ECE8863: COGNITIVE RADIO NETWORKS
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MIDTERM EXAM: MARCH 15, 2011

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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!!!

QUESTION 1. (24 points; 6 points each question)
  a) Why is the spectrum sensing eliminated from TV white spaces? How
     is the spectrum sensing problem solved for TV white spaces?
  b) Although cyclostationary feature detection has all the advantages for sensing,
     researchers still try to find new sensing techniques. Why?
  c) What are the advantages of cyclostationary feature detection compared to
     match filter detection?
  d) What was the problem with the Interference Temperature Management
     scheme? Why was it cancelled from the IEEE 802.22 standards?

QUESTION 2. (24 points; 6 points each question)
  a) What are the gains (give 4 reasons) of cooperative sensing and downsides (give
     2 reasons)?
  b) What are the differences between parallel fusion and cooperation models?
  c) What types of cooperative overhead can be affected by user selection & why?
  d) List 3 cases where cooperative sensing is not a good choice over individual/local
     spectrum sensing.

QUESTION 3: (24 points; 6 points each question)
  a) 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?
  b) What is the difference between Single and Multiple User Selection in Spectrum
     Decision?
  c) What are the objectives of the Spectrum Decision framework of Lee/Akyildiz
     for Real-Time traffic and Best Effort traffic?
  d) Clustering and correlation parameters are used to determine PU activity index in
     the paper Canberk/Akyildiz/Oktug. Why are these two parameters necessary to
     detect the short-term fluctuation of PU activity?

QUESTION 4. (28 points; 4 points each question)
  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) Heng and Zhao introduced 5 rules for their device centric approach. What is
     the major difference between these 5 rules?
  d) What are the major differences between the LOCAL BARGAINING SCHEME
     and DEVICE CENTRIC APPROACH, although both papers from the same
     authors?
  e) Belief Assisted pricing is also developed for CR ad hoc networks as the device
     centric approach? What are the major differences between them?
  f) 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?
  g) What are the major limitations (give 2) of Spectrum Policy Server Based
     Approach for Internetwork Spectrum Sharing?