

Editorial

## Wired/wireless Internet communications

Next generation mobile networks are expected to be based on Internet core networks and wireless access networks. The need for efficient merging of the wired and wireless infrastructure as well as new multimedia services and applications require novel network architectures, protocols and control mechanisms. The topics have been discussed during the 3rd International Conference on Wired/Wireless Internet Communications (WWIC 2005), which took place Xanthi (Greece) from May 11–13, 2005. WWIC 2005 addressed relevant research issues such as network design, traffic engineering, transport protocols, cross layer interaction, inter-working of wired and wireless networks, wireless multi-hop networks, handover and mobility management, quality-of-service, multimedia services and economical ones. The goal of the conference was to present high-quality results in the field. The international conference program committee selected 34 papers out of 117 submissions. Finally, 12 papers from the ones presented at the conference have been selected for this special issue. The selected papers have been improved based on the conference reviews and extended in order to present latest research results in more detail.

An important topic of WWIC 2005 has been the issue how to support multimedia applications over wired/wireless networks. Jeong-Yong Choi and Jitae Shin propose a “Content-Aware Packet-Level Interleaving Method for Video Transmission over Wireless Networks”. This mechanism considers the importance of the video content to ensure for interleaving in order to improve the overall video quality compared with content-blind interleaving methods. Another approach to improve video quality over wireless LANs is pursued by Francisco M. Delicado, Pedro Cuenca, and Luis Orozco-Barbosa in their paper “QoS Mechanisms for Multimedia Communications over TDMA/TDD WLANs”. The authors propose to perform bandwidth allocation in order to guarantee the performance requirements of multimedia applications. The article “A Performance Study on Service Integration in IEEE 802.11E Wireless LANs” from Frank Roijers, Hans van den Berg, Xiang Fan, and Maria Fleuren evaluate the IEEE 802.11e Quality-of-Service (QoS) differentiation

parameters. Moreover, the paper investigates how well the QoS mechanisms are able to support different types of services under realistic traffic conditions. The authors identify that although service differentiation is possible with IEEE 802.11e absolute QoS guarantees are difficult to achieve and require the deployment of call admission control mechanisms. Gennaro Boggia, Pietro Camarda, Luigi Alfredo Grieco, and Saverio Mascolo propose an “Energy Efficient Feedback-based Scheduler for Delay Guarantees in IEEE 802.11e Networks” in order to provide bounded delays while ensuring energy saving in IEEE 802.11e wireless LANs. Performance evaluations show that the proposed mechanism is able to provide a good trade-off between QoS and power saving at both low and high network loads.

Based on the popularity of wireless LANs, multi-hop wireless networks become more and more popular in certain application scenarios such as mobile ad-hoc or wireless mesh networks. Geert Heijenk and Fei Liu present in their paper “Interference-based Routing in Multi-hop Wireless Infrastructures” a new routing algorithm for wireless multi-hop networks called Balanced Interference Routing Algorithm (BIRA). BIRA takes the interference between transmitting wireless nodes into account for route calculation. This helps to reduce interference within the wireless network and simultaneously increasing network throughput. Attila Weyland, Thomas Staub, and Torsten Braun perform a “Comparison of Motivation-based Cooperation Mechanisms for Hybrid Wireless Networks”. The paper proposes a novel cooperation and accounting scheme that introduces monetary rewards for the users. The authors compare their scheme called CASHnet with related work and show several advantages regarding several parameters such as network liveness, goodput, overhead and packet loss. The paper from Jeroen Hoebeke, Ingrid Moerman, Bart Dhoedt, and Piet Demeester entitled “Analysis of decentralized resource and service discovery mechanisms in wireless multi-hop networks” has been awarded as the best paper of WWIC 2005. It compares the performance of proactive and reactive discovery resource and service discovery techniques. The results provide guidelines for

the development or extension of resource and service discovery protocols for their operation in mobile ad hoc networks.

On top of the network layer, efficient transport protocol mechanisms are required in wireless networks to provide good performance to applications. Roman Dunaytsev, Yevgeni Koucheryavy, and Jarmo Harju present in their paper “The PFTK-Model Revised” an analytical model of TCP Reno throughput as a function of loss event rate, average round trip time, average retransmission timeout value, and receiver window size based on the widely known so-called PFTK model. The newly developed model accounts fast retransmit/fast recovery dynamics and slow start phase after timeout. It gives a more accurate estimation of TCP Reno throughput in the presence of correlated losses. In the paper “Experimenting with  $\tau$ -AIMD over Wireless Asynchronous Networks” Adrain Lahanas and Vassilis Tsaoussidis propose a TCP congestion control mechanism based on additive increase/multiplicative decrease in order to improve performance and fairness in networks with varying delays. Moreover, the proposed mechanism does not increase the costs in terms of required energy.

Further, several articles present more sophisticated issues around mobile and wireless networking. The article “Location Assisted Fast Vertical Handover for UMTS/WLAN Overlay Networks” from Tom Van Leeuwen, Ingrid Moerman, and Piet Demeester introduces a new vertical handover protocol called APACHE that makes use of vehicle location information to predict where and when a handover should occur. This allows optimizing user throughput and network performance in integrated wireless LAN/UMTS scenarios. Dmitri Moltchanov, Yevgeni Koucheryavy, and Jarmo Harju present a “Loss performance model for wireless channels with auto-correlated arrivals and losses”. Their model is rather simple and

therefore computationally efficient. The model has been validated against empirical frame error traces in IEEE 802.11 wireless LANs. It can also be used for modelling bit errors in certain conditions. Finally, Stylianos Mammagkakis, Christos Baloukas, David Atienza, Francky Cattoor, Dimitrios Soudris, Antonios Thanailakis investigate in their paper “Reducing Memory Fragmentation in Network Applications with Dynamic Memory Allocators Optimized for Performance” how to reduce memory fragmentation in wired/wireless network applications by the use of appropriate dynamic memory allocators. The proposed dynamic memory allocation scheme shows significant performance improvements over other schemes.

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