ABSTRACT

A Mobile Ad hoc Networks (MANETs) is an infrastructure-less self-configuring network in that nodes themselves create and manage the network in a self-organized manner. Mobile Ad hoc networks play an important role in the deployment of future wireless communication systems. MANET in todays world finds its use in disaster management, military applications and other emergency operations. MANET demands great performance requirements in recent years due to the increased use of streaming multimedia applications. To meet these requirements, the existing routing protocols should provide data transfer with minimal delay, packet loss and jitter in a bandwidth restricted environment. A MANET inherently depends on the routing scheme employed to provide expected Quality of Service (QoS). Many congestion control routing protocols have been developed in the past to address these issues such as Dynamic Source Routing (DSR), Ad-hoc on-Demand Distance Vector (AODV), Zone Routing Protocol (ZRP) and Temporally Ordered Routing Algorithm (TORA). However, the capability of this traditional protocol to support streaming multimedia applications is limited. In the present investigation, we have proposed different approaches of Random Early Detection (RED) through queue management to design of an effective congestion control routing protocol for MANET. RED is a powerful mechanism for controlling traffic. It can provide better network utilization than Drop-Tail if properly used, but can induce network instability and major traffic disruption if not properly configured. RED configuration has been a problem since its first proposal, and many have tried to address this topic. Unfortunately, most of the studies propose RED configurations (optimal sets of RED parameters) based on heuristics and simulations, and not on a systematic approach. Their common problem is that each proposed configuration is only good for the particular traffic conditions studied, but may have detrimental effects if used in other conditions. In this study, we propose a general method for configuring RED congestion control modules, based on a model of active queue management (AQM).

In this dissertation, six new congestion control models Model-1: Application of

Dynamic Weight with Distance to Improve the Performance of RED (ADWD-RED-IP), Model-2: Active Queue Management in RED to Reduce Packet Loss (AQM-RED-RPL), Model-3: A Predictable Active Queue Management to Reduce Sensitivity of RED Parameter (PAQM-RS-RED), Model-4: An Innovative Active Queue Management Model Through Threshold Adjustment Using Queue Size (IAQM-TA-QZ), Model-5: A Nobel Congestion Control Algorithm Using Buffer Occupancy RED (CCA-BO-RED), Model-6: Active Queue Management in RED considering Critical Point on Target Queue (AQM-RED-CPTQ) have been introduced to improved the performance in RED. The Model-1 (ADWD-RED-IP) is proposed where the dynamic weight parameter D_q is presented with a probability of P_q to increase the RED efficiency. Next the Model-2(AQM-RED-RPL) is designed where less packet drop achieved by making many refinements and monitoring both the average queue size and the immediate queue size of the packet dropping function. After that Model-3 (PAQM-RS-RED) has been suggested which can also be incorporated as a clear demonstration in under RED routers, eliminates the sensitivity to variables that influence the functioning of RED and in a broad range of traffic situations can reach a clearly defined target average queue length reliable. Then, Model -4 (IAQM-TA-QZ) provides an algorithm that adapts the threshold parameters and probability of packet drop as per the load condition of traffic. The next Model-5 (CCA-BO-RED) which measure the rate of occupancy of the queue and treat it as a congestion parameter that will be predicted when the queue is crowded. This method is used to modify RED variables dynamic. Finally, we have proposed Model-6 AQM-RED-CPTQ). In order to provide greater congestion management over the network while also preserving the value of RED, it works to enhance these criteria. This model will introduce Critical Point on Target Queue and some traits of RED and its variations.

This research analyzes the performance of the proposed congestion control Ad hoc routing protocols such as Random Early Detection (RED) and Variation of RED using

Network Simulator Version no. 2 (NS- 2). The simulation is carried out with 100 nodes. Network traffic scenarios one with 10 connections and other with 20 connections are considered. The simulation area is 400 x 400 and 600 x 1000 meters and the mobility speeds fixed are 10 m/s and 20 m/s. The performance of the above routing protocols was analyzed in Random Waypoint, Random Walk and Random Direction Mobility Models. The packet delivery ratio and the end-to-end delay for varying number of sources has been evaluated with respect to the parameters such as node speed, Network Traffic and Node Density. The comparative study pointed out the relative strengths and weakness of those congestion control Ad hoc routing protocols.

In the present research, various methodologies have been introduced to improve the existing routing schemes for congestion control with the help of active queue management. We have compared our proposed schemes with the some of the popular existing scheme like RED, ERED, SRED, REM, BLUE, LDC, and FREED. It has been observed that End to End delay, Packet Delivery Ratio, the number of packet drop count is calculated and shown better than other existing schemes.