

# CSE3020 Network Technology

## Semester 1, 2004

### Tutorial 3 -Week 4

**Question T3.1** - What is the difference between bit rate and baud rate? Give an example where both are the same. Give an example where they are different.

**Question T3.2** - Calculate the bit rate for the given baud rate and type of modulation:

- (a) 2000 baud, FSK.
- (b) 4000 baud, ASK.
- (c) 6000 baud, 2-PSK.
- (d) 3000 baud, 4-PSK.
- (e) 2000 baud, 8-PSK.
- (f) 2000 baud, 4-QAM.
- (g) 1500 baud, 16-QAM.
- (h) 6000 baud, 64-QAM.

**Question T3.3** - What is the difference between encoding and modulation? For the bit stream

101110010, sketch the waveforms for each of the following schemes:

- (a) Nonreturn to Zero-Level (NRZ-L).
- (b) Nonreturn to Zero Inverted (NRZI).
- (c) Bipolar-AMI.
- (d) Pseudoternary.
- (e) Manchester.
- (f) Differential Manchester.
- (g) Amplitude Shift Keying (ASK).
- (h) Phase Shift Keying (PSK).
- (i) Frequency Shift Keying (FSK).

Assume that the signal level for the preceding bit for NRZI was low; the most recent preceding 1 bit (AMI) was a positive voltage; and the most recent preceding 0 bit (pseudoternary) was a positive voltage.

**Question T3.4** - Consider a stream of binary data consisting of 5 consecutive of 1s followed

by a zero followed by 5 consecutive of 1s, with the same assumptions as **Question T3.3**. Draw the waveforms for each of the following encoding schemes:

- (a) Nonreturn to Zero-Level (NRZ-L).
- (b) Bipolar-AMI.
- (c) Pseudoternary.

Does each of these schemes have a synchronization problem? If yes, explain your answer.

**Question T3.5** - This question relates to Pulse Code Modulation (PCM).

(a) What is digitization?

(b) Using diagrams, explain the steps that take an analogue signal to PCM digital code.

(c) How does the sampling rate affect the re-construction of the original analogue signal at the receiver?

(d) How does the number of bits allocated for each sample affect the transmitted digital signal?

(e) What is the sampling rate if a signal highest frequency component is 5,000 Hz?

What is the bit rate assuming 12 bits per sample? What is the signal-to-noise ratio?