UTN.BA

ARP

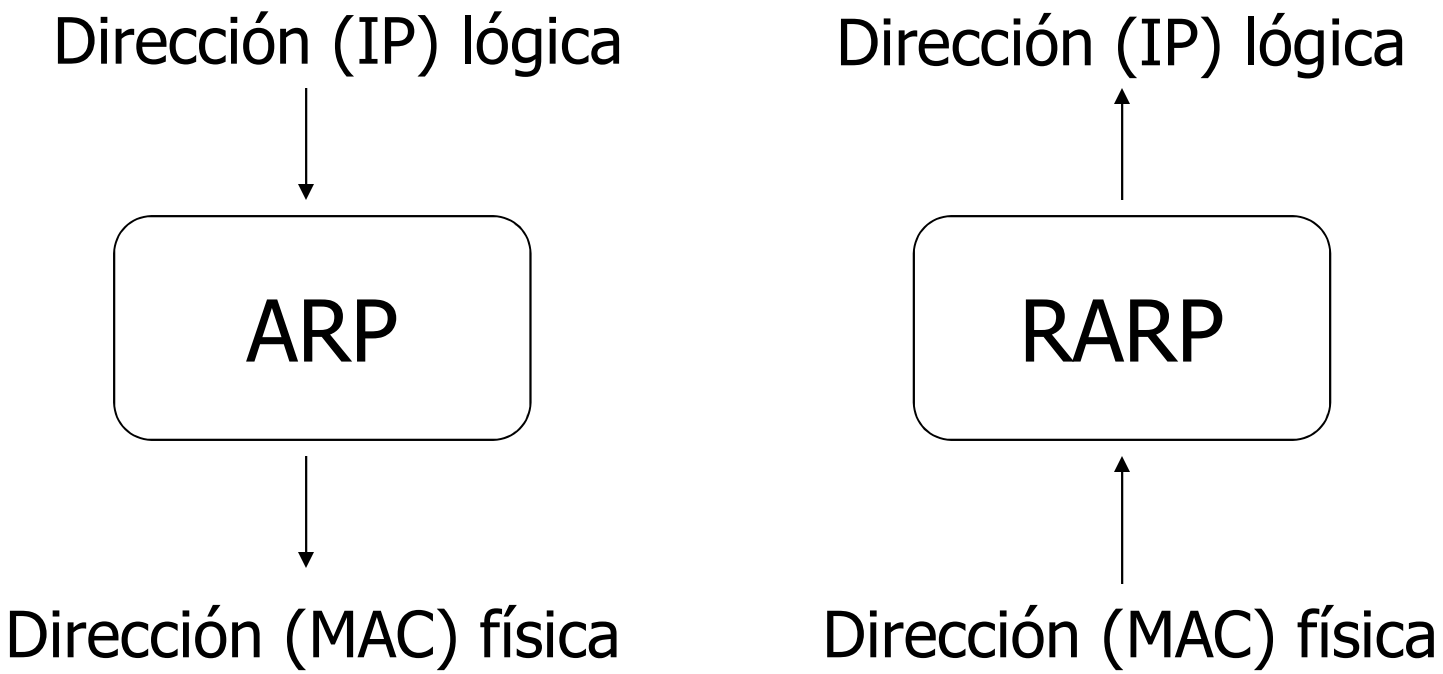
Address Resolution Protocol

(RFC 826)

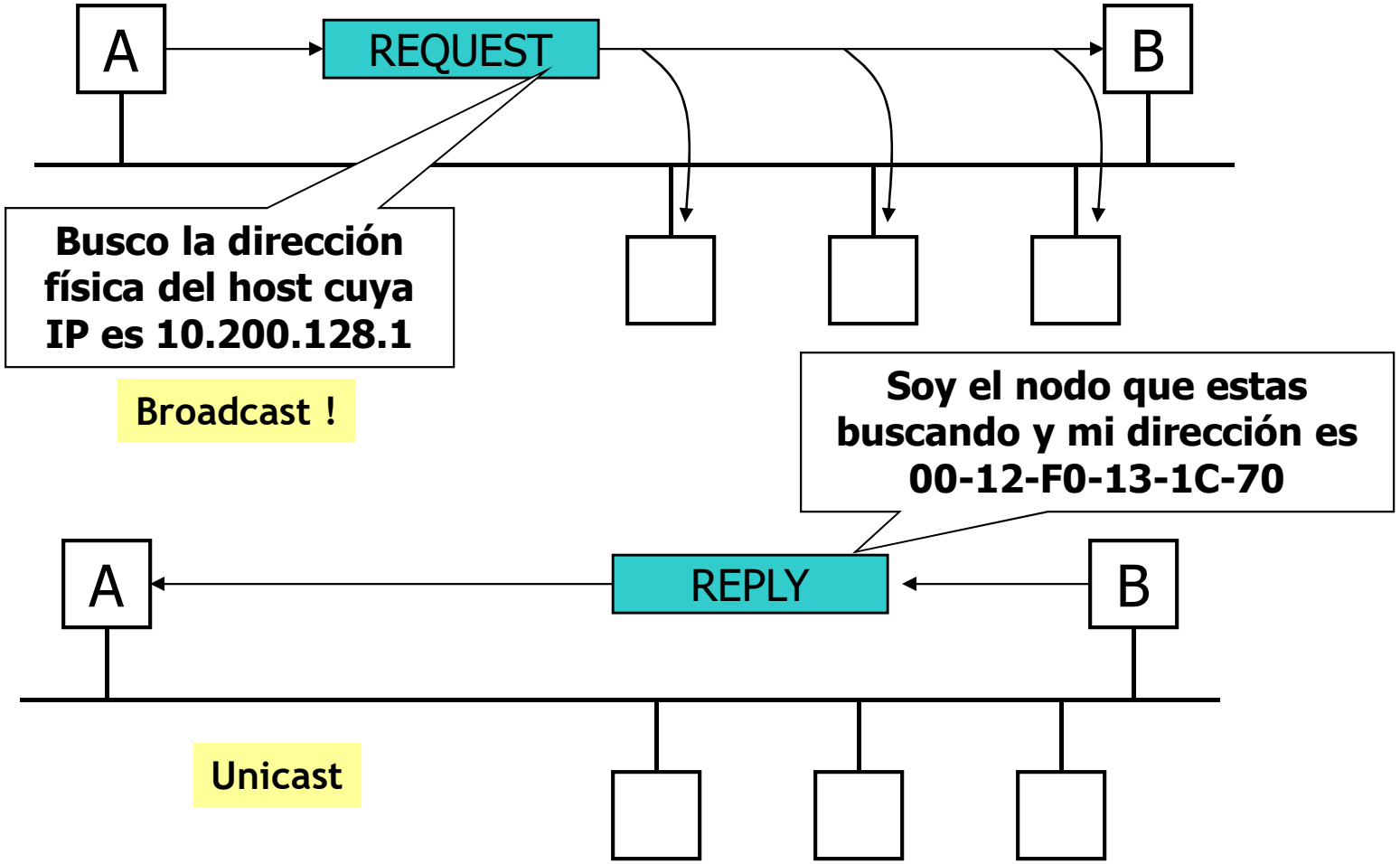
Problema de resolución

- ***Las aplicaciones de alto nivel solo trabajan con direcciones IP***
  - ***Ilusión de una única red virtual***
  - ***La comunicación es realizada por redes físicas, reales***
- ***Los datagramas IP son encapsulados en tramas MAC -> se necesitan direcciones de hardware MAC***
- ***Resolución: mapear direcciones IP de alto nivel a direcciones MAC físicas***

ARP vs RARP


Dirección (IP) lógica
ARP
Dirección (MAC) física
Dirección (IP) lógica
RARP
Dirección (MAC) física

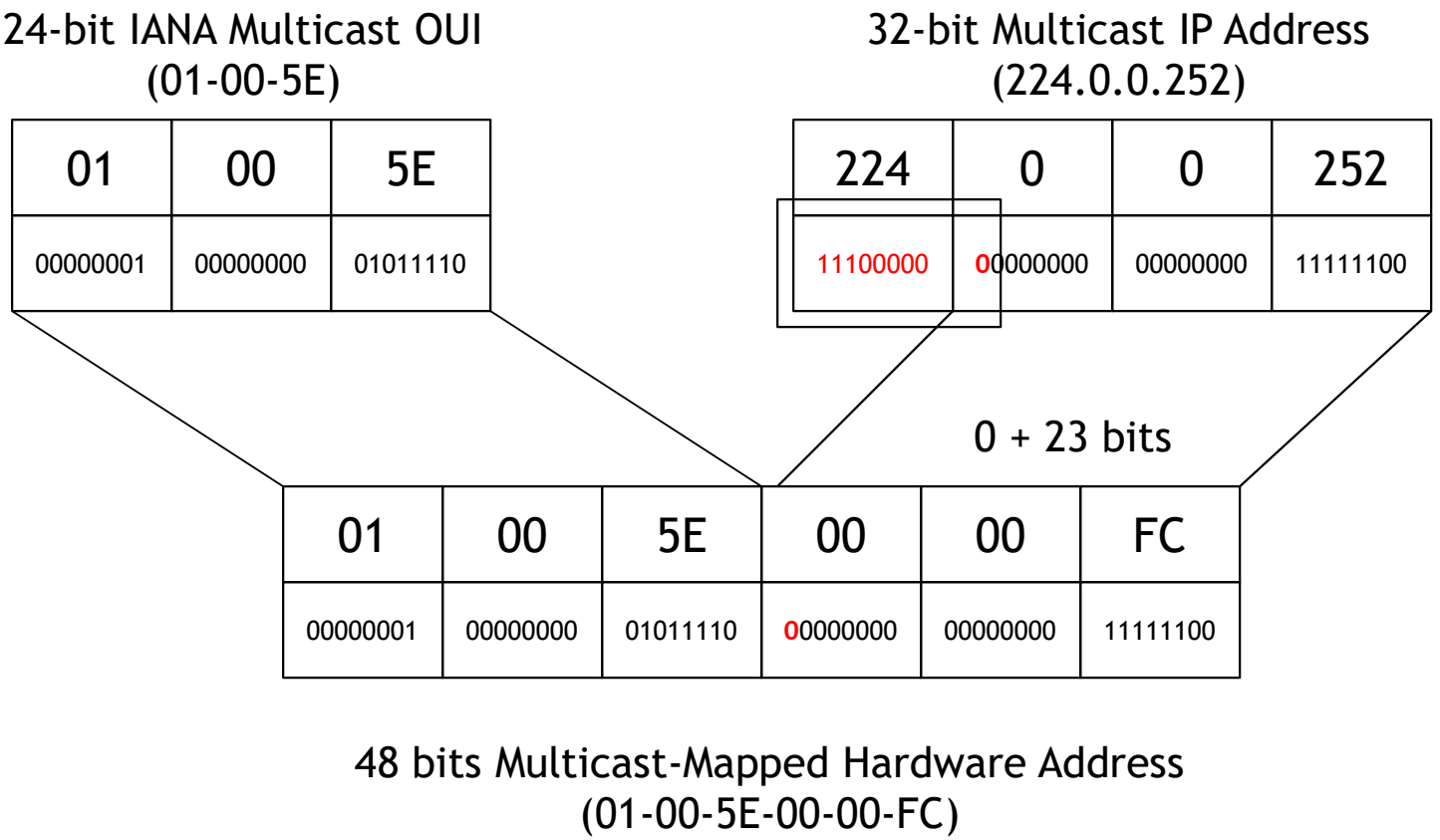
ARP


A
REQUEST
B
Busco la dirección física del host cuya IP es 10.200.128.1
Broadcast !
Soy el nodo que estas buscando y mi dirección es 00-12-F0-13-1C-70
A
REPLY
B
Unicast

ARP

- *Entrega directa*
- *¿Qué sucede con los broadcast?*
- *¿Y los multicast ?*

ARP – Multicast mapping



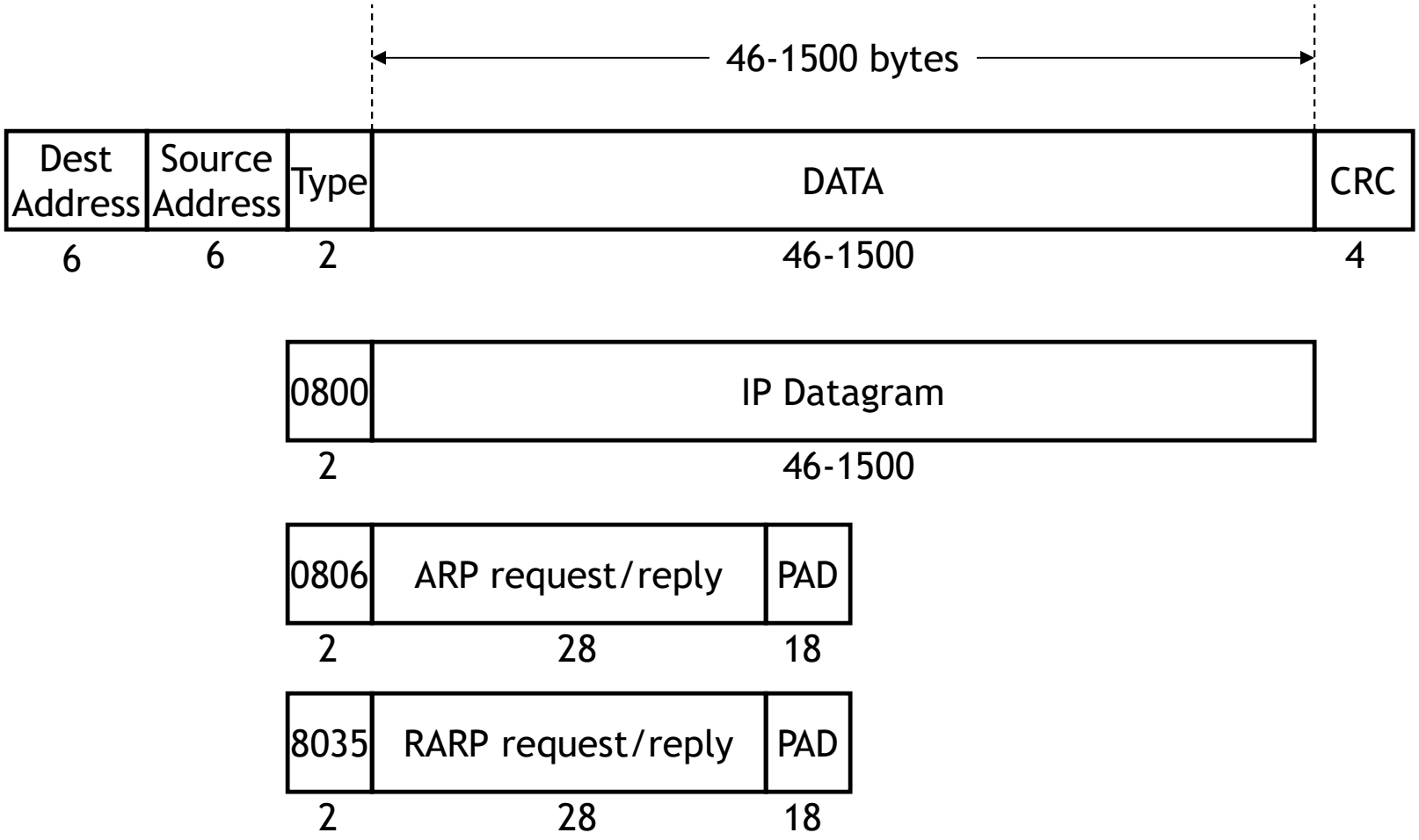
Formato del datagrama

Cant. Octetos		
2	HARDWARE TYPE	Ethernet=1
2	PROTOCOL TYPE	IP=0x800
1	LONG. DIRECCION FISICA (en Oct.)	6 for Ethernet
1	LONG. DIRECCION LOGICA (en Oct.)	4 for IP
2	OPERACION	Ver cuadro
6	DIRECCION FISICA DEL EMISOR	
4	DIRECCION LOGICA DEL EMISOR	
6	DIRECCION FISICA DEL DESTINO	
4	DIRECCION LOGICA DEL DESTINO	

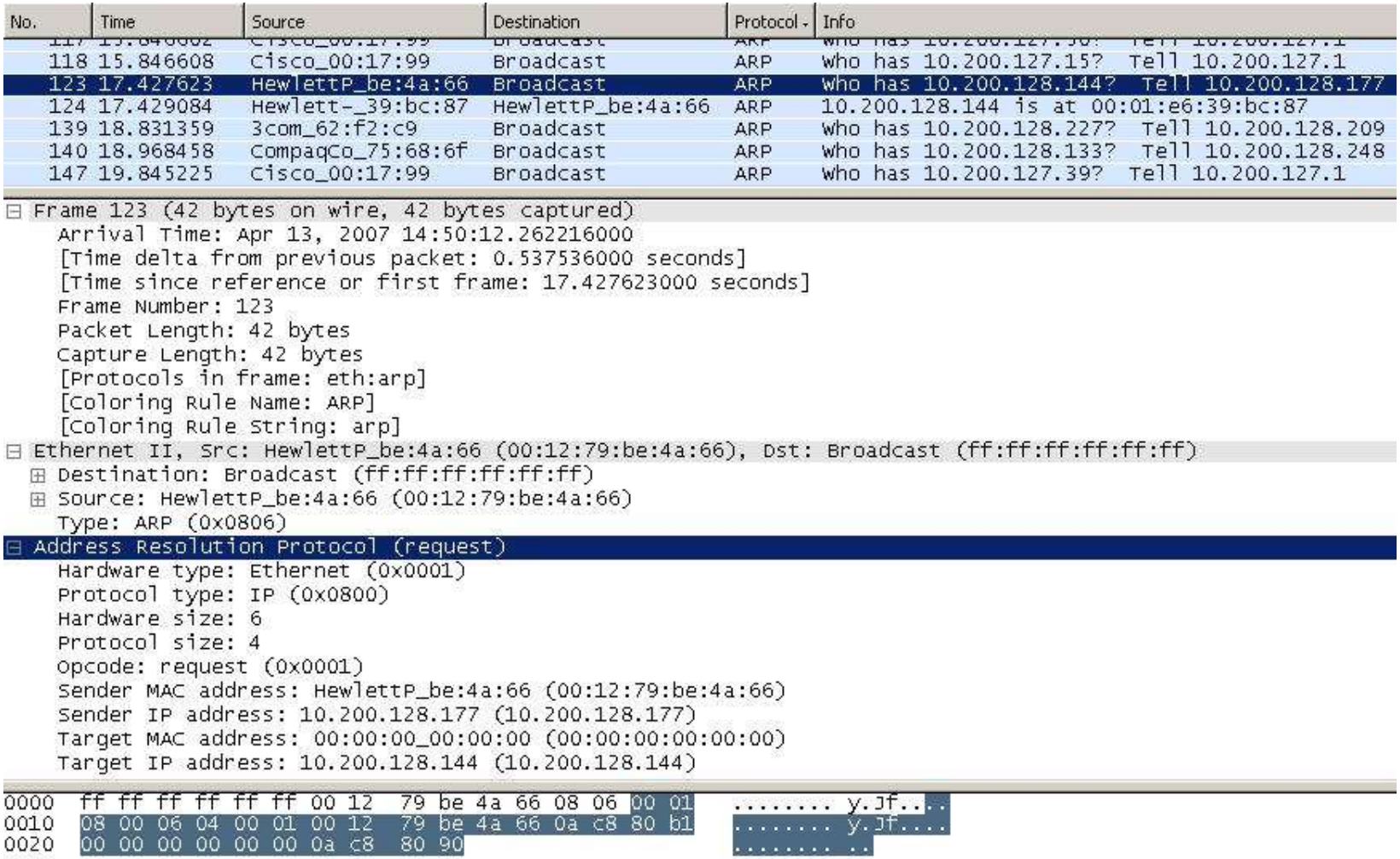
1=ARP Request
2=ARP reply
3=RARP request
4=RARP reply

Ethernet II frame type = 0x0806

Formato de trama Ethernet



Captura Ethereal - Request

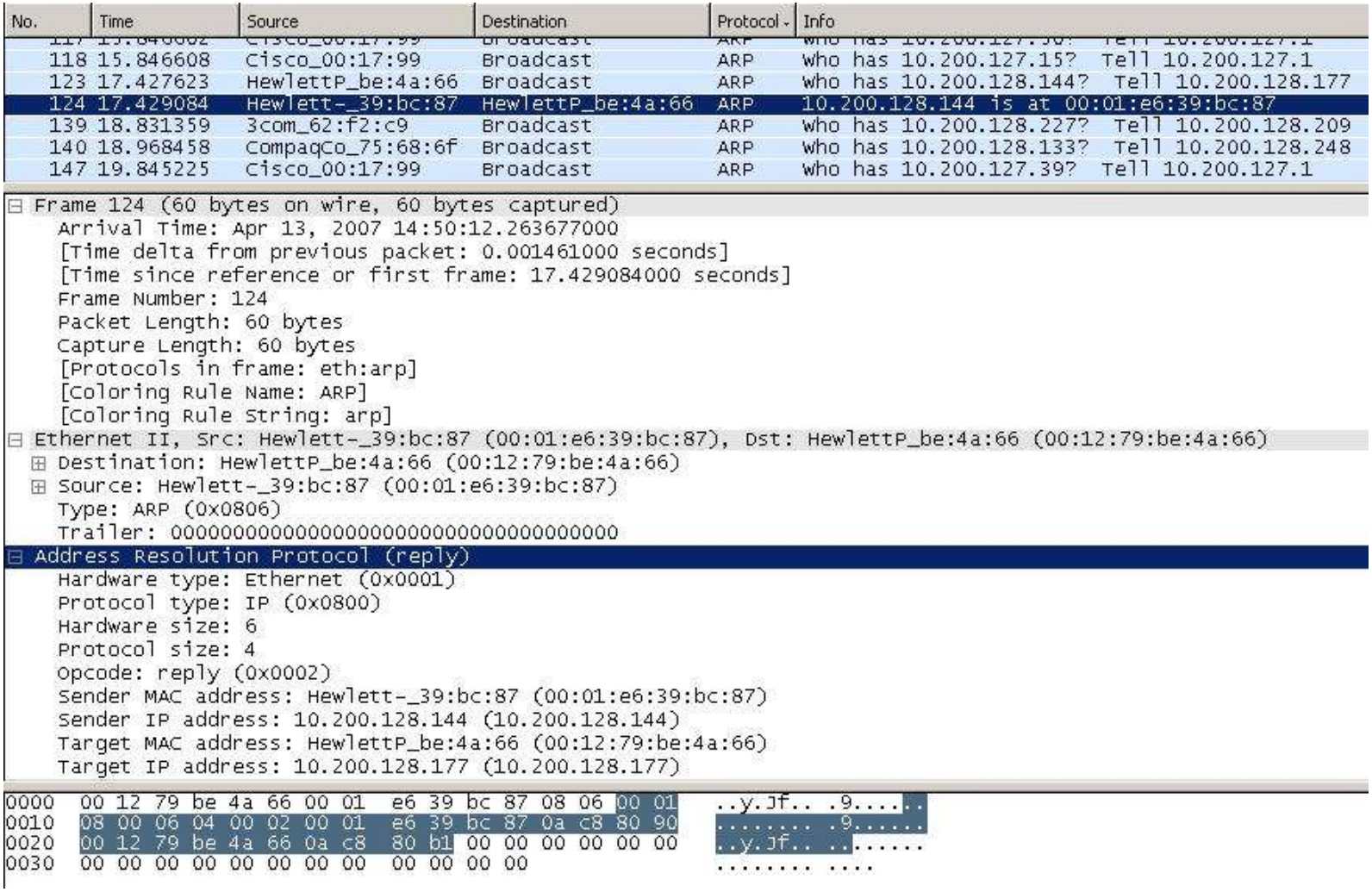


No.	Time	Source	Destination	Protocol	Info
118	15.846608	Cisco_00:17:99	Broadcast	ARP	Who has 10.200.127.15? Tell 10.200.127.1
123	17.427623	HewlettP_be:4a:66	Broadcast	ARP	Who has 10.200.128.144? Tell 10.200.128.177
124	17.429084	Hewlett-_39:bc:87	HewlettP_be:4a:66	ARP	10.200.128.144 is at 00:01:e6:39:bc:87
139	18.831359	3com_62:f2:c9	Broadcast	ARP	Who has 10.200.128.227? Tell 10.200.128.209
140	18.968458	CompaqCo_75:68:6f	Broadcast	ARP	Who has 10.200.128.133? Tell 10.200.128.248
147	19.845225	Cisco_00:17:99	Broadcast	ARP	Who has 10.200.127.39? Tell 10.200.127.1

```
⊟ Frame 123 (42 bytes on wire, 42 bytes captured)
    Arrival Time: Apr 13, 2007 14:50:12.262216000
    [Time delta from previous packet: 0.537536000 seconds]
    [Time since reference or first frame: 17.427623000 seconds]
    Frame Number: 123
    Packet Length: 42 bytes
    Capture Length: 42 bytes
    [Protocols in frame: eth:arp]
    [Coloring Rule Name: ARP]
    [Coloring Rule String: arp]
⊟ Ethernet II, Src: HewlettP_be:4a:66 (00:12:79:be:4a:66), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
  ⊞ Destination: Broadcast (ff:ff:ff:ff:ff:ff)
  ⊞ Source: HewlettP_be:4a:66 (00:12:79:be:4a:66)
    Type: ARP (0x0806)
⊟ Address Resolution Protocol (request)
    Hardware type: Ethernet (0x0001)
    Protocol type: IP (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: request (0x0001)
    Sender MAC address: HewlettP_be:4a:66 (00:12:79:be:4a:66)
    Sender IP address: 10.200.128.177 (10.200.128.177)
    Target MAC address: 00:00:00_00:00:00 (00:00:00:00:00:00)
    Target IP address: 10.200.128.144 (10.200.128.144)
```

```
0000  ff ff ff ff ff ff 00 12  79 be 4a 66 08 06 00 01   ........ y.Jf....
0010  08 00 06 04 00 01 00 12  79 be 4a 66 0a c8 80 b1   ........ y.Jf....
0020  00 00 00 00 00 00 0a c8  80 90                     ........ ..
```

Captura Ethereal - Reply



No.	Time	Source	Destination	Protocol	Info
118	15.846608	Cisco_00:17:99	Broadcast	ARP	Who has 10.200.127.15? Tell 10.200.127.1
123	17.427623	HewlettP_be:4a:66	Broadcast	ARP	Who has 10.200.128.144? Tell 10.200.128.177
124	17.429084	Hewlett-_39:bc:87	HewlettP_be:4a:66	ARP	10.200.128.144 is at 00:01:e6:39:bc:87
139	18.831359	3com_62:f2:c9	Broadcast	ARP	Who has 10.200.128.227? Tell 10.200.128.209
140	18.968458	CompaqCo_75:68:6f	Broadcast	ARP	Who has 10.200.128.133? Tell 10.200.128.248
147	19.845225	Cisco_00:17:99	Broadcast	ARP	Who has 10.200.127.39? Tell 10.200.127.1

```
Frame 124 (60 bytes on wire, 60 bytes captured)
    Arrival Time: Apr 13, 2007 14:50:12.263677000
    [Time delta from previous packet: 0.001461000 seconds]
    [Time since reference or first frame: 17.429084000 seconds]
    Frame Number: 124
    Packet Length: 60 bytes
    Capture Length: 60 bytes
    [Protocols in frame: eth:arp]
    [Coloring Rule Name: ARP]
    [Coloring Rule String: arp]
Ethernet II, Src: Hewlett-_39:bc:87 (00:01:e6:39:bc:87), Dst: HewlettP_be:4a:66 (00:12:79:be:4a:66)
  Destination: HewlettP_be:4a:66 (00:12:79:be:4a:66)
  Source: Hewlett-_39:bc:87 (00:01:e6:39:bc:87)
    Type: ARP (0x0806)
    Trailer: 00000000000000000000000000000000000000
Address Resolution Protocol (reply)
    Hardware type: Ethernet (0x0001)
    Protocol type: IP (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: reply (0x0002)
    Sender MAC address: Hewlett-_39:bc:87 (00:01:e6:39:bc:87)
    Sender IP address: 10.200.128.144 (10.200.128.144)
    Target MAC address: HewlettP_be:4a:66 (00:12:79:be:4a:66)
    Target IP address: 10.200.128.177 (10.200.128.177)
```

```
0000  00 12 79 be 4a 66 00 01  e6 39 bc 87 08 06 00 01   ..y.Jf.. .9......
0010  08 00 06 04 00 02 00 01  e6 39 bc 87 0a c8 80 90   ........ .9......
0020  00 12 79 be 4a 66 0a c8  80 b1 00 00 00 00 00 00   ..y.Jf.. ........
0030  00 00 00 00 00 00 00 00  00 00 00 00              ........ ....
```

Gratuitous ARP

Son útiles por las siguientes razones

- Permiten detectar conflictos en IP
- Actualizan el contenido del cache ARP
- Informan a los switches el MAC del cliente conectado
- Sucede a cada cambio de estado de la interfaz -> indicador de problemas

Práctica

- **Ver opciones del comando ARP**
  - **Analizar cache :**
  - **agregar, quitar y mostrar cache.**
- **Capturar con Ethereal**