

MONOGRAFIA

CASOS DE ESTUDIO

CURSO DE PROFUNDIZACION CISCO

DISEÑO E IMPLEMENTACION DE SOLUCIONES INTEGRADAS LAN / WAN

PRESENTADO POR:

JOSE GABRIEL CARDENAS MOYA

CC: 93.296.319

UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA UNAD  
ESCUELA DE CIENCIAS BÁSICAS TECNOLOGÍA E INGENIERÍA  
PROGRAMA DE INGENIERIA DE SISTEMAS

ACACIAS

2013

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TUROR:  
ING. JUANCARLOS VESGA

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## **OBJETIVOS**

### **OBJETIVO GENERAL.**

- Presentar el desarrollo de los dos casos de estudio del curso de profundización cisco diseño e implementación de soluciones integradas LAN / WAN, bajo los conceptos de CCNA1 FUNDAMENTOS DE NETWORKING y CCNA2 PRINCIPIOS DE ENRUTAMIENTO.

### **OBJETIVO ESPECIFICOS.**

- ✓ Diseñar un esquema de direccionamiento para la red.
- ✓ Establecer las subredes requeridas en el caso, mediante la utilización de VLSM.
- ✓ Elegir los dispositivos requeridos para la topología de la red.
- ✓ Configuración del protocolo de enrutamiento RIP y OSPF
- ✓ Configurar cada dispositivo, según especificaciones exigidas.
- ✓ Comprobar la conectividad de los dispositivos de la red.

## JUSTIFICACIÓN

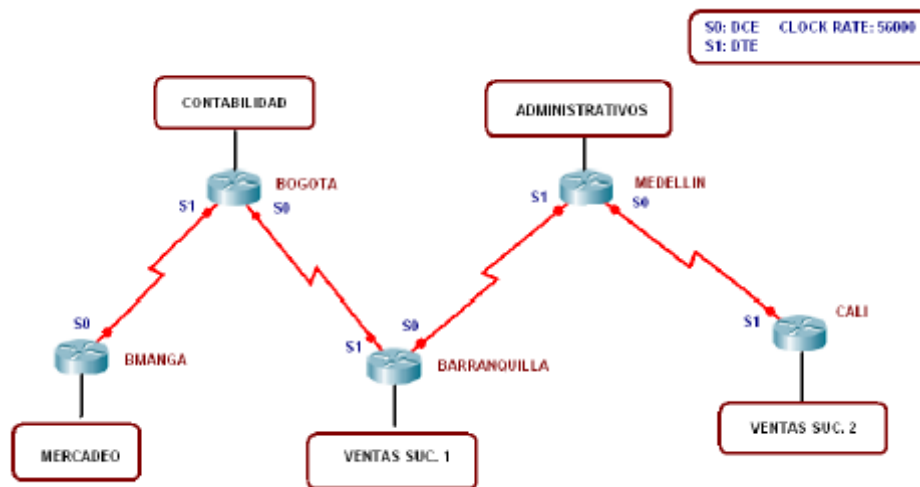
Como documento final del curso de profundización cisco,módulo CCNA1 FUNDAMENTOS DE NETWORKING y CCNA2 PRINCIPIOS DE ENRUTAMIENTO, se desarrolla el presente trabajo. Con el ánimo de documentar un tema de gran importancia a nivel mundial el cual son las redes de comunicación, en la actualidad el campo de las redes y las telecomunicaciones han logrado avances históricos hasta el punto de que hoy en día el acceso a la información desde cualquier parte del mundo y a cualquier momento se ha vuelto una de las necesidades primordiales del mundo empresarial y personal.

La masificación de aparatos tecnológicos en el mundo, requieren un manejo y consumo mayor de recursos, que son prestados por las empresas que tiene como fin, facilitar servicios a través de las redes de comunicación. Siendo este un campo importante para el desarrollo laboral del ingeniero de sistemas.

## CASO DE ESTUDIO CCN1 EXPLORATION: FUNDAMENTOS DE NETWORKING

### PLANTEAMIENTO DEL PROBLEMA.

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



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 1 (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 Tray verificación de funcionamiento de la red mediante el uso de comandos: Ping y Traceroute.

## SOLUCIÓN DEL CASO DE ESTUDIO 1.

Para la solución del caso de estudio se asigna la red: **192.168.26.0/24** con implementación de VLSM.

1. Se ordena en forma descendente las redes según la cantidad de host por cada red.

### 1.1 Tabla de requerimientos para la red.

NUMERO	RED	CANTIDAD HOST
1	Ventas Sucursal 2 CALI	40
2	Ventas Sucursal 1 BARRANQUILLA	30
3	ADMINISTRATIVOS MEDELLIN	25
4	CONTABILIDAD BOGOTA	15
5	MERCADEO BUCARAMANGA	10
6	RED WAN BUCARAMANGA- BOGOTA	2
7	RED WAN BOGOTA- BARRANQUILLA	2
8	RED WAN BARRANQUILLA- MEDELLIN	2
9	RED WAN MEDELLIN- CALI	2

### Diseño de la topología lógica de la red.

Se inicia con la red que requiere mayor cantidad de host, que es:  
Ventas Sucursal 2: en la ciudad de Cali que requiere 40 host.

Dirección de red: 192.168.26.0/24.

## 1.2 Tabla de asignación de subredes de la red 192.168.26.0/24 mediante la técnica VLSM

RED	INTERFAZ	SUBRED	DIRECCION IP PRIMER PC	DIRECCION IP ULTIMO PC	DIRECCION DE BROADCAST	DIRECCION GATEWAY	MASCARA SUBRED
VENTAS SUCURSA L 2 CALI	FA0/0	192.168.26.0/26	192.168.26.1	192.168.26.40	192.168.26.63	192.168.26.62	255.255.255.192
VENTAS SUCURSA L 1 BARRANQUILLA	FA0/0	192.168.26.64/27	192.168.26.65	192.168.26.93	192.168.26.95	192.168.26.94	255.255.255.224
ADMINISTRATIVOS MEDELLIN	FA0/0	192.168.26.96/27	192.168.26.97	192.168.26.121	192.168.26.127	192.168.26.126	255.255.255.224
CONTABILIDAD BOGOTA	FA0/0	192.168.26.128/27	192.168.26.129	192.168.26.143	192.168.26.159	192.168.26.158	255.255.255.224
MERCADERO BUCARAMANGA	FA0/0	192.168.26.160/28	192.168.26.161	192.168.26.170	192.168.26.175	192.168.26.174	255.255.255.240
RED WAN BUCARAMANGA BOGOTA	SERIAL	192.168.26.176/30	192.168.26.177	192.168.26.178	192.168.26.179	NO APLICA	255.255.255.252
RED WAN BOGOTA-BARRANQUILLA	SERIAL	192.168.26.180/30	192.168.26.181	192.168.26.182	192.168.26.183	NO APLICA	255.255.255.252
RED WAN BARRANQUILLA-MEDELLIN	SERIAL	192.168.26.184/30	192.168.26.185	192.168.26.186	192.168.26.187	NO APLICA	255.255.255.252
RED WAN MEDELLIN - CALI	SERIAL	192.168.26.188/30	192.168.26.189	192.168.26.190	192.168.26.191	NO APLICA	255.255.255.252

### 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



### 1.3 Tabla De Direccionamiento Lógico De Las Redes LAN.

<b>Ventas Sucursal 2 CALI</b>	
<b>DIRECCION DE RED 192.168.26.0/26</b>	
<b>CANTIDAD DE HOST: 40</b>	
<b>Dirección de subred</b>	192.168.26.0/26
Dirección IP de Gateway	192.168.26.62
Dirección IP del Primer PC	192.168.26.1
Dirección IP del ULTIMO PC	192.168.26.40
Dirección de Broadcast	192.168.26.63
Máscara de Subred	255.225.255.192
<b>Ventas Sucursal 1 BABRRANQUILLA</b>	
<b>DIRECCION DE RED 192.168.26.64/27</b>	
<b>CANTIDAD DE HOST: 30</b>	
<b>Dirección de subred</b>	192.168.26.64/27
Dirección IP de Gateway	192.168.26.94
Dirección IP del Primer PC	192.168.26.65
Dirección IP del ULTIMO PC	192.168.26.93
Dirección de Broadcast	192.168.26.95
Máscara de Subred	<b>255.255.255.224</b>
<b>ADMINISTRATIVOS MEDELLIN</b>	
<b>DIRECCION DE RED 192.168.26.96/27</b>	
<b>CANTIDAD DE HOST: 25</b>	
<b>Dirección de subred</b>	192.168.26.96/27
Dirección IP de Gateway	192.168.26.126
Dirección IP del Primer PC	192.168.26.97
Dirección IP del ULTIMO PC	192.168.26.121
Dirección de Broadcast	192.168.26.127
Máscara de Subred	<b>255.255.255.224</b>
<b>CONTABILIDAD BOGOTA</b>	
<b>DIRECCION DE RED 192.168.26.128/27</b>	
<b>CANTIDAD DE HOST: 15</b>	
<b>Dirección de subred</b>	192.168.26.128/27
Dirección IP de Gateway	192.168.26.158
Dirección IP del Primer PC	192.168.26.129

Dirección IP del ULTIMO PC	192.168.26.143
Dirección de Broadcast	192.168.26.159
Máscara de Subred	<b>255.255.255.224</b>
<b>MERCADEO BUCARAMANGA</b>	
DIRECCION DE RED 192.168.26.160/28 CANTIDAD DE HOST: 10	
<b>Dirección de subred</b>	192.168.26.160/28
Dirección IP de Gateway	192.168.26.174
Dirección IP del Primer PC	192.168.26.161
Dirección IP del ULTIMO PC	192.168.26.170
Dirección de Broadcast	192.168.26.175
Máscara de Subred	<b>255.255.255.240</b>

**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

**1.4 Tabla De Direccionamiento Lógico De Las Redes WAN.**

<b>RED WAN BUCARAMANGA BOGOTA</b>	
DIRECCION DE RED 192.168.26.176/30 CANTIDAD DE HOST: 2	
<b>Dirección de subred</b>	192.168.26.176/30
Dirección IP SERIAL 0 ROUTER BUCARAMANGA	192.168.26.177
Dirección IP SERIAL 1 ROUTER BOOGTA	192.168.26.178
Dirección de Broadcast	192.168.26.179
Máscara de Subred	<b>255.255.255.252</b>
<b>RED WAN BOGOTA- BARRANQUILLA</b>	
DIRECCION DE RED 192.168.26.180/30 CANTIDAD DE HOST: 2	
<b>Dirección de subred</b>	192.168.26.180/30

Dirección IP SERIAL 0 ROUTER BOGOTA	192.168.26.181
Dirección IP SERIAL 1 ROUTER BARRANQUILLA	192.168.26.182
Dirección de Broadcast	192.168.26.183
Máscara de Subred	<b>255.255.255.252</b>
<b>RED WAN BARRANQUILLA- MEDELLIN</b> DIRECCION DE RED 192.168.26.184/30 CANTIDAD DE HOST: 2	
<b>Dirección de subred</b>	192.168.26.184/30
Dirección IP SERIAL 0 ROUTER BARRANQUILLA	192.168.26.185
Dirección IP SERIAL 1 ROUTER MEDELLIN	192.168.26.186
Dirección de Broadcast	192.168.26.187
Máscara de Subred	<b>255.255.255.252</b>
<b>RED WAN MEDELLIN- CALI</b> DIRECCION DE RED 192.168.26.188/30 CANTIDAD DE HOST: 2	
<b>Dirección de subred</b>	192.168.26.188/30
Dirección IP SERIAL 0 ROUTER MEDELLIN	192.168.26.189
Dirección IP SERIAL 1 ROUTER MEDELLIN	192.168.26.190
Dirección de Broadcast	192.168.26.191
Máscara de Subred	<b>255.255.255.252</b>

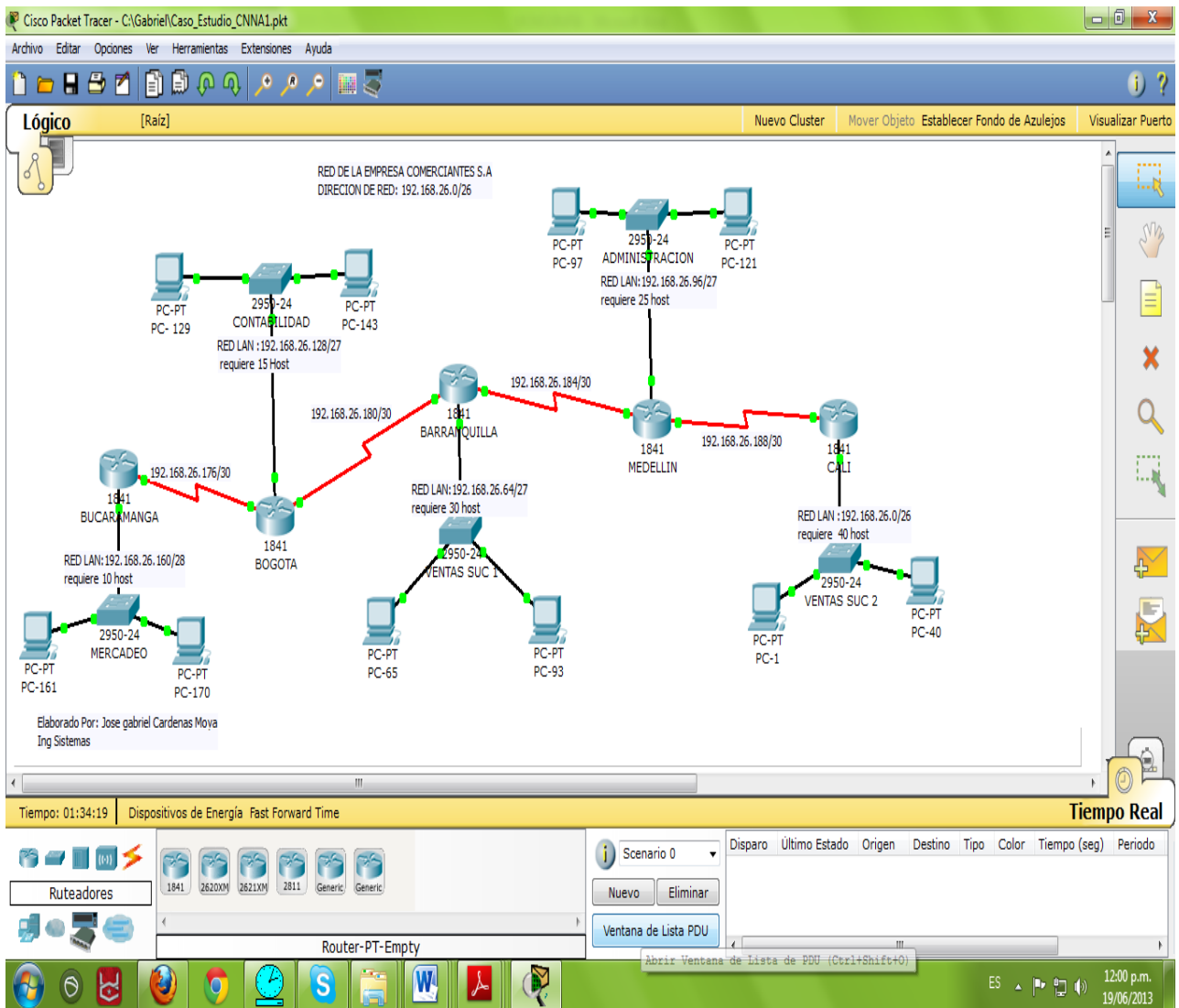
#### 1.4 Tabla de enrutamiento.

La siguiente tabla contiene: nombre de dispositivo de red (router), nombre de la interfaz, dirección IP de la interfaz, y máscara de subred.

DISPOSITIVO	INTERFAZ	DIRECCION IP	MASCARA DE SUBRED
CALI	FA0/0	192.168.26.62	255.225.255.192
	S0/0/1	192.168.26.190	255.255.255.252
BARRANQUILLA	FA0/0	192.168.26.94	255.255.255.224
	S0/0/0	192.168.26.185	255.255.255.252
	S0/0/1	192.168.26.182	255.255.255.252
MEDELLIN	FA0/0	192.168.26.126	255.255.255.224
	S0/0/0	192.168.26.189	255.255.255.252
	S0/0/1	192.168.26.186	255.255.255.252
BOGOTA	FA0/0	192.168.26.158	255.255.255.224
	S0/0/0	192.168.26.181	255.255.255.252
	S0/0/1	192.168.26.178	255.255.255.252
BUCARAMANGA	FA0/0	192.168.26.174	255.255.255.240
	S0/0/0	192.168.26.177	255.255.255.252

#### DIAGRAMA DE LA RED EN PACKET TRACER

Definir el nombre de los equipos y las interfaces por las cuales se van a conectar las mismas.



## CONFIGURACION DE CADA ROUTER.

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

## Configuración del Reuter CALI

```
hostname cali
!
enable secret 5 $1$mERr$hX5rVt7rPNoS4wqbXKX7m0
!
no ip domain-lookup
!
interface FastEthernet0/0
  description Interfaz de conexión Red LAN CALI VENTAS SUCURSAL
  ip address 192.168.26.62 255.255.255.192
  duplex auto
  speed auto
!
interface FastEthernet0/1
  no ip address
  duplex auto
  speed auto
  shutdown
!
interface Serial0/0/0
  description LINK TO R1
  no ip address
!
interface Serial0/0/1
  description Conexión WAN cali - medellin
```

```
ip address 192.168.26.190 255.255.255.252
!
router rip
version 2
passive-interface FastEthernet0/0
network 192.168.26.0
!
banner motd ^Cconexion con Medellin^C
!
line con 0
password cisco
login
line vty 0 4
password cisco
login
!
end
```

### **Configuración del Reuter BARRANQUILLA**

```
hostname BARRANQUILLA
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
no ip domain-lookup
```

```
!  
interface FastEthernet0/0  
  description Conexion red LAN BARRANQUILLA ventas sucursal 1  
  ip address 192.168.26.94 255.255.255.224  
  duplex auto  
  speed auto  
!  
interface FastEthernet0/1  
  no ip address  
  duplex auto  
  speed auto  
  shutdown  
!  
interface Serial0/0/0  
  description CONEXION WAN CON MEDELLIN  
  ip address 192.168.26.185 255.255.255.252  
  clock rate 56000  
!  
interface Serial0/0/1  
  description conexion WAN con BARRANQUILLA  
  ip address 192.168.26.182 255.255.255.252  
!  
interface Vlan1  
  no ip address  
  shutdown
```



```
!  
router rip  
version 2  
network 192.168.26.0  
no auto-summary  
!  
banner motd ^C conexion con Bogota y Medellin^C  
!  
line con 0  
password cisco  
login  
line vty 0 4  
password cisco  
login  
!  
end
```

### **Configuración del Reuter MEDELLIN**

```
hostname Medellin  
!  
enable secret 5 $1$mERr$hX5rVt7rPNoS4wqbXKX7m0
```

```
!  
no ip domain-lookup  
!  
interface FastEthernet0/0  
description conexion red LAN ADMINISTRACION MEDELLIN  
ip address 192.168.26.126 255.255.255.224  
duplex auto  
speed auto  
!  
interface FastEthernet0/1  
no ip address  
duplex auto  
speed auto  
shutdown  
!  
interface Serial0/0/0  
description conexion WAN con CALI  
ip address 192.168.26.189 255.255.255.252  
clock rate 56000  
!  
interface Serial0/0/1  
description conexion WAN con BARRANQUILLA  
ip address 192.168.26.186 255.255.255.252  
!  
router rip
```

```
version 2
passive-interface FastEthernet0/0
network 192.168.26.0
!
banner motd ^Cconexion con Barranquilla y Cali^C
!
line con 0
password cisco
login
line vty 0 4
password cisco
login
!
End
```

## Configuración del Reuter BOGOTA

```
hostname BOGOTA
!
enable secret 5 $1$mERr$hX5rVt7rPNoS4wqbXKX7m0
!
no ip domain-lookup
!
interface FastEthernet0/0
description conexion red LAN CONTABILIDAD BOGOTA
ip address 192.168.26.158 255.255.255.224
duplex auto
speed auto
!
interface FastEthernet0/1
no ip address
duplex auto
speed auto
shutdown
!
interface Serial0/0/0
description conexion WAN con BARRANQUILLA
ip address 192.168.26.181 255.255.255.252
clock rate 56000
```

```
!  
interface Serial0/0/1  
    description conexion WAN con BOGOTA  
    ip address 192.168.26.178 255.255.255.252  
!  
router rip  
    version 2  
    passive-interface FastEthernet0/0  
    network 192.168.26.0  
!  
banner motd ^CComunicacion con Roter de Bucaramanga y Barranquilla^C  
!  
line con 0  
    password cisco  
    login  
line vty 0 4  
    password cisco  
    login  
!  
end
```

### **Configuración del Reuter BUCARAMANGA**

```
hostname BUCARAMANGA
```

```
!  
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0  
!  
no ip domain-lookup  
!  
interface FastEthernet0/0  
description conexion red LAN MERCADEO BUCARAMANGA  
ip address 192.168.26.174 255.255.255.240  
duplex auto  
speed auto  
!  
interface FastEthernet0/1  
no ip address  
duplex auto  
speed auto  
shutdown  
!  
interface Serial0/0/0  
description conexion WAN con BOGOTA  
ip address 192.168.26.177 255.255.255.252  
clock rate 56000  
!  
interface Serial0/0/1  
no ip address  
clock rate 2000000
```

```
shutdown
!
router rip
version 2
passive-interface FastEthernet0/0
network 192.168.26.0
!
banner motd ^Ccomunicacin con Bogota^C
!
line con 0
password cisco
login
line vty 0 4
password cisco
login
!
end
```

### **Verificaci3n de conectividad de la red.**

La figura muestra la respuesta entre los routes de la red, se observa el 3xito de la conexi3n entre los dispositivos.

Cisco Packet Tracer - C:\Gabriel\Caso\_Estudio\_CNNA1.pkt

Archivo Editar Opciones Ver Herramientas Extensiones Ayuda

**Lógico** [Raíz]

RED DE LA EMPRESA COMERCIANTES S.A  
DIRECION DE RED: 192.168.26.0/26

Disparo	Último Estado	Origen	Destino	Tipo	Color	Tiempo (s)	Periódico	Num	Editar	Eliminar
●	Exitoso	BUCARAMANGA	BOGOTA	ICMP	Color 0	0.000	N	0	(edit)	(delete)
●	Exitoso	BUCARAMANGA	BARRANQUILLA	ICMP	Color 1	0.000	N	1	(edit)	(delete)
●	Exitoso	BARRANQUILLA	MEDELLIN	ICMP	Color 2	0.000	N	10	(edit)	(delete)
●	Exitoso	BARRANQUILLA	CALI	ICMP	Color 3	0.000	N	11	(edit)	(delete)
●	Exitoso	MEDELLIN	CALI	ICMP	Color 4	0.000	N	12	(edit)	(delete)
●	Exitoso	MEDELLIN	BARRANQUILLA	ICMP	Color 5	0.000	N	13	(edit)	(delete)
●	Exitoso	MEDELLIN	BOGOTA	ICMP	Color 6	0.000	N	14	(edit)	(delete)
●	Exitoso	MEDELLIN	BUCARAMANGA	ICMP	Color 7	0.000	N	15	(edit)	(delete)
●	Exitoso	MEDELLIN	CALI	ICMP	Color 8	0.000	N	16	(edit)	(delete)
●	Exitoso	CALI	BARRANQUILLA	ICMP	Color 9	0.000	N	17	(edit)	(delete)
●	Exitoso	CALI	BOGOTA	ICMP	Color 10	0.000	N	18	(edit)	(delete)
●	Exitoso	CALI	BUCARAMANGA	ICMP	Color 11	0.000	N	19	(edit)	(delete)
●	Exitoso	BUCARAMANGA	MEDELLIN	ICMP	Color 12	0.000	N	2	(edit)	(delete)
●	Exitoso	BUCARAMANGA	CALI	ICMP	Color 13	0.000	N	3	(edit)	(delete)
●	Exitoso	BOGOTA	BUCARAMANGA	ICMP	Color 14	0.000	N	4	(edit)	(delete)
●	Exitoso	BOGOTA	BARRANQUILLA	ICMP	Color 15	0.000	N	5	(edit)	(delete)
●	Exitoso	BOGOTA	MEDELLIN	ICMP	Color 16	0.000	N	6	(edit)	(delete)
●	Exitoso	BOGOTA	CALI	ICMP	Color 17	0.000	N	7	(edit)	(delete)

Tiempo: 02:18:44 Dispositivos de Energía Fast Forward Time

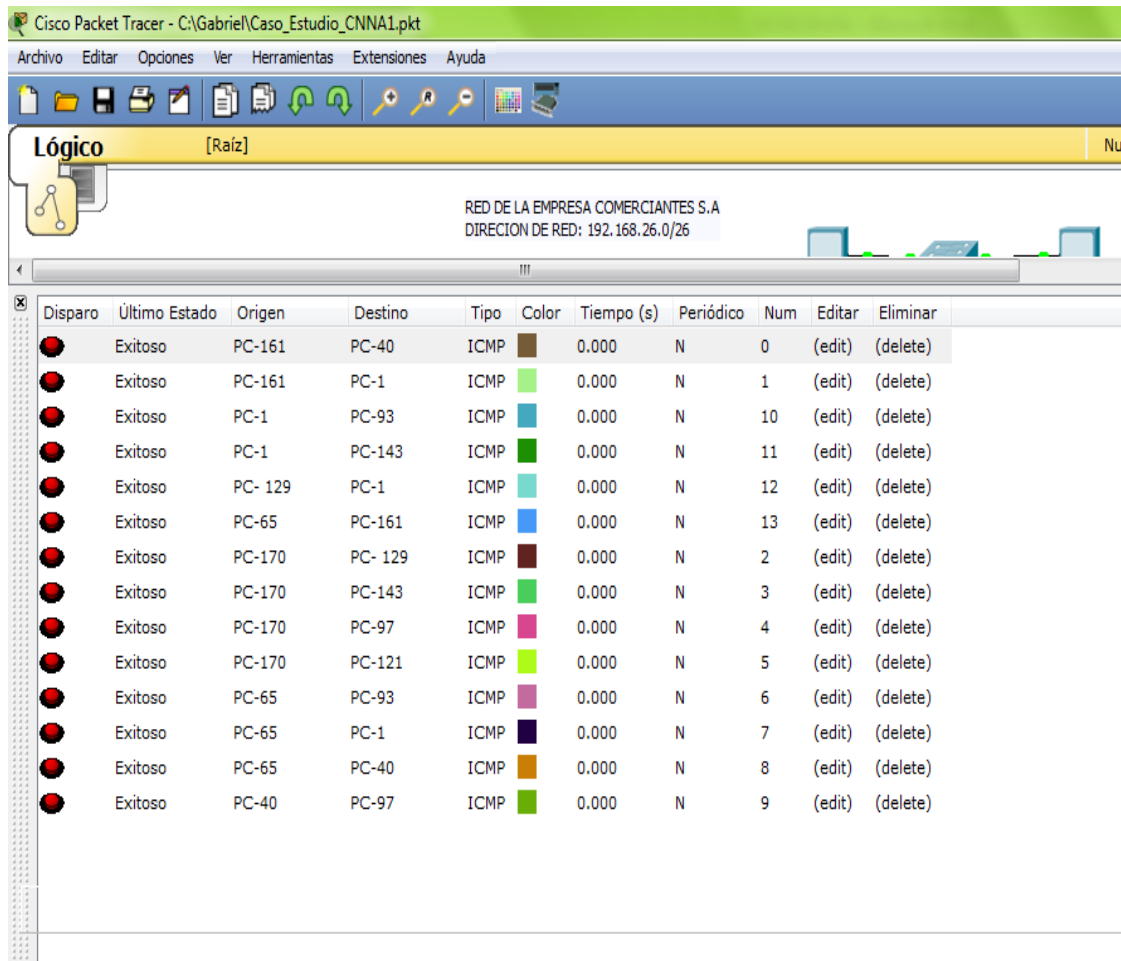
Ruteadores: 1841, 2620XM, 2621XM, 2811, Generic, Generic

Router-PT

Scenario 0

La figura muestra la respuesta entre los PC'S de la red, se observa el éxito de la conexión entre los dispositivos.





**Verificación de funcionamiento de la red mediante el uso de comandos: Ping y Traceroute.**

**PING desde 192.168.26.161 a 192.168.26.40**

**Resultado.**

Packet Tracer PC Command Line 1.0

PC>ping 192.168.26.40

Pinging 192.168.26.40 with 32 bytes of data:

Reply from 192.168.26.40: bytes=32 time=45ms TTL=123

Reply from 192.168.26.40: bytes=32 time=38ms TTL=123

Reply from 192.168.26.40: bytes=32 time=27ms TTL=123

Reply from 192.168.26.40: bytes=32 time=50ms TTL=123

Ping statistics for 192.168.26.40:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 27ms, Maximum = 50ms, Average = 40ms

**TRACERT desde 192.168.26.161 a 192.168.26.40**

**Resultado.**

PC>tracert 192.168.26.40

Tracing route to 192.168.26.40 over a maximum of 30 hops:

1	13 ms	10 ms	12 ms	192.168.26.174
2	16 ms	14 ms	15 ms	192.168.26.178
3	29 ms	20 ms	22 ms	192.168.26.182
4	30 ms	30 ms	26 ms	192.168.26.186

5	38 ms	38 ms	24 ms	192.168.26.190
6	48 ms	33 ms	47 ms	192.168.26.40

Trace complete.

### **PING desde 192.168.26.1 a 192.168.26.40**

#### **Resultado.**

Packet Tracer PC Command Line 1.0

PC>ping 192.168.26.40

Pinging 192.168.26.40 with 32 bytes of data:

Reply from 192.168.26.40: bytes=32 time=23ms TTL=128

Reply from 192.168.26.40: bytes=32 time=13ms TTL=128

Reply from 192.168.26.40: bytes=32 time=11ms TTL=128

Reply from 192.168.26.40: bytes=32 time=12ms TTL=128

Ping statistics for 192.168.26.40:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 11ms, Maximum = 23ms, Average = 14ms

### **TRACERT desde 192.168.26.1 a 192.168.26.40**

#### **Resultado.**

PC>tracert 192.168.26.40

Tracing route to 192.168.26.40 over a maximum of 30 hops:

1 15 ms 14 ms 11 ms 192.168.26.40

Trace complete

**PING desde 192.168.26.1 a 192.168.26.161**

**Resultado.**

PC>PING 192.168.26.161

Pinging 192.168.26.161 with 32 bytes of data:

Reply from 192.168.26.161: bytes=32 time=35ms TTL=123

Reply from 192.168.26.161: bytes=32 time=52ms TTL=123

Reply from 192.168.26.161: bytes=32 time=47ms TTL=123

Reply from 192.168.26.161: bytes=32 time=18ms TTL=123

Ping statistics for 192.168.26.161:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 18ms, Maximum = 52ms, Average = 38ms

**TRACERT desde 192.168.26.1 a 192.168.26.161**

**Resultado.**

PC>TRACERT 192.168.26.161

Tracing route to 192.168.26.161 over a maximum of 30 hops:

1	11 ms	11 ms	13 ms	192.168.26.62
2	25 ms	17 ms	20 ms	192.168.26.189
3	21 ms	27 ms	26 ms	192.168.26.185
4	28 ms	28 ms	28 ms	192.168.26.181
5	35 ms	25 ms	35 ms	192.168.26.177
6	54 ms	46 ms	50 ms	192.168.26.161

Trace complete.

**PING desde 192.168.26.129 a 192.168.26.1**

**Resultado.**

PC>PING 192.168.26.1

Pinging 192.168.26.1 with 32 bytes of data:

Reply from 192.168.26.1: bytes=32 time=20ms TTL=124

Reply from 192.168.26.1: bytes=32 time=42ms TTL=124

Reply from 192.168.26.1: bytes=32 time=34ms TTL=124

Reply from 192.168.26.1: bytes=32 time=48ms TTL=124

Ping statistics for 192.168.26.1:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 20ms, Maximum = 48ms, Average = 36ms

**TRACERT desde 192.168.26.129 a 192.168.26.1**

**Resultado.**

PC>TRACERT 192.168.26.1

Tracing route to 192.168.26.1 over a maximum of 30 hops:

1	7 ms	5 ms	13 ms	192.168.26.158
2	18 ms	15 ms	21 ms	192.168.26.182
3	24 ms	22 ms	19 ms	192.168.26.186
4	31 ms	32 ms	28 ms	192.168.26.190
5	44 ms	38 ms	41 ms	192.168.26.1

Trace complete.

**PING desde 192.168.26.121 a 192.168.26.1**

**Resultado.**

PC>PING 192.168.26.1

Pinging 192.168.26.1 with 32 bytes of data:

Reply from 192.168.26.1: bytes=32 time=35ms TTL=126

Reply from 192.168.26.1: bytes=32 time=35ms TTL=126

Reply from 192.168.26.1: bytes=32 time=27ms TTL=126

Reply from 192.168.26.1: bytes=32 time=30ms TTL=126

Ping statistics for 192.168.26.1:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 27ms, Maximum = 35ms, Average = 31ms

**TRACERT desde 192.168.26.121 a 192.168.26.1**

**Resultado.**

PC>TRACERT 192.168.26.1

Tracing route to 192.168.26.1 over a maximum of 30 hops:

1	15 ms	10 ms	15 ms	192.168.26.126
2	19 ms	18 ms	17 ms	192.168.26.190
3	28 ms	28 ms	34 ms	192.168.26.1

Trace complete.

**PING desde 192.168.26.65 a 192.168.26.129**

**Resultado.**

PC>PING 192.168.26.129

Pinging 192.168.26.129 with 32 bytes of data:

Reply from 192.168.26.129: bytes=32 time=28ms TTL=126

Reply from 192.168.26.129: bytes=32 time=26ms TTL=126

Reply from 192.168.26.129: bytes=32 time=29ms TTL=126

Reply from 192.168.26.129: bytes=32 time=34ms TTL=126

Ping statistics for 192.168.26.129:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 26ms, Maximum = 34ms, Average = 29ms

**TRACERT desde 192.168.26.65 a 192.168.26.129**

**Resultado.**

PC>TRACERT 192.168.26.129



Tracing route to 192.168.26.129 over a maximum of 30 hops:

1	15 ms	6 ms	11 ms	192.168.26.94
2	15 ms	19 ms	20 ms	192.168.26.181
3	27 ms	26 ms	27 ms	192.168.26.129

Trace complete.

**CASO DE ESTUDIO CCN2**  
**EXPLORATION: PRINCIPIOS DE ENRUTAMIENTO**

**CASO DE ESTUDIO CCNA 2 EXPLORATION**

**Objetivos de aprendizaje:**

1. Diseñar y documentar un esquema de direccionamiento según los requisitos.
2. Aplicar una configuración básica a los dispositivos.
3. Configurar una prioridad de routers y RID.
4. Configurar el enrutamiento OSPF
5. Desactivación de las actualizaciones de enrutamiento en las interfaces adecuadas.
6. Verificación de la completa conectividad entre todos los dispositivos de la topología.

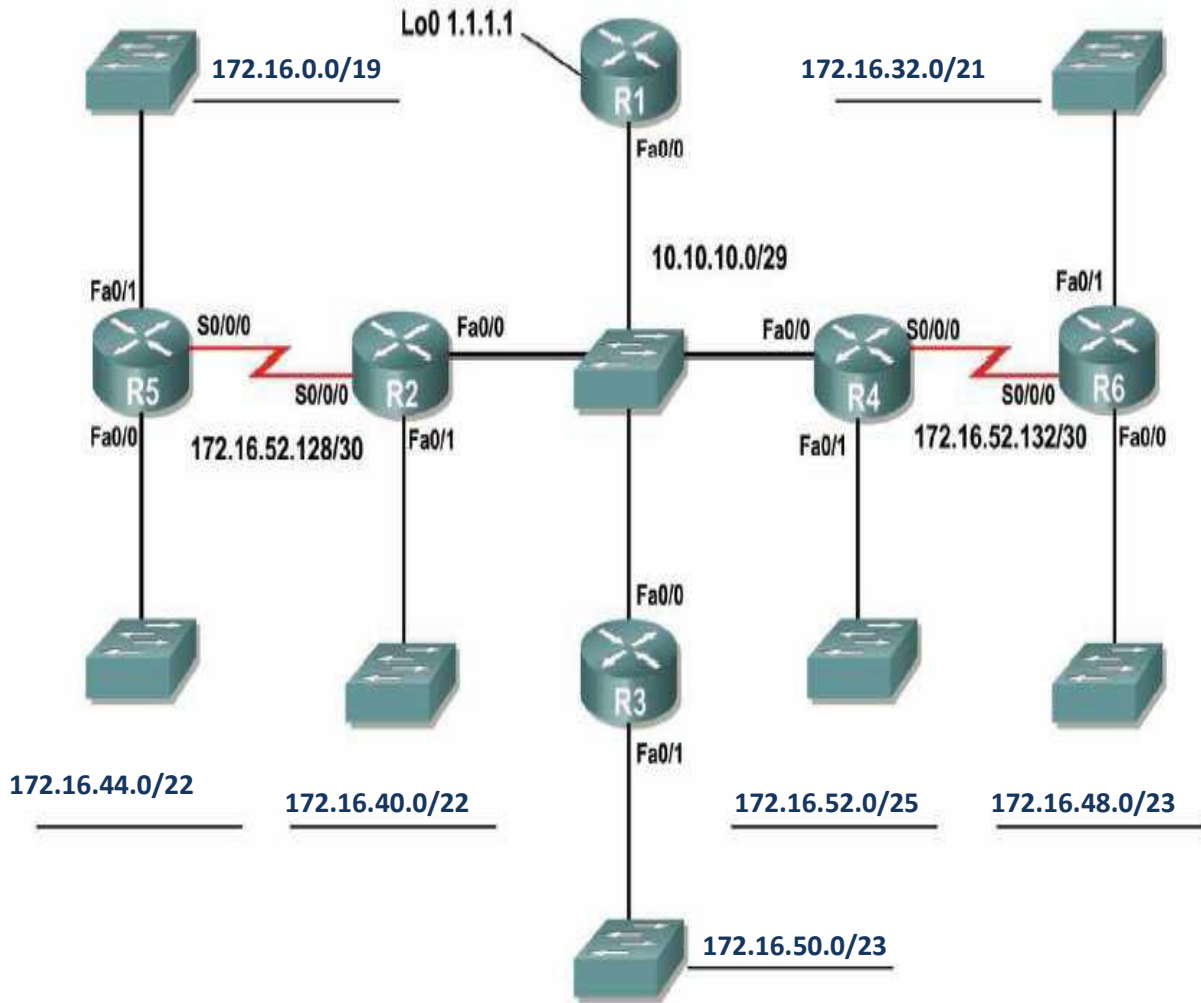
**Enunciado Principal del caso de estudio**

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 TOPOLOGIA**

Se asigna la red 172.16.0.0/16

Diagrama de topología con cada una de las subredes según la red asignada.



## Tarea 1:

### 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:

#### REQUISITOS DE LA RED.

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

Para la solución del caso de estudio se asigna la red: **172.16.0.0/16** con implementación de VLSM.

- Se debe dividir en subredes la red 172.16.0.0/16 para proporcionar direcciones para las siete (7) REDES LAN requeridas en la topología.
- La dirección de loopback que representa el enlace entre el router R1 y el ISP usará la red 1.1.1.1/32

El espacio de direccionamiento 172.16.52.128/30 debe dividirse en subredes para obtener las direcciones para los enlaces entre los routers R5 –R2 y R4-R6.

Se ordena en forma descendente las redes según la cantidad de host por cada red.

NUMERO	RED	INTERFAS	CANTIDAD DE HOST
0	R5	FA0/1	6.000
1	R6	FA0/1	2.000
2	R2	FA/01	1.000
3	R5	FA0/0	800
4	R6	FA0/0	500
5	R3	FA0/1	400
6	R4	FA0/1	120
7	ENALCE		2

	R2-R5		
8	ENLACE R4-R6		2

1. Se inicia con la red que requiere mayor cantidad de host, es:

RED	INTERFAS	CANTIDAD DE HOST
R5	FA0/1	6.000

Se asigna la subred, dirección del primer host, dirección de último host, dirección de broadcast, dirección de Gateway y mascara de subred.

SUBRED	DIRECCION IP PRIMER HOST	DIRECCION IP ULTIMO HOST	DIRECCION DE BROADCAST	DIRECCION GATEWAY	MASCARA SUBRED
172.16.0.0/19	172.16.0.1	172.16.31.254	172.16.31.255	172.16.0.1	255.255.224.0

2. la segunda red requiere:

RED	INTERFAS	CANTIDAD DE HOST
R6	FA0/1	2.000

Se asigna la subred, dirección del primer host, dirección de último host, dirección de broadcast, dirección de Gateway y mascara de subred.

SUBRED	DIRECCION IP PRIMER HOST	DIRECCION IP ULTIMO HOST	DIRECCION DE BROADCAST	DIRECCION GATEWAY	MASCARA SUBRED
172.16.32.0/21	172.16.32.1	172.16.39.254	172.16.39.255	172.16.32.1	255.255.248.0

3. la tercera red requiere:

RED	INTERFAS	CANTIDAD DE HOST
R2	FA/01	1.000

Se asigna la subred, dirección del primer host, dirección de último host, dirección de broadcast, dirección de Gateway y mascara de subred.

SUBRED	DIRECCION IP PRIMER HOST	DIRECCION IP ULTIMO HOST	DIRECCION DE BROADCAST	DIRECCION GATEWAY	MASCARA SUBRED
--------	--------------------------	--------------------------	------------------------	-------------------	----------------

172.16.40.0/22	172.16.40.1	172.16.43.254	172.16.43.255	172.16.40.1	255.255.252.0
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4. la cuarta red requiere:

RED	INTERFAS	CANTIDAD DE HOST
R5	FA0/0	800

Se asigna la subred, dirección del primer host, dirección de último host, dirección de broadcast, dirección de Gateway y mascara de subred.

SUBRED	DIRECCION IP PRIMER HOST	DIRECCION IP ULTIMO HOST	DIRECCION DE BROADCAST	DIRECCION GATEWAY	MASCARA SUBRED
172.16.44.0/22	172.16.44.1	172.16.47.254	172.16.47.255	172.16.44.1	255.255.252.0

5. la quinta red requiere:

RED	INTERFAS	CANTIDAD DE HOST
R6	FA0/0	500

Se asigna la subred, dirección del primer host, dirección de último host, dirección de broadcast, dirección de Gateway y mascara de subred.

SUBRED	DIRECCION IP PRIMER HOST	DIRECCION IP ULTIMO HOST	DIRECCION DE BROADCAST	DIRECCION GATEWAY	MASCARA SUBRED
172.16.48.0/23	172.16.48.1	172.16.49.254	172.16.49.255	172.16.48.1	255.255.254.0

6. la sexta red requiere:

RED	INTERFAS	CANTIDAD DE HOST
R3	FA0/1	400

Se asigna la subred, dirección del primer host, dirección de último host, dirección de broadcast, dirección de Gateway y mascara de subred.

SUBRED	DIRECCION IP PRIMER HOST	DIRECCION IP ULTIMO HOST	DIRECCION DE BROADCAST	DIRECCION GATEWAY	MASCARA SUBRED
--------	--------------------------	--------------------------	------------------------	-------------------	----------------

172.16.50.0/23	172.16.50.1	172.16.51.254	172.16.51.255	172.16.50.1	255.255.254.0
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7. la séptima red requiere:

RED	INTERFAS	CANTIDAD DE HOST
R4	FA0/1	120

Se asigna la subred, dirección del primer host, dirección de último host, dirección de broadcast, dirección de Gateway y mascara de subred.

SUBRED	DIRECCION IP PRIMER HOST	DIRECCION IP ULTIMO HOST	DIRECCION DE BROADCAST	DIRECCION GATEWAY	MASCARA SUBRED
172.16.52.0/25	172.16.52.1	172.16.52.126	172.16.52.127	172.16.52.1	255.255.255.128

8. al enlace entre R2 –R5 se asigna la red 172.16.52.128/30, que requiere solo dos direcciones lógicas.

SUBRED	DIRECCION IP PRIMER HOST	DIRECCION IP ULTIMO HOST	DIRECCION DE BROADCAST	MASCARA SUBRED
172.16.52.128/30	172.16.52.129	172.16.52.130	172.16.52.131	255.255.255.252

9. al enlace entre R4 –R6 se asigna la red 172.16.52.132/30, que requiere solo dos direcciones lógicas.

SUBRED	DIRECCION IP PRIMER HOST	DIRECCION IP ULTIMO HOST	DIRECCION DE BROADCAST	MASCARA SUBRED
172.16.52.132/30	172.16.52.133	172.16.52.134	172.16.52.135	255.255.255.252

### 1.1 Tabla asignación de subredes de la red 172.16.0.0/16 mediante la técnica VLSM

ROUTER	INTERFAZ	SUBRED	DIRECCION IP PRIMER HOST	DIRECCION IP ULTIMO HOST	DIRECCION DE BROADCAST	DIRECCION GATEWAY	MASCARA SUBRED
R2	FA0/1	172.16.40.0/22	172.16.40.1	172.16.43.254	172.16.43.255	172.16.40.1	255.255.252.0
R3	FA0/1	172.16.50.0/23	172.16.50.1	172.16.51.254	172.16.51.255	172.16.50.1	255.255.254.0
R4	FA0/1	172.16.52.0/25	172.16.52.1	172.16.52.126	172.16.52.127	172.16.52.1	255.255.255.128
R5	FA0/0	172.16.44.0/22	172.16.44.1	172.16.47.254	172.16.47.255	172.16.44.1	255.255.252.0
R5	FA0/1	172.16.0.0/19	172.16.0.1	172.16.31.254	172.16.31.255	172.16.0.1	255.255.224.0
R6	FA0/0	172.16.48.0/23	172.16.48.1	172.16.49.254	172.16.49.255	172.16.48.1	255.255.254.0
R6	FA0/1	172.16.32.0/21	172.16.32.1	172.16.39.254	172.16.39.255	172.16.32.1	255.255.248.0

### 1.2 Tabla de enrutamiento.

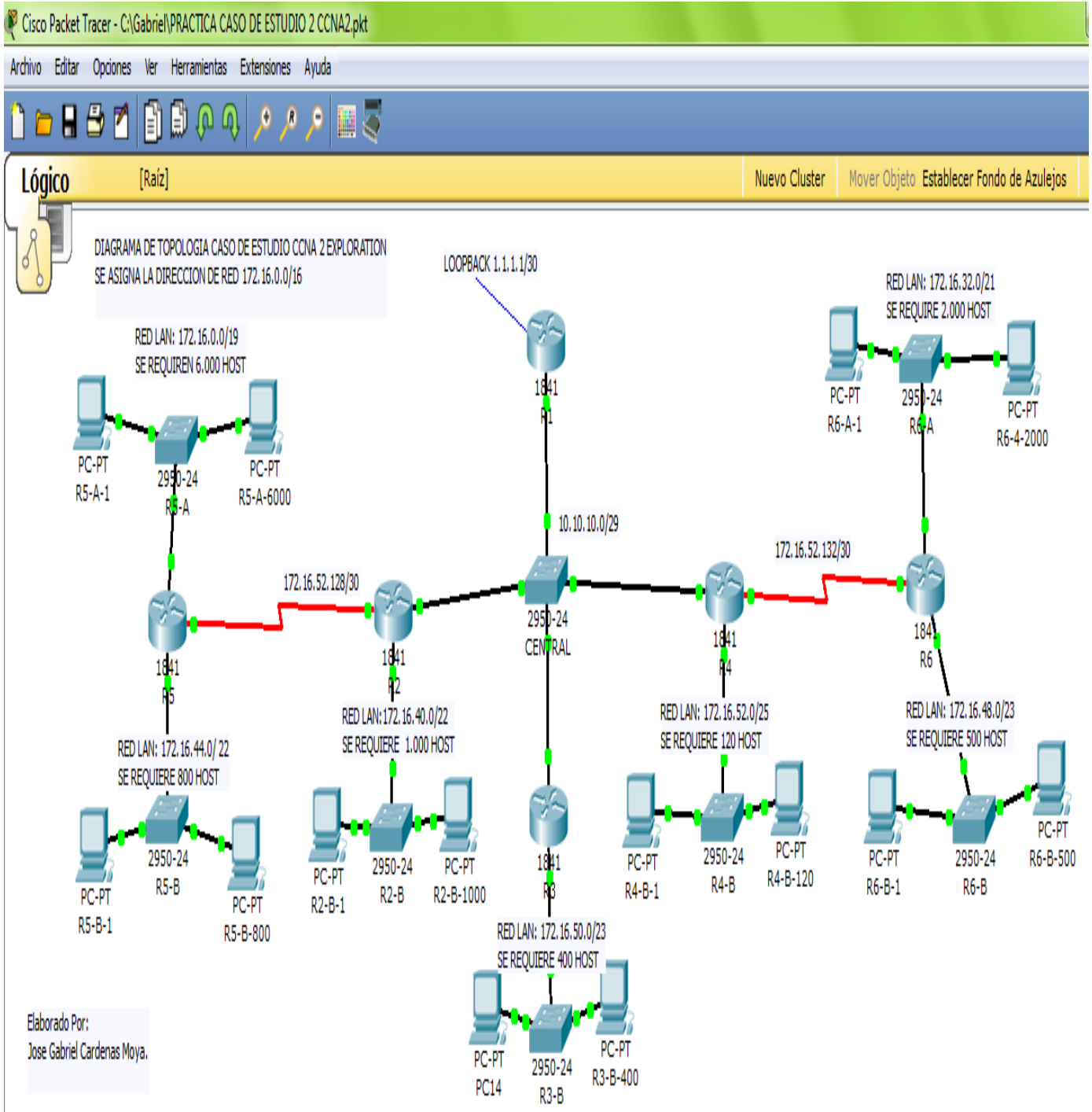
La siguiente tabla contiene: nombre de dispositivo de red (router), nombre de la interfaz, dirección IP de la interfaz, y máscara de subred.

DISPOSITIVO	INTERFAZ	DIRECCION IP	MASCARA DE SUBRED
R1	FA0/0	10.10.10.1	255.225.255.248
	LOOPBACK0	1.1.1.1	255.255.255.255
R2	FA0/0	10.10.10.2	255.225.255.248
	FA0/1	172.16.40.1	255.255.252.0
	S0/0/0	172.16.52.130	255.255.255.252
R3	FA0/0	10.10.10.3	255.255.255.248
	FA0/1	172.16.50.1	255.255.254.0
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	172.16.48.0.	255.255.254.0
	FA0/1	172.16.32.1	255.255.248.0
	S0/0/0	172.16.32.134	255.255.255.252



## DIAGRAMA DE LA RED EN PACKET TRACER

Definir el nombre de los equipos y las interfaces por las cuales se van a conectar las mismas



## Verificación, de conectividad de los dispositivos de la red.

Ventana de Lista PDU										
Disparo	Último Estado	Origen	Destino	Tipo	Color	Tiempo (s)	Periódico	Num	Editar	Eliminar
	Exitoso	R1	R2	ICMP	Dark Purple	0.000	N	0	(edit)	(delete)
	Exitoso	R2	R3	ICMP	Dark Brown	0.000	N	1	(edit)	(delete)
	Exitoso	R4-B-1	R4-B-120	ICMP	Purple	0.000	N	10	(edit)	(delete)
	Exitoso	R6-B-1	R6-B-500	ICMP	Olive Green	0.000	N	11	(edit)	(delete)
	Exitoso	R6-A-1	R6-4-2000	ICMP	Blue	0.000	N	12	(edit)	(delete)
	Exitoso	R5-A-1	R5-B-800	ICMP	Red	0.000	N	13	(edit)	(delete)
	Exitoso	R5-A-6000	R5-B-1	ICMP	Light Green	0.000	N	14	(edit)	(delete)
	Exitoso	R2-B-1	R6-4-2000	ICMP	Brown	0.000	N	15	(edit)	(delete)
	Exitoso	R6-A-1	R2-B-1000	ICMP	Orange	0.000	N	16	(edit)	(delete)
	Exitoso	PC14	R4-B-1	ICMP	Pink	0.000	N	17	(edit)	(delete)
	Exitoso	R4-B-120	R3-B-400	ICMP	Light Orange	0.000	N	18	(edit)	(delete)
	Exitoso	R6-B-500	R5-A-1	ICMP	Dark Green	0.000	N	19	(edit)	(delete)
	Exitoso	R4	R4	ICMP	Brown	0.000	N	2	(edit)	(delete)
	Exitoso	R6-B-1	R1	ICMP	Teal	0.000	N	20	(edit)	(delete)
	Exitoso	R6-4-2000	R1	ICMP	Purple	0.000	N	21	(edit)	(delete)
	Exitoso	PC14	R1	ICMP	Cyan	0.000	N	22	(edit)	(delete)
	Exitoso	R5-B-1	R1	ICMP	Yellow	0.000	N	23	(edit)	(delete)
	Exitoso	R5-A-1	R1	ICMP	Light Teal	0.000	N	24	(edit)	(delete)
	Exitoso	R2-B-1	R1	ICMP	Light Green	0.000	N	25	(edit)	(delete)
	Exitoso	R3	R4	ICMP	Purple	0.000	N	3	(edit)	(delete)
	Exitoso	R4	R5	ICMP	Dark Purple	0.000	N	4	(edit)	(delete)
	Exitoso	R5	R6	ICMP	Green	0.000	N	5	(edit)	(delete)
	Exitoso	R5-A-1	R5-A-6000	ICMP	Blue	0.000	N	6	(edit)	(delete)
	Exitoso	R5-B-1	R5-B-800	ICMP	Brown	0.000	N	7	(edit)	(delete)
	Exitoso	R2-B-1	R2-B-1000	ICMP	Yellow	0.000	N	8	(edit)	(delete)
	Exitoso	PC14	R3-B-400	ICMP	Olive Green	0.000	N	9	(edit)	(delete)

## Tarea 2: Aplicación de una configuración básica.

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

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

### CONFIGURACION DE R1

Se asigna nombre host, configuración de contraseñas de acceso y configuración de interfaces internet, serial y loopback.

```
hostname R1
!
enable secret 5 $1$mERr$NJdjwh5wX8la/X8aC4Rlu.
!
no ip domain-lookup
!
interface Loopback0
 ip address 1.1.1.1 255.255.255.255
!
interface FastEthernet0/0
 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 Vlan1
 no ip address
 shutdown
!
ip classless
ip route 0.0.0.0 0.0.0.0 Loopback0
!
banner motd ^C
```

```

!!AUTHORIZATION RESTRICTED!!
^C
!
line con 0
 password CISCO
 login
line vty 0 4
 password CISCO
 login
!
end

```

## CONFIGURACION DE R2

Se asigna nombre host, configuración de contraseñas de acceso y configuración de interfaces internet y serial.

```

hostname R2
!
enable secret 5 $1$mERr$NJdjwh5wX8la/X8aC4Rlu.
!
no ip domain-lookup
!
spanning-tree mode pvst
!
interface FastEthernet0/0
 ip address 10.10.10.2 255.255.255.248
 ip ospf priority 200
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 172.16.40.1 255.255.252.0
 duplex auto
 speed auto
!
interface Serial0/0/0
 ip address 172.16.52.130 255.255.255.252
 ipv6 ospf cost 781
!
interface Vlan1
 no ip address
 shutdown
!
banner motd ^C
///AUTHORIZATION RESTRICTED///
^C
!
line con 0
 password CISCO
 login
line vty 0 4
 password CISCO LOGIN

```

```
login
!  
end
```

### CONFIGURACION DE R3

Se asigna nombre host, configuración de contraseñas de acceso y configuración de interfaces internet y serial.

```
hostname R3
!  
enable secret 5 $1$mERr$NJdjwh5wX8la/X8aC4Rlu.
!  
no ip domain-lookup
!  
interface FastEthernet0/0
ip address 10.10.10.3 255.255.255.248
ip ospf priority 100
duplex auto
speed auto
!  
interface FastEthernet0/1
ip address 172.16.50.1 255.255.254.0
duplex auto
speed auto
!  
interface Vlan1
no ip address
shutdown
!  
banner motd ^C
!!AUTHORIZATION RESTRICTED!!
^C
!  
line con 0
password CISCO
login
line vty 0 4
password CISCO
login
!  
end
```

### CONFIGURACION DE R4

Se asigna nombre host, configuración de contraseñas de acceso y configuración de interfaces internet y serial y frecuencia de reloj.

```
hostname R4
!  
enable secret 5 $1$mERr$NJdjwh5wX8la/X8aC4Rlu.
```

```

!
no ip domain-lookup
!
interface FastEthernet0/0
ip address 10.10.10.4 255.255.255.248
ip ospf priority 100
duplex auto
speed auto
!
interface FastEthernet0/1
ip address 172.16.52.1 255.255.255.128
duplex auto
speed auto
!
interface Serial0/0/0
ip address 172.16.52.133 255.255.255.252
ipv6 ospf cost 781
clock rate 56000
!
interface Vlan1
no ip address
shutdown
!
banner motd ^C
!!AUTHORIZATION RESTRICTED
^C
!
line con 0
password CISCO
login
line vty 0 4
password CISCO
login
!
end

```

## CONFIGURACION DE R5

Se asigna nombre host, configuración de contraseñas de acceso y configuración de interfaces internet y serial y frecuencia de reloj.

```

hostname R5
!
enable secret 5 $1$mERr$NJdwh5wX8la/X8aC4Rlu.
!
no ip domain-lookup
!

```

```

interface FastEthernet0/0
ip address 172.16.44.1 255.255.252.0
duplex auto
speed auto
!
interface FastEthernet0/1
ip address 172.16.0.1 255.255.224.0
duplex auto
speed auto
!
interface Serial0/0/0
ip address 172.16.52.129 255.255.255.252
ipv6 ospf cost 781
clock rate 56000
!
interface Vlan1
no ip address
shutdown
!
banner motd ^C
!!AUTHORIZATION RESTRICTED
^C
!
line con 0
password CISCO
login
line vty 0 4
password CISCO
login
!
end

```

## CONFIGURACION DE R6

Se asigna nombre host, configuración de contraseñas de acceso y configuración de interfaces internet y serial.

```

hostname R6
!
enable secret 5 $1$mERr$NJdwh5wX8la/X8aC4Rlu.
!
no ip domain-lookup
!
interface FastEthernet0/0
ip address 172.16.48.1 255.255.254.0
duplex auto

```

```
speed auto
!  
interface FastEthernet0/1  
ip address 172.16.32.1 255.255.248.0  
duplex auto  
speed auto  
!  
interface Serial0/0/0  
ip address 172.16.52.134 255.255.255.252  
ipv6 ospf cost 781  
!  
interface Vlan1  
no ip address  
shutdown  
!  
banner motd ^C  
!!AUTHORIZATION RESTRICTED!!  
^C  
!  
line con 0  
password CISCO  
login  
line vty 0 4  
password CISCO  
login  
!  
End
```

### Tarea 3: Configurar el enrutamiento OSPF

**Paso 1:** Configurar el enrutamiento OSPF en cada Reuter.

#### CONFIGURACIÓN DE OSPF EN R1

```
R1(config)#router ospf 1  
R1(config-router)#network 10.10.10.0 0.0.0.7 area 0  
R1(config-router)#
```

**Se verifica que el protocolo este activado.**

```
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
  It is an autonomous system boundary router
  Redistributing External Routes from,
  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
  Routing Information Sources:
  Gateway        Distance    Last Update
  1.1.1.1         110        00:13:35
  172.16.50.1     110        00:13:40
  172.16.52.129  110        00:14:14
  172.16.52.130  110        00:13:40
  172.16.52.133  110        00:13:40
  172.16.52.134  110        00:14:14
  Distance: (default is 110)

```

## CONFIGURACIÓN DE OSPF EN R2

```

R2(config)#router ospf 1
R2(config-router)#network 10.10.10.0 0.0.0.7 area 0
R2(config-router)#network 172.16.40.0 0.0.3.255 area 0
R2(config-router)#network 172.16.52.128 0.0.0.3 area 0
R2(config-router)#exit

```

**Se verifica que el protocolo este activado.**

```
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	00:19:34
172.16.50.1	110	00:19:40
172.16.52.129	110	00:20:14
172.16.52.130	110	00:19:40
172.16.52.133	110	00:19:40
172.16.52.134	110	00:20:14

Distance: (default is 110)

### **CONFIGURACIÓN DE OSPF EN R3**

```
R3(config)#router ospf 1
R3(config-router)#network 10.10.10.0 0.0.0.7 area 0
R3(config-router)#network 172.16.50.0 0.0.1.255 area 0
R3(config-router)#exit
```

**Se verifica que el protocolo este activado.**

```
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:  
 10.10.10.0 0.0.0.7 area 0  
 172.16.50.0 0.0.1.255 area 0  
Routing Information Sources:  
 Gateway      Distance    Last Update  
1.1.1.1        110        00:24:02  
 172.16.50.1   110        00:24:07  
 172.16.52.129 110        00:24:41  
 172.16.52.130 110        00:24:07  
 172.16.52.133 110        00:24:07  
 172.16.52.134 110        00:24:41  
Distance: (default is 110)
```

## **CONFIGURACIÓN DE OSPF EN R4**

```
R4(config)#router ospf 1  
R4(config-router)#network 10.10.10.0 0.0.0.7 area 0  
R4(config-router)#network 172.16.52.0 0.0.1.255 area 0  
R4(config-router)#network 172.16.52.132 0.0.0.3 area 0  
R4(config-router)#exit
```

**Se verifica que el protocolo este activado.**

```
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 0.0.1.255 area 0

172.16.52.132 0.0.0.3 area 0

Routing Information Sources:

Gateway	Distance	Last Update
1.1.1.1	110	00:27:07
172.16.50.1	110	00:27:13
172.16.52.129	110	00:27:47
172.16.52.130	110	00:27:13
172.16.52.133	110	00:27:13
172.16.52.134	110	00:27:47

Distance: (default is 110)

## CONFIGURACIÓN DE OSPF EN R5

```
R5(config)#router ospf 1
R5(config-router)#network 172.16.44.0 0.0.3.255 area 0
R5(config-router)#network 172.16.16.0 0.0.31.255 area 0
R5(config-router)#network 172.16.52.128 0.0.0.3 area 0
R5(config-router)#exit
```

**Se verifica que el protocolo este activado.**

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	00:28:59
172.16.50.1	110	00:28:59
172.16.52.129	110	00:29:39
172.16.52.130	110	00:29:05
172.16.52.133	110	00:28:59
172.16.52.134	110	00:29:39

Distance: (default is 110)

## **CONFIGURACIÓN DE OSPF EN R6**

```
R6(config)#router ospf 1
R6(config-router)#network 172.16.32.0 0.0.7.255 area 0
R6(config-router)#network 172.16.48.0 0.0.1.255 area 0
R6(config-router)#network 172.16.52.132 0.0.0.3 area 0
```

**Se verifica que el protocolo este activado.**

```
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
```

```
172.16.52.132 0.0.0.3 area 0
```

```
172.16.32.0 0.0.7.255 area 0
```

```
Routing Information Sources:
```

Gateway	Distance	Last Update
1.1.1.1	110	00:01:06
172.16.50.1	110	00:01:11
172.16.52.129	110	00:01:45
172.16.52.130	110	00:01:10
172.16.52.133	110	00:01:11
172.16.52.134	110	00:01:44

```
Distance: (default is 110)
```

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

A través del comando show ip route, se verifica que las rutas estén aprendidas en cada router.

### Verificación en R1

```
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, 00:43:59, FastEthernet0/0
O      172.16.32.0/21 [110/66] via 10.10.10.4, 00:43:59, FastEthernet0/0
O      172.16.40.0/22 [110/2] via 10.10.10.2, 00:43:59, FastEthernet0/0
O      172.16.44.0/22 [110/66] via 10.10.10.2, 00:43:59, FastEthernet0/0
O      172.16.48.0/23 [110/66] via 10.10.10.4, 00:43:59, FastEthernet0/0
O      172.16.50.0/23 [110/2] via 10.10.10.3, 00:43:59, FastEthernet0/0
O      172.16.52.0/25 [110/2] via 10.10.10.4, 00:43:59, FastEthernet0/0
O      172.16.52.128/30 [110/65] via 10.10.10.2, 00:43:59, FastEthernet0/0
O      172.16.52.132/30 [110/65] via 10.10.10.4, 00:43:59, FastEthernet0/0
S*    0.0.0.0/0 is directly connected, Loopback0
R1#
```

### Verificación en R2

```
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 10.10.10.1 to network 0.0.0.0

```
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, 00:43:49, Serial0/0/0
O    172.16.32.0/21 [110/66] via 10.10.10.4, 00:43:09, 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, 00:43:49, Serial0/0/0
O    172.16.48.0/23 [110/66] via 10.10.10.4, 00:43:09, FastEthernet0/0
O    172.16.50.0/23 [110/2] via 10.10.10.3, 00:43:09, FastEthernet0/0
O    172.16.52.0/25 [110/2] via 10.10.10.4, 00:43:09, 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, 00:43:09, FastEthernet0/0
O*E2 0.0.0.0/0 [110/1] via 10.10.10.1, 00:43:09, FastEthernet0/0
R2#
```

### Verificación en R3

```
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 10.10.10.1 to network 0.0.0.0

```
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, 00:42:06, FastEthernet0/0
O    172.16.32.0/21 [110/66] via 10.10.10.4, 00:42:06, FastEthernet0/0
O    172.16.40.0/22 [110/2] via 10.10.10.2, 00:42:06, FastEthernet0/0
O    172.16.44.0/22 [110/66] via 10.10.10.2, 00:42:06, FastEthernet0/0
O    172.16.48.0/23 [110/66] via 10.10.10.4, 00:42:06, 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, 00:42:06, FastEthernet0/0
O    172.16.52.128/30 [110/65] via 10.10.10.2, 00:42:06, FastEthernet0/0
O    172.16.52.132/30 [110/65] via 10.10.10.4, 00:42:06, FastEthernet0/0
O*E2 0.0.0.0/0 [110/1] via 10.10.10.1, 00:42:06, FastEthernet0/0
R3#
```



## Verificación en R4

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 10.10.10.1 to network 0.0.0.0

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, 00:41:01, FastEthernet0/0
O    172.16.32.0/21 [110/65] via 172.16.52.134, 00:41:41, Serial0/0/0
O    172.16.40.0/22 [110/2] via 10.10.10.2, 00:41:01, FastEthernet0/0
O    172.16.44.0/22 [110/66] via 10.10.10.2, 00:41:01, FastEthernet0/0
O    172.16.48.0/23 [110/65] via 172.16.52.134, 00:41:41, Serial0/0/0
O    172.16.50.0/23 [110/2] via 10.10.10.3, 00:41:01, 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, 00:41:01, FastEthernet0/0
C    172.16.52.132/30 is directly connected, Serial0/0/0
O*E2 0.0.0.0/0 [110/1] via 10.10.10.1, 00:41:01, FastEthernet0/0
R4#
```

## Verificación en R5

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 172.16.52.130 to network 0.0.0.0

10.0.0.0/29 is subnetted, 1 subnets

```
O    10.10.10.0 [110/65] via 172.16.52.130, 00:37:07, 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, 00:36:57, Serial0/0/0
O    172.16.40.0/22 [110/65] via 172.16.52.130, 00:37:42, 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, 00:36:57, Serial0/0/0
O    172.16.50.0/23 [110/66] via 172.16.52.130, 00:36:57, Serial0/0/0
O    172.16.52.0/25 [110/66] via 172.16.52.130, 00:36:57, 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, 00:36:57, Serial0/0/0
O*E2 0.0.0.0/0 [110/1] via 172.16.52.130, 00:36:57, Serial0/0/0
R5#

```

## Verificación en R6

```
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 172.16.52.133 to network 0.0.0.0

10.0.0.0/29 is subnetted, 1 subnets

```
O    10.10.10.0 [110/65] via 172.16.52.133, 00:39:22, 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, 00:39:12, 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, 00:39:12, Serial0/0/0
O    172.16.44.0/22 [110/130] via 172.16.52.133, 00:39:12, 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, 00:39:12, Serial0/0/0
O    172.16.52.0/25 [110/65] via 172.16.52.133, 00:39:57, Serial0/0/0
O    172.16.52.128/30 [110/129] via 172.16.52.133, 00:39:12, Serial0/0/0
C    172.16.52.132/30 is directly connected, Serial0/0/0
O*E2 0.0.0.0/0 [110/1] via 172.16.52.133, 00:39:12, Serial0/0/0

R6#

```

#### Tarea 4: Ajuste refinado de OSPF

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

- ✓ **R1 nunca participará en una elección DR/BDR.**

```

R1(config)#interface fastethernet 0/0
R1(config-if)#ip ospf priority 0
R1(config-if)#

```

**Utilizar el comando `show ip ospf interface` para verificar que OSPF se haya configurado correctamente y que R1 nunca participará en una elección DR/BDR.**

```

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 00:00:06

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 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#

✓ **R2 siempre será el DR.**

```
R2(config)#interface fastethernet 0/0
```

```
R2(config-if)#ip ospf priority 200
```

```
R2(config-if)#
```

**Utilizar el comando show ip ospf interface para verificar que OSPF se haya configurado correctamente y que R2 es el DR**

```
R2#SHOW IP OSPF INTERFACE
```

```
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 00:00:09

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 0, Adjacent neighbor count is 0

Suppress hello for 0 neighbor(s)

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 200

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 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 3, Adjacent neighbor count is 3

Adjacent with neighbor 172.16.50.1

Adjacent with neighbor 172.16.52.133 (Backup Designated Router)

Adjacent with neighbor 1.1.1.1

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 00:00:05

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#

✓ **R3 y R4 tendrán la misma prioridad de 100.**

```
R3(config)#interface fastethernet 0/0
R3(config-if)#ip ospf priority 100
R3(config-if)#
```

```
R4(config)#interface fastethernet 0/0
```

```
R4(config-if)#ip ospf priority 100
R4(config-if)#
```

**Utilizar el comando show ip ospf interface para verificar que OSPF se haya configurado correctamente y que R3 y R4 tendrán la misma prioridad de 100**

```
R3#SHOW IP OSPF INTERFACE
```

```
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 DROTHER, Priority 100
```

```
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 00:00:02
```

```
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)
```

```
FastEthernet0/0 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 00:00:01

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 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)

R3#

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 00:00:01

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 3

Adjacent with neighbor 172.16.50.1

Adjacent with neighbor 172.16.52.130 (Designated Router)

Adjacent with neighbor 1.1.1.1

Suppress hello for 0 neighbor(s)

FastEthernet0/1 is up, line protocol is up

Internet address is 172.16.52.1/25, 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 00:00:02

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 00:00:02  
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#

✓ **R4 debe ser siempre el BDR**

Con el comando show ip ospf interface en el router R4 para verificar que R4 es el BDR

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 00:00:01

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 3  
    Adjacent with neighbor 172.16.50.1  
    Adjacent with neighbor 172.16.52.130 (Designated Router)  
    Adjacent with neighbor 1.1.1.1  
Suppress hello for 0 neighbor(s)  
FastEthernet0/1 is up, line protocol is up  
    Internet address is 172.16.52.1/25, 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 00:00:02  
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 00:00:02
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#
```

## Tarea 5: Configuración de un loopback

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

```
R1(config)#interface loopback 0
R1(config-if)#ip address 1.1.1.1 255.255.255.255
```

**Paso 2:** Cree una ruta por defecto al loopback

```
R1(config)#ip route 0.0.0.0 0.0.0.0 loopback 0
```

**Paso 3:** Propague la ruta con actualizaciones OSPF.

```
R1(config)#router ospf 1
R1(config-router)#default-information originate
```

Utilizamos la sintaxis `show ip route` en cada router para verificar que las rutas están aprendidas en todos los routers de la red.

Show ip route en R3:

La ruta estática por defecto se está distribuyendo a través de OSPF.

```
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 10.10.10.1 to network 0.0.0.0
```

```
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, 01:16:23, Serial0/0/0
```

```
O    172.16.32.0/21 [110/66] via 10.10.10.4, 01:15:43, 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, 01:16:23, Serial0/0/0
```

```
O    172.16.48.0/23 [110/66] via 10.10.10.4, 01:15:43, FastEthernet0/0
```

```
O    172.16.50.0/23 [110/2] via 10.10.10.3, 01:15:43, FastEthernet0/0
```

```
O    172.16.52.0/25 [110/2] via 10.10.10.4, 01:15:43, 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, 01:15:43, FastEthernet0/0
O*E2 0.0.0.0/0 [110/1] via 10.10.10.1, 01:15:43, FastEthernet0/0
```

### Show ip route en R3:

**La ruta estática por defecto se está distribuyendo a través de OSPF.**

```
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 10.10.10.1 to network 0.0.0.0
```

```
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, 01:16:38, FastEthernet0/0
```

```
O    172.16.32.0/21 [110/66] via 10.10.10.4, 01:16:38, FastEthernet0/0
```

```
O    172.16.40.0/22 [110/2] via 10.10.10.2, 01:16:38, FastEthernet0/0
```

```
O    172.16.44.0/22 [110/66] via 10.10.10.2, 01:16:38, FastEthernet0/0
```

```
O    172.16.48.0/23 [110/66] via 10.10.10.4, 01:16:38, 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, 01:16:38, FastEthernet0/0
O    172.16.52.128/30 [110/65] via 10.10.10.2, 01:16:38, FastEthernet0/0
O    172.16.52.132/30 [110/65] via 10.10.10.4, 01:16:38, FastEthernet0/0
O*E2 0.0.0.0/0 [110/1] via 10.10.10.1, 01:16:38, FastEthernet0/0

```

### Show ip route en R4:

**La ruta estática por defecto se está distribuyendo a través de OSPF.**

```
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 10.10.10.1 to network 0.0.0.0
```

```
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, 01:18:06, FastEthernet0/0
```

```
O    172.16.32.0/21 [110/65] via 172.16.52.134, 01:18:46, Serial0/0/0
```

```
O    172.16.40.0/22 [110/2] via 10.10.10.2, 01:18:06, FastEthernet0/0
```

- O 172.16.44.0/22 [110/66] via 10.10.10.2, 01:18:06, FastEthernet0/0
- O 172.16.48.0/23 [110/65] via 172.16.52.134, 01:18:46, Serial0/0/0
- O 172.16.50.0/23 [110/2] via 10.10.10.3, 01:18:06, 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, 01:18:06, FastEthernet0/0
- C 172.16.52.132/30 is directly connected, Serial0/0/0
- O\*E2 0.0.0.0/0 [110/1] via 10.10.10.1, 01:18:06, FastEthernet0/0

**Show ip route en R5:**

**La ruta estática por defecto se está distribuyendo a través de OSPF.**

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 172.16.52.130 to network 0.0.0.0

- 10.0.0.0/29 is subnetted, 1 subnets
- O 10.10.10.0 [110/65] via 172.16.52.130, 01:20:26, 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, 01:20:16, Serial0/0/0
- O 172.16.40.0/22 [110/65] via 172.16.52.130, 01:21:01, 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, 01:20:16, Serial0/0/0
- O 172.16.50.0/23 [110/66] via 172.16.52.130, 01:20:16, Serial0/0/0
- O 172.16.52.0/25 [110/66] via 172.16.52.130, 01:20:16, 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, 01:20:16, Serial0/0/0
- O\*E2 0.0.0.0/0 [110/1] via 172.16.52.130, 01:20:16, Serial0/0/0



## Show ip route en R6:

**La ruta estática por defecto se está distribuyendo a través de OSPF.**

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 172.16.52.133 to network 0.0.0.0

10.0.0.0/29 is subnetted, 1 subnets

O 10.10.10.0 [110/65] via 172.16.52.133, 01:21:53, 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, 01:21:43, 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, 01:21:43, Serial0/0/0

O 172.16.44.0/22 [110/130] via 172.16.52.133, 01:21:43, 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, 01:21:43, Serial0/0/0

O 172.16.52.0/25 [110/65] via 172.16.52.133, 01:22:28, Serial0/0/0

O 172.16.52.128/30 [110/129] via 172.16.52.133, 01:21:43, Serial0/0/0

C 172.16.52.132/30 is directly connected, Serial0/0/0

O\*E2 0.0.0.0/0 [110/1] via 172.16.52.133, 01:21:43, Serial0/0/0

## Tarea 6:

## Visualización de las actualizaciones OSPF.

### Paso 1: Ingrese al modo Simulación

DIAGRAMA DE TOPOLOGIA CASO DE ESTUDIO CONA 2 EXPLORATION  
SE ASIGNA LA DIRECCION DE RED 172.16.0.0/16

LOOPBACK 1.1.1.1/30

RED LAN: 172.16.0.0/19  
SE REQUIEREN 6.000 HOST

RED LAN: 172.16.44.0/22  
SE REQUIERE 800 HOST

RED LAN: 172.16.52.128/30

RED LAN: 172.16.40.0/22  
SE REQUIERE 1.000 HOST

RED LAN: 172.16.50.0/23  
SE REQUIERE 400 HOST

RED LAN: SE REQUIERE

Elaborado Por:  
Jose Gabriel Cardenas Moya.

Lista de Eventos

Vis.	Tiempo (s)	Ultimo Dispositivo	En Dispositivo	Tipo	Info
------	------------	--------------------	----------------	------	------

Reiniciar Simulación  Retardo Constante Capturado a: \* (sin capturas)

Controles de Reproducción

Regresar Auto Captura / Reproducir Capturar / Reenviar

Filtros de Lista de Eventos

Eventos Visibles: OSPF

Editar Filtros Mostrar Todo

### Paso 2: Seleccione solamente OSPF en el filtro.

DIAGRAMA DE TOPOLOGIA CASO DE ESTUDIO CONA 2 EXPLORATION  
SE ASIGNA LA DIRECCION DE RED 172.16.0.0/16

LOOPBACK 1.1.1.1/30

RED LAN: 172.16.0.0/19  
SE REQUIEREN 6.000 HOST

RED LAN: 172.16.44.0/22  
SE REQUIERE 800 HOST

RED LAN: 172.16.52.128/30

RED LAN: 172.16.40.0/22  
SE REQUIERE 1.000 HOST

RED LAN: 172.16.50.0/23  
SE REQUIERE 400 HOST

RED LAN: SE REQUIERE

Elaborado Por:  
Jose Gabriel Cardenas Moya.

Lista de Eventos

Vis.	Tiempo (s)	Ultimo Dispositivo	En Dispositivo	Tipo	Info
------	------------	--------------------	----------------	------	------

Reiniciar Simulación  Retardo Constante Capturado a: \* (sin capturas)

Controles de Reproducción

Regresar Auto Captura / Reproducir Capturar / Reenviar

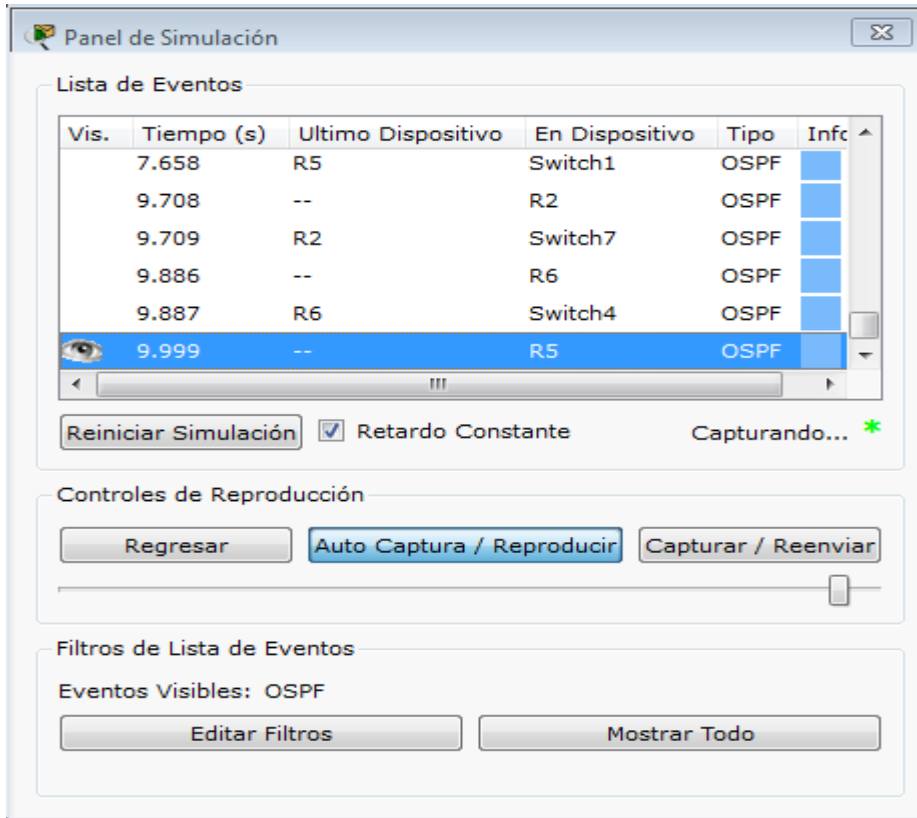
Filtros de Lista de Eventos

Eventos Visibles: OSPF

Editar Filtros de ACL

Mostrar Todos/

**Paso 3:** Visualice las actualizaciones.



5. Configuración final de cada uno de los dispositivos, describiéndose en detalle cada uno de los elementos que lo conforman. Por ejemplo, descripción de la configuración de interfaces, configuración del protocolo de enrutamiento, etc.

**Configuración de las interfaces en R1.**

```
R1#SHOW IP INTERFACE BRIEF
```

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	10.10.10.1	YES	manual	up	up
FastEthernet0/1	unassigned	YES	unset	administratively down	down
Loopback0	1.1.1.1	YES	manual	up	up
Vlan1	unassigned	YES	unset	administratively down	down

```
R1#
```

## Configuración del protocolo de enrutamiento en R1.

```
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
  It is an autonomous system boundary router
  Redistributing External Routes from,
  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
  Routing Information Sources:
Gateway        Distance    Last Update
  1.1.1.1             110      00:13:35
  172.16.50.1         110      00:13:40
  172.16.52.129       110      00:14:14
  172.16.52.130       110      00:13:40
  172.16.52.133       110      00:13:40
  172.16.52.134       110      00:14:14
  Distance: (default is 110)
```

## Configuración de las interfaces en R2.

```
R2#SHOW IP INTERFACE BRIEF
Interface      IP-Address    OK? Method Status      Protocol
FastEthernet0/0  10.10.10.2   YES manual up          up
FastEthernet0/1  172.16.40.1  YES manual up          up
Serial0/0/0     172.16.52.130 YES manual up          up
Vlan1           unassigned   YES unset  administratively down down
R2#
```

## Configuración del protocolo de enrutamiento en R2.

```
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        00:23:03
 172.16.50.1   110        00:23:08
 172.16.52.129 110        00:23:42
 172.16.52.130 110        00:23:07
 172.16.52.133 110        00:23:08
 172.16.52.134 110        00:23:41
Distance: (default is 110)

```

R2#

### Configuración de las interfaces en R3.

```

R3#SHOW IP INTERFACE BRIEF
Interface      IP-Address    OK? Method Status      Protocol
FastEthernet0/0 10.10.10.3    YES manual up          up
FastEthernet0/1 172.16.50.1   YES manual up          up
Vlan1          unassigned    YES unset  administratively down down
R3#

```

### Configuración del protocolo de enrutamiento en R3.

```

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:
 10.10.10.0 0.0.0.7 area 0
 172.16.50.0 0.0.1.255 area 0
Routing Information Sources:
 Gateway      Distance    Last Update
1.1.1.1       110         00:23:03
 172.16.50.1   110         00:23:07
 172.16.52.129 110         00:23:41
 172.16.52.130 110         00:23:07
 172.16.52.133 110         00:23:08
 172.16.52.134 110         00:23:41
Distance: (default is 110)

```

R3#

#### Configuración de las interfaces en R4.

```

R4#SHOW IP INTERFACE BRIEF
Interface      IP-Address    OK? Method Status      Protocol
FastEthernet0/0  10.10.10.4   YES manual up          up
FastEthernet0/1  172.16.52.1  YES manual up          up
Serial0/0/0      172.16.52.133 YES manual up          up
Vlan1           unassigned   YES unset  administratively down down
R4#

```

#### Configuración del protocolo de enrutamiento en R4.

```

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 0.0.1.255 area 0
    172.16.52.132 0.0.0.3 area 0
  Routing Information Sources:
    Gateway      Distance    Last Update
1.1.1.1         110         00:23:02
 172.16.50.1    110         00:23:07

```

```

172.16.52.129    110    00:23:41
172.16.52.130    110    00:23:07
172.16.52.133    110    00:23:07
172.16.52.134    110    00:23:41
Distance: (default is 110)

```

R4#

### Configuración de las interfaces en R5.

```

R5#SHOW IP INTERFACE BRIEF
Interface          IP-Address  OK? Method Status      Protocol
FastEthernet0/0    172.16.44.1  YES manual up          up
FastEthernet0/1    172.16.0.1   YES manual up          up
Serial0/0/0        172.16.52.129 YES manual up          up
Vlan1              unassigned  YES unset  administratively down down
R5#

```

### Configuración del protocolo de enrutamiento en R5.

```

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       00:23:03
  172.16.50.1       110       00:23:08
  172.16.52.129     110       00:23:41
  172.16.52.130     110       00:23:07
  172.16.52.133     110       00:23:08
  172.16.52.134     110       00:23:41
  Distance: (default is 110)

```

R5#

### Configuración de las interfaces en R6.

```
R6#SHOW IP INTERFACE BRIEF
Interface          IP-Address  OK? Method Status      Protocol
FastEthernet0/0    172.16.48.1 YES manual up          up
FastEthernet0/1    172.16.32.1 YES manual up          up
Serial0/0/0        172.16.52.134 YES manual up          up
Vlan1              unassigned  YES unset  administratively down down
R6#
```

### Configuración del protocolo de enrutamiento en R6.

```
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
    172.16.52.132 0.0.0.3 area 0
    172.16.32.0 0.0.7.255 area 0
  Routing Information Sources:
    Gateway         Distance   Last Update
  1.1.1.1           110       00:23:03
    172.16.50.1     110       00:23:08
    172.16.52.129   110       00:23:42
    172.16.52.130   110       00:23:08
    172.16.52.133   110       00:23:08
    172.16.52.134   110       00:23:41
  Distance: (default is 110)

R6#
```



## CONCLUSIONES

Se desarrolla los dos casos de estudio, siguiendo las especificaciones de la guía: se presenta la documentación para cada caso de estudio y cada una de las subredes requeridas en cada caso.

En packet tracer se hace la simulación, con los dispositivos requeridos para el desarrollo de las prácticas, en cada uno se realiza las configuraciones para sus interfaces, siguiendo las exigencias de la guía.

Se aprendió el manejo de la herramienta y de los comandos necesarios para el funcionamiento de la red, para cumplir el objetivo de cada caso de estudio.

Para que dos sistemas se comuniquen, se deben poder identificar y localizar entre sí.

Las direcciones IP se dividen en clases para definir las redes de tamaño pequeño, mediano y grande. Las direcciones Clase A se asignan a las redes de mayor tamaño. Las direcciones Clase B se utilizan para las redes de tamaño medio y las de Clase C para redes pequeñas.

Es muy importante en la configuración y acceso a un router, definir contraseña secreta, de consola y telnet.

Documentar en lo posible al máximo, el diseño y topología de una red, proporciona facilidad en la configuración de los dispositivos y sus interfaces.

Al momento de realizar una configuración a un router, hay que guardar los parámetros ingresados, estos son guardados en la memoria flash en dispositivos CISCO y se copia a la RAM durante el proceso de arranque.

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Herramienta de simulación

Cisco Packet tracer