.2 255.255.255.252
!
```

```
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 network 172.20.0.0
 network 192.168.1.0
!
ip classless
!
!
!
banner motd ^C
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
!!!!!!!ACCESO RESTRINGIDO POR EL AUTOR!!!!!!!!!
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
^C
!
!
!
!
line con 0
 password CISCO
 login
line vty 0 4
 password CISCO
 login
!
!
```

!

end

cali#

Ping a 192.168.1.41

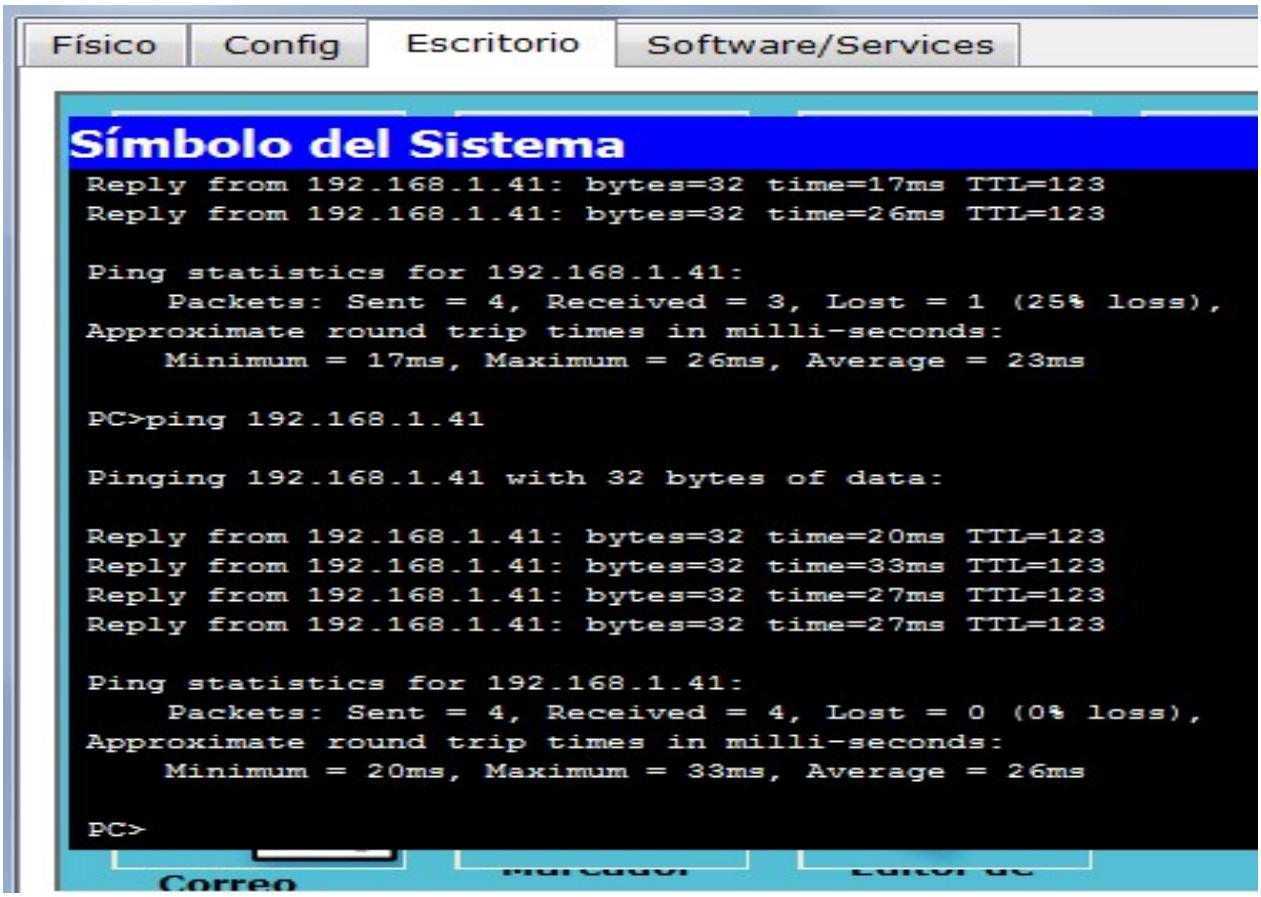

Ilustración 2. Ping a 192.168.1.41

Tracert a 192.168.5.2

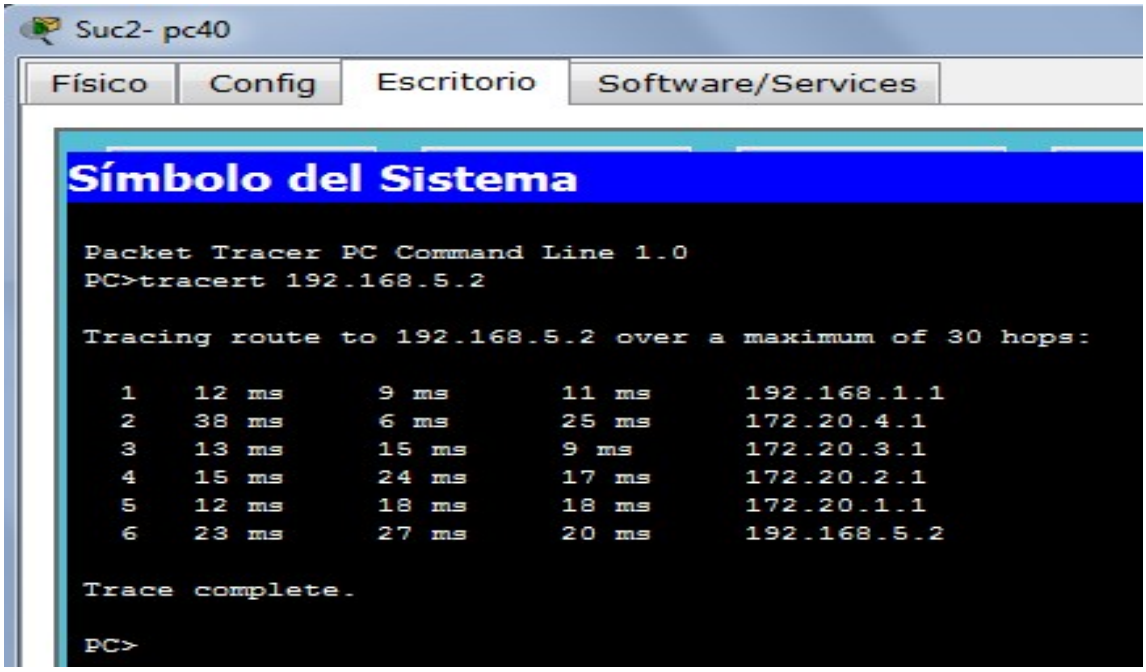

Ilustración 3.Tracert 192.168.5.2

Ping a 192.168.2.2

Ilustración 4. Ping 192.168.2.2

CASO DE ESTUDIO CCNA 2 EXPLORATION

Enunciado Principal del caso de estudio

Se desea diseñar todo el esquema de enrutamiento para la topología que se ilustra en la siguiente figura, acorde con las pautas establecidas en cada una de las tareas que se definen a continuación. El estudiante deberá realizar el diseño completo y documentarlo indicando paso a paso la solución del mismo y las estrategias que utilizó para alcanzar el objetivo.

Diagrama de topología

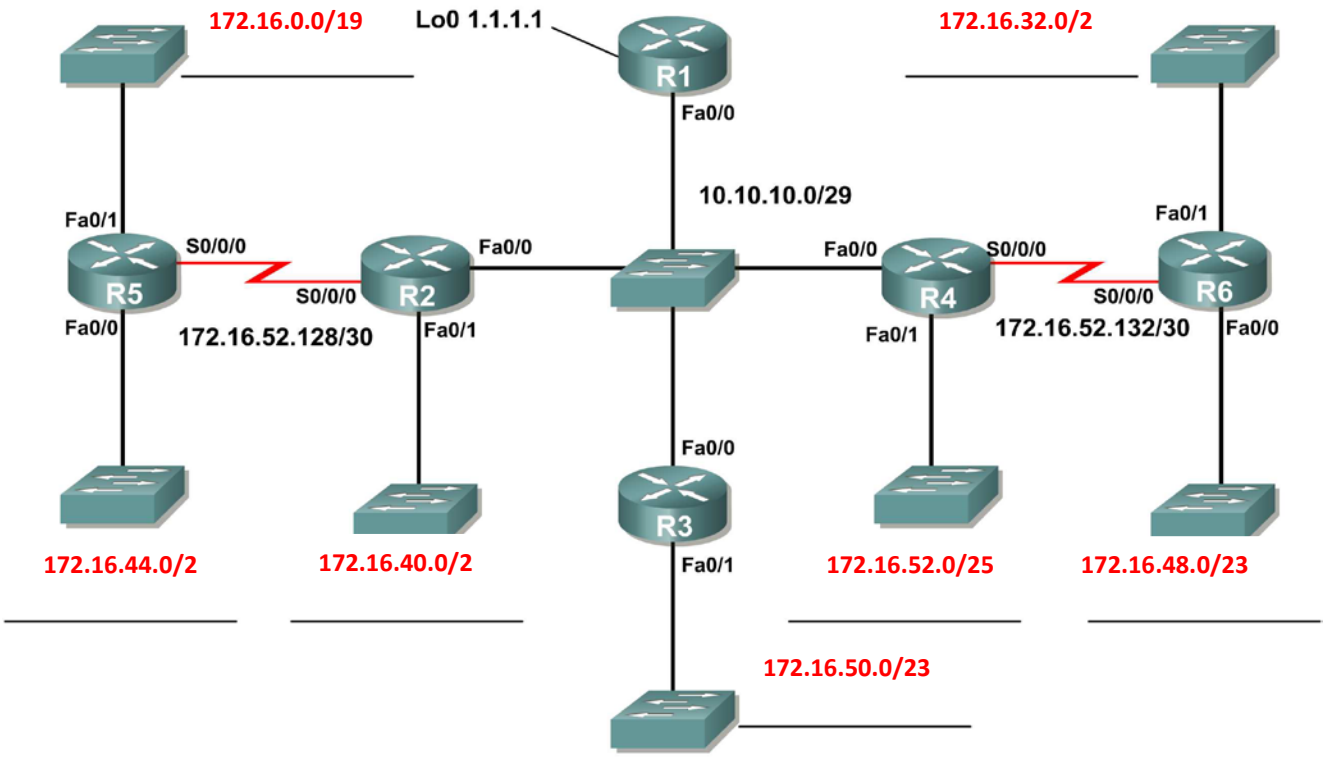

Ilustración 5. Diagrama de Topología CCNA2

Diseño y documentación de un esquema de direccionamiento

Utilice la 172.16.0.0/16 para crear un esquema de direccionamiento eficiente que cumpla los siguientes requisitos:

Nombre de host	Interfaz	Cantidad de hosts
R5	**Fa0/1**	6000
R6	**Fa0/1**	2000
R2	**Fa0/1**	1000
R5	**Fa0/0**	800
R3	**Fa0/1**	400
R6	**Fa0/0**	500
R4	**Fa0/1**	120

Tabla 13. Documentación de Esquema de Direccionamiento

NOTA: observe que se han establecido las direcciones IP correspondientes a la interfaz Fa0/0 en los routers R1, R2, R3 y R4 tal como se ilustra en la siguiente tabla.

DISPOSITIVO	INTERFAZ	DIRECCION IP	MASCARA DE SUBRED
R1	Fa0/0	10.10.10.1	255.255.255.248
	Loopbanck0	1.1.1.1	255.255.255.255
R2	Fa0/0	10.10.10.2	255.255.255.248
	Fa0/1	**172.16.40.1**	**255.255.252.0**
	S0/0/0	**172.16.52.130**	**255.255.255.252**
R3	F0/0	10.10.10.3	255.255.255.248
	Fa0/1	**172.16.50.1**	**255.255.254.0**

DISPOSITIVO	INTERFAZ	DIRECCION IP	MASCARA DE SUBRED
R4	Fa0/0	10.10.10.4	255.255.255.248
	Fa0/1	**172.16.52.1**	**255.255.255.128**
	S0/0/0	172.16.52.133	255.255.255.252
R5	Fa0/0	**172.16.44.1**	**255.255.252.0**
	Fa0/1	**172.16.0.1**	**255.255.224.0**
	S0/0/0	172.16.52.129	255.255.255.252
R6	Fa0/0	**172.16.48.1**	**255.255.254.0**
	Fa0/1	**172.16.32.1**	**255.255.248.0**
	S0/0/0	172.16.52.134	255.255.255.252

Tabla 14. Tabla de direccionamiento de Router

IDENTIFICACION DE VLSM, PARA DIRECCIONES IP

Se debe tener en cuenta que para establecer las direcciones IP para cada subred debe hacer uso de VLSM e identificar para cada una de ellas las siguientes direcciones IP:

1. Dirección de Subred
2. Dirección de Gateway
3. Dirección IP del primer PC de la subred
4. Dirección IP de último PC requerido en la subred. (Por ejemplo: Si la subred posee 800 host, cuál será la dirección IP del Host 800)
5. Dirección de Broadcast
6. Máscara de Subred

SUBRED	No HOST	N	DESCRIPCION	DIRECCION IP	MASCARA DE SUBRED
R5-Fa0/1	6000	13	DIR. SUBRED	172.16.0.0	255.255.224.0
			GATEWAY	172.16.0.1	
			PC1	172.16.0.2	
			PC 6000	172.16.23.113	
			BROADCAST	172.16.31.255	
R6-Fa0/1	2000	11	DIR. SUBRED	172.16.32.0	255.255.248.0
			GATEWAY	172.16.32.1	
			PC1	172.16.32.2	
			PC 2000	172.16.39.209	
			BROADCAST	172.16.39.255	
R2-Fa0/1	1000	10	DIR. SUBRED	172.16.40.0	255.255.252.0
			GATEWAY	172.16.40.1	
			PC1	172.16.40.2	
			PC 1000	172.16.43.233	
			BROADCAST	172.16.43.255	
R5-Fa0/0	800	10	DIR. SUBRED	172.16.44.0	255.255.252.0
			GATEWAY	172.16.44.1	
			PC1	172.16.44.2	
			PC 800	172.16.47.33	
			BROADCAST	172.16.47.255	
R6-Fa0/0	500	9	DIR. SUBRED	172.16.48.0	255.255.254.0
			GATEWAY	172.16.48.1	
			PC1	172.16.48.2	
			PC 500	172.16.49.245	
			BROADCAST	172.16.49.255	
R3-Fa0/1	400	9	DIR. SUBRED	172.16.50.0	255.255.254.0
			GATEWAY	172.16.50.1	
			PC1	172.16.50.2	
			PC 400	172.16.51.145	
			BROADCAST	172.16.51.255	
R4-Fa0/1	120	7	DIR. SUBRED	172.16.52.0	255.255.255.128
			GATEWAY	172.16.52.1	
			PC1	172.16.52.2	
			PC 120	172.16.52.121	
			BROADCAST	172.16.52.127	
WAN1	2	2	DIR. SUBRED	172.16.52.128	255.255.255.252
			Router 5 S0	172.16.52.129	
			Router 2 S0	172.16.52.130	
			BROADCAST	172.16.52.131	
WAN2	2	2	DIR. SUBRED	172.16.52.132	255.255.255.252
			Router 4 S0	172.16.52.133	
			Router 6 S0	172.16.52.134	
			BROADCAST	172.16.52.135	

Tabla 15. Direccionamiento VLSM

Aplicación de una configuración básica.

Paso 1: En cada router, utilice el siguiente cuadro para completar las configuraciones básicas del router.

Contraseña de consola	Contraseña de VTY	Contraseña secreta de enable	Frecuencia de reloj (si corresponde)
cisco	cisco	cisco	56000

Tabla 16. Configuraciones Básicas del Router.

Configurar el enrutamiento OSPF

Paso 1: Configurar el enrutamiento OSPF en cada router.

Paso 2: Verifique que se hayan aprendido todas las rutas.

Ajuste refinado de OSPF

Paso 1: Utilice las siguientes pautas para completar esta tarea:

- R1 nunca participará en una elección DR/BDR.
- R2 siempre será el DR

R2 siempre será el DR

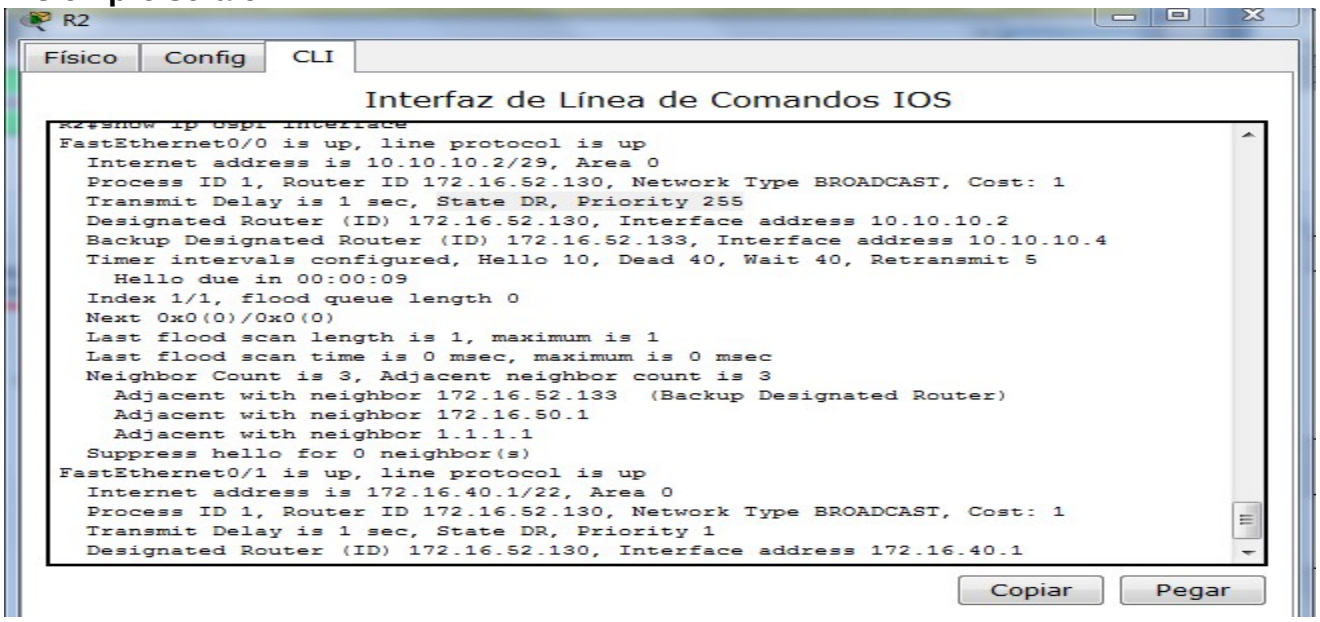

Ilustración 6. R2 siempre será el DR

R3 y R4 tendrán la misma prioridad de 100

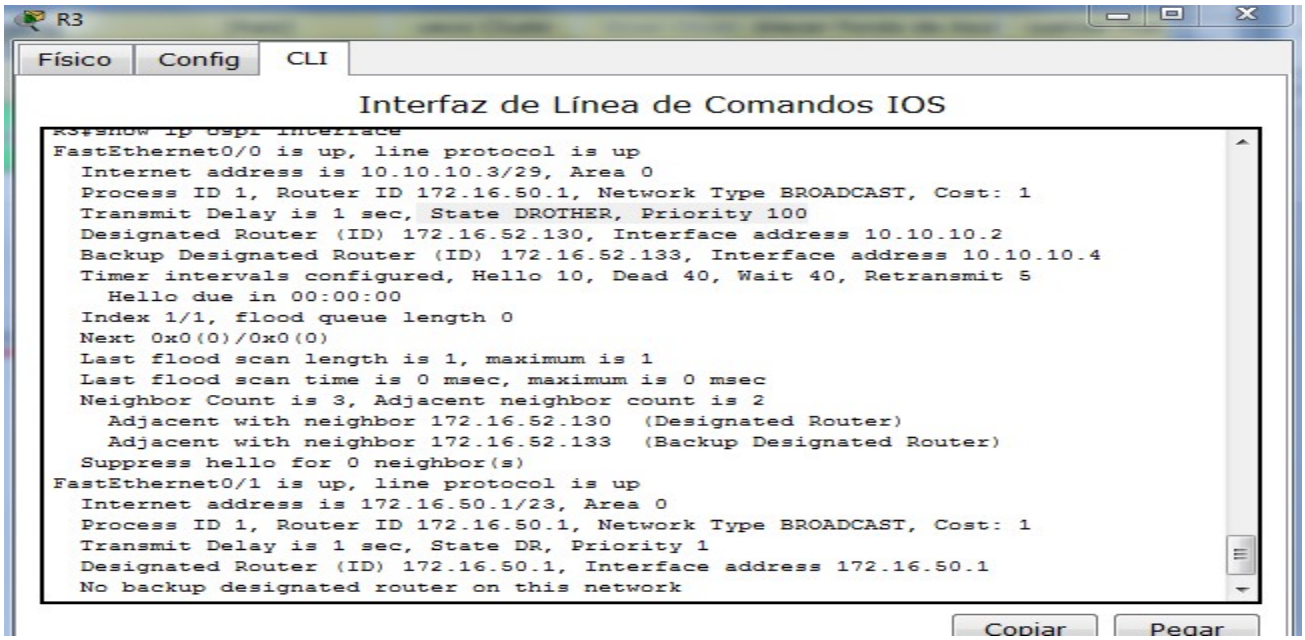

Ilustración 7. R3 y R4tendran la misma prioridad de 100

- R4 debe ser siempre el BDR

NOTA: SE DEBEN ESTABLECER TODAS LAS PRIORIDADES EN FA0/0

Paso 2: Fuerce una elección DR/DBR.

Elección BDR en R4

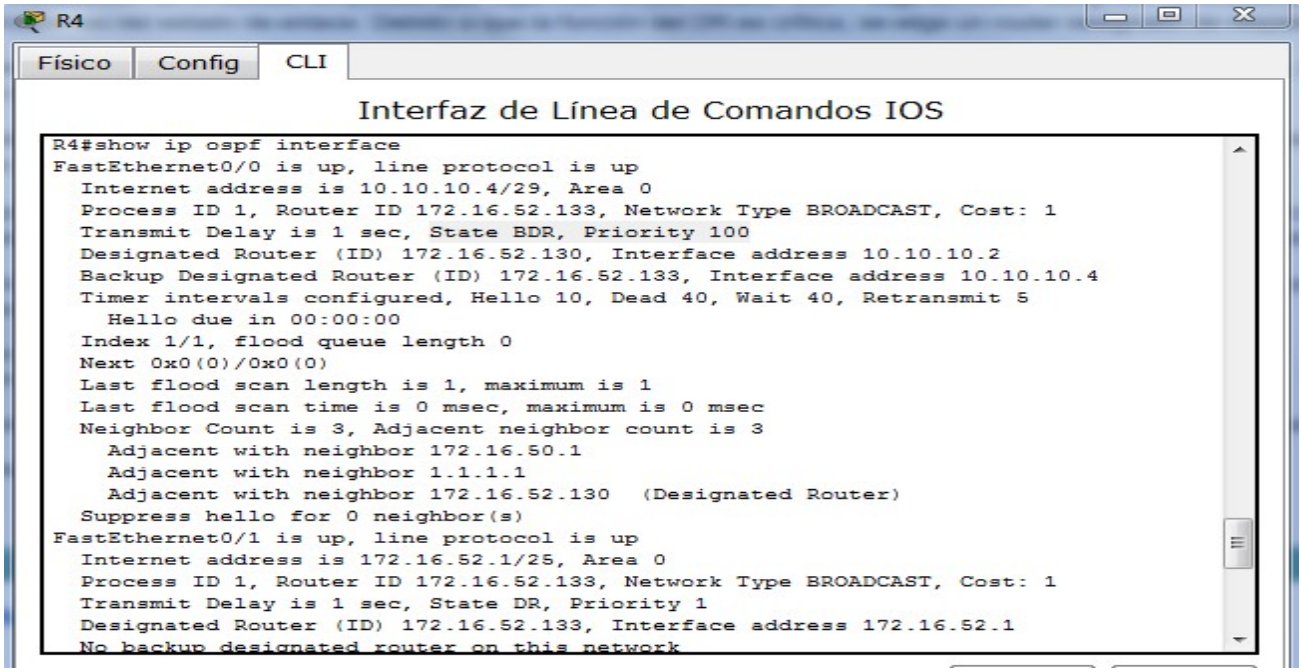

Ilustración 8. Eleccion de BDR en R4

Configuración de un loopback0

Paso 1: En R1 configure un loopback con una dirección 1.1.1.1/32.

Paso 2: Cree una ruta por defecto al loopback

Paso 3: Propague la ruta con actualizaciones OSPF.

Visualización de las actualizaciones OSPF.

Paso 1: Ingrese al modo Simulación

MODO SIMULACION OSPF Y LOOPBACK

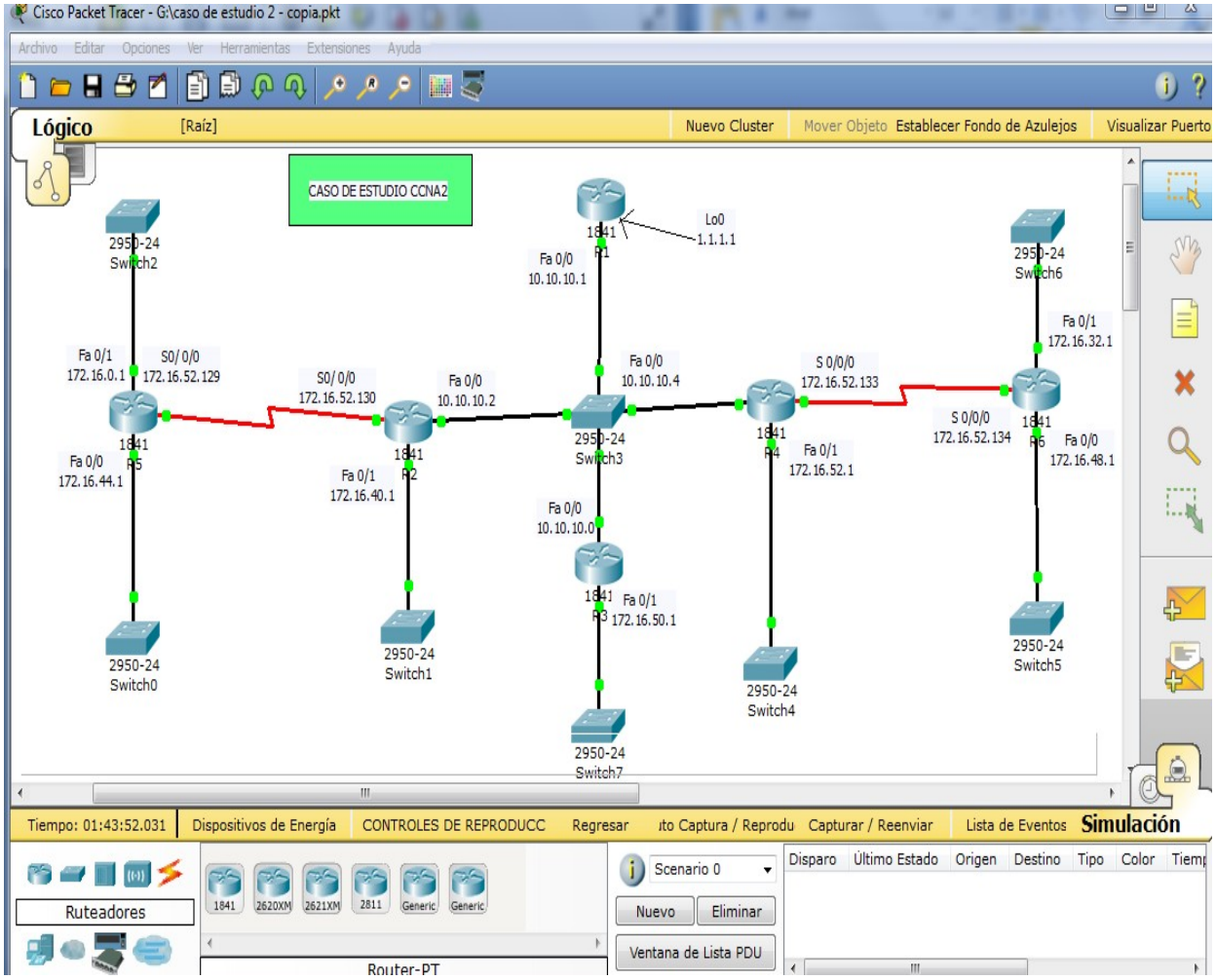

Ilustración 9. Simulación OSPF y Loopback.

Paso 2: **Seleccione solamente OSPF en el filtro.**
Paso 3: **Visualice las actualizaciones.**

ACTUALIZACIONES OSPF

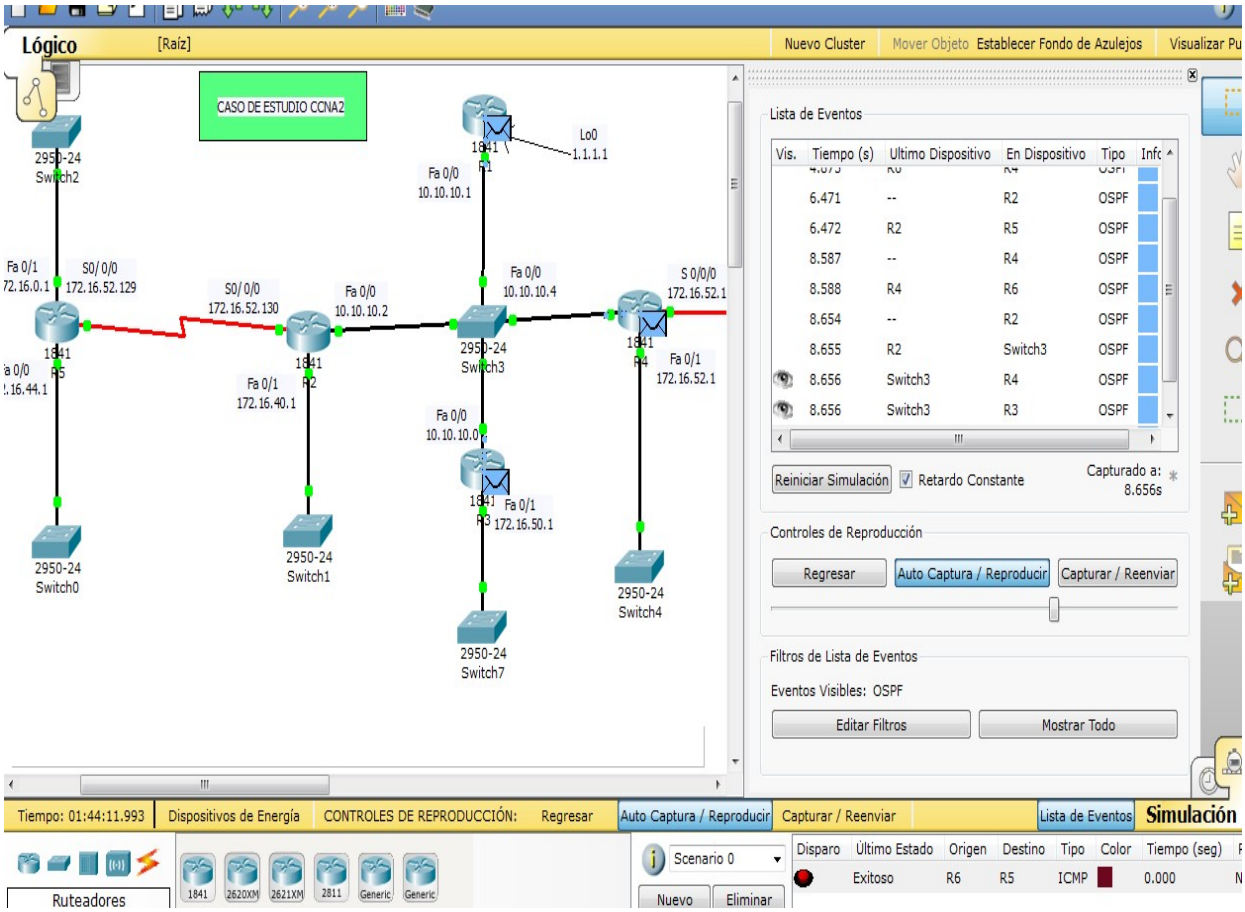

Ilustración 10. Actualización OSPF.

CONFIGURACION FINAL R1

R1#show running-config

Building configuration...

Current configuration : 1342 bytes

!

version 12.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

!

```
hostname R1
!
!
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
!
!
!
!
!
!
!
!
no ip domain-lookup
!
!
spanning-tree mode pvst
!
!
!
!
interface Loopback0
 description Interfaz de conexion de la red Loopback0 R1
 ip address 1.1.1.1 255.255.255.255
!
interface FastEthernet0/0
 description Interfaz de conexion de la red LAN R1
 ip address 10.10.10.1 255.255.255.248
 ip ospf priority 0
 duplex auto
 speed auto
```

```
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/1/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/1/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
```

```
 network 10.10.0.0 0.0.31.255 area 0
!
router rip
!
ip classless
ip route 0.0.0.0 0.0.0.0 Loopback0
!
!
!
banner motd ^C
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
!!!!!!!!!!!!!!!!ACCESO RESTRINGIDO POR EL AUTOR!!!!!!!!!!!!!!!!
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
^C
!
!
!
!
line con 0
 password cisco
 login
line vty 0 4
 password cisco
 login
!
!
!
end
R1#
```

R1#show ip ospf interface

FastEthernet0/0 is up, line protocol is up
Internet address is 10.10.10.1/29, Area 0
Process ID 1, Router ID 1.1.1.1, Network Type BROADCAST, Cost: 1
Transmit Delay is 1 sec, State DROTHER, Priority 0
Designated Router (ID) 172.16.52.130, Interface address 10.10.10.2
Backup Designated Router (ID) 172.16.52.133, Interface address 10.10.10.4
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:01
Index 1/1, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 3, Adjacent neighbor count is 2
Adjacent with neighbor 172.16.52.130 (Designated Router)
Adjacent with neighbor 172.16.52.133 (Backup Designated Router)
Suppress hello for 0 neighbor(s)

R1#show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
172.16.52.130	255	FULL/DR	00:00:36	10.10.10.2	FastEthernet0/0
172.16.52.133	100	FULL/BDR	00:00:36	10.10.10.4	FastEthernet0/0
172.16.50.1	100	2WAY/DROTHER	00:00:36	10.10.10.3	FastEthernet0/0

R1#show ip route

Codes: C - connected, S - static, I - IGRP, 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, E - EGP
        i - IS-IS, 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

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

     1.0.0.0/32 is subnetted, 1 subnets
C       1.1.1.1 is directly connected, Loopback0
     10.0.0.0/29 is subnetted, 1 subnets
C       10.10.10.0 is directly connected, FastEthernet0/0
     172.16.0.0/16 is variably subnetted, 9 subnets, 6 masks
O       172.16.0.0/19 [110/66] via 10.10.10.2, 02:00:30, FastEthernet0/0
O       172.16.32.0/21 [110/66] via 10.10.10.4, 02:00:30, FastEthernet0/0
O       172.16.40.0/22 [110/2] via 10.10.10.2, 02:00:30, FastEthernet0/0
O       172.16.44.0/22 [110/66] via 10.10.10.2, 02:00:30, FastEthernet0/0
O       172.16.48.0/23 [110/66] via 10.10.10.4, 02:00:30, FastEthernet0/0
O       172.16.50.0/23 [110/2] via 10.10.10.3, 02:00:30, FastEthernet0/0
O       172.16.52.0/25 [110/2] vía 10.10.10.4, 02:00:30, FastEthernet0/0
O       172.16.52.128/30 [110/65] via 10.10.10.2, 02:00:30, FastEthernet0/0
O       172.16.52.132/30 [110/65] via 10.10.10.4, 02:00:30, FastEthernet0/0
S*   0.0.0.0/0 is directly connected, Loopback0
```

R1#show ip protocols

```
Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 1.1.1.1
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    10.10.0.0 0.0.31.255 area 0
```

Routing Information Sources:

Gateway	Distance	Last Update
1.1.1.1	110	00:00:49
172.16.50.1	110	00:00:50
172.16.52.129	110	00:01:24
172.16.52.130	110	00:00:54
172.16.52.133	110	00:00:53
172.16.52.134	110	00:01:23

Distance: (default is 110)

CONFIGURACION FINAL R2

R2#show running-config

Building configuration...

Current configuration : 1393 bytes

!

version 12.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

!

hostname R2

!

!

!

enable secret 5 1mERr$hx5rVt7rPNoS4wqbXKX7m0

!

!

!

```
!
!
!
!
!
!
!
no ip domain-lookup
!
!
spanning-tree mode pvst
!
!
!
!
interface FastEthernet0/0
 description Interfaz de conexion con las redes LAN R1,R2 y R3
 ip address 10.10.10.2 255.255.255.248
 ip ospf priority 255
 duplex auto
 speed auto
!
interface FastEthernet0/1
 description Interfaz de conexion con la red LAN R2
 ip address 172.16.40.1 255.255.252.0
 duplex auto
 speed auto
!
interface Serial0/0/0
 description Interfaz de conexion con la red WAN R5
 ip address 172.16.52.130 255.255.255.252
!
interface Serial0/0/1
```

```
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/1/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/1/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 10.10.10.0 0.0.0.7 area 0
 network 172.16.52.128 0.0.0.3 area 0
 network 172.16.40.0 0.0.3.255 area 0
!
router rip
!
ip classless
!
!
banner motd ^C
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
!!!!!!!!ACCESO RESTRINGIDO POR EL AUTOR!!!!!!!!!
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

```
^C
!
!
!
!
line con 0
 password cisco
 login
line vty 0 4
 password cisco
 login
!
!
!
end
```

R2#show ip ospf interface

```
FastEthernet0/0 is up, line protocol is up
  Internet address is 10.10.10.2/29, Area 0
  Process ID 1, Router ID 172.16.52.130, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 255
  Designated Router (ID) 172.16.52.130, Interface address 10.10.10.2
  Backup Designated Router (ID) 172.16.52.133, Interface address 10.10.10.4
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:00
  Index 1/1, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 3, Adjacent neighbor count is 3
    Adjacent with neighbor 172.16.52.133  (Backup Designated Router)
```

Adjacent with neighbor 172.16.50.1
Adjacent with neighbor 1.1.1.1
Suppress hello for 0 neighbor(s)
FastEthernet0/1 is up, line protocol is up
Internet address is 172.16.40.1/22, Area 0
Process ID 1, Router ID 172.16.52.130, Network Type BROADCAST, Cost: 1
Transmit Delay is 1 sec, State DR, Priority 1
Designated Router (ID) 172.16.52.130, Interface address 172.16.40.1
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:00
Index 2/2, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 0, Adjacent neighbor count is 0
Suppress hello for 0 neighbor(s)
Serial0/0/0 is up, line protocol is up
Internet address is 172.16.52.130/30, Area 0
Process ID 1, Router ID 172.16.52.130, Network Type POINT-TO-POINT, Cost: 64
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:08
Index 3/3, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1 , Adjacent neighbor count is 1
Adjacent with neighbor 172.16.52.129
Suppress hello for 0 neighbor(s)

R2#show ip ospf neighbor

```
Neighbor ID     Pri   State           Dead Time   Address         Interface
172.16.52.133   100   FULL/BDR        00:00:32    10.10.10.4      FastEthernet0/0
172.16.50.1     100   FULL/DROTHER    00:00:32    10.10.10.3
FastEthernet0/0
1.1.1.1           0   FULL/DROTHER    00:00:33    10.10.10.1      FastEthernet0/0
172.16.52.129     0   FULL/  -        00:00:32    172.16.52.129   Serial0/0/0
```

R2#show ip protocols

```
Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 172.16.52.130
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    10.10.10.0 0.0.0.7 area 0
    172.16.52.128 0.0.0.3 area 0
    172.16.40.0 0.0.3.255 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1              110      00:10:52
    172.16.50.1          110      00:10:53
    172.16.52.129        110      00:11:26
    172.16.52.130        110      00:10:56
    172.16.52.133        110      00:10:56
    172.16.52.134        110      00:11:26
  Distance: (default is 110)
```

R2#show ip route

Codes: C - connected, S - static, I - IGRP, 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, E - EGP
i - IS-IS, 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

Gateway of last resort is not set

10.0.0.0/29 is subnetted, 1 subnets
C 10.10.10.0 is directly connected, FastEthernet0/0
172.16.0.0/16 is variably subnetted, 9 subnets, 6 masks
O 172.16.0.0/19 [110/65] via 172.16.52.129, 00:00:35, Serial0/0/0
O 172.16.32.0/21 [110/66] via 10.10.10.4, 00:00:35, FastEthernet0/0
C 172.16.40.0/22 is directly connected, FastEthernet0/1
O 172.16.44.0/22 [110/65] via 172.16.52.129, 00:00:35, Serial0/0/0
O 172.16.48.0/23 [110/66] via 10.10.10.4, 00:00:35, FastEthernet0/0
O 172.16.50.0/23 [110/2] via 10.10.10.3, 00:00:35, FastEthernet0/0
O 172.16.52.0/25 [110/2] via 10.10.10.4, 00:00:35, FastEthernet0/0
C 172.16.52.128/30 is directly connected, Serial0/0/0
O 172.16.52.132/30 [110/65] via 10.10.10.4, 00:00:35, FastEthernet0/0
R2#

CONFIGURACION FINAL R3

R3#show running-config

Building configuration...

Current configuration : 1277 bytes
!
version 12.4

```
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R3
!
!
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
!
!
!
!
!
!
!
!
!
no ip domain-lookup
!
!
spanning-tree mode pvst
!
!
!
!
interface FastEthernet0/0
 description interface con la lan R2, R1 y R4
 ip address 10.10.10.3 255.255.255.248
 ip ospf priority 100
 duplex auto
 speed auto
```

```
!
interface FastEthernet0/1
 description Interfaz de conexion de la red LAN R3
 ip address 172.16.50.1 255.255.254.0
 duplex auto
 speed auto
!
interface Serial0/0/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/1/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/1/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
```

```
 network 10.10.0.0 0.0.31.255 area 0
 network 172.16.50.0 0.0.1.255 area 0
!
ip classless
!
!
!
banner motd ^C
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
!!!!!!!!!ACCESO RESTRINGIDO POR EL AUTOR!!!!!!!!
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
^C
!
!
!
!
line con 0
 password cisco
 login
line vty 0 4
 password cisco
 login
!
!
!
end
```

R3#show ip ospf interface

```
FastEthernet0/0 is up, line protocol is up
  Internet address is 10.10.10.3/29, Area 0
  Process ID 1, Router ID 172.16.50.1, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DROTHER, Priority 100
  Designated Router (ID) 172.16.52.130, Interface address 10.10.10.2
```

```
  Backup Designated Router (ID) 172.16.52.133, Interface address 10.10.10.4
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:09
  Index 1/1, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 3, Adjacent neighbor count is 2
    Adjacent with neighbor 172.16.52.130  (Designated Router)
    Adjacent with neighbor 172.16.52.133  (Backup Designated Router)
  Suppress hello for 0 neighbor(s)
FastEthernet0/1 is up, line protocol is up
  Internet address is 172.16.50.1/23, Area 0
  Process ID 1, Router ID 172.16.50.1, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 172.16.50.1, Interface address 172.16.50.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:09
  Index 2/2, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
```

R3#show ip ospf neighbor

```
Neighbor ID     Pri   State           Dead Time   Address         Interface
172.16.52.130   255   FULL/DR         00:00:33    10.10.10.2      FastEthernet0/0
172.16.52.133   100   FULL/BDR        00:00:33    10.10.10.4      FastEthernet0/0
1.1.1.1           0   2WAY/DROTHER    00:00:34    10.10.10.1      FastEthernet0/0
```

R3#show ip protocols

Routing Protocol is "ospf 1"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Router ID 172.16.50.1

Number of areas in this router is 1. 1 normal 0 stub 0 nssa

Maximum path: 4

Routing for Networks:

10.10.0.0 0.0.31.255 area 0

172.16.50.0 0.0.1.255 area 0

Routing Information Sources:

Gateway	Distance	Last Update
1.1.1.1	110	00:18:37
172.16.50.1	110	00:18:37
172.16.52.129	110	00:19:11
172.16.52.130	110	00:18:41
172.16.52.133	110	00:18:41
172.16.52.134	110	00:19:11

Distance: (default is 110)

R3#show ip route

Codes: C - connected, S - static, I - IGRP, 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, E - EGP

i - IS-IS, 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

Gateway of last resort is not set

10.0.0.0/29 is subnetted, 1 subnets

C 10.10.10.0 is directly connected, FastEthernet0/0

172.16.0.0/16 is variably subnetted, 9 subnets, 6 masks

O 172.16.0.0/19 [110/66] via 10.10.10.2, 02:55:32, FastEthernet0/0

O 172.16.32.0/21 [110/66] via 10.10.10.4, 02:55:32, FastEthernet0/0

O 172.16.40.0/22 [110/2] via 10.10.10.2, 02:55:32, FastEthernet0/0

O 172.16.44.0/22 [110/66] via 10.10.10.2, 02:55:32, FastEthernet0/0

O 172.16.48.0/23 [110/66] via 10.10.10.4, 02:55:32, FastEthernet0/0

C 172.16.50.0/23 is directly connected, FastEthernet0/1

O 172.16.52.0/25 [110/2] via 10.10.10.4, 02:55:32, FastEthernet0/0

O 172.16.52.128/30 [110/65] via 10.10.10.2, 02:55:32, FastEthernet0/0

O 172.16.52.132/30 [110/65] via 10.10.10.4, 02:55:32, FastEthernet0/0

R3#

CONFIGURACION FINAL R4

R4#show running-config

Building configuration...

Current configuration : 1397 bytes

!

version 12.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

!

hostname R4

!

!

!

enable secret 5 1mERr$hx5rVt7rPNoS4wqbXKX7m0

!

```
!
!
!
!
!
!
!
!
!
no ip domain-lookup
!
!
spanning-tree mode pvst
!
!
!
!
interface FastEthernet0/0
 description Interfaz de conexion con la red LAN R1,R2 y R3
 ip address 10.10.10.4 255.255.255.248
 ip ospf priority 100
 duplex auto
 speed auto
!
interface FastEthernet0/1
 description Interfaz de conexion con la red LAN R4
 ip address 172.16.52.1 255.255.255.128
 duplex auto
 speed auto
!
interface Serial0/0/0
 description Interfaz de conexion con la red WAN R6
 ip address 172.16.52.133 255.255.255.252
```

```
 clock rate 56000
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/1/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/1/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 10.10.10.0 0.0.0.7 area 0
 network 172.16.52.0 0.0.0.127 area 0
 network 172.16.52.132 0.0.0.3 area 0
!
ip classless
!
!
!
```

```
banner motd ^C
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
!!!!!!!!!ACCESO RESTRINGIDO POR EL AUTOR!!!!!!!!
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
^C
!
!
!
!
line con 0
 password cisco
 login
line vty 0 4
 password cisco
 login
!
!
!
end
```

R4#show ip ospf interface

```
FastEthernet0/0 is up, line protocol is up
  Internet address is 10.10.10.4/29, Area 0
  Process ID 1, Router ID 172.16.52.133, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State BDR, Priority 100
  Designated Router (ID) 172.16.52.130, Interface address 10.10.10.2
  Backup Designated Router (ID) 172.16.52.133, Interface address 10.10.10.4
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:07
  Index 1/1, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
```

```
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 3, Adjacent neighbor count is 3
    Adjacent with neighbor 172.16.50.1
    Adjacent with neighbor 1.1.1.1
    Adjacent with neighbor 172.16.52.130  (Designated Router)
  Suppress hello for 0 neighbor(s)
FastEthernet0/1 is up, line protocol is up
  Internet address is 172.16.52.1/25, Area 0
  Process ID 1, Router ID 172.16.52.133, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 172.16.52.133, Interface address 172.16.52.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:07
  Index 2/2, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
Serial0/0/0 is up, line protocol is up
  Internet address is 172.16.52.133/30, Area 0
  Process ID 1, Router ID 172.16.52.133, Network Type POINT-TO-POINT, Cost:
64
  Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
  No designated router on this network
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:07
  Index 3/3, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
```

```
  Neighbor Count is 1 , Adjacent neighbor count is 1
    Adjacent with neighbor 172.16.52.134
  Suppress hello for 0 neighbor(s)
```

R4#show ip ospf neighbor

```
Neighbor ID     Pri   State           Dead Time   Address         Interface
172.16.50.1     100   FULL/DROTHER    00:00:38    10.10.10.3
FastEthernet0/0
1.1.1.1           0   FULL/DROTHER    00:00:39    10.10.10.1      FastEthernet0/0
172.16.52.130   255   FULL/DR         00:00:38    10.10.10.2      FastEthernet0/0
172.16.52.134     0   FULL/  -        00:00:34    172.16.52.134   Serial0/0/0
```

R4#show ip protocols

```
Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 172.16.52.133
  Number of areas in this router is 1. 1 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    10.10.10.0 0.0.0.7 area 0
    172.16.52.0 0.0.0.127 area 0
    172.16.52.132 0.0.0.3 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    1.1.1.1              110      00:23:43
    172.16.50.1          110      00:23:43
    172.16.52.129        110      00:24:17
    172.16.52.130        110      00:23:47
    172.16.52.133        110      00:23:46
```

172.16.52.134 110 00:24:17

Distance: (default is 110)

R4#show ip route

Codes: C - connected, S - static, I - IGRP, 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, E - EGP
i - IS-IS, 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

Gateway of last resort is not set

10.0.0.0/29 is subnetted, 1 subnets
C 10.10.10.0 is directly connected, FastEthernet0/0
172.16.0.0/16 is variably subnetted, 9 subnets, 6 masks
O 172.16.0.0/19 [110/66] via 10.10.10.2, 02:57:15, FastEthernet0/0
O 172.16.32.0/21 [110/65] via 172.16.52.134, 02:57:56, Serial0/0/0
O 172.16.40.0/22 [110/2] via 10.10.10.2, 02:57:15, FastEthernet0/0
O 172.16.44.0/22 [110/66] via 10.10.10.2, 02:57:15, FastEthernet0/0
O 172.16.48.0/23 [110/65] via 172.16.52.134, 02:57:56, Serial0/0/0
O 172.16.50.0/23 [110/2] via 10.10.10.3, 02:57:15, FastEthernet0/0
C 172.16.52.0/25 is directly connected, FastEthernet0/1
O 172.16.52.128/30 [110/65] via 10.10.10.2, 02:57:15, FastEthernet0/0
C 172.16.52.132/30 is directly connected, Serial0/0/0

R4#

CONFIGURACION FINAL R5

R5#show running-config

Building configuration...

Current configuration : 1366 bytes

!

version 12.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

!

hostname R5

!

!

!

enable secret 5 1mERr$hx5rVt7rPNoS4wqbXKX7m0

!

!

!

!

!

!

!

!

!

!

no ip domain-lookup

!

!

spanning-tree mode pvst

!

```
!
!
!
interface FastEthernet0/0
 description Interfaz de conexion de la red LAN R5
 ip address 172.16.44.1 255.255.252.0
 ip ospf priority 0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 description interfaz con la lan R5
 ip address 172.16.0.1 255.255.224.0
 duplex auto
 speed auto
!
interface Serial0/0/0
 description interfaz con la wan R2
 ip address 172.16.52.129 255.255.255.252
 clock rate 56000
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/1/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/1/1
 no ip address
```

```
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 172.16.44.0 0.0.3.255 area 0
 network 172.16.0.0 0.0.31.255 area 0
 network 172.16.52.128 0.0.0.3 area 0
!
router rip
!
ip classless
!
!
!
banner motd ^C
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
!!!!!!!!ACCESO RESTRINGIDO POR EL AUTOR!!!!!!!!!
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
^C
!
!
!
!
line con 0
 password cisco
 login
line vty 0 4
 password cisco
```

```
 login
!
!
!
end
```

R5#show ip ospf interface

```
FastEthernet0/0 is up, line protocol is up
  Internet address is 172.16.44.1/22, Area 0
  Process ID 1, Router ID 172.16.52.129, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 0
  Designated Router (ID) 172.16.52.129, Interface address 172.16.44.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:06
  Index 1/1, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
FastEthernet0/1 is up, line protocol is up
  Internet address is 172.16.0.1/19, Area 0
  Process ID 1, Router ID 172.16.52.129, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 172.16.52.129, Interface address 172.16.0.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:06
  Index 2/2, flood queue length 0
  Next 0x0(0)/0x0(0)
```

```
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
Serial0/0/0 is up, line protocol is up
  Internet address is 172.16.52.129/30, Area 0
  Process ID 1, Router ID 172.16.52.129, Network Type POINT-TO-POINT, Cost:
64
  Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
  No designated router on this network
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:06
  Index 3/3, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1 , Adjacent neighbor count is 1
    Adjacent with neighbor 172.16.52.130
  Suppress hello for 0 neighbor(s)
```

R5#show ip ospf neighbor

```
Neighbor ID     Pri   State           Dead Time   Address         Interface
172.16.52.130     0   FULL/  -        00:00:38    172.16.52.130   Serial0/0/0
```

R5#show ip protocols

```
Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 172.16.52.129
```

Number of areas in this router is 1. 1 normal 0 stub 0 nssa

Maximum path: 4

Routing for Networks:

172.16.44.0 0.0.3.255 area 0

172.16.0.0 0.0.31.255 area 0

172.16.52.128 0.0.0.3 area 0

Routing Information Sources:

Gateway	Distance	Last Update
1.1.1.1	110	00:27:39
172.16.50.1	110	00:27:40
172.16.52.129	110	00:28:13
172.16.52.130	110	00:27:44
172.16.52.133	110	00:27:43
172.16.52.134	110	00:28:13

Distance: (default is 110)

R5#show ip route

Codes: C - connected, S - static, I - IGRP, 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, E - EGP
i - IS-IS, 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

Gateway of last resort is not set

10.0.0.0/29 is subnetted, 1 subnets

O 10.10.10.0 [110/65] via 172.16.52.130, 02:41:21, Serial0/0/0

172.16.0.0/16 is variably subnetted, 9 subnets, 6 masks

C 172.16.0.0/19 is directly connected, FastEthernet0/1

O 172.16.32.0/21 [110/130] via 172.16.52.130, 02:41:21, Serial0/0/0

O 172.16.40.0/22 [110/65] via 172.16.52.130, 02:42:01, Serial0/0/0

C 172.16.44.0/22 is directly connected, FastEthernet0/0

O 172.16.48.0/23 [110/130] via 172.16.52.130, 02:41:21, Serial0/0/0

O 172.16.50.0/23 [110/66] via 172.16.52.130, 02:41:21, Serial0/0/0

O 172.16.52.0/25 [110/66] via 172.16.52.130, 02:41:21, Serial0/0/0

C 172.16.52.128/30 is directly connected, Serial0/0/0

O 172.16.52.132/30 [110/129] via 172.16.52.130, 02:41:21, Serial0/0/0

R5#

CONFIGURACION FINAL R6

R6#show running-config

Building configuration...

Current configuration : 1366 bytes

!

version 12.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

!

hostname R6

!

!

!

enable secret 5 1mERr$hx5rVt7rPNoS4wqbXKX7m0

!

!

!

!

!

!

```
!
!
!
!
no ip domain-lookup
!
!
spanning-tree mode pvst
!
!
!
!
interface FastEthernet0/0
 description Interfaz de conexion de la red LAN R6
 ip address 172.16.48.1 255.255.254.0
 ip ospf priority 0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 description Interfaz de conexion de la red LAN R6
 ip address 172.16.32.1 255.255.248.0
 duplex auto
 speed auto
!
interface Serial0/0/0
 description Interfaz de conexion de la red WAN R4
 ip address 172.16.52.134 255.255.255.252
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
```

```
!
interface Serial0/1/0
 no ip address
 clock rate 2000000
 shutdown
!
interface Serial0/1/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 172.16.48.0 0.0.1.255 area 0
 network 172.16.32.0 0.0.7.255 area 0
 network 172.16.52.132 0.0.0.3 area 0
!
ip classless
!
!
!
banner motd ^C
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
!!!!!!!!!ACCESO RESTRINGIDO POR EL AUTOR!!!!!!!!
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
^C
!
!
!
```

```
!
line con 0
 password cisco
 login
line vty 0 4
 password cisco
 login
!
!
!
end
```

R6#show ip ospf interface

```
FastEthernet0/0 is up, line protocol is up
  Internet address is 172.16.48.1/23, Area 0
  Process ID 1, Router ID 172.16.52.134, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 0
  Designated Router (ID) 172.16.52.134, Interface address 172.16.48.1
  No backup designated router on this network
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:06
  Index 1/1, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
FastEthernet0/1 is up, line protocol is up
  Internet address is 172.16.32.1/21, Area 0
  Process ID 1, Router ID 172.16.52.134, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
```

Designated Router (ID) 172.16.52.134, Interface address 172.16.32.1
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:06
Index 2/2, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 0, Adjacent neighbor count is 0
Suppress hello for 0 neighbor(s)
Serial0/0/0 is up, line protocol is up
Internet address is 172.16.52.134/30, Area 0
Process ID 1, Router ID 172.16.52.134, Network Type POINT-TO-POINT, Cost: 64
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:03
Index 3/3, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1 , Adjacent neighbor count is 1
Adjacent with neighbor 172.16.52.133
Suppress hello for 0 neighbor(s)

R6#show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
172.16.52.133	0	FULL/ -	00:00:31	172.16.52.133	Serial0/0/0

R6#show ip protocols

Routing Protocol is "ospf 1"
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Router ID 172.16.52.134
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Maximum path: 4
Routing for Networks:
172.16.48.0 0.0.1.255 area 0
172.16.32.0 0.0.7.255 area 0
172.16.52.132 0.0.0.3 area 0
Routing Information Sources:

Gateway	Distance	Last Update
1.1.1.1	110	00:14:39
172.16.50.1	110	00:14:40
172.16.52.129	110	00:15:13
172.16.52.130	110	00:14:43
172.16.52.133	110	00:14:43
172.16.52.134	110	00:15:13

Distance: (default is 110)

R6#show ip route

Codes: C - connected, S - static, I - IGRP, 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, E - EGP
i - IS-IS, 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

Gateway of last resort is not set

10.0.0.0/29 is subnetted, 1 subnets

```
O       10.10.10.0 [110/65] via 172.16.52.133, 02:45:17, Serial0/0/0
    172.16.0.0/16 is variably subnetted, 9 subnets, 6 masks
O       172.16.0.0/19 [110/130] via 172.16.52.133, 02:45:07, Serial0/0/0
C       172.16.32.0/21 is directly connected, FastEthernet0/1
O       172.16.40.0/22 [110/66] via 172.16.52.133, 02:45:07, Serial0/0/0
O       172.16.44.0/22 [110/130] via 172.16.52.133, 02:45:07, Serial0/0/0
C       172.16.48.0/23 is directly connected, FastEthernet0/0
O       172.16.50.0/23 [110/66] via 172.16.52.133, 02:45:07, Serial0/0/0
O       172.16.52.0/25 [110/65] via 172.16.52.133, 02:45:53, Serial0/0/0
O       172.16.52.128/30 [110/129] via 172.16.52.133, 02:45:07, Serial0/0/0
C       172.16.52.132/30 is directly connected, Serial0/0/0
R6#
```

CONCLUSIONES

Se realizaron las diferentes conexiones de la red COMERCIANTE S.A., con la herramienta de simulación Packet tracert.

Se confirmó la conectividad con él envió de PDU, también con el envío de ping a las diferentes PC.

El comando Tracert es una herramienta fundamental donde por medio de ella se puede comprobar los recorridos que hacen los PDU.

Se tomaran evidencias de la conexión de cada uno de los Router correspondientes a cada ciudad.
Los protocolos de enrutamiento son la base fundamental en el funcionamiento de la simulación de la red en Packt Tracer y el envío de paquetes a través de ella, donde se puede evidenciar el hello, para encontrar el mejor camino y llegar al destino.

La implementación de VLSM, es muy importante ya que nos permite realizar subdivisiones de una subred o sea permite crear direcciones de red adicionales utilizando una máscara de acuerdo a nuestra necesidad.

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