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Comparative Study of Energy Enhanced AOMDV and Energy Enhanced AODV in Wireless Sensor Network

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Abstract

Wireless Sensor Networks (WSNs) are nowadays becoming very vital in different fields such as underwater sensors, battle fields, military applications and many more. There are different protocols that play very vital role in energy saving. One such protocol is AODV. This is one of the best routing protocols in wireless networks. The major limitation of sensors is that the battery life is very limited in case of sensor networks. Hence it is very crucial to enhance the battery life time of the sensor nodes. In this paper a comparison is made between AOMDV with a recharging feature in a network and AODV with a recharging feature. Both these protocols carry a node which moves randomly towards other nodes and enhances the level of energy in them when necessary. The comparison is done on the basis of throughput and average remaining parameters which further clearly indicates that the performance of AOMDV with enhanced energy is better and efficient than the performance of AODV with enhanced energy.

Keywords— AOMDV, AODV, Remaining Energy, Throughput, WSNs etc

1. Introduction

IEEE 802.11 wireless sensor networks (WSNs) consist of a large number of detection nodes that have the capability to detect their neighboring environments along with the calculation and finally communicate wirelessly with each other. WSN networks are used in various application areas, such as Environmental Monitoring, Traffic Monitoring, Military and many more. In the network, each node contains a central processing unit, a radio frequency transceiver, a power supply, and a flash memory for storage and microcontrollers. Although these wireless nodes are better than wired nodes, there are still some routing problems in IEEE 802.11 WSN such as: network time, cost factor, and many more. We need to be careful when distributing nodes in the network, as it does not have infrastructures and nodes are distributed randomly. Additionally, more attention needs to be paid to available energy. The Fig. 1 illustrates the architecture for sensors in a wireless sensor network:

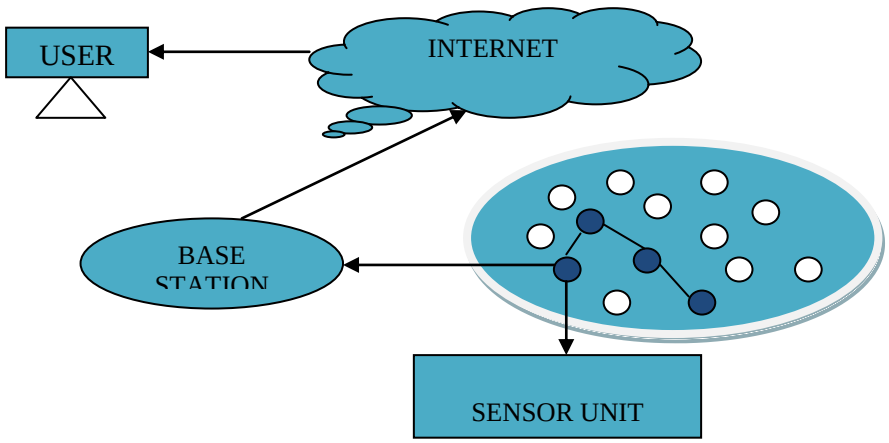

Fig. 1. Working of sensors in WSNs

2. LITERATURE REVIEW

[1], has compared different multipath routing protocols of wsn. In this paper various protocols & schemes are compared by using multipath approach which can help to investigate further development in wsn. [2], stated that, because of less energy efficiency of sensors in wsn a new algorithm is proposed in this paper which is "ERP-SCDS). In this paper this technique makes selection of cluster head selection technique that are used to enhance the lifetime of sensors. Finally in this paper a comparison is made with other protocols such as LEACH, HEED & Hausdorff. [3], proposed a new Trust and Energy Aware Routing Protocol that will give better flexibility in opposition to misbehaving nodes. Further this mechanism will also make more energy efficient wireless sensor network and increase its lifetime. [4], stated that energy consumption is one of the most important issues in wireless sensor network due to deployed irreplaceable nodes. This leads to a major challenge in design of energy efficient routing protocols with MAC 802.11 are evaluated to analyze the feasibility of using sensor network in an agricultural land. [5], presented that MANET based routing protocols are adapted for this types of WSNs such as habitat monitoring, structural , health monitoring , logistics, patient monitoring etc. AODV is one of the most commonly used routing protocols. But in WSNs, when the mobility is high, AODV needs new oath to the destination. [6] Described the idea of ad hoc networking by providing its background and presenting a range of the technical challenges. The researchers also mention a quantity of the applications that can be visioned for ad hoc networking. [7] Focused on routing and security issues associated with mobile ad hoc networks which are required in order to provide secure communication. [8] Implemented and proposed solutions to software energy management issues created by existing and suggested hardware innovations. [9] present a route discovery protocol that mitigates the detrimental effects of such malicious behavior, as to provide correct connectivity information. [10] Said that the significance and suitable method of energy preservation varies considerably across applications. [11] Focused at protected hierarchal routing protocols in WSNs and represent selected advancements which focus on this matter. [12] Discovered some energy effective routing protocols such as LEACH, Directed Diffusion, Gossiping and EESR and along with their enhancements. [13] Classified existing wireless sensor network architectures into particular groups based on WSNs performance. [14] Focused on building a Load-Balanced Data Aggregation Tree under the PNM, considering balancing the traffic load among all the nodes in a DAT. [15] Explained significance of data gathering; a variety of Hierarchical clustering methods are compared. [16] Performance examination of 3 distinct protocols namely AODV, DSDV, DSR on basis of throughput, end to end delay and packet delivery ratio is performed. [17] Proposed an innovative algorithm to improve the performance of sensor nodes on a variety of parameters like throughput, packet-delivery ratio, consumed energy of various sensor node. [18] Presents the detailed review of different methods to reduce the data aggregation problems in Wireless Sensor Network. [19] Discussed about a different range of of management techniques. [20] Suggested zonal based clustering approach wherein the area is divided into zones and the selection of cluster head is non-static so as to load balance with even dissipation of power by the deploying the Sensor Node.

3. RESEARCH GAP AND SCENARIO FORMULATED

A. Reserach Gap

In WSNs there is a big disadvantage of energy depletion. In the sensors whether the underwater sensor or sensor used for the military purposes or any other type of sensor, they all go through the problem of rapid battery depletion. So, there is need of increasing the saving of energy and to enhance the lifetime of the sensor nodes so that it can remain there for longer time duration and can sense the data or information to much greater extent as possible. Therefore to mitigate the problem of battery depletion, this paper overcomes this gap by introducing two major standard protocols i.e AODV and AOMDV. They both get energy from moving node and save them from dying early.

B. Scenario Formulated

In this paper scenario is created in NS2 simulator and the nodes are taken as 25 in first case and 50 in second case 75 in third and lastly 100. Apart from it other setting are mentioned in the below table. Values are gathered and comparison is made on the basis of received values:

TABLE I. Simulation Parameters with values

Nodes Taken	AODV with Enhanced Energy	AOMDV with Enhanced Energy
25	60.1	60.1
50	136.46	140.98
75	196.23	216.16
100	117.8	295.08

4. IMPLEMENTATION

In this phase of implementation, the work is done in NS2 and has taken two most vital parameters in order to save nodes from dying. These two parameters are Throughput and Average Remaining Energy as shown in Figure 2 and Figure 3 below:

TABLE II. Comparison of AODV with Enhanced Energy Vs AOMDV with Enhanced Energy on Basis of Throughput

Simulation Parameters	**Values**
Buffer dimension	50
Nodes Taken	Varied (25, 50, 75,100)
Parameters	Throughput, Remaining Energy
Antenna Type	Two Ray Ground

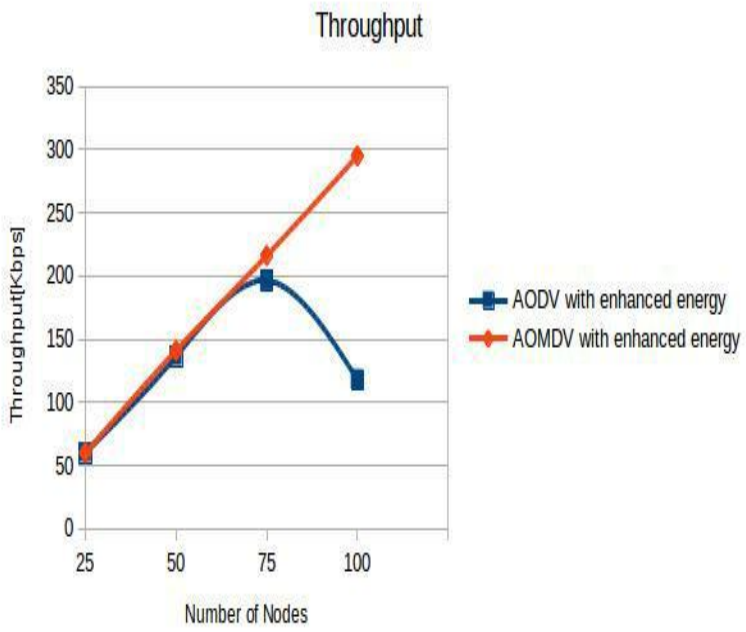

Fig. 2. Delay comparison of AOMDV & L_AOMDV

In the Table II shown above the values are gathered by varying different number of nodes and the graph is prepared on the basis of the result gathered.

TABLE III. AODV with Energy Enhanced vs AOMDV with Energy Enhanced on basis of Remaining Energy

Nodes Taken	AODV with Enhanced Energy	AOMDV with Enhanced Energy
25	13.031	5.69
50	4.05	4.08
75	3.86	5.09
100	3.12	4.23

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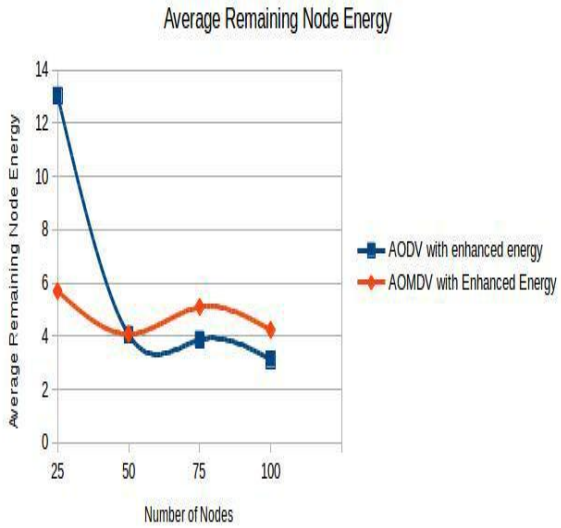

Fig. 3. Comparison of Normalised Routing Overload AOMDV & L_AOMDV

CONCLUSION

When the number of nodes are varied from 50 to 75 and from 75 to 100 then it clearly showed that the average remaining energy is more in case of AOMDV with enhanced energy whereas when the number of nodes is 25 or less at that time AODV with enhanced energy is better than other protocol. On the other hand when throughput is measured in each protocol when enhanced energy feature is introduced in them at that time also on varying number of nodes, AOMDV outperforms AODV both with feature of enhanced energy.

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