Tarea 11

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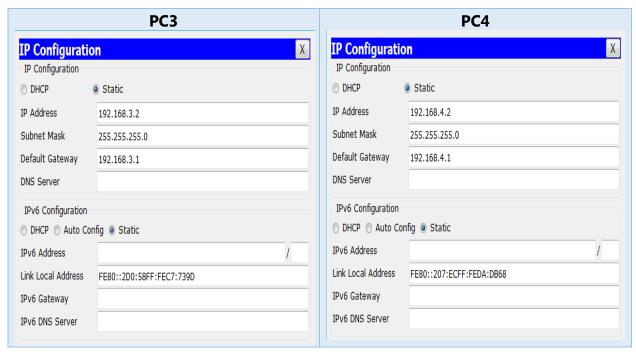
1. OSPF Multi Área

➢ **Configuración**

PC3	PC4

IP Configuration (PC3)
- IP Configuration
  - ○ DHCP   ● Static
  - IP Address: 192.168.3.2
  - Subnet Mask: 255.255.255.0
  - Default Gateway: 192.168.3.1
  - DNS Server:
- IPv6 Configuration
  - ○ DHCP ○ Auto Config ● Static
  - IPv6 Address: /
  - Link Local Address: FE80::2D0:58FF:FEC7:739D
  - IPv6 Gateway:
  - IPv6 DNS Server:

IP Configuration (PC4)
- IP Configuration
  - ○ DHCP   ● Static
  - IP Address: 192.168.4.2
  - Subnet Mask: 255.255.255.0
  - Default Gateway: 192.168.4.1
  - DNS Server:
- IPv6 Configuration
  - ○ DHCP ○ Auto Config ● Static
  - IPv6 Address: /
  - Link Local Address: FE80::207:ECFF:FEDA:DB68
  - IPv6 Gateway:
  - IPv6 DNS Server:

➢ Configuración Routers

➢ Router1

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config)#interface GigabitEthernet0/1
Router(config-if)#ip address 10.0.1.1 255.0.0.0
Router(config-if)#ip address 10.0.1.1 255.255.255.252
Router(config-if)#no shutdown
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 10.0.4.1 255.255.255.252
Router(config-if)#no shutdown
```

➢ Router2

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ip address 192.168.2.1 255.255.255.0
Router(config-if)#no shutdown
Router(config)#interface GigabitEthernet0/1
Router(config-if)#ip address 10.0.1.2 255.0.0.0
Router(config-if)#ip address 10.0.1.2 255.255.255.252
Router(config-if)#no shutdown
Router(config)#interface GigabitEthernet0/2
Router(config-if)#ip address 10.0.2.1 255.255.255.252
Router(config-if)#no shutdown
```

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> ➢ **Router3**

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#no ip address
Router(config-if)#ip address 192.168.3.1 255.255.255.0
Router(config-if)#no shutdown
Router(config)#interface GigabitEthernet0/2
Router(config-if)#ip address 10.0.2.2 255.0.0.0
Router(config-if)#ip address 10.0.2.2 255.255.255.252
Router(config-if)#no shutdown
Router(config)#interface GigabitEthernet0/1
Router(config-if)#ip address 10.0.3.1 255.255.255.252
Router(config-if)#no shutdown
```

> ➢ **Router4**

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ip address 192.168.4.1 255.255.255.0
Router(config-if)#no shutdown
Router(config)#interface GigabitEthernet0/1
Router(config-if)#ip address 10.0.3.2 255.0.0.0
Router(config-if)#ip address 10.0.3.2 255.255.255.252
Router(config-if)#no shutdown
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 10.0.4.2 255.255.255.252
Router(config-if)#no shutdown
```

> ➢ **Enrutamiento OSPF**

> ➢ **Router1**

```
Router(config)#route ospf 1
Router(config-router)#net
Router(config-router)#network 192.168.1.0 0.0.0.255 area 1
Router(config-router)#network 10.0.1.0 0.0.0.3 area 0
Router(config-router)#network 10.0.4.0 0.0.0.3 area 0
Router(config-router)#exit
```

> ➢ **Router2**

```
Router(config)#route ospf 1
Router(config-router)#net
Router(config-router)#network 192.168.2.0 0.0.0.255 area 2
Router(config-router)#network 10.0.1.0 0.0.0.3 area 0
Router(config-router)#network 10.0.1.0 0.0.0.3 area 0
00:59:42: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on GigabitEthernet0/1 from
Router(config-router)#network 10.0.2.0 0.0.0.3 area 0
Router(config-router)#exit
```

> ➢ **Router3**

```
Router(config)#route ospf 1
Router(config-router)#net
Router(config-router)#network 192.168.3.0 0.0.0.255 area 3
Router(config-router)#network 10.0.2.0 0.0.0.3 area 0
Router(config-router)#network 10.0.3.0 0.0.0.3 area 0
01:01:25: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on GigabitEthernet0/2 from
LOADING to FULL, Loading Do
Router(config-router)#exit
```

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> **Router4**

```
Router(config)#route ospf 1
Router(config-router)#net
Router(config-router)#network 192.168.4.0 0.0.0.255 area 4
Router(config-router)#network 10.0.3.0 0.0.0.3 area 0
Router(config-router)#network 10.0.4.0 0.0.0.3 area 0
00:59:58: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on Serial0/0/0 from LOADING
to FULL, Loading Done

00:59:59: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.3.1 on GigabitEthernet0/1 from
LOADING to FULL, Loading Done

Router(config-router)#exit
```

ACTIVIDADES

   a) Asegúrese de tener conectividad entre todos los PC's.

> PC1

```
Command Prompt                                                          X

Packet Tracer PC Command Line 1.0
PC>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=1ms TTL=126
Reply from 192.168.2.2: bytes=32 time=0ms TTL=126
Reply from 192.168.2.2: bytes=32 time=0ms TTL=126
Reply from 192.168.2.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time=1ms TTL=125
Reply from 192.168.3.2: bytes=32 time=0ms TTL=125
Reply from 192.168.3.2: bytes=32 time=11ms TTL=125
Reply from 192.168.3.2: bytes=32 time=10ms TTL=125

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 11ms, Average = 5ms

PC>ping 192.168.4.2

Pinging 192.168.4.2 with 32 bytes of data:

Reply from 192.168.4.2: bytes=32 time=17ms TTL=124
Reply from 192.168.4.2: bytes=32 time=10ms TTL=124
Reply from 192.168.4.2: bytes=32 time=11ms TTL=124
Reply from 192.168.4.2: bytes=32 time=12ms TTL=124

Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

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➢ **PC2**

```
Command Prompt                                                              X

Packet Tracer PC Command Line 1.0
PC>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=0ms TTL=126
Reply from 192.168.1.2: bytes=32 time=0ms TTL=126
Reply from 192.168.1.2: bytes=32 time=1ms TTL=126
Reply from 192.168.1.2: bytes=32 time=0ms TTL=126

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time=1ms TTL=126
Reply from 192.168.3.2: bytes=32 time=0ms TTL=126
Reply from 192.168.3.2: bytes=32 time=0ms TTL=126
Reply from 192.168.3.2: bytes=32 time=0ms TTL=126

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 192.168.4.2

Pinging 192.168.4.2 with 32 bytes of data:

Reply from 192.168.4.2: bytes=32 time=10ms TTL=125
Reply from 192.168.4.2: bytes=32 time=0ms TTL=125
Reply from 192.168.4.2: bytes=32 time=0ms TTL=125
Reply from 192.168.4.2: bytes=32 time=1ms TTL=125

Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

➢ **PC3**

```
Command Prompt                                                              X

Packet Tracer PC Command Line 1.0
PC>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=1ms TTL=125
Reply from 192.168.1.2: bytes=32 time=0ms TTL=125
Reply from 192.168.1.2: bytes=32 time=0ms TTL=125
Reply from 192.168.1.2: bytes=32 time=10ms TTL=125

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 10ms, Average = 2ms

PC>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=0ms TTL=126
Reply from 192.168.2.2: bytes=32 time=1ms TTL=126
Reply from 192.168.2.2: bytes=32 time=0ms TTL=126
Reply from 192.168.2.2: bytes=32 time=0ms TTL=126

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 192.168.4.2

Pinging 192.168.4.2 with 32 bytes of data:

Reply from 192.168.4.2: bytes=32 time=1ms TTL=126
Reply from 192.168.4.2: bytes=32 time=0ms TTL=126
Reply from 192.168.4.2: bytes=32 time=1ms TTL=126
Reply from 192.168.4.2: bytes=32 time=0ms TTL=126

Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

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> **PC4**

```
Command Prompt                                                    X

Packet Tracer PC Command Line 1.0
PC>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=12ms TTL=124
Reply from 192.168.1.2: bytes=32 time=12ms TTL=124
Reply from 192.168.1.2: bytes=32 time=0ms TTL=124
Reply from 192.168.1.2: bytes=32 time=10ms TTL=124

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 12ms, Average = 8ms

PC>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=0ms TTL=125
Reply from 192.168.2.2: bytes=32 time=0ms TTL=125
Reply from 192.168.2.2: bytes=32 time=0ms TTL=125
Reply from 192.168.2.2: bytes=32 time=10ms TTL=125

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 10ms, Average = 2ms

PC>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time=1ms TTL=126
Reply from 192.168.3.2: bytes=32 time=0ms TTL=126
Reply from 192.168.3.2: bytes=32 time=0ms TTL=126
Reply from 192.168.3.2: bytes=32 time=0ms TTL=126

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```
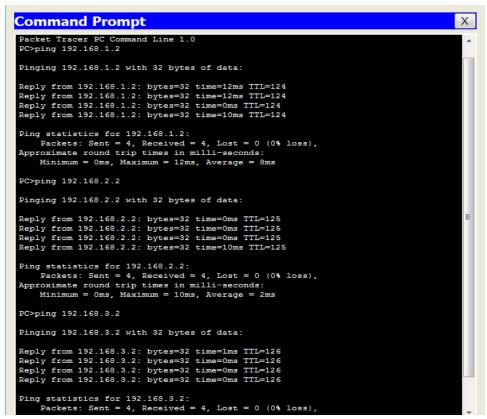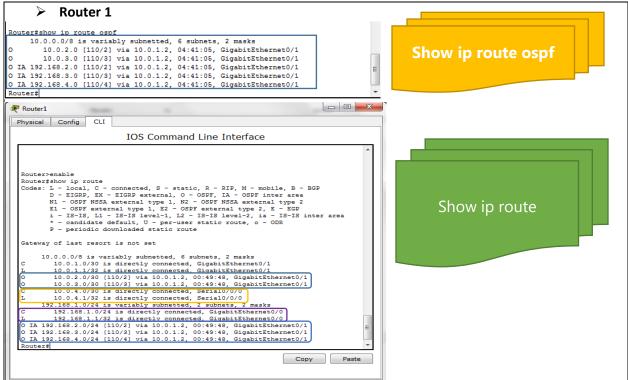
b) Explique las rutas configuradas y haga uso de los comandos show ip route
y show ip route ospf. ¿Cuál es la diferencia entre los dos comandos?

> **Router 1**

```
Router#show ip route ospf
     10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
O       10.0.2.0 [110/2] via 10.0.1.2, 04:41:05, GigabitEthernet0/1
O       10.0.3.0 [110/3] via 10.0.1.2, 04:41:05, GigabitEthernet0/1
O IA 192.168.2.0 [110/2] via 10.0.1.2, 04:41:05, GigabitEthernet0/1
O IA 192.168.3.0 [110/3] via 10.0.1.2, 04:41:05, GigabitEthernet0/1
O IA 192.168.4.0 [110/4] via 10.0.1.2, 04:41:05, GigabitEthernet0/1
Router#
```

Show ip route ospf

Show ip route

```
Router1                                                    [ _ ][ □ ][ X ]

Physical   Config   CLI

                  IOS Command Line Interface

Router>enable
Router#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, 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

     10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
C       10.0.1.0/30 is directly connected, GigabitEthernet0/1
L       10.0.1.1/32 is directly connected, GigabitEthernet0/1
O       10.0.2.0/30 [110/2] via 10.0.1.2, 00:49:48, GigabitEthernet0/1
O       10.0.3.0/30 [110/3] via 10.0.1.2, 00:49:48, GigabitEthernet0/1
C       10.0.4.0/30 is directly connected, Serial0/0/0
L       10.0.4.1/32 is directly connected, Serial0/0/0
     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
O IA 192.168.2.0/24 [110/2] via 10.0.1.2, 00:49:48, GigabitEthernet0/1
O IA 192.168.3.0/24 [110/3] via 10.0.1.2, 00:49:48, GigabitEthernet0/1
O IA 192.168.4.0/24 [110/4] via 10.0.1.2, 00:49:48, GigabitEthernet0/1
Router#

                                        Copy        Paste
```

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> ➤ **Router 2**

```
Router#show ip route ospf
     10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
O       10.0.3.0 [110/2] via 10.0.2.2, 04:42:51, GigabitEthernet0/2
O       10.0.4.0 [110/65] via 10.0.1.1, 04:42:51, GigabitEthernet0/1
O IA 192.168.1.0 [110/2] via 10.0.1.1, 04:42:36, GigabitEthernet0/1
O IA 192.168.3.0 [110/2] via 10.0.2.2, 04:42:36, GigabitEthernet0/2
O IA 192.168.4.0 [110/3] via 10.0.2.2, 04:42:36, GigabitEthernet0/2
Router#
```

Show ip route ospf

```
Router2                                                    [ - ] [ □ ] [ X ]

 Physical  | Config | CLI

                     IOS Command Line Interface
 00:00:45: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on GigabitEthernet0/1 from
 LOADING to FULL, Loading Done

 Router>en
 Router#show ip route
 Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, 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

      10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
 C       10.0.1.0/30 is directly connected, GigabitEthernet0/1
 L       10.0.1.2/32 is directly connected, GigabitEthernet0/1
 C       10.0.2.0/30 is directly connected, GigabitEthernet0/2
 L       10.0.2.1/32 is directly connected, GigabitEthernet0/2
 O       10.0.3.0/30 [110/2] via 10.0.2.2, 04:42:19, GigabitEthernet0/2
 O       10.0.4.0/30 [110/65] via 10.0.1.1, 04:42:19, GigabitEthernet0/1
 O IA 192.168.1.0/24 [110/2] via 10.0.1.1, 04:42:04, GigabitEthernet0/1
      192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
 C       192.168.2.0/24 is directly connected, GigabitEthernet0/0
 L       192.168.2.1/32 is directly connected, GigabitEthernet0/0
 O IA 192.168.3.0/24 [110/2] via 10.0.2.2, 04:42:04, GigabitEthernet0/2
 O IA 192.168.4.0/24 [110/3] via 10.0.2.2, 04:42:04, GigabitEthernet0/2
 Router#

                                              [ Copy ]    [ Paste ]
```

Show ip route

> ➤ **Router 3**

```
Router#show ip route ospf
     10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
O       10.0.1.0 [110/2] via 10.0.2.1, 04:43:35, GigabitEthernet0/2
O       10.0.4.0 [110/65] via 10.0.3.2, 04:43:45, GigabitEthernet0/1
O IA 192.168.1.0 [110/3] via 10.0.2.1, 04:43:35, GigabitEthernet0/2
O IA 192.168.2.0 [110/2] via 10.0.2.1, 04:43:45, GigabitEthernet0/2
O IA 192.168.4.0 [110/2] via 10.0.3.2, 04:43:45, GigabitEthernet0/1
Router#
```

Show ip route ospf

```
Router3                                                    [ - ] [ □ ] [ X ]

 Physical  | Config | CLI

                     IOS Command Line Interface
 00:00:45: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on GigabitEthernet0/2 from
 LOADING to FULL, Loading Done

 Router>en
 Router#show ip route
 Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, 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

      10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
 O       10.0.1.0/30 [110/2] via 10.0.2.1, 04:43:09, GigabitEthernet0/2
 C       10.0.2.0/30 is directly connected, GigabitEthernet0/2
 L       10.0.2.2/32 is directly connected, GigabitEthernet0/2
 C       10.0.3.0/30 is directly connected, GigabitEthernet0/1
 L       10.0.3.1/32 is directly connected, GigabitEthernet0/1
 O       10.0.4.0/30 [110/65] via 10.0.3.2, 04:43:19, GigabitEthernet0/1
 O IA 192.168.1.0/24 [110/3] via 10.0.2.1, 04:43:09, GigabitEthernet0/2
 O IA 192.168.2.0/24 [110/2] via 10.0.2.1, 04:43:19, GigabitEthernet0/2
      192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
 C       192.168.3.0/24 is directly connected, GigabitEthernet0/0
 L       192.168.3.1/32 is directly connected, GigabitEthernet0/0
 O IA 192.168.4.0/24 [110/2] via 10.0.3.2, 04:43:19, GigabitEthernet0/1
 Router#

                                              [ Copy ]    [ Paste ]
```

Show ip route

> ➤ **Router 4**

```
Router#show ip route ospf
     10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
O       10.0.1.0 [110/3] via 10.0.3.1, 04:45:00, GigabitEthernet0/1
O       10.0.2.0 [110/2] via 10.0.3.1, 04:45:15, GigabitEthernet0/1
O IA 192.168.1.0 [110/4] via 10.0.3.1, 04:45:00, GigabitEthernet0/1
O IA 192.168.2.0 [110/3] via 10.0.3.1, 04:45:00, GigabitEthernet0/1
O IA 192.168.3.0 [110/2] via 10.0.3.1, 04:45:00, GigabitEthernet0/1
Router#
```

Show ip route ospf

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Show ip route

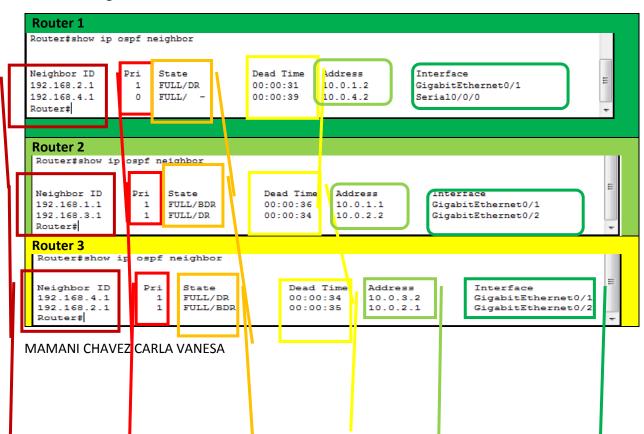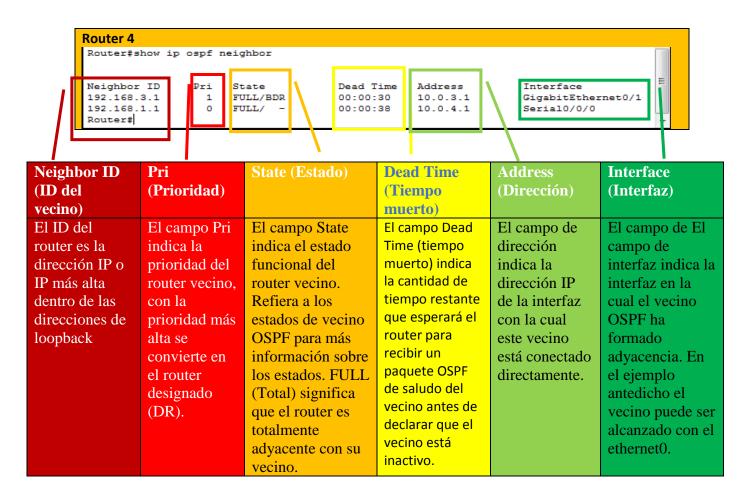Configuración de las rutas de conexión de los GigabitEthernet a las PC's.

Configuración de las rutas de conexión de los GigabitEthernet a los Routers vecinos.

Direcciones de los dispositivos que no se encuentran conectados al Router (ospf).

c) Explique en detalle la información que despliega el comando show ip ospf neighbor en los routers.

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```
Router 4
Router#show ip ospf neighbor


Neighbor ID     Pri  State          Dead Time   Address      Interface
192.168.3.1      1   FULL/BDR       00:00:30    10.0.3.1     GigabitEthernet0/1
192.168.1.1      0   FULL/  -       00:00:38    10.0.4.1     Serial0/0/0
Router#
```

Neighbor ID (ID del vecino)	Pri (Prioridad)	State (Estado)	Dead Time (Tiempo muerto)	Address (Dirección)	Interface (Interfaz)
El ID del router es la dirección IP o IP más alta dentro de las direcciones de loopback	El campo Pri indica la prioridad del router vecino, con la prioridad más alta se convierte en el router designado (DR).	El campo State indica el estado funcional del router vecino. Refiera a los estados de vecino OSPF para más información sobre los estados. FULL (Total) significa que el router es totalmente adyacente con su vecino.	El campo Dead Time (tiempo muerto) indica la cantidad de tiempo restante que esperará el router para recibir un paquete OSPF de saludo del vecino antes de declarar que el vecino está inactivo.	El campo de dirección indica la dirección IP de la interfaz con la cual este vecino está conectado directamente.	El campo de El campo de interfaz indica la interfaz en la cual el vecino OSPF ha formado adyacencia. En el ejemplo antedicho el vecino puede ser alcanzado con el ethernet0.

d) Proporcione información de los costos de las interfaces del Router1 y explique los valores obtenidos coste de una interfaz.
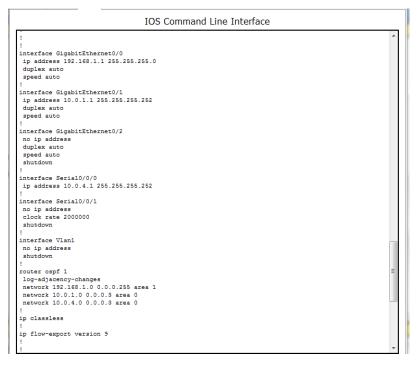
Para determinar el costo se calcula el valor en la siguiente fórmula:

$$Costo = \frac{Ancho\ de\ banda\ de\ referencia}{Ancho\ de\ banda\ de\ la\ interfaz}$$

Router 1			
Interfaces	Ancho de banda de referencia (bps)	Ancho de banda de la interfaz (bps)	Costo
(Switch)	100000000	100000000	1
(Router 2)	100000000	100000000	1
(Router 4)	100000000	1544000	6,5

e) Adjuntar la configuración de los routers usando el comando show running-config.

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Router 1

```
IOS Command Line Interface

!
!
interface GigabitEthernet0/0
 ip address 192.168.1.1 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 ip address 10.0.1.1 255.255.255.252
 duplex auto
 speed auto
!
interface GigabitEthernet0/2
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0/0
 ip address 10.0.4.1 255.255.255.252
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 192.168.1.0 0.0.0.255 area 1
 network 10.0.1.0 0.0.0.3 area 0
 network 10.0.4.0 0.0.0.3 area 0
!
ip classless
!
ip flow-export version 9
!
!
```
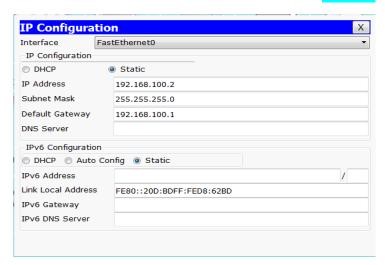
Router 2

```
IOS Command Line Interface

spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet0/0
 ip address 192.168.2.1 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 ip address 10.0.1.2 255.255.255.252
 duplex auto
 speed auto
!
interface GigabitEthernet0/2
 ip address 10.0.2.1 255.255.255.252
 duplex auto
 speed auto
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 192.168.2.0 0.0.0.255 area 2
 network 10.0.1.0 0.0.0.3 area 0
 network 10.0.2.0 0.0.0.3 area 0
!
ip classless
!
ip flow-export version 9
!
!
!
!
!
!
```

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✚ Router 3

IOS Command Line Interface

```
!
!
spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet0/0
 ip address 192.168.3.1 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 ip address 10.0.3.1 255.255.255.252
 duplex auto
 speed auto
!
interface GigabitEthernet0/2
 ip address 10.0.2.2 255.255.255.252
 duplex auto
 speed auto
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 192.168.3.0 0.0.0.255 area 3
 network 10.0.2.0 0.0.0.3 area 0
 network 10.0.3.0 0.0.0.3 area 0
!
ip classless
!
ip flow-export version 9
!
!
!
!
```

✚ Router 4

IOS Command Line Interface

```
spanning-tree mode pvst
!
!
!
!
!
interface GigabitEthernet0/0
 ip address 192.168.4.1 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 ip address 10.0.3.2 255.255.255.252
 duplex auto
 speed auto
!
interface GigabitEthernet0/2
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0/0
 ip address 10.0.4.2 255.255.255.252
 clock rate 2000000
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 192.168.4.0 0.0.0.255 area 4
 network 10.0.3.0 0.0.0.3 area 0
 network 10.0.4.0 0.0.0.3 area 0
!
```
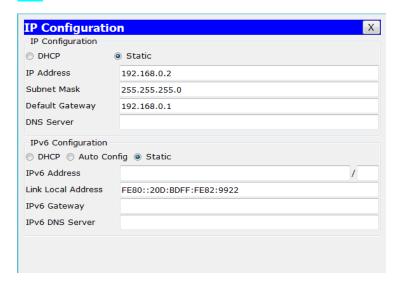
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2. Tabla Enrutamiento

Dispositivo	Interface	Dirección IP	Gateway
Servidor	NIC	192.168.100.2/24	192.168.100.1
PC1	NIC	192.168.0.2/24	192.168.0.1
PC2	NIC	130.10.1.100/16	130.10.1.20
PC3	NIC	130.10.1.200/16	130.10.1.20
R1	S0/0/0	10.11.0.2/8	N/A
	Fa0/0	130.10.1.20/16	N/A
R2	S0/0/0	10.11.0.1/8	N/A
	Fa0/0	192.168.100.1/24	N/A
	Fa0/1	192.168.0.1/24	N/A
Switch	Conectado a PC2, PC3 y R1		

+ Configuración de las PC's y Servidor

Servidor
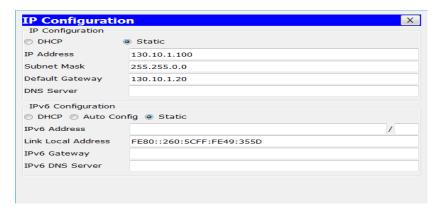
PC1
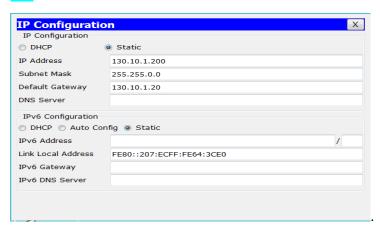
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PC2

IP Configuration   [X]

IP Configuration
○ DHCP   ● Static
IP Address   130.10.1.100
Subnet Mask   255.255.0.0
Default Gateway   130.10.1.20
DNS Server

IPv6 Configuration
○ DHCP ○ Auto Config ● Static
IPv6 Address   /
Link Local Address   FE80::260:5CFF:FE49:355D
IPv6 Gateway
IPv6 DNS Server

PC3

IP Configuration   [X]

IP Configuration
○ DHCP   ● Static
IP Address   130.10.1.200
Subnet Mask   255.255.0.0
Default Gateway   130.10.1.20
DNS Server

IPv6 Configuration
○ DHCP ○ Auto Config ● Static
IPv6 Address   /
Link Local Address   FE80::207:ECFF:FE64:3CE0
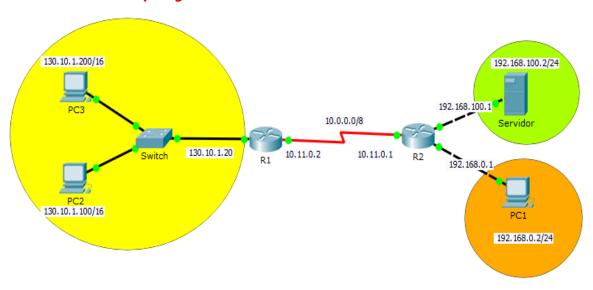IPv6 Gateway
IPv6 DNS Server

Router 1

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 130.10.1.20 255.255.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 10.11.0.2 255.0.0.0
Router(config-if)#no shutdown
```

Router 2

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.100.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 192.168.0.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 10.11.0.1 255.0.0.0
Router(config-if)#no shutdown
```

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Actividades

1. **Muestre la topología obtenida.**

2. **Configure enrutamiento con RIP2.**

ENRUTAMIENTO RIPv2

Router 1
```
Router>en
Router#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#route rip
Router(config-router)#version 2
Router(config-router)#network 192.168.0.0
Router(config-router)#network 192.168.100.0
Router(config-router)#network 10.0.0.0
Router(config-router)#exit
```
Router 2
```
Router>en
Router#conf ter
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#route rip
Router(config-router)#version 2
Router(config-router)#network 130.10.0.0
Router(config-router)#network 10.0.0.0
Router(config-router)#exit
```

3. **Verifique las configuraciones y asegúrese de tener conectividad entre todos los dispositivos.**

Servidor

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Command Prompt   X

```
Packet Tracer SERVER Command Line 1.0
SERVER>ping 192.168.0.2

Pinging 192.168.0.2 with 32 bytes of data:

Reply from 192.168.0.2: bytes=32 time=0ms TTL=127
Reply from 192.168.0.2: bytes=32 time=0ms TTL=127
Reply from 192.168.0.2: bytes=32 time=0ms TTL=127
Reply from 192.168.0.2: bytes=32 time=0ms TTL=127

Ping statistics for 192.168.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

SERVER>ping 130.10.1.100

Pinging 130.10.1.100 with 32 bytes of data:

Reply from 130.10.1.100: bytes=32 time=2ms TTL=126
Reply from 130.10.1.100: bytes=32 time=1ms TTL=126
Reply from 130.10.1.100: bytes=32 time=1ms TTL=126
Reply from 130.10.1.100: bytes=32 time=1ms TTL=126

Ping statistics for 130.10.1.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 2ms, Average = 1ms

SERVER>ping 130.10.1.200

Pinging 130.10.1.200 with 32 bytes of data:

Reply from 130.10.1.200: bytes=32 time=1ms TTL=126
Reply from 130.10.1.200: bytes=32 time=7ms TTL=126
Reply from 130.10.1.200: bytes=32 time=6ms TTL=126
Reply from 130.10.1.200: bytes=32 time=1ms TTL=126

Ping statistics for 130.10.1.200:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

PC1

Command Prompt   X

```
Packet Tracer PC Command Line 1.0
PC>ping 130.10.1.100

Pinging 130.10.1.100 with 32 bytes of data:

Reply from 130.10.1.100: bytes=32 time=2ms TTL=126
Reply from 130.10.1.100: bytes=32 time=2ms TTL=126
Reply from 130.10.1.100: bytes=32 time=18ms TTL=126
Reply from 130.10.1.100: bytes=32 time=1ms TTL=126

Ping statistics for 130.10.1.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 18ms, Average = 5ms

PC>ping 130.10.1.200

Pinging 130.10.1.200 with 32 bytes of data:

Reply from 130.10.1.200: bytes=32 time=2ms TTL=126
Reply from 130.10.1.200: bytes=32 time=1ms TTL=126
Reply from 130.10.1.200: bytes=32 time=1ms TTL=126
Reply from 130.10.1.200: bytes=32 time=11ms TTL=126

Ping statistics for 130.10.1.200:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 11ms, Average = 3ms

PC>ping 192.168.100.2

Pinging 192.168.100.2 with 32 bytes of data:

Reply from 192.168.100.2: bytes=32 time=1ms TTL=127
Reply from 192.168.100.2: bytes=32 time=0ms TTL=127
Reply from 192.168.100.2: bytes=32 time=0ms TTL=127
Reply from 192.168.100.2: bytes=32 time=0ms TTL=127

Ping statistics for 192.168.100.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

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PC2

```
Command Prompt                                                          X

Packet Tracer PC Command Line 1.0
PC>ping 192.168.0.2

Pinging 192.168.0.2 with 32 bytes of data:

Reply from 192.168.0.2: bytes=32 time=2ms TTL=126
Reply from 192.168.0.2: bytes=32 time=1ms TTL=126
Reply from 192.168.0.2: bytes=32 time=1ms TTL=126
Reply from 192.168.0.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 2ms, Average = 1ms

PC>ping 130.10.1.200

Pinging 130.10.1.200 with 32 bytes of data:

Reply from 130.10.1.200: bytes=32 time=2ms TTL=128
Reply from 130.10.1.200: bytes=32 time=0ms TTL=128
Reply from 130.10.1.200: bytes=32 time=0ms TTL=128
Reply from 130.10.1.200: bytes=32 time=0ms TTL=128

Ping statistics for 130.10.1.200:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 2ms, Average = 0ms

PC>ping 192.168.100.2

Pinging 192.168.100.2 with 32 bytes of data:

Reply from 192.168.100.2: bytes=32 time=1ms TTL=126
Reply from 192.168.100.2: bytes=32 time=1ms TTL=126
Reply from 192.168.100.2: bytes=32 time=1ms TTL=126
Reply from 192.168.100.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.100.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

PC3

```
Command Prompt                                                          X

Packet Tracer PC Command Line 1.0
PC>ping 192.168.0.2

Pinging 192.168.0.2 with 32 bytes of data:

Reply from 192.168.0.2: bytes=32 time=1ms TTL=126
Reply from 192.168.0.2: bytes=32 time=1ms TTL=126
Reply from 192.168.0.2: bytes=32 time=4ms TTL=126
Reply from 192.168.0.2: bytes=32 time=2ms TTL=126

Ping statistics for 192.168.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 4ms, Average = 2ms

PC>ping 130.10.1.100

Pinging 130.10.1.100 with 32 bytes of data:

Reply from 130.10.1.100: bytes=32 time=1ms TTL=128
Reply from 130.10.1.100: bytes=32 time=0ms TTL=128
Reply from 130.10.1.100: bytes=32 time=0ms TTL=128
Reply from 130.10.1.100: bytes=32 time=0ms TTL=128

Ping statistics for 130.10.1.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 192.168.100.2

Pinging 192.168.100.2 with 32 bytes of data:

Reply from 192.168.100.2: bytes=32 time=2ms TTL=126
Reply from 192.168.100.2: bytes=32 time=3ms TTL=126
Reply from 192.168.100.2: bytes=32 time=1ms TTL=126
Reply from 192.168.100.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.100.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```
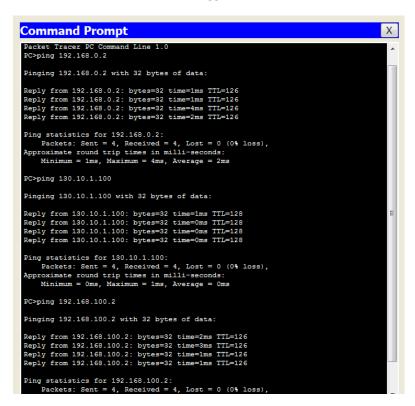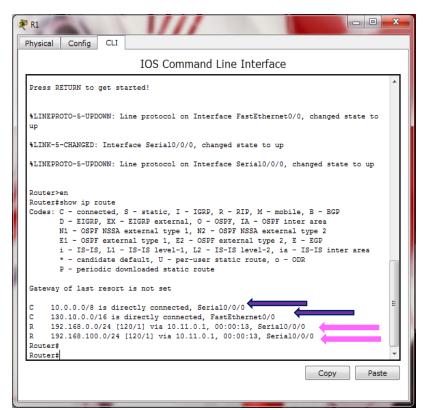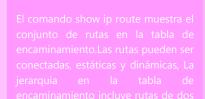
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4. Explique las rutas configuradas y confirme lo explicado mediante el uso del comando show ip route.

Router 1


```
R1                                                            - □ x
Physical   Config   CLI
                    IOS Command Line Interface

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to
up

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up


Router>en
Router#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

C    10.0.0.0/8 is directly connected, Serial0/0/0
C    130.10.0.0/16 is directly connected, FastEthernet0/0
R    192.168.0.0/24 [120/1] via 10.11.0.1, 00:00:13, Serial0/0/0
R    192.168.100.0/24 [120/1] via 10.11.0.1, 00:00:13, Serial0/0/0
Router#
Router#

                                        Copy        Paste
```

Router#show ip route

El comando show ip route muestra el conjunto de rutas en la tabla de encaminamiento.Las rutas pueden ser conectadas, estáticas y dinámicas, La jerarquía en la tabla de encaminamiento incluye rutas de dos niveles principales: Una ruta de nivel 1 y una ruta de nivel 2

Direcciones de red conectadas directamente al Router

Direcciones de red no conectada al Router pero enrutadas con RIPV2

Router 2


```
R2                                                            - □ x
Physical   Config   CLI
                    IOS Command Line Interface




Router>en
Router#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

C    10.0.0.0/8 is directly connected, Serial0/0/0
R    130.10.0.0/16 [120/1] via 10.11.0.2, 00:00:07, Serial0/0/0
C    192.168.0.0/24 is directly connected, FastEthernet0/1
C    192.168.100.0/24 is directly connected, FastEthernet0/0
Router#

                                        Copy        Paste
```
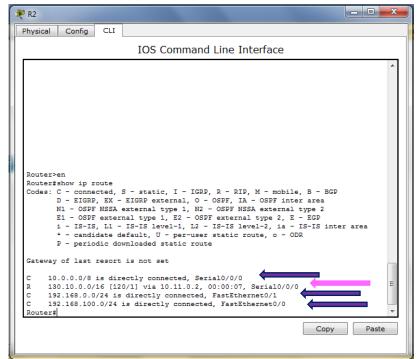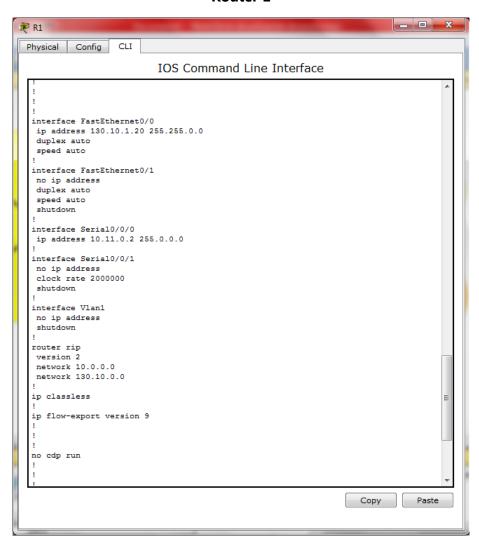
Direcciones de red conectadas directamente al Router

Direcciones de red no conectada al Router pero enrutadas con RIPV2

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5. Adjuntar la configuración de los routers usando el comando show running-config.

Router 1

```
R1                                                        □ X
Physical   Config   CLI

              IOS Command Line Interface

!
!
!
!
interface FastEthernet0/0
 ip address 130.10.1.20 255.255.0.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0/0
 ip address 10.11.0.2 255.0.0.0
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 network 10.0.0.0
 network 130.10.0.0
!
ip classless
!
ip flow-export version 9
!
!
!
no cdp run
!
!

                              Copy        Paste
```

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Router 2

```
!
spanning-tree mode pvst
!
!
!
!
!
!
interface FastEthernet0/0
 ip address 192.168.100.1 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 192.168.0.1 255.255.255.0
 duplex auto
 speed auto
!
interface Serial0/0/0
 ip address 10.11.0.1 255.0.0.0
 clock rate 2000000
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 network 10.0.0.0
 network 192.168.0.0
 network 192.168.100.0
!
ip classless
!
ip flow-export version 9
!
```