Feasibility of Hybrid Energy Aware Routing for Ad-hoc Network

Gaurav Vishnu Londhe, Dilendra Hiren

Abstract: In today’s modern era we are facing difficulties in data connectivity, the speed to which the data is transferred and drop in network causes delay in data transfer are the few vulnerabilities we found in the recent years researches in the area of wireless sensor networks. As we have referred in literature to overcome such drawbacks of the existing systems the proposed methodology is planned to recover the issue even in the congestion scenario to avoid the drop in the network and provide the efficient data connectivity with the results of the suggested approach help us to conclude about it with simulation results.

Keywords, Hybrid, Ad-Hoc Network, Energy Aware

I. INTRODUCTION

This paper is emphasizing on the critical approach of analysis with proposed algorithm with several parameters. This helps us to deduce that, the proposed approach is considered to be beneficial in many aspects for transmission of the message over the Ad hoc Network. Here we are simulating the algorithm and the results are declared which are helpful to understand the result with various parameters in the tabular information. This will help to reduce the time required to transfer the data from source to destination in the given interval of time. Which reduces the frequent network establishment time required due to frequent failure occurred in the earlier method. Therefore, we can share the data in a single transaction only with minimum time duration and maximum throughput.

II. RELATED WORK

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2. As per the Indrajeet Banerjee, Suriti Chakrabarty, Arunava Bhattacharya, Utsav Ganguly a method to move he base station from the neighbourhood of the hotspot locality has been suggested. This algorithm is efficiently able to select the nodes with minimum cost for the given link to route and ensures the nodes with maximum energy have got selected for the given link. This is achieved through cost updating process.
3. As per the Magnus Eriksson and Arif Mahmud, the multiple nodes sending one signal at a time over the one frequency channel. Diverse routing algorithms are suggested and evaluated for the broadcasting scenario with their results of simulations, which shows best algorithm reduces energy consumptions by up to 42% compared with an existing distance based routing.

Figure 1. Energy consumption Vs Transmitter power

Here the consumption of energy is described Vs Power of a transmitter in db is tested and found. Which is 64% and it significantly high in number to be considered for the calculating the overall throughput of the system for passing the message on a wireless network.

| Test Network Setting | Random | Static Flocking Setting (i) | Static Flocking Setting (ii) | Dynamic Flocking |
|----------------------|--------|-----------------------------|-------------------------------|-----------------|
| (30, 4)              | 36.09  | 41.64                       | 42.04                         | 43.9            |

TABLE I

COMPARISON OF THE FLOCKING ALGORITHMS ON LARGE TEST NETWORKS The average of percent user connectivity in 30 replications
As per the Abdullah Konak, a new flocking algorithm for the improvement in the connectivity in MANETs through autonomous auxiliary nodes which are termed as agents. This updates the distances based on the crowdedness in the vicinity to show the performance in the congestion scenario based on the fixed parameters.

As suggested by Priyanka R. More and Dr Sankpal in her paper, we could observe the overall performance of RMER algorithm with several parameters. RMER is an energy-efficient routing algorithm. They have obtained simulation results for the PDR, average Energy Delay, throughput, normalized overhead, and control overhead. This minimizes the consumption of an energy per packet traversal. Here it does not consider the residual battery energy of the nodes.

![Figure 2 Energy Consumption Vs Reachability](image)

### Figure 2 Energy Consumption Vs Reachability [3]

**Figure 3 Parameters considered for the Network Simulation**

| Parameter                      | Value |
|--------------------------------|-------|
| Initial battery energy of each node (B) | 100 [J] |
| Network area                   | 350*350 [m²] |
| Path-loss exponent (γ)         | 3     |
| Data rate (r)                  | 100 [Kbps] |
| Power consumption of transmitter circuit (P_t) | 100 [mW] |
| Power consumption of receiver circuit (P_r) | 100 [mW] |
| Maximum transmission power (P_max) | 150 [mW] |
| Minimum transmission power (P_min) | 15 [mW] |
| Maximum # of transmissions in HSBH system (Q_s) | 7 |
| Transmission range (d_max)     | 70 [m] |
| Data packet size (L_d)         | 512 [byte] |
| MAC ACK packet size (L_a)      | 240 [bit] |
| E2E ACK packet size (L_e)      | 96 [byte] |
| Hello packet size (L_h)        | 96 [byte] |
| Battery death threshold (B_d)  | 0     |
| Maximum collision probability (P_c) | 0.3 |
| channel sensing time (T_s)     | 50 [µs] |
| K_d                            | 0.2   |
| K_m                           | 0.4   |
| T_ne                        | 10 [s] |
| T_e                          | 20 [s] |

**Figure 4 Ratio of Packet delivery**

| Test Network (|U|, |A|) | Random | Mathematical Programming | Static Flocking | Dynamic Flocking |
|---------------|--------|-----------------|-------------------------|-----------------|-----------------|
| (10,2)        | 14.76  | 18.80           | 18.21                   | 17.68           |
| (10,3)        | 16.39  | 20.30           | 21.12                   | 19.85           |
| (10,4)        | 17.69  | 22.36           | 22.25                   | 21.84           |
| (10,5)        | 17.48  | 24.55           | 23.18                   | 23.49           |
| (10,6)        | 18.54  | 24.30           | 24.48                   | 25.63           |
| (20,2)        | 22.33  | 25.51           | 23.61                   | 24.84           |
| (20,3)        | 24.09  | 26.92           | 26.19                   | 27.47           |
| (20,4)        | 24.89  | 27.92           | 28.55                   | 30.08           |
| (20,5)        | 26.50  | 29.01           | 29.65                   | 32.69           |

**Table II**

**COMPARISON OF THE FLOCKING ALGORITHMS ON SMALL TEST NETWORKS**

The average of percent user connectivity in 30 replications.
Figure 5: Average Residual Energy

Figure 6: Normalized Overhead

Figure 7: Delay

Figure 8: Control Overhead

Figure 9: Throughput

Figure 10: Node Vs Jitter
6. As per the Bata Krishna Tripathy, Ashray Sudhir, Padmalochan Bera, they proposed a formal framework for modelling and verification of constraints required and can be utilised in designing an adaptive routing protocols for MANET. In addition to the framework they have given emphasis on the Quality of Service (QoS) constraints. Which is proposed with few experimental results.

Efficiency is also calculated.

Energy Consumption is measured.

Delivery Ratio is compared

Graphical representation of tabular information is explained in detail.

Such network can survive for longer duration once we simulate it.

The results of the simulation are explained further with several parameters and their respective values.

C. Statistics of Results

Table 1.1 Comparison Delay values in DSDV and AODV

| QoS         | DSDV-ELFN | AODV-ELFN |
|-------------|-----------|-----------|
| Simulation  | 1.5056    | 1.4545    |
| Pause Time  | 1.5923    | 1.4856    |
|             | 1.6431    | 1.5267    |
|             | 1.6789    | 1.6478    |
|             | 1.7889    | 1.7889    |

Table 1.2 Delivery Ratio of DSDV and AODV

| QoS         | Delivery Ratio (Rate Value) |
|-------------|----------------------------|
| Simulation  |                          |
| Time        | 7.02                      |
|             | 12.03                     |
|             | 17.05                     |
|             | 22.06                     |
|             | 23.00                     |
| DSDV-ELFN   | 33.723                    |
|             | 33.776                    |
|             | 33.800                    |
|             | 33.865                    |
|             | 33.890                    |
| AODV-ELFN   | 33.768                    |
|             | 33.794                    |
|             | 33.818                    |
|             | 33.870                    |
|             | 33.913                    |
The analysis of the above given DSDV ELFN and AODV ELFN is described here with several parametric values with its diagramatic representation which clearly pretends that, the overall dealy in time is caused in DSDV ELFN is less to that of AODV ELFN and hence the Delivery Ratio is also efficient in DSDV ELFN over the AODV ELFN. The analysis is done for the 500 packets sent for the delivery ratio in terms of Rate Value / Packet sent is taken here for in detail analysis, where by the complete analysis with these three tables concludes that the overall efficiency in DSDV over the AODV is much better and this is what is utilised in the existing system where we have found the energy aware concept is directly used with the distance based routing approach.

Quality of Service (QoS) has been given more emphasis for the judgement of the efficiency of the proposed hybridization.

Eventually this paves the way to reach to recapitulate that the overall efficiency and time requirement for the establishment of the network will be easier to that of earlier existing system and hence this helps us to forcast pragmatically that this seems to be an innovative approach which can be further implemented to avoid the call drop.

IV. CONCLUSION

The reading and diagrammatic representation clears that, the proposed method is more efficient and can survive for more duration and consumes less energy, which in turn takes less time to transmit the message and avoids failure so again the energy is saved which we might have required to establish the network for the same work.

To conclude we can say the proposed method is most durable for message transmission for the given mobile ad hoc network even in network congestion. Since it chooses the node with which is found to be free.

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