

PERFORMANCE ANALYSIS OF QOS. AWARE CELLULAR MOBILE SYSTEMS

by

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Submitted

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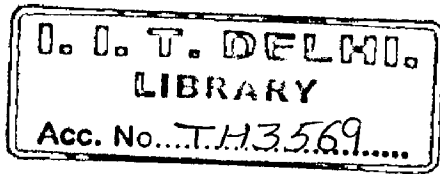


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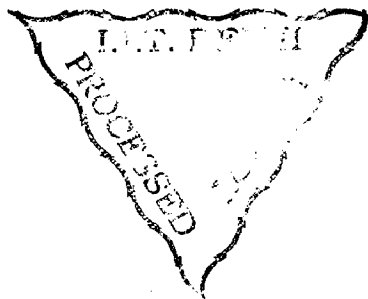
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1. Cellular Mobile Systems



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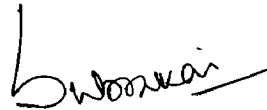
Certificate

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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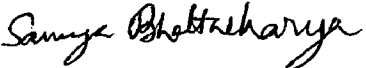
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Abstract

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.

Table of Contents

1	Introduction	1
1.1	Evolution of Cellular Systems	2
1.2	Basic Concepts of Cellular Systems	5
1.3	Multiple Access, Handoffs, and Channel Allocation	7
1.3.1	Fixed Channel Allocation	8
1.3.2	Dynamic Channel Allocation	11
1.4	Impact of Cellular Traffic and User Mobility on Connection Admission Control	11
1.5	Earlier Studies	13
1.5.1	Traffic models for Poisson distributed fresh call arrival and Poisson distributed handoff process	13
1.5.2	Traffic models for Poisson distributed fresh call arrival process and General distributed handoff process	19
1.5.3	Indoor mobility modeling	20
1.6	Open Problems and Motivations	22
1.7	Organization of the Thesis	24
2	An Improved Traffic Model using General Distributed Handoff Process and Fixed Channel Allocation	27
2.1	Introduction	27
2.2	General Distributed Handoff Traffic Estimation	29
2.2.1	The Two-Cell Model	29
2.2.2	Extension To Multi-Neighbor Model	32
2.3	Estimation of Congestion	37

2.4	Model Validation	39
2.5	Results	41
2.6	Conclusions	43
3	A Traffic Model using General Distributed Handoff Process and Dynamic Channel Allocation	45
3.1	Introduction	45
3.2	Traffic Model for Dynamic Channel Allocation	46
3.2.1	Assumptions	47
3.2.2	Construction of a Two-Dimensional Markov chain	48
3.3	Estimation of Congestion	53
3.4	Model Validation	54
3.5	Results	56
3.6	Conclusions	60
4	QoS in an Indoor Mobility Model for General Distributed Handoff Process and Dynamic Channel Allocation	61
4.1	Introduction	61
4.2	Mobility Model of an Airport building	63
4.2.1	Assumptions	63
4.2.2	Estimation of Mobility	65
4.3	Traffic Models	70
4.3.1	Comparison assuming General distributed Handoff Traffic with DCA	71
4.3.2	Comparison assuming Poisson distributed Traffic with FCA	72
4.3.3	Comparison assuming Poisson distributed Traffic with Timid DCA and Aggressive DCA	73
4.4	QoS parameters	75
4.4.1	Evaluation of the QoS parameters	75
4.4.2	Relative merits and demerits of the QoS parameters	77
4.5	Results and Discussions	78
4.5.1	Effects of Cell Types on Congestion	79

4.5.2	Effects of Offered Load on Congestion	81
4.5.3	Effects of User Speed on Congestion	83
4.5.4	Effects of Elevator Cell Residence Time on Congestion in an Elevator Cell	84
4.5.5	Effects of Offered Load and User Speed on QoS parameters .	85
4.6	Conclusions	90
5	A Finite Population Traffic Model for General Distributed Handoff Pro- cess and Fixed Channel Allocation	93
5.1	Introduction	93
5.2	The Two-Cell Model	94
5.2.1	Concept of Freed Carried Traffic in the Virtual Cell	97
5.2.2	Estimation of Handoff Traffic in Two-Cell Model	99
5.3	Extension to the Multi-Neighbor Model	100
5.3.1	Extension of Sanders [1] and Girard's Method [2] for Engset distributed Call Arrival Process	101
5.3.2	Equivalent Cell - Estimation of Handoff Traffic in Multi-Neighbor Model	104
5.4	Estimation of Congestion	105
5.5	Model Validation	111
5.6	Results	113
5.7	Conclusions	116
6	A Finite Population Traffic Model for General Distributed Handoff Pro- cess and Dynamic Channel Allocation	119
6.1	Introduction	119
6.2	Traffic Model for DCA	120
6.2.1	Assumptions	121
6.2.2	Construction of a Three-Dimensional Markov chain	122
6.3	Estimation of Congestion	133
6.4	Model Validation	134
6.5	Results	135

6.5.1	Application to an Indoor Mobility Model	140
6.6	Conclusions	146
7	Conclusions and Future Scope	149
7.1	Key Contributions	151
7.2	Future Scope	152
	Bibliography	154
	Appendices	161
A		161
A.1	Expressions for the Carried Traffic	161
A.2	Factorial Moments for the Offered Traffic	163
A.3	Expressions for the Overflow Traffic	164
A.4	Expressions for the Freed Carried Traffic	166
A.5	Expressions for the Handoff Offered Traffic	169
A.6	Expressions for the Aggregated Traffic consisting of Heterogeneous Traffic streams	171
B		173
B.1	Determination of $p_{th}(\epsilon, \Delta_i)$	173
B.2	Combination of Stochastic Variables	175
B.2.1	Stochastic Variables in Series	175
B.2.2	Stochastic Variables in Parallel	176
C		179
C.1	Carried Traffic for the Engset type arrival	179
C.2	Semi-Markov Analysis to estimate the variance of the traffic in the virtual cell	181
	List of Publications	189
	Author's Biography	191