ABSTRACT

Transmission Control Protocol (TCP) is a transport layer protocol which provides reliable end to end data delivery between end hosts in traditional wired network environment. In TCP, reliability is achieved by retransmitting the lost packets. Thus, each TCP sender maintains a running average of the estimated round trip delay and the average deviation derived from it. Packets will be retransmitted if the sender receives no acknowledgment within a certain timeout interval (e.g. the sum of smoothed round trip delay and four times the average deviation) or receives duplicate acknowledgements. Due to the inherent reliability of wired networks, there is an implicit assumption made by TCP that any packet loss is due to congestion. To reduce congestion, TCP invokes its congestion control mechanisms whenever any packet loss is detected. Since TCP is well tuned, it has become the de facto transport protocol in the Internet that supports many applications such as web access, file transfer and e-mail.

Due to its wide use in the Internet, it is desirable that TCP remains in use to provide reliable data transfer services for communications within wireless networks and for those across wireless networks and the wired Internet. It is thus crucial that TCP performs well over all kinds of wireless networks in order to extend the wired Internet to extend to the wireless world.
Unfortunately, wired networks and wireless networks are significantly different in terms of bandwidth, propagation delay, and link reliability. The implication of the difference is that packet losses are no longer mainly due to network congestion. They may well be due to some wireless specific reasons. As a matter of fact, in wireless LANs or cellular networks, most packet losses are due to high bit error rate in wireless channels and handoffs between two cells, while in mobile ad hoc networks, most packet losses are due to medium contention and route breakages, as well as radio channel errors. Although TCP performs well in wired networks, it suffers from serious performance degradation in wireless networks.

As TCP is a slow start it cannot differentiate losses due to link breakage, congestion delay window and power level of nodes. In this thesis some investigations are made to improve the performance of TCP in Ad hoc networks.

The main objectives of this research are listed below:

- To increase the reliability of TCP in mobile ad hoc networks, it is proposed a new algorithm, namely TCP-SA(Shooting of Acknowledgement), It reduces acknowledgements by using two parameters like delay window and delay window limit to improve the channel utilization of the network by which it can minimize the delay and increase the throughput of the network.
- To propose an algorithm which uses signal strength to estimate the link breakage due to varied power level of nodes and it reduce packet drop, using dynamic window size mechanism the acknowledgments of emptied, error and lost packets are mostly reduced to avoid congestion in the network. Packets buffers at intermediate node until the new route are discovered.

- To propose a new mechanism namely Explicit Congestion Control Protocol with Buffer management (ECCPBM). This mechanism involves in monitoring of packet Congestion, packet flow rate and Channel capacity of each multi-hop node. During channel under utilization it acts on TCP to regulate the packet flow by buffering them to the intermediate node and it completely checks the error and damaged packets in all the nodes by generating random early detection and explicit congestion notification feedback mechanism.

- Finally proposing a route Lifetime-prediction protocol in a Energy aware Greedy Nature Routing protocol (LEGR) to predict continues node life time and link life time for mobile Ad hoc network. This environment based on Ad hoc on demand Distance Vector routing (AODV) to improve the effectiveness of TCP is also mooted and described.