

## ABSTRACT

This dissertation will review the existing methods for the analysis of network reliability. Additionally, it reviews the literature in the areas related to Adhoc networking, wireless networking and reliability optimization. An extensive review has been done to identify the current drawbacks in analyzing the Network reliability. Moreover, this research presents suitable methods and potential results to solve many real life problems.

The main objective of this dissertation is on executing reliability of MSFN and MIN. This manuscript demonstrates an inclusive approach for analyzing certain reliability models, discussions on real life application of stochastic models that diverse the areas like Stochastic Flow Networks (SFN), Mobile Adhoc Networks (MANET), and Vehicular Adhoc Networks (VANET). The ultimate aim is to offer a Mathematical model to realize a highly reliable network that still conforms to other constraints like time and cost towards the system's development.

Organization of this dissertation is as follows. Introduction to this research field is done in Chapter 1. Chapter 2 models an algorithm to pertain the reliability evaluation of a MSFN. The problem accounted in this chapter is on executing the reliability of a MSS using Minimal path (MP) algorithm. The problem modelled here analyse the reliability of the system while sending  $d$  amount of data through  $m$  number of MPs simultaneously under both time and budget constraints.

Chapter 3 expounds the assessment of MANET reliability using the Universal Generating Function Technique (UGFT) subject to the constraints minimum cost and time . The different physical nature and different types of elements interaction of the MANET are modelled by constructing UGFs, which are used to describe the probability distributions of successful delivery between source and target. The communication within the network is addressed by the path UGF. .

Chapter 4 focuses the assessment of MANET by considering the Cluster Head Gateway Routing (CHGR) protocol. Chapter 5 discusses the novelty algorithm for performance

assessment of a MANET using weighted Universal Generating Function Technique (WUGFT). This work introduces a novelty approach based on Weighted Universal Generating Function which will reduce the computation burden in achieving the reliability of a MANET.

The emphasis in Chapter 6 is on enhancing the MANET reliability using Reliable Cluster Forming Protocol (RCPF). Cluster formation and execution of link reliability is formulated using a novelty algorithm based on UGFT. A simulation environment using Network Simulator-2 (NS-2) has also been done.

Chapter 7 aims to execute the VANET reliability using the UGFT. VANET is a subset of MANET where the moving vehicles are considered as nodes to make a communication between vehicles. The primary goal of VANET is to disseminate road safety messages including vehicles current speed, location, traffic alert messages, drivers behaviours etc. in an efficient manner. Chapter 8 is intended to provide a reliable path discovery in vehicular adhoc network using RCFP. This chapter integrates the performance of RCFP in VANET domain. It implements RCFP in five phases namely identifying neighbouring nodes, calculation of combined weight, cluster formation, achieving the connectivity among clusters and routing.

## **LIST OF PUBLICATIONS**

### **International Journals**

1. **Meena, KS & Vasanthi, T** 2015, 'The Performance Assessment of MANET using WUGF', Research Journal of Applied Sciences and Technology, vol. 10, no.8 , pp. 942-950. (Listed in Anna University Annexure II,- S.NO 17354).
2. **Meena, KS & Vasanthi, T** 2014, 'Reliability Analysis of Mobile Adhoc Networks using Universal Generating Function', Quality Reliability Engineering International, Wiley. Article first published online: 28SEP 2014, |DOI:10.1002/qre.1731.( Listed in Anna University Annexure I - S.NO 1732, Impact Factor-1.191).

3. **Meena, KS & Vasanthi, T** 2013, Bayes Approach for the Series System with Type-2 Censoring ,International Journal of Math. Analysis, Vol. 7, 2013, no. 13, 599 – 612. (Annexure II,-S.NO 9069).
4. **Meena, KS & Vasanthi, T** 2012 Optimal System Reliability through Number of Minimal Paths under Budget and Time Constraint, European Journal of Scientific Research,vol.80, no.2, pp.260-269.
5. **Meena, KS & Vasanthi, T** 2012, 'Reliability Design for a MANET with Cluster Head Gateway Routing Protocol', Communication in Statistics-Theory and Methods. (Accepted for publication - Listed in Anna University Annexure I,-S.NO 1945, Impact Factor 0.284).
6. **Meena, KS & Vasanthi, T** 'Enhancing the Performance of RCFP: Reliable Cluster Forming Protocol' (Under review –Journal of Applied Mathematics Listed in Anna University Annexure I,- S.NO 4290, Impact Factor 0.72).

### **National Conferences**

7. **Meena, KS & Vasanthi, T** 2012, 'Optimal Reliability Evaluation of Multi state Stochastic Flow Network with Unreliable Nodes', Presented at: National Symposium on Mathematical Methods And Applications (NSMMA-2012), IIT, Chennai. Abstract Book pp. 22
8. **Meena, KS & Vasanthi, T** 2015, 'Multi State Reliability Analysis of Tele Communication Network', in UGC sponsored NACCAM 20105 at Erode Arts and Science College, Erode, Year: 2015, Abstract Book pp. 21.