LEACH-DSR Base Routing For Minimization Energy Consumption in MANET

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Abstract- A mobile ad-hoc network (MANET) is autonomous, self organizing and self-configuring network with the capability of rapid deployment in response to application needs. In our simulation we use DSR (dynamic source routing) that provide MANET route request flood and maintenance of routing but one is the measure challenge is energy issue in mobile ad-hoc network, because mobile node are energy constraint devices, In this paper we proposed LEACH and DSR routing and find-out reliable path (higher energy base route selection), in our proposal LEACH generate cluster and gives information about energy of each cluster belongs zone and if energy of an of the node is higher so LEACH select that particular node for data transmission that work increases the reliability to the communication, in this paper we also analyze the result in the form of network parameter like throughput, packet delivery ratio, energy consumption via node and routing overhead.

In this method we analyze the behaviour of network through network simulator-2 and get result of the network.

Index Terms- Routing Load, Packet Delivery Ratio,attack,OLSR, congestion,Leach

I. INTRODUCTION

MMobile Ad hoc Networks (MANETs) consist of a collection of wireless mobile hosts (called nodes), recently have received increasing attention. Independence from central network administration, ability for being self-configured, self-healing through continuous reconfiguration, scalability and flexibility are the distinguished reasons to deploy such networks [1,2].

MANETs require no fixed infrastructure or central administration. Mobile nodes in an ad hoc network work not only as hosts but also as routers, and communicate with each other via packet radios.

Since most wireless nodes in ad hoc networks are not connected to a power supply and battery replacement may be difficult, optimizing the energy consumption in these networks has a high priority and power management is one of the most challenging problems in ad hoc networking.

Wireless mobile sensor network applications the energy source is a battery, energy plays an important role in wireless sensor network, and preserving the consumed energy of each node is an important goal that must be considered when developing a routing protocol for wireless sensor networks. Many routing protocols have been proposed in the literature such as LEACH [3,4]. Leach is considered as the most popular routing protocol that use cluster based routing in order to minimize the energy consumption; in this paper we propose an energy base routing on the Leach Protocol that further enhance the Power consumption.

Low Energy Adaptive Clustering Hierarchy (LEACH) [5, 6] is one of the most popular hierarchical routing protocols for wireless mobile sensor networks. The idea is to form clusters of the sensor nodes based on the received signal strength and use local cluster heads as routers to the sink. This will save energy since the transmissions will only be done by such cluster heads rather than all mobile sensor nodes. Conventional network protocols, such as direct transmission, minimum transmission energy, multi-hop routing, and clustering all have drawbacks that don't allow them to achieve all the desirable properties. LEACH includes distributed cluster formation, local processing to reduce global communication, and randomized rotation of the cluster - heads. Together, these features allow LEACH to achieve the desired properties. Initial simulations show that LEACH is an energy efficient protocol that extends system lifetime than some general-purpose multi-hop approaches, such as MTE routing and Static-Clustering protocol [5].

II. RELATED WORK

Here we describe various type of energy base routing scheme that is useful for encouragement and provides diversity on to new approach of energy base routing

"Flow Augmentation and Flow Redirection Energy-Conserving Routing" In [7], the authors propose two algorithms with the aim of extending the network lifetime via optimizing the routing from an energy consumption perspective. Their solutions are targeted toward networks with static or slowly changing topology. They define the problem as maximizing the minimum lifetime of all nodes. The goal is to find the best link cost function which will lead to the maximization of the system lifetime.

Power-Aware Routing

In [8], the authors explore power-aware metrics to use with routing protocols on top of their MAC power savings protocol, PAMAS. They indicate that the strategy followed by the different routing protocols that are not power conscious would lead to fast depletion of battery power and hence quick degradation of the network operation.

Maximum Battery Life Routing

In [9], a power-aware routing protocol that distributes power consumption evenly over nodes and minimizes the overall transmission power is proposed. This protocol uses the conditional max-min battery capacity routing (CMMBCR) scheme. It uses battery capacity instead of a cost function as a route selection metric. When all nodes on some possible routes between a source and a destination have sufficient remaining energy above a certain value, the route with the minimum total transmission power (MTRP) among these routes is chosen

Energy Drain Rate Based Routing

In [10], the authors propose route selection mechanisms for routing protocols based on a new metric, the drain rate. They propose the Minimum Drain Rate (MDR) mechanism which incorporates their new metric into the routing process. They also introduce the Conditional Minimum Drain Rate (CMDR) as MDR by itself does not guarantee that the total transmission energy is minimized over a given route. CDMR attempts to enhance the nodes and connections lifetime while minimizing the total transmission energy consumed per packet.

Localized Power-Aware Routing

In [11], localized power aware routing algorithms are devised on the assumption that each network node has accurate information about the location of its neighbors and the destination node. This could be the case in static networks or ones in which a strong location update scheme is utilized. Nodes exchange location information via control messages. In the power-efficient routing algorithm, each node decides to forward packets that are intended for a certain destination to a neighbor based on the minimum transmission power between this sending node and its neighbors.

III. PROBLEM STATEMENT

MANET device are work through energy and each node contain self battery backup power that leads to issue how we select the node from network because all are contain limited power so in this paper we deal and analyze LEACH-DSR base routing approach that minimize the energy consumption and increases the data delivery ratio, the selection of node on the bases of cluster formation. LEACH manages the cluster and creates the coordinator that inform to the source node for best possible path so sender established the connection.

IV. PROPOSED SLOUATION

In-network processing can greatly reduce the overall power consumption of a mobile ad-hoc network when large amounts of redundancy exist between nearby nodes. Rather than requiring all mobile nodes' sends energy information to be forwarded to a source node that is data sender in that environment, nodes within a region can collaborate and send only a single summarization packet for the region. In LEACH, nodes are divided into clusters, each containing a cluster head whose role is considerably more energy-intensive than the rest of the nodes; for this reason, nodes rotate roles between cluster head and ordinary mobile sensors throughout the lifetime of the network. At the beginning of each round, each sensor node makes an independent decision through a randomized algorithm about whether or not to assume a cluster head role. Nodes that choose to be cluster heads announce their status to the rest of the network. Based on the received energy strength of these announcements, mobile nodes join the cluster that requires the least power to communicate with the cluster head (assuming transmission power control is available). During the round, the ordinary sensors in each cluster send energy information to their respective cluster heads according to a time-division multiple access (TDMA) schedule. Inter cluster interference is reduced using different spreading codes in neighboring clusters. The cluster head sends maximum energy contained nodes information within cluster region into the sender node, and that sender sends actual data from these maximum energy based node into the receiver node

The length of each round is chosen such that each node is expected to be able to perform a cluster head role once during its lifetime. Because there is no interaction between nodes when deciding roles, the cluster heads may be chosen such that there is no uniformity throughout the network and certain mobile nodes are forced to join clusters located at large distances from them.

In our simulation we apply leach protocol for energy base routing and network layer protocol for route request flooding we use DSR (dynamic source routing) and establish the communication between sender to destination, LEACH use the cluster head base energy information to the sender and then sender sends data to the genuine receiver, but mobile ad-hoc network is dynamic in nature so if any cluster head and any of node change their position from one to another location or energy of particular source to destination belonging path are discharge and node died so cluster head will be change and also re-broadcast energy information of new cluster head to the sender node. Through that approach we increase the life time of the data communication and save the energy of the network.

V. PROPOSED ALGORITHM

Here we design algorithm for LEACH working as well as routing broadcasting on the bases of energy aware of the each node, that module useful for internal structure design of simulator. LEACH (low energy adaptive cluster head) mechanism are suitable for higher energy base node selection within the region that work minimize the route load of the source node and decreases the power consumption of the network.

```
Set Energy_Prot = LEACH          // for energy base routing
Set Node = M;                    // Mobile Node's
Set Sender = S;            // S € M;
Set Receiver = R;                //R € M;
Set Routing= DSR
Leach_method()
{
        Form cluster;
        Select cluster head;
        Periodical_rx energy info from all node's
        Save max_energy node info value Eg
}
Rreq_bcast(S, R, pkts)
        If (radio-rng<= 550 m && cluster-head ==true && energy== Eg)
                { receives routing packet and send to next hop;
```

If (receiver ==R)
{ receives routing packet;
Send ackpkt to sender;
}
Else { receiver not exist ;}
Else { node out of range or node is died}

Terminate session;

VI. SIMULATION STUCTURE

Ns is a discrete event simulator targeted at networking research. Ns provides substantial support for simulation of TCP, routing, and multicast protocols over wired and wireless (local and satellite) networks.

Ns began as a variant of the REAL network simulator in 1989 and has evolved substantially over the past few years. In 1995 ns development was supported by DARPA through the VINT project at LBL, Xerox PARC, UCB, and USC/ISI. Currently ns development is support through DARPA with SAMAN and through NSF with CONSER, both in collaboration with other researchers including ACIRI. Ns have always included substantial contributions from other researchers, including wireless code from the UCB Daedelus and CMU Monarch projects and Sun Microsystems.

A. Simulation Environment

Network simulator 2 is the result of an on-going effort of research and development that is administrated by researchers at Berkeley. It is a discrete event simulator targeted at networking research. It provides substantial support for simulation of TCP, routing, and multicast protocols [12].

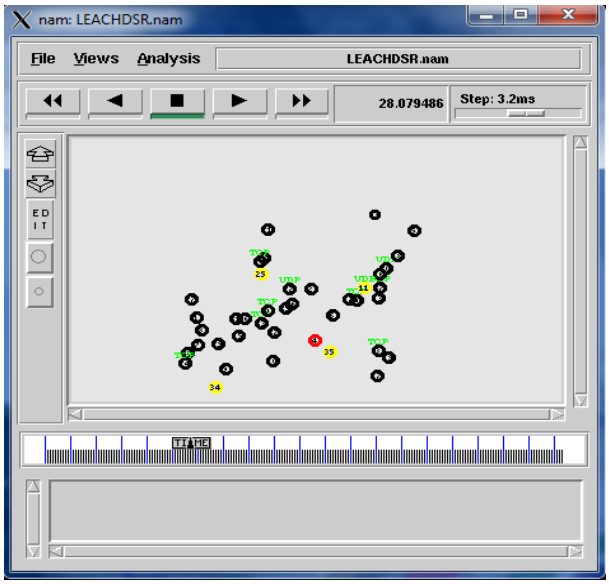

Figure 1: Network Animator scenario

The simulator is written in C++ and a script language called OTcl2. Ns use an OTcl interpreter towards the user. This means that the user writes an OTcl script that defines the network (number of nodes, links), the traffic in the network (sources, destinations, type of traffic) and which protocols it will use. This script is then used by ns during the simulations. The result of the simulations is an output trace file that can be used to do data processing (calculate delay, throughput etc) and to visualize the simulation with a program called

B. Simulation Parameter

We get Simulator Parameter like Number of nodes, Dimension, Routing protocol, traffic etc.

Simulation Parameter	Value
Number of nodes	40
Dimension of simulated area	800×800
Routing Protocol	DSR
Simulation time (seconds)	100
Energy Aware	LEACH
Transport Layer	TCP
Traffic type	CBR
Packet size (bytes)	1000
Initial Energy (in Joule)	Random
Number of traffic connections	10
Maximum Speed (m/s)	Random

Table 1 Simulation parameter

According to above table 1 we simulate our network.

C. Performance Evaluation

There are following different performance metrics have showed the results on the basis of following:

Packet delivery ratio: ratio of the data packets received at the destination nodes to the packets that were sent by the sources.
Routing load: number of routing packets (and supporting protocol control packets) transmitted per data packet delivered at the destination.

Throughput: throughput or **network throughput** is the average rate of successful message delivery over a communication channel from source to destination. This data may be delivered over a physical or logical link, or pass through a certain network node or mobile nodes. The throughput is usually measured in bits per second (bit/s or bps), and sometimes in data packets per second or data packets per time slot.

VII. SIMULATION RESULT

A. Packet Delivery Ratio Analysis

Packet delivery fraction (PDF) or packet delivery ratio is a ratio of receives packets from packets sends at time unit. PDF calculated as

$$PDF = \left(\frac{Rx}{Send}\right) * 100$$

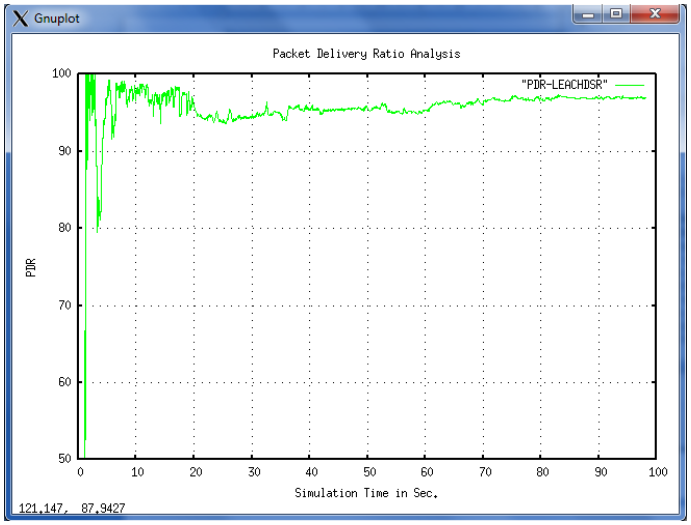

Figure 2: Packet Delivery Ratio Analysis

According to formula if our PDF is best that means this performance is very good.

In our simulation we create forty mobile nodes and generate test traffic and then analyze the packet delivery ratio, result shows our average PDF nearly 97 that is tremendous performance of the network

B. Energy consumption

In this graph we deploy energy consumption graph that shows at particular time energy remains of the node, in our simulation we use 50 mobile node but here we shows energy consumption only first ten node's, initially we set energy of each node is random that is from 1 joule to 100 joule and apply leach protocol for energy base routing very fist leach sends maximum energy contain information to the source node so sender sends data packet through maximum energy contain node, that work increases life time of the communication.

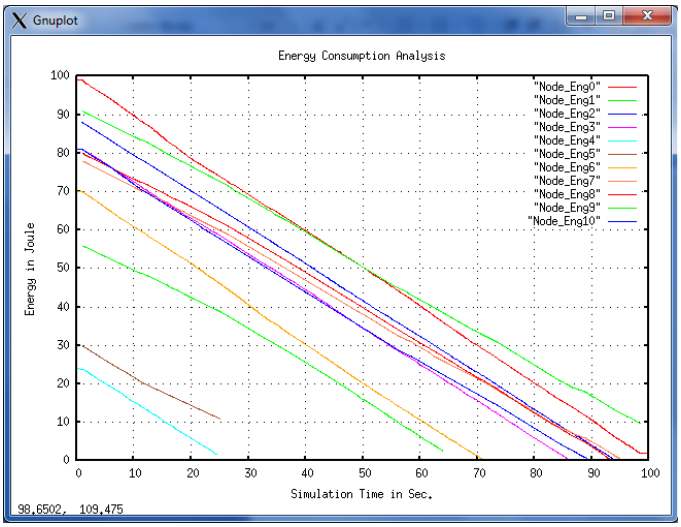

Figure 3: Energy analysis

If we take example of node 1 energy consumption graph very first we set nearly 90 joule if energy of that node and till end of simulation time 100th second energy remaining of that node nearly 10 joule

C. Throughput Analysis

Here we analyze throughput of the tcp transmission case, in our simulation we create three TCP connection and get nearly sixteen hundred data has been transmitted, LEACH-DSR protocol case our network throughput are constantly perform, that is gives better performance.

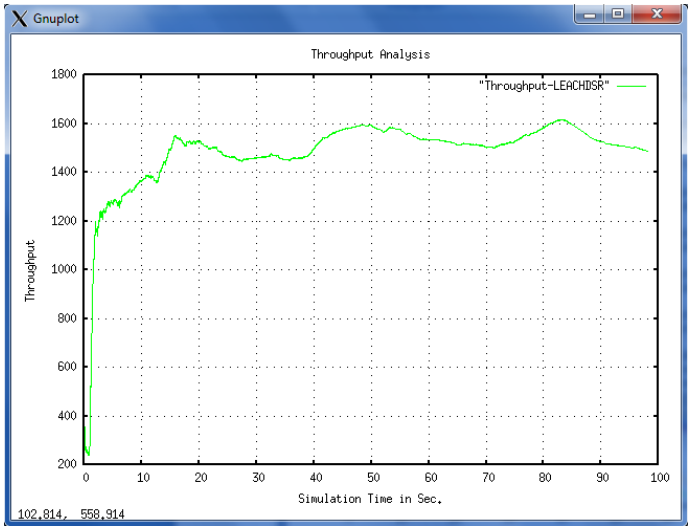

Figure 4: Throughput Analysis

D. Routing Load Analysis

Routing load is calculated as the total number routing packets are transmitted over the successful data transmission. The increase in the routing load reduces the performance of the ad-hoc network as it consumes portions from the bandwidth available to transfer data between the nodes.

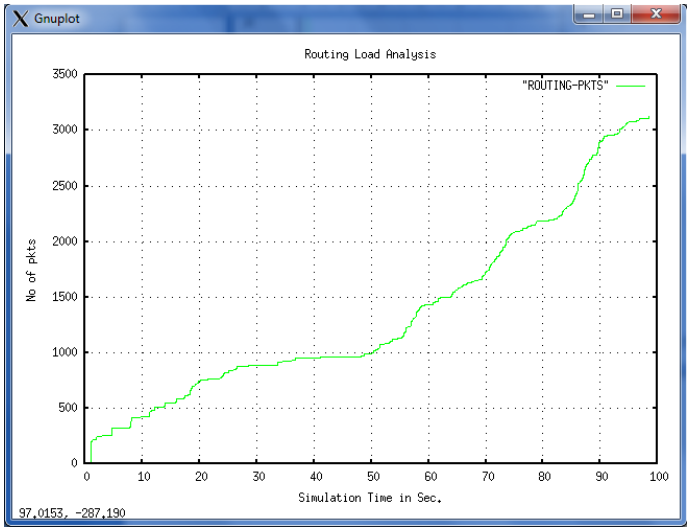

Figure 5: Routing Load Analysis

As per graph shown it is observed that till 50 seconds of simulation routing load is slightly increases in case of node movement drastically in the network

In this graph we analyze routing load, if routing overhead minimum that means efficient route search and gives better result, in our approach we use DSR as a routing protocol, through various research paper we get DSR are efficient so here we use DSR routing protocol, in this graph x-axis shows simulation time in second and y-axis shows number of routing packet, result conclude total routing packet nearly 3100 packet and normal routing overhead nearly 0.46percentage.

VIII. ABOUT THE DEMONSTRATION

In this demo, we analyze network performance on the basis of network parameter like attack percentage, routing load, packet delivery ratio and energy consumption analysis etc. In our simulation we check network performance in LEACH-DSRtime and found that protocol are very reliable in MANET environment.

IX. CONCLUSION

In this simulation we use network simulator -2 (ns-2). Here number of simulation were taken and finally conclude through various result. In our first parameter packet delivery ratio that case result nearly 96% that shows efficient communication in the form of data receiving base, in second result we deploy energy consumption but here we take only ten node and conclude that maximum node live till the end that means our approach are efficient energy utilize where actual needed, in third result we retrieve throughput of the network and get better result, lastly we identify routing overhead in forty node with random motion case routing overhead nearly 0.46% (on the bases of overall packet). LEACH and DSR jointly gives efficient approach for mobile ad-hoc network communication. and it's also work with the coordination base of each node.

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