

SIMULATION PERFORMANCE OF EFFECTIVE BANDWIDTH IN WIRELESS ASYNCHRONOUS TRANSFER MODE (WATM) NETWORK



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ABSTRACT

Recently there has been a considerable research interest in the next generation mobile networks. For fixed networks ATM is considered as the enabling technology to handle multi-service traffic. So to ease the transition, as well as aid simple internetworking, it is natural to use ATM for the mobile network as well. This is a non-trivial task that poses several technical challenges. Most of these challenges arise from the inherent differences between the wired and wireless media and from user mobility in the wireless world. One of the main problems with wireless ATM is overcoming the unreliability of the wireless link in order to maintain quality of service requirements over the wireless portion of the network using error control mechanisms.

Link capacity fluctuates according to a fluid version of Gilbert-Elliot model. Traffic sources are modeled as an on-off fluid process. This analytical framework incorporates the effects of error control schemes (FEC), which are used to improve the transport performance. The exact Cell Loss Rate (CLR) is derived from the buffer overflow at the sender side of the wireless link. A good closed form approximation of effective bandwidth is also obtained. From there, associated parameters affecting the effective bandwidth can be analyzed by evaluating the mathematical models using MATLAB. The parameters to simulate this software have been taken using 'on-off' traffic sources with exponentially distributed 'on' and 'off' period. Finally, the expressions for CLR and effective bandwidth are the used to study the optimal parameters that guarantee the Quality of Service (QoS). The results of the effective bandwidth performance in a wireless ATM link is affected by a few parameters, which are buffer size, bit error rate, cell loss ratio and number of correctable errors are reported and commented on.

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CHAPTER

INTRODUCTION

1.1 INTRODUCTION

The last few years has seen an explosion in wire line broadband networking technologies. This has been driven by an increased user demand for video teleconferencing, image applications, world wide web access and other multimedia applications as well as advancements in key enabling technologies such as high-speed digital transmission (optical fiber), digital signal processing and high-speed integrated circuits. In this time Asynchronous Transfer Mode (ATM) has emerged as the front-runner in integrated telecommunication technologies. ATM provides high-speed transfer, integration of traffic types, flexible bandwidth allocation and service type selection for a range of applications, efficient multiplexing of data from bursty data/multimedia sources and simplified network management. It is rapidly becoming a worldwide standard and has moved from concept to reality in the space of a few years. Wireless personal communication networks have also emerged as an important field of activity in telecommunications. This surge of interest is due to several factors such as the increased availability of wireless personal computing, entertainment and communication devices, liberalization of spectrum allocation procedures and advances in digital signal processing and radio modem technologies.

1.2 MOTIVATION AND HISTORY

The provisioning of QoS is particularly difficult in the wireless environment due to the scarcity of bandwidth and to the high and fluctuating bit-error rate (BER) of the radio channel.