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- Randomized Masking in Cognitive Radio Networks

Authors: K. Moshksar and A. K. Khandani

Affiliations: Department of Electrical and Computer Engineering, University of Waterloo, Canada

- System model
  - One primary user (PU) and several secondary users
  - Primary is unaware of
    - Channel coefficients
    - Number of SU
    - Codebook of each SU
  - SU knows
    - Codebook of PU
    - Number of SUs
    - Its direct channel coefficient, the coefficient of channels connecting other secondary transmitters and the primary transmitter to its receiver
  - Secondary receivers: capable of multiuser decoding
  - Primary receiver: treats interference as noise

- Problem statement: Design schemes such that
  - PU: performance should not degrade beyond a certain level
  - SU: satisfactory quality of service for itself
- Contributions
  - Randomized masking (RM)
  - Continuous transmission with power control (CTPC)
  - Randomized masking with power control (RMPC)
- RMPC can outperform both RM and CTPC

- Large-Scale MIMO Transmitters in Fixed Physical Spaces: The Effect of Transmit Correlation and Mutual Coupling

  Authors: C. Masouros, M. Sellathurai, and T. Ratnarajah

  Affiliations: University College London, Herriot Watt University, and University of Edinburgh

- Denser deployment of antennas
  - Spatial correlation
  - Mutual coupling
- Problem considered: investigate the combined effect of
  - Increasing the number of antenna elements
  - Fixed transmitter space
- System model
  - Downlink MIMO system: BS with N transmit antennas and M $(N \geq M)$ single antenna receivers
  - Semi-correlated channel at the transmitter $\mathbf{H} \sim \mathcal{CN}(\mathbf{0}, \mathbf{I}_M \otimes \sum_N)$
  - Frequency flat fading

- Precoding schemes
  - Channel inversion (CI)
  - Correlation rotation (CR)
- CI precoding: sum rate
- CR precoding: lower bound of the receive SNR
- Result
  - Performance benefits can be achieved by fitting an increased number of antennas at the transmitter
  - Separation between antennas can be less than the transmit frequency wavelength

- Transmission Policies for Energy Harvesting Sensors with Time-Correlated Energy Supply

Authors: N. Michelusi, K. Stamatiou, and M. Zorzi

Affiliations: University of Southern California, CTTC, and University of Padova

- System model
    - Wireless sensor powered by an energy harvesting device
    - Reports data of varying importance to receiver
    - Slotted-time system
    - Battery: finite capacity
    - EH process: two-state Markov chain
- Goal: Come up with low-complexity policies

- Contributions
  - Balanced Policy (BP): adapts transmission probability
    - Based only on the harvesting state
    - Energy harvesting and consumption need to be balanced
  - Closed-form expression: average reward of the BP
  - Asymptotic regime:
    - Energy arrivals are highly correlated
    - Battery capacity is very large

- Result: EHS performance is heavily dependent on the power-to-depletion (ρ)
  - Power that a fully charged battery can supply over a BAD period
  - Large ρ: battery capacity is sufficiently large to absorb the fluctuations in the EH process
  - Small ρ: adaptation of the transmission probability to the energy supply becomes more critical

- Average Rate of Downlink Heterogeneous Cellular Networks over Generalized Fading Channels: A Stochastic Geometry Approach

Authors: M. D. Renzo, A. Guidotti, and G. E. Corazza

Affiliations: University of Bologna, Italy

- System model
  - Downlink heterogeneous cellular networks
  - PPP based abstraction model for the positions of the BSs
  - Heterogeneous cellular deployment: modeled as a T-tier networks
  - Each tier models BSs of a particular class
- BS association
  - MT is connected to the BS: offers the highest avg. received power

- Problem statement
  - Compute the avg. rate of a heterogeneous cellular network
  - $$\mathcal{R} = \sum_{t=1}^{T} A_t R_t$$
    A_t: Prob. that MT is associated to t^{th} tier
    R_t: Avg. rate of MT conditioned on its association to t^{th} tier
  - Computationally very expensive to evaluate this term
- Contribution
  - New analytical methodology to evaluate the average rate

- Key features of the frame work
  - General fading channel models with arbitrary fading parameters
  - Needs only the MGF of the aggregate interference at the probe mobile terminal
  - Can handle correlated Log-Normal shadowing with slight increase in the computational complexity

- Y. and S. Dey: Power Allocation for Secondary Outage Minimization in Spectrum Sharing Networks with Limited Feedback
- H. Najafi, M. Damen, and A. Hjorungnes: Asynchronous Compute-and-Forward
- C. Potter, K. Kosbar, and A. Panagos: On Achievable Rates for MIMO Systems with Imperfect Channel State Information in the Finite Length Regime
- Y. Zhong and W. Zhang: Multi-Channel Hybrid Access Femtocells: A Stochastic Geometric Analysis