Electrical & Computer Engineering

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Louisiana State University

Achievable Quality of Service Region and Call Admission in Wireless ATM Networks

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Abstract—Wireless asynchronous transfer mode (WATM) has been proposed as a potential solution for broadband integrated wireless networks. Extending ATM services to the wireless environment allows for allocation of bandwidth on demand, quality of service (QoS) guarantees, as well as seamless transmission of ATM cells between wired and wireless networks without the need for protocol conversion.

ATM is designed for a fiber-based network where bandwidth is plentiful and can be allocated dynamically based on users' need, and transmission quality is very good (bit-error-rates of 10^{-9}). In ATM provision of quality of service (QoS) is achieved through call admission control and packet scheduling disciplines. In wireless ATM, however, due to the nature of the radio channel, design of call admission control and packet scheduling policies is more challenging. In the radio channel bandwidth is limited and must be shared by all users and the transmission quality is usually poor.

In this talk we derive the achievable QoS region for a family of channel-adaptive work-conserving, earliest-due-date (WC-EDD) scheduling policies operating in a time division multiple access (TDMA) system. The radio channel is modeled by a two state Gibert/ Elliot channel model (a good state with no errors and a bad state with high bit error rate). The scheduling policies are adapted so as not to schedule transmissions for the terminals whose radio channels are in a bad state. From the achievable QoS region we can then derive the call admission control algorithm for the WATM network.

When: Tuesday, **28 September 1999,** 13:30 - 14:30
Place: 117 EE Building
Info: `http://www.ee.lsu.edu/seminar`