Editorial

Charalampos Z. Patrikakis

Telecommunications Laboratory,
Computer Science Division,
Department of Electrical Engineering and
Computer Science,
National Technical University of Athens,
E-mail: bpatr@telecom.ntua.gr

Biographical notes: Charalampos Z. Patrikakis was born in Greece in 1970. He received his Dipl.-Ing. and his PhD from the Department of Electrical Engineering and Computer Science of NTUA, Greece. Currently, he is working in the field of computer networks research. He is in parallel teaching courses at NTUA and TEI Piraeus and is an Associated Tutor of the University of Paisley. He is a Senior Research Associate of the Telecommunications Laboratory of NTUA and Informatics Laboratory of AUA. He has participated in several European Union projects and has acted as Project Leader and Technical Coordinator of several successfully completed international projects.

1 Introduction

Wireless and mobile communications over the past years have witnessed a tremendous growth and have become a part of our everyday life, reaching up to the point of even substituting traditional wired communications. This rapid growth is accompanied by the flourishing of services and applications that constitute a comprehensive background, upon which multimedia-based communication, entertainment and information activities can be supported. As a consequence, traditional audiovideo based services have already reached mobile services and are commercially offered over wireless and mobile networks.

However, streaming over wireless and mobile networks is still in its infancy and many challenges should be faced in order to enable its full scale deployment. Audio-visual information must be tailored to the variability of effective bandwidth, the processing and display capabilities of the mobile devices. Apart from addressing access network and terminal heterogeneity, the services offered should be scalable, reliable and on top of all, QoS-enabled. Enabling the deployment of multiservice wireless networks to the extent that this happened in the past years, has made essential the design of QoS provisioning mechanisms, able to meet the QoS requirements of the various applications. Also, issues arising from the mobility of users such as the midstream handoffs of streaming sessions still have to be investigated.

Furthermore, we should make a special note of the advances in computer manufacturing technology that have allowed the augmentation of both processing power and memory capabilities of mobile devices. This has led to an increased number of mobile phones and PDAs becoming ubiquitously connected to the internet, while being capable of deploying sophisticated applications traditionally used only on desktop computers.

Taking into account all the above and recognising the vast interest in both scientific and applied research in the area of mobile communications that is related to multimedia support, this Special Issue of the *International Journal of Wireless and Mobile Computing (IJWMC)* is dedicated to media streaming over wireless and mobile networks. Being at a time where on one hand services for streaming in mobile and wireless networks are commercially offered, while on the other research on these issues is ongoing, this Special Issue tries to cover the full range of the topic, hosting selected papers that start from scientific work, proposed, argued and evaluated through simulation models and reach up to the design and implementation of actual applications and service platforms.

2 Papers in this issue

In the paper 'Robust source-adaptive real-time video transport over wireless multihop networks', the authors investigate the error-resilient video transport over lossy wireless networks and propose a source-adaptive error-resilience system to support video transport over multihop wireless networks.

In 'Adaptive semi-soft handoff for Cellular IP networks', a novel adaptive protocol is proposed as an extension to the current Cellular IP semi-soft handoff protocol to address such issue by assigning delay device and semi-soft delay values dynamically based on the present network condition. In order to prove the efficiency of their proposal, the authors present simulation results that demonstrated the performance of the protocol in terms of reduction of network traffic, packet losses and duplications during handoff, while still minimising handoff latency.

In 'Developing a QoS framework for media streaming over TDMA/TDD wireless networks', the authors

present a QoS framework that can be deployed for designing various QoS provisioning mechanisms for time-constrained variable bit-rate applications. The presentation is supported by simulation results that show the effectiveness of the mechanisms when supporting media streaming services, such as MPEG-4 video communications.

In 'WAQM: managing QoS in wireless networks by means of an XML-based multiagent system' WAQM, a novel XML-based multiagent system for QoS management in wireless networks is proposed, featuring several characteristics such as user profile handling, exploitation of resource management techniques to maximise user satisfaction and use of XML for guaranteeing a light, versatile and standard mechanism for information representation, storing and exchange. All these are presented through a performance evaluation study aiming at comparing it with alternative agent-based approaches for handling user access to telecommunications networks.

In the paper 'Rate adaptation for wireless video streaming based on error statistics' the authors deal with the issue of live video streaming over wireless IP networks deploying a rate control algorithm which is based on selective frame discarding. The algorithm uses a congestion estimation based on packet loss statistics obtained from RTCP feedback and from the Data Link layer. The authors proceed in presenting a characterisation of packet losses due to transmission errors and congestion, for selecting appropriate strategies to maximise the video quality experienced by the end-user.

In 'Seamless multimedia sessions and real time measurements in hybrid 3G and WLAN networks' the authors address the issue of multimedia service provisioning in heterogeneous network environments such as WLANs 3G systems, with particular emphasis on the interactions between multimedia signalling, mobility management and AAA interactions. The impact of mobility management on the performance of multimedia services in terms of session reestablishment and packet loss is also presented in the paper.

In the paper 'A rate adaptation scheme for media streaming over heterogeneous networks', a rate adaptation scheme for media streaming applications, appropriate for future heterogeneous networks is specified and validated through an actual implementation. The proposed scheme enhances an existing rate adaptation algorithm towards providing uninterrupted streaming sessions originating from or directed to, multimode mobile terminals, when vertical handovers occur across networks with diverse characteristics. Evaluation is performed through extensive simulations, while an actual implementation over an open end-to-end MPEG-4 streaming suite is presented and compared with an existing one, under vertical handover conditions.

Going towards a very practical issue, 'Mobile face detection and tracking for media streaming applications' presents a method for mobile face detection and tracking in media streaming applications. To account specifics of mobile image processing and pattern recognition, the experimental benchmarking of Intel x86 and Nokia S60 platforms is done. In this work, various aspects of mobile phone use are considered in order to record a profile on a mobile media streaming user. The authors describe the construction of the low bit-rate video coder that uses face detection and tracking to segment foreground/background objects and encode them with a different bit-rate. They also describe a framework for smart video conferences and experimental results on low bit-rate image coding for this application.

In the following paper: 'TCP-friendly MPEG-4 streaming video in CDMA networks via power and rate control', the authors propose a power and rate adaptation scheme for CDMA networks that utilises information from the TCP-friendly (TFRC) transport protocol and the type of MPEG-4 frame (i.e. intra, predictive or bidirectional) together with lower layer criteria in order to optimise packet transmission over the wireless link. A multiobjective optimisation problem is formulated based on the weighted sum of two competing objectives and is solved using derivative-based optimisation techniques, while through simulation results the proposed scheme is evaluated and possible different ramifications of the scheme are discussed.

Finally, in 'Constraint-based media content delivery over heterogeneous networks and devices', the authors present the Enamorado architecture that introduces a special client, which is a terminal with reconfiguration capabilities in both software and hardware, decoupling the development of new mobile devices from the advances in new content formats. The client can adapt itself according to the format of the requested content, so that the system can take advantage in order to select the most appropriate content format in terms of not only the device limitations and the end-user preferences, but also the current network conditions, the request arrival rate and the reconfiguration overhead.

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