Re-Powering Technique to Compare its Suitability with On-Demand Distance Vector Routing Protocols

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Abstract*: *A Wireless Sensor Networks consist of several units such as the radio, the memory, and the, microcontroller that uses the most power. One of the major confronts in these networks is to aim dynamic routing protocols which consume less overhead. Power consumption decides the life span of WSNs. This research work emphasis on minimizing the power consumption to avoid packet loss of WSNs. Therefore, a communication protocol Ad-hoc 0n-demand Multipath Distance Vector Routing protocol and Ad-hoc 0n-demand Distance Vector Routing protocol, both are tested when power is regenerated by using external wireless node. WSNs are a highly dynamic wireless network which can form without the need of any pre-existing infrastructure. This paper focuses on the Ad-hoc 0n-demand Multipath Distance Vector Routing protocol and Ad-hoc 0n-demand Distance Vector Routing protocol comparison when a technique of re-powering introduced. Further, the numerical outcomes find out the optimum routing protocol among these.

Index Terms*: *AODV, AOMDV, Power Consumption, Re-Powering, WSN.

I. INTRODUCTION

Wireless sensor networks (WSN) is a self-classified network created of several numbers of microsensors which arbitrarily positions in observing areas through a non-wired medium. Sensors depend on battery energy supply, their power storage ability, and communication capacity, which are very less. As a result, to use the power of nodes effectively, stabilize the network power utilization, and broaden the network life span. The main feature of an on-demand protocol is its path detection process. Such multipath protocols have a comparatively more exceptional capacity to minimize the route detection frequency in comparison to solo path protocols. On-demand multipath protocols determine several routes among the sender and the receiver in a solitary path discovery. Thus, if all such ways do not succeed, then a new route detection is always in need. AOMDV is an extension of AODV with the only difference that AOMDV uses multiple paths. Multiple routes so calculated are loop-free, and link disjoints. AOMDV too discovers ways on-demand using a pathfinding technique. AOMDV depends as much on the direction-finding information available already in the original AODV protocol, thus limiting the power consumed in discovering numerous routes. Moreover, It even does not need any particular control packets. Our Reseach work summarizes as under:

1) Design a model that can re-power the dissipated power in WSNs.
2) To implement the re-power technique on AODV and AOMDV protocol.
3) To analyze and compare the effectiveness of re-power technique on the protocols mentioned above based on power consumption in NS2 simulator.

II. RELATED WORK

Swarm intelligence is solitary bio-motivated work out that implements graph theory as an artificial intelligence method to the Travelling Salesman problem employing ants. Further, this approach became quite admired and applies in the communication network domain [1].

Ad-hoc Networks makes use of Ant-Based Routing Algorithm for Manets (ARAMA) to transmit the packets. The only difference between ARAMA and AntNet is in the amount of energy utilization from batteries [2].

Authors propose AOER ants, which gathers the residual battery energy of nodes, forward potential, and hop counting information. Such information used an inverted probabilistic routing table to discover the fewer power path for potential communication[3].

Levi Bayde Ribeiro and Miguel Franklin proposed

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Bio-stimulated enhancement for increased Sensor Life- time. Swarm Intelligence based Bio4Sel, was more particularly compared with ARAMA and AODV [4].

Wang et al. proposed Energy balanced and based routing protocol (EBAB) in which they built an adaptive non-static routing algorithm relied on ant colony optimization, which further compares with LEACH [5].

Marios Gatzianas et al.proposed a distributed algorithm to maximize network lifetime, which is based on the subgradient method and using the sink as a leader intends its performance evaluates through simulation for random networks [6].

To acquire more flexible information collecting excursions for mobile gatherers, authors propose an algorithm for drafting the moving route of mobile gatherers and stabilizing traffic in multi-hop networks. Even though such mobile information collecting methods can save an immense level of power in comparison to non-dynamic data collecting, there are still few drawbacks. A few of them might direct to widened data collecting latency as the SenCar can only gather data from a single sensor at a time using one antenna [7] [8].

T. Ming-hao et al. proposes a multipath routing protocol, which is one of the optimum ways to store power. He then linked cost function, which obtains residual power and number of hops to the target [9].

Y. Li et al. propose a technique that relies on elevated power efficiency known as Enhanced-Balanced Compressed Network Coding. With the help of the data compression method, the gathered data significantly gets minimizes while on the other hand, through the transport mechanism, the effectiveness of data collection gets preserved [10].

III. PROPOSED METHODOLOGY

Based on above-related work, an efficient and reliable technique for energy management is still in demand for on-demand distance vector routing protocols like AODV and AOMDV. Therefore we have implemented the power-efficient methodology for these two protocols, and then we have compared both based on the power consumption parameter. The method shows the step by step working as below in Fig. 1:

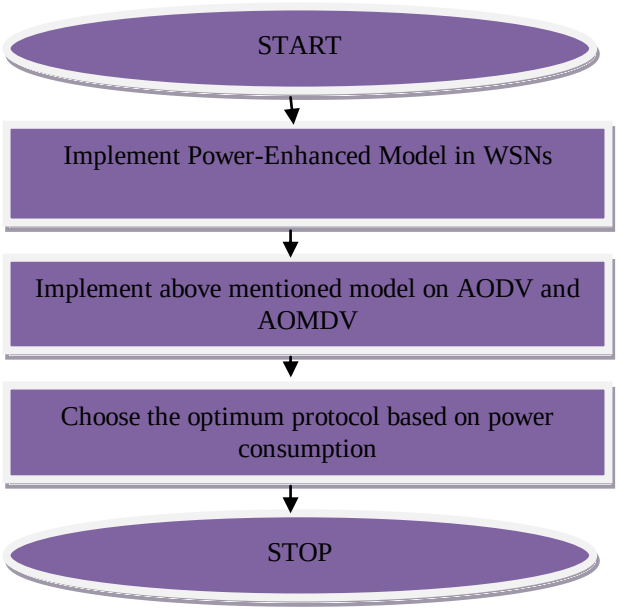

Figure1: Flowchart for the Proposed methodology

IV. ABOUT THE PROPOSED MODEL

The proposed model is a power efficient way in which one node is heavily powered so that it can be used to transmit the power to other nodes in a network when they need. This model will act as a power booster to increase the lifetime of sensor nodes. The nodes are deployed in a region of 1000*1000 m area, and an omnidirectional antenna will be used. The highly powered node will act as a master and will keep on traversing through the network randomly. So that, whenever it finds a dying node, it re-power that node with sufficient power. The re-powering is done if the value of a node is found below than a particular threshold value.

V. RESULTS AND DISCUSSIONS

This section discusses the outcomes generated after implementation of models on AODV and AOMDV protocols. The below parameter justifies the numerical interpretation of the values received at a different number of nodes, that is, 25, 50, 75, and 100.

The power consumption is the total amount of remaining energy minus the average remaining energy. Therefore, the numerical data are shown in table 1 also compares in the graphical form as well.

Table 1: Statistical Comparison between AODV and AOMDV

Number of Nodes	AODV	AOMDV
25	6.969	14.30615
50	14.46388	15.91001

75	15.13412	14.90334
100	13.44182	15.76058

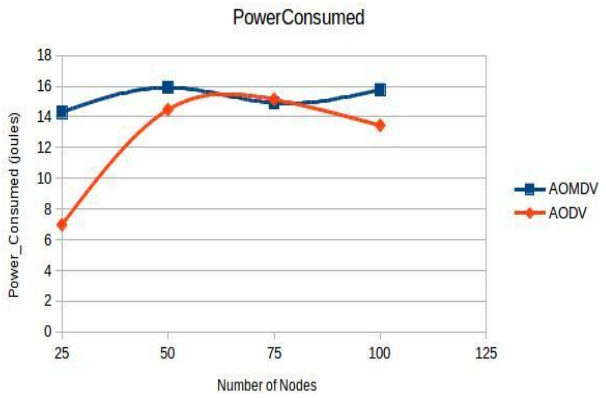

Figure 2: Comparison of AODV and AOMDV based on Power Consumption

Power Consumed

Thus, from the above statistical data in Fig. 2, it can be said that on re-powering the nodes in WSNs and implementing on AODV and AOMDV, the AODV protocol works more efficient when the number of nodes is 25, 50, and 100. But at 75 number of nodes, there is a marginal difference which is avoidable and can be considered.

VI. CONCLUSION

In this research paper, the re-powering model is presented and implemented on AODV and AOMDV protocols. In the first case, Highly Powered node moves arbitrarily among other nodes to calculate its remaining energy level. If the level found is less than the threshold, the highly powered will transmit its own power to the visited node via wireless energy transmission. Finally, the effectiveness when measured for both the protocols concludes that this model is best suitable to work for AODV rather than AOMDV.

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