



**INSTITUTO POLITÉCNICO NACIONAL**  
**ESCUELA SUPERIOR DE CÓMPUTO**  
**INGENIERÍA EN SISTEMAS**  
**COMPUTACIONALES**



# REDES DE COMPUTADORA



Práctica 02

Análisis de tramas IEEE 802.3

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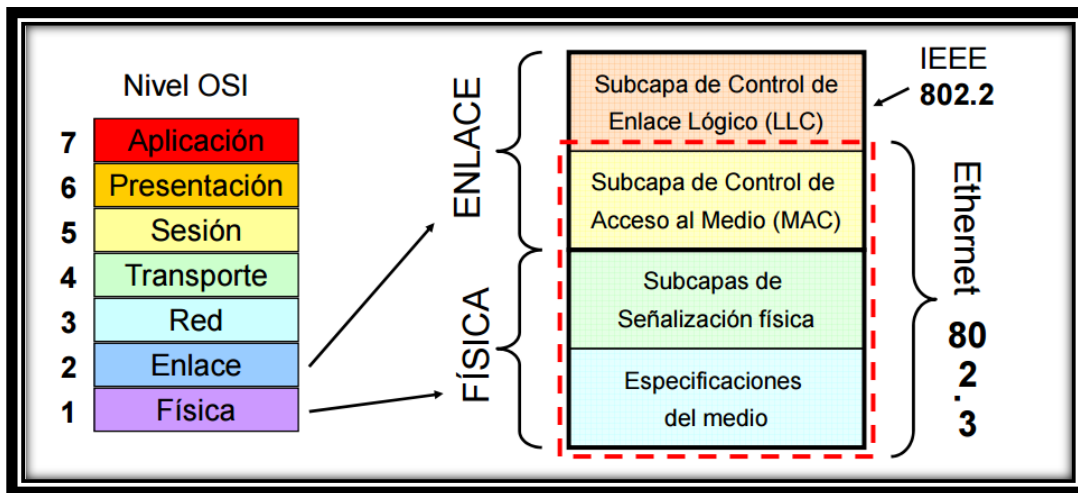
**Fecha de entrega:** de septiembre del 2017

# REDES DE COMPUTADORAS

## PRÁCTICA 02: Análisis de tramas IEEE 802.3

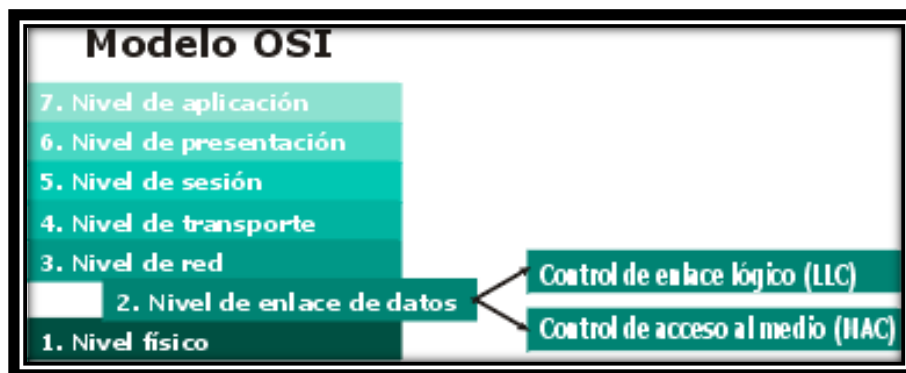
### Introducción

Los estándares para Ethernet (IEEE 802.3) especifican mediante subcapas elementos que se encuentran ubicados en las capas 1 y 2 de OSI.



### Subcapa de control de enlace lógico LLC

La subcapa LLC, según el autor Shaughnessy (2000), se especifican en la norma IEEE 802.2 y se define como una subcapa de la capa de enlace de datos, la cual administra las comunicaciones entre dispositivos sobre un solo enlace de red.



### Subcapa de control de enlace lógico LLC

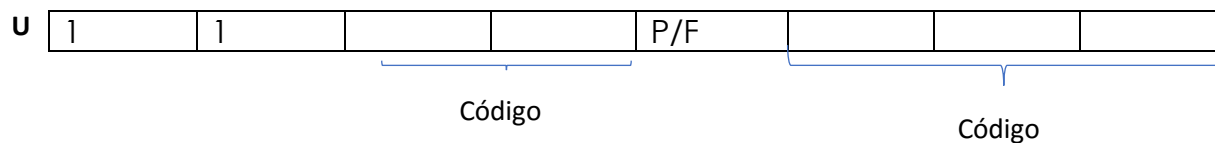
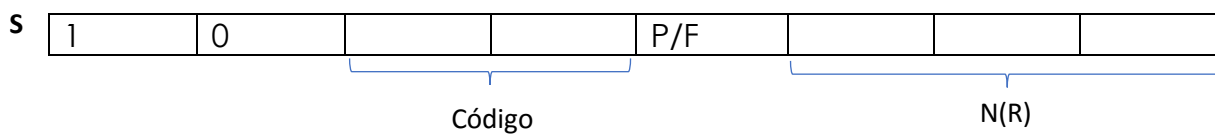
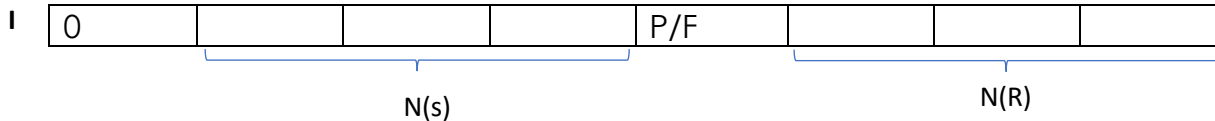
Asimismo, la diferencia entre la trama Ethernet con respecto a la IEEE 802.3, es el campo de tipo que establece el protocolo de red de alto nivel asociado al paquete, mientras que la trama IEEE 802.3, establece la longitud del campo de datos.

- Dada una trama, revisar el campo tipo/longitud.

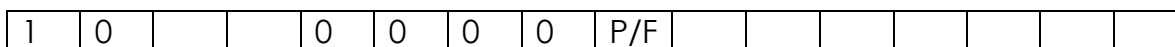
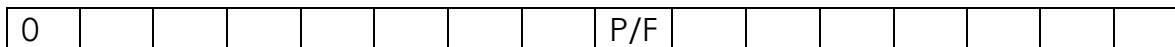
- Si su valor **< 1500** => Es una trama IEEE 802.3 y su formato es el siguiente.

$MAC_D$	$MAC_O$	LONGITUD	DSAP	SSAP	CONTROL	DATOS	CRC
6 bytes	6 bytes	2 bytes	1 byte	1 byte	1-2 bytes	46-1500 bytes	4 bytes

Control LLC (Modo normal -> 1 byte)



Control (Modo extendido)



**CAPA FISICA:** RAFAGA DE BITS

**CAPA ED**

Primeros 14 bytes -> MAC

Los otros 4 bytes-> LLC

SSAP -> IDENTIFICA AL PROTOCOLO QUE MANDÓ ESA TRAMA

DSAP -> PUNTO DE ACCESOS TIPO DESTINO

NO NUMERADAS -> ESTABLECIMIENTO DE CONEXIÓN Y MODIFICACION DE CANAL -> 5 BITS

TRAMAS DE INFORMACION AACARREAN DATOS DE APLICACIÓN

N(S): NUMERO DE SECUENCIA

N(R): NUMERO DE ACUSE

TRAMAS DE SUPERVISION: CONTROL DE ERROR Y CONTROL DE FLUJO.

TRAMA DE INFORMACION → CON 0

TRAMA NO ENUMERADA → CON 11

¿CÓMO DISTINGO UNA TRAMA SI TIENE UN CAMPO DE CONTROL DSI ES DE 1 O 2 BYTES?

→ USAMOS LA LONGITUD.

SI EN LA LONGITUD ES **0X003** -> 1 byte es de DSAP, otro de SSAP y uno de control

- Se debe de tener en cuenta el campo

### Tramas de supervisión (Control de flujo) en la parte de código

- 00 = RR "Listo para recibir" y en el N(R) dice que trama va a recibir.
- 01 = REI "Rechazado"
- 10 = RNR "No listos para recibir"
- 11 = SREJ "Rechazo selectivo"

### Código de la Trama 'U'.

Código	Orden	Respuesta	Def. de Orden
00001	SNRM	-	Activación de Modo de Respuesta Normal
11011	SNRME	-	Activación de Modo de Respuesta Extendido
11000	SARM	DM	Activación de Modo de Respuesta Asíncrona
11010	SARME	-	Activación de Modo de Respuesta Extendida
11100	SABM	-	Activación de Modo de Respuesta Asíncrona Balanceada
11110	SABME	-	Activación de Modo de Respuesta Asíncrona Balanceada Extendido
00000	UI	UI	Información sin numerar
00110	-	UA	Reconocimiento sin numerar
00010	DISC	RD	RD: Petición de desconexión / DISC: Desconexión
10000	SIM	RIM	
00100	UP		Sondeo sin numerar
11001	RSET		Reinicio
11101	XID	XID	Intercambio de ID

*Tabla con los códigos de la trama U y la orden que realizan.*

PF PULL FINAL -> Saber si es una solicitud o una respuesta.

DEL SAP

- Del bíte 0-6 es la dirección
- En el bit 7 es un C/R: \* 0 = Comando; \* 1=Respuesta

Del DSAP

- Del bit 0-6 es la dirección
- El 7º bit es un I/G

## Desarrollo

1. Descargar los siguientes archivos de la siguiente dirección:

[148.204.58.221/axel/redesnp/LLC/](http://148.204.58.221/axel/redesnp/LLC/)

- + practicaAnalizaLLC.pdf
- + Captura.zip

2. Probar el programa Captura.java

```

3. import java.util.ArrayList;
4. import java.util.Date;
5. import java.util.List;
6. import java.io.*;
7.
8. import org.jnetpcap.Pcap;
9. import org.jnetpcap.PcapAddr;
10. import org.jnetpcap.PcapIf;
11. import org.jnetpcap.packet.PcapPacket;
12. import org.jnetpcap.packet.PcapPacketHandler;
13. import org.jnetpcap.PcapBpfProgram;
14. import org.jnetpcap.protocol.lan.Ethernet;
15. import org.jnetpcap.protocol.tcpip.*;
16. import org.jnetpcap.protocol.network.*;
17. import org.jnetpcap.nio.JBuffer;
18. import org.jnetpcap.packet.Payload;
19. import org.jnetpcap.protocol.network.Arp;
20. import org.jnetpcap.protocol.lan.IEEE802dot2;
21. import org.jnetpcap.protocol.lan.IEEE802dot3;
22.
23.
24. public class Captura {
25.
26.     /**
27.      * Main startup method
28.      *
29.      * @param args
30.      *      ignored
31.      */
32.     private static String asString(final byte[] mac) {
33.         final StringBuilder buf = new StringBuilder();
34.         for (byte b : mac) {
35.             if (buf.length() != 0) {
36.                 buf.append(':');
37.             }
38.             if (b >= 0 && b < 16) {
39.                 buf.append('0');
40.             }
41.             buf.append(Integer.toHexString((b < 0) ? b + 256 : b).toUpperCase());
42.         }
43.     }

```

```

44.     return buf.toString();
45. }
46.
47.     public static void main(String[] args) {
48.         Pcap pcap=null;
49.         try{
50.             BufferedReader br = new BufferedReader(new
InputStreamReader(System.in));
51.             List<PcapIf> alldevs = new ArrayList<PcapIf>(); // Will be filled with
NICs
52.             StringBuilder errbuf = new StringBuilder(); // For any error msgs
53.             System.out.println("[0]-->Realizar captura de paquetes al vuelo");
54.             System.out.println("[1]-->Cargar traza de captura desde archivo");
55.             System.out.print("\nElige una de las opciones:");
56.             int opcion = Integer.parseInt(br.readLine());
57.             if (opcion==1){
58.
59.                 //////////////////////////////////lee archivo////////////////////////////////////
60.                 //String fname = "archivo.pcap";
61.                 String fname = "paquetes3.pcap";
62.                 pcap = Pcap.openOffline(fname, errbuf);
63.                 if (pcap == null) {
64.                     System.err.printf("Error while opening device for capture: "+
errbuf.toString());
65.                     return;
66.                 }//if
67.                 } else if(opcion==0){
68.
69.                     /*****
* First get a list of devices on this system
70.                     *****/
71.                     int r = Pcap.findAllDevs(alldevs, errbuf);
72.                     if (r == Pcap.NOT_OK || alldevs.isEmpty()) {
73.                         System.err.printf("Can't read list of devices, error is %s",
errbuf
74.                                     .toString());
75.                         return;
76.                     }
77.
78.                     System.out.println("Network devices found:");
79.
80.                     int i = 0;
81.                     for (PcapIf device : alldevs) {
82.                         String description =
83.                             (device.getDescription() != null) ? device.getDescription()
84.                             : "No description available";
85.                         final byte[] mac = device.getHardwareAddress();
86.                         String dir_mac = (mac==null)?"No tiene direccion
MAC":asString(mac);
87.                         System.out.printf("#%d: %s [%s] MAC:[%s]\n", i++,
device.getName(), description, dir_mac);
88.                         List<PcapAddr> direcciones = device.getAddresses();
89.                         for (PcapAddr direccion:direcciones){
90.                             System.out.println(direccion.getAddr().toString());
91.                         }//foreach
92.
93.                     }//for
94.
95.                     System.out.print("\nEscribe el número de interfaz a utilizar:");
96.                     int interfaz = Integer.parseInt(br.readLine());

```

```

97.      PcapIf device = alldevs.get(interfaz); // We know we have atleast 1
      device
98.      System.out
99.      .printf("\nChoosing '%s' on your behalf:\n",
100.             (device.getDescription() != null) ?
      device.getDescription()
101.             : device.getName());
102.
103.
      /*****
104.      * Second we open up the selected device
105.      *****/
      /*****
106.      /*"snaplen" is short for 'snapshot length', as it refers to
      the amount of actual data captured from each packet passing through the specified
      network interface.
107.      64*1024 = 65536 bytes; campo len en Ethernet(16 bits) tam
      máx de trama */
108.
109.      int snaplen = 64 * 1024;           // Capture all packets, no
      truncation
110.      int flags = Pcap.MODE_PROMISCUOUS; // capture all packets
111.      int timeout = 10 * 1000;           // 10 seconds in millis
112.
113.
114.      pcap = Pcap.openLive(device.getName(), snaplen, flags,
      timeout, errbuf);
115.
116.      if (pcap == null) {
117.          System.err.printf("Error while opening device for capture:
      "
118.                             + errbuf.toString());
119.          return;
120.      } //if
121.
      /*****F I L T R O*****/
122.
123.      PcapBpfProgram filter = new PcapBpfProgram();
124.      String expression = ""; // "port 80";
125.      int optimize = 0; // 1 means true, 0 means false
126.      int netmask = 0;
127.      int r2 = pcap.compile(filter, expression, optimize, netmask);
128.      if (r2 != Pcap.OK) {
129.          System.out.println("Filter error: " + pcap.getErr());
130.      } //if
131.      pcap.setFilter(filter);
132.      /*****/
133.      } //else if
134.
135.
      /*****
136.      * Third we create a packet handler which will receive packets
      from the
137.      * libpcap loop.
138.      *****/
139.      PcapPacketHandler<String> jpacketHandler = new
      PcapPacketHandler<String>() {
140.
141.          public void nextPacket(PcapPacket packet, String user) {
142.

```

```

143.                System.out.printf("\n\nPaquete recibido el %s
    caplen=%-4d longitud=%-4d %s\n\n",
144.                new
    Date(packet.getCaptureHeader().timestampInMillis()),
145.                packet.getCaptureHeader().caplen(), // Length
    actually captured
146.                packet.getCaptureHeader().wirelen(), // Original
    length
147.                user // User
    supplied object
148.                );
149.
150.
151.                /*****Desencapsulado*****/
152.                for(int i=0;i<packet.size();i++){
153.                System.out.printf("%02X
    ",packet.getUByte(i));
154.
155.                if(i%16==15)
156.                System.out.println("");
157.                }//if
158.
159.                int longitud =
    (packet.getUByte(12)*256)+packet.getUByte(13);
160.                System.out.printf("\nLongitud: %d
    (%04X)",longitud,longitud );
161.                if(longitud<1500){
162.                System.out.println("--->Trama
    IEEE802.3");
163.                System.out.printf(" |-->MAC Destino:
    %02X:%02X:%02X:%02X:%02X:%02X",packet.getUByte(0),packet.getUByte(1),packet.getUByte(2),packet.getUByte(3),packet.getUByte(4),packet.getUByte(5));
164.                System.out.printf("\n |-->MAC Origen:
    %02X:%02X:%02X:%02X:%02X:%02X",packet.getUByte(6),packet.getUByte(7),packet.getUByte(8),packet.getUByte(9),packet.getUByte(10),packet.getUByte(11));
165.                System.out.printf("\n |-->DSAP:
    %02X",packet.getUByte(14));
166.                //System.out.println(packet.getUByte(15)& 0x00000001);
167.                int ssap = packet.getUByte(15)&
    0x00000001;
168.                String c_r =
    (ssap==1)?"Respuesta":(ssap==0)?"Comando":"Otro";
169.                System.out.printf("\n |-->SSAP: %02X
    %s",packet.getUByte(15), c_r);
170.
171.                } else if(longitud>=1500){
172.                System.out.println("-->Trama ETHERNET");
173.                }//else
174.
175.
176.                //System.out.println("\n\nEncabezado: "+
    packet.toHexdump());
177.
178.
179.                }
180.            };
181.
182.
183.                /*****

```



```

184.          * Fourth we enter the loop and tell it to capture 10 packets.
    The loop
185.          * method does a mapping of pcap.datalink() DLT value to
    JProtocol ID, which
186.          * is needed by JScanner. The scanner scans the packet buffer
    and decodes
187.          * the headers. The mapping is done automatically, although a
    variation on
188.          * the loop method exists that allows the programmer to sepecify
    exactly
189.          * which protocol ID to use as the data link type for this pcap
    interface.
190.          *****/
191.          pcap.loop(-1, jpacketHandler, " ");
192.
193.          /******
194.          * Last thing to do is close the pcap handle
195.          *****/
196.          pcap.close();
197.          }catch(IOException e){e.printStackTrace();}
198.      }
199.  }

```

*Código Captura.java*

Prueba

```
[0]-->Realizar captura de paquetes al vuelo  
[1]-->Cargar traza de captura desde archivo
```

Elige una de las opciones:1

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```
00 02 B3 9C AE BA 00 02 B3 9C DF 1B 00 03 F0 F0  
7F 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  
00 00 00 00 00 00 00 00 00 00 00 00 00 43 05 90 6D
```

Longitud: 3 (0003)--->Trama IEEE802.3

```
|-->MAC Destino: 00:02:B3:9C:AE:BA  
|-->MAC Origen: 00:02:B3:9C:DF:1B  
|-->DSAP: F0  
|-->SSAP: F0 Comando
```

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```
00 02 B3 9C DF 1B 00 02 B3 9C AE BA 00 03 F0 F1  
73 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  
00 00 00 00 00 00 00 00 00 00 00 00 00 54 90 6D
```

Longitud: 3 (0003)--->Trama IEEE802.3

```
|-->MAC Destino: 00:02:B3:9C:DF:1B  
|-->MAC Origen: 00:02:B3:9C:AE:BA  
|-->DSAP: F0  
|-->SSAP: F1 Respuesta
```

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```
00 02 B3 9C AE BA 00 02 B3 9C DF 1B 00 04 F0 F0
01 01 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 41 A3 90 6D
```

Longitud: 4 (0004)--->Trama IEEE802.3

```
|-->MAC Destino: 00:02:B3:9C:AE:BA
|-->MAC Origen: 00:02:B3:9C:DF:1B
|-->DSAP: F0
|-->SSAP: F0 Comando
```

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```
00 02 B3 9C DF 1B 00 02 B3 9C AE BA 00 04 F0 F1
01 01 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 F2 90 6D
```

Longitud: 4 (0004)--->Trama IEEE802.3

```
|-->MAC Destino: 00:02:B3:9C:DF:1B
|-->MAC Origen: 00:02:B3:9C:AE:BA
|-->DSAP: F0
|-->SSAP: F1 Respuesta
```

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```
00 02 B3 9C AE BA 00 02 B3 9C DF 1B 00 12 F0 F0
00 01 0E 00 FF EF 19 8F BC 05 7F 00 23 00 7F 23
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 41 91 6D
```

Longitud: 18 (0012)--->Trama IEEE802.3

```
|-->MAC Destino: 00:02:B3:9C:AE:BA
|-->MAC Origen: 00:02:B3:9C:DF:1B
|-->DSAP: F0
```

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```
00 02 B3 9C DF 1B 00 02 B3 9C AE BA 00 12 F0 F0
00 03 0E 00 FF EF 17 81 BC 05 23 00 7F 00 23 7F
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 90 91 6D
```

Longitud: 18 (0012)--->Trama IEEE802.3

```
|-->MAC Destino: 00:02:B3:9C:DF:1B
|-->MAC Origen: 00:02:B3:9C:AE:BA
|-->DSAP: F0
|-->SSAP: F0 Comando
```

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```
00 02 B3 9C DF 1B 00 02 B3 9C AE BA 00 04 F0 F1
01 03 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 DF 91 6D
```

Longitud: 4 (0004)--->Trama IEEE802.3

```
|-->MAC Destino: 00:02:B3:9C:DF:1B
|-->MAC Origen: 00:02:B3:9C:AE:BA
|-->DSAP: F0
|-->SSAP: F1 Respuesta
```

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```
00 02 B3 9C AE BA 00 02 B3 9C DF 1B 00 04 F0 F1
01 03 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 18 AC 92 6D
```

Longitud: 4 (0004)--->Trama IEEE802.3

```
|-->MAC Destino: 00:02:B3:9C:AE:BA
|-->MAC Origen: 00:02:B3:9C:DF:1B
|-->DSAP: F0
```

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=192 longitud=192

```
00 02 B3 9C AE BA 00 02 B3 9C DF 1B 00 AC F0 F0
02 02 0E 00 FF EF 16 04 00 00 00 00 28 00 7F 23
FF 53 4D 42 72 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 82 09
00 77 00 02 50 43 20 4E 45 54 57 4F 52 4B 20 50
52 4F 47 52 41 4D 20 31 2E 30 00 02 4D 49 43 52
4F 53 4F 46 54 20 4E 45 54 57 4F 52 4B 53 20 33
2E 30 00 02 44 4F 53 20 4C 4D 31 2E 32 58 30 30
32 00 02 44 4F 53 20 4C 41 4E 4D 41 4E 32 2E 31
00 02 57 69 6E 64 6F 77 73 20 66 6F 72 20 57 6F
72 6B 67 72 6F 75 70 73 20 33 2E 31 61 00 02 4E
54 20 4C 4D 20 30 2E 31 32 00 00 FB 92 6D 86 DF
```

Longitud: 172 (00AC)--->Trama IEEE802.3

```
|-->MAC Destino: 00:02:B3:9C:AE:BA
|-->MAC Origen: 00:02:B3:9C:DF:1B
|-->DSAP: F0
|-->SSAP: F0 Comando
```

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```
00 02 B3 9C DF 1B 00 02 B3 9C AE BA 00 04 F0 F1
01 04 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 7B 93 6D
```

Longitud: 4 (0004)--->Trama IEEE802.3

```
|-->MAC Destino: 00:02:B3:9C:DF:1B
|-->MAC Origen: 00:02:B3:9C:AE:BA
|-->DSAP: F0
|-->SSAP: F1 Respuesta
```

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=112 longitud=112

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=112 longitud=112

```
00 02 B3 9C DF 1B 00 02 B3 9C AE BA 00 5F F0 F0
02 04 0E 00 FF EF 16 0C 00 00 28 00 28 00 23 7F
FF 53 4D 42 72 00 00 00 00 80 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 82 09
11 05 00 02 02 00 01 00 68 0B 00 00 00 00 01 00
7F 07 00 80 03 02 00 00 00 E5 FE 29 25 7C C2 01
2C 01 08 08 00 7F 07 00 80 32 3E B9 3D 00 CA 93
```

Longitud: 95 (005F)--->Trama IEEE802.3

|-->MAC Destino: 00:02:B3:9C:DF:1B

|-->MAC Origen: 00:02:B3:9C:AE:BA

|-->DSAP: F0

|-->SSAP: F0 Comando

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```
00 02 B3 9C AE BA 00 02 B3 9C DF 1B 00 04 F0 F1
01 04 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 7C 94 6D
```

Longitud: 4 (0004)--->Trama IEEE802.3

|-->MAC Destino: 00:02:B3:9C:AE:BA

|-->MAC Origen: 00:02:B3:9C:DF:1B

|-->DSAP: F0

|-->SSAP: F1 Respuesta

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=160 longitud=160

```
00 02 B3 9C AE BA 00 02 B3 9C DF 1B 00 91 F0 F0
04 04 0E 00 FF EF 16 0C 00 00 28 00 28 00 7F 23
FF 53 4D 42 73 00 00 00 00 10 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 82 09
0D 75 00 5D 00 68 0B 02 00 00 00 7F 07 00 80 00
```

```

00 57 69 6E 64 6F 77 73 20 34 2E 30 00 04 FF 00
00 00 02 00 02 00 17 00 20 00 5C 5C 50 52 4F 47
59 44 45 53 41 5C 49 50 43 24 00 49 50 43 00 00

```

Longitud: 145 (0091)--->Trama IEEE802.3

|-->MAC Destino: 00:02:B3:9C:AE:BA

|-->MAC Origen: 00:02:B3:9C:DF:1B

|-->DSAP: F0

|-->SSAP: F0 Comando

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```

00 02 B3 9C DF 1B 00 02 B3 9C AE BA 00 04 F0 F1
01 06 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 32 95 6D

```

Longitud: 4 (0004)--->Trama IEEE802.3

|-->MAC Destino: 00:02:B3:9C:DF:1B

|-->MAC Origen: 00:02:B3:9C:AE:BA

|-->DSAP: F0

|-->SSAP: F1 Respuesta

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=96 longitud=96

```

00 02 B3 9C DF 1B 00 02 B3 9C AE BA 00 46 F0 F0
04 06 0E 00 FF EF 16 0C 00 00 28 00 28 00 23 7F
FF 53 4D 42 73 00 00 00 00 90 00 00 00 00 00 00
00 00 00 00 00 00 00 00 03 C0 00 00 00 00 82 09
03 75 00 29 00 00 00 00 00 02 FF 00 00 00 04 00
49 50 43 00 00 81 95 6D 86 CB 94 6D 86 0D 09 0E

```

Longitud: 70 (0046)--->Trama IEEE802.3

|-->MAC Destino: 00:02:B3:9C:DF:1B

|-->MAC Origen: 00:02:B3:9C:AE:BA

|-->DSAP: F0

|-->SSAP: F0 Comando

```

00 02 B3 9C AE BA 00 02 B3 9C DF 1B 00 04 F0 F1
01 06 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 20 96 6D

```

Longitud: 4 (0004)--->Trama IEEE802.3

|-->MAC Destino: 00:02:B3:9C:AE:BA

|-->MAC Origen: 00:02:B3:9C:DF:1B

|-->DSAP: F0

|-->SSAP: F1 Respuesta

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=144 longitud=144

```

00 02 B3 9C AE BA 00 02 B3 9C DF 1B 00 7E F0 F0
06 06 0E 00 FF EF 16 0C 00 00 28 00 28 00 7F 23
FF 53 4D 42 25 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 03 C0 00 00 00 00 82 0A
0E 20 00 00 00 08 00 00 10 00 00 00 00 88 13 00
00 00 00 20 00 4C 00 00 00 00 00 00 00 2D 00 5C
50 49 50 45 5C 4C 41 4E 4D 41 4E 00 68 00 57 72
4C 65 68 44 7A 00 42 31 36 42 42 44 7A 00 01 00
00 10 FF FF FF FF 45 53 43 4F 4D 00 00 6F 96 6D

```

Longitud: 126 (007E)--->Trama IEEE802.3

|-->MAC Destino: 00:02:B3:9C:AE:BA

|-->MAC Origen: 00:02:B3:9C:DF:1B

|-->DSAP: F0

|-->SSAP: F0 Comando

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```

00 02 B3 9C DF 1B 00 02 B3 9C AE BA 00 04 F0 F1
01 08 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 BE 96 6D

```



```

01 08 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 BE 96 6D

```

Longitud: 4 (0004)--->Trama IEEE802.3

```

|-->MAC Destino: 00:02:B3:9C:DF:1B
|-->MAC Origen: 00:02:B3:9C:AE:BA
|-->DSAP: F0
|-->SSAP: F1 Respuesta

```

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```

00 02 B3 9C AE BA 00 02 B3 9C DF 1B 00 04 F0 F1
01 08 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 5D 97 6D

```

Longitud: 4 (0004)--->Trama IEEE802.3

```

|-->MAC Destino: 00:02:B3:9C:AE:BA
|-->MAC Origen: 00:02:B3:9C:DF:1B
|-->DSAP: F0
|-->SSAP: F1 Respuesta

```

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=144 longitud=144

```

00 02 B3 9C AE BA 00 02 B3 9C DF 1B 00 7E F0 F0
08 08 0E 00 FF EF 16 0C 00 00 28 00 28 00 7F 23
FF 53 4D 42 25 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 03 C0 00 00 00 00 02 0B
0E 20 00 00 00 08 00 00 10 00 00 00 00 88 13 00
00 00 00 20 00 4C 00 00 00 00 00 00 00 2D 00 5C
50 49 50 45 5C 4C 41 4E 4D 41 4E 00 68 00 57 72
4C 65 68 44 7A 00 42 31 36 42 42 44 7A 00 01 00
00 10 00 00 00 80 45 53 43 4F 4D 00 00 AC 97 6D

```

Longitud: 126 (007E)--->Trama IEEE802.3

```

|-->MAC Destino: 00:02:B3:9C:AE:BA

```

```
|-->MAC Destino: 00:02:B3:9C:AE:BA
|-->MAC Origen: 00:02:B3:9C:DF:1B
|-->DSAP: F0
|-->SSAP: F0    Comando
```

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```
00 02 B3 9C DF 1B 00 02 B3 9C AE BA 00 04 F0 F1
01 0A 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 FB 97 6D
```

Longitud: 4 (0004)--->Trama IEEE802.3

```
|-->MAC Destino: 00:02:B3:9C:DF:1B
|-->MAC Origen: 00:02:B3:9C:AE:BA
|-->DSAP: F0
|-->SSAP: F1    Respuesta
```

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```
00 02 B3 9C AE BA 00 02 B3 9C DF 1B 00 04 F0 F1
01 0A 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 4A 98 6D
```

Longitud: 4 (0004)--->Trama IEEE802.3

```
|-->MAC Destino: 00:02:B3:9C:AE:BA
|-->MAC Origen: 00:02:B3:9C:DF:1B
|-->DSAP: F0
|-->SSAP: F1    Respuesta
```

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```
00 02 B3 9C AE BA 00 02 B3 9C DF 1B 00 12 F0 F0
0A 0B 0E 00 FF EF 14 00 00 00 28 00 00 00 7F 23
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 01 99 98 6D
```

```

00 02 B3 9C DF 1B 00 02 B3 9C AE BA 00 04 F0 F1
01 13 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 7C 9B 6D

```

Longitud: 4 (0004)--->Trama IEEE802.3

|-->MAC Destino: 00:02:B3:9C:DF:1B

|-->MAC Origen: 00:02:B3:9C:AE:BA

|-->DSAP: F0

|-->SSAP: F1 Respuesta

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```

00 02 B3 9C AE BA 00 02 B3 9C DF 1B 00 03 F0 F0
53 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 CB 9B 6D

```

Longitud: 3 (0003)--->Trama IEEE802.3

|-->MAC Destino: 00:02:B3:9C:AE:BA

|-->MAC Origen: 00:02:B3:9C:DF:1B

|-->DSAP: F0

|-->SSAP: F0 Comando

Paquete recibido el Mon Mar 24 12:24:33 CST 2014 caplen=64 longitud=64

```

00 02 B3 9C DF 1B 00 02 B3 9C AE BA 00 03 F0 F1
73 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 77 9C 6D

```

Longitud: 3 (0003)--->Trama IEEE802.3

|-->MAC Destino: 00:02:B3:9C:DF:1B

|-->MAC Origen: 00:02:B3:9C:AE:BA

|-->DSAP: F0

|-->SSAP: F1 RespuestaBUILD SUCCESSFUL (total time: 43 seconds)

### Prueba de Captura.java

De la prueba anterior podemos observar que el programa muestra si es una trama IEEE 802.3, su MAC tanto de origen como de destino, DSAP y SSAP.

Modificar el código

### Código Captura.java modificado

Prueba

### Prueba de Captura.java modificado

## Conclusiones personales

- + Díaz Medina Jesús Kaimorts:
- + Esquivel Valdez Alberto:
- + Vargas Romero Erick Efraín:

## Referencias

- + Barbieri, Sebastián. "Ethernet / IEEE 802.3". Comunicación de Datos I Ingeniería en Sistemas – Facultad Cs. Exactas, Universidad Nacional de Centro de la Prov. de Bs. As. Disponible en línea en:  
<http://www.exa.unicen.edu.ar/catedras/comdat1/material/Ethernet2010.pdf>
- + Molero, Luis G. "Ethernet e IEEE 802.3 y Arquitectura de TCP-IP". Universidad Rafael Belloso Chacín. Disponible en: <http://www.urbe.edu/info-consultas/web-profesor/12697883/archivos/Redes%20de%20Area%20Local%20y%20Metropolitana-cd2/Contenido/EthernetIEEE802.3yArquitecturadeTCP-IP.pdf>