CHAPTER 7

CONCLUSION AND SCOPE FOR FURTHER ENHANCEMENTS

7.1 CONCLUSION

The main contribution of this thesis was to show how the system performance measures in terms of crisp values are evaluated for different fuzzy queuing models. These fuzzy queuing models are helpful to design computer networks to avoid buffers. Performance measures of (FM/FM/1): (∞/FIFO/∞) queue have been evaluated using fuzzy structured element. Construction of fuzzy structured element is based on the property that Monotonic transformation of a fuzzy number is also a fuzzy number. This method provides analytic computation of the fuzzy number and fuzzy-valued functions and makes fuzzy numbers directly involved in the operation. Robust ranking technique has been used to defuzzify the values of fuzzy performance measures for decision making.

System characteristics for fuzzy non preemptive priority queue and fuzzy bulk arrival queue have been provided for different fuzzy arrival rates and fuzzy services rates. Trapezoidal and triangular fuzzy numbers are used as input parameters. As the inputs are fuzzy and output results are crisp values, it is concluded that this method is suitable for system designers to take optimum decisions.
In this research work, series queue with blocking technique has been used between network layers to improve the Quality of Service (QoS) in Mobile Ad hoc Networks (MANETs). To analyze energy consumption, blocking probabilities of the arrival packets has been found for different fuzzy arrival rates and different service rates. According to the arrived results, it was found that when service rate is increased in the MAC layer, packet dropping as well as energy consumption will be reduced considerably. So it is concluded that this method provides the system designers to design the microcontroller and wireless transceiver chips effectively.

Moreover, multiprocessing unit has been used in the MAC layer of OSI network model in order to improve the performance of communication. Multiprocessing unit provides best QoS performance enhancement in OSI layers compared to single processing unit. As arrival rates of data packets are fuzzy numbers, the system is more realistic and nature. The proposed model gives clear picture on how transceiver and receiver should be designed in order to reduce data loss and minimize buffer size.

In addition to that, system performance measures analysis has been presented for heterogeneous computing network for different fuzzy arrival rates and fuzzy service rates using fuzzy queuing system with heterogeneous servers. From the numerical analysis, it is concluded that when difference between efficiency of two server increases, the system attains better performance results. So this method provides optimum results for system designers even installation of servers with high efficiency compared to data loss.
7.2 SUGGESTION FOR FUTURE RESEARCH

Though the present work has brought out some important results and conclusions on fuzzy queuing models and applications in computer networks the research work could be extended further to address the following issues:

i. The fuzzification of system performance measures for multiple server queuing models using fuzzy structured element could be studied.

ii. Performance measures evaluation for fuzzy non pre-emptive priority queues and fuzzy bulk arrival queues could be made using fuzzy arithmetical operations under function principle.

iii. The present work could be extended for different ad hoc networks to improve QoS performance using fuzzy queuing models.

iv. Extensive study of other performance metrics such as throughput, packet delivery ratio, and average end-to-end delay may be carried out in different OSI layers using series queue with blocking technique.

v. System performance measures analysis for heterogeneous computing network could be made using fuzzy arithmetical operations under function principle.