



# Illinois Center for Wireless Systems

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## ICWS Seminar Series

### TCP-Aware Channel Allocation in CDMA Networks

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B02 CSL

**Abstract:** Modern cellular networks incorporate RF technology that allows them to dynamically vary the wireless channel rate in response to user demand and channel conditions. However, the set of data rates as well as the scheduler's rate adaptation policy are typically chosen to optimize throughput for inelastic applications. In order to optimize such a system for TCP, we propose a joint optimization of MAC and physical layer parameters with respect to TCP sending rate. In particular, we propose a TCP-aware channel scheduler that switches the wireless channel rate as a function of the TCP sending rate and explore its performance for both single and multiple concurrent sessions. In the case of a single TCP session, we develop a fluid model of its steady state behavior in such a system with two channel rates and derive analytical expressions for throughput that account for rate variability as well as the dependency between the scheduler and TCP. The accuracy of the model, its utility in selection of optimal rates as well as performance of systems with up to three channel rates are explored through simulation. Our results indicate that the scheme improves TCP throughput by 15% to 20% compared to systems that do not exploit rate adaptation and that most benefits are obtained with just two channel rates. Finally we extend this framework to scenarios involving multiple TCP sessions. We propose simple rate allocation schemes for sharing variable rate channels amongst TCP sessions and study their performance.