Energy Efficiency in Manet

[1]Sarabjeet Kaur, [2] Vikas Gupta, [3]Simratpal Kaur

[1]*PG Scholar, Department of IT*
[2]*Assistant Professor, Department of ECE*
[3]*Assistant Professor, Department of IT*

[1,2,3] *Adseh Institute of Engineering & Technology, Faridkot*

Abstract:-The need to exchange digital information outside the typical wired office environment is growing. A mobile ad-hoc network which does not use a wired network and base station system is composed of a group of mobile and wireless nodes. There are various types of restrictions. The biggest restriction is the confined energy of the batteries. Battery power of the nodes is primarily consumed while transmitting packets. This proposed model uses energy sharing concept in multi-hop ad hoc network to increase the efficiency & lifetime of the system. It also defines that the response time & throughput increases while traffic increases. Therefore our proposal decreases response time, increases power efficiency & increases throughput of the MANET system.

Keywords: **MANET, Power Consumed/ Packet, Response Time, Throughput, DPSR**

1. INTRODUCTION

In a typical ad hoc network, mobile nodes come together for a period of time to exchange information. While exchanging information, the nodes may continue to move, and so the network must be prepared to adapt continually. In the applications we are interested in, networking infrastructure such as repeaters or base stations will frequently be either undesirable or not directly reachable, so the nodes must be prepared to organize themselves into a network and establish routes among themselves without any outside support[1].The idea of ad hoc networking is sometimes also called infrastructure less networking, since the mobile nodes in the network dynamically establish routing among themselves to form their own network.

2. MOBILE AD HOC NETWORK

A mobile ad-hoc network (MANET) is composed of a group of mobile, wireless nodes which cooperate in forwarding packets in a multi-hop fashion without any centralized administration. Applications of MANETs occur in situations like battlefields, major disaster areas, and outdoor assemblies.Routing protocols are needed whenever delivered data packets need to be handed over several nodes to arrive at their destinations. Routing protocols have to find routes for packet delivery and make sure the packets are delivered to the correct destinations. Pro-active protocols try to maintain an up-to-date map of the network; Re-active protocols (on-demand protocols) only start a route discovery procedure when needed. When a route from a source to a destination is needed, some sort of global search procedure is started. Hybrid protocols combine the advantages of both pro-active and re-active routing by locally using pro-active routing and inter-locally using re-active routing.

3. RELATED WORK

Benjie Chen et.al. (2002) described An Energy-Efficient Coordination Algorithm for Topology Maintenance in Ad Hoc Wireless Networks provides a span technique.

Wang (2005) presented p-MANET: Efficient Power Saving Protocol for Multi-Hop Mobile Ad Hoc Networks proposes an efficient power saving protocol for multi-hop mobile ad hoc networks, called p-MANET. Our design is expected as a new foundation MAC layer power saving protocol.

Xiaonan Luo et.al. (2006) presented a study Energy-Efficient Routing in Mobile Ad Hoc Networks: Mobility-Assisted Case provides information regarding energy-efficient packet routing in a multi-hop wireless network, where mobility is taken into account by adopting a deterministic model.

Zeng (2008) described Opportunistic Routing in Multi-hop Wireless Networks: Capacity, Energy Efficiency, and Security studied geographic opportunistic routing (GOR), a variant of OR which makes use of nodes' location information.

4. PROBLEM FORMULATION

MANETs are multi-hop, there are chances of a node's involvement in data transfer irrespective of not being a target or a source. The routing algorithm decides which of the nodes needs to be selected in a particular communication. Thus, routing algorithms play an important role in saving the energy of a communication system and the life of the nodes and thus of the whole network. In this work, the concept of

energy sharing has been used to achieve better efficiency & lifetime. Following metrics are evaluated to compare the energy efficient techniques:

- Power consumed/packet
- Response Time
- Throughput

While, the first metric calculates the average of energy consumed by different packet transmissions in the network. Consequently, the second metric computes the percentage of successful packet delivery for a particular network setup. A Dynamic P2P Source Routing (DPSR), a new routing protocol for MANETs has been proposed in this research work that exploits the synergy between P2P and MANETs for increased scalability. By integrating Dynamic Source Routing (DSR) and a proximity-aware structured P2P overlay routing protocol, DPSR limits the number of the source routes that each node has to discover and rediscover, while retaining all the attributes of DSR for dealing with the specifics of ad hoc networks.

5. RESULTS

Following parameters were considered to check the energy efficiency in MANET system: Power Consumed/ Packet, Response Time, Throughput

5.1 Power Consumed/ Packet

The power consumed by the network interface when a host sends, receives or discards a packet can be described using a linear equation Power = m × size + b

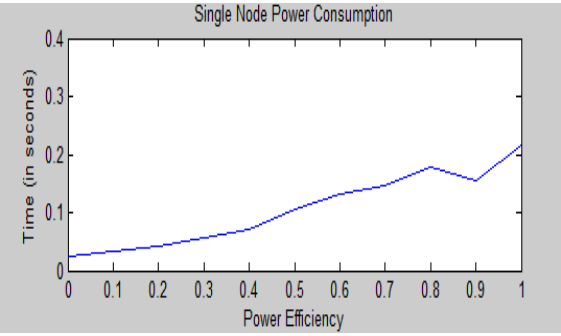

Fig 1: Power Consumption by single node

Fig 1 shows the power consumption by single node to transfer a packet. It is the minimum power consumption using multihoping concept in the MANET system. Fig 2 shows the minimum power consumption by 10 nodes of the mobile ad hoc network. The loss of energy in nodes can affects the communication activities in network. For MANETs, optimization of power consumption has greater impact as it directly corresponds to lifetime of networks and hence the creation of an energy efficient system.

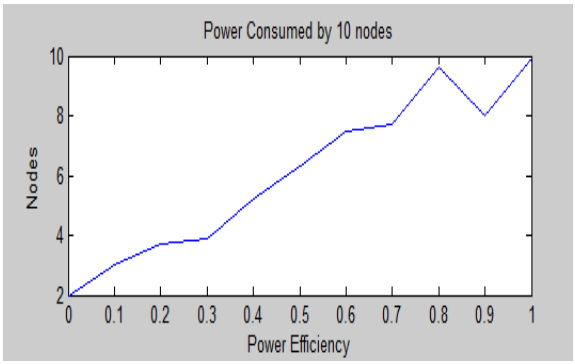

Fig 2: Power Consumed by 10 nodes

5.2 Response Time

The response time of data packets is the interval between the data packet generation time and the time when the last bit arrives at the destination. Fig 3 shows the average response time which shows that as the traffic increases, system response also increases.

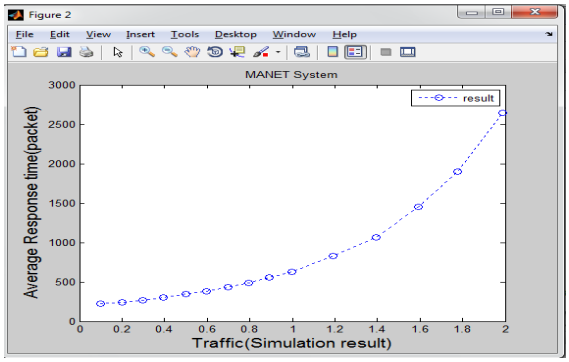

Fig 3: Average Response Time

5.3Throughput

A parameter of the network which gives the fraction of the channel capacity used for useful transmission that selects a destination at the beginning of the simulation Fig 4 shows that the proposed model increases the throughput of the MANETs system.

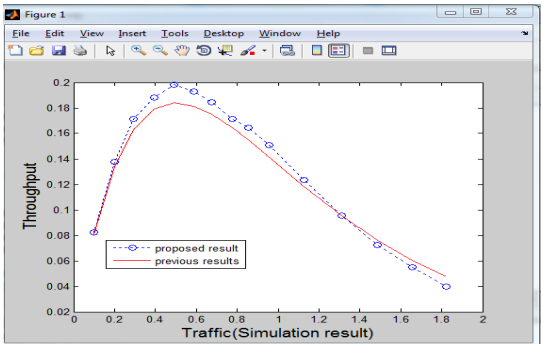

Fig 4 Throughput of the MANET system

6. CONCLUSION

This proposed model shows that the response time & throughput increases while traffic increases. As all these parameters related to efficiency of the network so on improving their results the proposed scheme shows that the efficiency of the mobile ad hoc network also increases.

7. FUTURE SCOPE

More work can be carried out in following areas : Cluster formation and Mobility of the nodes can be predicted for cluster maintenance. Bandwidth of the links can be calculated. Cost of security of the nodes can be minimized.

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