

Guest Editorial

Guohong Cao · Dapeng Wu · Hongyi Wu ·
Junshan Zhang

Published online: 24 May 2006
© Springer Science + Business Media, LLC 2006

With various network characteristics, a number of wireless systems have been developed over past years, targeting at different applications. For example, the cellular systems have evolved from 2G to 3G which supports not only voice but also data traffic at a speed of up to 2 Mbps, while the 4G system is under development for achieving the data rate of ten times higher. On the other hand, a series of complementary IEEE standards, including IEEE 802.20, IEEE 802.16, IEEE 802.11 and IEEE 802.15, have been developed or are currently under development for effecting data communication in wireless wide area networks (WANs), metropolitan area networks (MANs), local area networks (LANs), and personal area networks (PANs), respectively. While most of these wireless technologies are deployed independently for now, the service providers surely intend to own and operate overlaid heterogeneous wireless systems, which integrate multiple wireless technologies with partially overlapped coverage areas and provide ubiquitous network service to mobile users. Recent advances in reconfigurable computing have greatly advanced the design of soft radios, which enable the communication with many different radios with only a re-configuration in software parameters. The maturation of soft radio technology is becoming one of the most important milestones for seamless integration of the heterogeneous wireless network.

Among the six papers accepted in this special issue, the first paper entitled “Spectrum Co-existence of IEEE 802.11b and 802.16a Networks Using Reactive and Proactive Etiquette Policies” gives a comprehensive introduction to cognitive radio and presents an investigation of spectrum co-existence between IEEE 802.11b and 802.16a networks in

the same shared frequency band using cognitive radio techniques with different levels of complexity.

Opportunistic channel access is a key design issue in heterogeneous wireless networks for improving spectrum utilization. In the paper entitled “Utilization and Fairness in Spectrum Assignment for Opportunistic Spectrum Access Systems”, C. Peng et al. propose centralized and distributed spectrum allocation schemes in wireless networks, in order to allow secondary users to opportunistically make use of available spectrum without interfering with the primary users. In the paper “Sensing-based Opportunistic Channel Access”, X. Liu and S. Shankar study the channel selection issue of secondary users in spectrum-agile communication systems, with main focus on the sensing-based approach for channel selection.

The last three papers address the channel assignment, traffic control, and handoff issues in heterogeneous wireless networks. In the paper entitled “On-demand Diversity Wireless Relay Networks”, J. Shin et al. study the formation of relay networks for dynamic multi-radio, multi-hop wireless cellular systems, and propose five network formation algorithms that support intelligent frequency assignments. The paper entitled “Downlink Traffic Control for Multiple Classes of Services in MC-CDMA Cellular Systems” addresses the problem of downlink traffic control in Multi-code Code Division Multiple Access (MC-CDMA) systems, which support multiple classes of services with diverse QoS requirements. In the paper, “Application Signal Threshold Adaptation for Vertical Handoff in Heterogeneous Wireless Networks”, B. Liang et al. study the performance of vertical handoff using the integration of 3G cellular and wireless local area networks as an example. In particular, the authors investigate the effect of an application-based signal strength threshold on an adaptive preferred-network lifetime-based handoff strategy, in terms

of the signaling load, available bandwidth, and packet delay for an inter-network roaming mobile.

Finally, we would like to thank all our reviewers for their constructive reviews. We would also like to thank Dr. Imrich Chlamtac, the Editor-in-Chief of MONET, for his support for this special issue.



Guohong Cao received his B.S. degree from Xian Jiaotong University, Xian, China. He received the MS degree and Ph.D. degree in computer science from the Ohio State University in 1997 and 1999 respectively. Since then, he has been with the Department of Computer Science and Engineering at the Pennsylvania State University, where he is currently an Associate Professor. His research interests are wireless networks and mobile computing. He

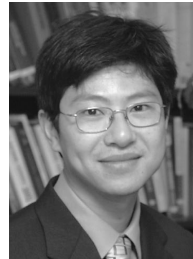
has published over one hundred papers in the areas of sensor networks, wireless network security, data dissemination, resource management, and distributed fault-tolerant computing. He is an editor of the IEEE Transactions on Mobile Computing and IEEE Transactions on Wireless Communications, a guest editor in ACM Mobile Networking and Applications, and has served on the program committee of many conferences. He was a recipient of the NSF CAREER award in 2001.



Dapeng Oliver Wu received B.E. in Electrical Engineering from Huazhong University of Science and Technology, Wuhan, China, in 1990, M.E. in Electrical Engineering from Beijing University of Posts and Telecommunications, Beijing, China, in 1997, and Ph.D. in Electrical and Computer Engineering from Carnegie Mellon University, Pittsburgh, PA, in 2003. Since August 2003, he has been with

Electrical and Computer Engineering Department at University of Florida, Gainesville, FL, as an Assistant Professor. His research interests are in the areas of networking, communications, multimedia, signal processing, and information and network security. He received the IEEE Circuits and Systems for Video Technology (CSVT) Transactions Best Paper Award for Year 2001. Currently, he is an Associate Editor for IEEE Transactions on Wireless Communications, IEEE Transactions on Circuits and Systems for Video Technology, IEEE Transactions on Vehicular Technology, and International Journal of Ad Hoc and Ubiquitous Computing. He is also a guest-editor for IEEE Journal on Selected Areas in Communications (JSAC), Special Issue on Cross-layer Optimized Wireless Multimedia Communications. He served as Program Chair for IEEE/ACM First International Workshop on Broadband Wireless Services and Applications (BroadWISE

2004); and as a technical program committee member of over 30 conferences. He is Vice Chair of Mobile and wireless multimedia Interest Group (MobiG), Technical Committee on Multimedia Communications, IEEE Communications Society. He is a member of the Best Paper Award Committee, Technical Committee on Multimedia Communications, IEEE Communications Society.



Hongyi Wu received his Ph.D. degree in Computer Science and M.S. degree in Electrical Engineering from State University of New York (SUNY) at Buffalo in 2002 and 2000, respectively. He received his B.S. degree in Scientific Instruments from Zhejiang University in 1996. He is currently an Assistant Professor at the Center for Advanced Computer Studies (CACS), University of Louisiana (UL) at Lafayette. His research interests include wire-

less mobile ad hoc networks, wireless sensor networks, next generation cellular systems, and integrated heterogeneous wireless systems. He has served as chair and technical committee member of several IEEE conferences. He has published about fifty technical papers in leading journals and conference proceedings. He received NSF CAREER Award in 2004.



Junshan Zhang was born in September 1972. He received his Ph.D. degree from the School of Electrical and Computer Engineering at Purdue University in 2000. He joined the Department of Electrical Engineering at Arizona State University in August 2000, where he is currently an Associate Professor. His research interests fall in the general area of wireless networks, spanning from the networking layer to the physical layer. His current research fo-

cus on fundamental problems in wireless ad-hoc networks and sensor networks, including cross-layer optimization and design, network management, network information theory, stochastic analysis.

He is a recipient of the ONR Young Investigator Award in 2005 and the NSF CAREER award in 2003. He has also received the Outstanding Research Award from the IEEE Phoenix Section in 2003. He was chair of the IEEE Communications and Signal Processing Phoenix Chapter from Jan. 2001 to Dec. 2003. He has served as a TPC co-chair for IPCCC 2006 and TPC vice chair for ICCCN 2006, and will be the general chair for IEEE Communication Theory Workshop 2007. He has been on the technical program committees for many conferences, including INFOCOM, SECON, GLOBECOM, ICC, MOBIHOC, BROADNETS, and SPIE ITCOM. He has been an Associate Editor for IEEE Transactions on Wireless Communications since 2004.