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Approximations on the Aggregate MPEG Video Traffic and Their Impact on Admission Control

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Abstract: In this paper, we investigate the aggregate traffic approximations for the Motion Pictures Expert Group (MPEG) coded variable bit rate (VBR) video traffic and their impact on admission control at a desired Quality of Service (QoS) level. In order to generate the MPEG coded VBR video traffic, we use a novel source model that employs a mixture of two first-order autoregressive processes with lognormally distributed residuals (2LAR). The model parameters are found based on least square estimates to capture the marginal distribution and autocorrelation function as well as the single server queuing behavior of an MPEG coded empirical bitstream. We also present two candidate approximations to estimate the aggregate traffic: Gaussian and lognormal approximations, such that the former relies on the central limit theorem and the latter, which relies on the residual sequence of the 2LAR process, is further estimated based on moment expectations by a lognormal distribution. Finally, we show a set of Monte-Carlo simulation results for these approximations based on an admission control strategy that is specified by a QoS threshold determined by the value of the probability of aggregated traffic exceeding the link capacity.

Key Words: MPEG video source model, aggregate traffic, quality of service, admission control

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