ETH

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**Distributed
Computing**

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Computer Engineering II
Solution to Exercise Sheet Chapter 5

Basic

1 MAC Addresses vs. IP Addresses

a) - They operate on different layers in the network stack: link layer vs network layer.
    - Different size (6 bytes vs 4 or 16 bytes) and notation
    - Assigned by hardware manufacturer vs by network administrator
    - Used for routing vs used as unique identifier (esp. before an IP address is assigned)

b) MAC addresses are impractical for routing on the Internet as they are not grouped by network or location. (Instead they are grouped by manufacturer.)

c) Some kind of unique name is required to be able to execute any meaningful protocol when first joining a network.

2 Escape Sequences

a) It is never possible to be sure a string was escaped, but some escaping schemes allow telling when a string has not been escaped, namely if it contains invalid byte sequences, i.e., Yz where $z \notin \{A, B\}$.

b) In software strings are usually parsed from the start, hence joining in the middle of an ongoing transmission as in the physical layer is not a concern. This means that the delimiter `X` may occur in the string as part of an escape sequence without being mistaken as the delimiter. Of course, escape sequences may still not start with an `X`.

c) `\"Oh no,\" Jon said, \"my cat \\\"Garfield\\\" is locked outside in the rain!\"`

3 Manchester Decoding

The bits are `0110100001101001` (in order).
$01101000_2 = 104 = $ `ascii('h')`, $01101001_2 = 105 = $ `ascii('i')`.
Hence, the message is `hi`.

Data	0	1	1	0	1	0	0	0	0	1	1	0	1	0	0	1
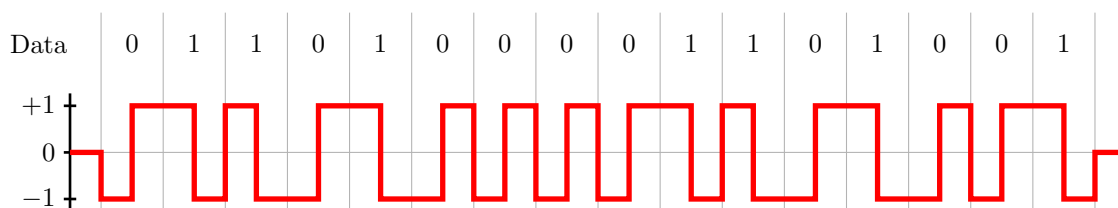
4 Bit Stuffing

Note that we just list example solutions here.

a) We append to every occurence of the string `01111` (a substring of `S`) the bit `1` (preventing `S` from occurring). Note that this operation is trivially reversible and hence allows for easy decoding.

b) The problem is that the `0` at the end of `S` may combine with the start of the packet into another instance of `S`. In principle, the same thing could happen at the end of the packet with the leading `0` of `S`, but this is not an issue for our solution from a).

Solution: Just add a `0` to the front of the packet *before* performing the bit insertions. Clearly, this operation is also reversible.

5 AM/FM/PM Demodulation

The symbols are `0110 0111 0110 1111 0110 1111 0110 0100 0110 1010 0110 1111 0110 0010` (in order). The message reads `goodjob`.