HDLC & PPP

1) The High-Level Data Link Control (HDLC) protocol defines a number of types of frames shown in figure 1). Explain I) the general layout of HDLC frames, II) the use of the frame types to implement flow control concepts such as Stop-and-Wait ARQ and Selective Repeat ARQ, and III) the terms piggybacking and bit stuffing.

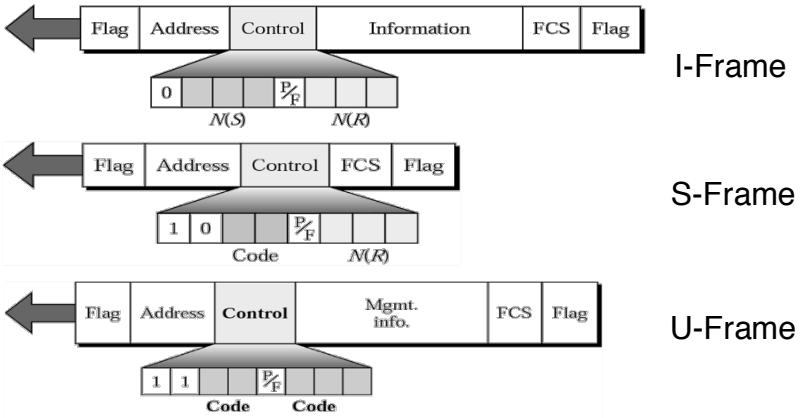

Figure 1: Types of HDLC frames

2) Assume that station 00001100 will send a 200 byte response using HDLC. Write out the complete frame for HDLC. Where information such as sequence numbers, etc is not given, choose a number and explain your choice.

3) The IEEE 802.2 Logical Link Control (LLC) provides a slim layer on top of various IEEE 802 protocols using a similar format for its protocol data unit (PDU) as HDLC. Discuss the difference between the control fields of the two protocols and effect of this difference for LLC.

DSAP address	SSAP address	Control	Information
8 bits	8 bits	8 or 16 bits	M*8 bits

DSAP address = Destination service access point address field
SSAP address = Source service access point address field
Control = Control field [16 bits for formats that include sequence numbering, and 8 bits for formats that do not (see 5.2)]
Information = Information field
* = Multiplication
M = An integer value equal to or greater than 0. (Upper bound of M is a function of the medium access control methodology used.)

Figure 2: LLC PDU format

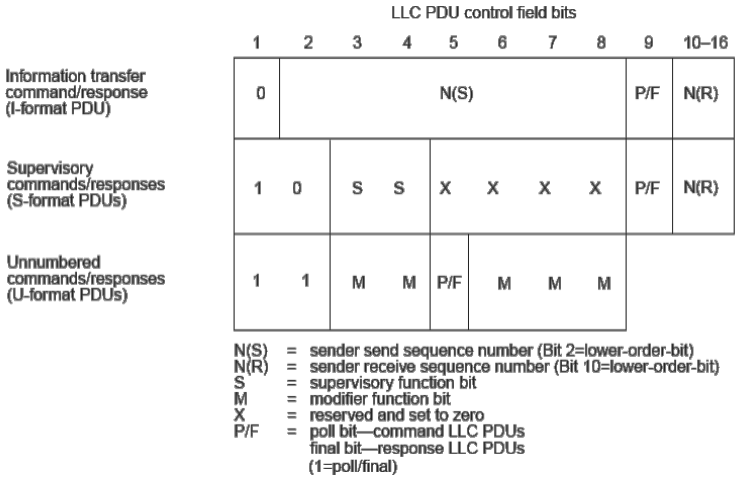

Figure 3: Logical Link Control PDU fields

4) The Point-to-Point Protocol (PPP) uses a lifecycle shown in the state diagram in figure 2. Draw a sequence diagram that associates the frames exchanged between to endpoints as every step in the state diagram.

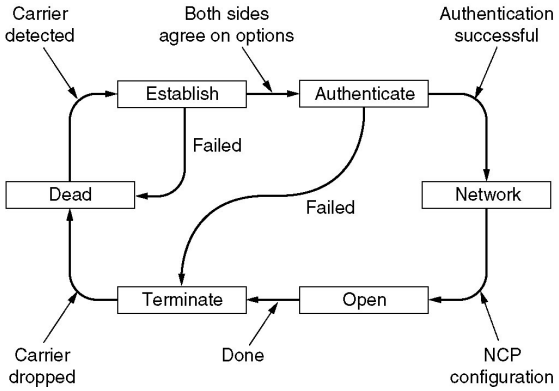

Figure 4: PPP State diagram

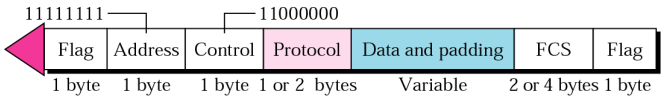

Figure 5: PPP Frame Layout

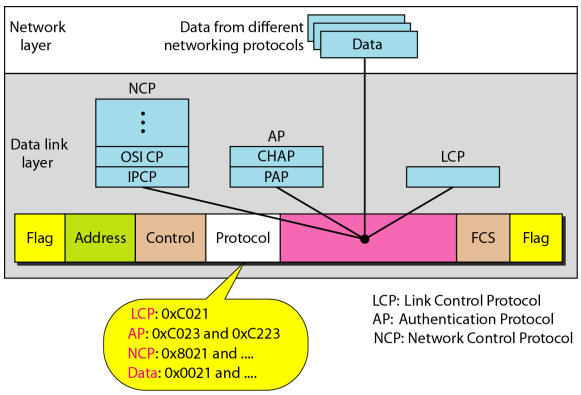

Figure 6: PPP Protocol byte