Mobile Networks and Applications

Editor-in-Chief:
Imrich Chlamtac

Mobile Networks and Applications

The journal of special issues on mobility of systems, users, data and computing

Mobile Networks and Applications (MONET) is a joint publication of the ACM and Baltzer Science Publishers

Editor-in-Chief: Imrich Chlamtac, ECS Department, Boston University, 44 Cummington Street, Boston, MA 02215, USA
E-mail: chlamtac@acm.org

Aims and Scope:
MONET's technical scope reflects the emerging symbiosis of portable computers and wireless networks, addressing the convergence of mobility, computing and information organization, its access and management. In approving Special Issues, the journal places an equal emphasis on the various areas of nomadic computing, data management, related software and hardware technologies, and mobile user services, alongside more "classical" topics in wireless and mobile networking. The journal documents practical and theoretical results which make a fundamental contribution, in the following, representative, areas:

- Nomadic computing, applications and services supporting the mobile user
- Design and analysis of algorithms for online and mobile environments
- Protocols to cope with mobility, limited bandwidth, intermittent connectivity
- Data management issues in mobile environments
- Mobile and wireless networks and their architectures
- Mobile node/host architectures
- Mobility management, mobile agent and proxy architectures
- Solutions for portable, mobile and roaming services
- Mobile applications, location-dependent and sensitive applications
- Systems and technologies for wireless and mobile environments, wearable computers and body area networks
- Performance characterization of mobile/wireless and nomadic systems
- Design, management and operation of emerging wireless environments
- Mobile network planning and standardization
- Integration of wireline and wireless systems
- Security, scalability and reliability in wireless communication and computations environments
- Service algorithms, emerging topics, multimedia, ATM, etc.

Subscription Information
Subscription Volume 1, 1996: Institutional price: Swiss Francs 354.00 / US$ 290.00 including postage.
Subscription Volume 2, 1997 (4 issues): Institutional price: Swiss Francs 365.00 / US$ 299.00 including postage.
Personal pricing on request. In case of exchange rate fluctuations the Swiss Francs Price is definitive.
Subscriptions should be sent to your usual supplier or to Baltzer Science Publishers, P.O. Box 37208, 1030 AE Amsterdam, The Netherlands (subscribe@ns.baltzer.nl). Second class postage paid at Rahway, NJ. Postmaster: please send address corrections to Baltzer Science Publishers, C/O Mercury Airfreight International Ltd., 2323 Randolph Avenue, Avenel, NJ 07001, USA. *ACM members:* MONET is available for its members at the rate of US$ 47.00; *student members:* US$ 42.00. In the USA please contact: ACM Member Services Department, Church Street Station, P.O. Box 12114, New York, NY 10257, USA (acmhelp@acm.org); *members in Europe:* ACM European Services Centre, 108 Cowley Road, Oxford OX4 1JF, UK. Phone: +44 1865 382338. E-mail: acm-europe@acm.org. WWW: http://www.acm.org, http://www.acm.org/journals/130.html.

Mobile Networks and Applications

The journal of special issues on mobility of systems, users, data and computing

Volume 1 (1996) No. 3

Published December 1996

Contents

Editorial 233

Wireless ATM – an overview
G.A. Awater and J. Kruys 235

Forward error control for MPEG-2 video transport in a wireless ATM LAN
E. Ayanoglu, P. Pancha, A.R. Reibman and S. Talwar 245

A multiple access scheme for multimedia traffic in wireless ATM
X. Qiu, V.O.K. Li and J.-H. Ju 259

Mobility management in integrated wireless-ATM networks
B. Rajagopalan 273

A signaling and control architecture for mobility support in wireless ATM networks
R. Yuan, S.K. Biswas, L.J. French, J. Li and D. Raychaudhuri 287

Lossless handover for wireless ATM
H. Mitts, H. Hansén, J. Immonen and S. Veikkolainen 299

A hybrid handover protocol for local area wireless ATM networks
C-K Toh 313

A proposal of an ATM wireless access system for tetherless multimedia services
M. Umehira, A. Hashimoto, H. Matsue and M. Nakura 335

A multiple access scheme for multimedia traffic in wireless ATM

Xiaoxin Qiu, Victor O.K. Li and Ji-Her Ju

Communication Sciences Institute, Department of Electrical Engineering, University of Southern California, Los Angeles, CA 90089-2565, USA

Abstract. This paper proposes a multiple access scheme for the forthcoming wireless ATM (Asynchronous Transfer Mode) system. Such ATM compatible wireless systems are motivated by the rapidly increasing demand for wireless extensions to broadband networks, which are expected to support mixed broadband services including Constant Bit Rate (CBR), Variable Bit Rate (VBR), and Available Bit Rate (ABR) traffic. Since these different traffics have very different performance requirements, the multiple access scheme design is very challenging. In this paper, we propose a multiple access scheme called Dynamic Time Division Multiple Access with Piggybacked Reservation (DTDMA/PR), attempting to achieve higher statistical multiplexing efficiency in the mixed VBR/CBR/ABR traffic scenario. The basic idea is to exploit two levels of reservation. The first level deals with the isochronous nature of CBR and VBR traffic and the bursty nature of ABR traffic by using the ALOHA reservation procedure. The second level exploits the piggybacked reservation approach to cope with the dynamic feature of VBR traffic in order to increase the multiplexing efficiency. An analytical model is also developed in this paper and verified by simulation. Numerical examples are given to gain some insight into the protocol itself.

1. Introduction

It is generally believed that the wireless system is evolving towards supporting a wide range of telecommunication services, including data, voice, video, and images. Such "multimedia capable" wireless system is motivated by the rapidly increasing demand for wireless extensions to future broadband networks. It is obvious that this extension will be very challenging because the bandwidth of the wireless system is much more limited than that of its wireline counterpart. But it is very important in the system design to provide at least qualitatively similar attributes even though quantitative equivalence is not feasible. To be compatible with the developing ATM network, the wireless ATM concept is proposed in [13]. In that paper, the possibility of supporting broadband services in the wireless environment is explored from the architecture point of view. The same issues are also discussed in [3] from the system viewpoint. Wireless ATM is a very popular topic nowadays, stimulating much research and commercial interests.

A major technical issue related to the wireless ATM system design which has a significant impact on the user performance, system capacity and complexity is the selection of the appropriate multiple access control scheme. Wireless ATM is expected to support Constant Bit Rate (CBR) traffic such as voice and CBR video, Variable Bit Rate (VBR) traffic such as teleconferencing and dial-up videophone, and Available Bit Rate (ABR) traffic such as packet data, which have very different characteristics (bit-rate range, Quality-of-Service (QOS) requirement, etc.). For example, voice telephone traffic is CBR with bit rates ranging from 2.4 Kbps to 32 Kbps, depending on the vocoder. It is either active (during voice talkspurt) or inactive (between talkspurts). When the source is active, the CBR packet is generated periodically. It can tolerate low to medium packet loss but is not very tolerable to delay and delay jitter. On the other hand, teleconferencing is a VBR type of service with bit rates ranging from 64 Kbps to 384 Kbps. It can also tolerate packet loss but not delay and delay jitter. VBR traffic is also generated periodically but with certain dynamic characteristics. The number of packets generated in a period is a random variable instead of a fixed number as in CBR. Finally, high-speed data with bit rates from 1 Mbps to 10 Mbps requires high transfer rate and very low or no packet loss. But it can tolerate some delay and delay jitter [13]. The desired multiple access scheme must provide mechanisms to deal with each of these service types at reasonable QOS levels.

Several multiple access schemes which attempt to cope with the different features of ATM traffic can be found in the literature. Dynamic Time Division Multiple Access (DTDMA) is discussed in [13] under the integrated voice and data scenario. The frame structure is shown in Fig. 1(a). Each frame is divided into three periods, namely, the reservation subframe, the fixed allocation subframe, and the dynamic allocation subframe. In DTDMA, the voice user can make a reservation for a traffic slot in the fixed allocation subframe by using the ALOHA protocol at the beginning of each active period (or talkspurt) and can keep the slot until the end of its active period. However, the data user has to make reservations each time he has something to transmit. This protocol is designed to provide the flexibility to accommodate CBR and ABR traffic. VBR is not considered. A similar protocol called TDD ALOHA-Reservation is proposed in [15] for the integration of video (VBR) and data (ABR) in wireless LAN. Its frame structure is shown in Fig. 1(b). Each frame is divided into uplink and

DOCKET ALARM

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS
Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS
Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS
Sync your system to PACER to automate legal marketing.