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Prioritized Dynamic Reservation Access For Cellular Wireless ATM Networks

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Abstract. We consider a system configuration consisting of both an uplink MAC (Medium Access Control) protocol with priority access control and a UPC (Usage Parameter Control) at the base station for supporting heterogeneous services. The MAC is implemented by a prioritized TDMA/DR (Time Division Multiple Access with Dynamic Reservation) MAC protocol while the UPC is implemented by a leaky bucket device. A prioritized access strategy to support voice, video and data is described. Voice, compressed video and data are used as test traffic. The performance metrics are delay and cell loss. Numerical results based on approximate analysis and simulation are used to draw conclusions regarding the size of input buffers of the leaky bucket needed to yield a prescribed packet loss rate.
Keywords. wireless ATM, medium access control, usage parameter control, prioritized dynamic reservation TDMA, leaky bucket, performance evaluation.

1 Introduction

Wireless ATM (WATM) networks are attractive because they can provide true portability and support for personal, integrated broadband services currently envisioned for wired ATM systems only. A wireless ATM access network has to provide a reasonable user-transparent QoS for different service classes as well as seamless integration across an interconnection of wireless and wired ATM networks. Communication support in wireless ATM involves three fundamental control issues: (i) medium access control (MAC), (ii) usage parameter control (UPC) and (iii) connection admission control (CAC). In the literature, there are numerous papers that address the MAC in wireless ATM-based networks, e.g., [12,15,16,19,24,28,30-32,39,40-43,45,48]. Most of the WATM networks are based on a time division multiple access (TDMA) technology. TDMA with dynamic reservation was first introduced by Lee and Mark in [22,23] in a packet-switched satellite communications setting.