PERFORMANCE ANALYSIS OF QOS AWARE CELLULAR MOBILE SYSTEMS

by

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1. Cellular Mobile systems

To

my loving

PARENTS

for their

unending

support

Certificate

This is to certify that the dissertation entitled "**Performance Analysis of QoS Aware Cellular Mobile Systems**" by **Samya Bhattacharya** in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Electrical Engineering is a bonafide record of his own work carried out under our supervision and guidance. In our opinion, the thesis has reached the standards fulfilling the requirements of the regulations related to the degree. It is also certified that this work has not been submitted elsewhere for any other degree or diploma.

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Abstract

The performance analysis of state-of-the-art cellular mobile systems with micro- and pico-cells has attracted considerable attention. These systems are subjected to different propagation conditions, and service users with highly variable mobility. In such scenarios, it has been shown that the handoff process does not remain Poisson distributed. As a result, even if the fresh call arrival process can be represented by a Poisson distribution, the aggregated traffic stream is more realistically represented by the General distribution. It has also been proposed that in case of General distributed traffic, the two-moment representation (mean,variance) of traffic is a better approach than a single moment representation. Taking the above into account, we propose a number of cellular mobile traffic models for fixed channel allocation and dynamic channel allocation, considering the cases, where user population is either infinite or finite. We first propose an improved traffic model for cellular mobile systems using fixed channel allocation scheme, where fresh call arrival follows Poisson distribution (infinite user population) and handoff process follows General distribution. Next, we extend the above in case of dynamic channel allocation. In addition, we develop an indoor mobility model for cellular mobile systems, which considers asymmetric cellular structure. Finally, the above traffic models are modified for the case of finite user population. The proposed traffic models are used in the above indoor mobility model to investigate the performance of the cellular mobile systems in terms of some QoS parameters. The proposed models are useful for system designers to allocate the resources effectively for a given set of QoS constraints.

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