ECT-215 Homework #5 Solution Set
DATA LINK PROTOCOLS (SYLLABUS)

Scoring: 36 points total.
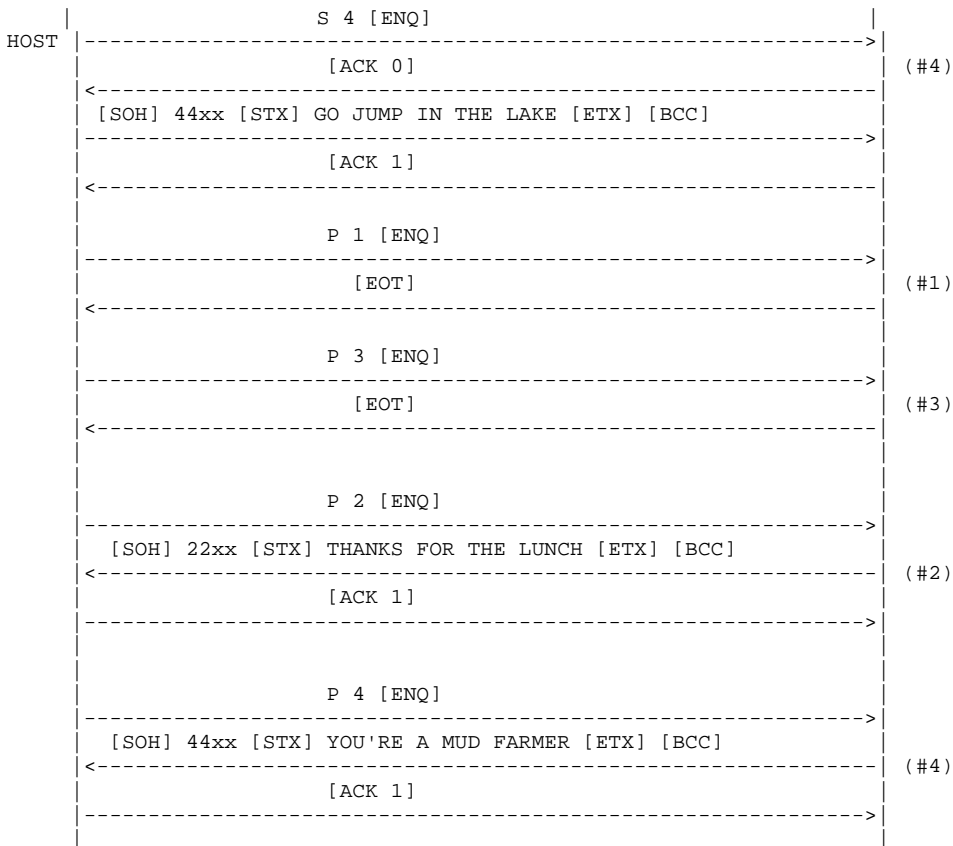
1. Given: STANDARD SELECT   (14 POINTS - SEE "EVALUATION" BELOW)

      POLL LIST = { 4,1,3,2 }

      HOST WANTS TO SAY "GO JUMP IN THE LAKE" TO TERMINAL #4
      TERMINAL #1 HAS NOTHING TO SAY
      TERMINAL #2 WANTS TO SAY "THANKS FOR THE LUNCH"
      TERMINAL #3 HAS NOTHING TO SAY
      TERMINAL #4 WANTS TO SAY "YOU'RE A MUD FARMER" TO THE HOST

  Draw: An action diagram showing all messages that would be sent on a multi-drop network. Use "P" for Poll and "S" for Select. Use a straightedge when making the diagram - draw neatly.

EVALUATION: BELOW IS A CORRECT ACTION DIAGRAM. EACH EVENT (LINE) IS WORTH 1 POINT. IF ONE ITEM IS OUT OF ORDER, DON'T COUNT SUBSEQUENT ITEMS WRONG IF THEY ARE OTHERWISE CORRECTLY SEQUENCED. THE OVERALL ORDER OF SERVICE SHOULD BE 4 - 1 - 3 - 2 -4 TO SEND ALL THE MESSAGES. <u>14 POINTS TOTAL</u>.

```
        |                          S 4 [ENQ]                          |
HOST    |----------------------------------------------------------->|
        |                          [ACK 0]                            |  (#4)
        |<-----------------------------------------------------------|
        | [SOH] 44xx [STX] GO JUMP IN THE LAKE [ETX] [BCC]            |
        |----------------------------------------------------------->|
        |                          [ACK 1]                            |
        |<-----------------------------------------------------------|
        |                                                             |
        |                          P 1 [ENQ]                          |
        |----------------------------------------------------------->|
        |                          [EOT]                              |  (#1)
        |<-----------------------------------------------------------|
        |                                                             |
        |                          P 3 [ENQ]                          |
        |----------------------------------------------------------->|
        |                          [EOT]                              |  (#3)
        |<-----------------------------------------------------------|
        |                                                             |
        |                                                             |
        |                          P 2 [ENQ]                          |
        |----------------------------------------------------------->|
        |   [SOH] 22xx [STX] THANKS FOR THE LUNCH [ETX] [BCC]         |
        |<-----------------------------------------------------------|  (#2)
        |                          [ACK 1]                            |
        |----------------------------------------------------------->|
        |                                                             |
        |                                                             |
        |                          P 4 [ENQ]                          |
        |----------------------------------------------------------->|
        |   [SOH] 44xx [STX] YOU'RE A MUD FARMER [ETX] [BCC]          |
        |<-----------------------------------------------------------|  (#4)
        |                          [ACK 1]                            |
        |----------------------------------------------------------->|
        |                                                             |
```

(14 POINTS - SEE "EVALUATION" BELOW)

2. Two host systems are connected using 3270 on a point-to-point network.
The following events are scheduled for each host:

KC HOST: EVENT @ 14:00. Three message blocks will need to be sent:
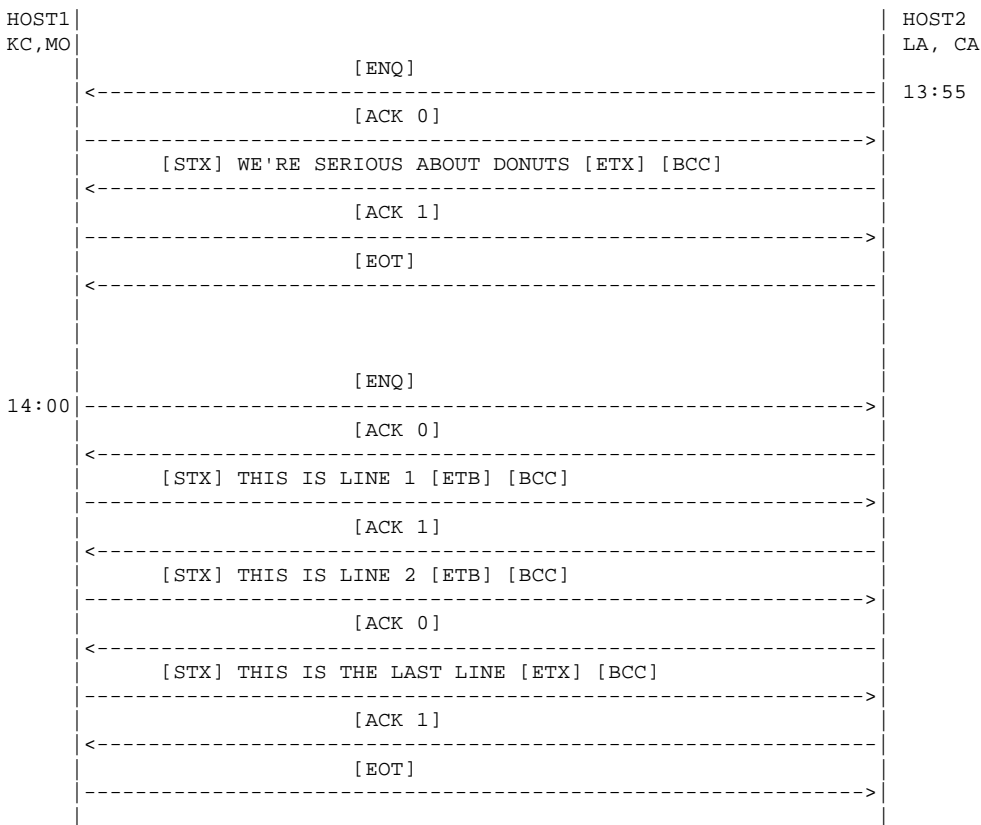
Block 1: "THIS IS LINE 1"
Block 2: "THIS IS LINE 2"
Block 3: "THIS IS THE LAST LINE"

LA HOST: EVENT @ 13:55. A single message block needs to be sent:

Block 1: "WE'RE SERIOUS ABOUT DONUTS"

EVALUATION: BELOW IS A CORRECT ACTION DIAGRAM. EACH EVENT (LINE) IS
WORTH 1 POINT. IF ONE ITEM IS OUT OF ORDER, DON'T COUNT SUBSEQUENT
ITEMS WRONG IF THEY ARE OTHERWISE CORRECTLY SEQUENCED. 14 POINTS
TOTAL.

```
HOST1|                                                                    | HOST2
KC,MO|                                                                    | LA, CA
     |                              [ENQ]                                 |
     |<-------------------------------------------------------------------| 13:55
     |                             [ACK 0]                                |
     |------------------------------------------------------------------->|
     |        [STX] WE'RE SERIOUS ABOUT DONUTS [ETX] [BCC]                |
     |<-------------------------------------------------------------------|
     |                             [ACK 1]                                |
     |------------------------------------------------------------------->|
     |                              [EOT]                                 |
     |<-------------------------------------------------------------------|
     |                                                                    |
     |                                                                    |
     |                                                                    |
     |                              [ENQ]                                 |
14:00|------------------------------------------------------------------->|
     |                             [ACK 0]                                |
     |<-------------------------------------------------------------------|
     |         [STX] THIS IS LINE 1 [ETB] [BCC]                          |
     |------------------------------------------------------------------->|
     |                             [ACK 1]                                |
     |<-------------------------------------------------------------------|
     |         [STX] THIS IS LINE 2 [ETB] [BCC]                          |
     |------------------------------------------------------------------->|
     |                             [ACK 0]                                |
     |<-------------------------------------------------------------------|
     |       [STX] THIS IS THE LAST LINE [ETX] [BCC]                     |
     |------------------------------------------------------------------->|
     |                             [ACK 1]                                |
     |<-------------------------------------------------------------------|
     |                              [EOT]                                 |
     |------------------------------------------------------------------->|
     |                                                                    |
```

3. List the three types of HDLC data blocks, and give the purpose of each one. (2 points)

    1. <u>Supervisory</u> - Used to control the flow information, and for handshaking
    2. <u>Information</u> - Used to carry information, as well as handshaking
    3. <u>Unnumbered</u> - Used to initialize secondary units on the network

4. Draw the structure of an information frame, using block notation. (2 points)

FLAG $7E	ADDRESS 8 bits	CONTROL 8 bits	CLIENT DATA Variable Size	FCS CCITT CRC-16	FLAG $7E
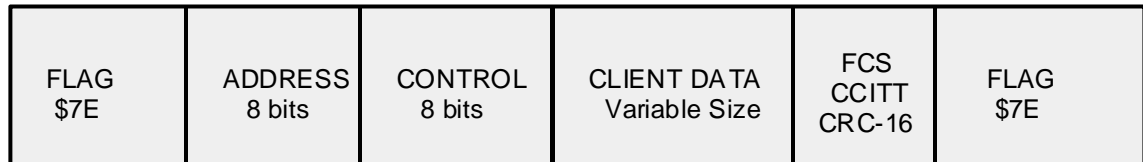
5. Which part of the HDLC frame structure identifies the frame type? (1 point)

The control field identifies the frame type. Specifically, the first two bits (D0-D1) within the control field are an enumerated bit-mapped field expressing the frame type information.

6. An HDLC transmitter sends frames numbered 2,3,4. The receiver responds with an S-frame with NR=4. Explain the meaning of this transaction, and state what will happen *next* on the network. (1 point)

Since NR=4 means that the receiver expects frame 4 next, <u>the receiver has detected an error in frame 4.</u>

<u>The next event that will take place is the retransmission of frame 4.</u>

7. What are "outstanding" frames? How many are allowed under HDLC? What is the advantage of windowing when compared to simpler protocol such as IBM-3270? (2 points)

Outstanding frames are those that have been transmitted across the network, but not yet acknowledged.

Up to seven (7) outstanding frames are permitted in HDLC.

Windowing is another name for allowing outstanding frames to be sent. <u>The advantage of windowing is increased efficiency and speed of transfer</u>, since an acknowledge need not be sent for every individual data block.