CO2017 — Surgery 7, Physical & Data-Link 2018–19

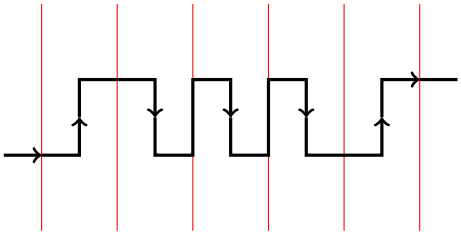
2019–03–03; R1447

Questions

Q1—Physical layer - Manchester Encoding

Decoding

Look at this transmission.



1. What bit sequence would they represent if using Manchester encoding?
2. What bit sequence would they represent if using Differential Manchester encoding?

Encoding

For each of the bit streams listed, draw a diagram showing how they would be transmitted over copper wire, using each of Manchester Encoding and Differential Manchester Encoding:

1. 01110
2. 101010

Q2—Data-Link Layer

Bit stuffing

At the data link layer, suppose that the following streams of bits are to be transmitted. In each case construct the frame that would be sent.

The delimiter bit sequence is `01111110`.

1. `0110 1100 1111 1110 0100`
2. `11011111 01111110 01000100 10100011`

Byte stuffing

1. Suppose that the following ***frame*** is **received** at the data link layer.
   `05A11B7C10D1090`
   The delimiter byte is `0` and the control byte is `1`, and other bytes are represented by single numbers or letters.
   What was the original frame?
2. Suppose that you want to transmit the following streams of bytes at the data-link layer. If the delimiter byte is 0, and the escape byte is 1, use ***byte-stuffing*** to construct the frame that would be transmitted in each case.
   (a) 9AB01XP012
   (b) 11AA0011BB

Triple modular redendancy

Suppose that the following streams of bits have been **received** at the data link layer, encoded using ***triple modular redundancy***. In each case, what was the original stream assuming no more than one bit error in each 3 bit group?

1. **`101011 111111 001000 110001`**
2. **`11000001 11110000 1110110`**

2-Dimensional parity

1. Suppose that the following stream of 32 bits has been **received** at the data link layer, encoded using ***two dimensional, even parity***.
   `10101111 11110010 01011010 00000011`
   Assuming no more than a single bit-error in transmission, what was the original 21 bit stream before it was encoded?

Hamming(7,4)

1. The following 7-bit strings have been encoded using Hamming(7,4), then transmitted, with at most a single bit error.

   Work out what the original 4-bit strings were, showing your working.

   1101110, 1101111.
2. The following 4-bit strings are to be transmitted. Encode them using Hamming(7,4).

   1101, 0101.