



Fall 2011 Colloquium

Temple University Computer and Information Sciences

DISTINGUISHED LECTURE

Coexistence of Heterogeneous Networks

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Friday, 10/7, 11am, TECH Center 111

Abstract: Heterogeneous networks (HetNets) are typified by cellular deployments with various types of cells of different sizes and overlapping coverage areas, as well as by the ISM spectrum sharing, e.g., coexistence of WiFi and ZigBee. The HetNet concept has been drawing considerable attention as a cost-effective means of enhancing network throughput via spatial reuse of spectrum resource. HetNets are also expected to not only improve the quality of links in hotspot and indoor areas, but also offload macrocells, benefiting both operators and subscribers. The first part of this talk will overview challenges and approaches associated with the realization of the HetNet's potential.

The second part of this talk will focus on the coexistence of HetNets in the ISM band. The disparate power levels, asynchronous time slots, and incompatible PHY layers of heterogeneous networks severely degrade the effectiveness of traditional MAC. Specifically, I will present details of a new mechanism (we developed), called the Cooperative Busy Tone (CBT), that enables the reliable coexistence between two such networks, ZigBee and WiFi. CBT allows a separate ZigBee node to schedule a busy tone concurrently with the desired transmission, thereby improving the visibility of ZigBee devices to WiFi. The analytical, detailed simulation, and experimental results demonstrate CBT's significant throughput improvement over the legacy ZigBee protocol, with negligible performance loss to WiFi.

This is joint work with Xinyu Zhang.

Bio: **Kang G. Shin** is the Kevin & Nancy O'Connor Professor of Computer Science in the Department of Electrical Engineering and Computer Science, The University of Michigan, Ann Arbor. His current research focuses on computing systems and networks as well as on embedded real-time and cyber-physical systems, all with emphasis on timeliness, security, and dependability.

He has supervised the completion of 68 PhDs, and authored/coauthored about 750 technical articles, one a textbook and more than 20 patents or invention disclosures, and received numerous best paper awards, including the Best Paper Awards from the 2010 and 2000 USENIX Annual Technical Conferences, the IEEE Communications Society William R. Bennett Prize Paper Award in 2003, an Outstanding IEEE Transactions of Automatic Control Paper Award in 1987. He has also received several institutional awards, including the Research Excellence Award in 1989, Outstanding Achievement Award in 1999, Distinguished Faculty Achievement Award in 2001, and Stephen Attwood Award in 2004 from The University of Michigan (the highest honor bestowed to Michigan Engineering faculty); a Distinguished Alumni Award of the College of Engineering, Seoul National University in 2002; 2003 IEEE RTC Technical Achievement Award; and 2006 Ho-Am Prize in Engineering (the highest honor bestowed to Korean-origin engineers).

He has chaired several major conferences, including 2009 ACM MobiCom, 2008 IEEE SECON, 2005 ACM/USENIX MobiSys, 2000 IEEE RTAS, and 1987 IEEE RTSS. He is the fellow of both IEEE and ACM, and served on editorial boards, including IEEE TPDS and ACM Transactions on Embedded Systems. He has also co-founded a couple of startups.