ECE8863: COGNITIVE RADIO NETWORKS

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MIDTERM EXAM: MARCH 15, 2012

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*** PUT A CODEWORD NEXT TO YOUR NAME!!!**
*** OPEN BOOK EXAM (EVERYTHING ALLOWED EXCEPT LAPTOPS AND CELL PHONES)**
*** DURATION 75 MINUTES**
*** ANSWER THE QUESTIONS RIGHT TO THE POINT;**
*** AVOID LONG EXPLANATIONS; COUPLE SENTENCES WILL BE ENOUGH AS LONG AS THEY ARE CORRECT!! GIVE SHORT ANSWERS!!!**

SPECTRUM SENSING:
QUESTION 1: (35 points)

a) What are the major differences between spectrum sensing methods in infrastructure-based networks and in ad-hoc networks?
b) What are the major two problems faced by the transmitter detection (sensing) techniques for spectrum sensing?
c) What are the gains (give 2) of Cooperative sensing?
d) What are the downsides/disadvantages) (give 2) of Cooperative Sensing?
e) Why is the spectrum sensing eliminated from TV white spaces?

SPECTRUM DECISION
QUESTION 2: (30 points)

a) In which network protocol layers can Spectrum Decision exist?
b) In the spectrum decision framework for long term quality variations and PU appearance cases we go back to Admission Control and for short term fluctuations we go back to spectrum sharing only. Why? What is the gain of this? Why don't we go to admission control in both cases?
c) What are the objectives of the Spectrum Decision framework of Lee/Akyildiz for Real-Time traffic and Best Effort traffic?
d) What are the two simplifying assumptions in the Lee/Akyildiz paper? These simple assumptions may affect the accuracy/validity of the results.
e) What are still open research problems (give 2) for Spectrum Decision?

SPECTRUM SHARING
QUESTION 3. (35 points)

a) Why is One Dimensional Based Auction with Pricing based on SINR or Power?
b) What are the major differences between the papers: Auction based Spectrum Sharing and Interference Compensation Based Spectrum Sharing although both papers are from the same authors, Huang et.al.?
c) What are the major differences between the LOCAL BARGAINING SCHEME and DEVICE CENTRIC APPROACH, although both papers from the same authors?
d) Belief Assisted pricing is also developed for CR ad hoc networks as the device centric approach? What are the major differences between them?
e) Competitive Equilibrium is a well-known approach for the optimal outcomes from economic models. However, the authors did not use that approach and suggested a multistage model. But they also did not use that multistage model and suggested a belief assisted pricing? Why all these steps?