Improving Energy Efficiency in Manet by Using Genetic Algorithm

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Abstract — Mobile Ad-Hoc Network is infrastructure less network. MANET consists of randomly deployed nodes connected by various links. Important issues in MANET are link failure, power failure of node, limited bandwidth, and limited transmission power. To overcome these problems, energy efficient protocol has become a very interesting and important research area. To improve network lifetime, energy balance is an important concern in MANET. In this paper, we investigate the different protocols proposed to resolve the issue of energy consumption of routing nodes in MANET. We provide parameterized study of energy efficient protocols. We discuss and compare these protocols to provide an overview of the latest approaches in the field.

Keywords — MANET, Energy efficient protocols, Routing nodes, Network lifetime

1. INTRODUCTION

The widely deployed mobile ad hoc networks (MANET’s) can establish a dynamic network without a fixed infrastructure. A node in MANET’s can function both as a network router for routing packets from the other nodes and as a network host for transmitting and receiving data [1]. MANET’s are particularly useful when a reliable or fixed infrastructure is not available. MANET’s nodes cooperate with each other to achieve a common goal without centralized control. The major activities involved in self-organization are neighbour discovery, topology organization, and topology reorganization. Mobile ad-hoc network has no fixed topology therefore distributed topology control consists of two factors that are neighbour selection and transmission power assignment [2].
II. ENERGY AWARE ROUTING MODULE

The nodes in an ad hoc network are constrained by battery power or energy for their operation. To route a packet from a source to a destination involves a sufficient number of intermediate nodes. Hence, battery power of nodes in network is a precious limited resource that must be used efficiently in order to avoid early termination of a node or a network. Thus, energy utilization and management is an important issue in dynamic networks. Energy Efficient utilization, transmission energy management and system power management are the major means of increasing the life of a node. These management schemes deals in the management of energy resources. By controlling the early depletion of the battery, adjust the transmission power according to next neighbor to decide the proper power level of a node and incorporate the low power strategies into the protocols used in various layers of protocol stack. There are so many issues and solutions which witnesses the need of energy management in ad hoc wireless networks. A few reasons for efficient energy utilization in MANETs are Limited Energy of the nodes, Difficulties in Replacing the Batteries, Lack of Central Coordination, Constraints on the Battery Source, Selection of optimum Transmission Power, and Channel utilization. Finally at the network layer, issues which are open are as designing of an efficient routing algorithm that increases the network lifetime by selecting an optimal relay node. For that purpose we set each node initial energy as a randomly and set threshold energy as 10 joule we also define discharge energy on the bases of transmission power, receiving power and idle power with respect to time and calculate existing path using AODV routing protocol.

III. PROBLEM STATEMENT

Mobile Ad-hoc Network partitioning interrupts communication session; this can be caused by node movement or by node failure due to energy depletion. Whereas the former cannot be controlled by the routing protocol, the latter can be avoided through appropriate routing decisions. Operational lifetime is therefore defined in this survey as the time until network partitioning occurs due to battery outage. A few reasons for energy deterioration in MANETs are Limited Energy of the nodes, Difficulties in Replacing the Batteries, Lack of Central Coordination, Constraints on the Battery Source, Selection of optimum Transmission Power, and Channel utilization. All of them is big challenge to manage energy issue in MANET environment, so our aim to efficient as well as reliable communication using energy aware of each node and apply MIN MAX scheme.
IV. PROPOSED METHODOLOGY

In our proposed scheme we use the energy module and set the initial energy to all node and also set transmission power, receiving power, idle power and sleep power required by each node, according to various paper we set decreasing power of energy level and simulate the result of mobile nodes. For achieving the goal of proposed work very first we broadcast route request packet through number of intermediate node’s and check node energy of each devices on the bases of Genetic Algorithm energy scheme, in this scheme if two intermediate node exists in two different path so same time duration we check both device current energy and calculate GA energy, and select route as maximum contain energy node, we apply this process until we reach the destination. After find route on the basis of energy level we send actual data packet to the destination this work increases the life time of communication between senders to destination. GAs is stochastic search algorithms based on the mechanism of natural selection and natural genetics. GA, differing from conventional search techniques, start with an initial set of random solutions called population satisfying boundary and/or system constraints to the problem. Each individual in the population is called a chromosome (or individual), representing a solution to the problem at hand. Chromosome is a string of symbols usually, but not necessarily, a binary bit string. The chromosomes evolve through successive iterations called generations. During each generation, the chromosomes are evaluated, using some measures of fitness. To create the next generation, new chromosomes, called offspring, are formed by either merging two chromosomes from current generation using a crossover operator or modifying a chromosome using a mutation operator. A new generation is formed by selection, according to the fitness values, some of the parents and offspring, and rejecting others so as to keep the population size constant. Fitter chromosomes have higher probabilities of being selected. After several generations, the algorithms converge to the best chromosome, which hopefully represents the optimum or suboptimal solution to the problem.

General Structure of a Genetic Algorithm

In general, a GA has five basic components:
1. A genetic representation of potential solutions to the problem.
2. A way to create a population (an initial set of potential solutions)
3. An evaluation function rating solutions in terms of their fitness.
4. Genetic operators that alter the genetic composition of offspring (Crossover, mutation, selection, etc.).
5. Parameter values that genetic algorithm uses (population size, probabilities of applying genetic operators, etc.).

V. EXPECTED OUTCOME OF OUR PROPOSED WORK

Our proposed work simulate through network simulator-2, and provide result in the form of network parameter like throughput, packet delivery ratio, energy consumption of each node, and end-to-end delay, routing load etc. through our work will gives better result in the form of network parameter and efficiently with intellectual result gives. Following parameter we define here:-

Packet Delivery Ratio: The ratio between the number of packets originated by the application layer CBR sources and the number of packets received by the CBR sink at the final destination. Average End-to-end Delay: This includes all the possible delays caused by buffering during route discovery latency, queuing at the interface queue, retransmission delays at the MAC, and propagation and transfer times. Packet Drop: The routers might fail to deliver or drop some packets or data if they arrive when their buffer are already full. Some, none, or all the packets or data might be dropped, depending on the state of the network, and it is impossible to determine what will happen in advance. Routing Load: The total number of routing packets transmitted during the simulation. For packets sent over multiple hops, each transmission of the packet or each hop counts. Energy Utilization: that parameter base we analyze is fraction of second discharge energy of each mobile node that provide energy utilization graph of nodes.

VI. CONCLUSION

Our proposed methodology under Genetic Algorithm base energy scheme that provide reliable communication and provide energy of each node that work provide maximum data delivery in each session and increases the performance of the network like packet delivery ratio, throughput and minimize the end-to-end delay, will It will also gives each node’s energy value, required transmission power and receiving power. Energy based routing protocol always gives accuracy of the result and also increases life time of the network.

REFERENCES


