Fitness student, department of computer science, professor,

Business, Management

Fitness Function for Energy Efficient Multipath Routing Protocol in MANETs

T. RADHAKRISHNA

V. V. RAMAPRASAD II. M. Tech student, Department of ComputerScience, Professor, Departmentof Computer science, Sree Vidyanikethan Engineering CollegeTirupati, India.

Sree VidyanikethanEngineering College Tirupati, India Abstract: MobileAd hoc network (MANET) is group of self-routing enabled devices that transmitamong themselves without any certain network infrastructure. Routing in MANETShas routes between nodes in a topology with many unidirectional links usingminimum resources. Since routing protocols have role in MANETS, theirenergy-awareness make greater network lifetime by efficiently using of theavailable energy. In all existing single path routing schemes a new path-discoveryprocess is meant once a path failure is detected and it causes wastage of nodemeasure. A multipath routing scheme is the alternative to maximize the networklifetime. Energy, distances are the fitness values used in the previous work tofind the optimal path in multipath routing. In this work, it is proposed to usethe network resource bandwidth as a fitness value. The calculations forselecting routes towards the destination will be according to energy, distanceand also bandwidth.

The proposed work is expected to improve the performance ofmobile ad hoc networks by prolonging the lifetime of the network. Theperformance will be evaluated in terms of throughput, packet delivery ratio, end-to-end delay, routing overhead ratio, energy consumption and then comparewith the

results of existing AOMDVprotocol Keywords: Mobile Ad hoc network, routing protocol, multipath routing, fitness value 1. INTRODUCTION: At presentcomputer performance and technologies in mobile system to communicate are beingadvanced. Nodes communication can be done through links in the ad hoc networks. Battery capacity of node is depleted which means network security is needed. Routingprotocol made the node energy effective that represent the lifetime of network. Lifetime of a network must be maximized.

There are 3 generations in MANETs: first generation is the Packet Radio Network in 1970’s. Survivable AdaptiveRadio Network is developed by PRNET in 1980’s. To maintain MANETs there are standards like Bluetooth, IEEE 802. 11.

The pathwhich is effective to send packets is taken and the route that is efficient canbe find using Route Request. Route reply gives the view about the hop, residualenergy and bandwidth. Link breakage can be find by the Route Error. These arethe control packets in the protocol to get the required information about theroute. First the route selection is done based on the control packets. The pathwith less distance and the residual energy of the node can be considered. When this occurs the sourcetransmit the package over the path to the destination without any interruption. This can be done with the multipath routing protocol which are referred to theone path routing protocol.

In one path routing once the link splits the packetswill not transmit Whereas in multipath, path are made to sendthe data packets. Fitness function is derived from Particle Swarm Optimization(PSO) algorithm. Fitness Function is mostly used to find the ideal route. Theoptimal path is the one with:· Lessdistance and· Exhaustless energy. The optimal pathminimizes the energy loss and increases the network period. Thus the proposedFF-AOMDV performance in maximizing the network lifetime is possible incomparison with the AOMDV.

1. 1. Existing system: Here AODV (ad hoc on-demanddistance vector) is the protocol from which AOMDV can be taken i. e., AOMDVcreates the multipath between the source and destination.

AOMDV has route _listwhich is not present in AODV and it has advertised_hopcount. As in AODV theroute reply contains the information regarding the node in AOMDV. Damage inlink happens by which multiple paths are required to send the data packets.

Allthe process in AOMDV is done through control packets (RREQ, RREP andRERR). Protocol can be designed based on distance, energy and bandwidth factor. 2. LITERATURE SURVEY: EnergyEfficiency: The authorsTejpreet Singh et al.

1 demonstrates that to maintain a routing protocol, securityand energy efficiency are the important factors. Energy-efficient Securedrouting protocol is implemented to reduce the task. Safety for the protocol isdone by Secure

optimized link state routing system. To get the new route, powerstatus of the node is verified in the route table.

Node representation to theprocess is done and nodes are accessed through safe system. Access controlentity gives a a private key Ki, public key Ki and the certificate Ci needed toget the group key by an approved node. Group key distribution obtaining the generatedkeys with messages support decreasing energy usage. When a safety link is taken thecommunication for the two message sender and message recipient is provided.

Thegroup key distribution mechanism admits alternative of the group key when anode is eliminated. Non-authorized friend is able to make the resources whenthe group key is send by the authorized user. Fig1. illustrates the group keydistribution mechanism Sudhakar Pandey et al 2 Networkaccomplishment can be enriched by using cross-layer approach. Application of sendingpower charge method to arrange communication power issues in decline of energyconsumption. ED is examined to consult the weight assisted with each node. D views for degreeand E views for energy. System usage is increased and energy consumption isreduced by control overhead reduction.

Energy method of Wireless network is stated asthe entire energy usage of the network and the units like sensor elements, routingsenergy usage. For a protocol creating a model i. e., energy model to its growthis the best method.

N mobile sensor nodes, one sink node is taken with in anetwork. Energy used by sensor device: sensortool consists of processing units, sensing unit, memory unit and transceiverunit. Energy usage of single unit taken is: E Sensor Device = E processor + E sensor +

Ememory+Etransceiver (1)

Where E Sensor Device is the energy consumed by asensor device, E processor is the energy depleted by the processing units, E sensoris the energy use up by the sensing unit, E memory is the energy spent by thememory unit and E transceiver is the energy consumed by the transceiver unit. Sensornodes exist many years and nearly 75% of networks energy is used for communication.

Thus the energy usage of node must be reduced because for every device energyis utilized. So, energy usage is more and it should be decreased. S. Muthurajkumar et al 3 In MANETs, two vital issues are Energy consumption andSecurity. With key management, trust management, ? rewalls and intrusiondetection the security is maintained.

As the security and energy are essentialfor communication they are studied in routing algorithms. When the securityattacks in routing protocols are blocked energy usage is reduced. Trust score evaluation, routing and threshold setting usingthe trust values are the phases in trust based secure routing algorithm. Intrust score evaluation process the trust score for distinctive nodes arecalculated depending on factors like nodes that are really able to send theiracknowledgement to neighbors when the packets are

taken can be considered asfirst group and the nodes that leave many packets are treated as group twonodes.

By this the trust score will be calculated through the Eq which showsthe percentage of acknowledgements. TS1i=(ACK/RP)*100 (2) ACK = No. of acknowledgements transmit to the neighbors TS1i = First trust score in percentage for ith node, RP= No. of packetsaccepted from neighbors. second trustscore is estimated using Eq (3) which counts the dropped packets TS1i= 100-((DP/TDP)*100) (3) DP = No.

of packets dropped, TDP = Entire packetsdropped in network. TS2i = Second trust score percentage forith node. The total trust score of the particular node isconsidered using Eq. (4) TSi=(TSli+TS2i)/2 (4) TS1i = First trust score for node i, TS2i = - Secondtrust score for node I, TSi = Entire trust score for node i. Forestablishing a cluster based network a clustering scheme is evolved with clusters. A Cluster based Energy Ef? cient Secure Routing Algorithm (CEESRA) is proposed formaintaining efficient routing. Malignant nodes should be prevented and traced applyingthe trust score. A dynamic clustering technique not only uses low mobilitynodes, energy usage, trust values and distance terms in maintaining the energyef? cient secure routing algorithm.

N. Magadevi et al 4 The wireless nodes havelimited power resource in Wireless Sensor Networks. To recharge the batteriesof the wireless nodes

Wireless charging is an alternative. Using a singlemobile anchor a wireless recharging and also localization are proposed. Localization provides the position information. Static node is located by themobile anchor first and then it receives the battery level. Later static nodesare recharged if the static node battery is lesser than the threshold limit. Fundamentalunit of sensor network is sensor node.

It comprises of sensors, microprocessor, transceiver, memoryand power supply. An Adhoc network with a collection of number of sensor nodesis Wireless Sensor Network. It is used in many ? elds like disaster rescue, intrusiondetection and in health care applications. Gateway between the WSN and theother network is sink node. Noise Ratio (SNR), increased ef? ciency, improvedrobustness and scalability are the advantages in WSN.

In designing WSN thereare several challenges like software development, deployment, localization, hardware design, routing protocol and coverage. For effective data communicationand computation sensor node must be accurate. In the advancement of wirelesssensor networks effective localization system must be developed. Range freelocalization algorithms do not require distance or angle measurements. Alongwith the wireless charging localization problem is addressed here. Sensorsenses the data and communicates with the base station through Multi hopcommunication. In Wireless Rechargeable Sensor Network an effective andcontrollable energy harvesting scheme is to be adopted.

Wen-KuangKuoet al 5 The energy consumption of battery-powered mobile devices can beincreased by measured in bits per Joule for MANETs. By jointly consideringrouting multimedia applications the energy ef? ciency (EE) is an essentialaspect of mobile ad hoc networks (MANETs). Based on the cross-layer designparadigm EE optimization is, traf? c scheduling, and power control a non convexmixed integer nonlinear programming is modeled as a problem. Branch and bound(BB) algorithm is devised to ef? ciently solve this optimal problem. EEOPTIMIZATION PROBLEM: A MANET comprised of one set of stationary nodes N connected by a set L oflinks. We consider everylink l = nt-> nr to be directional, where nt and nr are thetransmitter and receiver of l, respectivelyMATHMATICAL MODEL FOR THEEE OPTIMIZATION PROBLEM: For every link l at every time slot t, binary variable as (),

(5) Where ? = (1 ,...., T) and T is the total number of scheduled time slots.

Transmissionpower on link l at time slot t, i. e., , is continuously adjustedin given interval 0, pmax. constraint (

(6)Note thatbeing allowed to transmit does not necessarily mean a transmission actuallyoccurs, which is decided by the optimization algorithm. With recent advances ininformation and communication technology (ICT), MANETs become a promising andgrowing technique. Multimedia services like video on-demand, remote education, surveillance, and health monitoring are supported using MANETs. Energy is ascarce resource for mobile devices, which are typically driven by batteries. Using cooperative multi-input-single-output transmissions authors maximized EEfor the MANET.

By designing resource allocation mechanisms cross-layeroptimization can substantially enhance EE. By jointly computing routing path, transmission schedule, and power control to the network, link, and PHY layersacross-layer optimization framework is proposed to enhance EE. The transmission power of every active node ineach time slot is specified by the power control problem. To globally optimize , anovel BB algorithm is developed. In terms of computational complexity proposedalgorithm outperformed the reference algorithm. By exploiting the cross-layerdesign principle a solution to determine the optimal EE of the MANET isprovided. Distributed algorithms and protocols are designed to find the optimalEE.

Any technique which can optimize non convex MINLP problem in a distributedmanner is not proposed. Thus distributed algorithms and protocols are developedusing approximation algorithms. The guarantee for acquiring the optimalsolution is the disadvantage of approximation algorithm.

A customized BB algorithmfor the optimization of the problem is proposed. A novel lower boundingstrategy and branching rule is designed and incorporated in the proposed BBalgorithm. To optimize EE of MANETs distributed protocols and algorithms areimplemented. To improve EE of MANETs novel distributed protocols and algorithmsare developed.

3. PROPOSED SYSTEM: A newmultipath routing protocol called the FF-AOMDV routing protocol is acombination of Fitness Function and the AOMDV’s protocol. When a RREQ isbroadcast and taken, the source node can have

three kinds of data to get the shortest and optimized path with less energy consumption. This has: 1.

Information about network’s every node’s energy level 2. The distance of each path 3. Theenergy consumed in the method of route discovery. The source node will transmit the data packets by thepath that has more Energy level, through that it can get the energyconsumption. Through the simulation, an OTcl script is taken to demonstrate thenetwork parameters and topology, such as traffic source, number of nodes, queuesize, node speed, routing protocols used and many other parameters. Two filesare generated when loading the simulation: trace file for processing and a networkanimator (NAM) to see the simulation. Fig.

2 Optimumroute selection NAM is agraphical simulation display tool. It makes the route selection of FF-AOMDVdepending on certainparameters. Theoptimum route is the route which has the best energy level and the minimaldistance. Preference is likely to the energy level, regarding the route withthe disordered arrow. In other criteria, if the path contains maximum energylevel, but does not has the smallest distance, it will be taken but with lesspreference. In other scenarios, if the intermediate nodes placed between the sourceand destination with less energy levels distinguished to remaining nodes in thenetwork, the fitness function can select the route depending on the smallestdistance. Available Bandwidth: Bandwidth is also known as the data transferrate.

It describes the data sent out by means of connection over a specifiedtime and the bandwidth is expressed in bps. Bandwidth is the bit-rate of theexisting or the consumed information capacity uttered normally in metricmultiples of bits per second. As the bandwidth is kept high the energyconsumption is also high. The data packets send increases and the energyconsumed at each node is also high. The transmission power consumption is highbecause the packets send are more. When the bandwidth is taken as a parameteralong with the distance and energy, energy consumption varies as: 1.

when distanceincreases energy consumption also increases and when the route distance is lessenergy consumed will be low. 2. whenbandwidth is high energy consumption isalso high and when it is less energy consumed will be low. Thusbandwidth is the parameter considered here and the simulation hasscenarios like node speed, packet size and simulation time. simulations aredone by keeping the scenariosas: varying the packetsize(64, 128, 256, 512, 1024) andkeep both the node speed and simulation time fixed. Packet delivery ratio, Throughput, End-to-end delay, Routing overhead ratio are the performance metrics used to test thescenarios.

In the proposed system as the bandwidth is the other parameter themathematical model is to be find based on the three parameters energy, distanceand bandwidth. Route reply’s are sent from the specified intermediate nodes bywhich hop count, residual energy, Qlength, bandwidth values are taken. Let theformula be

Ax1+bx2+cx3+dx4/4 (7) where x1-> hop

count, x2-> Q length, x3-> residual energy, x4-> bandwidth. And a, b, c, d are based on priority.

By takingthe values of the parameters optimal path can be find. 4. CONCLUSION: Energyef? ciency (EE) is an important aspect of mobile ad hoc networks (MANETs). securedrouting protocol is designed that is energy efficient and security is arrangedfor the two link and message without depending on the third party. A secureconnection between the participating nodes is provided by the environment of MANETS. Energy consumption shows an vital aspect in network lifetime. As networkadjustability is an important aspect and network's energy is used up in datacommunication, Cross-Layer design access is used to improve the transmissionpower for power control. Energy consumption can be reduced by the avoidance ofsecurity attacks on routing protocols.

Here to find the optimal path inmultipath routing, distance and energy are the fitness values used. It isproposed to use the network resource bandwidth. Thus the proposed work minimizesenergy consumption and maximizes network lifetime. REFERENCES: 1. TejpreetSingh, JaswinderSingh, and SandeepSharma," Energyef? cient secured routing protocol for MANETs," in Wireless Networks, Springer, pp-1001-1009, May2017.

2. SudhakarPandeyandDeepikaAgarwal," AnEDBasedEnhancedEnergy Ef? cient Cross Layer Model for Mobile Wireless Sensor Network," in NationalAcademy Science Letters., Springer, pp 421-427, December 2017. 3. S. Muthurajkumar, S. Ganapathyand M. Vijayalakshmi, " An

IntelligentSecured and Energy Ef? cient Routing Algorithm for MANETs," in Wireless PersonalCommunications, Springer, pp1753-1769, September 2017. 4. N. Magadevi, V. JawaharSenthilKumarand A. Suresh, " Maximizing the Network Life Time of Wireless Sensor NetworksUsing a Mobile Charger," in Wireless Personal Communications ., Springer , pp1-11, 2017. 5. Wen-KuangKuoand Shu-Hsien Chu, " Energy Efficiency Optimization for Mobile Hoc Networks," IEEE Access, pp 928-940, March 2016