THE CHINESE UNIVERSITY OF HONG KONG
Department of Computer Science and Engineering and
Department of Information Engineering

Joint Seminar on

Connectivity Properties of
Cooperative Wireless Ad Hoc Networks
by
Professor Don Towsley
Distinguished Professor
Department of Computer Science
University of Massachusetts
U.S.A.

Date   :   13 Oct., 2009 (Tue.)
Time   :   2:30-3:30pm
Venue   :   Room 833, Ho Sin Hang Engineering Building
                 The Chinese University of Hong Kong

Abstract

Extensive research has demonstrated the potential improvement in physical layer performance when multiple radios transmit concurrently in the same radio channel. We consider here how such cooperation affects the required node density for full connectivity and percolation for different values of the path loss exponent, α in large wireless ad hoc networks. For one-dimensional (1-D) extended networks, in contrast to non-cooperative networks, full connectivity occurs for any node density when $\alpha \leq 1$. Conversely, there exist unconnected nodes with probability one when $\alpha > 1$, and the network does not percolate for any node density if $\alpha > 2$. The existence of percolation remains an open problem for $1 < \alpha \leq 2$ in the one-dimensional (1-D) case. In two-dimensional (2-D) extended networks with non-coherent cooperation, full connectivity is achieved for any node density with $\alpha \leq 2$. Conversely, there exist disconnected nodes with probability one when $\alpha > 2$; however the cooperative network percolates for node densities above a threshold which is strictly less than that of the non-cooperative network.

The above results hold in the presence of receiver cooperation. We also present results for the case that senders cooperate but receivers do not.

Joint work with D. Goeckel, B. Liu, L. Wang, C. Westphal

Biography

Don Towsley holds a B.A. in Physics (1971) and a Ph.D. in Computer Science (1975) from University of Texas. He is currently a Distinguished Professor at the University of Massachusetts in the Department of Computer Science. He has held visiting positions at numerous places including IBM T.J. Watson Research Center and Microsoft Research Lab, Cambridge, UK. His research interests include networks and performance evaluation.

He currently serves on the editorial boards of *Journal of the ACM* and *IEEE Journal on Selected Areas in Communications* and has previously served on numerous other editorial boards. He has served as Program Co-chair of several conferences including INFOCOM 2009.

He has received numerous awards including the 2007 IEEE Koji Kobayashi Award and 2008 ACM SIGCOMM Lifetime Achievement Award along with numerous paper awards including a 2008 SIGCOMM Test-of-Time Paper Award and the 1998 IEEE Communications Society William Bennett Best Paper Award. Last, he has been elected Fellow of both the ACM and IEEE.

** ALL ARE WELCOME **

Host: Professor Dah-Ming Chiu (Tel: 2609-8357, Email: dmchiu@ie.cuhk.edu.hk)
Enquiries: Information Engineering Dept., CUHK (Tel.: 2609-8385)