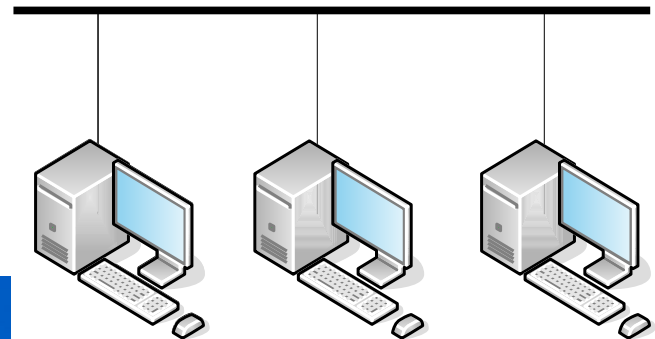


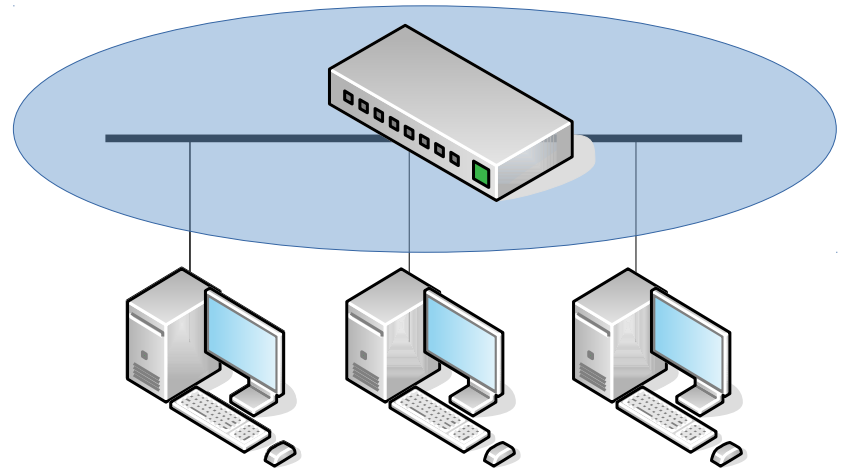
Ethernet

- Estandarizada por IEEE802.3
- Originalmente, topología de bus
 - Implementada sobre coaxil
 - 10Base5, 10Base2 (1982-1985)

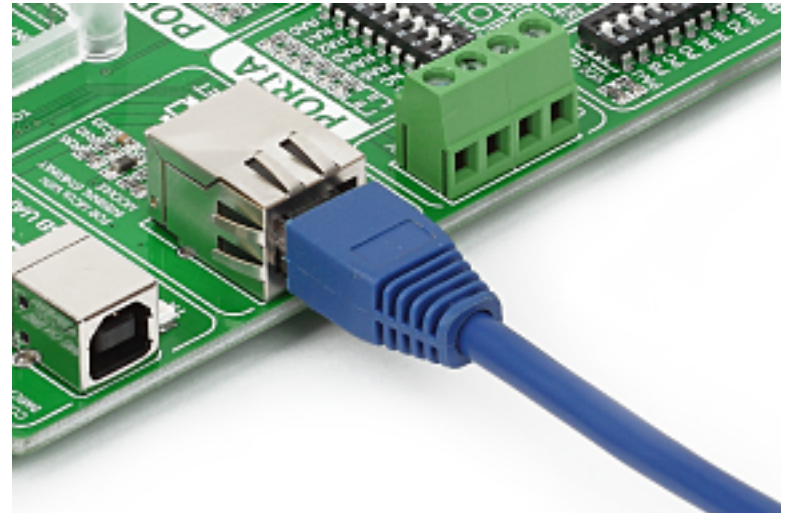
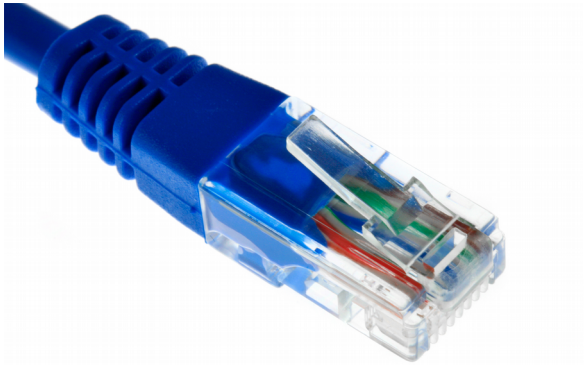


Ethernet

- 10Base-T (1990)
- 100Base-F
- 100Base-TX, 100Base-T4, 100Base-FX
- 1000Base-T (1999)
- 10GBase-T (2003-2006)
- Topología en estrella
- Cableado UTP, RJ45



Ethernet



Interfaces

```
oso@betsyrc ~ $ lspci
```

```
00:00.0 Host bridge: Intel Corporation 3rd Gen Core processor  
DRAM Controller (rev 09)
```

```
00:01.0 PCI bridge: Intel Corporation Xeon E3-1200 v2/3rd Gen  
Core processor PCI Express Root Port (rev 09)
```

```
00:02.0 VGA compatible controller: Intel Corporation 3rd Gen  
Core processor Graphics Controller (rev 09)
```

```
00:14.0 USB controller: Intel Corporation 7 Series/C210 Series  
Chipset Family USB xHCI Host Controller (rev 04)
```

```
...
```

```
03:00.0 Ethernet controller: Realtek Semiconductor Co., Ltd.  
RTL8111/8168/8411 PCI Express Gigabit Ethernet Controller (rev  
06)
```

Interfaces

```
oso@betsyrc ~ $ lspci
```

```
00:00.0 Host bridge:
```

```
DRAM Controller (rev
```

```
00:01.0 PCI bridge: I
```

```
Core processor PCI Ex
```

```
00:02.0 VGA compatibl
```

```
Core processor Graphi
```

```
00:14.0 USB controlle
```

```
Chipset Family USB xH
```

```
...
```

```
03:00.0 Ethernet cont
```

```
RTL8111/8168/8411 PCI
```

```
06)
```

```
oso@betsyrc ~ $ lspci -n
```

```
00:00.0 0600: 8086:0154 (rev 09)
```

```
00:01.0 0604: 8086:0151 (rev 09)
```

```
00:02.0 0300: 8086:0166 (rev 09)
```

```
00:14.0 0c03: 8086:1e31 (rev 04)
```

```
00:16.0 0780: 8086:1e3a (rev 04)
```

```
00:1a.0 0c03: 8086:1e2d (rev 04)
```

```
00:1b.0 0403: 8086:1e20 (rev 04)
```

```
00:1c.0 0604: 8086:1e10 (rev c4)
```

```
00:1c.3 0604: 8086:1e16 (rev c4)
```

```
00:1d.0 0c03: 8086:1e26 (rev 04)
```

```
00:1f.0 0601: 8086:1e59 (rev 04)
```

```
00:1f.2 0106: 8086:1e03 (rev 04)
```

```
00:1f.3 0c05: 8086:1e22 (rev 04)
```

```
01:00.0 0300: 10de:0de9 (rev ff)
```

```
02:00.0 0280: 8086:088e (rev 24)
```

```
03:00.0 0200: 10ec:8168 (rev 06)
```

cessor

rd Gen

d Gen

Series

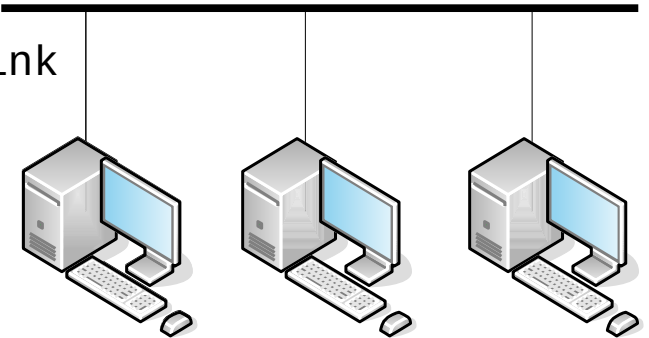
Ltd.

er (rev

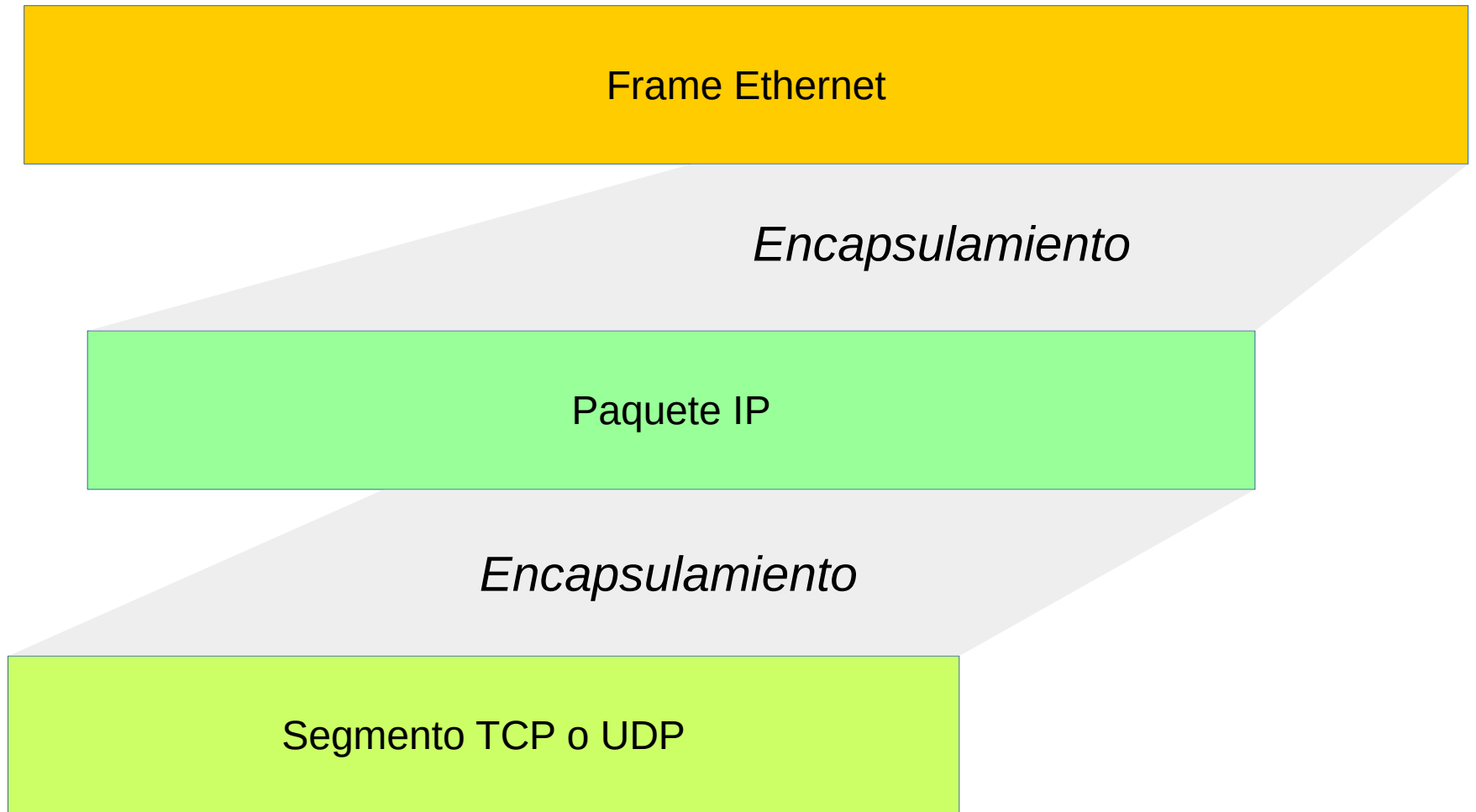
Direcciones

```
betsyrc ~ # ifconfig eth0
eth0      Link encap:Ethernet  HWaddr 50:b7:c3:04:5d:06
          inet addr:10.0.2.226  Bcast:10.0.2.255  Mask:255.255.255.0
          inet6 addr: fe80::52b7:c3ff:fe04:5d06/64  Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:402483 errors:0 dropped:0 overruns:0 frame:0
          TX packets:168545 errors:0 dropped:1 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:95016681 (90.6 MiB)  TX bytes:155432538 (148.2 MiB)
```

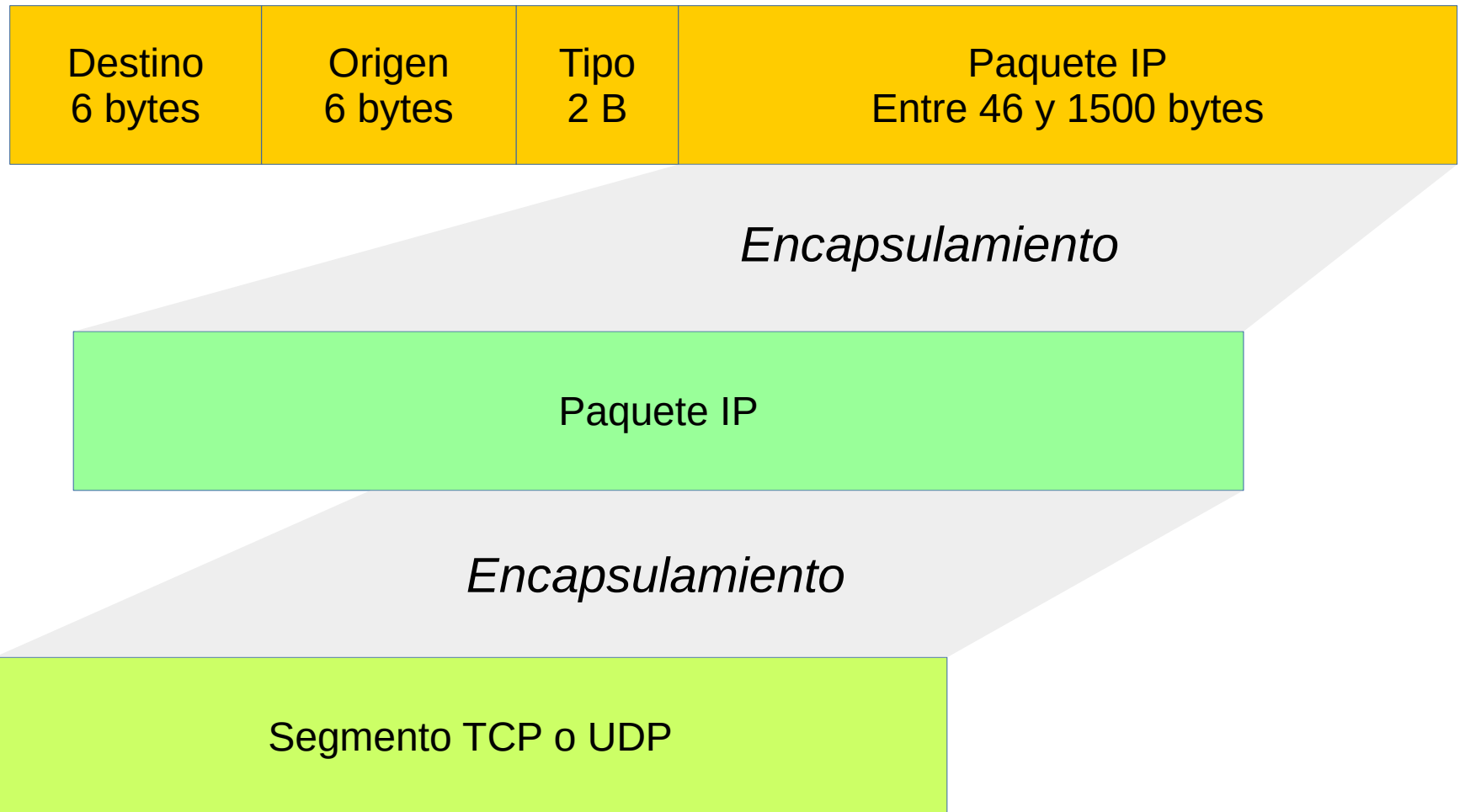
```
betsyrc ~ # ip addr show dev eth0
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast
state UP group default qlen 1000
    link/ether 50:b7:c3:04:5d:06 brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.226/24 brd 10.0.2.255 scope global eth0
        valid_lft forever preferred_lft forever
    inet6 fe80::52b7:c3ff:fe04:5d06/64 scope link
        valid_lft forever preferred_lft forever
```



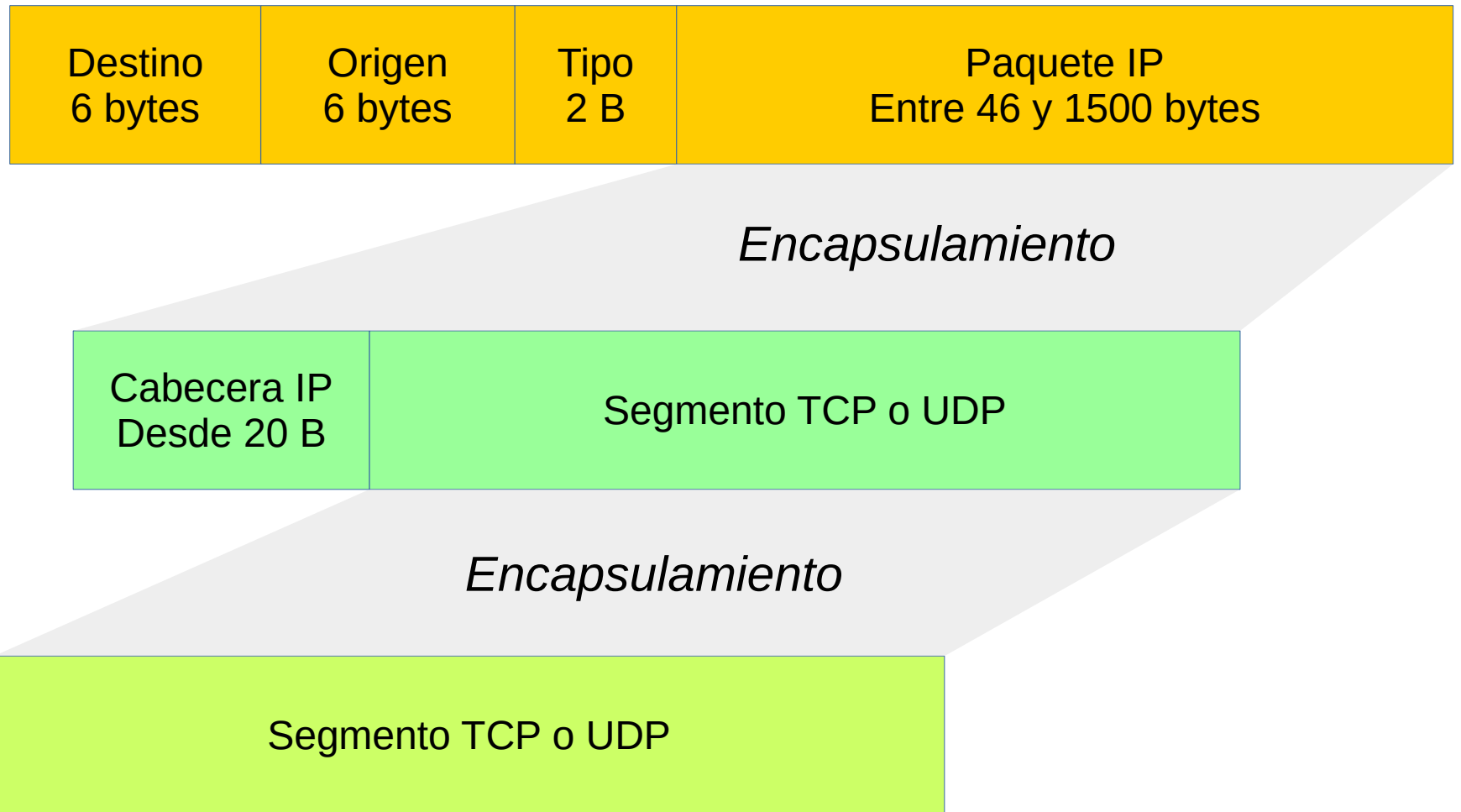
Frames, paquetes, segmentos



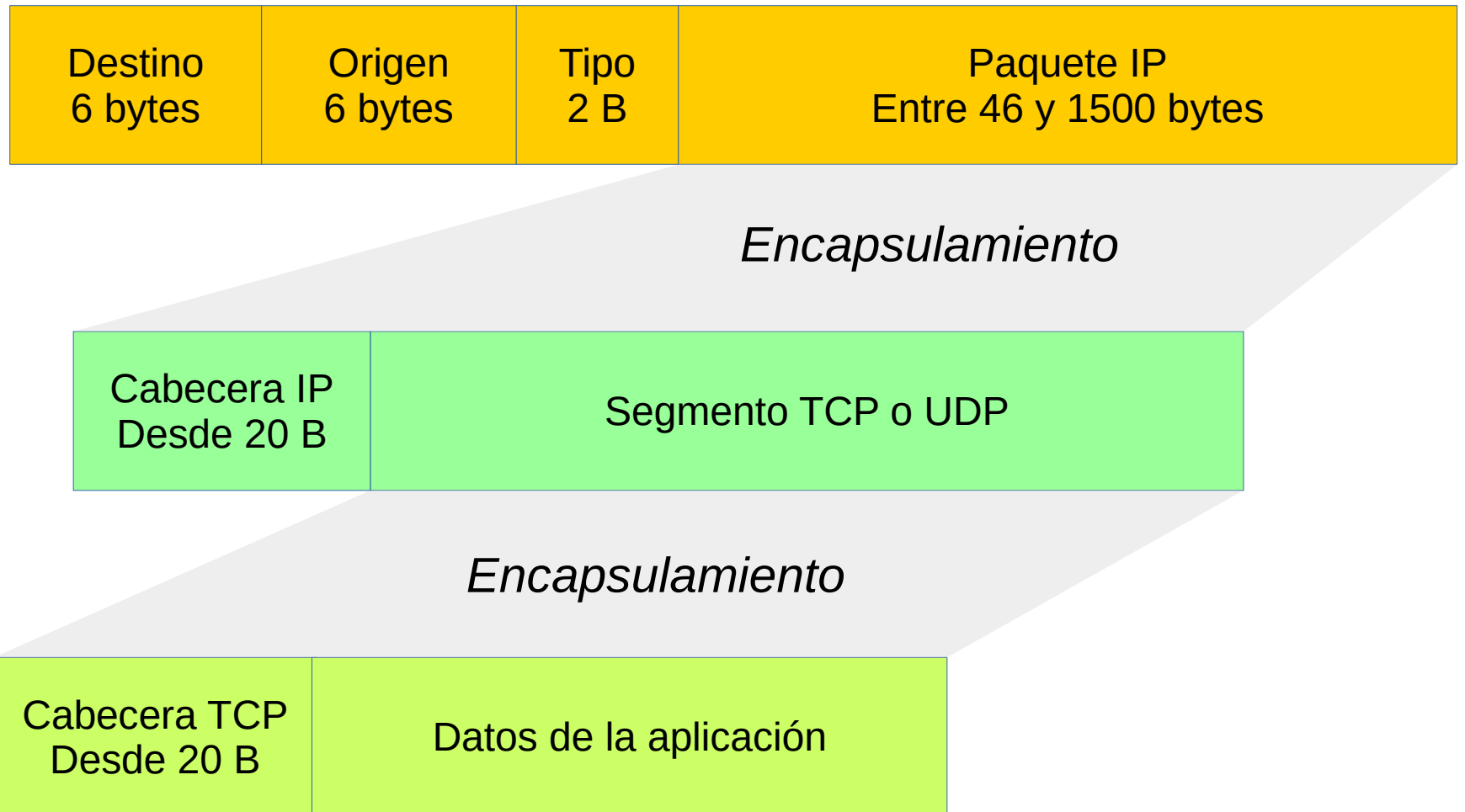
Frames, paquetes, segmentos



Frames, paquetes, segmentos



Frames, paquetes, segmentos



Dirección destino

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: Expression... Clear Apply Save

No.	Time	Source	Destination	Protocol	Length	Info
155	2.533127	173.194.42.90	192.168.1.5	TCP	66	443→59709 [ACK] Seq=1 Ack=217 Win=4364
156	2.537225	173.194.42.90	192.168.1.5	TLSv1.2	1484	Server Hello
157	2.539993	173.194.42.90	192.168.1.5	TCP	1484	[TCP segment of a reassembled PDU]
158	2.542150	173.194.42.90	192.168.1.5	TLSv1.2	1244	Certificate
159	2.545182	190.193.195.252	192.168.1.5	TCP	1506	3149→51413 [ACK] Seq=72789 Ack=1 Win=6
160	2.548089	SamsungE_04:5d:06	Broadcast	ARP	42	Who has 10.0.2.1? Tell 192.168.1.5
161	2.566028	190.193.195.252	192.168.1.5	TCP	1506	3149→51413 [ACK] Seq=74229 Ack=1 Win=6
162	2.589070	190.193.195.252	192.168.1.5	TCP	1506	3149→51413 [ACK] Seq=75669 Ack=1 Win=6
163	2.611234	190.193.195.252	192.168.1.5	TCP	1506	3149→51413 [ACK] Seq=77109 Ack=1 Win=6

Frame 159: 1506 bytes on wire (12048 bits), 1506 bytes captured (12048 bits)

Ethernet II, Src: Fiberhom_84:54:68 (04:c1:b9:84:54:68), Dst: SamsungE_04:5d:06 (50:b7:c3:04:5d:06)

Destination: SamsungE_04:5d:06 (50:b7:c3:04:5d:06)

Address: SamsungE_04:5d:06 (50:b7:c3:04:5d:06)

.... ..0. = LG bit: Globally unique address (factory default)

.... ...0 = IG bit: Individual address (unicast)

Source: Fiberhom_84:54:68 (04:c1:b9:84:54:68)

Address: Fiberhom_84:54:68 (04:c1:b9:84:54:68)

0 = LG bit: Globally unique address (factory default)

0000 50 b7 c3 04 5d 06 04 c1 b9 84 54 68 08 00 45 00 P...]. .Th..E.

0010 05 d4 dc 57 40 00 72 06 e2 60 be c1 c3 fc c0 a8 ...W@.r. .`.....

0020 01 05 0c 4d c8 d5 6a 1d 0b 6c 75 52 df 9a 80 10 ...M..j. .luR....

0030 fd df 41 d6 00 00 01 01 08 0a 00 00 4a 12 05 0b ..A.....J...

0040 ad 00 f9 24 bd 51 79 80 35 a7 98 23 5e 6c 64 87 ...\$.Qy. 5..#^ld.

Dirección origen

The image shows a Wireshark network traffic analysis interface. The top menu bar includes File, Edit, View, Go, Capture, Analyze, Statistics, Telephony, Tools, Internals, and Help. Below the menu is a toolbar with various icons for file operations, capture, and analysis. A filter bar is present with a text input field and buttons for Expression..., Clear, Apply, and Save.

The main packet list table is as follows:

No.	Time	Source	Destination	Protocol	Length	Info
155	2.533127	173.194.42.90	192.168.1.5	TCP	66	443->59709 [ACK] Seq=1 Ack=217 Win=4364
156	2.537225	173.194.42.90	192.168.1.5	TLSv1.2	1484	Server Hello
157	2.539993	173.194.42.90	192.168.1.5	TCP	1484	[TCP segment of a reassembled PDU]
158	2.542150	173.194.42.90	192.168.1.5	TLSv1.2	1244	Certificate
159	2.545182	190.193.195.252	192.168.1.5	TCP	1506	3149->51413 [ACK] Seq=72789 Ack=1 Win=6
160	2.548089	SamsungE_04:5d:06	Broadcast	ARP	42	Who has 10.0.2.1? Tell 192.168.1.5
161	2.566028	190.193.195.252	192.168.1.5	TCP	1506	3149->51413 [ACK] Seq=74229 Ack=1 Win=6
162	2.589070	190.193.195.252	192.168.1.5	TCP	1506	3149->51413 [ACK] Seq=75669 Ack=1 Win=6
163	2.611234	190.193.195.252	192.168.1.5	TCP	1506	3149->51413 [ACK] Seq=77109 Ack=1 Win=6

The detailed view of packet 159 shows the following structure:

- Frame 159: 1506 bytes on wire (12048 bits), 1506 bytes captured (12048 bits)
- Ethernet II, Src: Fiberhom_84:54:68 (04:c1:b9:84:54:68), Dst: SamsungE_04:5d:06 (50:b7:c3:04:5d:06)
 - Destination: SamsungE_04:5d:06 (50:b7:c3:04:5d:06)
 - Address: SamsungE_04:5d:06 (50:b7:c3:04:5d:06)
 -0. = LG bit: Globally unique address (factory default)
 -0 = IG bit: Individual address (unicast)
 - Source: Fiberhom_84:54:68 (04:c1:b9:84:54:68)
 - Address: Fiberhom_84:54:68 (04:c1:b9:84:54:68)
 - 0 = LG bit: Globally unique address (factory default)

The packet bytes are displayed in hexadecimal and ASCII format:

Offset	Hex	ASCII
0000	50 b7 c3 04 5d 06 04 c1 b9 84 54 68 08 00 45 00	P...]. .Th..E.
0010	05 d4 dc 57 40 00 72 06 e2 60 be c1 c3 fc c0 a8	...W@.r. .`.....
0020	01 05 0c 4d c8 d5 6a 1d 0b 6c 75 52 df 9a 80 10	...M..j. .luR....
0030	fd df 41 d6 00 00 01 01 08 0a 00 00 4a 12 05 0b	..A..... .J...
0040	ad 00 f9 24 bd 51 79 80 35 a7 98 23 5e 6c 64 87	...\$.Qy. 5..#^ld.

ARP

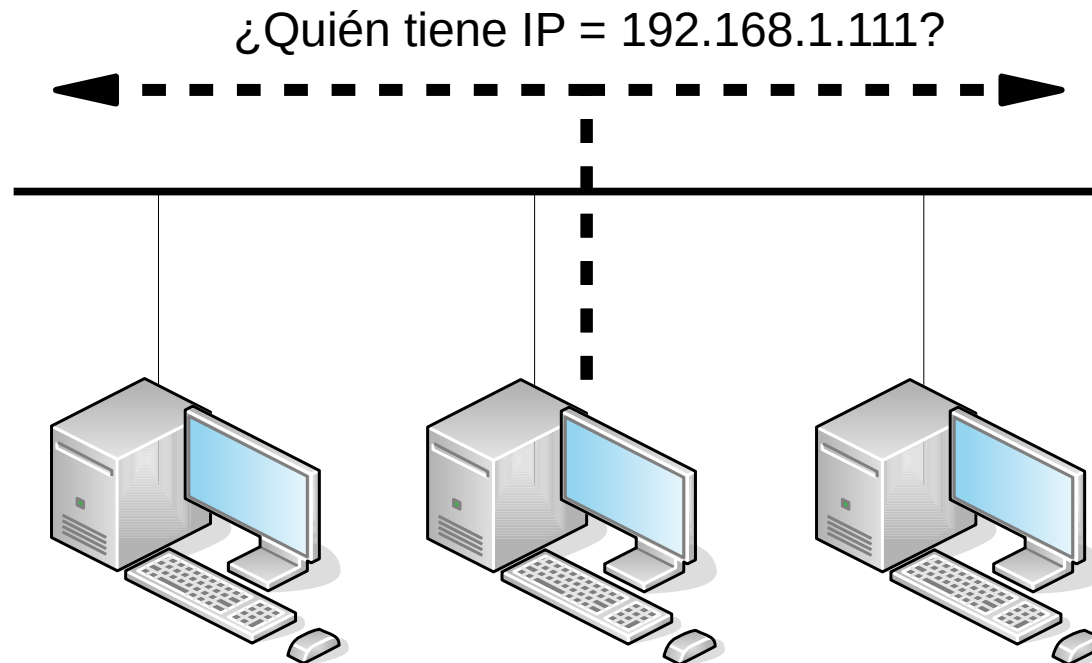
```
betsyrc ~ # ping 192.168.1.111
```

```
PING 192.168.1.111 (192.168.1.111) 56(84) bytes of data.
```

```
64 bytes from 192.168.1.111: icmp_seq=2 ttl=64 time=0.690 ms
```

```
64 bytes from 192.168.1.111: icmp_seq=3 ttl=64 time=0.642 ms
```

```
64 bytes from 192.168.1.111: icmp_seq=4 ttl=64 time=0.728 ms
```



Broadcast

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: Expression... Clear Apply Save

No.	Time	Source	Destination	Protocol	Length	Info
155	2.533127	173.194.42.90	192.168.1.5	TCP	66	443->59709 [ACK] Seq=1 Ack=217 Win=4364
156	2.537225	173.194.42.90	192.168.1.5	TLSv1.2	1484	Server Hello
157	2.539993	173.194.42.90	192.168.1.5	TCP	1484	[TCP segment of a reassembled PDU]
158	2.542150	173.194.42.90	192.168.1.5	TLSv1.2	1244	Certificate
159	2.545182	190.193.195.252	192.168.1.5	TCP	1506	3149->51413 [ACK] Seq=72789 Ack=1 Win=6
160	2.548089	SamsungE_04:5d:06	Broadcast	ARP	42	who has 10.0.2.1? Tell 192.168.1.5
161	2.566028	190.193.195.252	192.168.1.5	TCP	1506	3149->51413 [ACK] Seq=74229 Ack=1 Win=6
162	2.589070	190.193.195.252	192.168.1.5	TCP	1506	3149->51413 [ACK] Seq=75669 Ack=1 Win=6
163	2.611234	190.193.195.252	192.168.1.5	TCP	1506	3149->51413 [ACK] Seq=77109 Ack=1 Win=6

Frame 160: 42 bytes on wire (336 bits), 42 bytes captured (336 bits)

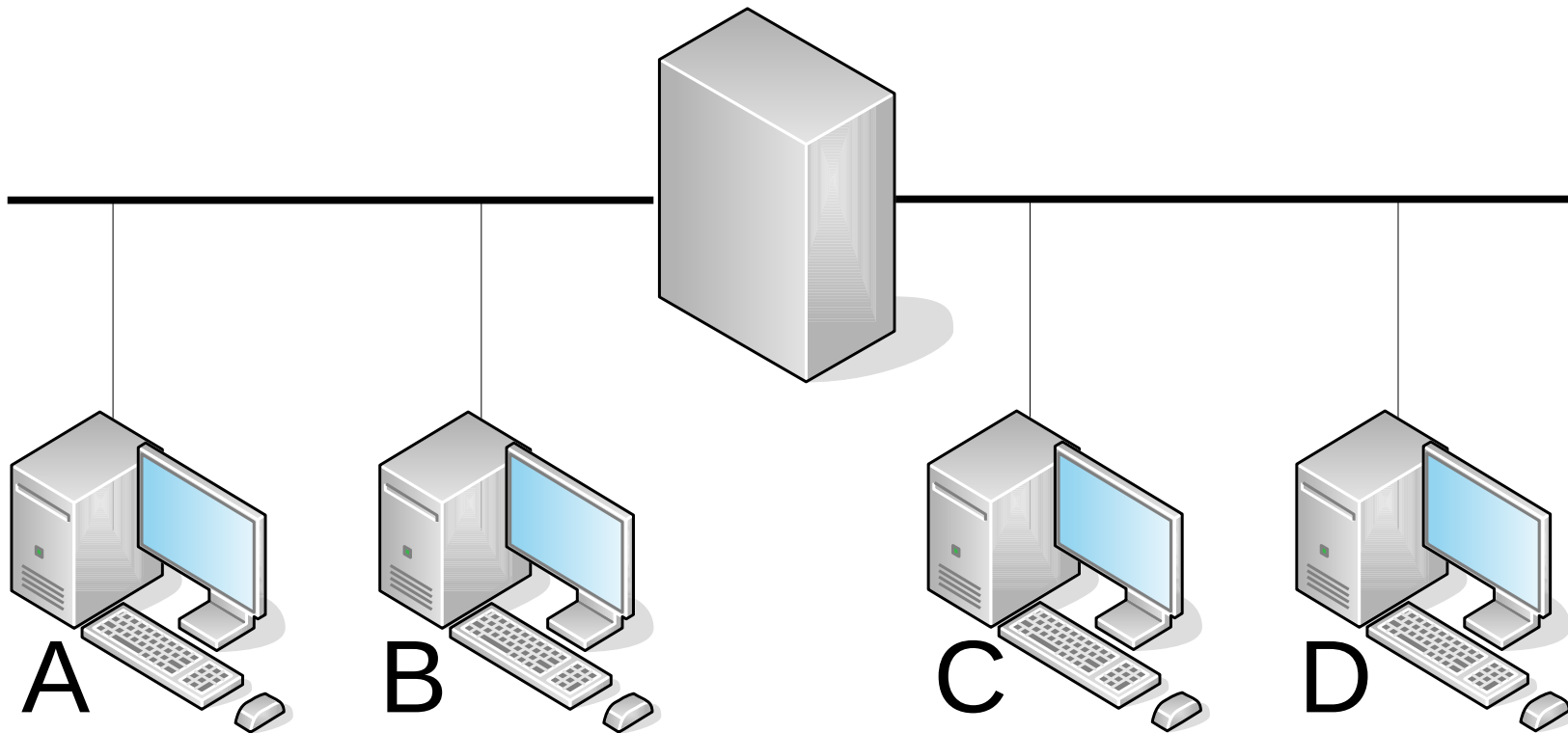
Ethernet II, Src: SamsungE_04:5d:06 (50:b7:c3:04:5d:06), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

- Destination: Broadcast (ff:ff:ff:ff:ff:ff)
- Source: SamsungE_04:5d:06 (50:b7:c3:04:5d:06)
- Type: ARP (0x0806)

Address Resolution Protocol (request)

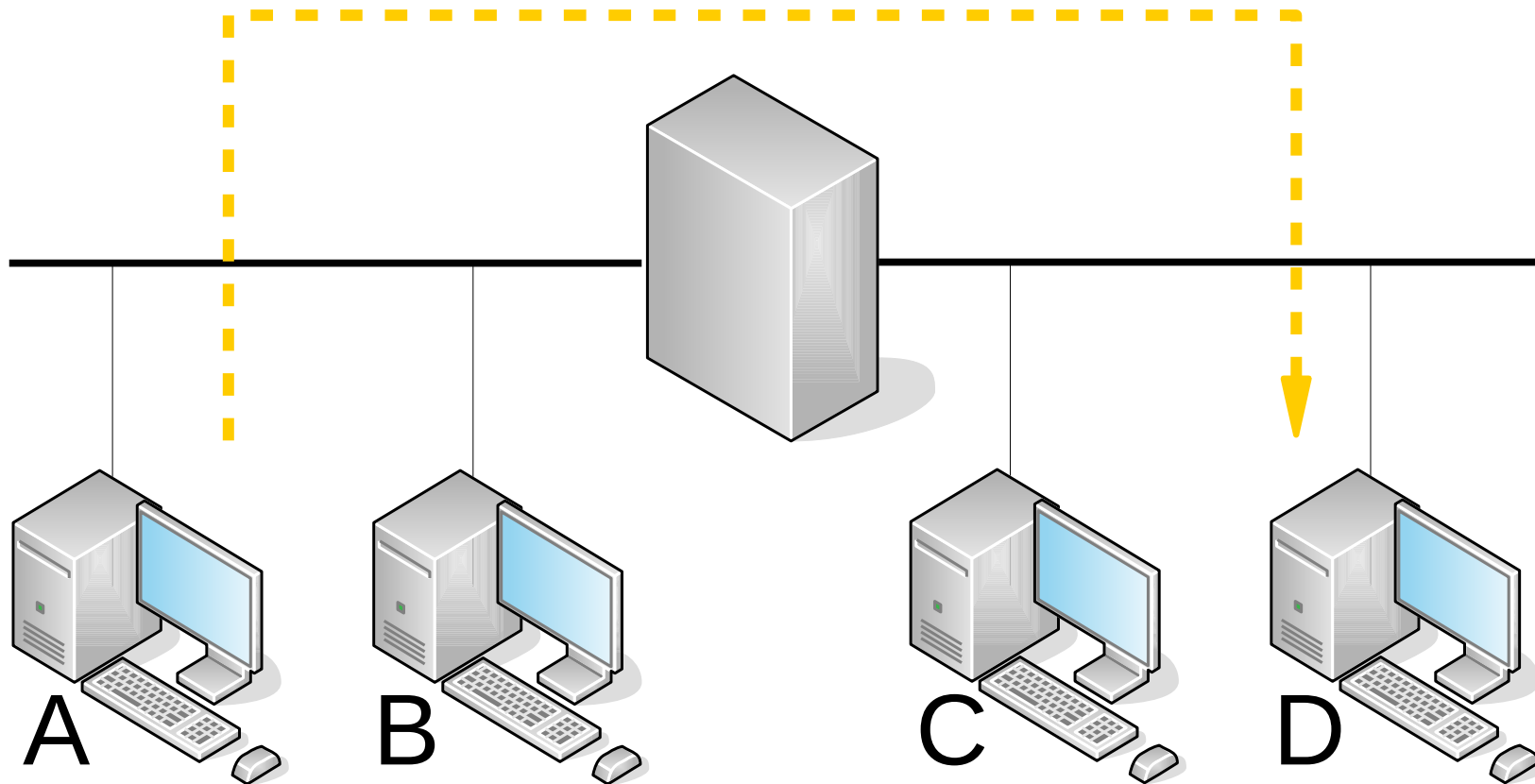
```
0000  ff ff ff ff ff ff 50 b7 c3 04 5d 06 08 06 00 01  ....P. ...]....
0010  08 00 06 04 00 01 50 b7 c3 04 5d 06 c0 a8 01 05  ....P. ...]....
0020  00 00 00 00 00 00 0a 00 02 01                    ..... ..
```

Bridges

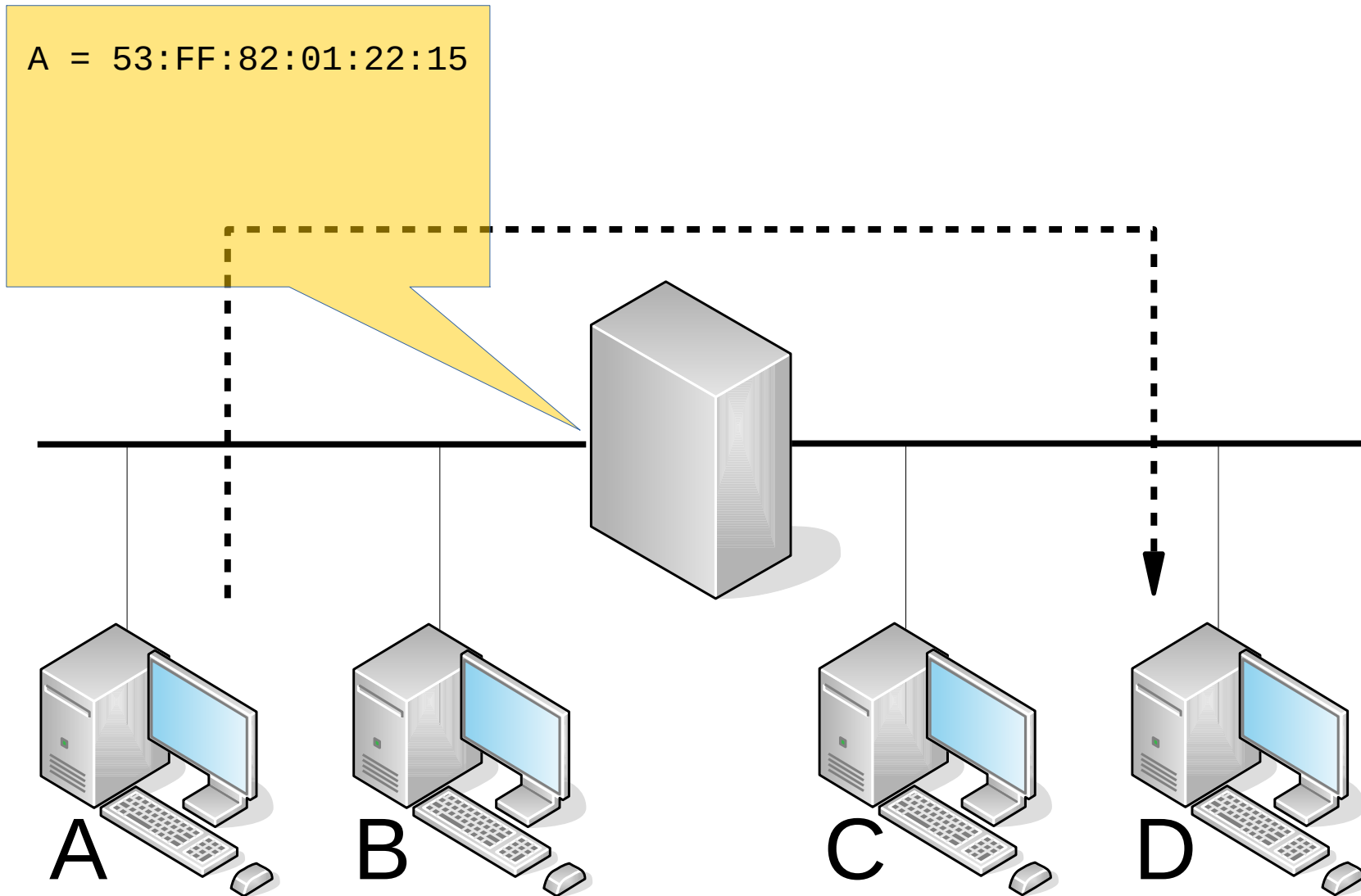


Bridges: inundación

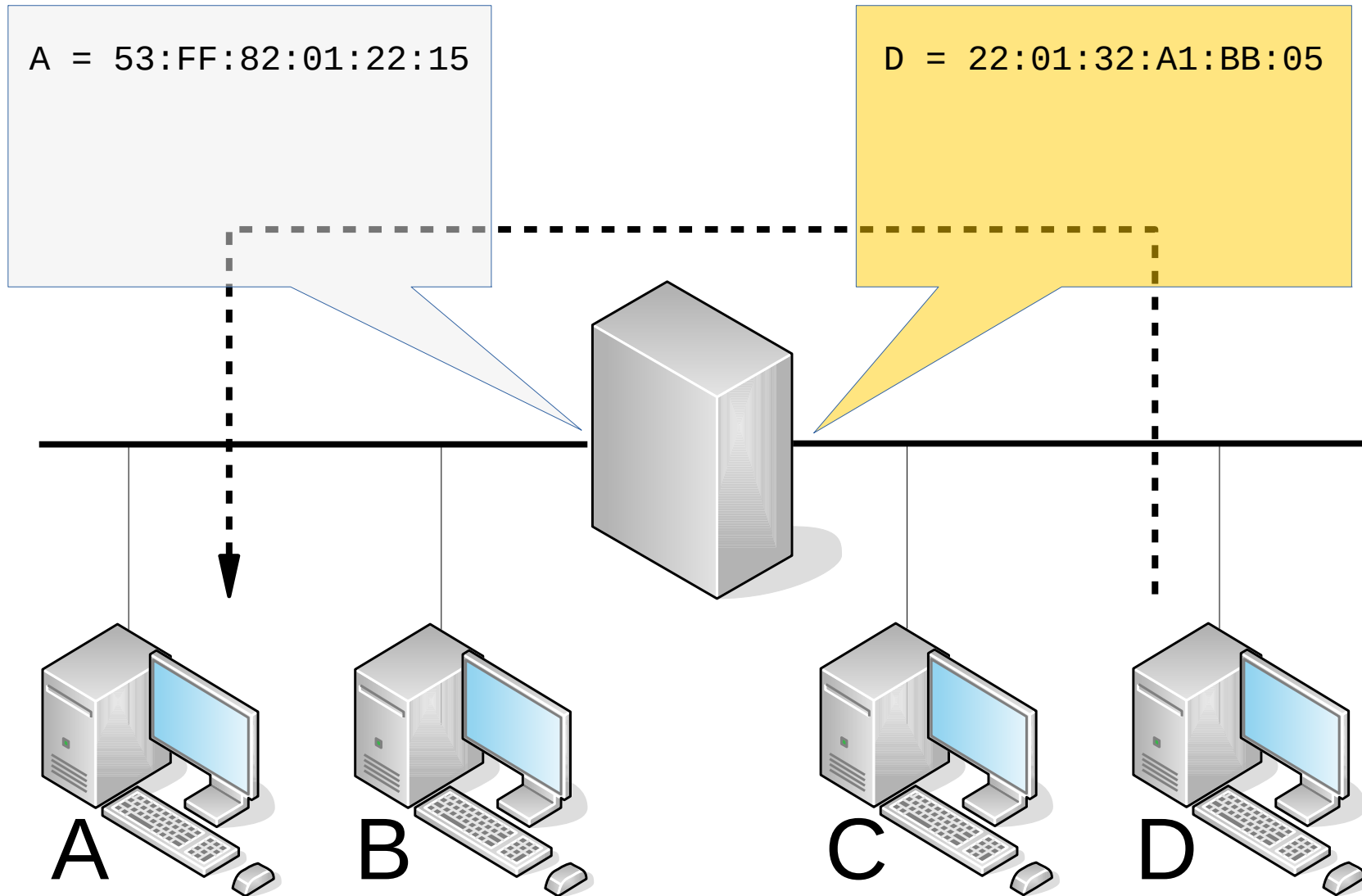
Destino D	Origen A	Tipo 2 B	Paquete IP Entre 46 y 1500 bytes
--------------	-------------	-------------	-------------------------------------



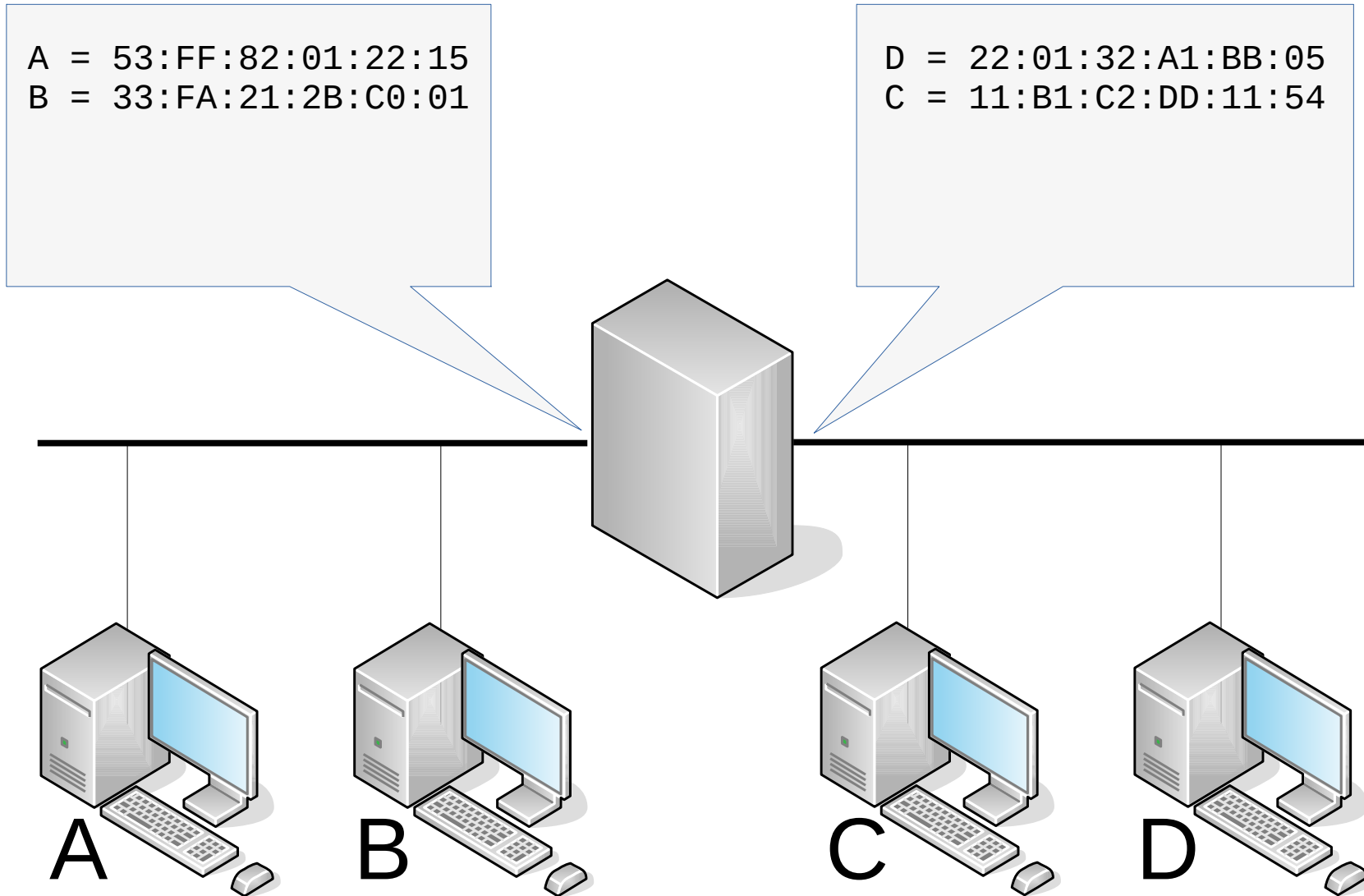
Bridges: aprendizaje



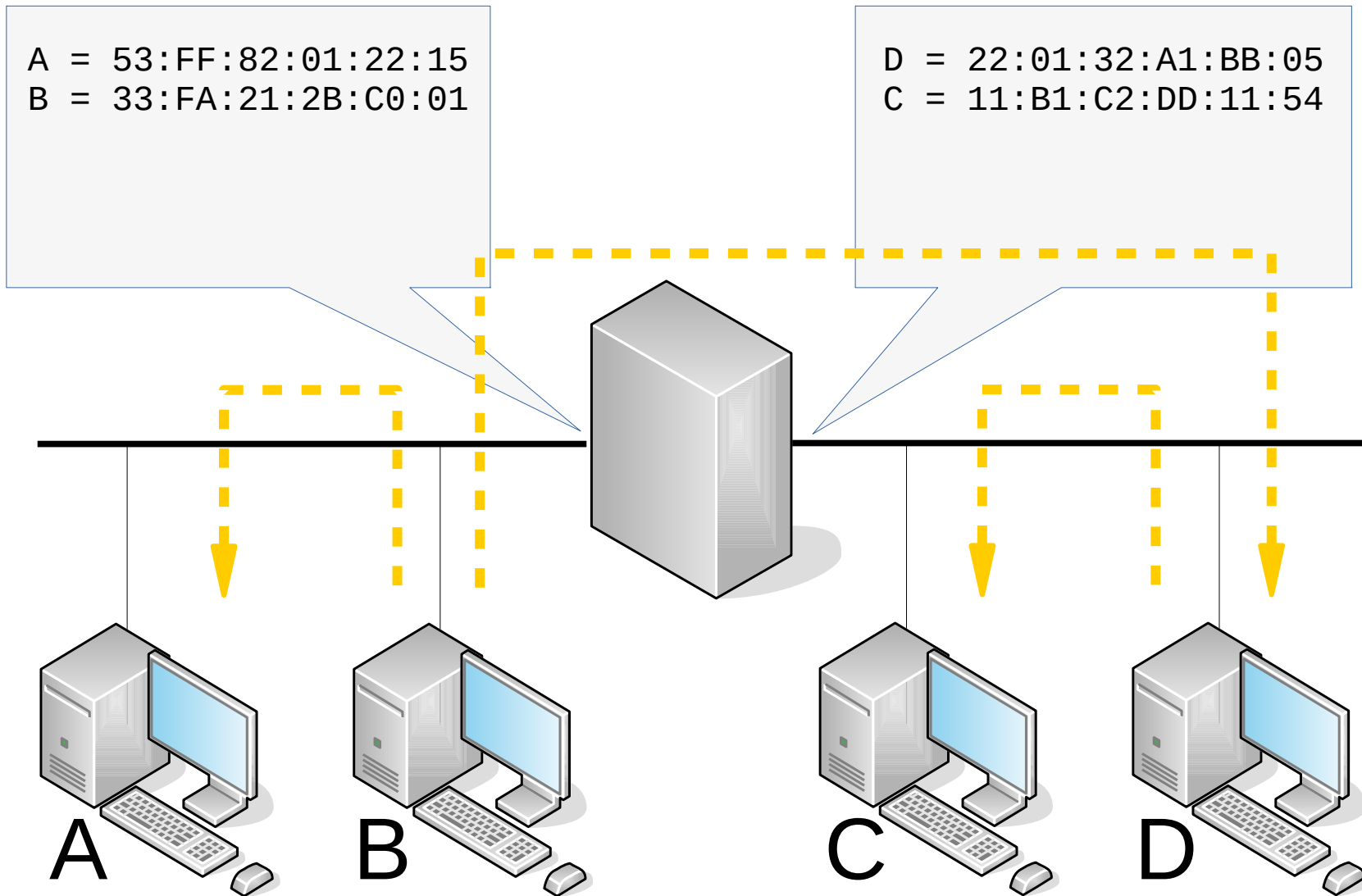
Bridges: aprendizaje



Bridges: aprendizaje

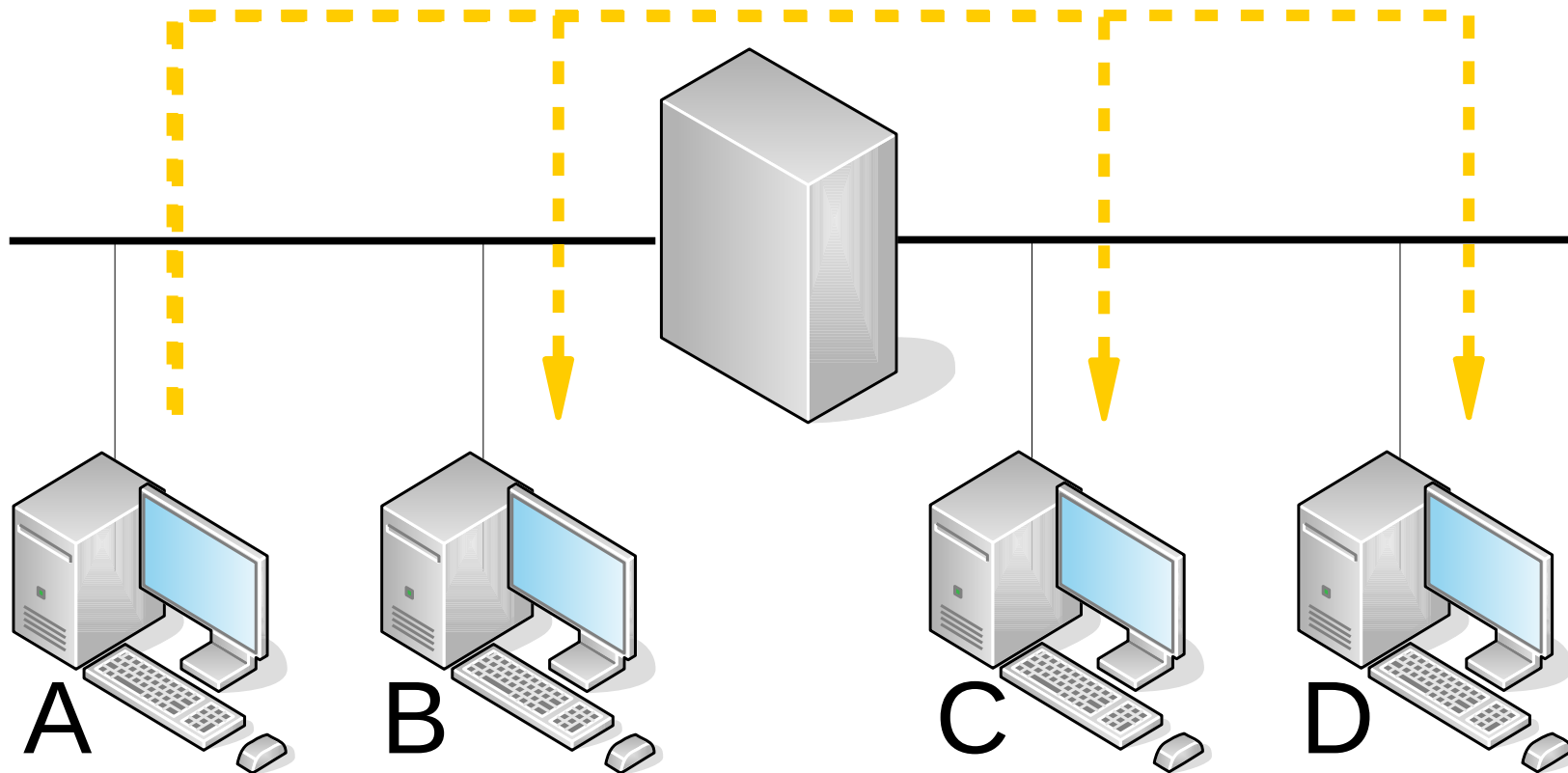


Bridges: filtrado

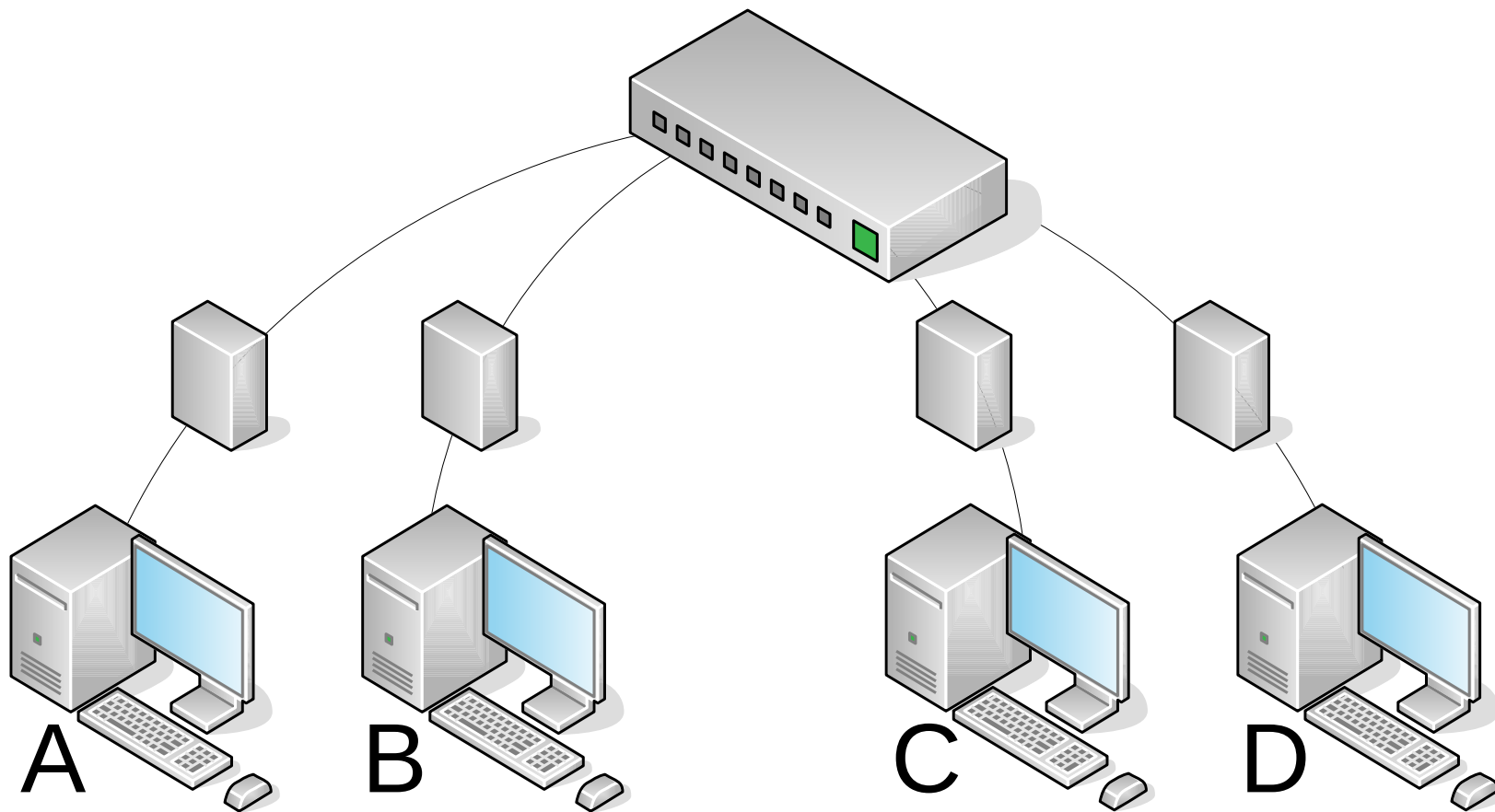


Bridges: broadcasts

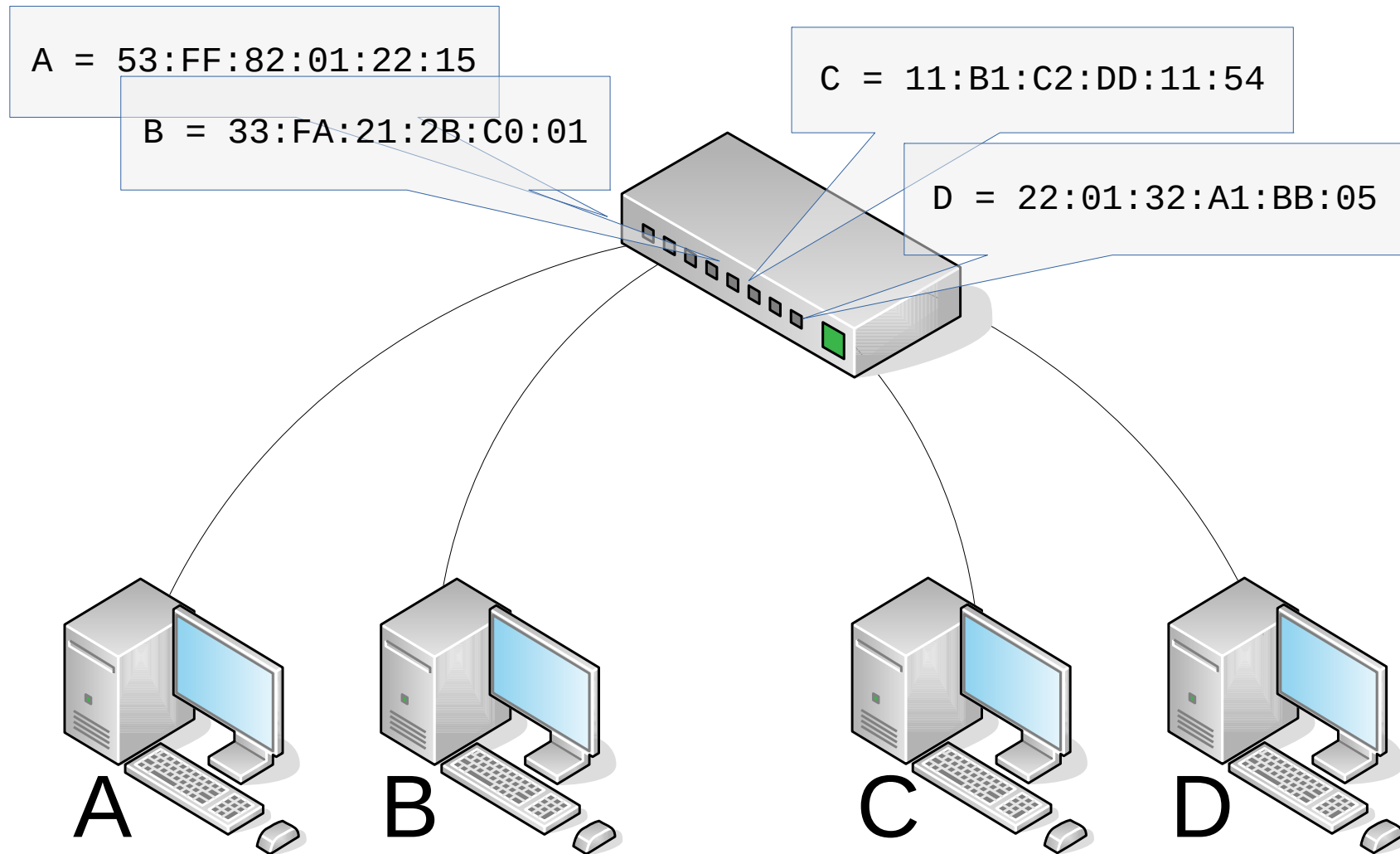
Destino	Origen	Tipo	Paquete IP
FF:FF:FF:FF:FF:FF	A	2 B	Entre 46 y 1500 bytes



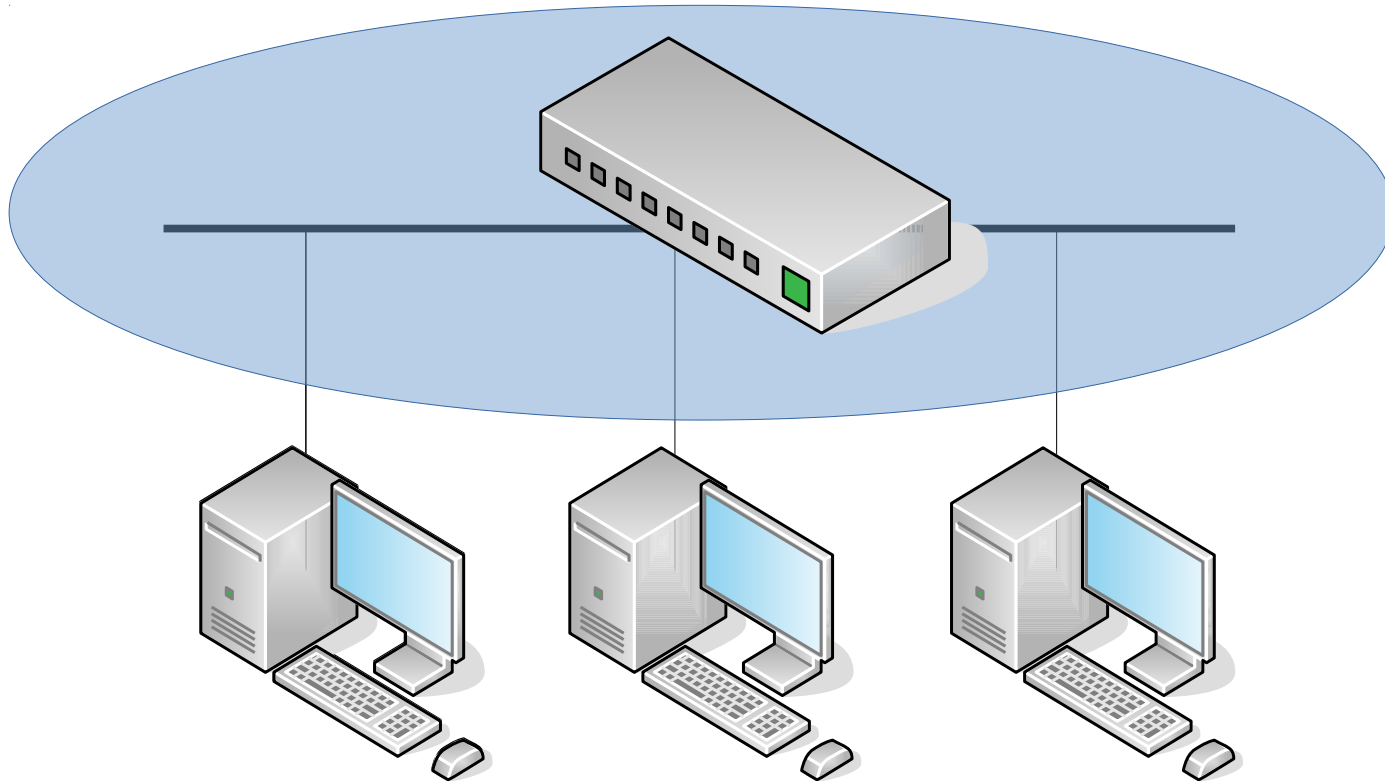
Switches: bridges multivía



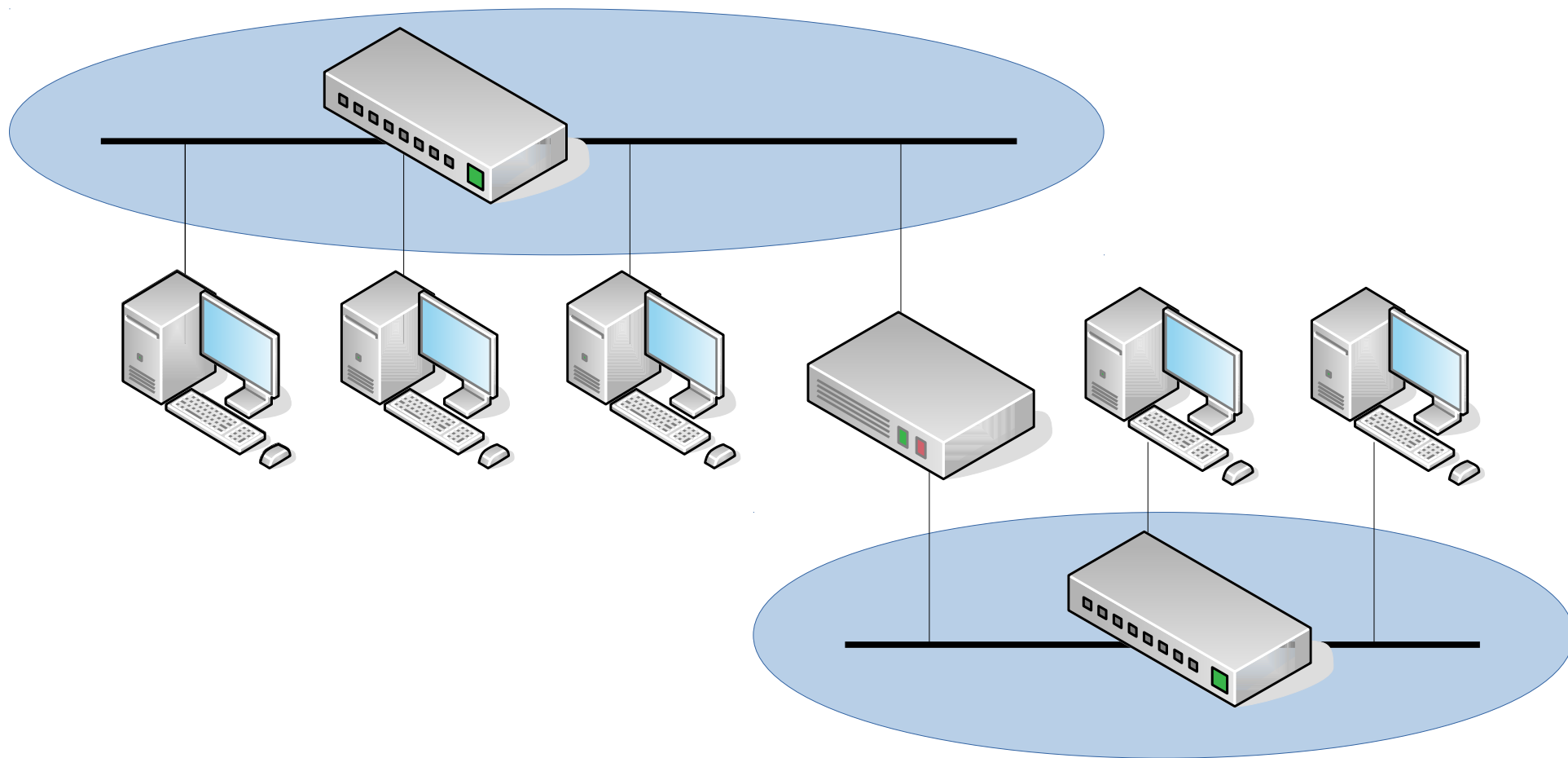
Switches: bridges multivía



Dominio de broadcast



Broadcast y routers



Broadcast y routers

