

Emerging Technologies of Future Multimedia Coding, Analysis and Transmission

► Huifang Sun



Huifang Sun (hsun@merl.com) received his PhD degree from the University of Ottawa, Canada. In 1990, he was an associate professor at Fairleigh Dickinson University. Also in 1990, he joined Sarnoff Corporation as a member of the technical staff and was later promoted to technology leader. In 1995, he joined Mitsubishi Electric Research Laboratories and was promoted to vice president, deputy director, and fellow (2003). He has co-authored two books and published more than 140 journal and conference papers. He holds more than 60 US patents. In 1994, Dr. Sun received a Technical Achievement Award for optimization and specification of the Grand Alliance HDTV video compression algorithm. In 1992, he won the Best Paper award from IEEE Transaction on Consumer Electronics. In 1996, he won the Best Paper award at ICCE, and in 2003, he won the Best Paper award from IEEE Transactions on CSVT. He has been associate editor of IEEE Transaction on Circuits and Systems for Video Technology and was the chair of the Visual Processing Technical Committee of IEEE's Circuits and System Society. He is an IEEE Fellow.

► Can Shen



Can Shen (shen.can1@zte.com.cn) received his PhD degree in physical electronics from Southeast University, China in 1997. From 1997 to 2000, he was a lecturer in Nanjing University of Posts and Telecommunications. From 2000, he joined ZTE as a senior engineer and was later promoted to the chief engineer. He has published more than 15 papers and holds more than 50 patents.

► Ping Wu



Ping Wu (ping.wu@zte.com.cn) received his PhD degree in signal processing from Reading University, United Kingdom in 1993. From 1993 to 1997, he was a Research Fellow in the area of medical data processing in Plymouth University, United Kingdom. From 1997 to 2008, he was a Consultant Engineer in News Digital Systems Ltd, Tandberg Television, and Ericsson. He participated in the development of ISO/IEC MPEG and ITU-T video coding standards. He also supervised the engineering team to build the High Definition H.264 encoder products for broadcasters. From 2008 to 2011, he joined Mitsubishi Electric Research Centre Europe and continued to participate in HEVC standard development with contributions in Call for Evidence and Call for Proposal. From 2011, he has been a senior specialist in video coding in ZTE. He has many technical proposals and contributions to the international standards on video coding over past 18 years.

Three years ago, *ZTE Communications* published a special issue called Emerging Technologies of Multimedia Coding, Analysis and Transmission. Over the past three years, great advances have been made in multimedia. The purpose of this special issue is to report on the progress and achievements in this field. We invited 11 papers, seven of which will be published in this issue and four in the next issues as research papers. All authors we invited are the top researchers in the area of multimedia from both academic and industry. Also, these papers have been reviewed by the experts who are working in the front of this area.

The paper "Overview of the Second Generation AVS Video Coding Standard (AVS2)" by Shanshe Wang *et al.* introduces a new generation video coding standard developed by the AVS working group. Compared with the first generation video coding standard AVS1, AVS2 significantly improves coding performance. Also, AVS2 shows competitive performance compared to high efficiency video coding (HEVC). Especially for scene video, AVS2 can achieve 39% bit rate saving over HEVC.

The paper "An Introduction to High Efficiency Video Coding Range Extensions" by Bin Li and Jizheng Xu introduces the coding tools in HEVC range extensions and provides experimental results to compare HEVC range extensions with previous video coding standards.

The paper "Multi-Layer Extension of the High Efficiency Video Coding (HEVC) Standard" by Ming Li *et al.* presents an overview of multi-layer extension of HEVC. With the Multi-layer Extension, HEVC can then have its extension on Scalable HEVC, MV HEVC, 3D HEVC, etc.

The paper "SHVC, the Scalable Extensions of HEVC, and Its Applications" by Yan Ye *et al.* discusses SHVC, the scalable extension of the High Efficiency Video Coding (HEVC) standard, and its applications in broadcasting and wireless broadband multimedia services. SHVC was published as part of the second version of the HEVC specification in 2014.

The paper "ITP Colour Space and Its Compression Performance for High Dynamic Range and Wide Colour Gamut Video Distribution" by Peng Yin *et al.* introduces High Dynamic Range (HDR) and Wider Colour Gamut (WCG) content format representation. With advances in display technologies, commercial interest in High Dynamic Range (HDR) and Wide Colour Gamut (WCG) content distribution are growing rapidly. In order to deliver HDR/WCG content, an HDR/WCG video distribution workflow has to be implemented, from content creation to final display.

The paper "DASH and MMT and Their Applications in ATSC 3.0" by Yiling Xu, *et al.* mainly describes features and design considerations of ATSC 3.0 and discusses the applications of the transport protocols used for broadcasting. Additionally, the function of DASH and MMT is to meet the requirement of on-demand viewing of multimedia content over Internet Protocol (IP) with browser-centric media endpoints for more individualized and flexible access to the content.

The paper "Introduction to the AVS2 Scene Video Coding Techniques" by Tiejun Huang *et al.* presents the special applications of AVS2 for surveillance video or

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video conference videos. By introducing several new coding techniques, AVS2 can provide more efficient compression of scene videos.

The other four papers that have been reviewed and accepted will be published in the next issues due to the page limit.

The paper “Review of AVS Audio Coding Standard” by Tao Zhang *et al.* presents AVS audio coding standard. The latest version of the AVS audio coding standard is ongoing and mainly aims at the increasing demands for low bitrate and high quality audio services. The paper reviews the history and recent development of AVS audio coding standard in terms of basic features, key techniques and performance. Finally, the future development of AVS audio coding standard is discussed.

The paper “Screen Content Coding in HEVC and Beyond” by Tao Lin *et al.* describes an extension of HEVC specially designed to code the videos or pictures captured from a computer screen typically by reading frame buffers or recording digital display output signals of a computer graphics device. Screen content has many unique characteristics not seen in traditional

content. By exploring these unique characteristics, new coding techniques can significantly improve coding performance for screen content.

The paper “Depth Enhancement Methods for Centralized Texture-Depth Packing Formats” by Jar-Ferr Yang *et al.* presents a scheme which can deliver 3D videos through the current 2D broadcasting system with frame-compatible packing formats properly including one texture frame and one depth map in various down-sampling ratios have been proposed to achieve the simplest, most effective solution.

The paper “Light Field Virtual View Rendering based on EPI-representations” by Lu Yu *et al.* presents a new idea for future video coding.

Finally, thank all authors who accepted our invitations and submitted high quality papers in short time with their very busy schedule. Also we take this opportunity to thank all reviewers who provided very valuable comments for further improving the papers. The editors of *ZTE Communications* also made great contributions in this special issue.

Call for Papers

ZTE Communications Special Issue on
Multiple Access Techniques for 5G

5G mobile cellular networks are required to provide the significant increase in network throughput, cell-edge data rate, massive connectivity, superior spectrum efficiency, high energy efficiency and low latency, compared with the currently deploying long-term evolution (LTE) and LTE-advanced networks. To meet these challenges of 5G networks, innovative technologies on radio air-interface and radio access network (RAN) are important in PHY design. Recently, non-orthogonal multiple access has attracted the interest of both academia and industry as a potential radio access technique.

The upcoming special issue of *ZTE Communications* will focus on the cutting-edge research and application on non-orthogonal multiple access and related signal processing methods for the 5G air-interface. The expected publication date is July 2016. Topics related to this issue include, but are not limited to:

- Non-orthogonal multiple access (NOMA)
- Filter bank multicarrier (FBMC)
- Generalized frequency division multiplexing (GFDM)
- Faster than Nyquist (FTN) transmissions
- Signal detection and estimation in NOMA
- Resource allocations for 5G multiple access
- Cross-layer optimizations of NOMA

- Design and implementation on the transceiver architecture.

Paper Submission:

Please directly send to j.yuan@unsw.edu.au and copy to all guest editors, with the subject “ZTE-MAC-Paper-Submission”.

Tentative Schedule:

Paper submission due: March 31, 2016;
Review complete: June 15, 2016;
Final manuscript due: July 31, 2016.

Guest Editors:

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