# Laboratorio 2

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Se comienza escogiendo las siguientes IPs para las redes entre routers:

**Router0**: Se0/1/0: 2.0.0.2
Se0/1/1: 3.0.0.1

**Router1**: Se0/1/0: 1.0.0.2
Se0/1/1: 3.0.0.2

**Router2**: Se0/1/0: 4.0.0.1
Se0/1/1: 6.0.0.2

**Router3**: Se0/1/0: 5.0.0.1
Se0/1/1: 6.0.0.1

**Router4**: Se0/0/0: 1.0.0.1
Se0/0/1: 2.0.0.1
Se0/1/0: 4.0.0.2
Se0/1/1: 5.0.0.2

## Red 0

**X = 9**
**2 (9 + 1) = 20**

**10.0.0.0/8 =** 00001010 00000000 00000000 00000000

Se divide la subred 10.0.0.0/8 en 20 subredes:

10.252.206.0/23 (mask: 255.255.254.0) 00001010 11111100 11001110 00000000
10.252.208.0/23 (mask: 255.255.254.0) 00001010 11111100 11010000 00000000
10.252.210.0/23 (mask: 255.255.254.0) 00001010 11111100 11010010 00000000
10.252.212.0/23 (mask: 255.255.254.0) 00001010 11111100 11010100 00000000
10.252.214.0/23 (mask: 255.255.254.0) 00001010 11111100 11010110 00000000

10.252.216.0/23 (mask: 255.255.254.0) 00001010 11111100 11011000 00000000
10.252.218.0/23 (mask: 255.255.254.0) 00001010 11111100 11011010 00000000
10.252.220.0/23 (mask: 255.255.254.0) 00001010 11111100 11011100 00000000
10.252.222.0/23 (mask: 255.255.254.0) 00001010 11111100 11011110 00000000
10.252.192.0/23 (mask: 255.255.254.0) 00001010 11111100 11000000 00000000

10.252.232.0/23 (mask: 255.255.254.0) 00001010 11111100 11101000 00000000
10.252.234.0/23 (mask: 255.255.254.0) 00001010 11111100 11101010 00000000
10.252.236.0/23 (mask: 255.255.254.0) 00001010 11111100 11101100 00000000
10.252.238.0/23 (mask: 255.255.254.0) 00001010 11111100 11101110 00000000
10.252.240.0/23 (mask: 255.255.254.0) 00001010 11111100 11110000 00000000

10.252.242.0/23 (mask: 255.255.254.0) 00001010 11111100 11110010 00000000
10.252.244.0/23 (mask: 255.255.254.0) 00001010 11111100 11110100 00000000
10.252.246.0/23 (mask: 255.255.254.0) 00001010 11111100 11110110 00000000
10.252.248.0/23 (mask: 255.255.254.0) 00001010 11111100 11111000 00000000
10.252.250.0/23 (mask: 255.255.254.0) 00001010 11111100 11111010 00000000

**PC0**: 10.252.250.1
**PC1**: 10.252.250.2
**Router0**: 10.252.251.254 00001010 11111100 11111011 11111110

Tabla de rutas de Router0:

```
O    1.0.0.0/8 [110/128] via 3.0.0.1, 00:00:40, Serial0/1/1
               [110/128] via 2.0.0.1, 00:00:40, Serial0/1/0
     2.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       2.0.0.0/8 is directly connected, Serial0/1/0
L       2.0.0.2/32 is directly connected, Serial0/1/0
     3.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       3.0.0.0/8 is directly connected, Serial0/1/1
L       3.0.0.2/32 is directly connected, Serial0/1/1
O E2 4.0.0.0/8 [110/20] via 2.0.0.1, 00:00:50, Serial0/1/0
O E2 5.0.0.0/8 [110/20] via 2.0.0.1, 00:00:50, Serial0/1/0
O E2 6.0.0.0/8 [110/20] via 2.0.0.1, 00:00:50, Serial0/1/0
     10.0.0.0/8 is variably subnetted, 3 subnets, 3 masks
O E2    10.252.210.128/26 [110/20] via 2.0.0.1, 00:00:05, Serial0/1/0
C       10.252.250.0/23 is directly connected, GigabitEthernet0/0
L       10.252.251.254/32 is directly connected, GigabitEthernet0/0
     172.16.0.0/20 is subnetted, 1 subnets
O       172.16.192.0/20 [110/65] via 3.0.0.1, 00:00:40, Serial0/1/1
     192.168.0.0/29 is subnetted, 1 subnets
O E2    192.168.0.240/29 [110/20] via 2.0.0.1, 00:00:50, Serial0/1/0
```

## Red 1

**X = 9**

172.16.0.0/16 = 10101100 00010000 00000000 00000000

Se divide la subred 172.16.0.0/16 en 9 subredes:

172.16.128.0/20 (mask: 255.255.240.0) 10101100 00010000 10000000 00000000
172.16.192.0/20 (mask: 255.255.240.0) 10101100 00010000 11000000 00000000
172.16.48.0/20 (mask: 255.255.240.0) 10101100 00010000 00110000 00000000

172.16.64.0/20 (mask: 255.255.240.0) 10101100 00010000 01000000 00000000
172.16.80.0/20 (mask: 255.255.240.0) 10101100 00010000 01010000 00000000

172.16.160.0/20 (mask: 255.255.240.0) 10101100 00010000 10100000 00000000
172.16.224.0/20 (mask: 255.255.240.0) 10101100 00010000 11100000 00000000
172.16.112.0/20 (mask: 255.255.240.0) 10101100 00010000 01110000 00000000
172.16.240.0/20 (mask: 255.255.240.0) 10101100 00010000 11110000 00000000

**PC4**: 172.16.192.1
**PC5**: 172.16.192.2
**Router1**: 172.16.207.254 10101100 00010000 11001111 11111110

Tabla de rutas de Router1:

```
     1.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       1.0.0.0/8 is directly connected, Serial0/1/0
L       1.0.0.2/32 is directly connected, Serial0/1/0
O    2.0.0.0/8 [110/128] via 1.0.0.1, 00:07:13, Serial0/1/0
               [110/128] via 3.0.0.2, 00:07:13, Serial0/1/1
     3.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       3.0.0.0/8 is directly connected, Serial0/1/1
L       3.0.0.1/32 is directly connected, Serial0/1/1
O E2 4.0.0.0/8 [110/20] via 1.0.0.1, 00:07:13, Serial0/1/0
O E2 5.0.0.0/8 [110/20] via 1.0.0.1, 00:07:13, Serial0/1/0
O E2 6.0.0.0/8 [110/20] via 1.0.0.1, 00:07:13, Serial0/1/0
     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
O E2    10.252.210.128/26 [110/20] via 1.0.0.1, 00:06:33, Serial0/1/0
O       10.252.250.0/23 [110/65] via 3.0.0.2, 00:07:13, Serial0/1/1
     172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.16.192.0/20 is directly connected, GigabitEthernet0/0
L       172.16.207.254/32 is directly connected, GigabitEthernet0/0
     192.168.0.0/29 is subnetted, 1 subnets
O E2    192.168.0.240/29 [110/20] via 1.0.0.1, 00:07:13, Serial0/1/0
```

## Red 2

**X = 7**

10.252.210.0/23 (mask: 255.255.254.0) 00001010 11111100 1101001**0** 00000000

Se divide la subred 10.252.210.0/23 en 7 subredes:

10.252.210.64/26 (mask: 255.255.255.192) 00001010 11111100 11010010 01000000
10.252.210.128/26 (mask: 255.255.255.192) 00001010 11111100 11010010 10000000
10.252.210.192/26 (mask: 255.255.255.192) 00001010 11111100 11010010 11000000

10.252.211.0/26 (mask: 255.255.255.192) 00001010 11111100 11010011 00000000
10.252.211.64/26 (mask: 255.255.255.192) 00001010 11111100 11010011 01000000
10.252.211.128/26 (mask: 255.255.255.192) 00001010 11111100 11010011 10000000
10.252.211.192/26 (mask: 255.255.255.192) 00001010 11111100 11010011 11000000

**Server0**: 10.252.210.129
**Router2**: 10.252.210.190 00001010 11111100 11010010 10111110

Tabla de rutas de Router2:

```
B    1.0.0.0/8 [20/20] via 4.0.0.2, 00:00:00
B    2.0.0.0/8 [20/20] via 4.0.0.2, 00:00:00
B    3.0.0.0/8 [20/128] via 4.0.0.2, 00:00:00
     4.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       4.0.0.0/8 is directly connected, Serial0/1/0
L       4.0.0.1/32 is directly connected, Serial0/1/0
B    5.0.0.0/8 [20/0] via 4.0.0.2, 00:00:00
     6.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       6.0.0.0/8 is directly connected, Serial0/1/1
L       6.0.0.2/32 is directly connected, Serial0/1/1
     10.0.0.0/8 is variably subnetted, 3 subnets, 3 masks
C       10.252.210.128/26 is directly connected, GigabitEthernet0/0
L       10.252.210.190/32 is directly connected, GigabitEthernet0/0
B       10.252.250.0/23 [20/65] via 4.0.0.2, 00:00:00
     172.16.0.0/20 is subnetted, 1 subnets
B       172.16.192.0/20 [20/65] via 4.0.0.2, 00:00:00
     192.168.0.0/29 is subnetted, 1 subnets
B       192.168.0.240/29 [20/0] via 6.0.0.1, 00:00:00
```

## Red 3

**X = 8**
**(X/2) + 1 = 5**

| | | |
|---|---|---|
| 192.168.0.8/29 | (mask: 255.255.255.248) | 11000000 10101000 00000000 00001000 |
| 192.168.0.16/29 | (mask: 255.255.255.248) | 11000000 10101000 00000000 00010000 |
| 192.168.0.24/29 | (mask: 255.255.255.248) | 11000000 10101000 00000000 00011000 |
| 192.168.0.32/29 | (mask: 255.255.255.248) | 11000000 10101000 00000000 00100000 |
| 192.168.0.40/29 | (mask: 255.255.255.248) | 11000000 10101000 00000000 00101000 |
| 192.168.0.48/29 | (mask: 255.255.255.248) | 11000000 10101000 00000000 00110000 |
| 192.168.0.56/29 | (mask: 255.255.255.248) | 11000000 10101000 00000000 00111000 |
| 192.168.0.64/29 | (mask: 255.255.255.248) | 11000000 10101000 00000000 01000000 |
| 192.168.0.72/29 | (mask: 255.255.255.248) | 11000000 10101000 00000000 01001000 |
| 192.168.0.80/29 | (mask: 255.255.255.248) | 11000000 10101000 00000000 01010000 |
| 192.168.0.88/29 | (mask: 255.255.255.248) | 11000000 10101000 00000000 01011000 |
| 192.168.0.96/29 | (mask: 255.255.255.248) | 11000000 10101000 00000000 01100000 |
| 192.168.0.104/29 | (mask: 255.255.255.248) | 11000000 10101000 00000000 01101000 |
| 192.168.0.112/29 | (mask: 255.255.255.248) | 11000000 10101000 00000000 01110000 |
| 192.168.0.120/29 | (mask: 255.255.255.248) | 11000000 10101000 00000000 01111000 |

192.168.0.128/29 (mask: 255.255.255.248) 11000000 10101000 00000000 10000000
192.168.0.136/29 (mask: 255.255.255.248) 11000000 10101000 00000000 10001000
192.168.0.144/29 (mask: 255.255.255.248) 11000000 10101000 00000000 10010000
192.168.0.152/29 (mask: 255.255.255.248) 11000000 10101000 00000000 10011000

192.168.0.160/29 (mask: 255.255.255.248) 11000000 10101000 00000000 10100000
192.168.0.168/29 (mask: 255.255.255.248) 11000000 10101000 00000000 10101000
192.168.0.176/29 (mask: 255.255.255.248) 11000000 10101000 00000000 10110000
192.168.0.184/29 (mask: 255.255.255.248) 11000000 10101000 00000000 10111000

192.168.0.192/29 (mask: 255.255.255.248) 11000000 10101000 00000000 11000000
192.168.0.200/29 (mask: 255.255.255.248) 11000000 10101000 00000000 11001000
192.168.0.208/29 (mask: 255.255.255.248) 11000000 10101000 00000000 11010000
192.168.0.216/29 (mask: 255.255.255.248) 11000000 10101000 00000000 11011000

192.168.0.224/29 (mask: 255.255.255.248) 11000000 10101000 00000000 11100000
192.168.0.232/29 (mask: 255.255.255.248) 11000000 10101000 00000000 11101000
192.168.0.240/29 (mask: 255.255.255.248) 11000000 10101000 00000000 11110000
192.168.0.248/29 (mask: 255.255.255.248) 11000000 10101000 00000000 11111000

**PC2**: 192.168.0.241
**PC3**: 192.168.0.242
**Router3**: 192.168.0.246 11000000 10101000 00000000 11110110

Tablas de ruta de Router3:

```
B    1.0.0.0/8 [20/20] via 5.0.0.2, 00:00:00
B    2.0.0.0/8 [20/20] via 5.0.0.2, 00:00:00
B    3.0.0.0/8 [20/128] via 5.0.0.2, 00:00:00
B    4.0.0.0/8 [20/0] via 5.0.0.2, 00:00:00
     5.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       5.0.0.0/8 is directly connected, Serial0/1/0
L       5.0.0.1/32 is directly connected, Serial0/1/0
     6.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       6.0.0.0/8 is directly connected, Serial0/1/1
L       6.0.0.1/32 is directly connected, Serial0/1/1
     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
B       10.252.210.128/26 [20/0] via 6.0.0.2, 00:00:00
B       10.252.250.0/23 [20/65] via 5.0.0.2, 00:00:00
     172.16.0.0/20 is subnetted, 1 subnets
B       172.16.192.0/20 [20/65] via 5.0.0.2, 00:00:00
     192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.0.240/29 is directly connected, GigabitEthernet0/0
L       192.168.0.246/32 is directly connected, GigabitEthernet0/0
```

Tabla de rutas de Router4:

```
     1.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       1.0.0.0/8 is directly connected, Serial0/0/0
L       1.0.0.1/32 is directly connected, Serial0/0/0
     2.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       2.0.0.0/8 is directly connected, Serial0/0/1
L       2.0.0.1/32 is directly connected, Serial0/0/1
O    3.0.0.0/8 [110/128] via 1.0.0.2, 00:16:25, Serial0/0/0
               [110/128] via 2.0.0.2, 00:16:25, Serial0/0/1
     4.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       4.0.0.0/8 is directly connected, Serial0/1/0
L       4.0.0.2/32 is directly connected, Serial0/1/0
     5.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       5.0.0.0/8 is directly connected, Serial0/1/1
L       5.0.0.2/32 is directly connected, Serial0/1/1
B    6.0.0.0/8 [20/0] via 5.0.0.1, 00:00:00
     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
B       10.252.210.128/26 [20/0] via 4.0.0.1, 00:00:00
O       10.252.250.0/23 [110/65] via 2.0.0.2, 00:16:25, Serial0/0/1
     172.16.0.0/20 is subnetted, 1 subnets
O       172.16.192.0/20 [110/65] via 1.0.0.2, 00:16:25, Serial0/0/0
     192.168.0.0/29 is subnetted, 1 subnets
B       192.168.0.240/29 [20/0] via 5.0.0.1, 00:00:00
```

Finalmente, se tiene:

PC0: 10.252.250.1 (mask: 255.255.254.0)
PC1: 10.252.250.2 (mask: 255.255.254.0)
PC2: 192.168.0.241 (mask: 255.255.255.248)
PC3: 192.168.0.242 (mask: 255.255.255.248)
PC4: 172.16.192.1 (mask: 255.255.240.0)
PC5: 172.16.192.2 (mask: 255.255.240.0)
Server0: 10.252.210.129 (mask: 255.255.255.192)

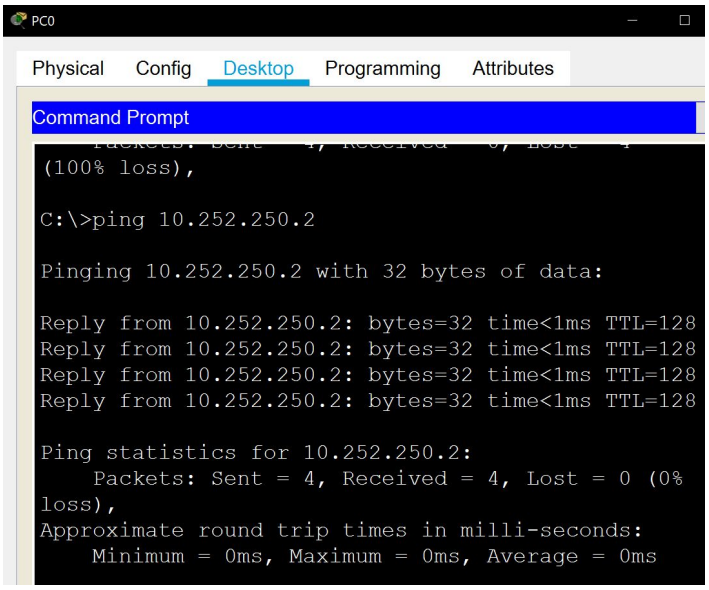
Router0: 10.252.251.254 (mask: 255.255.254.0)
Router2: 10.252.210.190 (mask: 255.255.255.192)
Router1: 172.16.207.254 (mask: 255.255.255.248)
Router3: 192.168.0.246 (mask: 255.255.240.0)

## Preguntas y análisis

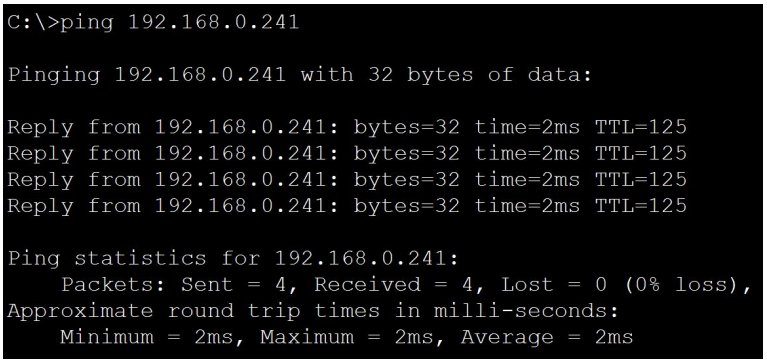
• *Verifique que todos los host sean capaces de comunicarse entre sí. Muestre en el informe el proceso que realizó para verificar esto y las rutas que usó cada mensaje. Hint: use mensajes PDU simples o use el comando ping.*

## PC0

**PC0**→Switch0→**PC1**




**PC0**→Switch0→Router0→Router4→Router3→Switch2→**PC2**




**PC0**→Switch0→Router0→Router4→Router3→Switch2→**PC3**

```
C:\>ping 192.168.0.242

Pinging 192.168.0.242 with 32 bytes of data:

Reply from 192.168.0.242: bytes=32 time=37ms TTL=125
Reply from 192.168.0.242: bytes=32 time=2ms TTL=125
Reply from 192.168.0.242: bytes=32 time=2ms TTL=125
Reply from 192.168.0.242: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.0.242:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 37ms, Average = 10ms
```

**PC0**→Switch0→Router0→Router1→Switch1→**PC4**

```
C:\>ping 172.16.192.1

Pinging 172.16.192.1 with 32 bytes of data:

Reply from 172.16.192.1: bytes=32 time=1ms TTL=126
Reply from 172.16.192.1: bytes=32 time=1ms TTL=126
Reply from 172.16.192.1: bytes=32 time=1ms TTL=126
Reply from 172.16.192.1: bytes=32 time=1ms TTL=126

Ping statistics for 172.16.192.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms
```

**PC0**→Switch0→Router0→Router1→Switch1→**PC5**

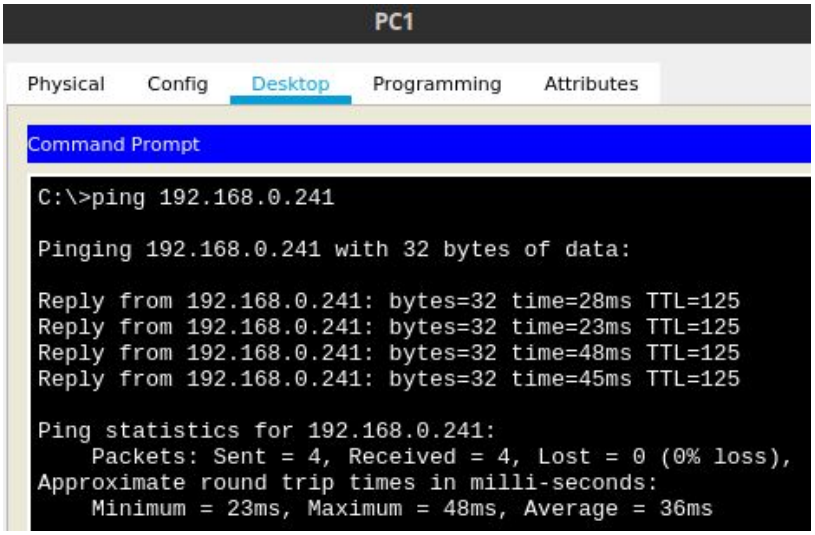
```
C:\>ping 172.16.192.2

Pinging 172.16.192.2 with 32 bytes of data:

Reply from 172.16.192.2: bytes=32 time=31ms TTL=126
Reply from 172.16.192.2: bytes=32 time=23ms TTL=126
Reply from 172.16.192.2: bytes=32 time=24ms TTL=126
Reply from 172.16.192.2: bytes=32 time=1ms TTL=126

Ping statistics for 172.16.192.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 31ms, Average = 19ms
```

**PC0**→Switch0→Router0→Router4→Router2→**Server0**

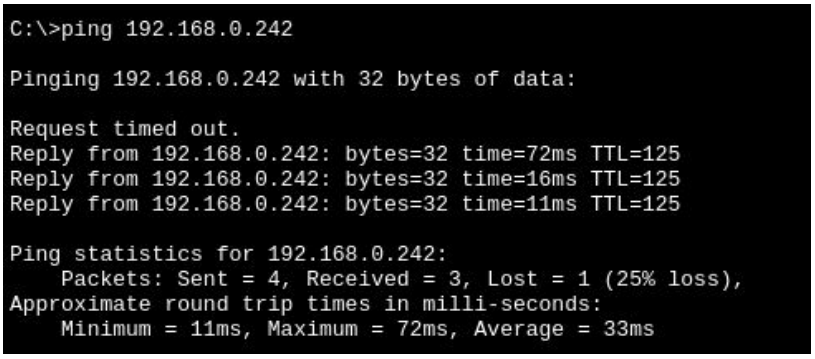
```
C:\>ping 10.252.210.129

Pinging 10.252.210.129 with 32 bytes of data:

Reply from 10.252.210.129: bytes=32 time=25ms TTL=125
Reply from 10.252.210.129: bytes=32 time=2ms TTL=125
Reply from 10.252.210.129: bytes=32 time=10ms TTL=125
Reply from 10.252.210.129: bytes=32 time=2ms TTL=125

Ping statistics for 10.252.210.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 25ms, Average = 9ms
```

# PC1

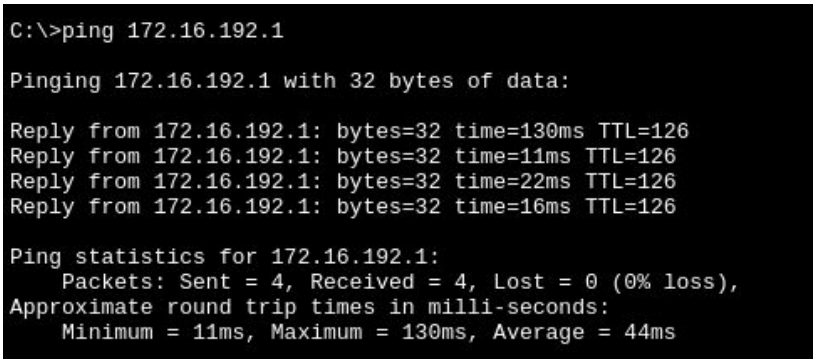
**PC1** → Switch0 →Router0 → Router4 → Router3 → Switch2 → **PC2**




**PC1** → Switch0 →Router0 → Router4 → Router3 → Switch2 → **PC3**




**PC1** → Switch0 →Router0 → Router1 → Switch1 → **PC4**



**PC1** → Switch0 →Router0 → Router1 → Switch1 → **PC5**

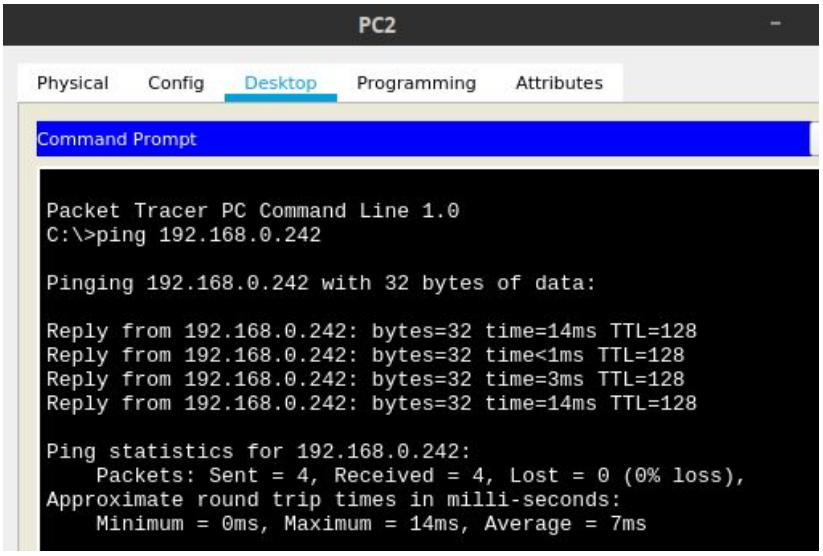
```
C:\>ping 172.16.192.2

Pinging 172.16.192.2 with 32 bytes of data:

Reply from 172.16.192.2: bytes=32 time=18ms TTL=126
Reply from 172.16.192.2: bytes=32 time=17ms TTL=126
Reply from 172.16.192.2: bytes=32 time=10ms TTL=126
Reply from 172.16.192.2: bytes=32 time=45ms TTL=126

Ping statistics for 172.16.192.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 10ms, Maximum = 45ms, Average = 22ms
```

**PC1** → Switch0 →Router0 → Router4 → Router2 → **Server0**

```
C:\>ping 10.252.210.129

Pinging 10.252.210.129 with 32 bytes of data:

Reply from 10.252.210.129: bytes=32 time=8ms TTL=125
Reply from 10.252.210.129: bytes=32 time=36ms TTL=125
Reply from 10.252.210.129: bytes=32 time=12ms TTL=125
Reply from 10.252.210.129: bytes=32 time=15ms TTL=125

Ping statistics for 10.252.210.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 36ms, Average = 17ms
```

## PC2

**PC2** → Switch2 → **PC3**



**PC2** → Switch2 →Router3 → Router4 → Router1 → Switch1→ **PC4**

```
C:\>ping 172.16.192.1

Pinging 172.16.192.1 with 32 bytes of data:

Reply from 172.16.192.1: bytes=32 time=17ms TTL=125
Reply from 172.16.192.1: bytes=32 time=15ms TTL=125
Reply from 172.16.192.1: bytes=32 time=87ms TTL=125
Reply from 172.16.192.1: bytes=32 time=16ms TTL=125

Ping statistics for 172.16.192.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 15ms, Maximum = 87ms, Average = 33ms
```

**PC2** → Switch2 →Router3 → Router4 → Router1 → Switch1→ **PC4**

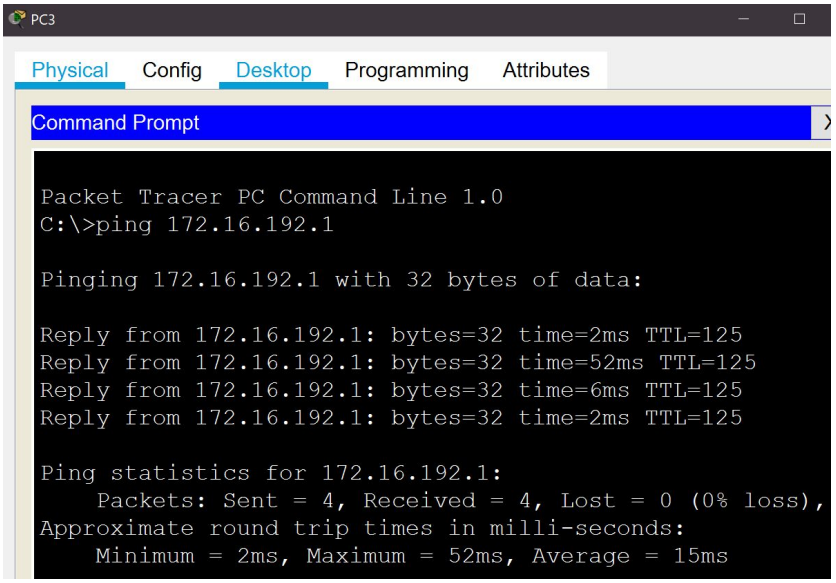
```
C:\>ping 172.16.192.2

Pinging 172.16.192.2 with 32 bytes of data:

Request timed out.
Reply from 172.16.192.2: bytes=32 time=14ms TTL=125
Reply from 172.16.192.2: bytes=32 time=11ms TTL=125
Reply from 172.16.192.2: bytes=32 time=14ms TTL=125

Ping statistics for 172.16.192.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 11ms, Maximum = 14ms, Average = 13ms
```

**PC2** → Switch2 →Router3 → Router2 → **Server0**

```
C:\>ping 10.252.210.129

Pinging 10.252.210.129 with 32 bytes of data:

Reply from 10.252.210.129: bytes=32 time=1ms TTL=126
Reply from 10.252.210.129: bytes=32 time=1ms TTL=126
Reply from 10.252.210.129: bytes=32 time=1ms TTL=126
Reply from 10.252.210.129: bytes=32 time=1ms TTL=126

Ping statistics for 10.252.210.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms
```

## PC3

**PC3**→Switch2→Router3→Router4→Router1→Switch1→**PC4**




**PC3**→Switch2→Router3→Router4→Router1→Switch1→**PC5**

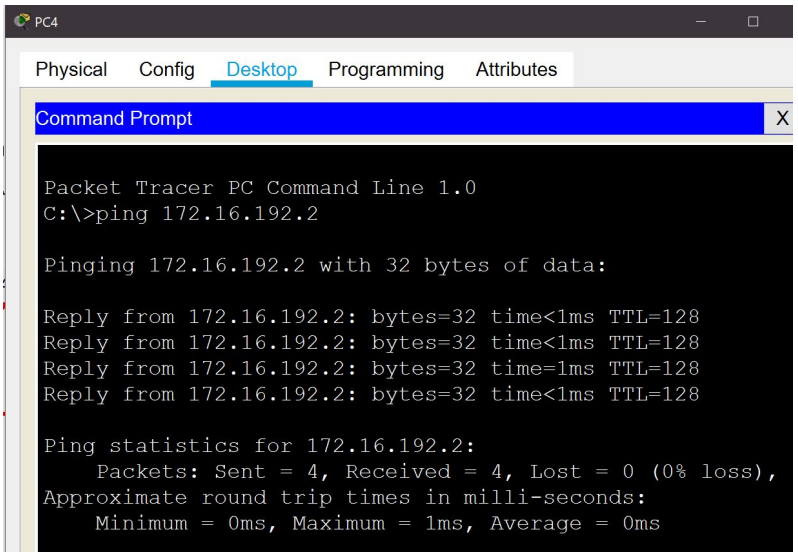
```
C:\>ping 172.16.192.2

Pinging 172.16.192.2 with 32 bytes of data:

Reply from 172.16.192.2: bytes=32 time=2ms TTL=125
Reply from 172.16.192.2: bytes=32 time=29ms TTL=125
Reply from 172.16.192.2: bytes=32 time=25ms TTL=125
Reply from 172.16.192.2: bytes=32 time=2ms TTL=125

Ping statistics for 172.16.192.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0%
loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 29ms, Average = 14ms
```

**PC3**→Switch2→Router3→Router2→**Server0**

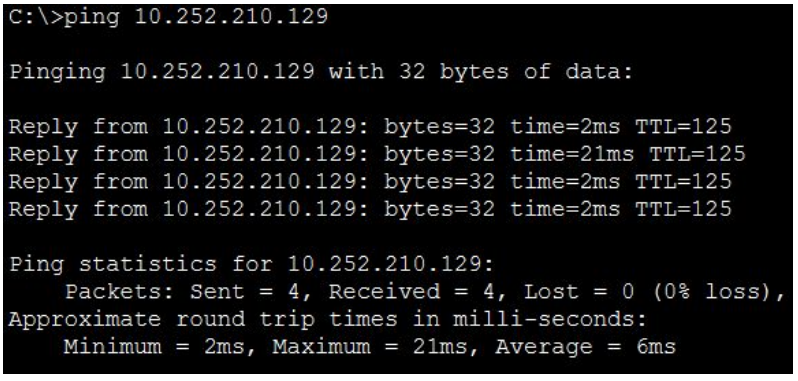
```
C:\>ping 10.252.210.129

Pinging 10.252.210.129 with 32 bytes of data:

Reply from 10.252.210.129: bytes=32 time=8ms TTL=126
Reply from 10.252.210.129: bytes=32 time=5ms TTL=126
Reply from 10.252.210.129: bytes=32 time=1ms TTL=126
Reply from 10.252.210.129: bytes=32 time=112ms TTL=126

Ping statistics for 10.252.210.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 112ms, Average = 31ms
```

# PC4

**PC4**→Switch1→**PC5**

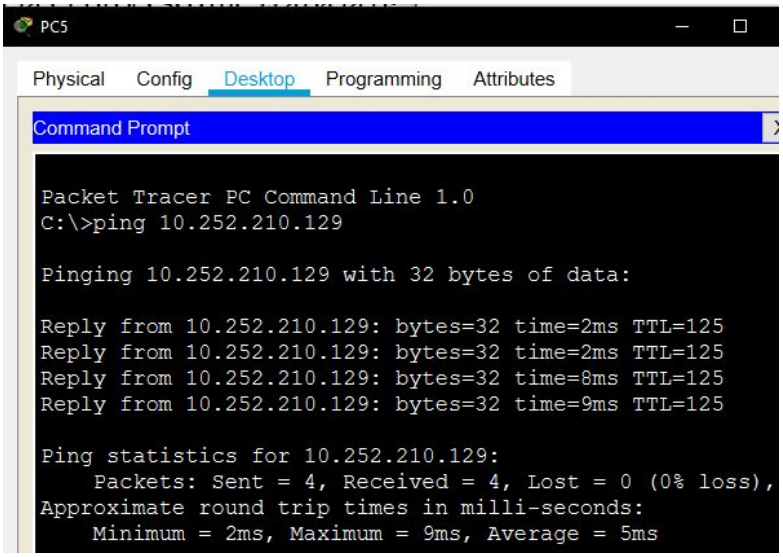



**PC4**→Switch1→Router1→Router4→Router2→**Server0**



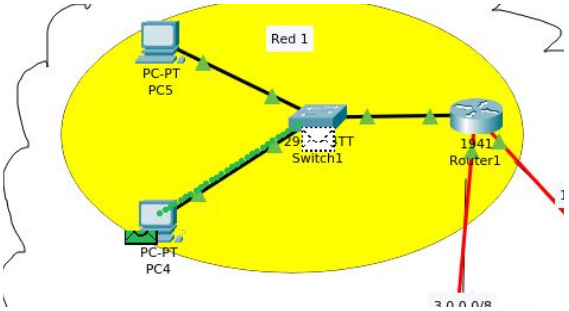

# PC5

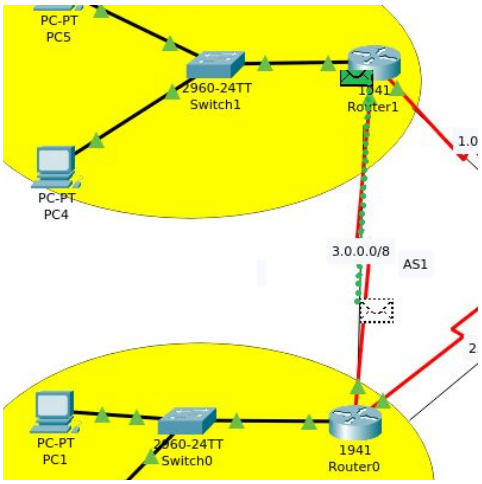
**PC5**→Switch1→Router1→Router4→Router2→**Server0**



*• Elija un host de la red 1, y revise las rutas que usa para enviar mensajes a ambos host de la red 0. ¿Qué ruta usa? ¿Y por qué se debe?*

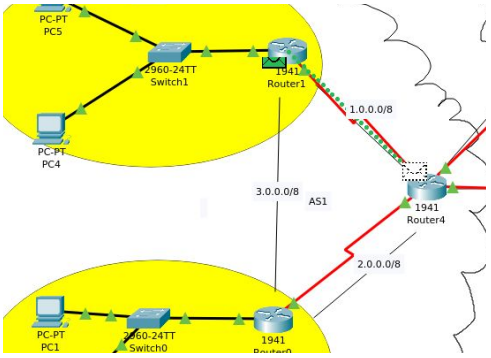
Enviando un mensaje desde **PC4**, el Router1 utiliza la subred 3.0.0.0 para ir al Router0 y llegar al **PC0** y **PC1**, ya que es la ruta de menor costo hacia su destino, teniendo en cuenta que se utiliza el protocolo OSPF dentro del sistema autónomo.
Por defecto todos los routers tienen el mismo de ancho de banda, el que es inversamente proporcional al costo de enlace, por lo tanto se prioriza pasar por la menor cantidad de subredes.

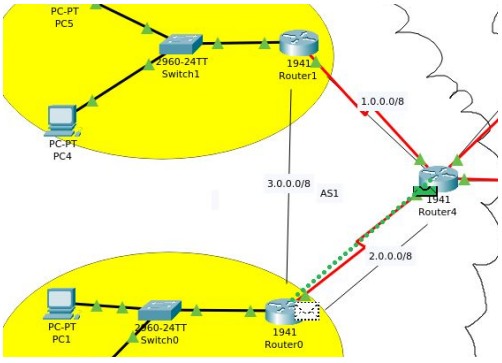



*• Elija una de las conexiones entre los routers que fue usada en una de las rutas vistas en el punto anterior y elimínela. ¿Los mensajes logran llegar a su destino? ¿A qué se debe?.*

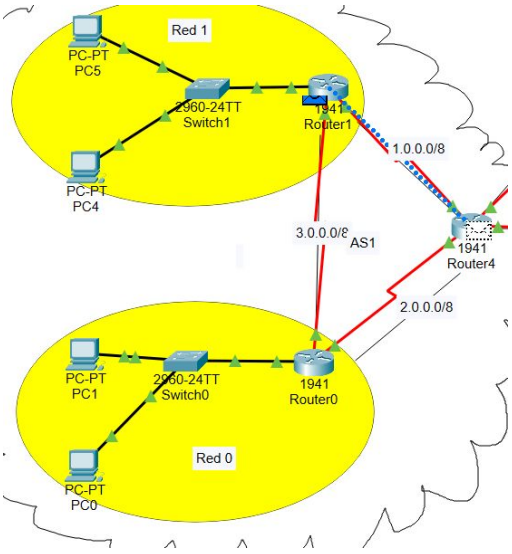
Al eliminar la subred 3.0.0.0, el mensaje también logra llegar a sus destinos, ya que el Router1 lo envía a través de 1.0.0.0 hacia el Router4, y luego este por 2.0.0.0 al Router0, llegando finalmente a ambos hosts.

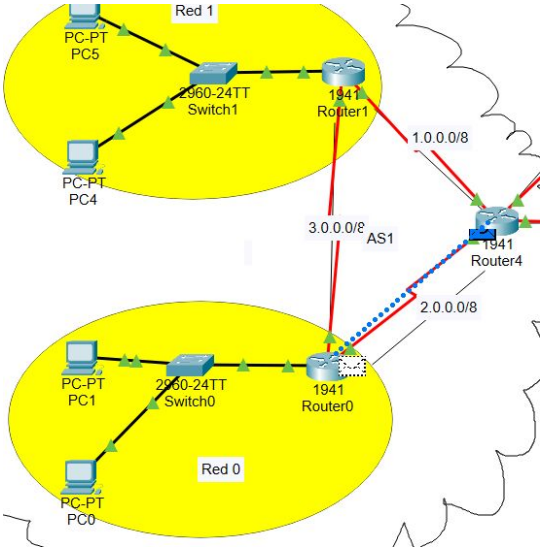


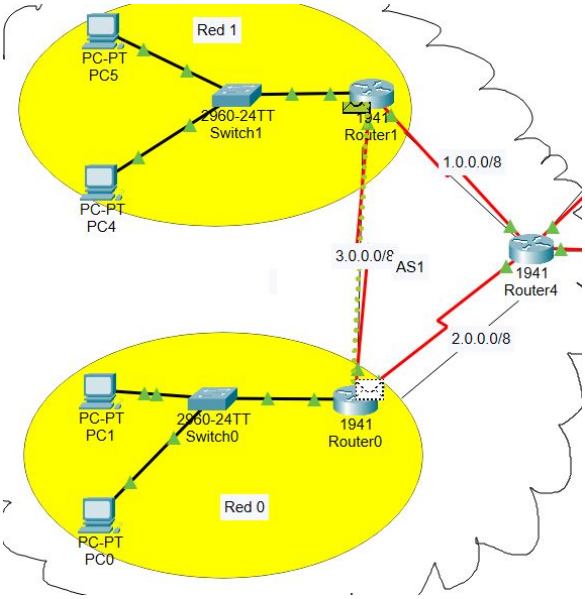
• *Repare la conexión eliminada. Configure el ancho de banda de la interfaz "Serial" del router 3 que lo conecta al router 0, junto a la interfaz que recibe dicha conexión a 100 kbps. ¿Espera que la ruta se mantenga o cambie? ¿Qué ocurrió en realidad? ¿Y qué ocurre si cambia el ancho de banda a 4000 kbps? Explique lo ocurrido en base al protocolo OSPF. Al terminar restaure el ancho de banda a 1544 kbps.*

Se envió un mensaje de PC4 a PC0
Con 100 kbps se espera que se pase por el router 4 para evitar la subred 3.0.0.0 ya que OSPF usa la información link-state y el algoritmo Dijkstra para encontrar y utilizar el camino más corto.




Y en la realidad pasó lo que teníamos esperado, por lo cual OSPF cumple con lo visto.

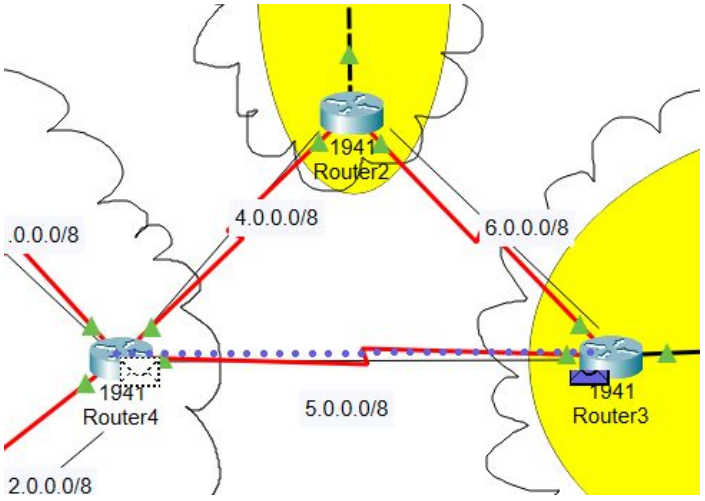



Con 4000 kbps pasó directo del Router1 al Router0, ya que es el camino más corto.

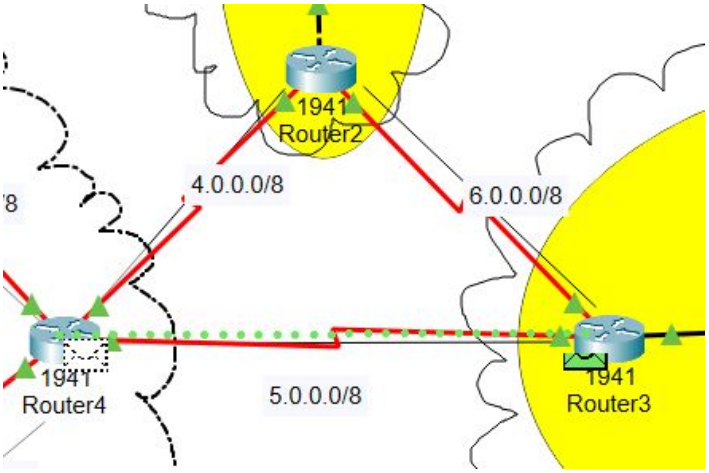
Como se mencionó anteriormente todo esto ocurrió por el uso de OSPF que utiliza Dijkstra para buscar el camino más corto.

• *Realice el experimento previo, pero usando la conexión entre los routers 4 y 3. ¿Espera que la ruta se mantenga o cambie? ¿Qué ocurrió en realidad? ¿Y qué ocurre si cambia el ancho de banda a 4000 kbps? Explique lo ocurrido en base al protocolo BGP. Al terminar restaure el ancho de banda a 1544 kbps.*

Se envió un mensaje de PC2 a PC4
Con 100 kbps se espera que pase directo del Router3 al Router 4, ya que lo que busca el protocolo BGP es realizar la menor cantidad de saltos entre subredes.




Con 4000 kbps se espera también, y con mayor razón, por ser el camino menos costoso, que pase directamente hacia el Router4.




En ambos casos ocurre lo esperado, debido a que BGP busca minimizar la cantidad de saltos, pasando de manera más directa los paquetes, en cuanto a número de sistemas autónomos por los que pasa.