Executive Summary of Minor Research Project entitled

STUDY OF CUSTOMER AND SERVER INDUCED INTERRUPTIONS IN QUEUEING SYSTEM WITH APPLICATIONS IN WIRELESS NETWORKS

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Congestion is a natural phenomenon in real systems. A service facility gets congested if there are more people than the server can possibly handle. Thus Queueing theory deals with mathematical techniques for analyzing congestion problems. Service interruptions in a queueing system are a common phenomenon and there is an extensive literature on this. In the literature of queues with interruptions, recently *Krishnamoorthy, Pramod, Chakravarthy* (2012) provide a survey of work in queues with interruption and some new results. Up to 2010, all work on interruptions deal with server induced ones. Thus all work reported deal with cases in which service interruptions are generated by sources other than customers. However, there are situations where interruptions are due to the customers rather than the system, we call such interruption as customer induced interruption.

In the literature of queues with interruptions, the study of customer induced interruptions have been first introduced and studied by *Jacob, Chakravarthy and Krishnamoorthy* (2010). The purpose of this study is to extend the service interruptions to both customer induced and server induced in a queueing models in a general aspect. We can see these type of queueing models in communication networks especially in wireless network. In this study we considered a single-server queueing system with customer and server induced interruption of service. All underlying distributions are assumed to be exponential that are independent of each other. A finite buffer BIP, of capacity K, for self interrupted customers to wait for completion of interruption and another buffer BIC, of the same capacity, for those who have completed interruptions, are introduced. The combined maximum customers held in BIP and BIC together are K for reasons obvious from the formulation of the model. The steady-state analysis of the model is performed using Matrix Geometric Method. Expected number of server induced interruptions during a single service and expected waiting time in the primary queue are computed. Several performance measures are derived. Numerical illustration of the system behavior is also performed. An optimization problem of interest that determine the optimal capacity of the buffer for interrupted customers, so as to maximize the Expected Total Profit when all other parameters stay put are investigated.

In wireless networks (both LANs and cellular networks) while data transmissions is carried out, the signals (packets) will be corrupted due to lower signal-to-noise ratio. Consequently the performance of such networks may be affected severely due to invoking transmission control protocol (TCP) congestion algorithms whenever a packet is lost. So the proposed model describes how received packets are corrected based on Fano decoding mechanism and how the retransmission of corrupted packets is performed. Using the present queueing model we can analyze these type of problems in wireless networks.

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