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Energy-Aware Resource Allocation for Device-to-Device Underlay Communication

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- Objective: To maximize the battery lifetime of D2D users subject to rate constraints
- System Model:
  - Single-cell system with C cellular users and D D2D pairs communicating on the uplink
  - Channels occupied by the cellular users orthogonal to one another
  - Multiple D2D users allowed to share resource blocks of one or more cellular users
  - Battery lifetime (L) of each D2D user modeled according to Peukert's law
  - Total power P_i of the i-th D2D user modeled as:

$$P_i = \underbrace{\sum_{c=1}^{C} p_i^c}_{Tx\ \ power} + P_c$$

p_i^c - transmit power of the i-th D2D user on the c-th channel
P_c - circuit power (constant for all users)

- Main Problem:

$$\max \sum_{i=1}^{D} L_i \ s.t. \ \sum_{c=1}^{C} r_i^c \geq R \ \forall i; \ p_i^c \geq 0 \ \forall i, c \tag{1}$$

r_i^c - rate of communication of the i-th D2D user on the c-th channel, R - a threshold rate of communication

- Contributions:
  - A game theoretic approach proposed to solve the resource allocation (RA) problem of (1)
  - The proposed game shown to have Nash equilibrium that is Pareto efficient
  - An auction-based RA algorithm proposed by introducing pricing in (1) to deal with externalities
  - The proposed algorithm shown to perform better than the random allocation scheme

Simultaneous Wireless Information and Power Transfer (SWIPT) Under Different CSI Acquisition Schemes

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- Objective: To study the performance of SWIPT for a multiple input single output (MISO) system, in terms of downlink rate and outage probability, under various CSI acquisition schemes at the transmitter
- System Model:
  - An access point (AP) with L antennas, and a user terminal (UT) with single antenna
  - The UT has no access to external power supply, and derives power from the AP through wireless power transfer (WPT)
  - Three schemes considered at the AP:
    - No CSI
    - TDD, with CSI acquisition by the AP through pilot estimation
    - FDD, with CSI acquisition by the AP through analog feedback from the UT in the uplink
  - The UT uses the power acquired through WPT for pilot transmission in TDD, analog feedback in the uplink in FDD, and data decoding

- Contributions:
  - Closed-form expressions, for the downlink rate, data outage probability and energy shortage probability, derived under each of the aforementioned schemes
  - Closed-form expression, for the optimal duration of the WPT phase, derived for all the schemes
  - For the TDD and FDD schemes, optimal durations of the channel training and feedback obtained
  - The TDD scheme shown to outperform the FDD scheme in terms of both downlink rate and data outage probability
  - Correctness of the theoretical results verified through simulations

Energy Efficient Collaborative Spectrum Sensing Based on Trust Management in Cognitive Radio Networks

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- Objective: To come up with energy efficient (EE) schemes for collaborative spectrum sensing (CSS) in cognitive radio networks (CRNs)
- System Model:
  - A CRN with H honest secondary users (HSUs) and M malicious secondary users (MSUs)
  - A primary user base station (PUBS) and a secondary user base station (SUBS) that communicate with primary and secondary users respectively
  - The PUBS and SUBS exchange the band state matrix (BSM) on a periodic basis
  - The secondary users (SUs) use energy detection for finding the occupancy of a band, and send their sensed values to a fusion center (FC) located at the SUBS
  - The FC assesses the accuracy of the sensing reports sent by the SUs, by assigning a trust value to each of them

- Contributions:
  - An EE-CSS protocol proposed, and closed-form expression for the average number of sensing reports transmitted by the SUs obtained
  - Energy consumption models for EE-CSS and traditional CSS (T-CSS) formulated, and the energy efficiency of E-CSS shown to be higher than that of T-CSS
  - For the scenario when no MSUs are present, closed-form expressions for global false alarm (FA) and missed detection (MD) probabilities obtained. Further, the impact of link outage on the aforementioned probabilities analyzed
  - For given target values of FA and MD probabilities, EE-CSS shown to reduce the number of reports transmitted by the SUs, and thus the energy consumption, when compared with T-CSS

Some More Papers

- Performance of OFDM Systems With Best-m Feedback, Scheduling, and Delays for Uniformly Correlated Subchannels
- Space-Time Network Coding With Transmit Antenna Selection and Maximal-Ratio Combining
- Geometrical-Based Throughput Analysis of Device-to-Device Communications in a Sector-Partitioned Cell