Review and Comparative Study of Different Energy Saving Techniques in Manet

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ABSTRACT

Energy efficiency plays a vital role in the design of protocols for the applications in networks to enhance the network lifetime. Since the networks nodes are battery-powered, thus energy or battery power is a precious resource that has to be carefully used by the nodes in order to avoid an early network failure. In Mobile Ad Hoc Networks researcher has focused on various energy parameters through managing transmission and distribution of loads by limiting the dynamic energy for communication required to send or receive packets. Many researchers suggested, to attain efficient power conservation dual approach may be combined and power usage can be limited by making mobile nodes in-active. In this paper we present a comparative analysis based on review study and have a closer look at some protocols, energy saving techniques and methods adopted in saving power for MANET.

Keywords : MANET, Energy Efficiency Routing, Energy Routing Protocols

I. INTRODUCTION

The greatest challenge in the design of wireless ad hoc networks is the limited availability of the energy resources. These resources are quite limited in wireless networks than in wired networks. Energy-efficient communication system is critical for increasing the life of power limited wireless ad hoc networks. Each mobile node is based on the operation by a limited energy battery and usually it is impossible to recharge or replace the batteries during a mission. Since wireless communication system expend noteworthy measures of battery power or energy, hence the restricted battery lifetime forces an extreme imperative on the execution of system. In MANET Energy efficient operations are used to enhance the network lifetime Extensive studies on energy conservation in wireless ad hoc networks has been done. Wireless communications system consume significant amount of battery power, and therefore efficient energy operations or scheme are critical to enhance the life of such networks. Some amount of energy is lost even when a node is in idle mode or condition. During the previous couple of years, there has been expanding enthusiasm for the outline of energy efficient protocols for wireless communication systems. Energy-restricted batteries power the vast majority of the mobile nodes in a wireless network system; the constrained battery lifetime is an obstacle to network performance.

II. NEED OF ENERGY

In the current past years energy efficient routing in Ad hoc network was addressed by numerous research works, which has created so much development and original thoughts in this field. Most of the today's work is based on energy efficient routing because power is main concern in ad- hoc wireless networks. Each protocol has some advantages and shortcomings. It is totally depends upon the parameters of network which decide the which protocol is to be used.

The nodes in a network consume energy in four different ways. [1]

1. On sending a packet
2. On receiving of data packet
3. In idle mode condition
4. In sleep mode condition

III. RELATED WORK

M. Rehan Rasheed et al. [2] investigate different routing protocols and evaluate their performances based on 802.16 WiMAX networks. Using simulation technique, different routing protocols have been tested with various network parameters. Results show that DSDV in general performs better than other routing protocols. [3] They conclude different routing protocols behave differently in 802.16 networks according to their internal working mechanism. [4] It is found that in terms of the packet delivery fraction parameter, the DSDV protocol has the best performance which outperforms both DSR and AODV but it is also experienced that the packet delay in DSDV are greater than the delay experienced by the on-demand routing protocols

M. Tarique et al. [5] presents the Design, implementation, and performance of the Energy Saving Dynamic supply Routing (E-DSR) protocol. E-DSR could be a changed version of dynamic supply routing (DSR) that integrates the benefits of a transmission power management approach and a load

sharing approach to avoid wasting energy and maximize the lifetime of a mobile accidental network (MANET). During this theme [6] (E-DSR) combines two approaches that try and minimize the quantity of energy consumed throughout routing. The transmit power management approach minimizes total transmission energy. The weakness of this E-DSR approach is that it usually chooses an identical slightest transmission management path, which makes this path be to overused and therefore 'die' quicker than alternative ways. The load sharing approach focuses on equalisation energy usage among nodes by avoiding over-utilized nodes.

According to Ahlam Hashim Mohsin et. Al. [7] in 2012, presents the adjustment of nodes inside a network with the information about location for the minimization of retransmission and limiting the power consumption, however this was achieved on network reach ability. Author finished that for single protocols it's unimaginable to deliver the general performance demands for painter while not mercantilism off alternative execution measurements to accomplish high energy conservation.

Khalid et al. [8] projected a degree rule for limiting power usage in network. The proposed protocol uses the built-in GPS for information regarding placement of nodes to check average distance of primary source and neighbours. Protocol gives information regarding random distance between the nearest and farthest hops with it's neighbours for adjusting the transmission. In proposed technique simulation is performed on two kinds of flooding algorithm which support the result and was shown that the influence on power consumption varied from $10-15\%$. Based on the result it is clearly shown that, this quantity of power conservation is higher, and it also save power as results from network transmission parameters.

The proposed protocol [9] is designed for multi hop wireless networks and uses distributed technique that limits the power consumption of the network. The proposed approach performs the multi- hop routing

and associated with stay-awake and sleeps cycle of the nodes, whereas some other nodes can remain in mode of power saving and also become an organizer if they must remain awaken. The selection of organizer nodes depends upon area adaptively chosen by proposed protocol, and through permitting intermediate nodes to use delay and decide to become a co-ordinator or not inside a network and by rotating the sequence timely. The procedure adopted in proposed protocol conjointly conserves the capability, and conjointly decreases the free latency and provides the sizable power savings. [10] The power saving quality decreases the node density inside the networks and outperforms since the nodes were awaken and coordinates for minimization of node traffic [11].

Preeti Arora et al. [12] focus upon those routing protocols particularly designed for wireless networks. Here, they study and compare the performance of various accidental routing protocols like (AODV, DSR, and ZRP) for Mobile WiMAX surroundings beneath the belief that every of the subscriber node has routing capabilities at intervals its own network. From simulation, they found that ZRP and AODV protocols outgo DSR and applications area unit growing apace because it provides freedom to the subscribers to be on-line where they're at a competitive worth and alternative vital facilities like increasing amounts of information measure, employing a type of mobile node devices etc. [13][14].

In this proposed approach [15] for power saving, author considers that all the devices are connected with GPS receiver inside a network; this approach gives introduction about geographical wireless networks GAF [16]. The proposed approach is based on the concept of network optimization for power saving in a large wireless network, which is free from routing protocol adopted by the nodes. The higher rate of energy is conserved by turning off uncalled-for nodes, and through maintaining the level of routing overhead [17].

The proposed approaches [18][19] considered the network parameters like partitioning and take the advantage of these network and minimizes the overhead problems caused due to infrastructure less architecture of MANET. Rather than using the network size, this approach depends on the multicast cluster size, which results in higher performance ration as compared to other protocols for MANETs that consisting many intermediate nodes. The simulation result shows that, due to the high packet delivery ratio in mobile environments, this is the most considerable power savings technique as compared to already existing algorithms. What makes PEMA thus very different is its speed; it's very quick as a result of its period is freelance of its network size and also the routing. [20]

IV. PROBLEM DEFINITION

The problem of conservation of energy with economical routing in MANETs will be self-addressed at totally different layers. Improvement in the field of utilization of energy resources and mobile nodes, have been addressed by many researchers in the recent times. Different schemes were projected for limiting the power usage in wireless network for achieving the energy consumption in transmission of data packets between sender and receiver by using various energy-aware routing protocols. Many researchers suggested different schemes for restricting the packets through nodes with lo residual energy. In MANET, data flooding, medium collision and interference are the factors which slowed down the performance of the wireless network.

V. PERFORMANCE COMPARISON OF THE ENERGY CONSERVATION ROUTING PROTOCOL

The performance demand of different protocols reviewed so far has very pitched the additional benefits and downsides of those protocols against one another. In the maximum amount as of these protocols strived to cut back power consumption either at node level or

on the network generally, all projected solutions have a form of trade-off that permit attend have conspicuous energy saving. To bring out this performance trade-off, Hashim, A., Kamalrulnizam, A., Adebanjo, A., & Kayhan, Z. (2012) presents an exceedingly tabular type as represented in Table 1.1, during this paper we tend to take into account the subsequent as major performance parameters: the amount of routes established throughout route discovery, the message overheads, energy preserved in average , magnitude relation of information PDR, the lifetime of network, the node-to-node delay information, complexness of the algorithm and eventually, these parameters establish a direct relationship with energy conservation .

TABLE I

SOURCE : HASHIM A., KAMALRULNIZAM, A., ADEBANJO, A., & KAYHAN, Z. . *NETWORK PROTOCOLS AND ALGORITHMS ISSN 1943*, *3581*, 4-2.

PROTO COL	OVERH EAD	EFFICIE NT ENERG Y PARAM ETER	P D R	NO DE- NO DE DEL AY	LIFETI ME OF NETW ORK	COMPLE XITY
LBPC	L	M	AV	AV	M	Y
SPAN	L	H	AV	H	H	N
EELAR	L	H	H	L	H	N
PEMA	M	H	AV	L	H	N
E-DSR	L	H	H	L	H	Y

VI. SURVEY EXTRACTION / CONCLUSION

MANET protocols use routing broadcast technique and that cause maximum routing overhead in the network, so there is a need to minimize routing overhead for the better performance, MANET also faces the problem of limited battery power because each node work through the energy value. By the related study it is observed that no single protocol is efficient for enhancing network performance in MANET. Routing protocols have a limitation of enhancing network performance but they are best suited in their criteria. Hence, it is observed that a new concept of hybrid routing protocols scheme with the energy aware technique may be able to short out these limitations and provides the better performance.

VII. FUTURE WORK

In future, the study and implementation of energy-efficient algorithms for wireless networks quite constitutes a vast area of research in the field of ad hoc networks. In future an approach can be designed which provides suitable baseline in the field of security and congestion control technique. This review study is also useful in the field of load balancing and load sharing technique. This will also help to full fill MANET requirement an energy module can also be improved in future. This paper presents common issues related to energy saving in MANET and various energy saving schemes and their comparison based on different parameters. MANET has vast potential; still, it has many challenges left to be solved. In our survey, we describe a variety of energy schemes that may present on different layers. This study tried to answer 'How the better services can be obtained in MANET?' MANET needs very specialized energy saving model; a single approach does not fit for all the energy saving schemes.

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