

ECE 250 HOMEWORK # 6

Answer the following questions:

Paper # 1: Goldsmith & Wicker, "Design Challenges for Energy-constrained Wireless Ad Hoc Networks", IEEE Wireless Comm. Mag., Aug. 2002

1. (a) Explain why energy minimization requires a "cross-layer design" approach?
 (b) What other networks require a cross-layer design approach for their optimization?
 (c) Give any examples of network metrics that do not require a cross-layer design approach for their optimization. Why not?
2. (a) What is the domain of application of "turbo codes"? (i.e. describe the channel conditions, as well as the kinds of applications for which turbo codes are suitable.)
 (b) Are turbo codes used in any of the current wireless standards? Which ones?
 (c) Explain the difference between "serial" and "parallel" concatenated convolutional codes. Which of these performs better on the AWGN channel? Why?
 (c) Explain the advantage of turbo codes over simple convolutional codes.
 (d) What is the disadvantage of turbo codes compared with convolutional codes?
3. What is meant by "topology control"?
4. Explain the result in Figure 10 (i.e. describe what is going on in this figure, and why?)

Paper # 2: Rodoplu & Meng, "Minimum Energy Mobile Wireless Networks", IEEE JSAC, Aug. 1999

1. Describe in simple terms what a "relay region" is. Why is the benefit of the relay region computation?
2. (a) Explain in simple terms what the enclosure algorithm is, and what problem it solves?
 (b) State the conditions under which the enclosure algorithm can be used.
3. Explain why the enclosure algorithm is suitable for mobile networks. What happens as the topology changes?
4. Critique Phase II of the distributed network protocol. In particular, in the worst-case, how many cycles are needed (for a network of N nodes) for the cost distribution phase to stabilize? For a mobile network, does this pose any problems? Be precise, and try to give order of magnitude measures of convergence.