



Explicación Práctica

Capa de Red

Capa de Red - Ejercicio de parcial



Utilizando únicamente direcciones de los rangos que se muestran debajo del gráfico, asignar IPs a las redes de la topología, desaprovechando la menor cantidad de direcciones posibles.

a. Tener en cuenta las siguientes condiciones:

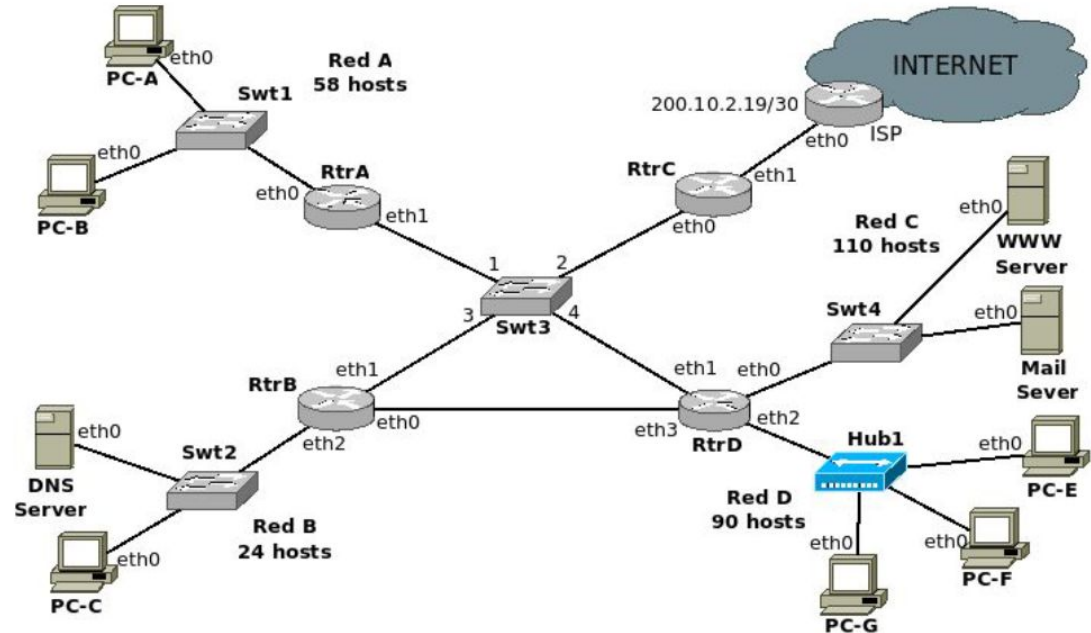
- Red A, clase B y privada.
- Red B, clase C y privada.
- Red C y D: clase B y pública.
- Redes entre routers, clase A y privada.

b. Asignar IP a todos los dispositivos en cada red (asignar la primera IP disponible a las interfaces de los routers, siempre que sea posible).

Capa de Red - Topología



- Red A, clase B y privada.
- Red B, clase C y privada
- Red C y D: clase B y pública

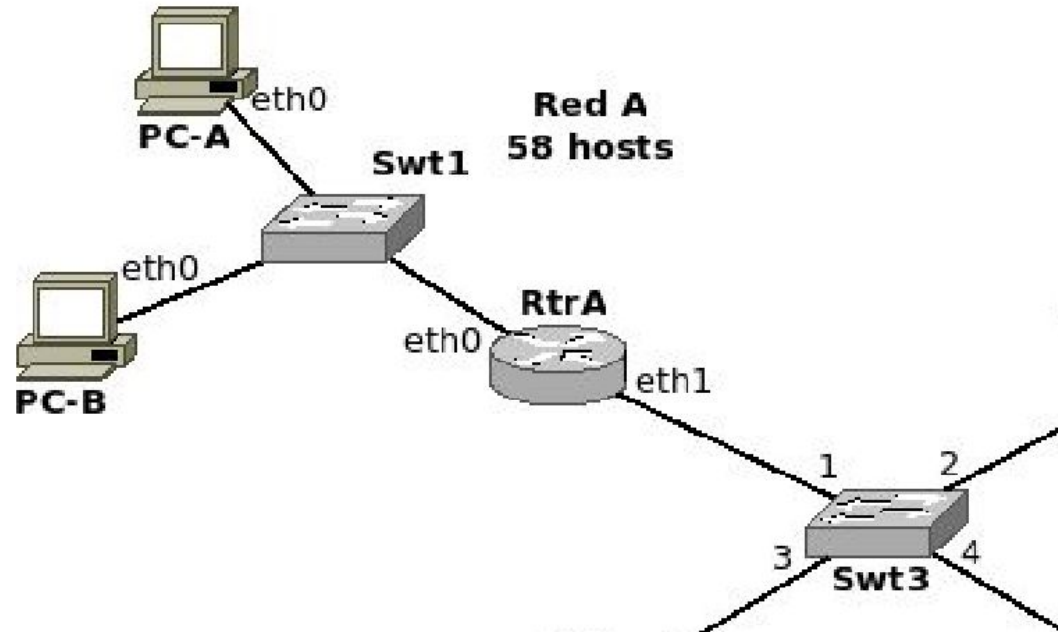


| | | | |
|-------------------|-----------------|----------------|-----------------|
| 224.1.0.0/24 | 192.10.10.64/26 | 172.32.0.64/26 | 10.1.0.0/27 |
| 192.168.200.64/26 | 172.31.10.0/24 | 160.0.210.0/23 | 240.10.0.128/25 |

Capa de Red - Red A



Red A, clase B y
privada.
172.31.10.0/24



Capa de Red - Red A - 172.31.10.0/24



| Bloque de direcciones de red | Mascara de subred | Número de hosts/subredes | Número de subredes |
|----------------------------------|-----------------------|--------------------------|--------------------|
| 172.31.10.0/24 | 255.255.255.0/24 | 256 | 1 |
| Intervalo de direcciones de host | Dirección de difusión | Máscara de comodines | Notación CIDR |
| 172.31.10.1 - 172.31.10.254 | 172.31.10.255 | 0.0.0.255 | 172.31.10.0/24 |

Address: 172.31.10.0 10101100.00011111.00001010. 00000000
Netmask: 255.255.255.0 = 24 11111111.11111111.11111111. 00000000
Wildcard: 0.0.0.255 00000000.00000000.00000000. 11111111
=>
Network: 172.31.10.0/24 10101100.00011111.00001010. 00000000
HostMin: 172.31.10.1 10101100.00011111.00001010. 00000001
HostMax: 172.31.10.254 10101100.00011111.00001010. 11111110
Broadcast: 172.31.10.255 10101100.00011111.00001010. 11111111
Hosts/Net: 254 Class B, Private Internet



Capa de Red - Red A - 172.31.10.0/24 a /26



Bloque de direcciones de red

172.31.10.0/24

Mascara de subred

255.255.255.192/26

Número de hosts/subredes

64

Número de subredes

4

Intervalo de direcciones de host

172.31.10.1 - 172.31.10.62

Dirección de difusión

172.31.10.63

Máscara de comodines

0.0.0.63

Notación CIDR

172.31.10.0/26

Detalles de subred

| Subnet ID | Subnet Address | Host Address Range | Broadcast Address |
|-----------|----------------|-------------------------------|-------------------|
| 1 | 172.31.10.0 | 172.31.10.1 - 172.31.10.62 | 172.31.10.63 |
| 2 | 172.31.10.64 | 172.31.10.65 - 172.31.10.126 | 172.31.10.127 |
| 3 | 172.31.10.128 | 172.31.10.129 - 172.31.10.190 | 172.31.10.191 |
| 4 | 172.31.10.192 | 172.31.10.193 - 172.31.10.254 | 172.31.10.255 |

Capa de Red - Red A - 172.31.10.0/24 a /26

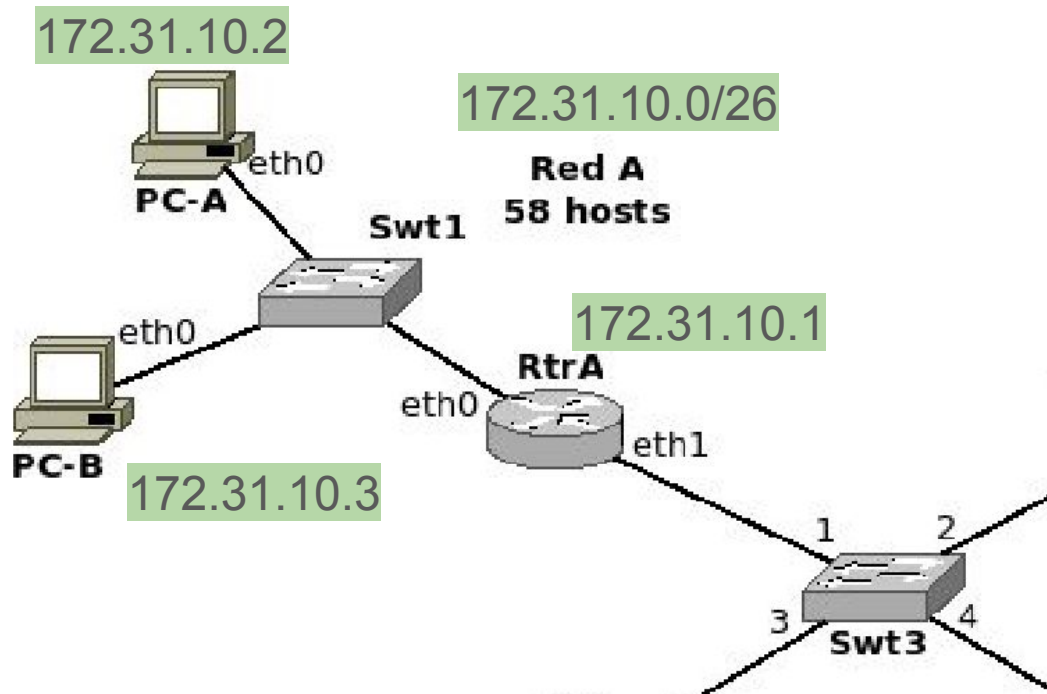


```
Subnets after transition from /24 to /26
Netmask: 255.255.255.192 = 26 11111111.11111111.11111111.11 000000
Wildcard: 0.0.0.63 00000000.00000000.00000000.00 111111
1.
Network: 172.31.10.0/26 10101100.00011111.00001010.00 000000
HostMin: 172.31.10.1 10101100.00011111.00001010.00 000001
HostMax: 172.31.10.62 10101100.00011111.00001010.00 111110
Broadcast: 172.31.10.63 10101100.00011111.00001010.00 111111
Hosts/Net: 62 Class B, Private Internet
2.
Network: 172.31.10.64/26 10101100.00011111.00001010.01 000000
HostMin: 172.31.10.65 10101100.00011111.00001010.01 000001
HostMax: 172.31.10.126 10101100.00011111.00001010.01 111110
Broadcast: 172.31.10.127 10101100.00011111.00001010.01 111111
Hosts/Net: 62 Class B, Private Internet
3.
Network: 172.31.10.128/26 10101100.00011111.00001010.10 000000
HostMin: 172.31.10.129 10101100.00011111.00001010.10 000001
HostMax: 172.31.10.190 10101100.00011111.00001010.10 111110
Broadcast: 172.31.10.191 10101100.00011111.00001010.10 111111
Hosts/Net: 62 Class B, Private Internet
4.
Network: 172.31.10.192/26 10101100.00011111.00001010.11 000000
HostMin: 172.31.10.193 10101100.00011111.00001010.11 000001
HostMax: 172.31.10.254 10101100.00011111.00001010.11 111110
Broadcast: 172.31.10.255 10101100.00011111.00001010.11 111111
Hosts/Net: 62 Class B, Private Internet
Subnets: 4
Hosts: 248
```

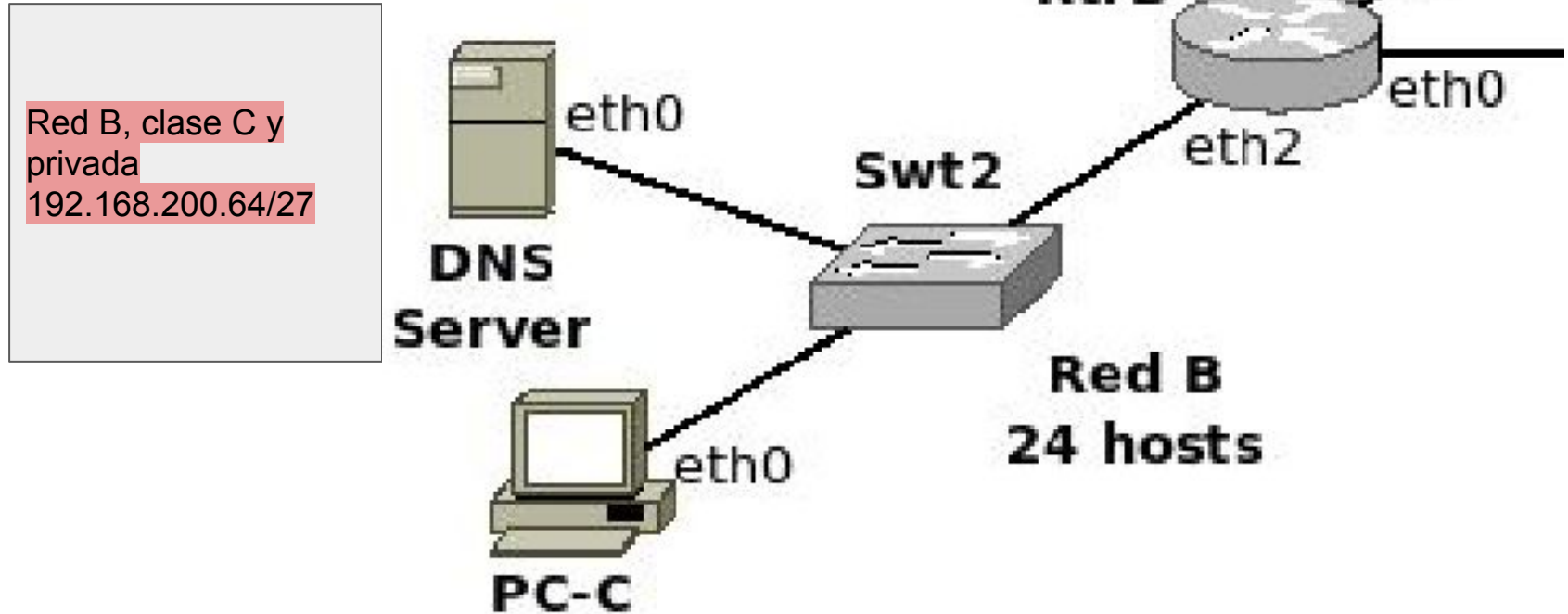
Capa de Red - Red A - 172.31.10.0/26



Netmask: 255.255.255.192 = 26
Wildcard: 0.0.0.63
1.
Network: 172.31.10.0/26
HostMin: 172.31.10.1
HostMax: 172.31.10.62
Broadcast: 172.31.10.63
Hosts/Net: 62



Capa de Red - Red B



Capa de Red - Red B - 192.168.200.64/26



Bloque de direcciones de red

192.168.200.64/26

Mascara de subred

255.255.255.192/26

Número de hosts/subredes

64

Número de subredes

1

Intervalo de direcciones de host

192.168.200.65 - 192.168.200.126

Dirección de difusión

192.168.200.127

Máscara de comodines

0.0.0.63

Notación CIDR

192.168.200.64/26

Address: 192.168.200.64 11000000.10101000.11001000.01 000000
Netmask: 255.255.255.192 = 26 11111111.11111111.11111111.11 000000
Wildcard: 0.0.0.63 00000000.00000000.00000000.00 111111
=>
Network: 192.168.200.64/26 11000000.10101000.11001000.01 000000
HostMin: 192.168.200.65 11000000.10101000.11001000.01 000001
HostMax: 192.168.200.126 11000000.10101000.11001000.01 111110
Broadcast: 192.168.200.127 11000000.10101000.11001000.01 111111
Hosts/Net: 62 Class C, Private Internet



Capa de Red - Red B - 192.168.200.64/26 a /27



Bloque de direcciones de red

192.168.200.64/26

Mascara de subred

255.255.255.224/27

Número de hosts/subredes

32

Número de subredes

2

Intervalo de direcciones de host

192.168.200.65 - 192.168.200.94

Dirección de difusión

192.168.200.95

Máscara de comodines

0.0.0.31

Notación CIDR

192.168.200.64/27

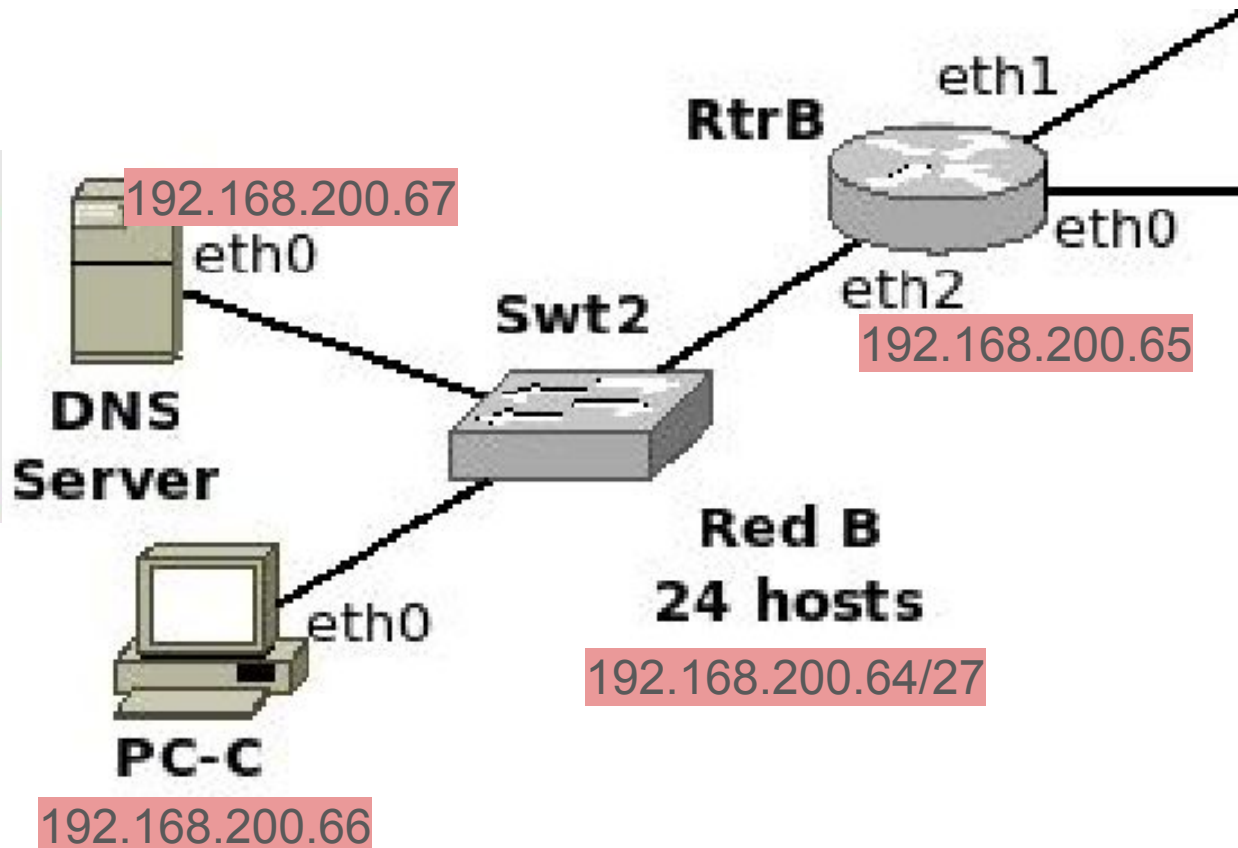
Detalles de subred

| Subnet ID | Subnet Address | Host Address Range | Broadcast Address |
|-----------|----------------|----------------------------------|-------------------|
| 1 | 192.168.200.64 | 192.168.200.65 - 192.168.200.94 | 192.168.200.95 |
| 2 | 192.168.200.96 | 192.168.200.97 - 192.168.200.126 | 192.168.200.127 |

Capa de Red - Red B - 192.168.200.64/27



Address: 192.168.200.64
Netmask: 255.255.255.224 = 27
Wildcard: 0.0.0.31
=>
Network: 192.168.200.64/27
HostMin: 192.168.200.65
HostMax: 192.168.200.94
Broadcast: 192.168.200.95
Hosts/Net: 30



Capa de Red - Red B - 192.168.200.64/27



Subnets after transition from /26 to /27

Netmask: 255.255.255.224 = 27 11111111.11111111.11111111.111 00000

Wildcard: 0.0.0.31 00000000.00000000.00000000.000 11111

1.

Network: 192.168.200.64/27 11000000.10101000.11001000.010 00000

HostMin: 192.168.200.65 11000000.10101000.11001000.010 00001

HostMax: 192.168.200.94 11000000.10101000.11001000.010 11110

Broadcast: 192.168.200.95 11000000.10101000.11001000.010 11111

Hosts/Net: 30 Class C, [Private Internet](#)

2.

Network: 192.168.200.96/27 11000000.10101000.11001000.011 00000

HostMin: 192.168.200.97 11000000.10101000.11001000.011 00001

HostMax: 192.168.200.126 11000000.10101000.11001000.011 11110

Broadcast: 192.168.200.127 11000000.10101000.11001000.011 11111

Hosts/Net: 30 Class C, [Private Internet](#)

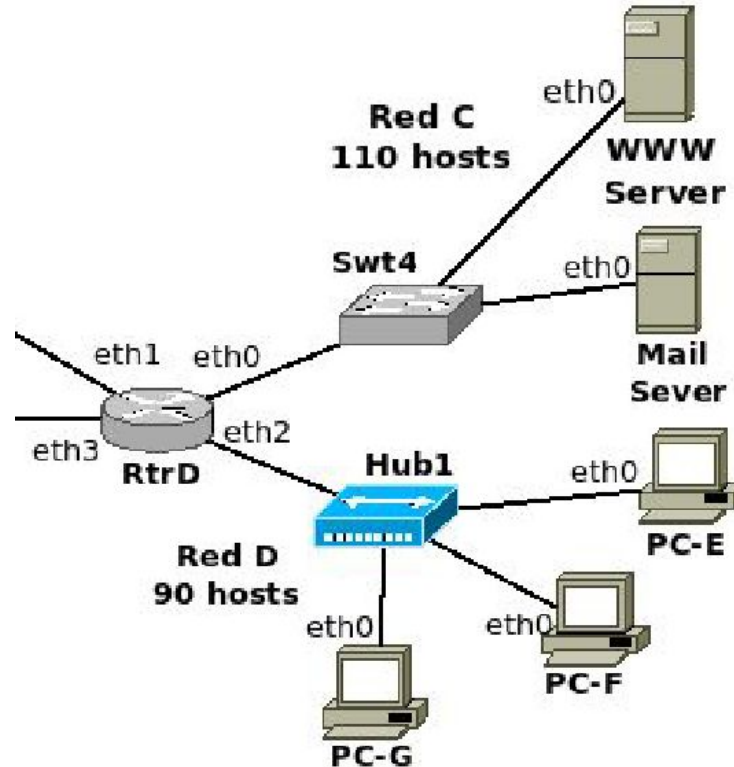
Subnets: 2

Hosts: 60

Capa de Red - Red C y D



Red C y D: clase B y
pública
160.0.210.0/23



Capa de Red - Red C y D - 160.0.210.0/23



Bloque de direcciones de red

160.0.210.0/23

Mascara de subred

255.255.254.0/23

Número de hosts/subredes

512

Número de subredes

1

Intervalo de direcciones de host

160.0.210.1 - 160.0.211.254

Dirección de difusión

160.0.211.255

Máscara de comodines

0.0.1.255

Notación CIDR

160.0.210.0/23

Address: 160.0.210.0 10100000.00000000.1101001 0.00000000
Netmask: 255.255.254.0 = 23 11111111.11111111.1111111 0.00000000
Wildcard: 0.0.1.255 00000000.00000000.0000000 1.11111111
=>
Network: 160.0.210.0/23 10100000.00000000.1101001 0.00000000
HostMin: 160.0.210.1 10100000.00000000.1101001 0.00000001
HostMax: 160.0.211.254 10100000.00000000.1101001 1.11111110
Broadcast: 160.0.211.255 10100000.00000000.1101001 1.11111111
Hosts/Net: 510 Class B



Capa de Red - Red C y D - 160.0.210.0/23 a /25



Bloque de direcciones de red

160.0.210.0/23

Mascara de subred

255.255.255.128/25

Número de hosts/subredes

128

Número de subredes

4

Intervalo de direcciones de host

160.0.210.1 - 160.0.210.126

Dirección de difusión

160.0.210.127

Máscara de comodines

0.0.0.127

Notación CIDR

160.0.210.0/25

Detalles de subred

| Subnet ID | Subnet Address | Host Address Range | Broadcast Address |
|-----------|----------------|-------------------------------|-------------------|
| 1 | 160.0.210.0 | 160.0.210.1 - 160.0.210.126 | 160.0.210.127 |
| 2 | 160.0.210.128 | 160.0.210.129 - 160.0.210.254 | 160.0.210.255 |
| 3 | 160.0.211.0 | 160.0.211.1 - 160.0.211.126 | 160.0.211.127 |
| 4 | 160.0.211.128 | 160.0.211.129 - 160.0.211.254 | 160.0.211.255 |

Capa de Red - Red C y D - 160.0.210.0/23 a /25



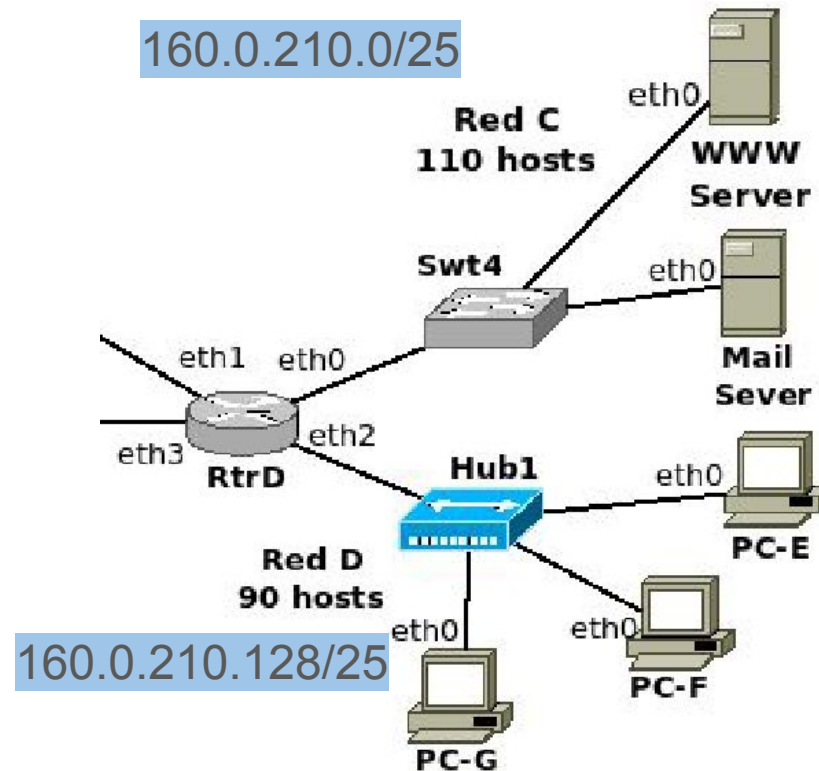
```
Subnets after transition from /23 to /25
Netmask: 255.255.255.128 = 25 11111111.11111111.11111111.1 00000000
Wildcard: 0.0.0.127 00000000.00000000.00000000.0 11111111
1.
Network: 160.0.210.0/25 10100000.00000000.11010010.0 00000000
HostMin: 160.0.210.1 10100000.00000000.11010010.0 00000001
HostMax: 160.0.210.126 10100000.00000000.11010010.0 11111110
Broadcast: 160.0.210.127 10100000.00000000.11010010.0 11111111
Hosts/Net: 126 Class B
2.
Network: 160.0.210.128/25 10100000.00000000.11010010.1 00000000
HostMin: 160.0.210.129 10100000.00000000.11010010.1 00000001
HostMax: 160.0.210.254 10100000.00000000.11010010.1 11111110
Broadcast: 160.0.210.255 10100000.00000000.11010010.1 11111111
Hosts/Net: 126 Class B
3.
Network: 160.0.211.0/25 10100000.00000000.11010011.0 00000000
HostMin: 160.0.211.1 10100000.00000000.11010011.0 00000001
HostMax: 160.0.211.126 10100000.00000000.11010011.0 11111110
Broadcast: 160.0.211.127 10100000.00000000.11010011.0 11111111
Hosts/Net: 126 Class B
4.
Network: 160.0.211.128/25 10100000.00000000.11010011.1 00000000
HostMin: 160.0.211.129 10100000.00000000.11010011.1 00000001
HostMax: 160.0.211.254 10100000.00000000.11010011.1 11111110
Broadcast: 160.0.211.255 10100000.00000000.11010011.1 11111111
Hosts/Net: 126 Class B
Subnets: 4
Hosts: 504
```

Capa de Red - Red C y D - 160.0.210.0/25

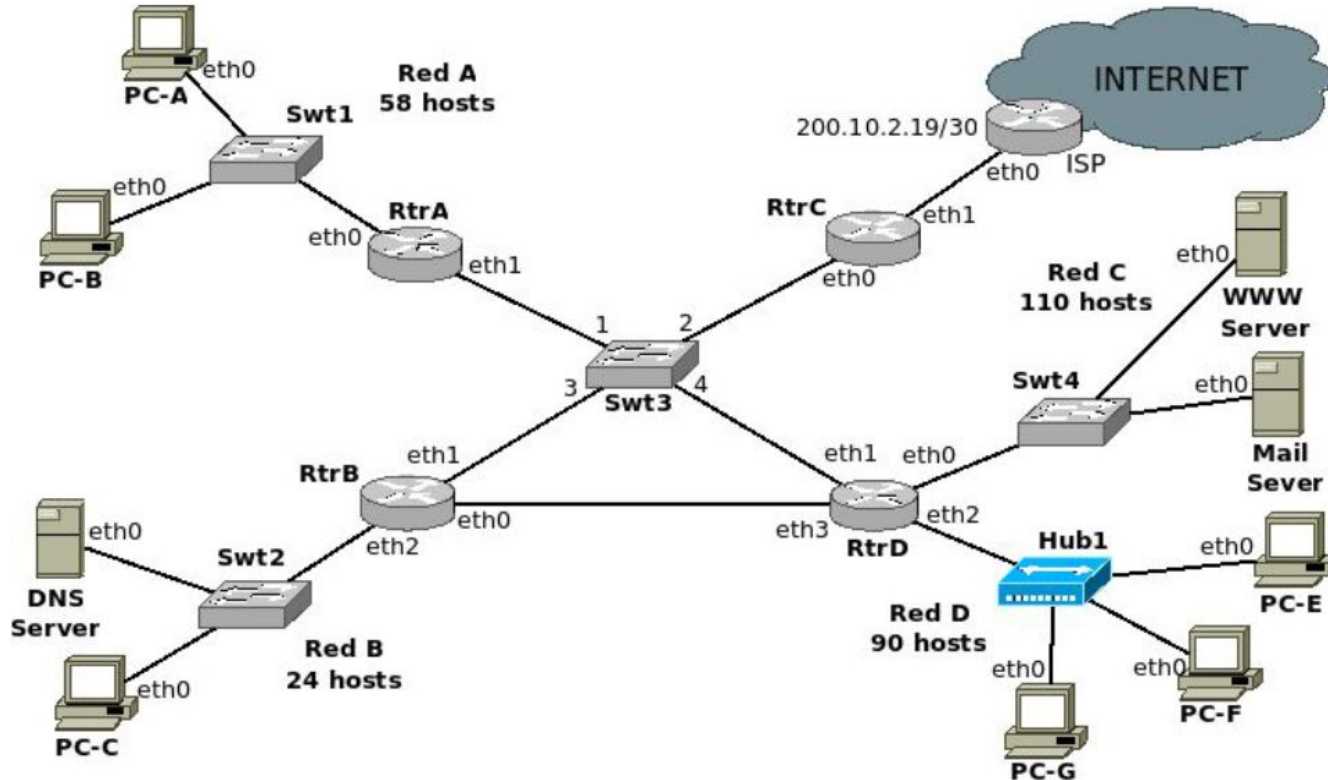


Network: 160.0.210.0/25
HostMin: 160.0.210.1
HostMax: 160.0.210.126
Broadcast: 160.0.210.127
Hosts/Net: 126

Network: 160.0.210.128/25
HostMin: 160.0.210.129
HostMax: 160.0.210.254
Broadcast: 160.0.210.255
Hosts/Net: 126



Capa de Red - RtrC - INTERNET

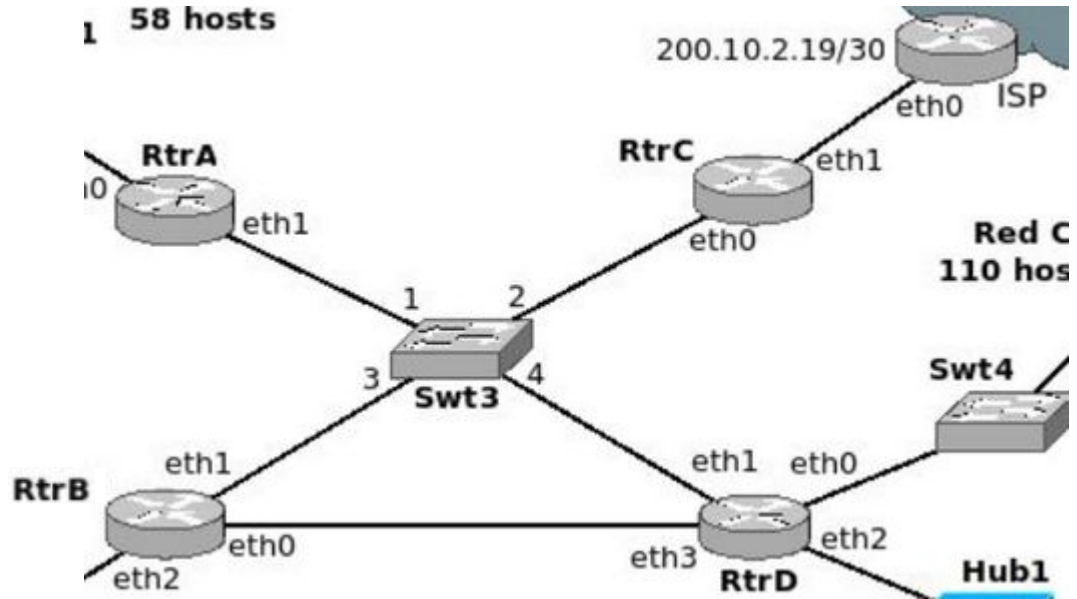


Capa de Red - Redes entre routers



Redes entre routers, clase A y privada:

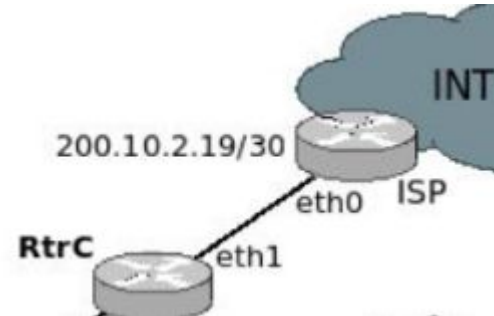
- Red RtrB - RtrD
- Red entre RtrA, RtrB, RtrC y RtrD



Capa de Red - Red entre RtrC y Router ISP



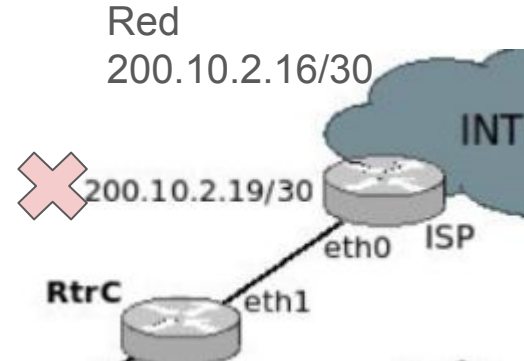
- ¿Es correcta la dirección de red?



Capa de Red - Red entre RtrC y Router ISP



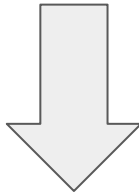
- ¿Es correcta la dirección de red?
No, es la dirección de broadcast para esa red.



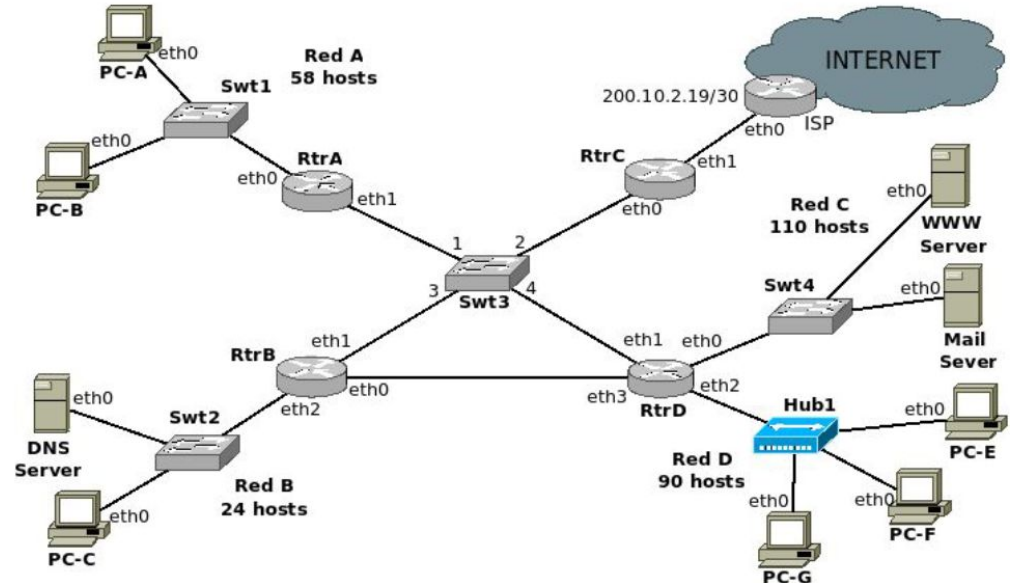
Capa de Red - RtrB - Sumarizar



| Red | Máscara | Interfaz |
|---------------|---------|----------|
| 160.0.210.0 | 25 | eth0 |
| 160.0.210.128 | 25 | eth0 |



| Red | Máscara | Interfaz |
|-------------|---------|----------|
| 160.0.210.0 | 23 | eth0 |

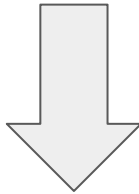


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- The diagram illustrates a multi-protocol network topology. It features four reds (A, B, C, D) connected to a central switch (Swt3) and a central router (RtrB). Red A (58 hosts) includes PC-A and PC-B connected to Swt1, which is connected to RtrA. Red B (24 hosts) includes PC-C and a DNS Server connected to Swt2, which is connected to RtrB. Red C (110 hosts) includes a WWW Server and a Mail Server connected to Swt4, which is connected to RtrC. Red D (90 hosts) includes PC-E, PC-F, and PC-G connected to Hub1, which is connected to RtrD. The central switch (Swt3) is connected to RtrA, RtrB, RtrC, and RtrD. The central router (RtrB) is connected to RtrA, RtrC, and RtrD. The Internet is connected to RtrC via an ISP with IP 200.10.2.19/30.

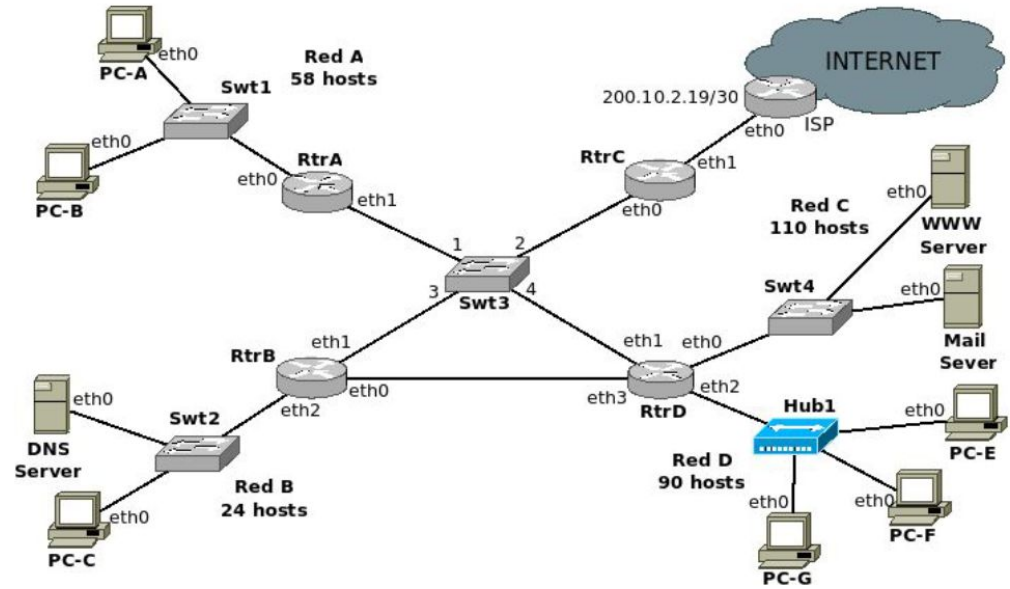
Capa de Red - RtrD - Sumarizar



| Red | Máscara | Interfaz |
|---------------|---------|----------|
| 160.0.210.0 | 25 | eth0 |
| 160.0.210.128 | 25 | eth2 |



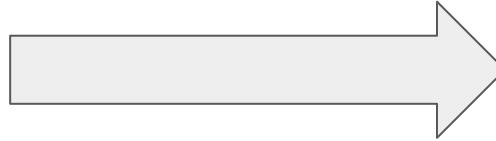
Red C y Red D son directamente conectadas a RtrD y tienen distintas interfaces, no se pueden sumarizar.



Capa de Red - Sumarizar - Ejemplo



- 10.56.248.0/24
- 10.56.249.0/25
- 10.56.249.128/26
- 10.56.249.192/26
- 10.56.250.0/23



10.56.248.0/22

Redes contiguas

Capa de Red - Sumarizar - Ejemplo



- 10.56.248.0/24
- 10.56.249.0/25
- 10.56.249.128/26
- 10.56.249.192/26
- 10.56.250.0/23

Redes contiguas

10 . 56 . 248 . 0
00001010.00111000.11111000.00000000

10 . 56 . 249 . 0
00001010.00111000.11111001.00000000

10 . 56 . 249 . 128
00001010.00111000.11111001.10000000

10 . 56 . 249 . 192
00001010.00111000.11111001.11000000

10 . 56 . 250 . 0
00001010.00111000.11111010.00000000

Capa de Red - Sumarizar - Ejemplo



- 10.56.248.0/24
- 10.56.249.0/25
- 10.56.249.128/26
- 10.56.249.192/26
- 10.56.250.0/23

10.56.248.0/24

00001010.00111000.11111000.00000000

10.56.249.0/25

00001010.00111000.11111001.00000000

10.56.249.128/26

00001010.00111000.11111001.10000000

10.56.249.192/26

00001010.00111000.11111001.11000000

10.56.250.0/23

00001010.00111000.11111010.00000000

Capa de Red - Sumarizar - Ejemplo



10.56.248.0/24

00001010.00111000.11111000.00000000

10.56.249.0/25

00001010.00111000.11111001.00000000

10.56.249.128/26

00001010.00111000.11111001.10000000

10.56.249.192/26

00001010.00111000.11111001.11000000

10.56.250.0/23

00001010.00111000.11111010.00000000

10.56.249.128/26

00001010.00111000.11111001.10000000

10.56.249.192/26

00001010.00111000.11111001.11000000

10.56.249.128/25

00001010.00111000.11111001.10000000

Capa de Red - Sumarizar - Ejemplo



10.56.248.0/24
00001010.00111000.11111000.00000000

10.56.249.0/25
00001010.00111000.11111001.00000000

10.56.249.128/25
00001010.00111000.11111001.10000000

10.56.250.0/23
00001010.00111000.11111010.00000000

10.56.249.0/25
00001010.00111000.11111001.00000000

10.56.249.128/25
00001010.00111000.11111001.10000000

10.56.249.0/24
00001010.00111000.11111001.00000000

Capa de Red - Sumarizar - Ejemplo



10.56.248.0/24
00001010.00111000.11111000.00000000

10.56.249.0/24
00001010.00111000.11111001.00000000

10.56.250.0/23
00001010.00111000.11111010.00000000

10.56.248.0/24
00001010.00111000.11111000.00000000

10.56.249.0/24
00001010.00111000.11111001.00000000

10.56.248.0/23
00001010.00111000.11111000.00000000

Capa de Red - Sumarizar - Ejemplo



10.56.248.0/23
00001010.00111000.11111000.0.00000000

10.56.250.0/23
00001010.00111000.11111010.0.00000000

10.56.248.0/23
00001010.00111000.11111000.0.00000000

10.56.250.0/23
00001010.00111000.11111010.0.00000000

10.56.248.0/22
00001010.00111000.11111000.0.00000000

Capa de Red - Sumarizar - Ejemplo



10.56.248.0/22

00001010.00111000.11111000.00000000

PREFIJO /22

22 bits = 11111111.11111111.11111100.00000000 =
255.255.252.0

Calculadoras IP



- <https://www.site24x7.com/es/tools/ipv4-subredes-calculadora.html>
- <https://aprendaredes.com/cgi-bin/ipcalc/ipcalc.cgi>
- ipcalc