Editorial

Ethernet has been the predominant LAN technology for decades because of its low cost and simple cabling. In recent years, demand for wireless connectivity has grown considerably with a proliferation of portable and laptop computers. In addition to providing for computing mobility, wireless LANs are easier to install and save the costs of recabling offices and buildings. At the same time, wireless technology has been improving and services such as PCS and mobile IP have become widespread.

This special issue of *Mobile Networks and Applications* contains a collection of papers representing recent advances in wireless LANs. It is evident that much of the current research centers on wireless ATM, although ATM is not the only technological choice for wireless LANs. ATM was originally designed for the reliable, high-bandwidth environment of fiber optical networks rather than the wireless environment, but ATM offers the advantages of a simple well-defined cell format, connectivity with ATM wide area networks, and potential support of applications with diverse quality of service (QoS). Nevertheless, in addition to the challenges present in wireline ATM design (which are not yet fully resolved), new challenges have emerged due to user mobility and the characteristics of the wireless medium.

The 'openness' of the wireless medium in conjunction with user mobility and medium characteristics create new challenges to the authentication process and overall network security. The channel characteristics (quality, limitations, etc.) make it necessary to develop efficient dynamic resource allocation mechanisms, capable of responding to changes in the environment and allocating dynamically resources to diverse applications. For instance, traditional MAC protocols and scheduling schemes would need to be re-engineered to be more responsive to traffic changes and accommodating to applications with diverse deadlines. Finally, the difficulty of preserving the QoS support in ATM in the wireless environment with limited resources is a unique challenge that ATM has presented to the design of wireless LANs. The papers included in this special issue investigate these types of issues.

The first paper, "Security protocol for IEEE 802.11 wireless local area network", by Se Hyun Park, Aura Ganz and Zvi Ganz, proposes a new protocol to add privacy and authentication to the IEEE 802.11 standard. The problem is complicated by the unique limitations of the wireless environment in terms of station mobility, bandwidth, channel reliability, and power consumption. The proposed protocol uses public key encryption and features a small number of messages to be exchanged with retransmissions as needed.

The second paper, "Wireless ATM MAC performance evaluation, a case study: HIPERLAN type 1 vs. modified MDR", by Jouni Mikkonen and Liina Nenonen, studies medium access control (MAC) protocols for wireless ATM LANs in the range of 20 Mbits/s. Two candidate MAC protocols are compared by simulations: EY-NPMA (elimination yield-nonpreemptive priority multiple access), the channel access mechanism in the HIPERLAN type 1 standard developed by the RES10 technical subcommittee in ETSI; and MDR (multiservice dynamic reservation), a centralized dynamic TDMA-based protocol.

The third paper, "A scalable wireless virtual LAN", by Zhao Liu, Malathi Veeraraghavan and Kai Eng, describes an ATM local area network that supports mobile IP hosts. Their scheme builds on their earlier wireless ATM network architecture, BAHAMA, and adds specific IP support. The proposed wireless virtual LAN (WVLAN) includes solutions for resolving IP and ATM address formats, supporting ARP, and connection admission control.

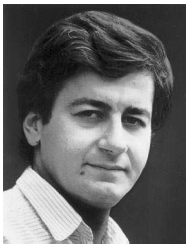
The fourth paper, "MAC protocol and traffic scheduling for wireless ATM networks", by Nikos Passas, Lazaros Merakos, Dimitris Skyrianoglou, Frédéric Bauchot, Gérard Marmigère and Stéphane Decrauzat, describes the MAC protocol in the WAND (wireless ATM network demonstrator) system. The MAC protocol is based on dynamic TDMA, combining reservation-based and contention-based methods to achieve efficiency and quality of service guarantees. The description includes PRADOS (prioritized regulated allocation delay oriented scheduling) which is a deadline-driven traffic scheduling algorithm.

The fifth paper, "Comparative analysis of wireless ATM channel access protocols supporting multimedia traffic", by Jyh-Cheng Chen, Krishna Sivalingam and Raj Acharya, investigates a number of candidate MAC protocols for wireless ATM. Simulations are carried out with self-similar data, speech with activity detection, and H.261 videoconference type video traffic.

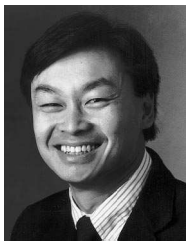
The sixth and final paper, "Dynamic capacity allocation and hybrid multiplexing techniques for ATM wireless LANs", by Anthony Burrell, Harold Stern and Titsa Papantoni-Kazakos, proposes the use of a novel traffic monitoring algorithm to dynamically allocate channel capacity among time-varying sources. Its use is described in two framed transmission approaches: a framed time domain-based (FTDB) and a framed CDMA technique.

We are grateful for the invaluable help from the reviewers, and we especially thank all of the authors who submitted contributions to this issue. Finally, we want to acknowledge the help of Editor-in-Chief Imrich Chlamtac, who guided us with patience and wisdom.

Ioannis Stavrakakis and Thomas M. Chen
Editors



Ioannis Stavrakakis received the Diploma in electrical engineering from the Aristotelian University of Thessaloniki, Greece, 1983, and the Ph.D. degree in electrical engineering from the University of Virginia, 1988. In 1988, he joined the Faculty of Computer Science and Electrical Engineering at the University of Vermont as an Assistant and then Associate Professor. Since 1994, he has been an Associate Professor of Electrical and Computer Engineering at Northeastern University, Boston. His research interests are in stochastic system modeling, teletraffic analysis and discrete-time queueing theory, with primary focus on the design and performance evaluation of Broadband Integrated Services Digital Networks (B-ISDN). Dr. Stavrakakis is a senior member of IEEE, a member of the IEEE Communications Society, Technical Committee on Computer Communications (TCCC) and a member of IFIP WG6.3. He has organized and chaired sessions, and has been a technical committee member, for numerous conferences sponsored by IEEE, ACM, ITC and IFIP. He is currently the TCCC conference coordinator. He has served as the TCCC representative for ICC '95 conference and as a co-organizer of the 1996 International Teletraffic Congress (ITC) Mini-Seminar, on "Performance Modeling and Design of Wireless/PCS Networks".



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