Energy Efficient Techniques In Multipath Routing Protocol Using Modified Genetic Algorithm

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Abstract

The Ad hoc On-Demand Multipath Distance Vector (AOMDV) routing protocol uses a newtness function (FFn) to determine the optimal path. We introduce this function and its usage in the Genetic Algorithm (GA). It is planned to use FFn in the AOMDV routing protocol (AOMDV-FFn). There is a connection between the AOMDV mechanism and the genetic algorithm (AOMDV-GA). These protocols enable an optimization process to choose the paths with the highest fitness values, enforcing the shortest path, maximising residual energy, and minimising data traffic even when data packets are dropped at random. The optimum path is calculated using the FFn and the TCP Congestion Control Enhancement for Random Loss (TCP CERL). The relative efficiency of the different mechanisms is evaluated.

Keywords:TCP Congestion control, AOMDV, AOMDV-GA, Genetic Algorithm

1. INTRODUCTION

Mobile ad hoc networks (MANETs) are wireless networks in which individual nodes are free to come and go as they want without being tethered to a specific physical place. Due to the distance between the source and the target, MANET is a multi-hop network in which the source node communicates with the target node through intermediate nodes. Exciting new technology, MANET lets users make temporary connections without setting up any underlying infrastructure in advance. Critical in emergency situations, disaster relief areas, and brief conflict zones. One of MANET's most serious problems is connection failure, which disrupts previously established connections. The AOMDV (ad hoc on-demand multi-path distance vector) routing protocol is often used since it selects paths with the fewest possible hops. After a node or channel failure, AOMDV automatically switches to a backup route, which improves throughput and decreases latency. Data transmission stops and the process of identifying another route begins in a single path routing approach, degrading network performance [1]-[5]. Self-configuring, self-organizing, and infrastructure-free, mobile devices form a mobile ad hoc network (MANET). Also called "on-the-fly" or "spontaneous" networks. The nodes in a mobile ad hoc network (MANET) are mobile computers that work together to form a wireless ad hoc network and operate as routers and hosts. A wireless sensor network with a single base station and nine relay nodes is shown in Figure 1. There are two possible paths from source node 1 in the network to the destination node BS: either 1 > 4 > 5 > BS or 1 > 2 > 6 > 9 > BS. These routes do not include any nodes other than the starting and ending ones in their entirety. The two paths leading to and from the node are considered to be its "paths," or individual pathways. Routing protocols often prioritise boosting QoS performance in the sensing network above reducing routing processing time. Therefore, determining the best possible course of action would use a lot of power due to the considerable processing time involved. As the amount of routing requests and the time required to process them both rose, which is mostly dictated by the complexity of the routing algorithm, the sensors' batteries would eventually run out. The sensors in a network are considered bad nodes if their power has been drained. Network performance is impacted in terms of data throughput and communication delay between end nodes; hence, different paths should be explored. To avoid experiencing dead nodes, particularly during data transmission time [6]-[10], it is recommended that routes be selected such that they go across nodes that have sufficient energy.

2. RELATED WORK

The Genetic Algorithm is both a method for finding the best solutions and a computational model that mimics the processes of natural selection and biological evolution. First, genetic algorithms define a population of individuals with genes that can solve the challenge at hand. Therefore, each individual may be seen as a unique being with its own set of chromosomes. In the genetic algorithm, the notions of natural selection and the survival of the fittest are used. Using the original population as a starting point, the genetic operator combines crossover and mutation operations to create a new population with a different set of solutions. This method, like natural epigenetic population evolution, will produce a solution set population that is more adapted to solve the issue than the previous generation (as described by the fitness function) and may therefore be used as the approximate optimal solution to the problem. The challenge of multipath routing in WSNs might be seen as a Darwinian competition for survival. Furthermore, while searching for the best path, it is important to consider the energy requirements and fault tolerance of each network node.

3. PROPOSED ALGORITHM

In order to determine the optimal path, the Ad hoc On-Demand Multipath Distance Vector (AOMDV) protocol is introduced here, along with an unique fitness function (FFn) that might be utilised in a Genetic Algorithm (GA).
Second, we present a routing protocol based on AOMDV and FFn (AOMDV-FFn).
Third, the AOMDV mechanism incorporates the genetic algorithm (AOMDV-GA).

4. PROPOSED SYSTEM

Following in its predecessor's footsteps, the AOMDV-FFn multipath routing protocol uses the AOMDV algorithm. AOMDV-GA is an innovative routing protocol that makes use of the evolutionary algorithm (GA is shown in fig.2.). When an RREQ is broadcast and various routes are received, the sender node must choose the shortest and most efficient route with the least amount of energy consumption and the least amount of traffic, taking into consideration the risk of connections failure resulting in random data packet loss. In other words, the FFn will take into account the following: • the residual energy at each node along the route, • the distance of each potential route, • the congestion along each possible route, and • the discrimination of random loss from congestion lossis shown in figure.1.

Figure.1. Proposed System Process

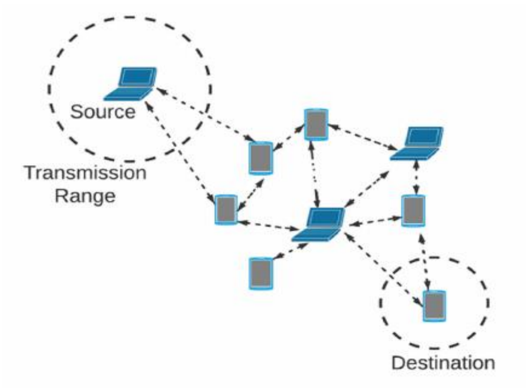


FIGURE.2.UNSIGNCRYPTION

4. RESULTS ANDDISCUSSION

The MANET node is transmitted and receiving the signal is shown in figure from 3 to 8.

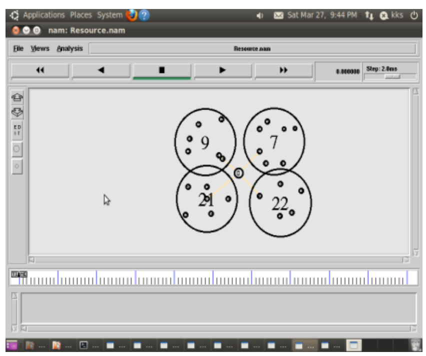


Figure.3. Initial Node creation AOMDV-FFn multipath routing protocol

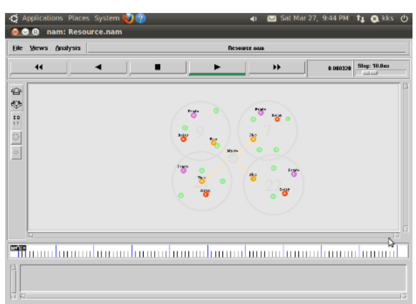


Figure.4.Initial Acknowledgement

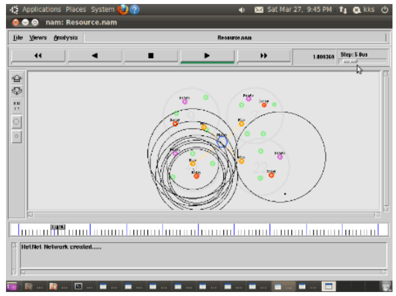


Figure.5. Communication with new fitness function (FFn) Method

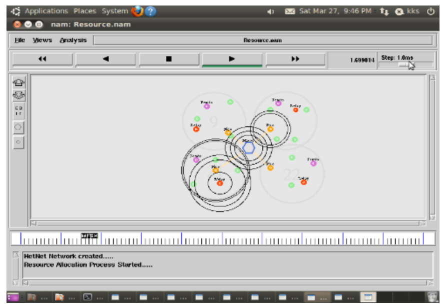


Figure.6. AOMDV-FFn multipath routing protocol

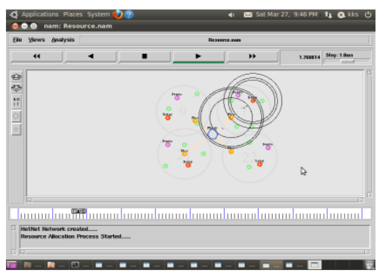
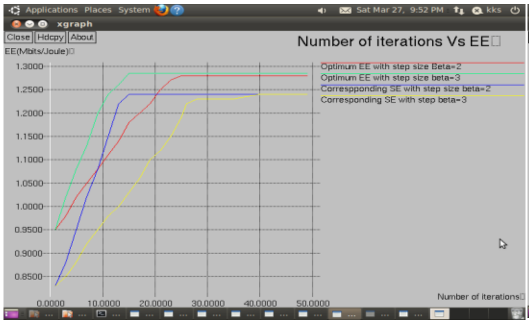


Figure.7.Communication with Low Communication Nodes

Figure.8.Resource Allocation with AOMDV-GA Blocks

5. GRAPHS AND ANALYSES

Network Simulator (NS2) is a simple event-driven simulation tool that has been successfully used to probe dynamic resource allocation in communication networks. NS2 is capable of simulating wired and wireless network services and protocols. As can be seen in Figure 9, NS2 gives its users the ability to build network protocols and simulate their operation.



(a)

(b)

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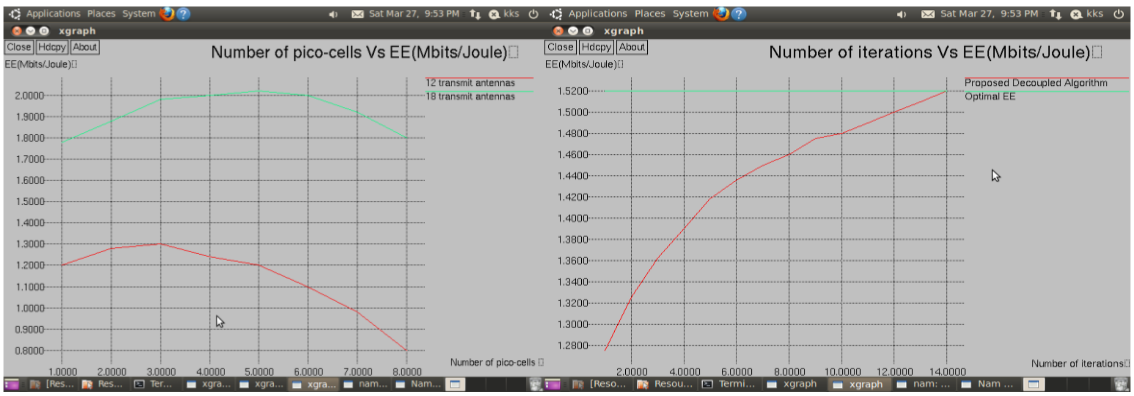
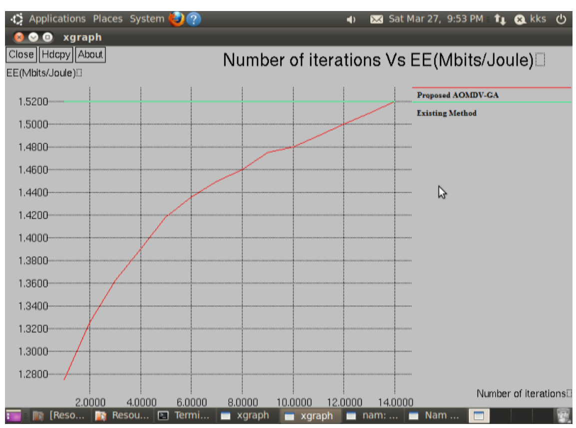


(c)



(d)

Figure.9(a,b,c & d).Number of iterations vs EE

6. CONCLUSION

Improved routing efficiency for IEEE 802.11 MANETs is the topic of this study. The random loss of data packets is an inevitable consequence of connection failure caused by the roving nature of nodes in MANETs. More data retransmissions would be required, increasing energy consumption. We propose a fitness function that takes into account travel time between nodes, the efficiency of traffic flow, and the amount of energy used.

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