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2nd licence year
Exercises serie

Communication Networks tutorial
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Data Link layer

Exercice 1 Frame delimitation

1. The following text must be sent on a link :

   "The link layer is layer number 2."

   Knowing that the frame delimitation method used is character counting and that the block size is 4 characters, give the string of characters really transmitted.
2. The following binary data (4 bytes) must be transmitted on a link :

   0011 0111 0111 1110 0001 0001 1011 1110 is still in hexadecimal 377E11BE
   - The frame delineation used is bit stuffing. Briefly recall its principle.
   - What data would then be observed on the physical line ?

Exercice 2 Parity

Consider the message composed of the string : "NET", the control of transmission of each character is ensured by an odd parity bit, give the binary representation of the transmitted message.
We assume that the characters are encoded according to the ASCII code, using 7 bits.
Reminder : The ASCII code of the characters transmitted are : N : 1001110, E : 1001001, T : 1010100

Exercice 3 CRC code

- Consider the following message : 0011111101. A CRC calculated by the generator polynomial $g(x) = x^2+x+1$ is added to this message. What is the coded message ?
- Message 101011000110 is received. The polynomial used for error detection is the following $x^6 + x^4 + x + 1$. Was the transmission done correctly and what is the message sent.

Exercice 4 HDLC procedure

We want to send a sequence of information from Station A to Station B using the level 2 link protocol HDLC (High level Data Link Control) defined by the ISO. Assuming that the size of the window = 8 (0..7) and that the Transmitting Station A sends only 04 numbered I information frames then places itself on hold for acknowledgment,

1. You are asked to determine the supervision frame generated by station B according to the following cases :
   - Case1 : all frames were successfully received.
   - Case 2 : I frame N°2 was received incorrectly.
   - Case 3 : I frames N°1 and N°3 contain errors.
   - Case 4 : Receiving Station B does not respond. (study the different possible reasons)
2. You are asked to determine the sequence of frames sent from Station A based on the sequence of the following S/U supervision frames sent by receiving Station B :

t_0	t_1	t_2	t_3	t_4	t_5	t_6	t_7	t_8
UA	RR-04	REJ-06	RR-02	SREJ-04	SREJ-07	RR-04	UA	end

   t_i : at time t_i
   Comment your answer.

Exercice 5 HDLC procedure

1. Given the sequence of binary data located in the information field of an HDLC frame :

   011110111110011111100011
   - What sequence is actually provided to the transmission medium (for this data only) ?
   - What happens if the twelfth bit of the sequence actually transmitted was misrecognized by the receiver ?
2. Decode the following HDLC frames represented in hexadecimal by extracting the different fields and giving their meaning :
   - "7E C0 48 4D 41 47 49 53 54 45 52 D3 E1 7E", "7E 80 BC 02 2D 7E", "7E C0 A6 FF 7E", "7E 80 95 FF 7E"

Good Luck