

Protocol HDLC

(Control of Link of Data of High Level)

- Is a protocol of the layer of Link of Data responsible of define as HE must encapsulate the data for his transmission to a machine remote to through of links dedicated (networks WAN).

Only is one of many others protocols of link of data used in networks WAN, such with ISDN, ATM, Frame Relay.

**HDLC supports communication spot to spot and multipoint.

Guy of communication	Protocol
Spot to spot dedicated	PPP, ** HDLC
Switching of circuits	PPP, ISDN
Switching of packages	Frame Relay, ATM

HDLC supports 3 guys of seasons, two configurations of link and three modes of data transfer .

Guys of stations supported in HDLC

Primary:

Is responsible of manage he link of communication through he shipment of plots (orders) and the reception of plots (answers).

Secondary:

Reply to the requests (orders) of the season primary. Are stations they cannot communicate directly between Yeah. They need do it to through of a season primary.

Combined:

Has the ability of communicate with other season combined and transmit orders , or answers.

Settings of link supported in HDLC



No Balanced (unbalanced):



Allows the communication of a station primary and a either further stations secondary schools. The station primary is responsible of establish and keep the channel of communication.



Balanced (balanced):



Allows to two stations combined have a communication spot to point (duplex/half-duplex). Both stations have the ability of establish either keep the channel of communication.

Modes of operation in HDLC

▮ **HE account with three phases of operation (initialization, transfer, disconnection):**

▮ **Initialization :**

A/season primary either combined can start/restart he control of the link toward a season secondary/combined.

Modes of operation in HDLC

▮ **HE account with three phases of operation (initialization, transfer, disconnection):**

▮ **Transfer :**

1. Mode Response Normal (NRM) :

- ▮ HE uses in a configuration No balanced, can be spot to spot either multipoint (sun or a season primary).
- ▮ The transmission of data HE can give of shape duplex (full duplex) either half duplex. By defect is half duplex.
- ▮ The season primary is the that manages the transmission of the others stations (technique (of survey selection).

Modes of operation in HDLC

▮ **HE account with three phases of operation (initialization, transfer, disconnection):**

▮ **Transfer :**

2. Mode of Answer Asynchronous Balanced (ABM) :

- ▮ HE uses in a configuration balanced, Only in links spot to spot.
- ▮ The transmission of data HE can give of shape duplex (full duplex) either half duplex. By flaw It is duplex .

Modes of operation in HDLC

▮ **HE account with three phases of operation (initialization, transfer, disconnection):**

▮ **Transfer :**

3. Mode of Answer Asynchronous (ARM) :

It is used in a configuration No balanced, can be spot to spot either multipoint (only a primary station).

The transmission of data HE can give of shape duplex (full duplex) either half duplex.

The season secondary can convey without a permission explicit of the season primary (without probe).

Modes of operation in HDLC

▮ **HE account with three phases of operation (initialization, transfer, disconnection):**

▮ **Disconnection** : In these modes the stations operate disconnected logically from the link of communication.

1. Mode of Disconnection Normal (NDM) :

Apply to the Mode of Answer Normal (NRM).

The stations secondary depend of the station primary for can do any stuff.

Modes of operation in HDLC

▮ **HE account with three phases of operation (initialization, transfer, disconnection):**

▮ **Disconnection** : In these modes the stations operate disconnected logically from the link of communication.

2. Mode of Disconnection Asynchronous (ADM) :

Apply to the modes asynchronous (ABM and ARM).

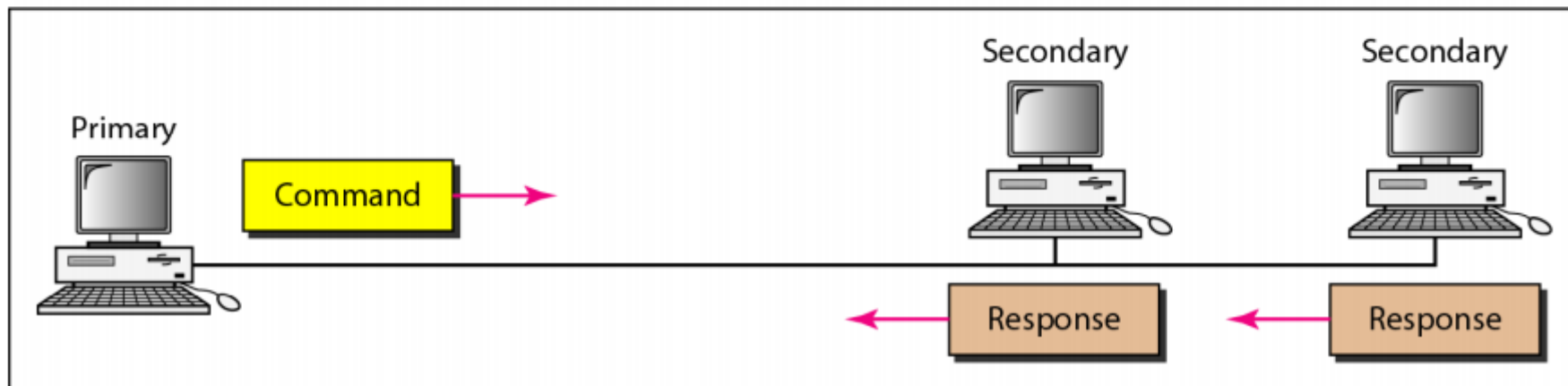
The stations secondary they can start a disconnection without need of that the station primary they are indicate.

Modes of operation

Normal response mode



a. Point-to-point



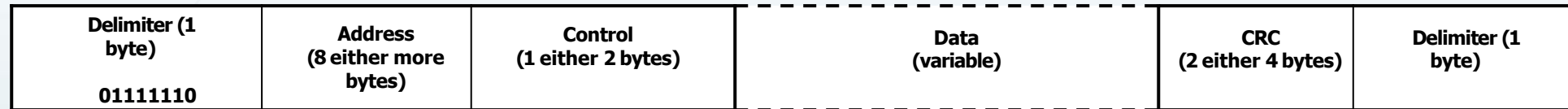
b. Multipoint

Modes of operation

Asynchronous balanced mode



Format of plots HDLC



Address : In case of need address further of 256 stations (1 byte), c/byte will have off he first bit, except the last byte.

Control : Identify he guy of plot (information, supervision, without number) that this being transmitted

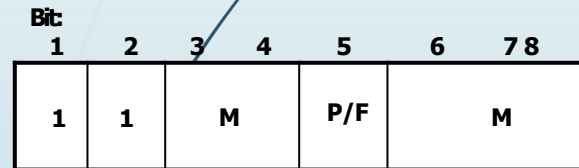
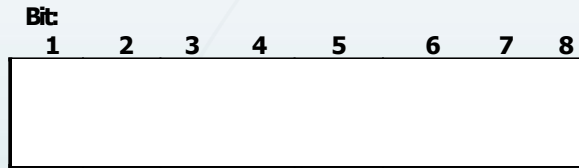
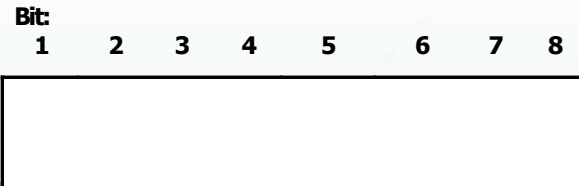
Format of plots

HDLC define 3 guys of plots:

1. **Plots of Information (YO)**: transport data of user and information control of user.
2. **Plots of Supervision (S)**: transport information of control of flow and control of mistake.
3. **Plots Without number (U)**: They transport information that serves for manage the link of communication (eg. establishment of mode of operation).

Format of plots of control

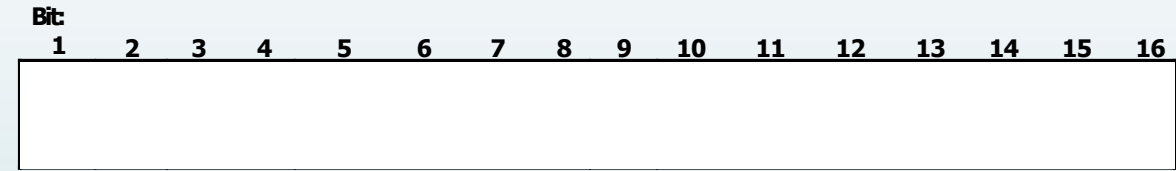
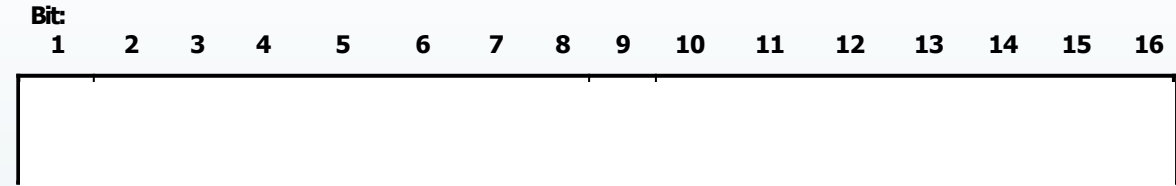
Mode normal Mode extended



← PLOT Yo →

← PLOT S →

PLOT OR



FAQ: The season primary puts P/F=0 for a order without option to answer of secondary schools . When the station primary puts P/F=1 is for a probe and the secondary transmits answers with P/F=0, except the last plot, to indicate end of answer.

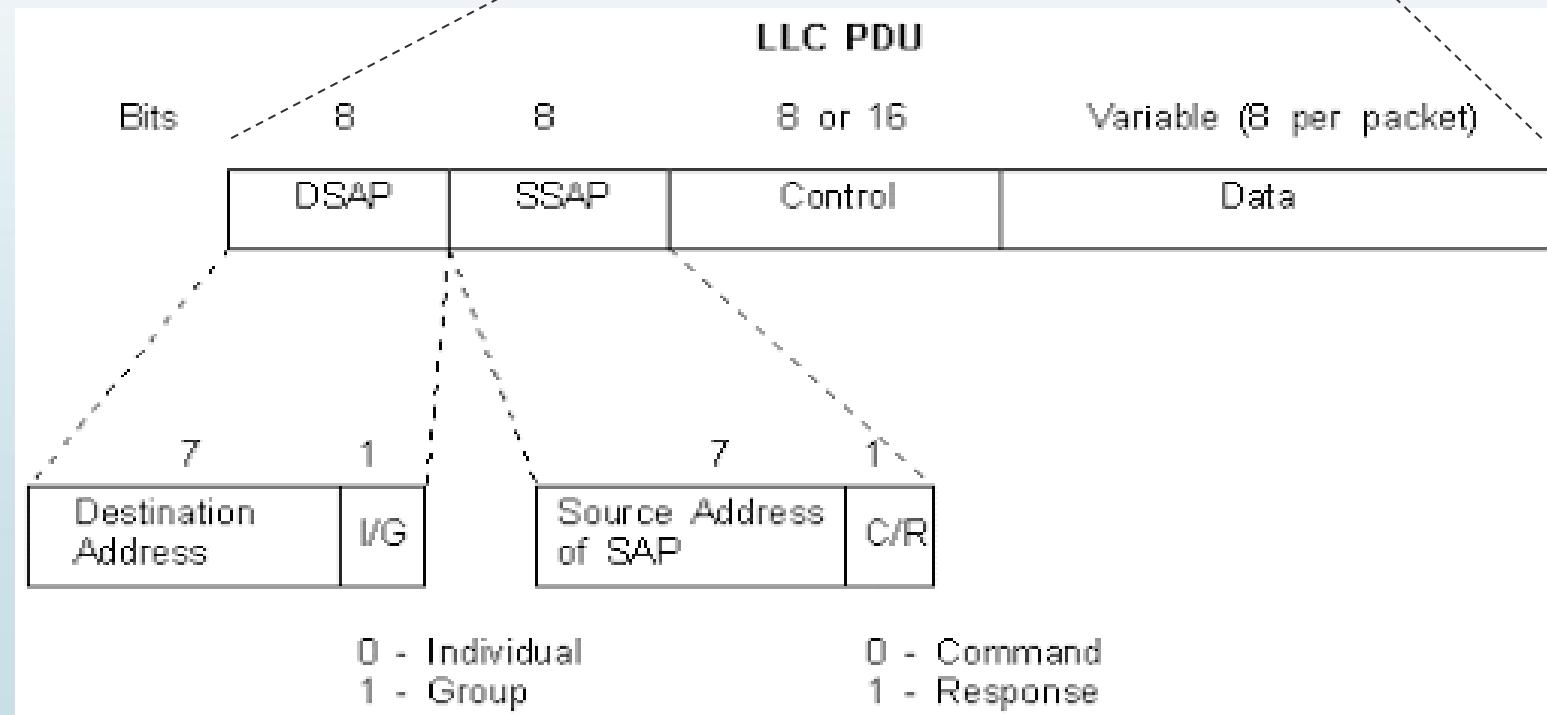
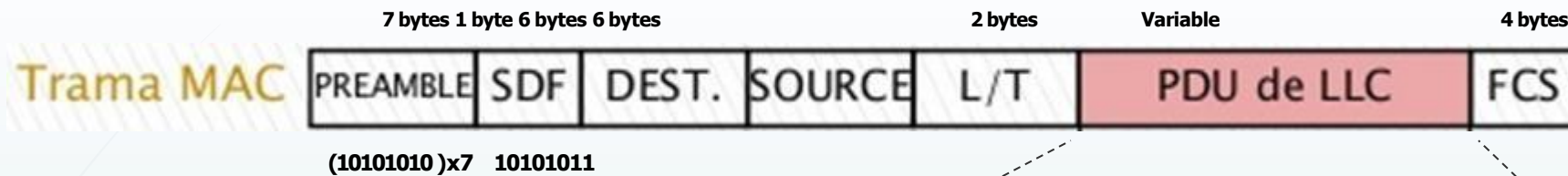


Analysis of the protocol LLC

Control of Link Logical (LLC)

- LLC is part of the model of reference IEEE 802, is the sublayer superior of the layer of Liaison of Data. HE communicates with the sublayer of Control of Access to the Half (MAC) and the layer of Grid.
- Was very used in different environments of communications, such as X.25 (definite by the ITU- T) through he protocol LAPB, IEEE 802.2, FDDI.
- His functions main are: multiplex the information coming from of protocols of the layer of grid, toast control of flow and control of mistake in a link of communication.
- Are functions are used by others protocols of communication that operate in layers superiors, such as Netbios Frames of level of transport.

Format of plot



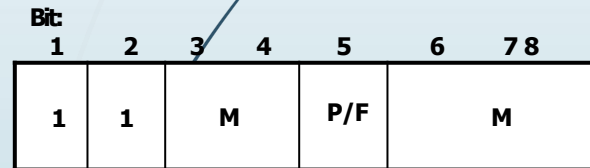
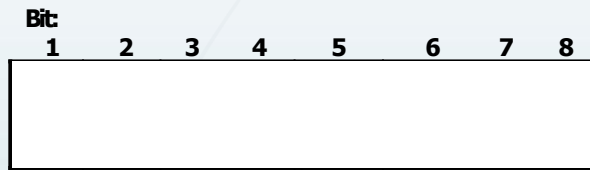
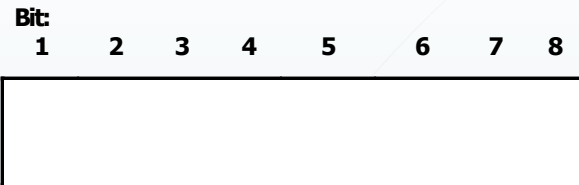


SAP

SAP	Protocol
00	Null SAP
04	SNA
05	SNA
06	TCP
08	SNA
0C	SNA
42	Spanning Tree
7F	ISO 802.2
80	XNS
AA	SNAP
E0	IPX
F0	NetBIOS
F8	RPL
FC	RPL
FE	OSI
FF	Global SAP

Format of the field of control

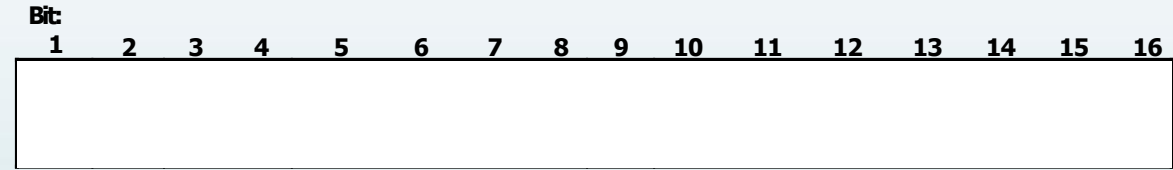
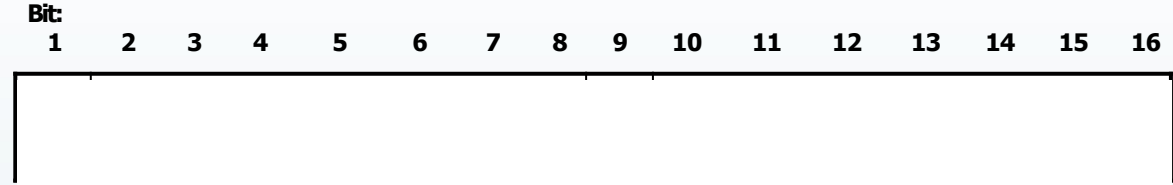
Mode normal Mode extended



← PLOT Yo →

← PLOT S →

PLOT OR



FAQ: The season primary puts P/F=0 for a order without option to answer of secondary schools . When the station primary puts P/F=1 is for a probe and the secondary transmits answers with P/F=0, except the last plot, to indicate end of answer.

Codes plot S

Code
Plot S

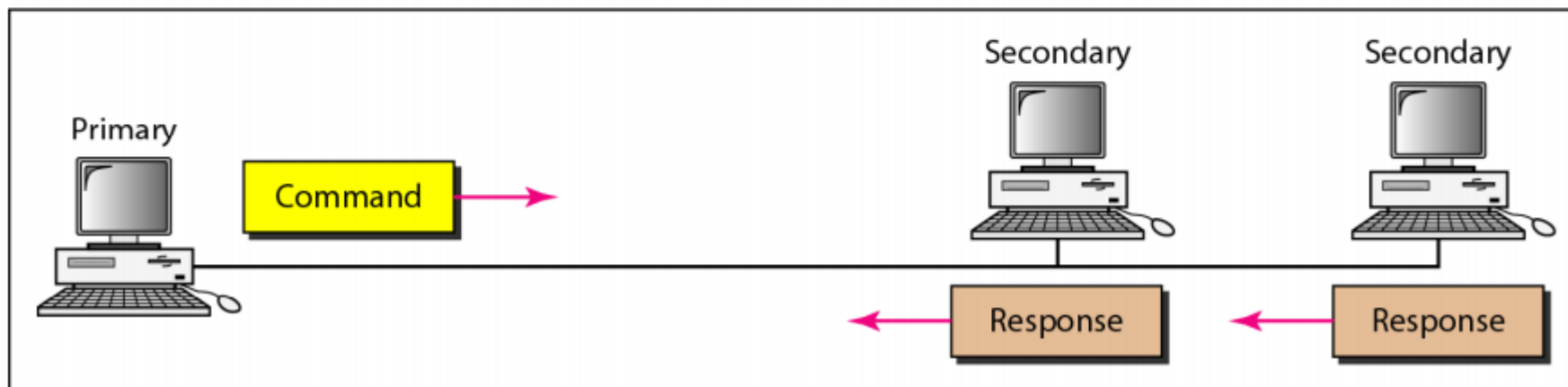
- 00 Ready for receive (RR)
- 01 Rejection (REJ)
- 10 Receiver No ready for receive (RNR)
- 11 Rejection selective (SREJ)

Modes of operation

Normal response mode



a. Point-to-point



b. Multipoint

Modes of operation

Asynchronous balanced mode



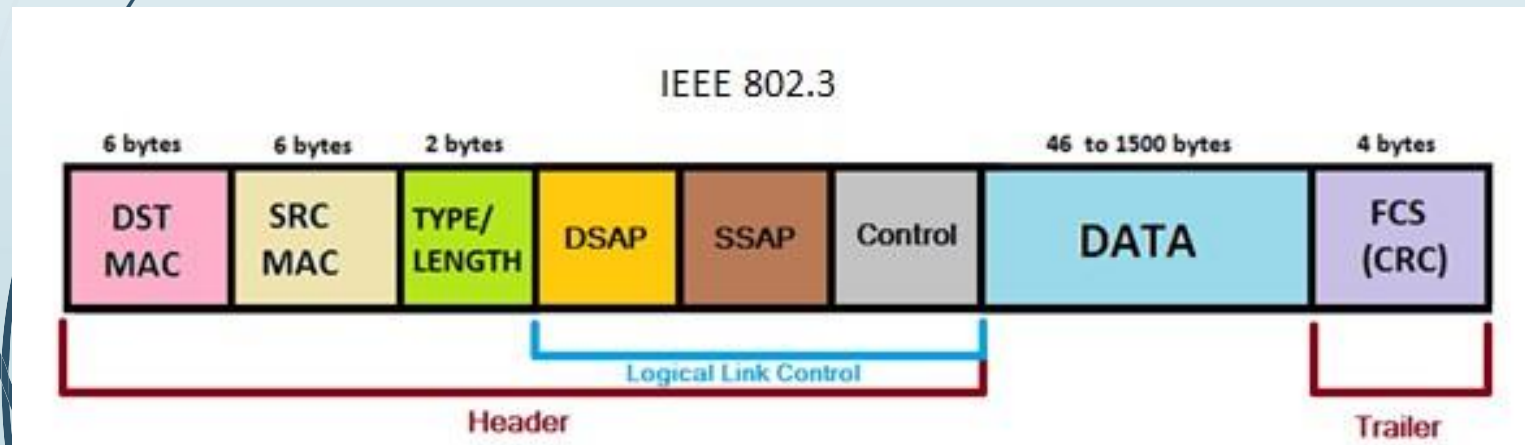
Codes plot OR

Comandos de control de la trama U con sus respuestas

<i>Código</i>	<i>Comando</i>	<i>Respuesta</i>	<i>Significado</i>
00 001	SNRM		Activación de modo de respuesta normal
11 011	SNRME		Activación de modo de respuesta normal (ampliado)
11 100	SABM	DM	Activación de modo de respuesta asíncrona balanceada
11 110	SABME		Activación de modo de respuesta asíncrona balanceada (ampliada)
00 000	UI	UI	Información sin numerar
00 110		UA	Reconocimiento sin numerar
00 010	DISC	RD	Desconexión o Petición de desconexión
10 000	SIM	RIM	Activación de modo de iniciación o Modo de petición de información
00 100	UP		Muestra sin numerar
11 001	RSET		Reset
11 101	XID	XID	Intercambio de ID
10 001	FRMR	FRMR	Rechazo de trama

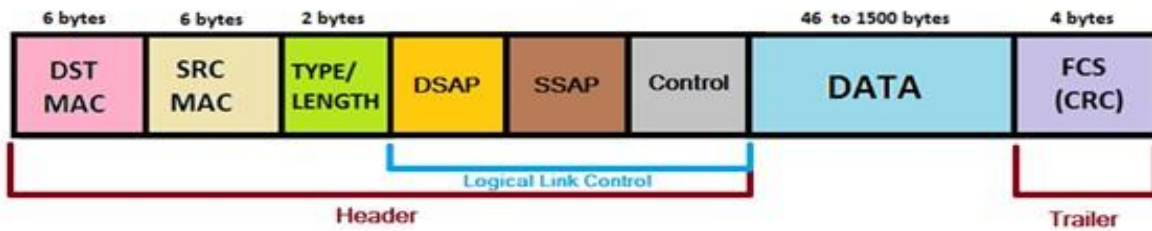
Eg. Dadaist the plot

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 00 00 00 00 00 00 90 91 6d



Eg. Dadaist the plot

IEEE 802.3



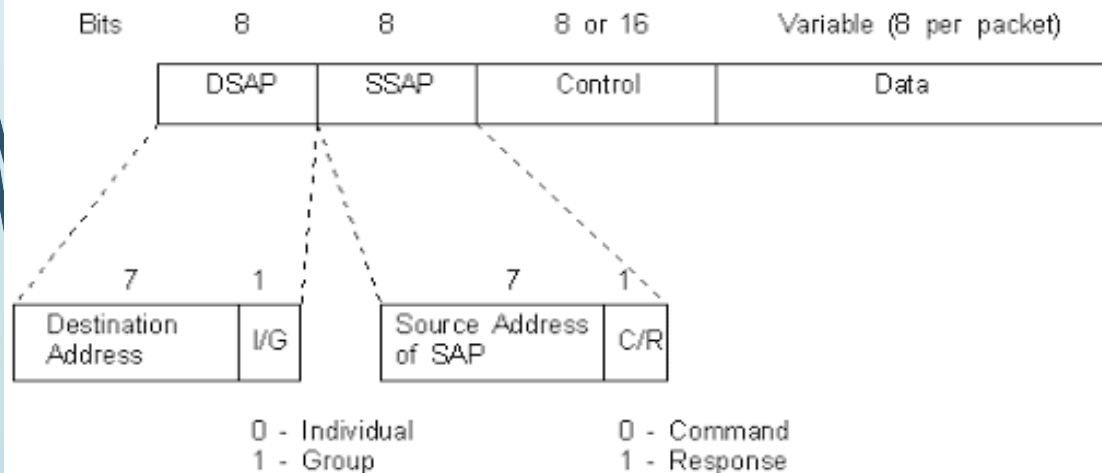
00 02 b3 9c df 1b 00 02 b3 9c ae ba 00 12 f0 f 0

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 00 00 00 90 91 6d

LLC PDU



DSAP
F 0
1111 000
0

SSAP
F 0
1111 000
0

Field of control

00 03

0 0 0 3
 0000 0000 0000 0011
 ← ←

0000000011000000

0	00000000	1	10000000
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N(S)=0

P/F=1

N(R)=1

Plot I

PLOT Yo

Bit:															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	N(s)								P/F	N(r)					

PLOTS

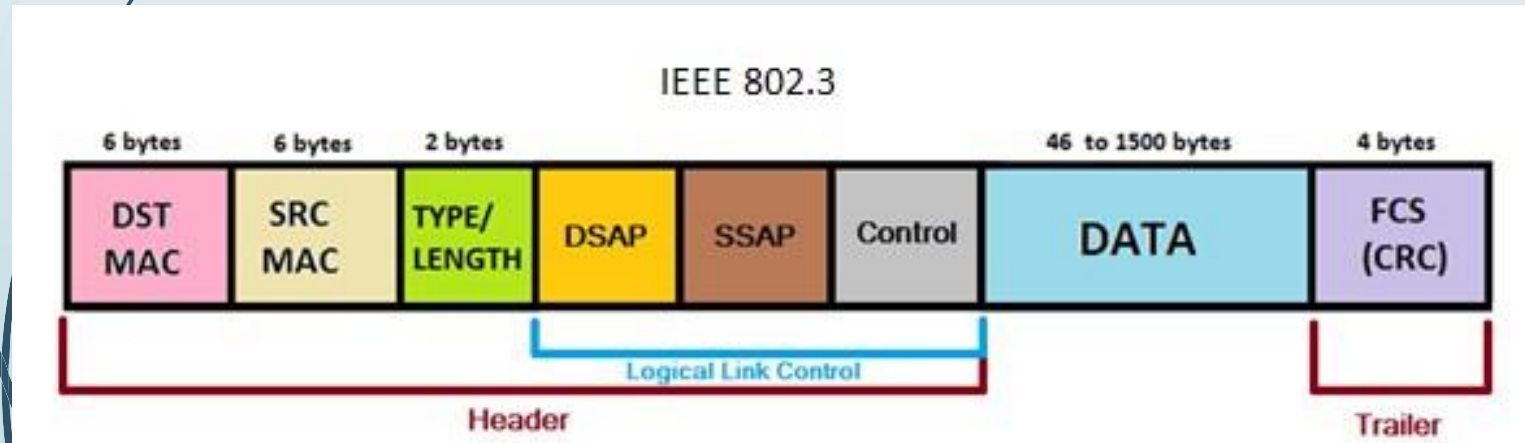
Bit:															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0	S	0000				P/F			N(r)					

PLOT OR

Bit:							
1	2	3	4	5	6	7	8
1	1	M	P/F	M			

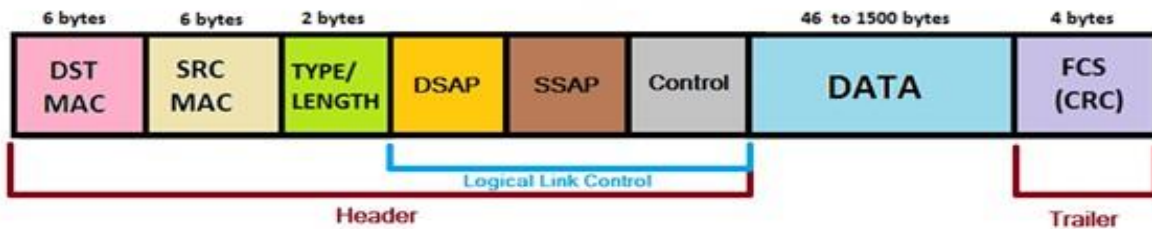
Eg. Dadaist the plot

00 02 b3 9c ae b a 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 00 00 00 00 00 43 05 90 6d



Eg. Dadaist the plot

IEEE 802.3



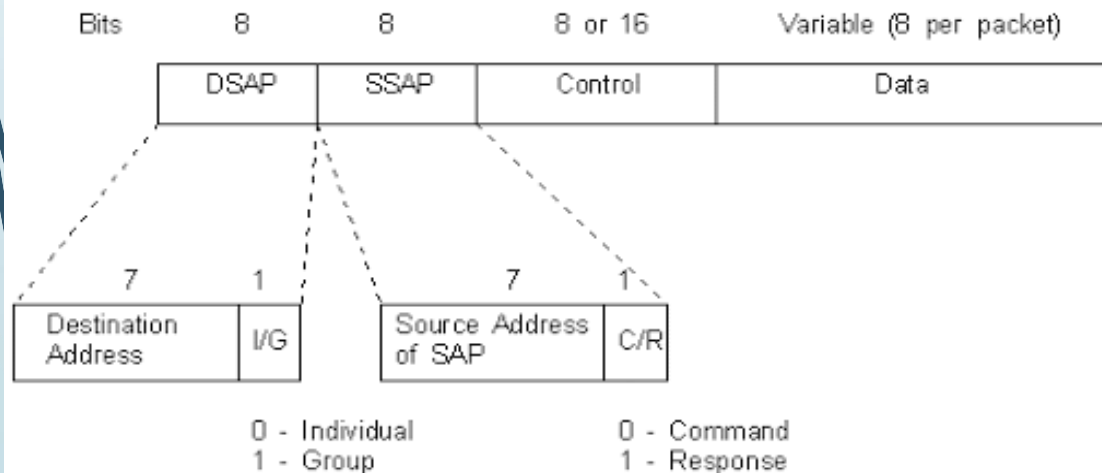
00 02 b3 9c ae ba 00 02 b3 9c df 1b 00 03 f0 f0

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 00 00 00 00 43 05 90 6d

LLC PDU



DSAP
F 0
1111 000
0

SSAP
F 0
1111 000
0

Field of control

7f

7 F
0111 1111
←

11111110

11	11	1	110	Plot U
code		P/F=1	code	

Code=11110 → KNOW ME
(Mode of answer asynchronous Balanced)

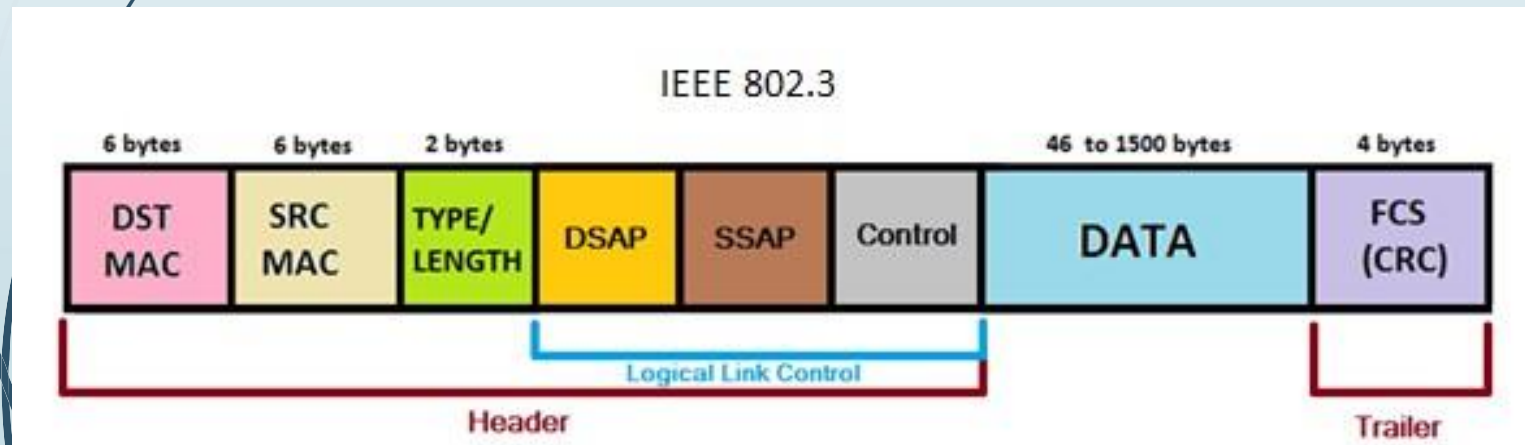
Bit:																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
PLOT Y ₀	0	N(s)								P/F	N(r)					

Bit:																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
PLOTS	1	0	S	0 0 0 0				P/F	N(r)							

Bit:							
1	2	3	4	5	6	7	8
PLOT OR	1	1	M	P/F	M		

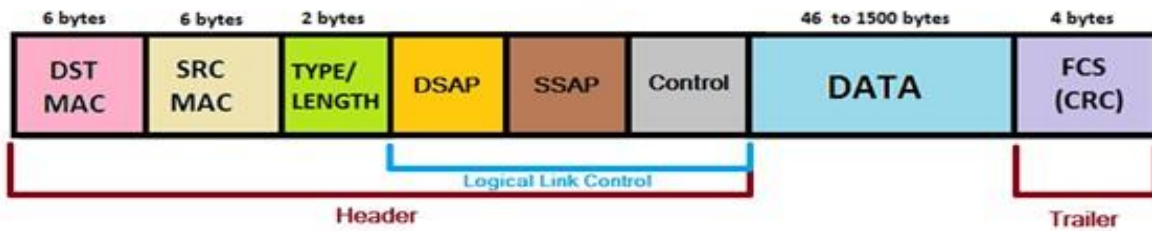
Eg. Dadaist the plot

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 00 00 00 00 00 00 be 96 6d



Eg. Dadaist the plot

IEEE 802.3



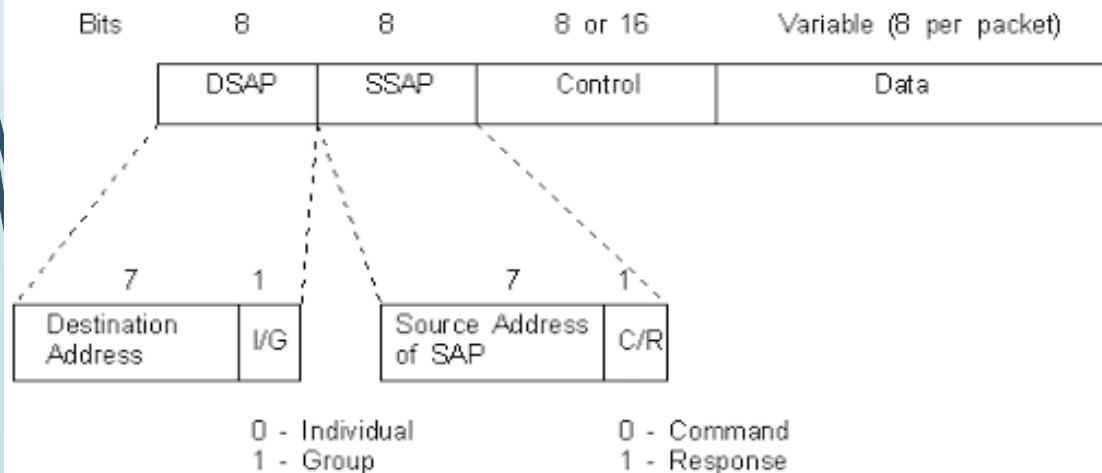
00 02 b3 9c df 1b 00 02 b3 9c ae ba 00 04 f0 f 1

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 00 00 00 00 00 00 00 00 00 00 be 96 6d

LLC PDU



DSAP
F 0
1111 000
0

SSAP
F 1
1111 000
1

Field of control

00 03

0 1 0 8
 0000 0001 0000 1000
 ← ←

10000000000010000

10	00	0000	0	0010000
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RR

P/F=1

N(R)=4

Plot S

PLOT Yo

Bit															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	N(s)								P/F	N(r)					

PLOTS

Bit															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0	S	0000				P/F			N(r)					

PLOT OR

Bit							
1	2	3	4	5	6	7	8
1	1	M	P/F	M			