Performance Exploration of QoS parameters in MANET

D.V. Biradar, **Praful P. Maktedar**

Abstract*—Nowadays there are large applications expanding for the reliable transport of data packets from source node to the sink node amongst them Mobile Ad hoc network (MANET) has very vast extent of study. Different mobile sensor nodes are arbitrarily positioned in given network without having much loss of data packets in the network. It encompasses number of sensor nodes having inadequate processing power, communicating over a network. These sensors are scattered in specified network environment so that they gathers data, process that data and send it back to the destination. Various factors are affecting on data transmission process like reporting rate, packet size. Here by changing reporting rate, we calculate packet Delivery Ratio, Packet loss Ratio as well as throughput, control overheads and Energy consumption of a system.

***Index Terms*— Mobile Ad hoc Network; Reliability; Reporting Rate; Packet Delivery ratio; Congestion Control.**

I. INTRODUCTION

Mobile Ad hoc network is self-configuring, and self-maintaining networks. Different Mobile sensor nodes are randomly placed in given sensor field. As there are no predefined network infrastructures, so mobile nodes are continuously changing their positions Mobile nodes acts as routers and they forward the data packets to the other nodes. So the routes between nodes may potentially contain multiple hops. Due to node mobility in MANET route may changes very frequently. As mobile routers are connected with wireless link which form random topology of a network. If MANET is tied with Internet or any other private network then it is called as Hybrid MANET [1].

MANET will provide full network flexibility which makes it useful for natural disasters like tsunami, Earthquake; in military applications, in extreme medical situations and so on, MANET has many advantages like low cost, Easy and speed of deployment, flexible and minimizes dependency on network infrastructure. There may be chance of node misbehaving means a node is agree to join the route but it does not forward the packet to next hop node. It is doing so because it wants to conserve its energy or due to launch a denial of service attack or may be overload of data packets. To minimize this, we use a Watchdog Timer Approach. In this approach, each node governs that whether a node is forwarded a packet or not, in same way, each node try to monitor its forwarded node for efficient data packet transmission process. Path rater is run by each node.

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Each node assign rating to its known node such that previously unknown nodes are assigns as neutral nodes with rating 0.5. The suspected misbehaving nodes are rated with negative value while other nodes having positive rating between 0 to 0.8 value. Each node wills successfully forward data packets must sent an acknowledgement to its previous node [2]. In case of packet loss, node will send NACK means Not Acknowledgement message to its previous node so that retransmission of lost packet take placed. Fig.1 illustrate Mobile Ad hoc network. It involves of 9 mobiles nodes. As node R1 alternate its position then topology of network transformed. So that new route must be found to convey packets to node R1. It is not promising that all the nodes are present in each other range.

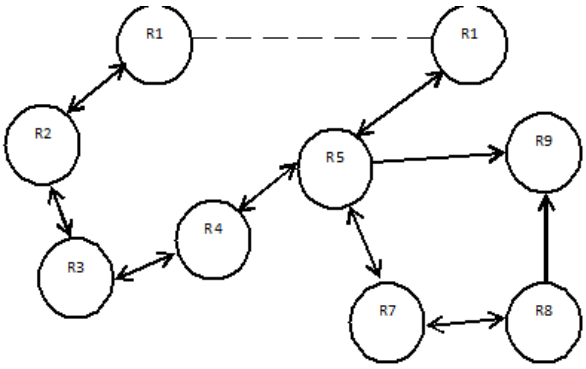

Fig1. Mobile Ad hoc Network

Some of them are present in range of other 2 or more nodes as well as some are out of range. Another concern is symmetrical (bi-directional) and asymmetrical (unidirectional) links. As shown in fig.1 node R2 is in the range of R3 node and node R3 is in the range of R2 node so they can communicate with each other symmetrically. But node R5 and node R9 are not in the range hence they link asymmetrically [3].

II. LITERATURE SURVEY

Richard j. La et al [4] suggested that Mobile Ad hoc Network (MANET) is an association of mobile nodes which can build and retain their network without any central authority. As there is no switches and routers for forwarding packets so each node is depends upon its neighboring node.

A location server will preserve locations of all the mobile nodes in the network. But in case of MANET location server is absent. The nodes are deployed in a given geographical area may be vulnerable to attack by third party.

Here with the use of mobile nodes we make a virtual location server which will provide location information of all nodes. Due to distribution and recovery of locality evidence of

nodes routing overheads may arise. Each packet has its ID and address of its destination node. If mobile nodes are interrelated means if we know that the position of mobile nodes and route covered by them then calculated routing overheads goes on slightly increasing [5]. Shengbo Yang et al [6] presents that in MANET if we prearranged the route of data transmission then it is hard to sustain it. The route discovery and recovery processes are also time and energy consuming. If in case, the path breaks, then data packets will get lost or delayed for long time until reconstruction of route. This paper deals with problems of reliable delivery of data packets.It suggested Position Based Opportunistic Routing (POR) Protocol. A time limit is set for packet forwarding process. If any node does not forward the packet within certain time limit then suboptimal candidate node will forward it according to locally formed order. So all packets are either succeeds in sending or receiving by candidate nodes leads to no disturbance in data transmission process. In POP protocol, additional selecting next hop node, several candidate nodes are explicitly specified in case of link break and broken route can recover in timely manner [7]. Xiaoqin Chen et al [8] MANET is self-configuring, dynamic network in which nodes are free to move. MANET selects multi hop paths for the data packets transmission and its reliability is be influenced by reliability of channel on each hop that link fluctuation. To sidestep this, it projected a new channel adaptive routing protocol which extends Ad hoc on Demand Multipath Distance Vector (AOMDV) Routing protocol [9]. It used to select stable links for path discovery. So that routes can be used again when they are accessible again, rather than discarded [10].

Handoff means getting range of signals anywhere within a precise zone. Soft handoff is receiving a signal from next cell without leaving previous cell. Hard handoff means breaking signal while getting out of the cell. Through path conservation, expected signal strength and channel average fading duration are combined with handoff to conflict channel fading and progress channel consumption [11].

III. PERFORMANCE ANALYSIS

We use Network Simulator (NS2) tool for simulation of nodes present in a given network area. We take 50 nodes as one of them is sink node. Reporting rate of packets is 10 packets per second. We use random topology. IEEE 802.11 Medium Access Control (MAC) protocol is used and Ad Hoc on Demand Routing Protocol (AODV) routing protocol is used. On the basis of this scenario we can draw the following graphs.

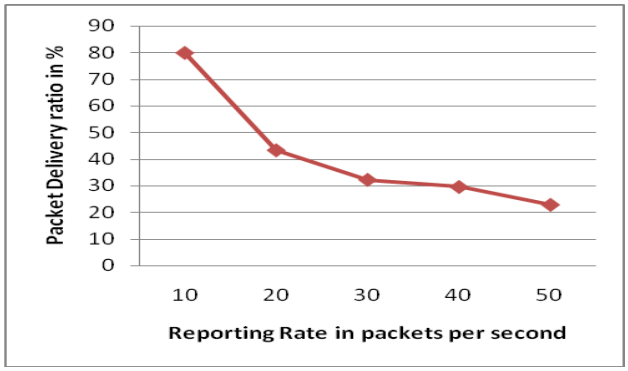

Fig2. PDR is a function of reporting rate in packets per second

Fig. 2 shows the graph of packet delivery ratio (PDR) in percentage as a function of reporting rate in packets per second. At the beginning, when reporting rate is 10, PDR is high. But as reporting rate increases; PDR decreases. Because due to increase in reporting rate, increases number of packets in given network but processing speed of network and buffer size is not increased hence congestion happens in given network so that packets does not find a path to reach to destination. Nodes that are added in given network go in starvation mode. They neither transmitting data packets nor receiving data packets which results in decreasing PDR rate of a given network.

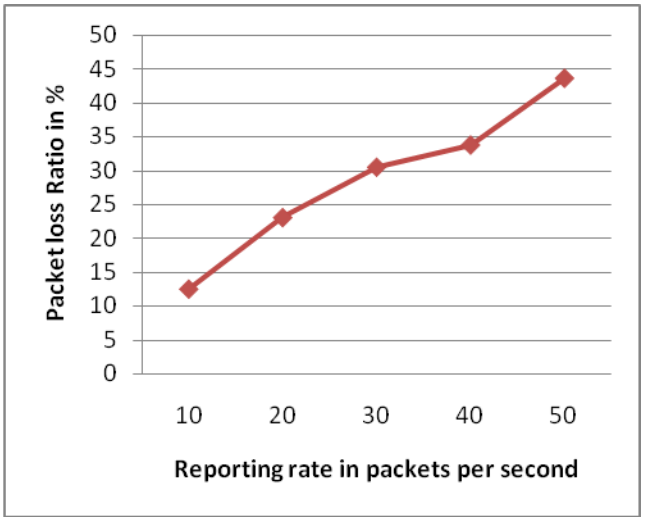

Fig.3. PLR as a function of reporting rate in packets per second

Fig. 3 shows the graph of packet loss ratio (PLR) in percentage as a function of reporting rate in packets per second. At the beginning, when reporting rate is 10, PLR is low. But as the reporting rate increases, PLR also increases because of increase in number of nodes; it is able to receive more packets at sink node. Hence there is increase in packet drops due to this PLR rate slowly increases.

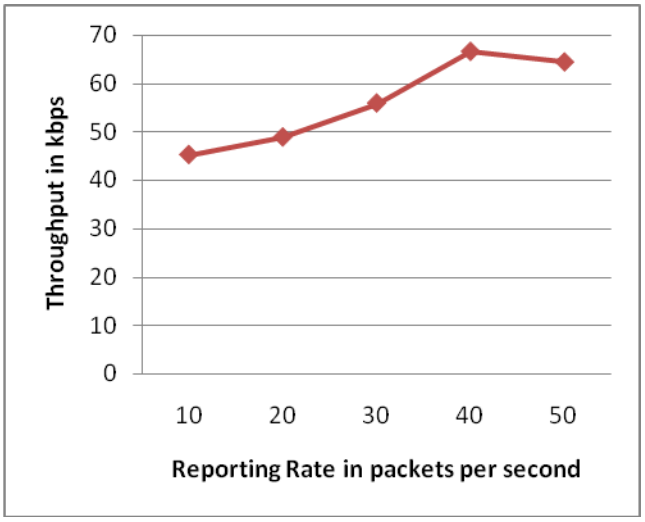

Fig.4. Throughput in kbps as a function of reporting rate in packets per second

Fig. 4 shows the graph of Throughput in kbps as a function of reporting rate in packets per second. At the beginning, when reporting rate is 10 then throughput is low. But as the reporting rate more increases throughput also increases because data packets may get a clear path to reach to destination.

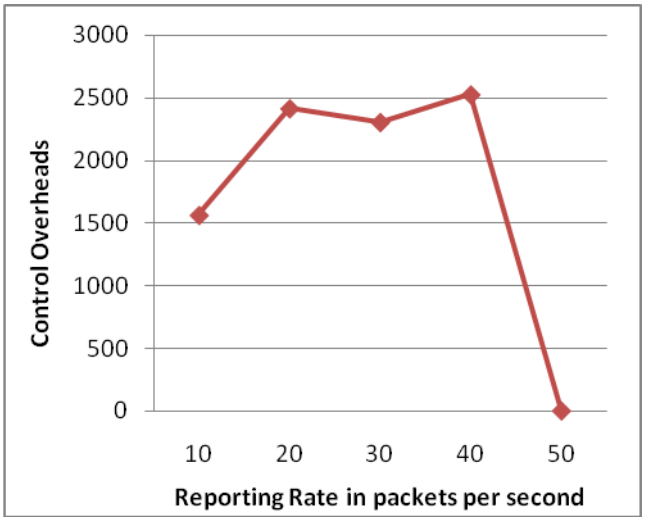

Fig.5. Control Overheads as a function of reporting rate in packets per second

Fig. 5 shows the graph of Control Overheads as a function of reporting rate in packets per second. At the beginning, when reporting rate is 10 then Control Overheads is low. But as the reporting rate more increases Control Overheads also increases because with handshaking process the connection is established between source node and sink node and data transmission process is started effectively.

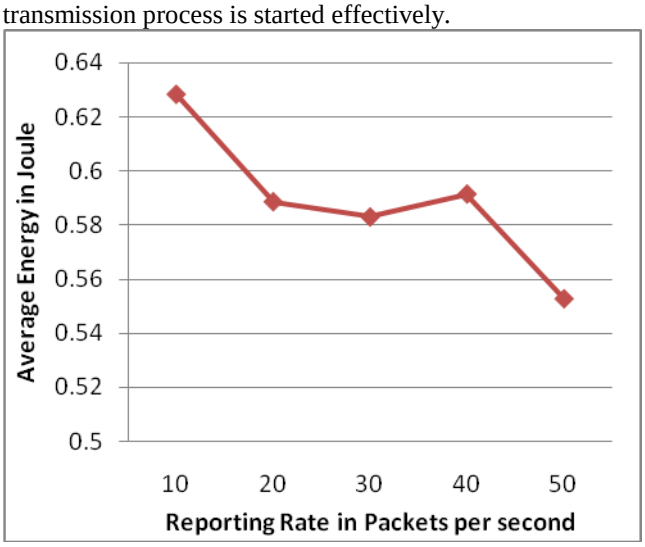

Fig.6. Average Energy in joule as a function of reporting rate in packets per second

Fig. 6 shows the graph of Average Energy in joule as a function of reporting rate in packets per second. At the beginning, when reporting rate is 10 then Average Energy is high. But as the reporting rate more increases Average Energy are decreases because initially energy is used for handshaking process as well as deciding route for data transmission process.

IV. CONCLUSION AND FUTURE WORK

In this paper, after examination of five graphs we conclude that during the data transmission process we noted down the precious changes occurred. From fig. 2 we had seen that as reporting rate of data increases PDR rate is decreases. Similarly from fig. 3 had seen that as reporting rate increases PLR rate increases. From Fig. 4 we can say that Throughput is dependent upon reporting rate of data. Fig. 5 shows that control overheads are increases with increase in reporting rate. Fig.6 shows average energy consumption is minimized .It gives better results to the user. Hence it is prove that reporting rate affects on number of packets received at destination end during data transmission process

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