

BASIC THEORIES AND KEY TECHNOLOGIES IN NEXT GENERATION NETWORKS



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The next generation network is a high-speed broadband network based on the packets, which offers unrestricted access by users to different service providers. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users. The wireless communication network is an important part of the next generation network. With the rapid development of wireless networks and smart-phone techniques, more and more image, video and other high data rate services are expected to be deployed, which lead to great interests to devise new innovative wireless technologies. There have been some breakthroughs in multiple access, advanced waveform technologies combined with advances in coding and modulation, algorithms and architecture.

This Special Topic Issue contains a collection of papers that provide both theoretical advances and practical experiences on wireless communication including modulation method and Constellation Mapping, new multiple access technology, and resource allocation for multiuser-multiservice femtocell networks. We collected outstanding papers to this Special Topic Issue and to explore research and developments related wireless communication to further its state of art. We received 19 manuscripts in response to our call for papers, and we have accepted 3 papers for this Special Issue.

The first article, “A Survey: Several Technologies of Non-Orthogonal Transmission for 5G”, by TAO Yunzheng, et al., proposes a novel concept of non-orthogonal transmission for 5G mobile communications. In this pa-

per, some promising ones of them were discussed which include NOMA, SCMA, MUSA, PDMA and some main new waveforms including FBMC, UFMC, GFDM. By analyzing and comparing features of these technologies, a research direction of guiding on future 5G multiple access and waveform are given.

The second article, “A 3-D Polarization Quadrature Amplitude Modulation Method and Constellation Mapping”, is authored by SUN Xuehong, et al., and provides an innovative modulation mode. This paper studied the relationship between the SER theoretical value of PQAM and the distribution of M and N, proposes a new M, N allocation scheme. This paper also proposes a new and straightforward design method of constructing higher-level 3-D signal constellations.

The third article, by YUAN Deyu, et. al., is titled “QoE-Oriented Resource Allocation for Multiuser-Multiservice Femtocell Networks”, and studies the issue of novel QoE-oriented radio resource allocation (RRA) algorithms for multiuser-multiservice femtocell networks. In the proposed algorithms, a priority mechanism is employed to ensure fairness.

The editors thank all of the authors for their submissions to this Special Issue. We are also grateful to the anonymous reviewers for their timely responses and their valuable comments to improve the quality of the articles. We hope that this Special Issue will further stimulate research interests in the significant research area of wireless communication.

Biographies

ZHANG Ping, Ph. D Prof. of BUPT (Beijing University of posts and telecommunications), Director of State Key Laboratory of network and switching technology. Focus on wireless communication, new technologies for cognitive radio, cognitive wireless networks, TD-LTE, MIMO, OFDM and etc. He is Executive Associate Editor-in-chief on information sciences of Chinese Science Bulletin, a Member of next-generation broadband wireless communication network in National Science and Technology Major Project committee, a Member of the 5th Advisory Committee of NSFC(National Natural Science Foundation of China), the Chief Scientist of "973" National Basic Research Program of China, member of MOST(The Ministry of science and technology) 863 Program Expert team, member of MOST IMT-Advanced 5G Expert team, He applied over 150 patents with 131 authorized. 7 proposal accepted as International Standard. He received award of National Science and Technology Advance Prize, Award of National Science and Technology Invention Prize, the Provincial Science and Technology Awards many times, and was given the Title of Outstanding Scientific and Technological Workers in 2010.

FENG Zhiyong, received her B.S., M.S. and Ph.D. degrees from Beijing University of Posts and Telecommunications (BUPT), China. Now she is a professor at BUPT and she is the Director of Key Laboratory of Universal Wireless Communications, Ministry of Education, P. R. China. She is a senior member of IEEE and active in standards development such as ITU-R WP5A/WP5D, IEEE 1900,

ETSI and CCSA. Her main research interests include the wireless network architecture design and radio resource management in 5th generation mobile networks (5G), spectrum sensing and dynamic spectrum management in cognitive wireless networks, universal signal detection and identification, network information theory, etc.

HU Fei, Dr. Fei Hu is currently a professor in the Department of Electrical and Computer Engineering at the University of Alabama (main campus), Tuscaloosa, Alabama, USA. He obtained his Ph.D. degrees at Tongji University (Shanghai, China) in the field of Signal Processing (in 1999), and at Clarkson University (New York, USA) in the field of Electrical and Computer Engineering (in 2002). He has published over 200 journal/conference papers, books, and book chapters. Dr. Hu's research has been supported by U.S. National Science Foundation (NSF), U.S. Department of Defense (DoD), Cisco, Sprint, and other sources. He has chaired a few international conferences. His research interests are 3S - *Security, Signals, Sensors*: (1) Security: This is about how to overcome different cyber attacks in a complex wireless or wired network. Recently he focuses on cyber-physical system security and medical security issues. (2) Signals: This mainly refers to *intelligent signal processing*, that is, using machine learning algorithms to process sensing signals in a smart way in order to extract patterns (i.e., achieve pattern recognition). (3) Sensors: This includes micro-sensor design and wireless sensor networking issues.