



Guest Editorial

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Future mobile networks are being designed for carrying multimedia calls, including voice and bursty data transmission. Many studies have predicted a large increase of customer demand for the mobile services and applications in the near future. To meet these demands with adequate Quality of Services (QoS), we must devise efficient network and service architectures. In contrast to the wired networks, there is not enough understanding or availability of network control mechanisms, traffic characteristics, measurement, performance analysis and models for mobile networks. However, such understanding of teletraffic issues is vital for designing and dimensioning efficient mobile networks. These networks will incorporate different networking technologies, control algorithms and versatile services. How to guarantee the required QoS of mobile services as expected by customers using present and future technologies presents a real challenge for mobile-network researchers.

The focus of this special issue is the performance evaluation of different architectures supporting QoS in mobile networks, and the traffic issues and performance models in such environments. Areas of interest include but are not limited to: performance analysis of wireless Internet, wireless LANs, next generation wireless networks, QoS guarantee in mobile networks, traffic models and control algorithms for future mobile networks. Our goal is to provide a forum for exchange of results and ideas among researchers and engineers in industries and universities.

We received a total of 33 submissions for this special issue. Each paper was subject to a typical peer review process and review reports were obtained from experts in the field. Owing to space limitation, we could select only eight papers for publication in this issue. As a result, should we have additional room, many good papers that were rejected could have been accepted. In any event, we sincerely thank all the authors for their submissions. As discussed in the following, the accepted papers address issues such as QoS architecture, QoS for wireless LANs, end-to-end QoS provisioning, and performance analysis of CDMA networks, shared packet wireless networks, and integrated cellular and ad-hoc wireless networks.

One of the important design issues for future mobile IP networks is to make sure the efficient use of network resources while maintaining QoS. In the first paper on this issue, “An Efficient RSVP–Mobile IP Internetworking Scheme”, S. Paskalis et al. present a new approach for mobility management support and QoS provision. The approach enhances the network resource efficiency, while minimizing the QoS deterioration after a terminal movement. In the second paper entitled “A Unified Approach for Improving QoS and Provider Revenue in 3G Mobile Networks”, C. Lindemann et al. propose an adaptive control method to improve both QoS for mobile subscribers and to increase revenue for service providers. The proposed method adaptively adjusts the admission controller and packet scheduler to achieve the objectives.

It is well known that the medium access control (MAC) protocol plays a significant role in determining the QoS. In the paper entitled “Quality of Service Schemes for IEEE 802.11 Wireless LANs – An Evaluation”, A. Lindgren et al. evaluate the performance of several MAC protocols, including the point coordination function (PCF) for IEEE 802.11, the enhanced distributed coordination function (EDCF) of the 802.11e standard proposal, the distributed fair scheduling (DFS) and Blackburst. They also examine tradeoffs among various performance measures such as throughput, medium utilization, collision rate, and delay. As a second paper on MAC protocols, B. van Houdt and C. Blondia study the robustness of FS-ALOHA protocols for uplink transmission in wireless centralized LANs. In particular, they propose analytic models to consider general Markovian packet arrivals, capture effect and channel errors. The next paper by O. Yu and S. Khanvilkar, “End-to-End Dynamic Adaptive QoS Provisioning over GPRS Wireless Mobile Network”, presents a guaranteed QoS MAC protocol and an accompanying call admission control protocol to maintain QoS in the General Packet Radio Service (GPRS) wireless networks.

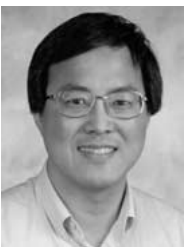
Another key issue for future mobile networks is to support heterogeneous service requirements in terms of data rates, QoS and transmission power constraints. In the paper entitled “Overlaying CDMA System with Interference Differentials”, L. Zhuge and V. Li examine how multiband CDMA systems can be used to accommodate these heterogeneous requirements. In particular, they analyze the system capacity in terms of the number of users and the bandwidth utilization.

To support the service requirements, network performance is also a key area. In the paper entitled “Performance of a Shared Packet Wireless Network with Interactive Data Users”, N.K. Shankaranarayanan et al. study the user-perceived performance of a shared packet wireless network for web-browsing applications. They propose a new measure – the Equivalent Circuit Rate (ECR) – to characterize the perceived performance for each user in a shared access network. Last but not least, H. Wu and C. Qiao propose approximate Markov chain models for integrated cellular and ad hoc relay networks in their paper entitled “Modeling iCAR via Multi-Dimensional Markov Chains”. Using their models, results show that the call blocking probability in a congested cell can be improved by having a limited number of ad hoc relaying stations.

Finally, we would like to express our sincere thanks to our reviewers for their dedicated efforts in providing timely and constructive reviews of the manuscripts. Without their help, maintaining the high quality of this special issue would not have been possible. We also thank Professor Imrich Chlamtac, the Editor-in-Chief of MONET, for his help and support for this special issue.



Sándor Molnár received his M.Sc. and Ph.D. in electrical engineering from the Technical University of Budapest, Budapest, Hungary, in 1991 and 1996, respectively. In 1995 he joined the Department of Telecommunications and Telematics, Budapest University of Technology and Economics. He is now an Associate Professor and the research leader of the teletraffic research program of the High Speed Networks Laboratory. Dr. Molnár has participated in the European projects COST 242 and COST 257 and now he is engaged in project COST 279 on “Analysis and Design of Advanced Multiservice Networks Supporting Mobility, Multimedia, and Internetworking”. He is also a member of the IFIP TC6 WG 6.3 on “Performance on Communication Systems” and served on numerous technical program committees of IEEE, ITC and IFIP conferences, among others as the Program Chair of the 9th IFIP Working Conference on Performance Modelling and Evaluation of ATM&IP Networks. His main interests include teletraffic analysis and performance evaluation of modern communication networks.



Kin K. Leung received his B.S. degree in electronics from the Chinese University of Hong Kong, Hong Kong, in 1980, and his M.S. and Ph.D. degrees in computer science from University of California, Los Angeles, in 1982 and 1985, respectively. He joined AT&T Bell Labs in 1986. Currently, he is a Technology Consultant at AT&T Labs, working on radio resource allocation, power control, adaptive modulation, spread spectrum, MAC protocols, teletraffic issues and mobility management in broadband wireless networks. He received the Distinguished Member of Technical Staff Award from AT&T Bell Labs in 1994, and shared with his colleagues the 1997 Lanchester Prize Honorable Mention Award. He is an IEEE fellow. He actively serves on the technical program committees for international conferences, including as the committee co-chair for the Multiaccess, Mobility and Teletraffic for Wireless Communications (MMT'98), and the committee vice-chair for the ICC 2002. He was a guest editor for the IEEE Journal on Selected Areas in Communications (JSAC) and an editor for the JSAC: Wireless Series. Currently, he is an editor for the IEEE Transactions on Communications and the Transactions on Wireless Communications.