

Journal Watch: IEEE Trans. On Communications  
Sept. 2013 Issue

Venugopalakrishna Y. R.  
SPC Lab, IISc.

# Power-Delay Tradeoff over Wireless Networks

Xi Zhang and Jia Tang, Texas A&M Univ.

- Minimizing transmit powers increases entire system capacity
- However, in multimedia wireless n/w, there is tradeoff between delay QoS constraint and power
- Delay Constraints
  - Hard delay-bound QoS
  - Average delay-bound QoS
  - Statistical QoS (delay-bound violation prob. And effective capacity)

# This Paper

- OFDM Comm. System is considered
- N/w infrastructures: Point-to-point systems, multihop AF network and multi-user cellular network
- Min. Transmit power under Statistical QoS constraint in convex optimization setting
- Proposes algorithms to do (joint scheduling) and power allocation
- Derive expressions for effective capacity

# Achievable Throughput Regions of Fading Broadcast and Interference Channels under QoS Constraints

Deli Qiao, Univ. Of Nebraska  
Mustafa Cenk Gursoy and Senem Velisapalar, Syracuse Univ.

- Information theoretic study
  - Broadcast Channels
    - Capacity is achieved by superposition coding and successive decoding
  - 2-user Interference Channels
    - Strong intf. regime – Capacity is characterized
    - Weak intf. regime – Capacity characterization is still an open problem
    - Best achievable scheme: Han-Kobayashi
- This paper studies throughput when users operate under buffer constraints

- Statistical QoS is considered as delay constraint
- Effective Capacity
  - Maximum constant arrival rate that a time-varying service process can support under QoS constraint
  - Performance metric in multi-user systems
- Effective capacity region is characterized for Broadcast channel and 2-user intf. Channel

# On Optimality of Myopic Sensing Policy with Imperfect Sensing in Multi-Channel Opportunistic Access

Kehao Wang, Quan Liu, Wuhan Univ., China  
Lin Chen, and Khaldoun Al Agha, University of Paris, France



## ■ System Model

- $N$  i.i.d. Channels, each evolving as a two-state Markov chain (representing availability)
- In a time slot: a user can sense  $k$  out of  $N$  channels and transmit data based on availability
- Goal: Find optimal policy to sense  $k$  out of  $N$  channels at each slot to max. Accumulated throughput under imperfect sensing
- This problem can be cast as RMAB, but finding optimal policy is hard, thus uses myopic policy
- Shows optimal policy is optimal in case of  $N$  channels

# Modeling, Analysis and Design for Carrier Aggregation in Heterogeneous Cellular Networks

Xingqin Lin, Jeffrey G. Andrews, The Univ. Of Texas Austin

Amitabha Ghosh, Nokia Siemens Networks, USA

- NextGen n/ws: Carrier aggregation (CA) and small cells are two key features
- This paper considers CA-enabled HetNets
- Poisson point processes (PPP) model HetNets well
  - Enables tractable analysis
- Different type of BSs are modeled as an independent PPP

- Light loading of small cells is a concern
  - Biasing (load balancing)- artificial increase of transmit powers alleviates this problem
- However, in fully-loaded single-band HetNets, doesn't help in maximizing sum rate
- Thus, load-aware models are important
- This paper
  - Load-aware multi-band HetNet model is proposed
  - Rate analysis (correlation across different band is handled)