

## GUEST EDITORIAL PREFACE

# Special Issue on Future Mobile Computing Environments and Multimedia

*George Mastorakis, Department of Business Administration, Technological Educational Institute of Crete, Crete, Greece*

*Evangelos Pallis, Department of Informatics Engineering, Technological Educational Institute of Crete, Crete, Greece*

*Constandinos X. Mavromoustakis, Department of Computer Science, University of Nicosia, Nicosia, Cyprus*

The incredible evolution of multimedia-capable mobile devices (e.g. smart phones, netbooks and tablets), as well as modern advances in telecommunication networks and multimedia technologies, has led to a number of research efforts, dedicated to adopt advanced multimedia techniques, including content processing/analysis, scalability issues and cross-layer optimization methods for audio-visual services support. A large number of content providers support delivery of services, rich in multimedia content, through sophisticated wireless network platforms. Such services include real-time digital audio-visual content, as well as streaming and tele-conference applications hosting high definition video and audio of increased

quality. In addition, several wireless network platforms support the provision of user-centric applications, allowing mobile users to create, manipulate and deliver their own multimedia content, using handheld devices. However, provision of high quality multimedia services over mobile computing environments, introduces new challenges. The main challenge is to provide mobile users satisfactory QoE, sustainable throughout a multimedia session. This means that provision of sufficient bandwidth in the network is required, while upper thresholds of several performance evaluation networking metrics, such as latency and jitter have to be preserved. In addition, mobile networks suffer from rapidly changing networking conditions,

resulting to make challenging the provision of delay-sensitive multimedia content. On the other hand, mobile devices have significant limitations, regarding high energy consumption issues and limited processing capabilities. Motivated by further examining recent advances in this field and satisfying the potential for ubiquitous real-time multimedia services provision with maximum-possible QoE, through sophisticated mobile computing systems in the presence of user mobility, this Special Issue aims at fostering dissemination of high quality research in the field and present current and future trends and directions, in terms of energy-efficient, high quality multimedia services provision over mobile computing systems, as well as novel multimedia processing technologies with emphasis on mobile applications.

Six (6) papers were selected, which were reviewed by qualified anonymous referees according to the practices of this journal. These papers cover a variety of important and challenging topics in the area of opportunistic systems and address various aspects of infrastructures and performance.

Jang and Lee investigate a QoS-constraint resource allocation scheduling scheme to enhance data transmission for uplink SC-FDMA. Authors' three-stage approach uses a time domain scheduler to differentiate user equipment (UE) services according to their distinct QoS service requirements as well as frequency domain scheduler to prioritize UE services based on channel quality and modulation downgrade of RBs allocation in order to enhance system throughput. The proposed method is compared to fixed sub-carrier dynamic resource allocation method and adaptive dynamic sub-carrier resource allocation method and it was shown that it outperforms the other two methods in terms of throughput, transmission delay, packet loss ratio, and RB utilization.

Kormentzas proposes an innovative cloud-based technological bus, where the inter-connected entities develop and share cloud

services such as farm managing, e-commerce of agrifood products, automation tools for farmers' administrative procedures, e-learning for agriculture topics, information portal, social networking for farmers, traceability services and information tools for precision farming.

Mamun, Islam and Kaosar present two versions of a secured key management scheme adopted on cluster based topology of sensor network. The proposed schemes use partial key pre-distribution and symmetric cryptography techniques, and shows high resilience to different security attacks.

Nomikos et al. propose and investigate in-depth a model where femtocells' and relays' complementary characteristics are effectively exploited into femto-relays. In turn authors evaluate the anticipated technical impact of the proposed model, through targeted simulation where results are presented for a campus topology where femto-relays are compared with classic femtocells. Authors also discuss the related open issues, such as signaling overheads management, context-aware resource management, and business logic aspects, in contrast with the femto-relay's real market penetration opportunities amid current and long-term future trends.

Shiakallis et al. propose a Traffic-based S-MAC protocol to increase the data exchange and preserve the energy conservation, among the nodes in mobile Ad-Hoc Networks. The performance of the proposed protocol is thoroughly evaluated, by conducting multiple experimental results. The results verify the efficient performance of the protocol and indicate fields for further research and experimentation.

Sun et al. propose a new routing protocol that exploits the transfer of CR performance data from the Physical/MAC layers up to Network layer in order to be used within the route selection algorithm. Authors define node mobility and other factors and evaluate the performance

of the newly proposed scheme via simulations within CR MANET environments compared to AODV and DSR.

*George Mastorakis*  
*Evangelos Pallis*  
*Constandinos X. Mavromoustakis*  
*Guest Editors*  
*IJWNB*

## ACKNOWLEDGMENT

We would like to thank all authors who submitted papers, including those whose papers were not selected for this special issue. A special note of thanks goes to all of the referees for donating their abundant time and effort. Without them, this issue would not be possible. We hope that contributions in this special issue will stimulate further research in the important area of Future Mobile Computing Environments and Multimedia.

*George Mastorakis received his B.Eng. (Honors) in Electronic Engineering from UMIST (University of Manchester Institute of Science & Technology) in 2000, his M.Sc. in Telecommunications from UCL (University College London) in 2001 and his Ph.D. in Telecommunications from University of the Aegean in 2008. He currently serves as an Assistant Professor in the Department of Business Administration at Technological Educational Institute of Crete in Greece and as a research associate in Research & Development of Telecommunications Systems Laboratory at Centre for Technological Research of Crete. He has actively participated in a large number of EU funded research projects (FP6 and FP7) and national research ones. He has also acted as a technical manager in many research projects funded by GSRT (General Secretariat for Research & Technology, Ministry of Development, Greece). He has more than 120 publications at various international conferences proceedings, workshops, scientific journals and book chapters. He is an editor of Journal of Networks and has acted as a reviewer for several scientific journals and member of conferences technical program committees. He is also author/editor of four Edited Books. His research interests include cognitive radio networks, IoT applications, IoE architectures, radio resource management, interactive television broadcasting, networking traffic analysis, end-to-end QoS, 5G mobile networks, dynamic bandwidth management and energy-efficiency networks.*

*Evangelos Pallis is an Associate Professor in the Department of Applied Informatics and Multimedia School of Applied Technology at Technological Educational Institute of Crete (TEIC), and co-director of Research and Development of Telecommunication Systems Laboratory "PASIPHAE" of the same Department. He received his B.Sc. in Electronic Engineering from the Technological Educational Institute of Crete in 1994, his M.Sc. in Telecommunications from University of East London, in 1997, and received his PhD in Telecommunications from the University of East London in 2002. His research interests are in the fields of wireless networks, mobile communication systems, digital broadcasting technologies and interactive television systems, QoS/QoE techniques and network management technologies. He has participated in a number of national and European funded R&D projects, including the AC215 "CRABS", IST-2000-26298 "MAMBO", IST-2000-28521 "SOQUET", IST-2001-34692 "REPOSIT", IST-2002-FP6-507637 "ENTHRONE", "IMOSAN", and as Technical/Scientific coordinator for the IST-2002-FP6-507312 "ATHENA" project. Currently he is involved within the FP7- 214751 "ADAMANTIUM", in the FP7-ICT-224287 "VITAL++" and in the FP7-ICT-248652 "ALICANTE" projects. He has more than 80 publications in international referred journals, conference papers and book-chapters in the above scientific areas. He is the general chairman of the international conference on Telecommunications and Multimedia (TEMU), member of IET/IEE, and active contributor to the IETF interconnection of content distribution networks (CDNi).*

*Constandinos X. Mavromoustakis is currently an Associate Professor at the Department of Computer Science at the University of Nicosia, Cyprus. He received a five-year dipl. Eng (BSc/BEng/MEng) in Electronic and Computer Engineering from Technical University of Crete, Greece, MSc in Telecommunications from University College of London, UK, and his PhD from the department of Informatics at Aristotle University of Thessaloniki, Greece. Dr. Mavromoustakis is leading the Mobile Systems Lab. (MOSys Lab., <http://www.mosys.unic.ac.cy/>) at the Department of Computer Science at the University of Nicosia, dealing with design and implementation of hybrid wireless testbed environments, high performance opportunistic cloud and mobile cloud computing (MCC) systems, modeling and simulation of mobile computing environments and protocol development and deployment for large-scale heterogeneous networks as well as new 'green' mobility-based protocols. Dr. Mavromoustakis has a dense research work outcome in Distributed Systems and spatio-temporal scheduling, consisting of numerous refereed publications. He is a management member of IEEE Communications Society (ComSoc) Radio Communications Committee (RCC) and served as track Chair and co-Chair of various IEEE International Conferences (including AINA, IWCMC, IEEE Internet of Things, ACM MSWiM/HPMOSys etc). He is the recipient of various grants including the highly competitive European grant of Early Stage Researcher (ESR), for the excellent research output and research impact, in December 2013 (EU secretariat/Brussels).*