THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering

Seminar

Anycasting for Delay Minimization and Lifetime Maximization in Low-Duty-Cycled Wireless Sensor Networks
by
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Date : **2 March, 2009 (Mon.)**
Time : **4:30 – 5:30pm**
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The Chinese University of Hong Kong

Abstract
This is joint work with Joohwan Kim, Ness Shroff, and Prasun Sinha.

Efficient energy management has been a key issue in wireless sensor networks. Sleep-wake scheduling mechanisms (i.e., with low duty-cycle) can result in substantial energy savings by sending nodes to periodic sleep when there are no pending communication activities. However, sending the radio to sleep could also result in excessive delay, because a packet needs to wait until the next-hop node to wake up before it can be forwarded. This can be a severe problem in asynchronous wireless sensor networks where nodes do not synchronize their clocks. Recently, "anycast" mechanisms have been proposed to reduce this delay by exploiting the broadcast nature of the wireless medium. In anycasting, the sending node transmits to the first node that wakes up in its forwarding set, which may result into significant reduction on the one-hop packet forwarding delay. However, the critical challenges with anycasting are in selecting the forwarding set for all nodes in a distributed fashion, to avoid packet loops and to minimize the end-to-end delay.

In this talk, we formulate the anycast problem as a dynamic programming problem that minimizes the expected delay from each node to the sink. We find the optimal anycast policy that simultaneously minimizes the end-to-end delay from all nodes. Further, we formulate an optimization problem that maximizes the network lifetime subject to a constraint on the expected end-to-end delay. This problem requires a joint control of the sleep-wake schedule and the anycast policy. Based on the optimal anycast policy for delay minimization, we solve this joint control problem with distributed solution that is easy to implement.

Biography
Xiaojun Lin received his B.S. degree in Electronics and Information Systems from Zhongshan University, Guangzhou, China, in 1994, and his M.S. and Ph.D. degrees in Electrical and Computer Engineering from Purdue Univeristy in 2000 and 2005, respectively. Since August 2005, he has been an Assistant Professor at the School of Electrical and Computer Engineering, Purdue University. His research interests are in the simplification of network dynamics in large communication networks, resource allocation, network pricing, Quality-of-Service routing, wireless cross-layer control, mobile ad hoc and sensor networks. He received the Best Paper of the Year award from Journal of Communications and Networks in 2005, the Best Paper Award in IEEE INFOCOM 2008, and the NSF CAREER award in 2007. He has served as the Workshop Co-Chair for IEEE Globecom 2007, the Panel Co-Chair for WICON 2008, and the Technical Program Committee Co-Chair for ACM MobiHoc 2009.

** ALL ARE WELCOME **

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