

3. Problem Sheet

Out	Due	Discussion
03.05.17	09.05.17	12.05.17 - 16.05.17

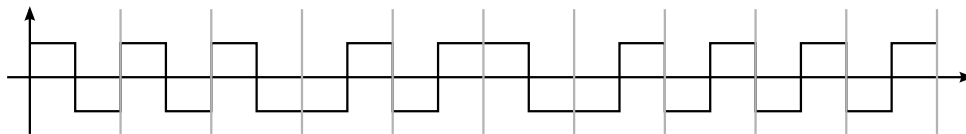
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Please solve the problems in groups with two people and submit your solutions before the lecture. The discussion of the problem sheet is in the exercise course after the submission.

Problem 1: (Differential) Manchester

4 points

Consider you have measured the following signal.



The vertical lines represent the end of a bit. Specify the bit sequence that is encoded in the signal considering that it was encoded with:

1. Manchester baseband encoding (also called biphas-level)
2. Differential Manchester

Can the bit sequences be specified unambiguously?

Problem 2: Data Encoding

5 points

The following bit sequence shall be encoded: 0101110010

Represent the sequence in a time-voltage-diagram using the following encoding schemes:

1. Non-Return-to-Zero (NRZ)
2. Return-to-Zero (RZ)
3. Differential-Non-Return-to-Zero
4. Manchester
5. Differential-Manchester

Problem 3: Manchester Encoding & Bandwidth

3 points

Explain the disadvantage of the Manchester encoding scheme. Propose an improvement!

Problem 4: Analog to Digital

3 points

Consider a scenario where an analog voice sample has to be transmitted via a digital network.

1. Explain how this can be achieved and which steps are necessary.
2. Discuss the errors that can occur.
3. Discuss the sampling theorem in this context.

Problem 5: Baud

2 points

1. What is the difference between Baud und Bit/s?
2. A quaternary digital signal has a symbol rate of $v = 10^6$ Baud. Is the data rate equal, smaller or greater than the Symbol rate? Is this allways the case?
3. For the given signal, what is the data rate?

Problem 6: Transmission medium used in Ethernet

3 points

1. Which different mediums are used in Ethernet communication?
2. Which medium is the “best” for the given situations?
 - (a) As primary technology of the Internet’s backbone
 - (b) A dynamic network of moving communication partners
 - (c) A cheap connection between two nodes which is robust against interference
 - (d) A network of many nodes at the same location, in which traffic is produced by a single node broadcasting to all others
 - (e) A network of many nodes located in an area of a few hundred meters, in which traffic is produced by a single node broadcasting to all others
 - (f) A tremendously fast point-to-point connection

a total of 20 points