

Guest Editorial——Special Issue on Research Frontier in Computing, Networking and Communications

JianMing Wu and Ai-Chun Pang

Over the last decades, the data communication industry hits a great success. With the popularity of handheld mobile devices, it is commonly believed that the amount of devices requiring network connections will soar to unprecedented volume. Users will be even more throughput-hungry and would like to enjoy multimedia services with better experience in the near future. This special issue brings together modern technologies and state-of-the-art research contributions that address the various aspects of next-generation communication networks. In the first set of four articles, the authors address challenging issues for wireless communication networks and software defined networks, and develop novel solutions accordingly.

The first article, “A new approach to coding in content-based MANETs” by Joy *et al.*, focuses on random linear network coding (NC) in content-based mobile Ad-hoc networks (CB-MANETs), which efficiently and reliably disseminates large files under intermittent connectivity. This paper introduces both intermediate nodes and NC packets; the former is able to cache a file and exploit their processing power, storage space, and the latter is to be encoded not only at the originator but also at the intermediate caches.

The second article, “Efficient and reliable communication in wireless relay networks using joint network channel fountain” by Nessa *et al.*, introduces joint network-channel coding (JNCC) and employs rateless coding and network coding, to achieve reliable data transmission over error-prone transmission channel. This paper proposes a joint network and fountain coding (JNFC), depending on the coding techniques at relay nodes and analyzes their performance in different network scenarios.

The third article, “A northbound API for QoS management in online games using software-defined networks” by Humernbrum *et al.*, briefly discusses research challenges in real-time online interactive applications (ROIA), realizing high quality of service (QoS) demands on the underlying network. This work relaxes the limited possibilities of influencing the network behavior by means of software-defined networking (SDN) technology decoupled by the control and forwarding logic from the network infrastructure.

The fourth article, “Rapid dissemination of public safety message flows in vehicular networks” by Rubin *et al.*, considers vehicular Ad hoc network (VANET)

system to provide for vehicle-to-vehicle multi-hop transport of critical public safety message. This paper proposes a VANET networking scheme and studies the optimal cross-layer design of such a network system, showing that a high level of coverage of highway vehicles, coupled with very low incurred queuing delays, can be achieved by employing a flow admission control mechanism at the source. The second group of two articles investigates channel coding schemes for future communication systems.

We would like to express our grateful thanks to all the authors who made submissions to this special issue. We hope the papers in this special issue will provide an insightful overview of the existing literature and inspire new research ideas in next-generation communications networks.



Jianming Wu received the Ph.D. degree in telecommunications from INRS, Quebec University, Canada, in 2001. From 2000 to 2007, he was a senior researcher with Wireless Technology Labs (WTL), Nortel Networks, Ottawa, Canada, working on many projects related to MIMO and array beamforming in CDMA and OFDMA, and involving in the most major standards such as 3GPP2 (1xEV-DV, 1xEV-DO), 3GPP (HSDPA, HSUPA, LTE, LTE-A), and IEEE802.16e/m. From 2007 to 2009, he was a technique manager with Network System Labs (NSL), Fujitsu, Japan, activating on the projects of standard researches in LTE-Advanced. Since 2009, he has been with Fujitsu R&D Center (FRDC) in China, as a director, leading Communication Technology Lab. His research interests are in aspects of antenna array beamforming, MIMO, relay networking, and sensor network for wireless communication systems.



Ai-Chun Pang received the B.S., M.S. and Ph.D. degrees in Computer Science and Information Engineering from National Chiao Tung University, Taiwan, in 1996, 1998 and 2002, respectively. She joined the Department of Computer Science and Information Engineering (CSIE), National Taiwan University (NTU), Taipei, Taiwan, as an

Assistant Professor in 2002. She is now the Director of Graduate Institute of Networking and Multimedia (INM), and a Professor in CSIE and INM. She is also an Adjunct Research Fellow of Research Center for Information Technology Innovation, Academia Sinica, Taiwan. Her research interests include the design and analysis of wireless and multimedia networking, mobile

communications, and cloud datacenter networking. She is a Senior Member of IEEE.

Jianming Wu, *Guest Editor*

Fujitsu R&D Center, China

Ai-Chun Pang, *Guest Editor*

National Taiwan University, Taiwan