WIRELESS BROADBAND ACCESS: WiMAX AND BEYOND

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Recent developments in wireless communication technology have resulted in tremendous innovations to make wireless access networks able to replace wired access networks with much more bandwidth. The IEEE 802.16d standard, which was ratified in June 2004, specified all the techniques needed at the physical layer and the services that should be provided at the medium access control (MAC) layer in WiMAX systems. As a wireless access network, WiMAX has shown great potential to provide broadband transmission services to residential houses. These services include normal Internet access, data transmission, as well as voice and video transmission due to its broad bandwidth. With the support of mesh networking, WiMAX systems can easily be configured as wireless metropolitan area networks (WMANs). IEEE 802.16e, which was officially approved in December 2005, has further enhanced the ability of WMANs with mobility support. The amended standard specifies mobile WMANs for combined fixed and mobile broadband access supporting subscriber stations moving at vehicular speeds operating in licensed bands below 6 GHz. The IEEE 802.16e standard provides service providers the ability to offer a wide range of new and revolutionary high-speed mobile wireless applications and services that will greatly improve people's way of life.

We have received a very large number of submissions and after a thorough review process, we have selected three articles that we believe address some of the challenges and open opportunities in this promising technology.

The first article, by F. Panken *et al.*, presents an extension of third-generation (3G)/WiMAX networks and services through residential access capacity. The second article, by B. Li *et al.*, provides an overview of state-of-the-art mobile WiMAX technology and its development. Finally, R. Agrawal *et al.* describe the economic aspect of the design of fourth-generation (4G) wireless network architectures that are aimed at improving costs in various aspects of the network.

We sincerely hope that you enjoy reading this feature topic. Its quality depends on the quality of articles and the stringent refereeing carried out by a large number of vol-unteers. As guest editors, we wish to thank all the reviewers as well as the authors who have agreed to publish their work in this feature topic. We would also like to thank Editor-in-Chief Tom Chen for his support, encouragement, and guidance through this entire project. Special thanks also to Sue Lange, ComSoc Publications, for her patience during this process.

BIOGRAPHIES

MOHSEN GUIZANI [SM] (mguizani@ieee.org) is currently a professor and chair of the Computer Science Department at Western Michigan University. He received his B.S. (with distinction) and M.S. degrees in electrical engineering, and M.S. and Ph.D. degrees in computer engineering in 1984, 1986, 1987, and 1990, respectively, from Syracuse University, New York. His research interests include computer networks, wireless communications and mobile computing, and optical networking. He currently serves on the editorial boards of six technical journals, and is the founding Editor-in-Chief of *Wireless Communications and Mobile Computing* published by Wiley (http://www.interscience.wiley.com/jpages/1530-8669/). He is also the Founder and General Chair of the IEEE International Conference of Wireless Networks, Communications, and Mobile Computing. He is the author of six books and more than 180 publications in refereed journals and conferences. He has guest edited a number of special issues in IEEE as well as international journals and magazines. He has also served as member, Chair, and General Chair of a number of conferences. He received both the Best Teaching Award and the Excellence in Research Award from the University of Missouri-Columbia in 1999 (a college wide competition). He won the Best Research Award from UPM in 1995 (a university wide competition). He was selected as the Best Teaching Assistant for two consecutive years at Syracuse University, 1988 and 1989. He is the Chair of TAOS and Vice-Chair of TCPC IEEE Technical Committees. He is an active member of IEEE ComSoc, IEEE Computer Society, ASEE, and ACM.

MOUNIR HAMDI (hamdi@cs.ust.hk) received a B.S. degree in electrical engineering from the University of Louisiana in 1985, and M.S. and Ph.D. degrees in electrical engineering from the University of Pittsburgh in 1987 and 1991, respectively. He has been a faculty member in the Department of Computer Science at Hong Kong University of Science and Technology (HKUST) since 1991, where he is now a full professor of computer science and engineering. From 1999 to 2000 he held visiting professor positions at Stanford University and the Swiss Federal Institute of Technology. His general area of research is in high-speed wired/wireless networking in which he has published more than 220 research publications, received numerous research grants, and graduated more 20 Ph.D./Master students. He is/was on the Editorial Boards of *IEEE Transactions on Communications*, *IEEE Communications Magazine*, *Computer Networks*, *Wireless Communications and Mobile Computing*, and *Parallel Computing*. He has chaired more than seven international conferences. He is/was Chair of the IEEE Communications Society Technical Committee on Transmissions, Access and Optical Systems, and Vice-Chair of the Optical Networking Technical Committee, as well as a member of the ComSoc Technical Activities Council. In addition to

his commitment to research and professional service, he is also a dedicated teacher. He received the Best 10 Lecturers Award and Distinguished Engineering Teaching Appreciation Award from HKUST, and various grants targeted toward the improvement of teaching methodologies, delivery, and technology.

PASCAL LORENZ [SM] (lorenz@ieee.org) received a Ph.D. degree from the University of Nancy, France. Between 1990 and 1995 he was a research engineer at WorldFIP Europe and at Alcatel-Alsthom. He is a professor at the University of Haute-Alsace and responsible for the Network and Telecommunication Research Group. His research interests include QoS, wireless networks, and high-speed networks. He was Program and Organizing Chair of IEEE ICATM '98, ICATM '99, ECUMN 2000, ICN '01, ECUMN '02, ICT '03, ICN '04, and PWC '05, Symposium Co-Chair of ICC '06, GLOBECOM '07, ICC '08, and GLOBECOM '08 and Co-Program Chair of ICC '04. Between 2000 and 2006 he was a Technical Editor of *IEEE Communications Magazine*. He is Vice-Chair of the IEEE ComSoc Communications Software Technical Committee and Chair of the IEEE ComSoc Communications Systems Integration and Modelling Technical Committee. He is a member of many international program committees and has served as a guest editor for a number of journals, including *Telecommunications Systems*, *IEEE Communications Magazine*, and *LNCS*. He has organized and chaired several technical sessions and given tutorials at major international conferences. He is the author of three books, two patents, and 190 publications in international journals and conferences.

MAODE MA (Maode_Ma@pmail.ntu.edu.sg) received his B.E. degree from Tsinghua University in 1982 and his M.E. degree from Tianjin University in 1991. He received his Ph.D. degree from HKUST in 1999. Since 2000 he has beeen a faculty member with the School of Electrical and Electronic Engineering at Nanyang Technological University, Singapore. His major research interest is in MAC protocol design and analysis in wireless networks and optical networks. He has about 100 international academic publications including IEEE academic journals, IEEE conference papers, and book chapters. He has been invited to be a member of the Technical Program Committee or session chair for more than 40 international conferences. Since 2003 he has been an Associate Editor for *IEEE Communications Letters*, *IEEE Communications Surveys & Tutorials*, and five other international academic journals.

IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS (JSAC)
CALL FOR PAPERS
UNDERWATER WIRELESS COMMUNICATIONS AND NETWORKS

Wireless information transmission through the ocean is one of the enabling technologies for the development of future ocean-observation systems, whose applications include gathering of scientific data, pollution control, climate recording, detection of objects on the ocean floor, and transmission of images from remote sites. Implicitly, wireless signal transmission is crucial for control of autonomous vehicles which will serve as mobile nodes in the future information networks of distributed underwater sensors.

Wireless communications underwater are usually established using acoustic waves, while electro-magnetic waves can be used over short distances. Acoustic communications are governed by three factors: limited bandwidth, time-varying multipath propagation, and low speed of sound underwater. Together, these factors result in a communication channel of poor quality and high latency, thus ironically combining the worst properties of terrestrial mobile radio and satellite channels. In addition, because acoustic propagation is best supported at low frequencies, high-rate underwater systems are inherently ultra-wideband. These facts necessitate dedicated design of communication algorithms and network protocols at all layers of the system architecture. The proposed JSAC special issue seeks original research papers that explicitly address the unique technical challenges encountered in underwater scenarios, including (but not limited to) the following areas:

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- Multiple access techniques

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