



PRÁCTICA 1

Analizador de protocolo LLC



Redes de Computadoras • Escuela Superior de Cómputo • Instituto Politécnico Nacional

- En esta práctica se realizará una función que analice tramas del protocolo LLC y se alimentará con las tramas capturadas por un programa que emplea la librería winpcap.

Introducción

El protocolo LLC (control lógico de enlace) es un protocolo de capa de enlace de datos derivado de HDLC, del cual hereda su campo de control, y fue estandarizado por la IEEE bajo la denominación 802.2. Igual que en HDLC se tienen tramas de información, supervisión y no numeradas distinguiéndose entre ellas por los bits menos significativos de su campo de control.

Investigue el formato de las tramas LLC (802.2) encapsuladas dentro del protocolo 802.3 y analice las siguientes tramas llenando la tabla que se encuentra al final de las mismas. En la tabla se incluye el análisis de la primera trama para servir de ejemplo.

1	00 02 b3 9c ae ba	00 02 b3 9c df 1b	00 03 f0 f0
2	00 02 b3 9c df 1b	00 02 b3 9c ae ba	00 03 f0 f1
3	00 02 b3 9c ae ba	00 02 b3 9c df 1b	00 04 f0 f0
4	00 02 b3 9c df 1b	00 02 b3 9c ae ba	00 04 f0 f1
5	00 02 b3 9c ae ba	00 02 b3 9c df 1b	00 12 f0 f0
6	00 02 b3 9c df 1b	00 02 b3 9c ae ba	00 12 f0 f1
7	00 02 b3 9c df 1b	00 02 b3 9c ae ba	00 04 f0 f0
8	00 02 b3 9c ae ba	00 02 b3 9c df 1b	00 04 f0 f1

00 00 00 00 00 00 00 00 00 00 00 00 18 ac 92 6d	9
00 02 b3 9c ae ba 00 02 b3 9c df 1b 00 ac f0 f0	172
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	
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 4d 4e 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	
10	
00 02 b3 9c df 1b 00 02 b3 9c ae ba 00 04 f0 f1	4
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 00	
11	
00 02 b3 9c df 1b 00 02 b3 9c ae ba 00 05 f0 f0	95
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 00	
11 05 00 02 02 00 01 00 68 0b 00 00 00 00 00	
7f 07 00 80 03 02 00 00 00 e5 fe 29 25 7c e2 01	
2c 01 08 08 00 7f 07 00 80 32 3e b9 3d 00 ca 93	
12	
00 02 b3 9c ae ba 00 02 b3 9c df 1b 00 04 f0 f1	4
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 00	
13	
00 02 b3 9c ae ba 00 02 b3 9c df 1b 00 91 f0 f0	145
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 00	
0d 75 00 5d 00 68 0b 02 00 00 00 7f 07 00 80 00	
00 00 00 00 00 00 00 01 00 00 00 20 00 00 45	
53 43 4f 4d 00 57 69 6e 64 6f 77 73 20 34 2e 30	
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 58 50 52 4c 47	
59 44 45 53 41 5c 49 50 43 24 00 49 50 43 00 00	
14	
00 02 b3 9c df 1b 00 02 b3 9c ae ba 00 04 f0 f1	4
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	
15	
00 02 b3 9c df 1b 00 02 b3 9c ae ba 00 46 f0 f0	70
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 00 00 00 00 00	
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	

16

00 02 b3 9c ae ba 00 02 b3 9c df 1b 00 04 f0 f1
 01 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

17

00 02 b3 9c ae ba 00 02 b3 9c df 1b 00 07 fe f0 f0
 06 06 0e 00 ff ef 16 0c 00 00 28 06 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 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 0f 96 6d

18

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 00 00 be 96 6d

19

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 5d 97 6d

20

00 02 b3 9c ae ba 00 02 b3 9c df 1b 00 07 fe 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 00 45 53 43 4f 4d 00 00 ac 97 6d

21

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 00 00 fb 97 6d

22

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 00 00 4a 98 6d

23

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 00 01 99 98 6d

24

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 00 00 45 99 6d

25

03 00 00 00 00 01 00 04 ac 44 4d 02 00 8b f0 f0
 03 2c 00 ff ef 08 00 00 00 00 00 00 00 42 34 20
 20 20 20 20 20 20 20 20 20 20 20 20 1b 49 42 4d
 53 45 52 56 45 52 20 20 20 20 20 20 00 ff 53 4d
 42 25 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00 00 00 00 00 00 11 00 00
 06 00 00 00 00 00 00 00 00 00 e8 03 00 00 00 00
 00 00 00 00 06 00 56 00 03 00 01 00 01 00 02 00
 17 00 5c 4d 41 49 4c 53 4c 4f 54 5c 42 52 4f 57
 53 45 00 09 04 33 17 00 00 00 9b 99 6d 86 99 98

26

00 02 b3 9c ae ba 00 02 b3 9c df 1b 00 35 f0 f0
 0c 0a 0e 00 ff ef 16 04 00 00 00 00 28 00 7f 23
 ff 53 4d 42 25 00 00 00 00 00 01 00 00 00 00 00
 00 00 00 00 00 00 00 00 03 c0 00 00 00 00 01 50
 00 00 00 45 f1 99 6d 86 45 99 6d 86 1f 09 52 5b

27

00 02 b3 9c df 1b 00 02 b3 9c ae ba 00 35 f0 f0
 0a 0e 0e 00 ff ef 16 0c 00 00 28 00 28 00 23 7f
 ff 53 4d 42 25 00 00 00 00 8c 01 00 00 00 00 00
 00 00 00 00 00 00 00 00 03 c0 00 00 00 00 01 50
 00 00 00 00 40 9a 6d 86 9b 99 6d 86 20 09 75 5b

28

00 02 b3 9c ae ba 00 02 b3 9c df 1b 00 12 f0 f0
 0e 0d 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 00 00 8f 9a 6d

29

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 00 00 de 9a 6d

30

00 02 b3 9c ae ba 00 02 b3 9c df 1b 00 12 f0 f0
 10 0d 0e 00 ff ef 18 00 00 00 00 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 00 00 2d 9b 6d

31



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 00 00 9b 6d

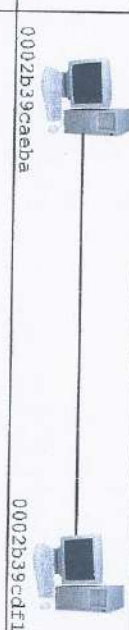
32

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 00 00 cb 9b 6d

33

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 77 9c 6d

No. Trama	Tamaño (bytes)	Campo de Control (en binario)	Tipo de Trama	N(s)	N(r)	P/F	<div>  0002b39cae8a </div> <div>  0002b39cdf1b </div>
1	3						↖
2	3						↗
3	4						↘
4	4	•					↗
5	18						↘
6	18						↗
7	4						↗
8	4						↘
9	172						↘
10	4						↗
11	95						↗
12	4						↘
13	149						↘
14	4						↗
15	70						↗
16	4						↘
17	126						↘

No. Trama	Tamaño (bytes)	Campo de Control (en binario)	Tipo de Trama	N(s)	N(r)	P/F		
18	4						→	
19	4						←	
20	126						←	
21	4						→	
22	4						←	
23	18						←	
24	4						→	
25	—						—	
26	53						→	
27	53						←	
28	18						→	
29	4						←	
30	18						→	
31	4						←	
32	3						→	
33	3						←	

6 bytes		6 bytes		2 bytes		1 byte		1 byte		1 ó 2 bytes		variable		variable	
Dir. Destino	Dir. Origen	Tamaño	SAP Destino	SAP Origen	Control	Información	Relleno								