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Fitness Function for Energy Efficient Multipath Routing Protocol in MANETs T.

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Routing in MANETShas routes between nodes in a topology with many unidirectional links usingminimum resources. Since routing protocols have role in MANETS, their energy-awareness makegreater network lifetime by efficiently using of the available energy. In allexisting single path routing schemes a new path-discovery process is meant oncea path failure is detected and it causes wastage of node measure.

A multipath routing scheme is the alternativeto maximize the network lifetime. Energy, distances are the fitness values usedin the previous work to find the optimal path in multipath routing. In thiswork, it is proposed to use the network resource bandwidth as a fitness value. The calculations for selecting routes towards the destination will be accordingto energy, distance and also bandwidth. The proposed work is expected toimprove the performance of mobile ad hoc networks by prolonging the lifetime ofthe network. The performance will be evaluated in terms of throughput, packetdelivery ratio, end-to-end delay, routing overhead ratio, energy

consumptionand then compare with the results of existing AOMDV protocol 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: firstgeneration is the Packet Radio Network in 1970’s. Survivable Adaptive RadioNetwork 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 Energy efficiency and security arethe challenging tasks in the design of a routing protocol. Energy–efficientsecured routing protocol is proposed to get away from this challenge. Secureoptimized link state routing protocol is used to supply security to theprotocol. Node Identification to the network is declared and nodes are approvedby the access control.

Access control entity signs a private key Ki, public keyKi and the certificate Ci needed to obtain the group key by an authorized node.

Group key distribution accepting the generated keys with messages supportreducing energy consumption. The group key distribution mechanism allowssubstitute of the group key periodically or when a node is removed. The cyclicdistribution suspends adversaries with the group key, but not a private key. Incommunity networks, an authorized user may send the group key to anon-authorized friend so as to the friend accesses network resources. An intrusiondetection system (IDS) also triggers the group key distribution. 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. Energy consumption is reduced and network accomplishmentis enriched by Control overhead reduction while route discovery and dynamicimprovement of transmission power is done. The energy model of wireless sensor networkcan be stated as the total energy consumption of the network, arrange all itsunits, be it sensor device components, energy used in routing or routemaintenance, topology maintenance or whosoever it may be. Creating an energymodel is an vital part of any protocol growth and its performance estimation. Here a network is treated with n mobile sensor nodes and single sink node thatis static.

Energy consumed by sensor device: The sensor device consistsof processing units, sensing unit, memory unit and transceiver unit. So, energyconsumption of each unit made considered as: 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. Sincenetwork lifespan is an vital aspect criterion Sensor nodes perform for years. clearly 70% of network's energy is used in data communication.

By getting average ofReceived Signal Strength (RSS) values, transmission power is improved byCross-Layer design approach for Power Control. S. Muthurajkumar et al 3 Two important aspects of Mobile Ad Hoc Networks (MANETs) areEnergy consumption and security.

Using trust management, key management,? rewalls and intrusion detection security is provided in MANET. It is essentialto consider the energy and security aspects in routing algorithms since energyand security are important for communication. Energy consumption can be reducedautomatically by the prevention of security attacks on routing protocols andcluster based routing. Trust score evaluation, routing andthreshold setting using the trust values are the phases in trust based securerouting algorithm. In trust score evaluation process the trust score forindividual nodes are calculated based on constraints like nodes which

aregenuinely sending their acknowledgement to neighbors when they received thepackets are treated as first group and the nodes which drop more packets are considered as and the nodes which drop more packets areconsidered as group two nodes. Now, the initial trust score is computed usingthe Eq that represents the percentage of acknowledgements. TS1i=(ACK/RP)*100 (2)

ACK = No.

of acknowledgements sent to the neighbors , TS1i = First trustscore in percentage for ith node, RP = No. of packets received from neighbors second trust score is computed using Eq (3) which calculatesthe dropped packets TS1i= 100-((DP/TDP)*100) (3)

DP = No. of packets dropped, TDP = Total number ofpackets dropped in network.

TS2i = Second trust score percentagefor ith node. The overall trust score of the particular nodeis calculated using Eq. (4) TSi=(TSli+TS2i)/2 (4) TS1i = First trust score for node i, TS2i = -Secondtrust score for node I, TSi = Overall trust score for node i.

Fordeveloping a cluster based network a clustering scheme is developed with clusters. A Cluster based Energy Ef? cient Secure Routing Algorithm (CEESRA) is proposed forproviding effective routing. Malicious nodes can be avoided and detected usingthe trust score. A dynamic clustering technique not only uses low mobilitynodes, energy consumption, trust values and distance parameters for providingthe energy ef? cient secure routing algorithm. The proposed algorithm providesbetter performance in terms of

packet drop ratio, residual energy, security andthroughput when compared to the existing techniques. 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 datacommunication and computation sensor node must be accurate. In the advancementof wireless sensor networks effective localization system must be developed.

Rangefree localization algorithms do not require distance or angle measurements. Along with 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.

Thus proposed methodimproves the network’s lifetime. 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 BBalgorithm for 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 will have three types of information inorder to find the shortest and optimized route path with minimized energyconsumption. This include: 1. Information about network’s each node’s energy level 2. The distance of every route 3.

Theenergy consumed in the process of route discovery. The source node will then sends the data packets viathe route with highest Energy level, after which it will calculate its energyconsumption. In this simulation, an OTcl script has been written to define thenetwork parameters and topology, such as traffic source, number of nodes, queuesize, node speed, routing protocols used and many other parameters. Two filesare produced when running the simulation: trace file for processing and anetwork animator (NAM) to visualize the simulation. Fig.

2 Optimumroute selection NAM is agraphical simulation display tool. It shows the route selection of FF-AOMDVbased on specific parameters. The optimum route refers to the route that hasthe highest energy level and the less distance. Priority is given to the energylevel, as seen on the route with the discontinuous arrow. In another scenario, if the route has the highest energy level, but does not have the shortestdistance, it can also be chosen but with less priority. In some otherscenarios, if the intermediate nodes located between the source and destinationwith lesser energy levels compared to other nodes in the network, the fitnessfunction will choose the route based on the shortest distance available 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 the existingor the consumed information capacity uttered normally in metric multiples ofbits per second.

As the bandwidth is kept high the energy consumption is alsohigh. The data packets send increases and the energy consumed at each node isalso high. The transmission power consumption is high because the packets sendare more. When the bandwidth is taken as a parameter along with the distanceand 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 are doneby keeping the scenariosas: varying the packetsize(64, 128, 256, 512, 1024) and keepboth 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 essential aspect of mobile ad hoc networks(MANETs). secured routing protocol is proposed which is energy efficient andsecurity is provided for both link and message without relying on the thirdparty. A secure communication among the participating nodes is offered by theenvironment of MANETS. Energy consumption plays an important role in networklifetime.

Since network mobility is an important factor and network’s energy isconsumed in data communication, Cross-Layer design approach is used to enhancethe transmission power for power control. Energy consumption can be reduced bythe prevention of security attacks on routing protocols. Here to find theoptimal path in multipath routing, distance and energy are the fitness values used. It is proposed to use the network resource bandwidth and calculations inselecting the routes towards the destination will be according to the distance, energy and also bandwidth . Thus the proposed work minimizes energy consumptionand maximizes network lifetime.

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