Problem Set 1, Part a

Due: Wednesday, March 1, 2006
Problem sets will be collected in class. Please hand in each problem on a separate page, with your name on it.

Reading:

Paper by Gallager; by Komlos and Greenberg.
Brenner's notes on 802.11.
MACAW paper

Background: Schiller, Chapters 2 and 3.
Vaidya's notes on physical and MAC layers.

Reading for next week: Localization papers.

Problems:

1. IEEE 802.11, MACA, and other MAC-layer protocols use the Binary Exponential Backoff (BEP) strategy.

    (a)   What problem is BEP intended to solve?

    (b)   Explain concisely how it works.

    (c)   Give an informal explanation of why the method is supposed to solve the problem it is intended to solve.
          You don't need to include mathematical analysis, but you can if that is helpful.

    (d)   Describe some situations in which it does not work well.

2. The Komlos and Greenberg paper asserts the existence of a sequence of query sets $Q_1, Q_2, \ldots, Q_t$, where t is $O(k + k \log \frac{n}{k})$, that successfully solve isolate all contending devices. But, they do not actually exhibit such a sequence.

    (a)   For some small values of k and n, can you construct a specific sequence of queries that works?

    (b)   Choose two different input sets I and J, each of size k, at random. Give traces of how your query set list works on both of these sets.