

Research Colloquium
Department of Computer Science

Yi Qian
Department of Electrical and Computer Engineering
University of Puerto Rico at Mayaguez

will speak on:

Modeling Dynamic Behavior of Mobile Ad Hoc Networks

11:00 a.m. on Friday, February 24 in Houser 108

There has been a great deal of work on ad-hoc network communications and protocol issues, and research is ongoing to expand the scope and quality of service of these networks. The performance of ad-hoc networks is normally studied via simulation over a fixed time horizon using a steady-state type of statistical analysis procedure. However, due to the dynamic nature of the network topology such an approach may be inappropriate in many cases as the network may spend most of the time in a transient or nonstationary state.

The objective of this research proposal is to develop a performance modeling framework and detailed techniques for analyzing the time varying performance of mobile ad-hoc networks. Our approach is a hybrid of discrete event simulation and numerical analysis techniques. Network queues are modeled using fluid-flow based differential equation models which are solved using numerical methods, while node mobility is modeled using either discrete event simulation techniques or stochastic modeling of adjacency matrix elements. Extensions to the basic model include incorporating energy consumption, interference and propagation effects into the hybrid modeling framework to improve its fidelity.

The intellectual merit of this proposal lies in the unique goal of developing performance modeling techniques for studying the dynamic behavior of mobile ad-hoc networks. These techniques are expected to lead to insights into basic ad-hoc network behavior, for example, how mobility affects the stability of the network topology from a performance standpoint and what types of mobility patterns are particularly advantageous or detrimental to network performance. Additionally the models can serve as the basis for the application of control theory techniques to develop dynamic network control algorithms.
