IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Energy Efficient Multipath Routing In MANET's Using Swapping Of Nodes

Dr. K.R. Patil,

Professor,

Vishwakarma University, Pune

Prof. Kriti Wanjale

Associate Professor,

SSSTUMS,Sehore

***Abstract*—To carry multiple routing in order to make mobile ad-hoc network more energy efficient and to perform swapping of nodes in order to make network more reliable and balance the load on to node ,here best fit function will be used in order to carry out swapping of two perfectly suitable nodes. System initially generates self-configuring network, which contained mobile nodes without any fixed infrastructure. After generating the network multipath source and destination is selected for sending the data. After that multipath is find for sending the data. Shortest path is finding on the basis of energy of nodes and distance of nodes. After that energy consumption of each node is calculated those node which is in ideal state (node which is not in working condition or node with low energy) are swap by using the swapping algorithm to the node with high energy and data is send to the destination node.**

***Index Terms*—Wireless Sensor Networks, MANETs, Sensor Nodes, energy efficient, multipath routing.**

I. Introduction

Now a days execution of wireless communications tech-nology has progressed in recent years. Accordingly, it was considered that utilization of advance mobile wireless com-puting will be progressively spread. Much of this future advancement will include the use of the Internet Protocol (IP) suite. Mobile ad hoc network (MANETs) are imagined to help effective and robust mobile network system activity through the routing functionality into mobile nodes. These systems are predicted to have topologies that are multihop, dynamic, random, and at times quickly changing. These topologies will conceivably be made out of remote connections that are generally bandwidth constrained [1]. Ad hoc systems are essential in the development of remote systems, as they are composed of mobile nodes which convey over wireless connections without central control. The conventional remote and mobile communication issues like data transfer capacity advancement, transmission quality improvement and power control are specifically acquired by ad-hoc remote systems. Moreover, new research issues like Configuration publicizing, disclosure and maintenance are likewise brought by ad-hoc networks as a result of their multi-hop nature, absence of a settled framework andad-hoc addressing and self-routing. There have been various proposition on various methodologies and conventions as there are various standardization efforts being done in the Internet Engineering Task Force and even asacademic and industrial ventures [2].

A mobile ad hoc network is a bunch of wireless mobile sensor nodes in which given task of sending data packets for each other and allows other sensor nodes to communicate out-side the direct wireless range. These network are completely distributed to the decided geographical area, and can work at any place without the help of any infrastructure [8]. Ad-hoc networks does not needed and specific network infrastructure such as base station(BS) and can be easily set up at lower cost as required. the data routers which are involved nodes act as data router, are free to move in network randomly and direct themselves arbitrarily thus, the network's wireless topology may change unpredictably and rapidly. Each sensor node is operated by a limited battery power and sometimes it is impossible to charge these batteries or replace these non-chargeable batteries in the remote area. Every one of the path are computed and after that restored in network. Routing tables are of two sorts Static routing and dynamic routing. Static routing is a sort of network routing strategy. Dynamic routing is a networking method that gives optimal information routing. The routing table isn't influenced by expansion or erasures of routers but it is affected in dynamic routing. Due changing of positions of nodes [3] and connections, the energy and lifetime of network degrades.

II. Review of Literature

In [1] Focused on the energy consumption in MANET by applying the fitness function technique to optimize the energy consumption in ad hoc on demand multiple path distance vector (AOMDV) routing protocol. The proposed protocol is called AOMDV with the fitness function (FF-AOMDV). The fitness funcion is used to find the optimal route from source node to destination node to decrease the energy consump-tion in multipath routing. The performance of the proposed FF-AOMDV protocol

has been estimated by using network simulator version 2, where the performance was compared with AOMDV and ad hoc on demand multipath routing with increasing lifetime of (AOMR-LM) protocols, the two most famous protocols proposed in this area. Te comparison was estimate based on energy consumption, throughput, packet delivery ratio, end-to-end delay, network lifetime and routing overhead ratio performance metrics, varying the node speed, packet size, and simulation time.

MANET (Mobile Ad-hoc NETworks) is useful in many practical scenarios since it provides multi-hop communication without wired infrastructure. In MANET the rout energy is biggest issue and network strength is week.. in this paper alternate-path algorithm is used for congestion control and signal strength. However, to this end, the detour paths should not use the nodes in the more populated area, which is in fact relatively large due to the nature of radio waves. In this paper we have optional path to avoid this problem i.e alternative path is an option for the solution. In this paper, we propose an algorithm and a routing scheme to compute and utilize detour paths adaptively according to the network traffic conditions. From all evaluation, we show that the proposed scheme improve the communication performance by using the detour paths in feasible network scenarios [2].

In [3] designed a new algorithm using the combination of Ad-hoc on Demand Distance Vector (AODV) and Cross layer structure design approach. It is referred as Congestion Control AODV (CCAODV) approach. It is used to avoid link break in MANET due to poor signal strength. Received signal strength is used as cross layer structure design parameter. The CCAODV protocol creates powerful and steady route by using signal strength of sensor node. The signal strength mainly depends on the parameters like energy of the node, transmission power of sensor node and distance between two nodes. The cross layer design approach is tested by using Ns 2.35 simulator and compared with the AODV routing protocol.

Wireless Sensor technology is one among the fast and developing technologies in the current scenario and it has large range of application also which has small sensors with minimum communicational and computational battery power. Depending on the overhead of a node, the energy consumption is different from each other. This leads to the non-uniform dis-tribution of the energy which in turn reduces the performance of the whole network. Swap Rate algorithm (SRA) is used for detecting the low level energy node.if that nodes is present in data routing path then low energy node is replaced by its neighbor node which has specific amount of energy. It will replace the node and finally the data transmission is performed successfully without any obstacles to achieve the reliability in the network [4].

In [5] a particle swarm optimization (PSO)-based lifetime prediction algorithm for route recovery in MANET has been proposed. This is the technique which is widely used in WSN. Here we form a network of having a nearby same amount of energy. From the previous performance of the network we predict the network lifetime of that network. PSO is considered each and every partial. If we can predict lifetime of every node it is easy to predict lifetime of whole network. With the aid of the simulated results, the minimization of data loss and communication overhead using PSO prediction has been discussed in detail.

In this paper[6], Wireless Sensor Networks (WSNs) play an important role in increasing the ubiquity of networks with smart devices that are low-cost and easy to deploy. However, sensor nodes are restricted in terms of energy, processing and memory. Additionally, low-power radios are very sensitive to noise, interference and multipath distortions. In this they proposes a routing protocol based on Routing by Energy and Link quality (REL) for IoT applications. To increase relia-bility and energy-efficiency, REL selects routes on the basis of a proposed end-to-end link quality estimator mechanism, residual energy and hop count. The results show that REL increases the network lifetime and services availability, as well as the quality of service of IoT applications. It also provides an even distribution of scarce network resources and reduces the packet loss rate, compared with the performance of well-known protocols.

In this paper[7], Vehicular Ad Hoc Networks (VANET) are key to realizing Intelligent Transportation Systems (ITS). VANETs are highly dynamic due to high speed mobility of vehicles and traditional routing algorithms for MANETs cannot deal with such dynamicity of network nodes. Several comparative studies have suggested AODV (Ad hoc On-Demand Distance Vector), a well known MANET protocol that is adaptive to dynamic changes in network and makes efficient utilization of network resources, to be the best can-didate for dealing with VANETs. However, verbatim adoption of AODV is not an efficient routing solution for VANETs. They propose Pro-AODV (Proactive AODV), a protocol that uses information from the AODV routing table to minimize congestion in VANETs, yet sustains other performance metrics at acceptable levels. The novelty and elegance in Pro-AODV comes from the fact that it does not require the execution of any additional logic, it is sufficient to know only the size of the routing table at each node.

In [8], novel routing protocol (energy sensing routing proto-col, ESRP) is based on the energy sensing strategy. Multiple strategy routing and substitute routing are both purposed in this paper. Referring to the level of the residual energy and the situation of energy consumption, different routes are chosen for packets transmission. The local maintenance is adopted, which can reduce packets retransmission effectively when the link breaks. We focus on the network lifetime most in all performances. The evaluation is done in comparison with other routing protocols on NS2 platform, and the simulation results show that this routing protocol can prolong the network lifetime and balance energy consumption effectively.

In [9], they develop an on-demand, multipath distance vec-tor routing protocol for mobile ad hoc networks. Specifically, they propose multipath extensions to a well-studied single path routing protocol known as ad hoc on-demand distance vector (AODV). The resulting protocol is referred to as ad hoc on-demand multipath distance vector (AOMDV). The protocol guarantees loop freedom and disjointness of alternate paths. Performance comparison of AOMDV with AODV using ns-2 simulations shows that AOMDV is able to effectively cope with mobility-induced route failures. In particular, it reduces the packet loss by up to 40% and achieves a remarkable improvement in the end-to-end delay (often more than a factor of two). AOMDV also reduces routing overhead by about 30% by reducing the frequency of route discovery operations.

In [10], An ad hoc mobile network is a collection of mobile nodes that are dynamically and arbitrarily located in

such a manner that the interconnections between nodes are capable of changing on a continual basis. In order to facilitate communication within the network, a routing protocol is used to discover routes between nodes. The primary goal of such an ad hoc network routing protocol is correct and efficient route establishment between a pair of nodes so that messages may be delivered in a timely manner. Route construction should be done with a minimum of overhead and bandwidth consumption. This paper examines routing protocols for ad hoc networks and evaluates these protocols based on a given set of parameters. The paper provides an overview of eight different protocols by presenting their characteristics and functionality, and then provides a comparison and discussion of their re-spective merits and drawbacks.

In [11], Wireless networking has witnessed an explosion of interest from consumers in recent years for its applications in mobile and personal communications. As wireless networks become an integral component of the modern communication infrastructure, energy efficiency will be an important design consideration due to the limited battery life of mobile terminals. Power conservation techniques are commonly used in the hardware design of such systems. Since the network interface is a significant consumer of power, considerable research has been devoted to low-power design of the entire network protocol stack of wireless networks in an effort to enhance energy efficiency. This paper presents a comprehensive summary of recent work addressing energy efficient and low-power design within all layers of the wireless network protocol stack.

III. System Overview

A. Proposed System Overview

Detailed descriptions of the proposed system are as follows:

1) *Network Generation*
Initially random network is generated and node position in random network is not fixed.
2) *Select Source and Destination Node*
After the network creation, the selection of source node and destination node is done.
3) *Find the Path* Depending on the source node and destination node generated, the multiple paths from source node to destination node are found.
4) *Search Shortest Path*
Next step is to search the shortest path among the multiple paths to send data.
5) *Energy Value Calculation*
After finding shortest path calculate the energy of each node of shortest path, if node energy is sufficient to transfer data then data is transferred from source to destination.
6) *Swapping of Node*
If node energy is not sufficient to transfer data then it checks the neighboring paths node energy, if there is sufficient energy to data transfer then swapping of node is performed.
7) *Send Data*
After selecting the shortest path with energy efficient node then send the data from source node to destination node .

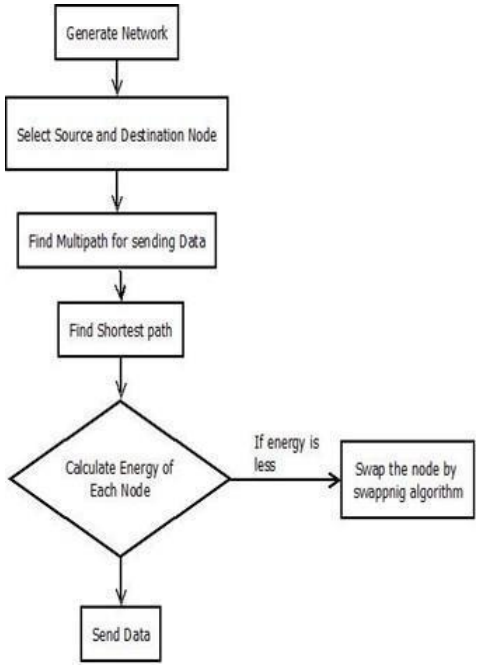

Fig. 1. Proposed System Architecture

B. Algorithm Used

1) Deployment of Random nodes in the network .
2) Select source node S(n) and Destination node D(n).
3) Find the multiple paths from source to destination for sending data.
4) Depend on the hop(h) value find the shortest path from multiple path.
5) After selecting the Shortest path, calculate the energy of each node, e(n1), e(n2). e(n3)...e(n) in path.
6) If e(n) ≥ Te(n) then
Transfer of data from source to destinations. Else
Checks the neighboring paths node energy e(n). If e(n) ≥ Te(n) then
Select the node for swapping. Else
Check another neighboring node.
7) After swapping the node get appropriate path to send data from source to destination.

C. Mathematical Model

System S is represented as S= Dn,S(n),D(n), P, PS

1) Deploy nodes
Dn = {D1, D2,..... ,Dn}
Dn is set of all deployed nodes.
2) Select source ad destination S(n)= {S1} D(n)=D1

3) Find Multiple path source to destination P= {P1,P2,P3,P4... }
   Where P is a set of all Paths
4) Find shortest path
   PS= PS1,{ PS2, PS3.. }
   Where PS is the shortest path
5) Calculate the energy in shortest path E = E1,{ E2, E3..En }
   Where E is a set of all nodes energy
6) Swapping the node
   N = {N1, N2, ... ,}
   Where N is a set of all swapping nodes
7) Data sending from cluster members to cluster Head and from here to base station
   F = { f1, f2, f3, ... fn}
   Where, F is a set of all data packets transmitted.

IV. System Analysis

A. Experimental Setup

The system is built using Java framework on Windows platform. The Net beans IDE is used as a development tool. The system doesn't require any specific hardware to run; any standard machine is capable of running the application.

B. Expected Result

In this section discussed the experimental result of the proposed system.

Following figure 2 shows the time consumption graph of the proposed system with the existing system. Comparison graph shows that the time required for implementing the proposed system is less than the time required for implementing the existing system.

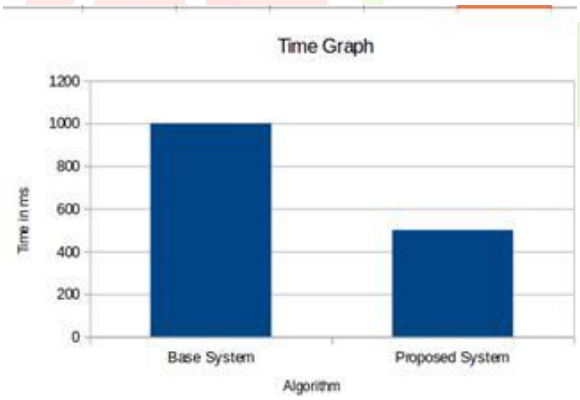

Fig. 2. Time Graph

Table II describes the energy required in Joules for total data routing from cluster member to base station for existing and proposed system. Proposed system reduces energy consump-tion, because there is no need of data resending, if attack found on cluster head as well as data collection node. So that energy consumption is decreases.

TABLE I
Energy Co mparison

Systems	Energy in Jules
Existing System	23000
Proposed System	10000

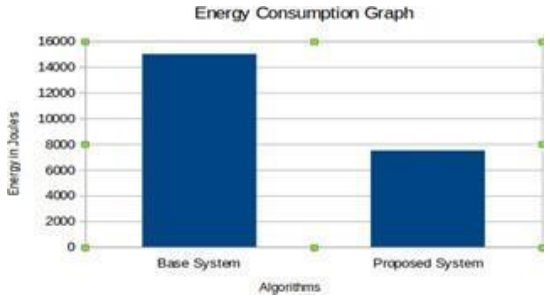

Fig. 3. Energy Graph

V. Conclusion

An energy efficient routing has been simulated by using node rotation concept which helps in the uniform distribution of the energy throughout the network. The critical nodes will be disconnected from the data transmission and the neighbor nodes that have energy level greater than threshold level will be elected as border nodes after. By determining the location and energy information, the nodes will be swapped without network interruptions, in turn enhances the battery life.

References

[1] AQEEL TAHA et al. "Energy Efficient Multipath Routing Protocol for Mobile Ad-Hoc Network Using the Fitness Function",date of publication May 24, 2017, Digital Object Identifier 10.1109/ACCESS.2017.2707537
[2] Kiyotaka Kaji , Takuya Yoshihiro. "Adaptive Rerouting to Avoid Local Congestion in MANETs", 978-1-5090-4183-1/17/31.00 2017 IEEE Open Access journal.
[3] Mazher Khan, Dhat Shital M, Dr. Sayyad Ajij D. "Cross Layer Design Approach for Congestion Control in MANETs" 2016 (ICAECCT) Ra-jarshi Shahu College of Engineering, Pune India. Dec 2-3, 2016.
[4] N.G.Pavithra , M.G.Sumithra, E.Shalini."Efficient energy management in wireless sensor networks using node rotation" 2016 IEEE Online International Conference on Green Engineering and Technologies(IC-GET)
[5] D. Manickavelu and R. U. Vaidyanathan, "Particle swarm optimization (PSO)-based node and link lifetime prediction algorithm for route recov-ery in MANET," EURASIP J. Wireless Commun. Netw., vol. 2014, p. 107, 2014.
[6] Eduardo Cerqueira Kassio Machado, Denis Rosario and Jose Neuman de Souza. "A routing protocol based on energy and link quality for internet of things applications". Sensors,3(2):1942 1964, Feb 2013.
[7] Tanjida Kabir, Novia Nurain, and Md. Humayun Kabir, "Pro-AODV (Proactive AODV): Simple Modifications to AODV for Proactively Minimizing Congestion in VANETs", Proc. of IEEE Inter. Conf. on Networking Systems and Security, Dhaka, Bangladesh, 5-7 Jan. 2015.
[8] S. Zheng, W. U. Weiqiang, Q. Zhang, "Energy and link-state based routing protocol for MANET", IEICE Trans. Inf. Syst., vol. 94, pp. 1026-1034, 2011.
[9] M. K. Marina, S. R. Das, "Ad hoc on-demand multipath distance vector routing", Wireless Commun. Mobile Comput., vol. 6, no. 7, pp. 969-988, 2006.
[10]E. Royer and C-K Toh, "A Review of Current Routing Protocols for Ad-Hoc Mobile Wireless Networks, IEEE PCM, pp. 46-55, April 2000.

[11] S. Bhandare , "Energy Aware Implementation of an Ad Hoc Routing Protocol, ITD Masters Thesis University of Colorado, 2003.