

Proposal for an

IEEE Network

Special Issue on

Wireless Local Area Networking: QoS Provision & Resource Management

A special issue of IEEE Network on “WLAN Networking: QoS Provision & Resource Management” is proposed.

The guest editors for this special issue are Dr. Christos Douligeris, Univ. of Piraeus, Greece and Dr. Dimitrios D Vergados, Univ. of the Aegean, Greece.

Justification:

Next generation wireless networks are evolving to accommodate a variety of services and traffic types, including data transfer, voice, video and multimedia streaming , while allowing a user to roam within the service area of the network, or between networks without disrupting the quality of service (QoS) provided. Current wireless local area networks can provide only best-effort QoS with limited capabilities regarding mobility. Future wireless access networks must be able to guarantee predefined levels of QoS allowing the services mentioned above to be supported. Furthermore, the QoS parameters should not be exceeded when the mobile users move from the coverage area of one access point to another, from one wireless local area network to another, or from a wireless local area network (WLAN) to a wide area cellular network and vice-versa.

Providing QoS sufficient to support these applications over a WLAN can be a challenging task. WLANs often allow a variable number of users with heterogeneous QoS requirements to share a common radio channel, usually with limited access control, making the packet-loss, delay, jitter and bandwidth parameters provided by the network fluctuant and unpredictable. WLAN MAC protocols must be extended to support prioritization and bandwidth reservation so enable guaranteed QoS provisioning to users of wireless services.

When a mobile user moves from an underutilized to an overutilized service area, the QoS provided to the user’s applications cannot always be sustained. Handoffs require signalling which unavoidably introduces delays and can potentially result in packet loss, violating the QoS expectations of some applications. A QoS-enabled connection must often limit its requirements, or can even be dropped when the point of attachment changes, due to limited channel resources or due to path rerouting in the fixed

infrastructure. In many cases resources must be pre-reserved in some areas for guaranteeing the QoS level of users that are anticipated in these areas. Therefore, user mobility, as it has been manifested in extensive studies in cellular networks, introduces a new set of QoS parameters, for example handoff delay, connection blocking probability, early connection dropping probability etc., which must be considered when designing a local area network.

Wireless Local Area Networks cover single-hop or multi-hop communications which can provide various network services within a limited service area. Research and deployment of these networks has been very rapid in the past few years, leading to the development of a number of wireless local area network technologies, like 802.11 (Wi-Fi), 802.15.1 (Bluetooth wireless technology), 802.15.3 and HiperLAN. Even though these technologies can provide high speed (broadband) wireless access to IP networks, they have significant limitations, which must be overcome for allowing seamless, scalable and stable QoS for wireless mobile users.

Content of Special Issue¹

The goal of the special issue is to publish original research and review articles which should be comprehensive to all readers of the magazine regardless of their specialty.

This special issue will cover comprehensively architectures, algorithms and technologies for QoS and resource management in local wireless area networks.

QoS provision problems in WLANs include: designing of Medium Access Control (MAC) algorithms for guaranteed QoS parameters, evaluation of emerging WLAN standards, optimization of WLAN topologies, interworking architectures and scenarios, consistent QoS across WLAN and 3G, Resource Assignment and Sharing in WLANs, architectures and protocols for QoS provisioning, efficient handoff control for seamless mobility and appropriate resource management for ensuring bandwidth availability.

Furthermore, mobility management (location management, handoff control, admission control) in these networks will be examined. Power control and management for energy-efficient WLANs, security issues and enhancements of WLANs as well as WLAN authentication, needs to be investigated, as well as unified accounting & billing among WLANs and 3G networks.

Sources of papers and referees:

The guest editors have made initial contacts with the well known researchers in the field of wireless networks as potential sources of papers and referees. Initial reactions have been quite supportive.

¹ It is worth noting here that the number of approved papers will be fewer than the problem topics covered in this special issue.

In order to solicit papers, a call for papers will be prepared, which we propose to include in **IEEE Network**, **IEEE Communications**, **IEEE Communications Letters**, **IEEE Wireless Communications**, and to email to specialized groups such as TCCC, ITC etc.

In addition, we intend to invite personally distinguished researchers that are active in the focus areas of this special issue to submit their recent work for possible inclusion in the issue.

Proposed schedule :

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- Proposed Call for Papers completed (attached), March 2004
- Proposal for special issue completed, March 2004
- Presentation to IEEE Network editorial board, April 2004
- Call for Papers to Magazines (subject to approval), May 2004
- Letters to Perspective Authors, May 2004
- Paper Submission Deadline, August 31, 2004
- Feedback to Authors, November 30, 2004
- Final Manuscripts to Publisher, February 28, 2005
- Publication of Completed Special Issue, May 2005

Guest editors

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Editors' Short CVs

Prof. Christos Douligeris

Christos Douligeris was born in Melissopetra Arcadia Greece. He received his Diploma in Electrical Engineering from the National Technical University of Athens in 1984 and the M.S., M.Phil. and Ph.D. degrees from Columbia University in 1985, 1987, 1990 respectively. He has held positions with the Department of Electrical and Computer Engineering at the University of Miami, where he reached the rank of associate professor and was the associate director for engineering of the Ocean Pollution Research Center. He is currently an associate professor at the Department of Informatics of the University of Piraeus, Greece. He has served in technical program committees of several conferences. His main technical interests lie in the areas of performance evaluation of high speed networks, neurocomputing in networking, resource allocation in wireless networks and information management, risk assessment and evaluation for emergency response operations. He is an editor of the IEEE Communications Letters, Computer Networks, IEEE Network, a former technical editor of the IEEE Communications Magazine, a senior member of IEEE, and a member of INFORMS (formerly ORSA) and the Technical Chamber of Greece.

Dr. Dimitrios D. Vergados was born in Athens, Greece in 1973. He received his B.Sc. in Physics from the University of Ioannina and his Ph.D. in Integrated Communication Networks from the National Technical University of Athens, School of Electrical Engineering and Computer Science. His research interests are in the area of Broadband Communication Networks, Wireless - Mobile Communications, Heterogeneous Communications Networks - Military Networks, WLANs, DiffServ, especially in QoS and Resource Allocation, Mobility Management and Performance evaluation. Since 2003 Dimitrios Vergados is Lecturer in the University of the Aegean, Department of Information and Communication Systems Engineering. Also, the previous years he was visiting Lecturer in the University of the Aegean, Department of Information and Communication Systems Engineering and in the National Technical University of Athens, Department of Electrical and Computer Science Engineering. He has several publications in journals, books and conference proceedings and participated in several EC projects. Dimitrios Vergados is a member of the IEEE and AFCEA. He is reviewer in IEEE Communications Society, Elsevier Computer Communications., IEEE Communication Letters, IEEE Communications Magazine, and ACM MONET.

Topics of Interest

This special issue is targeted at the above issues related to Wireless Local Area Networking: QoS provision & Resource Management. Authors are invited to submit previously unpublished papers to this special issue. Topics include, but are not limited to:

- QoS supports in WLANs
- Service differentiation WLANs.
- Interworking architectures and scenarios
- MAC algorithms for guaranteed QoS parameters
- Resource management for QoS-sensitive services in WLANs
- Security enhancements of WLANs - Security issues
- WLAN-based online/offline billing- Unified accounting & billing
- Mobility managements/supports
- Evaluation of emerging WLAN standards
- Architectures and Protocols for QoS provisioning
- Consistent QoS across WLAN and 3G handover
- Power control and management for energy-efficient WLANs
- Resource Assignment and Sharing in WLANs
- Optimization of WLAN Topology
- Authentication in WLANs