ISSN 2347 - 3983
Volume 8. No. 9, September 2020
International Journal of Emerging Trends in Engineering Research
Available Online at http://www.warse.org/IJETER/static/pdf/file/ijeter176892020.pdf
https://doi.org/10.30534/ijeter/2020/176892020

An Energy Optimizing Routing in Wireless Senor Networks using Bee Colony Algorithm

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ABSTRACT

Several investigations have been undertaken in the past decade to evolve efficient routings for the mobile networks of the manet. In Spite of that, energy-efficient protocols will be added an overall network performance degradation and their nodes. The Optimization of Bee Colony (BCO) model is introduced with a new swarm-inspired intelligent routing algorithm. The proposed study and analysis are to study and analyze the function of the bee routing algorithm in terms of energy consumed along each possible route from source to destination. The results were presented on the basis of NS2 (network simulation) simulations. The proposed mobility and network size algorithms will be used for a detailed comparator study.

Key words: Bee Routing, WSN, Energy

1. INTRODUCTION

A wireless sensor network is a category of wireless network comprising a huge number of flowing a minute, self-directed, consuming less power devices called sensor nodes. The growing demand for mobile wireless communications has promoted the appearance of infrastructure with no commonly referred ad hoc mobile networks (MANETs), mainly in cases when normal infrastructure communications networks do not exist or have been crashed [8].
An ad hoc mobile network is a classification of mobile nodes [5], network that cooperatively exceeds any fixed or central administration infrastructure. Usually, mobile nodes are small battery driven elements. There is an unrestricted energy storage at the base stations.

Mobile nodes communicate only with base stations that provide internode and fixed network connectivity, which moderate communication. A MANET is characterized by mobile energy-stricken nodes, flexible bandwidth-restricted links and unpredictable, dynamic topology.

Swarm Intelligence [1] involves collective behavior, in order to solve an individual problem, of the autonomous agents which interact with each other locally. The optimized bee colony model is a new model, involving mainly two types of routing agents: scouts which find new routes on request, and foragers carrying packets of data, and who simultaneously assess the quality of the routes discovered on category of the energy utilization expected and delay in their completion

The various applications of wsn are in the field of military, health, Home and many more.

2. LITERATURE SURVEY

The Authors Imane, proposes a new smart, Bees-inspired routing algorithm to predict the amount of energy all nodes will use on each of their possible routing routes between a given source node. This algorithm will be used to determine the quantity of energy that is consumed by the nodes [2].

The Authors Ahmed. Nagy explained in their paper [6] entitled Power Routing Protocol for MANETs that ad hoc Nodes has small amount of power resources and processing power. New objections such as the need to use power resources efficiently have arisen as wireless devices evolve and user motion is increasing. Knots in an ad hoc network have little power and limited processing power.

In paper [8] Networks discussed using the lowest power path are by the writers Rahul says that who may not be optimal from a long-term point of view. The recent heed in sensor networks has showed to a range of systems in routing, which allow more effective use of limited resources at sensor nodes. These systems generally attempt to determine the very less energy path to maximize energy utilization at a node.

In the article [9] titled Investigation of energy efficient network protocols the authors M. Agrawal provided a detailed energy efficiency description of all layers of the protocol stack for wireless network. Obviously, wireless protocol stack power consumption is key in wireless networks.

In the paper [7] entitled utilization of energy for the performance in manet routings the author L. M. Feeney

provides a model for evaluating MANET's energy usage behavior. The research describes a model for energy consumption which is modified both for use with mobility and traffic. This model analyzed the energy usage of two famous protocols for maneuvering.

3. ARCHITECTURE OF BEE ADHOC

MANET node has a colony, made up of three parts: floor packaging, Embedding the floor dance. Figure 1 shows the structure of the colony. The entrance is a MAC-layer interface while the packaging floor is a layer-transport interface. All packets go in through the entry to the colony. The dance floor includes the ravagers for the routing of the data packets from the server.

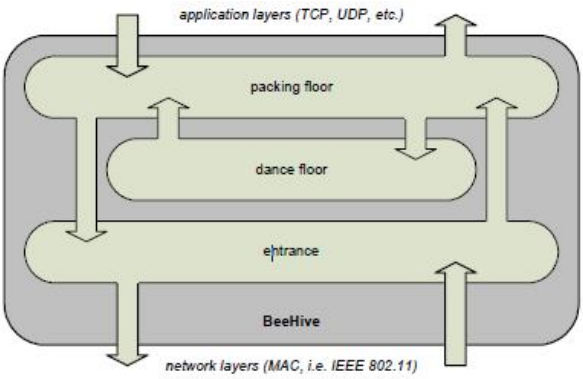
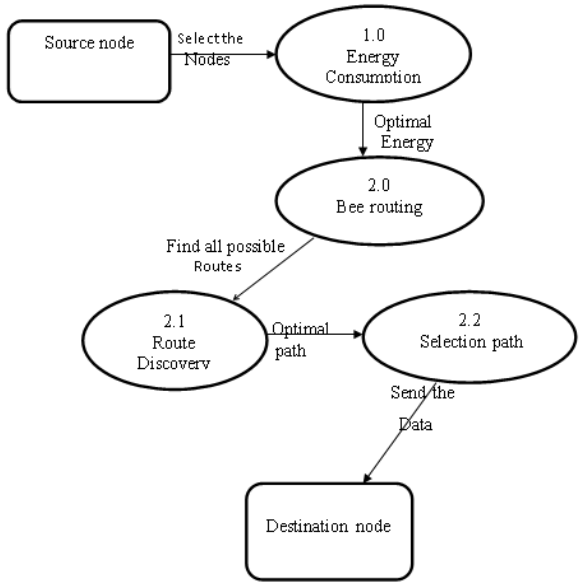


Figure 1:. Bee Architecture

A bee swilling process will be used in the proposed routing protocol. In this process the Scouts: responsible for the discovery of all possible sources of food (all roads). There are three main groups of bees. Then the foragers are led out of the hive with the "waggle dance," which shows the direction of the food.

The Data Flow Diagram is as shown in the below figure



- The energy parameters for various level are done and selected optimized nodes are selected for routing
- The routing is done by selecting all the paths b/w source and destination
- The optimal path is selected and data is sent to the destination

4. ENERGY OPTIMIZATION BEE ROUTING ALGORITHM

The energy optimized model inspired by the *BCD* swarm intelligent model is an optimization model for the MANET. The discovery of optimum path of process from source node to destination node , as follows:

Step1: Each source n node should start its routing path discovery procedure to define the best path between all possible M paths to the target node in arrange to efficiently route its packets towards the destination node.

Step 2: The discovery of path, each node sends bee agents (via beacon messages) over the M potential paths mapped with the TTL (Time To Live)to all close by nodes.

Step 3: If the TTL packet run outs, the bee agent packet will indicate the failure of source and rejected by the path.

Step 4: The bee agent when comes to the termination node, it is sent.

Step 5: Return to starting node, recorded path after collecting all the required routing details. The back-bee agent (became a forager) packet will reveal the path information it has discovered, depending on each potential path node: residual battery power Pm.) where i=1 to N node on each path j, h(Pj) hop number and D(Pj) delay end-toend.

Step 6: At the source node, the quantity of energy to be consumed should be calculated on the basis of the number of hops h(Pj) times the total quantity of energy taken by each node over the track indicated by the expression.

Step 7: The energy consumption of E(Rj) will be calculated.

Step 8: Finally, the goodness ratio of each path g(R j) will be deduced by the forger to find the optimum path R, that is, the energy expected to be consumed, the indicating the hops

number and the delay between end to end in order to route the data packets along from the starting node to the terminating node.

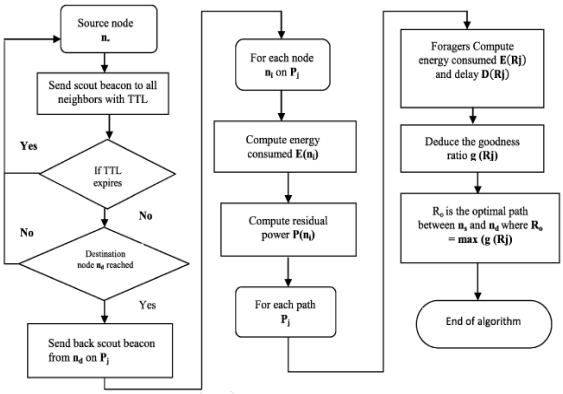


Figure 2: Energy Optimization Flowchart

5. SIMULATION RESULTS

In our simulation, we are using NS2 to simulate our proposed protocol, and mobile hosts have the same channel capacity value of 2 Mbps. As the protocol of MAC layer, we use IEEE 802.11's. The network layer is able to notify about the breakdown of the connection. For a simulation time of 100 seconds, 16 mobile nodes are dropped in a rectangular area of 1400 x 1400 m. The range of transmission on each node is identical to 240 m. Constant bit rate (CBR) traffic is simulated.

No of nodes	14
Area Size	1400X1400 meters
Mac	802.11b
Radio range	240 meters
Simulation Time	200 Seconds
Traffic Source	CBR
Packet Size	128KB
Mobility Model	Random Way Model
Initial Energy	0.4 Joules
Pause Time	0.20

Source Initialization Screen

The initial network settings with some nodes in the wireless network are found in figure 3. The nodes are arranged in topology, as mentioned in the tcl file, in this instantaneous picture before deployment in the network.

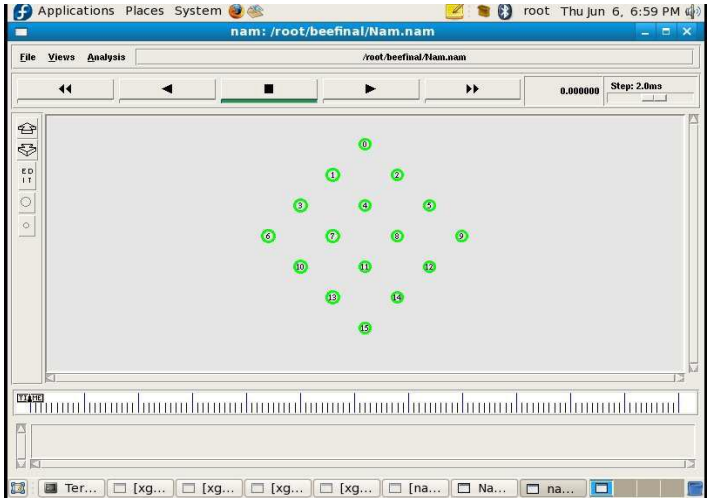


Figure 3: nodes initialization Screen

The Figure 4 shows the nodes in which the transaction time between the nodes is begun, and the screen shot shows a running time.

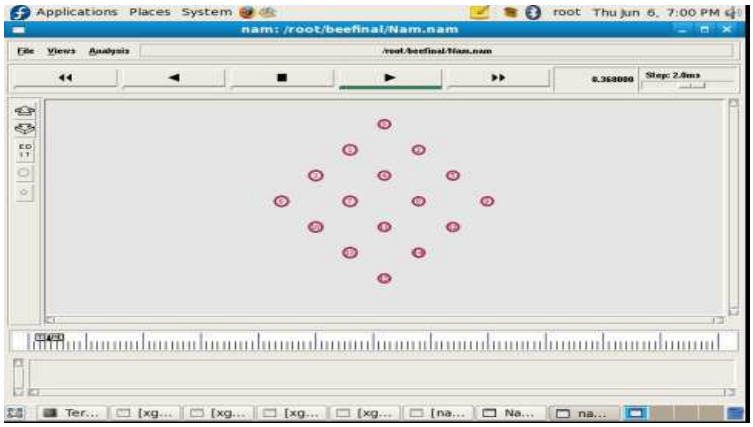


Figure 4: Transaction Started Screen

The figure 5 indicates the deployment of nodes when the transaction is started with the Range of each node deploying each other

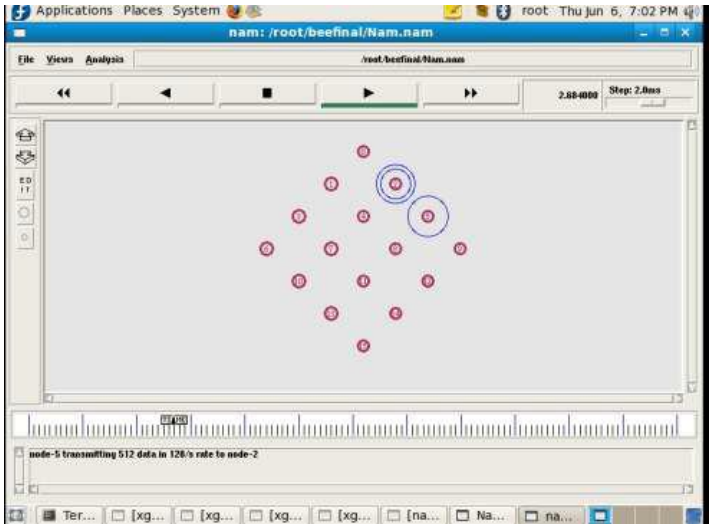


Figure 5: Node deployment Screen

The figure 6, indicates the Data transmission i.e flow of packets from source node to the destination nodes through various intermediate nodes which are energy optimized

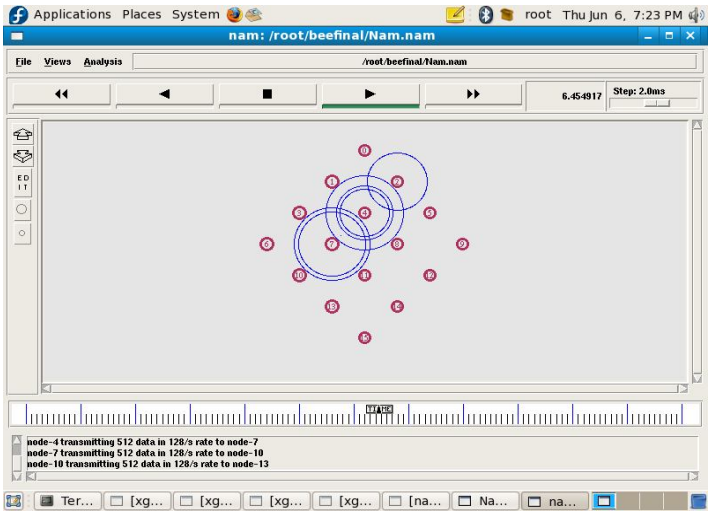


Figure 6: Data Transmission and Energy Efficient routing

This snapshot indicates the start of simulation and all the route discovery by bee agents and its best energy optimized route for routing and its displays route for evaluation with energy parameter

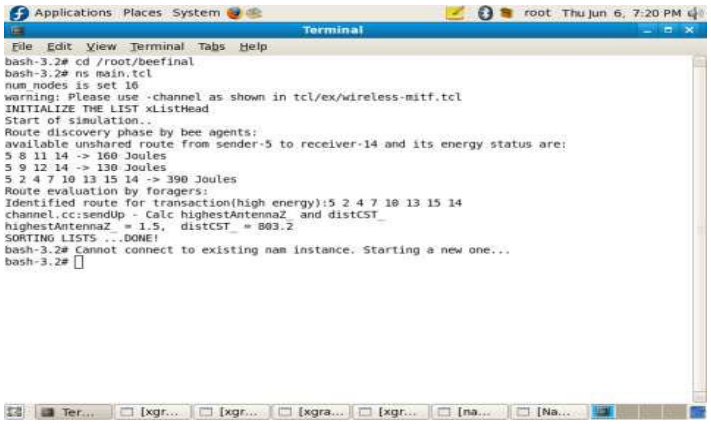


Figure 7: Display of Route Discovery Screen

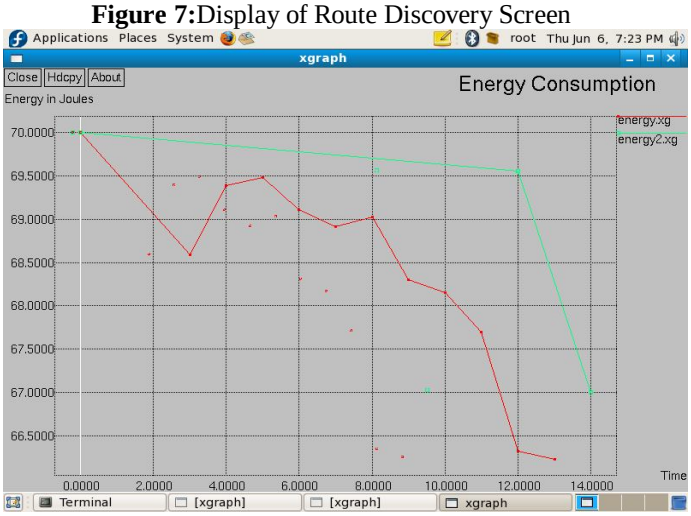


Figure 8: Energy Consumption Graph

The Graph indicates the energy consumption of nodes with different protocols and how the energy consumption of bee routing is optimized. The rate of energy consumption is low compared to other routing protocol in which network lifetime is increased.

6. CONCLUSION

The implementation of the Energy Optimizing Routing in Wireless Senor Networks has been implemented using Bee Colony Algorithm discovery technique for ad hoc mobile networks. The algorithm was inspired by the actions of the natural bee searching for food. The aim of this routing technique is to find the most favorable routing based on its ratio. Energy Optimizing Bee Routing simulation is performed in ns-2, and a comparative analysis is performed under scenarios of mobility and network scale. Future modelling work involves simulation of real-world settings.

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