

Exploiting Link Rate Diversity for High-Performance Wireless Meshes

by Archan Misra, IBM T J Watson Research Center

Date: March 11, 2008 (Tuesday)
Time: 6:30 pm (refreshment starts at 6:15 pm)
Place: 202 ECEC, NJIT

About the Speaker

Archan Misra is a Researcher at the IBM TJ Watson Research Center, Hawthorne, NY. At IBM, for the past 7 years, he has been working on and leading projects in the broad areas of high-performance wireless mesh networks, presence architectures for converged applications, information processing for sensor-based networks and remote health monitoring. He has published extensively in the areas of wireless networking, pervasive services and mobility management and is a co-author on papers that received the Best Paper awards in ACM WOWMOM 2002 and IEEE MILCOM 2001. Archan holds a Ph.D. in Electrical and Computer Engineering from the University of Maryland at College Park, and a B.Tech in Electronics and Communication Engineering from IIT Kharagpur, India. He is currently an editor of the IEEE Wireless Communications Magazine and the Journal of Pervasive and Mobile Computing, and is the outgoing chair of the IEEE Computer Society's Technical Committee on Computer Communications (TCCC).

About the Talk

Multi-hop wireless meshes may provide a low-cost access architecture for many urban communities; however, the low traffic capacity and high latency of multi-hop wireless networks continues to be a critical challenge. In this talk, I'll discuss advances for supporting broadcast/multicast-based applications in such meshes, specifically focusing on the consequences of allowing individual mesh nodes to dynamically adjust their link transmission rate for link-layer broadcasts. We shall demonstrate how the tradeoff between the transmission rate and the coverage area motivates the use of Rate-Area Product (RAP) as a metric for choosing evaluating the effectiveness of various broadcast rates. We'll show that exploitation of such multi-rate capability can a) lower the broadcast latency by as much as 60-80%, and b) increase the admissible multicast traffic load by ~50%. Moreover, we shall point out interesting interactions between rate diversity and channel diversity in wireless environments. Also, the use of rate diversity must be balanced with reliability, as the end-to-end delivery rates may otherwise prove to be unacceptably low. We shall describe early work suggesting how wireless meshes may be architected to achieve the right balance between raw capacity and reliable delivery.

Sponsors: IEEE Communications Society North Jersey Chapter
NJIT Department of Electrical and Computer Engineering