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Energy Efficient with Throughput Maximization Routing in MANETS

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***Abstract*— In Mobile Ad-hoc network, the mobility decides the routing path and the delivery rate of the packet transmission thus mobile nodes may lead to network partitioning or performance degradation. Several techniques proposed to increase the overall throughput using on-demand routing protocol. We develop an efficient energy model with dynamic link repair routing, which reduce the dropping ratio in the network. By selecting the shortest hop neighbour through on-demand protocol delay can be minimised to reduce the energy usage in the network .Thus the proposed approach in demonstrated under network simulation in terms of Overall Throughput, End to end Delay and packet delivery rate.**

***Keyterms*: Mobile ad hoc networks, link repair routing, Energy Optimisation, Throughput Maximization**.

I. Introduction

Mobile ad hoc networks (MANETs) is a special type of wireless network, every node have their individual property which can function individually in the network. Mobile nodes has application in search-and-use [2] the availability with the mobility handling operations. It is an centralized severing network, However, due to the error prone wireless channel and the dynamic network topology, fails to improve the data delivery rate. Even fast changing network topology is very difficult to maintain a stable routing. If such transmission is used as backup, the robustness of the routing protocol can be significantly enhanced. The main objectives of MANET routing protocols is to maximize network throughput, and to optimize maximize energy efficiency, better network lifetime, and to reduce delay [1]. The network throughput is calculated by packet received with time and the energy is by difference between the energy level of overall network, the most significant contribution to energy consumption is measured by routing overhead which is the number or size of routing control packets is small[1].

The general simulations (the network simulator NS2 [2] is that reactive protocols(AODV protocol), those finding routes on fly by request with when they need in transmission, perform better than proactive routing protocols[2], which maintain the routes for all transmission [4]. If energy model approach is to be considered then, on-demand protocols, where transmission range in network will decide the control packets transfer is limited and the routing inform is frequently updated [4].

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On demand protocols. flooding the route request packets throughout the network does the route discovery. Our main aim is to make energy efficient routing protocol and to perform link recovery of the routing in the ad hoc networkTransmission range decides the routing way points or hops to reach destination, however it targets to reduce energy consumption between any two neighbouring nodes in the network [5].To reduce the transmission energy no of hops (intermediate node have to be reduced) in routing has to be reduced. The total transmission energy consumed in the network is depend on the reliability of data packet transmitting from one node to its neighbouring node called as the link cost[5].

A. High mobility vs. Low mobility:

If a node moves frequently, its links are unstable, which in turn costs more energy for route reconstruction, and deteriorates the quality of the established routes. In this case, the node should keep a lower degree to reduce its dependency on nearby nodes by turning up [5] .On the contrary, if a node has lower mobility, it should turn down its to construct more reliable routes. The energy efficiency of routes and a node u can conserve its own energy by simply broadcasting to hop nodes. Possible factors which can induce benign dropping include the following:

- mobility of nodes
- network/traffic density
- traffic type

Mobility makes the routes dynamic, i.e., an active route can become broken due to mobility. Here, the dropping of the packets becomes inevitable, as re-establishing a new route takes some time. Furthermore, mobility creates changing channel and fading conditions. Dropping can also be due to signal loss, interference, etc. Network and traffic density are crucial factors. The type of traffic characterizes the randomness in interval between transmissions and packet size. For example, a video streaming has a constant bit rate (CBR) with a fixed bandwidth.

When a node is within transmission range of a sender node, it can receive and correctly decode packets from the sender node. In our simulations, the transmission range is 250 m when using the highest transmits power level.In existing energy routing schemes, they discuss only on the energy consumption but our proposed approach gives the complete solution for the routing selection and the issues' on the MANET (i.e., mobility) .

II. Problem Identification

The main problem in routing is to achieve the maximum throughput is Link break and energy optimisation. Where link break can be repair using route threshold repair mechanism and energy usage will be minimized automatically.

III. Proposed Approach

The Ad-hoc On-demand Distance Vector (AODV) routing protocol [12] is one of the best reactive protocols in MANET and WMN routing protocols. It establishes routes on –demand service needed. It discovers a route by broadcasting a Route Request message by the source node that is search for a route to a destination node through intermediate nodes, the destination node replies with a corresponding Route Reply message with in transmission range. During route discovery process, intermediate nodes create routing table updation for both source and destination nodes, thereby creating a bidirectional end-to-end route [12].

A. *Identification of Link Break*

By overhearing the control messages from intermediate nodes and restricting the local repair search in network, the radius of node of radio frequency range the link break so that alternative routes to the destination node can be quickly found with minimal routing overheads [12]. The scope of the RREQ messages sent as part of a Local Repair is limited via setting their TTL values accordingly. In case the Local Repair attempt is not successful, i.e. no valid RREP message is received in response to the RREQ, the repairing node will revert back to the Source Repair mechanism, by sending a RERR message back to the source node.

```
if Link Break Occur
        Attempt Local Repair
            Neighbor search
If n> E max
       successful
       resume transmission
else
       perform Source Repair
else
        perform Source Repair
```

Figure 1: Route Threshold Repair Mechanisms

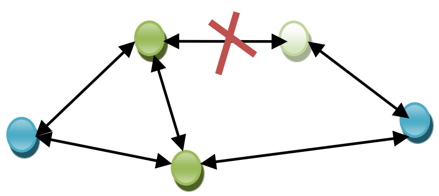

Figure 2: Link break and Repair examples

Source will search neighbour list and send request of best forwarding node, which respond in short period of time of transmission range 250 m. The best neighbour should have max energy to participate in packet transmission. Energy will be reduced when a node participated in the transmission or if it gives response to neighbour nodes.

B. *Energy model in Routing Path*

If a node has insufficient energy or moves frequently then it is not able to transmit the packet to the destination. Another parameter of quality of service is overhead, which occurs due to appending of the addresses of intermediate nodes present on the route from source to destination. It depends on the selection routing on energy level in Manet. We define a new rule which will show the trust on node while transmission, but source and the destination have peak energy when comparing with other nodes in the network [5]. Thus the parameter is as follows

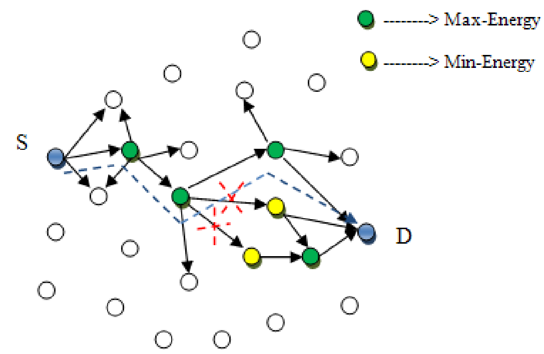

Figure 3: Routing Scheme with Energy Selection

Individual Energy,

$$IE = N\,W_e\,(1 - (Energy / Energy\ Full), + N\,Ws\,(Mobility / Mobility\ max) \quad \text{---- Eq (1)}$$

Where,

N = node
Energy = residual energy
Mobility = current mobility
Energy Full=full energy
Mobility max= Max mobility level

Mobility level by two weights;

$W_{e,\,n} = 1 - (Energy/Energy\ Full)$
$W_{s,\,n} = (1 - W_{e,\,n})$

By using this adaption rule we can improve the life time of node in the network, given in fig1. If a node has insufficient energy or moves frequently, a smaller that leads to a lower node degree, transmission radius, and power is desired. When node repeating the transmission again in the network with pn-cycles, the lost energy in p1-cycle cannot be regained in the pn cycles. So, energy lost can be replaced only by the external energy or power or with constant battery power availability. Otherwise we can switch over the level of energy to virtual energy to achieve the best routing with maximum throughput.

IV. Performance Analysis & Discussion

Quality of service is the main aim of network. Where we can prove that by comparing the on-demand protocol with improved link break recovery with the energy model in the configurated level of network. Throughput is the packet travelled by the time in the network. Packet delivery ratio is defined with the difference of sent and received packets. End to end delay is difference between the starting and ending time of the packet transmission

PDR = Received Packets/Sent Packets x 100 ---- Eq (2)

TABLE 1: Proposed MAC Routing Efficiency

Protocol	QOS parameters		
	PDR	Delay	Throughput
AODV	43.57	0.27385	71449.37
Energy-LB- AODV	52.20	0.25107	425274.66

Time = End Time – Start Time ---------- Eq (3)

TABLE 2: Our Simulation parameter is as follows:

Parameter	Value
Simulator	Ns2 - 2.26
Number of nodes	30 , 50, 100
Simulation Time	20 min
Packet Interval	0.01 sec
Simulation Landscape	1000 x 1000
Traffic Size	CBR
Packet Size	1000 bytes
Queue Length	50
Initial Energy	10 Joules
Node Transmission range	250 m
Initial Energy	100 Joules
rxPower	0.3 W
txPower	0.6 W
Antenna Type	Omni directional
Mobility Models	Random-waypoint (0-30 m/s)
Routing Protocol	AODV
MAC Protocol	IEEE 802.11
Background Data Traffic	CBR

V. Experimental Results

To solve the problem of link break and to bring the energy efficient model in the network which is proved with achieves maximum throughput. The individual energy using Adaptive configuration Algorithm/ rule identify the energy level of the node in the network. Having the survey and the collection of data from different scenario, we can publish that our proposed energy mechanism in reactive protocol will provide good performance and achieve the quality of service better in MANET. Network simulation (NS2) tools helps to simulate the demand on service of energy [2] maximisation by the mechanism of reducing the hops in the data transmission in network which dynamically change the topology. Our performance is analysed with time taken to reach the destination with the estimated packets and the usage of the energy of individual nodes have been calculated.

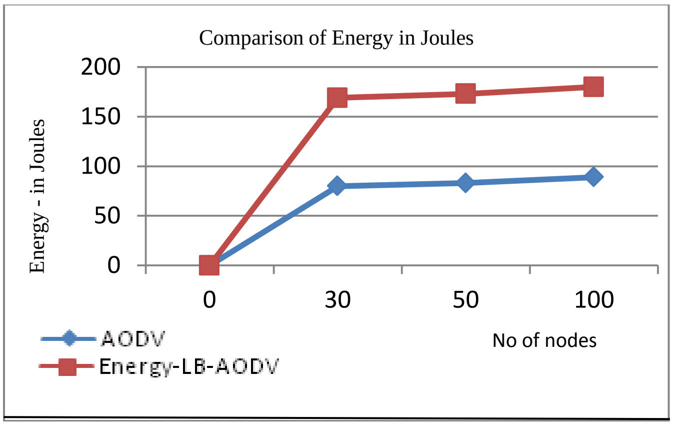

Figure 4: Energy Consumption In network

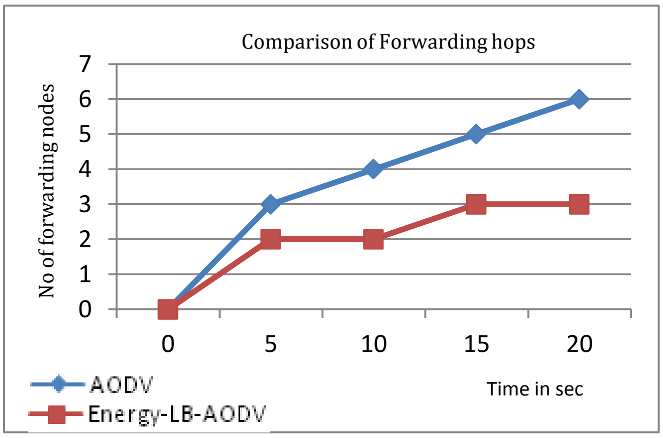

Fig 5 : Comparison of Forwarding hops

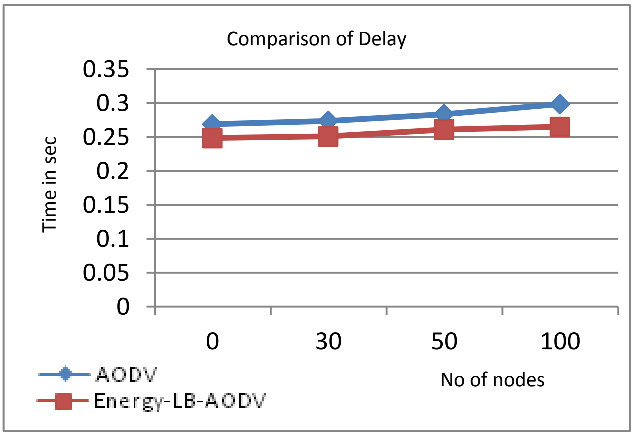

Figure 6: Comparison of delay

Conclusion and Future Work

In this paper the QOS is increased using on-demand protocol (AODV) which reduces the energy usage and increases the throughput in the network, according to the individual energy of the node network life time will be increasing. In future work we can compare our work with enhance power optimization which is having the stable power for extreme transmission and overhead as their complicity and which randomly increases the performance in the network.

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