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Elsevier Journal on Computer Networks

Special Issue on

Wireless IP Through Integration of Wireless LAN and Cellular Networks

Wireless Internet technology will be the next milestone for modern telecommunications technology. In order to provide Internet connectivity over a wide geographical area, it is necessary to utilize the advanced features of modern cellular systems – known as third generation wireless cellular – such as UMTS and cdma2000 and their future evolution. One obstacle toward such utilization is the current technological shortcomings of cellular systems that limit the data rate. One interim way to bypass this limitation is to use wireless LAN in cooperation with cellular networks. Wireless LAN is a very cost-effective alternative to cellular access networks in hot spot areas, such as business centers, supermarkets and airports, as the equipment cost is relatively low and they operate in the unlicensed industrial, scientific and medical (ISM) band. Data rates provided by the wireless LAN standards is far above the targeted 144 kbps of GPRS and 384 Kbps – 2 Mbps of the UMTS cellular systems, making the wireless LAN an important and attractive, yet easy to implement add-on service to the usual 3G cellular systems. As a result, most cellular system providers have now considered the integration of the wireless LAN with their wide area cellular network in order to cope with the ever-increasing demand from high-speed data applications at least in hot spot and indoor environments. At the same time, such integration will ultimately reduce the cost and provide service affordability to mobile data users.

Internetworking of the wireless LAN (as an extension of the wired LAN) with the mobile cellular technology however, will not be a straightforward task. As a first step, an architecture that can provide adaptation of different elements implemented in the two systems must be designed. ETSI (the European Telecommunications Standards Institute) has already specified two generic approaches toward the integration of the Wireless LAN and GPRS/UMTS systems, known as loose coupling and tight coupling. Although the two approaches are promising, there is no final decision on whether the future integrated network would use either of those approaches or a completely different one. The first step will be followed by many other steps such as mobility management, data security, user authentication and authorization, traffic and congestion control, quality of service guarantee, real-time and constant/variable bit-rate support for voice and video. Without all these steps, a seamless internetworking between the two systems will not be feasible.

This special issue of the Computer Networks is devoted to the research activities within industry and academia toward the integration of the wireless LAN and cellular 3G systems. Articles for this special issue will be solicited through an open call-for-papers and invitation to experts in the field from industry and academia. The special issue will accommodate in-depth research and tutorial papers discussing different aspect of the wireless LAN, cellular systems for Internet connectivity, integration of the two systems, and performance analysis. Topics of interest include but not limited to:

- Architecture design alternatives and performance analysis for an integrated wireless LAN-cellular system
- Design of internetworking functional units and their performance analysis
- Smooth handoff techniques between wireless LAN and cellular systems
- Quality of service establishment in heterogeneous networks
- Network selection criteria and selection techniques in heterogeneous networks
- Traffic control techniques and traffic monitoring in heterogeneous networks
- IP address selection techniques in the wireless LAN/cellular integrated environment
- Macro-mobility techniques for seamless internetworking
- Pricing and subscription database techniques in integrated wireless LAN-cellular systems
- Security techniques in heterogeneous networks
- Location management and database management techniques
- Convergence of link layer functionality in wireless LAN and cellular systems
- Standardization activities as well as proprietary solutions for the wireless LAN-cellular integration

Submissions

Articles discussing in-depth research on performance analysis, simulation results, data collection and data management, architecture design, and techniques for the above topics are solicited. Author's guideline can be found at <http://www.elsevier.nl/locate/comnet>. Each submission should include a cover page with the title of paper, name and affiliation of all authors, name and contact address, fax, and email address of the corresponding author, a list of five key words, and a short abstract of maximum 200 words. Please send PDF (preferred) or Microsoft Word formatted papers to Abbas Jamalipour (a.jamalipour@ieee.org) according to the following timetable. The cover page and the manuscript must be sent in separate files. All papers will be reviewed by experts for technical merit, correctness, and relevance.

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