Exercise Sensor Networks

Lecture 4: Error recovery and energy efficient MAC (till April 7, 2008)

Exercise 4.1: Poisson-distribution

An audience consists of 10 listeners. Every listener produces an arrive rate of 0.1 phonemes (basic atoms which build spoken language) per time unit. The speaker (in front of the audience) is able to talk at a rate of 2 phonemes per time unit. Each time the speaker encounters 3 or more phonemes, the particular time unit is lost and he has to repeat himself. How high is the data rate that can be achieved in this scenario?

Exercise 4.2: Energy efficiency of pure Aloha

A sensor node consumes the following amount of energy:

Basic consumption	: 8 mA
additional consumption for sending	: 20 mA
additional consumption for receiving	: 6 mA

A node must meet a particular energy constraint that requires it not to consume more than 18 mA. How high can the transmission rate per node be chosen in order not to violate the constraint?

Exercise 4.3: Genie Aided Aloha

Genie-aided Aloha was an estimate for the energy efficiency of the Aloha protocol. Is GAA better than pure Aloha in every case and if not when and why?