Performance Analysis of MANET Using Efficient Power Aware Routing Protocol (EPAR)

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ABSTRACT: *During the past decade, wireless network has became popular. In wireless network, devices are connected through wireless links. There are two types of wireless networks infrastructure and infrastructure less network. The network in which communications among the terminal is established and maintained with help of centric controller is known as infrastructure network, for example wireless local network and cellular network. The network in which in communications among the terminal is established and maintained without help of centric controller is known as infrastructure less network, for example Mobile Ad Hoc Network (MANET). MANET is networks in which different nodes are communicate with each other with help of multi-hop links. All the nodes are moving in network, therefore network topology gets changes. In MANET all the nodes are battery driven but with the time taken battery power of nodes start decreasing. Therefore author will solve such problem with help energy power aware routing protocol (EPAR). EPAR increases the lifetime of the network. It can also handle the mobility of nodes.*

Keywords – *DSR, EPAR, Efficient energy, MANETs, Residue battery power*

I. INTRODUCTION

Mobile Ad hoc Network (MANET) does not depend on fixed communication infrastructures to provide connection. It is collection of nodes. Mobile ad hoc network‘s every node is behave as both as a host and a router. All the nodes in network are communicated through multi hop link [1]. When two nodes are in a transmission range of other node then can communicate through intermediate nodes. Due to high mobility of nodes network topology gets changes [2]. Network lifetime is important issue in MANET. All the nodes are battery driven [3]. The link breakage in such environment is occur because

1. Nodes are moving out of transmission range of each other.
2. They are dying due to energy exhaustion.

The lifetime of the network depends on the energy levels of the nodes. Thus if the energy levels of the mobile nodes in the network are preserved, the network tends to work for a longer duration of time. The energy efficiency is achieved by balancing the load over the nodes in the network [4]. If the load is equally distributed among the node, they tend to perform for larger time. In mobile ad hoc networks, the load balancing is commonly achieved by using multipath routing protocols, which requires more than one path to be formed between source and the destination node. EPAR protocol is reactive routing protocol. It increases a network lifetime. It works on max min formula. EPAR also provide highest energy efficient path from source to destination. Packet delivery ratio and network life time, throughput increases with help EPAR algorithm [3].

II. LITERATURE SURVEY

Now-a-days lot of important tasks are performed using MANET. To improve the communication energy efficiency at individual nodes power aware is an important issue. Here, authors [1] proposed an efficient Power Aware Routing (EPAR), a new power aware routing protocol that increases the MANET lifetime. Comparing to conventional power aware algorithms, EPAR identifies the node capacity not just by its battery power, but also by the energy lost in reliably forwarding data packets over a specific link. This is by a mini-max formulation; EPAR selects the path that has maximum packet capacity at the lowest residual packet transmission capacity. In addition to EPAR we consider the traffic density factor to improve the packet delivery ratio. Thus to find the optimal path we are considering the node with maximum power and maximum number of neighbouring nodes to it. The proposed scheme thus reduces the total energy consumption and decreases the mean delay especially for high load networks while achieving a good packet delivery ratio.

The author proposed [2] an efficient power aware routing (EPAR), a new power aware routing protocol that increases the network lifetime of MANET. In contrast to conventional power aware algorithms, EPAR identifies the capacity of a node not just by its residual battery power, but also by the expected energy spent in reliably forwarding data packets over a specific link. Using a mini-max formulation, EPAR selects the path that has the largest packet capacity at the smallest residual packet transmission capacity. This protocol must be able to handle high mobility of the nodes that often cause changes in the network topology. This paper evaluates three ad hoc networks routing protocols (EPAR, MTPR, and DSR) in different network scales, taking into consideration the power consumption. Indeed, our proposed scheme reduces for more than 20% the total energy consumption and decreases the mean delay, especially for high load networks, while achieving a good packet delivery ratio.

In paper [3], new protocol energy efficient ad hoc on demand distance vector routing protocol (E-AOMDV) has been proposed by the authors. Existing Multipath routing protocol has provided the concept of load balancing but had not considered the energy. The proposed E-AOMDV i.e. Energy Efficient AOMDV have taken both parameters energy and load balancing into consideration. The selection of next hop is depended upon its energy level and load balancing among its neighbors'. The load from each node i.e. data sent through selected node is calculated. The performance of proposed E-AOMDV is compared with AOMDV on the basis of different performance metrics like Packet delivery ratio, Average end-to-end latency, Routing packet overhead, and Throughput, using NS-2.31 as simulation environment. The proposed scheme has shown better performance over existing protocol. E - AOMDV helped in distributing the load properly and in reducing energy consumption.

The rapid evolution in the field of mobile computing is driving a new alternative way in which mobile devices form a self-creating, self-administering and self-organizing wireless networks called Mobile Ad hoc Networks (MANETs). In MANET, the aware of power heterogeneity is an important technical challenging problem to increase the energy efficiency of each node. The mobile nodes in MANETs have different transmission power and power heterogeneity. This paper analyzes the performance evaluation of three Efficient Energy Routing Protocols such as EPAR (Efficient Power Aware Routing Protocol), MTPR (Minimum total Transmission Power Routing) and DSR (Dynamic Source Routing). The Efficient Power Aware Routing protocol (EPAR) mainly considers the node capacity by its remaining battery power and the expected energy spent for forwarding data packets reliably. EPAR uses mini- max formulation method for the selection of the route that has maximum packet delivery ratio at the smallest Residual Battery Power. With different network scenarios, EPAR is dominating in terms of Residual Battery Power, Power Consumption, Network lifetime and Throughput with respect to time and routed data packets.

III. PROPOSED METHOLOGY

EPAR schemes make routing decisions to optimize performance of power or energy related evaluation metrics. Suppose there are number of path in MANET and main task is to select the best path to send data from source to destination. Firstly it find lowest energy of nodes in each path, then it select path with a maximum energy out of these minimum energy [4], [8], [11]. The selected path is energy efficient path.

IV. RESULTS AND DISCUSSION

The EPAR protocol chosen to send data from source to destination .In this the minimum energy of the nodes is highest when taken into account the minimum energy of the nodes in other possible paths and increases the quality of the network and the less mobile nodes should be preferred so the link breakages are reduced in the network . The results of EPAR are given based on packet delivery ratio, energy consumption and throughput factor. Simulations were conducted using NS-2 software.

Simulation parameters

Channel Type	:	Channel/WirelessChannel
Radio-propagation model	:	Propagation/TwoRayGround
Network interface type	:	Phy/WirelessPhy
MAC type	:	Mac/802_11

Antenna model	:	Antenna/OmniAntenna
Number of mobile nodes	:	50
Routing protocol	:	EPAR
Initial energy in Joules	:	100
Transmission power	:	0.002 j
Ideal power	:	1.0 j

Packet delivery ratio

Packet Delivery Ratio (PDR) is the ratio of number of packets received and number of packets sends in network. This performance metrics important to analyze the packet percentage successfully received in network. If its value is equal to one then network performance is good. If its value is less than one then network performance is poor.

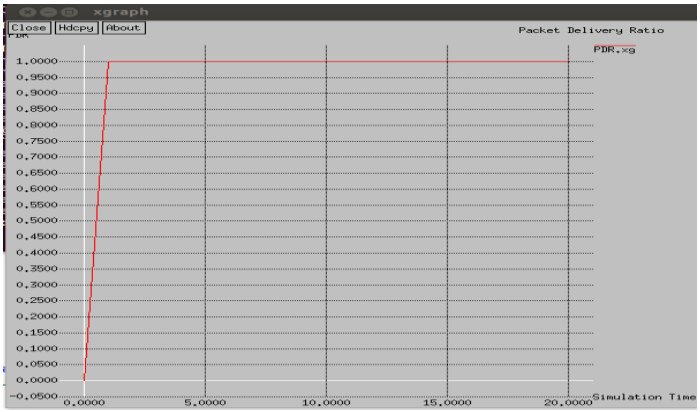

Fig.1: Packet Delivery Ratio V/S Simulation Time.

Throughput

Throughput represents the number of packets send and received in per unit of time and increase in graph shows that data is being received at destination node.

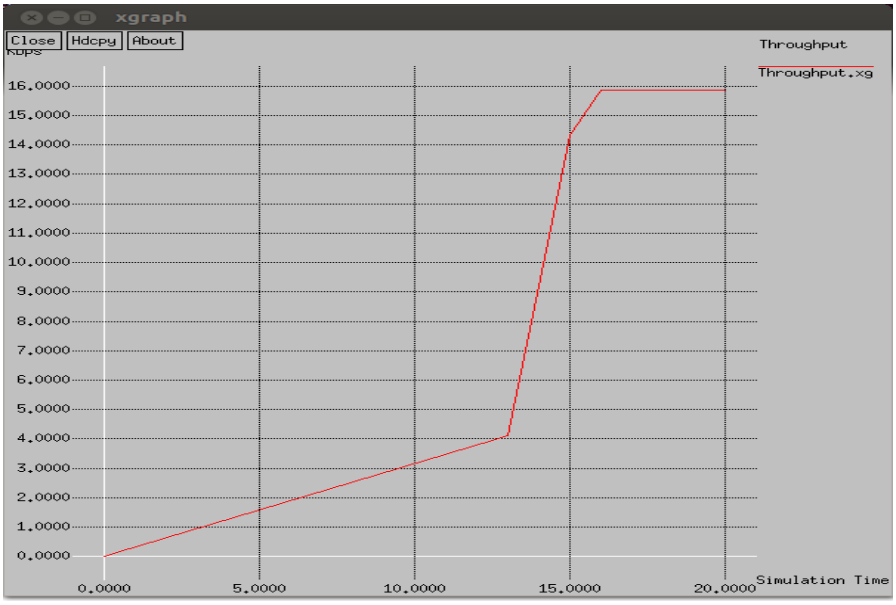

Fig.2: Throughput V/S Simulation Time.

Energy consumption

It represent lifetime of the network, lesser the energy consumption more the life time network. The initial energy 70 joules provided to nodes and at the end of the simulation the remaining of the network was 56 joules showing the consumption of 14 joules.

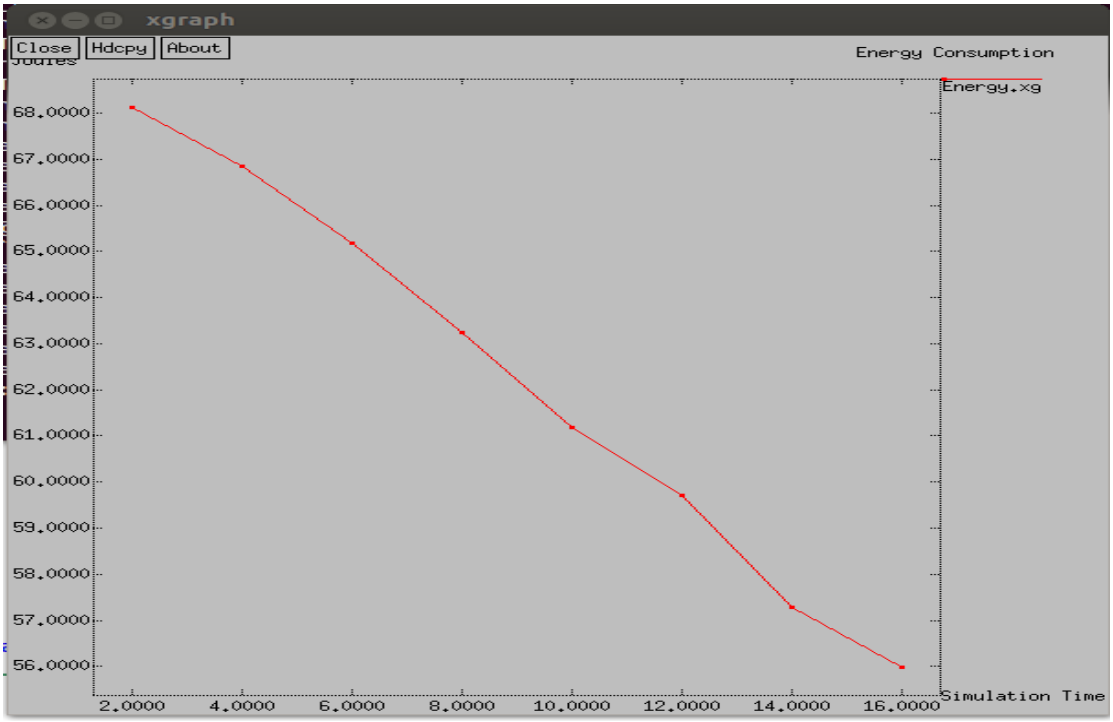

Fig.3: Energy Consumption V/S Simulation Time.

V. CONCLUSION

This study analyzes the performance of the network using EPAR which consider energy of a node while making the path from source to destination node. The performance was analyzed in term of packet delivery ratio, throughput and energy consumption. The value of packet delivery ratio is approximately one, throughput, found to be 16 kbps, and we found that 14 joules energy was consumed in the network. In future this work is extended on reducing a link breakage in MANET caused by mobility of nodes. Also energy of the network can further be optimized by reducing the broadcasting in the network, which will eventually lead to increased network lifetime and improve network performance.

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