

Presents the Spring 2012 EECS Seminar Series

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“Resource Management for Wireless Networks and the Smart Power Grid”

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ABSTRACT

Optimal resource management is a crucial task in a plethora of scientific fields, including wireless communication and electric power networks, where it ensures efficient operation and user satisfaction. Delivering data, voice, and video seamlessly over wireless networks with the quality-of-service demanded by today's multimedia applications requires optimal link-adaptive allocation of the available resources—e.g., power—to the different network entities. By the same token, the pressing need to modernize the aging power grid has culminated to a vision encouraging interaction of the end-users with the grid through demand response, which amounts to electricity end-users adapting their power consumption in response to pricing schemes varying over time (e.g., every hour or day).

This talk presents algorithms for (a) optimal wireless network design and (b) scheduling of demand response in the smart power grid. In particular, optimal wireless network design amounts to joint optimization of application-level rates, routes, link capacities, power consumption, and power allocation across frequency tones, neighboring terminals, and fading states. This work leverages modern optimization tools to develop algorithms with guaranteed performance and adaptability to dynamic network conditions. As regards the smart power grid, the focus is on a setup where multiple end-users are supplied with electricity from the same provider. The end-users have loads whose power consumption can be adjusted, and power consumption outside user-specified limits entails user dissatisfaction. The aim is to jointly minimize the cost of the electricity provider and the end-user dissatisfaction in a distributed fashion.

BIOGRAPHY

Nikolaos Gatsis received the Diploma (5-year) degree in Electrical and Computer Engineering from the University of Patras, Patras, Greece in 2005. Since September 2005, he has been working toward the Ph.D. degree with the Department of Electrical and Computer Engineering, University of Minnesota, Minneapolis, MN. His research interests are in optimization methods for wireless communication networks and the smart power grid, with focus on resource management. Specific research topics include cross-layer network designs, power control for dynamic spectrum access networks, distributed load control in smart grids, and residential energy consumption scheduling.