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An Efficient Cluster Based Routing Protocol (ECCRP) Technique Based on Weighted Clustering Algorithm for Different Topologies in Manets using Network Coding

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Abstract- All nodes are energy constrained in MANET. In such a scenario, reducing energy consumption is necessary. The goal of this study is to minimize the energy utilization of various types and environments in MANETs using network coding in a CBRP. Consider other CBRP such as energy-efficient unmanned aerial vehicle fitness (EEFUAV) and compare its performance with the ECCRP and CBRP by taking into account node mobility, traffic and transmission range. Network coding is a way to enhance the efficiency of wireless networks. Energy Requirements, of the EEFUAV approach is intended to be developed to improve the performance of the CBRP and Energy ECCRP.

Keyword- Effective cluster-based routing protocol (ECCRP), clustered-based routing protocol (CBRP), energy-efficient fitness of unmanned aerial vehicles (EEFUAV) Mobile adhoc networks (MANET).

I. INTRODUCTION

MANET (Mobile adhoc networks) [1] are essential when infrastructure does not exist or is difficult to set up. They are ideal for disaster recovery, remote place search and rescue, battle fields, patient tracking, Bluetooth, alarms, cyclone evolution research, earthquake detection, interactive museums or toys, public building safety, and object location. MANET make it easier for users to communicate without any physical infrastructure. It requires the construction of a temporary network without wires, and no administrative interference. Figure 1 shows MANET with five nodes. In MANET, each node functioning as the router and host to forward data packets. The nodes are able to move randomly. The most significant networking considerations in a broad scale of the networking domain is the self-organizing capacity to respond complex circumstances well and the capacity for contact between the nodes [2].

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Protocol design is the major issue of such studies, particularly in this regard, energy efficiency. Many researchers have established different network layer routing protocols, but when routing data packets to the destination, they have considered transmitting energy, residual battery capacity, and self-organization [3].

The lifespan of the network depends on energy resource management. The ability to use less power in the routing process has more advantages than saving the node's battery power [4]. A number of research efforts [5] have been made to develop energy efficient routing protocols in MANETs. They found two methods called minimizing active communication energy and inactive communication energy.

Transmission power control and load balanced approaches are used to minimize the active communication energy. Sleep down mode is used to minimize the energy of inactive communication. The work above considers energy-efficient communication problems in MANETs without network coding. The goal of this paper is to use network coding techniques to minimize routing protocol energy consumption. My objective is to minimize CBRP energy consumption by integrating network coding technologies into the CBRP [6] protocol. Network coding is a popular mechanism for increasing the throughput of wireless networks. Performs the mixing of packets at intermediate nodes. It therefore reduces the number of packet transmissions and therefore also reduces the amount of redundant transmissions that occur as a result of broadcasting. The transmission of each packet absorbs energy and the consumption of energy is proportional to the number of packets transmitted. Cluster-based approach is used to reduce overall broadcast overhead. Cluster heads help prevent unnecessary network-wide flooding of MANETs. COPE [7] is the first protocol to implement the coding of wireless networks. In COPE, coding can be carried out at all nodes in the network to increase coding opportunities. It thus causes extra overhead computing. In order to reduce this overhead, to reduce the number of coding nodes, I apply network coding only to specific nodes. It is possible to perform this network coding at cluster heads. I use the CBRP to identify these cluster heads.

To minimize overhead coding and reduce redundant transmissions, I apply network coding to cluster heads, thereby reducing the number of transmissions. The energy consumption involved in the sending and receiving of packet transmissions is therefore minimized.

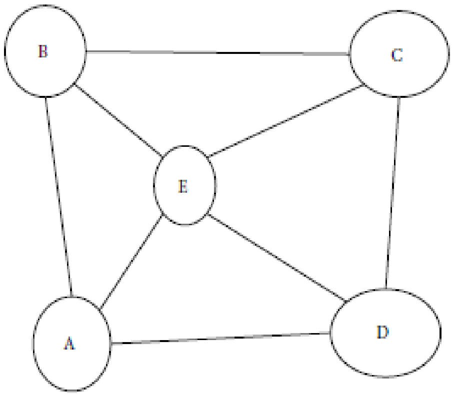

Fig.1: Mobile ad hoc network.

A network coding-aware energy-efficient fitness unmanned aerial vehicles (EEFUAV) for MANETs is introduced in this article. In the following respects, my job is distinct from current ones. Next, the nodes of the network are organized into clusters. In order to increase the life of the network and reduce energy consumption, I choose the cluster head as an energy-rich node. Network coding is then done only at cluster heads to reduce network coding overhead issues. Second, I change the queue layout of COPE when performing coding on cluster heads. I use a flow-based queue structure to maximize coding possibilities and decrease the number of transmissions, which helps to reduce energy consumption. The remainder of the paper is arranged as follows: In Section 2, Objectives of research work and implementation. In Section 3, Analysis of the proposed algorithm using simulation results. Finally, Section 4 summarizes the conclusions.

II. OBJECTIVES OF RESEARCH WORK AND IMPLEMENTATION

To reduce the energy consumption of routing protocols, I aim to apply network coding technology. My aim is to minimize CBRP energy consumption by checking various CBRP [6] protocol and ECCRP protocol network topology technologies.

The proposed research will focus on developing multi-objective energy efficient routing protocol with the following objectives,

1. To maximize network energy lifetime by avoiding nodes with little energy.

2. To achieve link stability.

3. To assure secure communication by integrating trust.

4. To develop a security mechanism to reduce the effect of routing denial of service attack.

The research will be carried out using analytical and mathematical modeling along with simulations. The research objective is to develop routing protocol, which will be multi-objective, energy efficient and secure for MANET applications.

IMPLEMENTATION CODE

I. An Energy Efficient Framework For Uav-Assisted Millimeter Wave 5g Heterogeneous Cellular Networks

```
//Field Dimensions - x and y maximum (in meters)
xm=100;
ym=100;
x and y //Coordinates of the Sink//
sink.x=1.5*xm;
sink.y=0.5*ym;
//Number of Nodes in the field//
n=200;
//Optimal Election Probability of a node
to become cluster head//
p=0.2;
//Energy Model (all values in Joules)
Initial Energy//
Eo=0.5;
Eelec=Etx=Erx
ETX=50*0.000000001;
ERX=50*0.000000001;
Transmit Amplifier types
Efs=10*0.000000000001;
Emp=0.0013*0.000000000001;
Data Aggregation Energy
EDA=5*0.000000001;
Values for Hetereogeneity
Percentage of nodes than are advanced
m=0.2;
alpha
a=1;
maximum number of rounds
rmax=10;
```

III. RESULT AND ANALYSIS

The result of the research to various inputs is given in this chapter. In order to assess my proposed method. My research were conducted using MATLAB software. I observe energy consumption in sending, receiving, idle, and sleep mode. I executed the simulation for different number of nodes. The performance of the proposed EEFUAV protocol is compared with that of original CBRP protocol and ECCRP protocol. I simulate CBRP, ECCRP and EEFUAV by using MATLAB. Since I consider the effect of clustering on energy consumption, I primarily add the network layer and take into account the energy consumed. Each packet has a size of 128 bytes and a rate of transmission of 250 kbps. The simulation area is 3 km x 3 km in size and nodes are randomly included in it.

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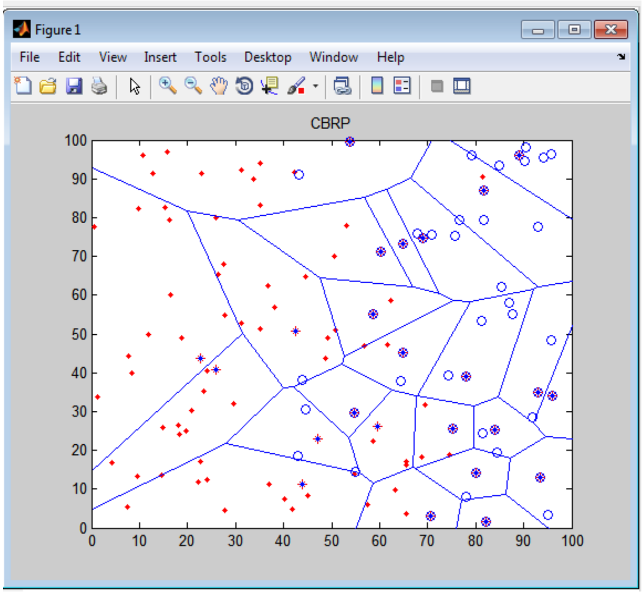

Fig 2: shows generating the initial nodes (CBRP)

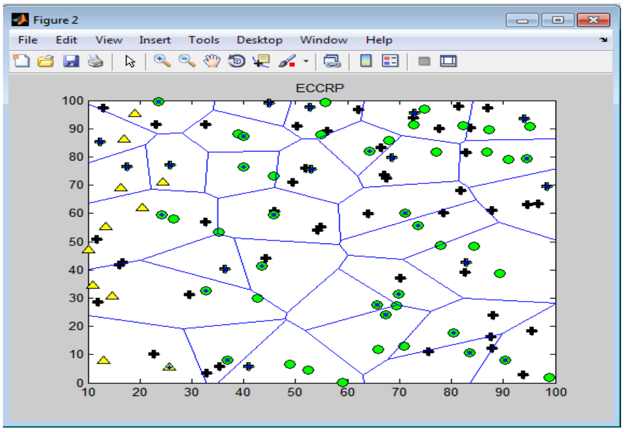

Fig 3: shows generating the initial nodes (ECCRP)

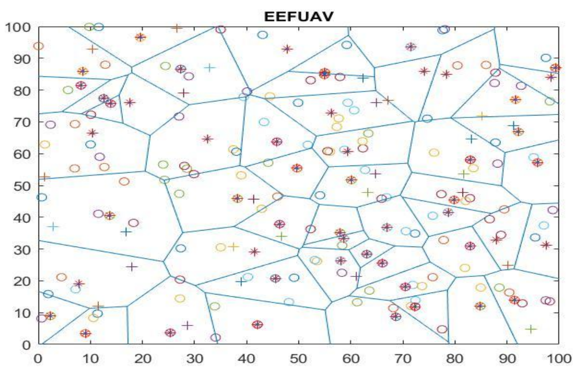

Fig 4: shows generating the initial nodes (EEFUAV)

3.1. Nodes' energy consumption. Within the given region, I consider 30 sources out of 60 nodes and the number of packets sent from 5 to 60 packets/s. Each node travels at a speed of 0-20 m/s and the simulation model has been executed 20 times. Each node is initialized at 510 J and the simulation has been completed for 1000 s. Figure 4 indicates this number of nodes with zero residual energy versus simulation time. The EEFUAV absorbs less energy relative to both the CBRP and ECCRP as the simulation time increases. In the proposed EEFUAV algorithm, the number of nodes with zero remaining energy at 700s is 41 nodes in the CBRP and ECCRP, respectively, as shown in Figure 2 and Figure 3. Here proportional to the number of transmissions. I simulated the CBRP protocol, ECCRP and EEFUAV protocols here. Figures display the average energy consumption in the route search versus the number of network nodes at different nodes. I found that as the number of nodes increases energy consumption, the results show that EEFUAV algorithms are better than CBRP and ECCRP algorithms.

3.2 Energy Consumption. The amount of energy consumed is taken into account compared to the number of transmissions. I simulated the CBRP protocol, ECCRP and EEFUAV protocols here. Figure 5 shows the average energy usage for the identification of routes versus the number of network nodes at different nodes. From the results, I observed that energy consumption increases as the number of nodes increases and EEFUAV algorithm performance is better than CBRP and ECCRP algorithm performance.

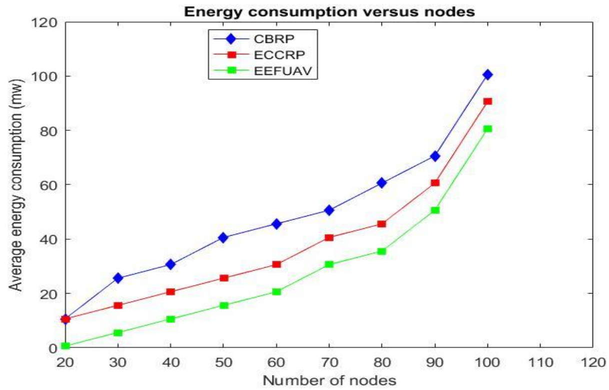

Fig 5: shows energy consumption versus nodes for CBRP, ECCRP AND EEFUAV

3.3 Energy Consumption versus Simulation Time. The energy consumed versus simulation time on the network is shown in Fig.6. As the simulation time increases, energy consumption increases and CBRP and ECCRP consume more energy, In order to minimize the number of transmissions, EEFUAV consumes less energy as it conducts network coding at the cluster heads. So the propagation of the total network packets requires less energy.

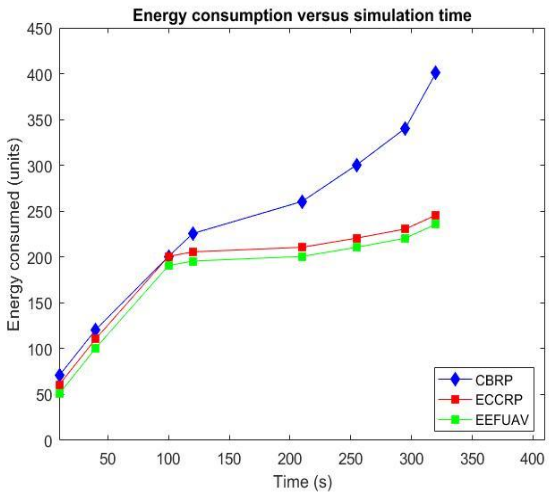

Fig 6: shows energy consumption versus simulation time

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3.4 Data Packets Reached to Destination. In order to assess how these energy savings would impact the lifespan of the network when the EEFUAV protocol is used, each node was given an initial energy of 20 joules. The simulations were run for 5000 s in order to ensure that nodes ran out of resources. Fig.7 indicates the number of data packets successfully sent to destinations. It is obvious that, relative to the CBRP and ECCRP protocols, the amount of packets transmitted successfully to the destination using the EEFUAV protocol was high.

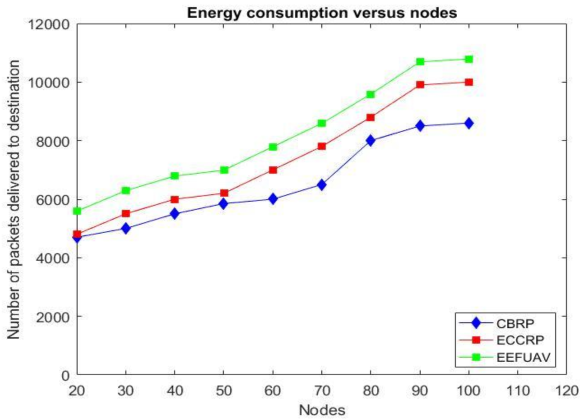

Fig 7: Number of packets delivered to destination for CBRP, ECCRP and EEFUAV

IV. CONCLUSION

In this work, I proposed an EEFUAV technique, designed to improve the performance of CBRP and EECRP in terms of energy consumption. EEFUAV makes use of an algorithm for Weighted Clustering. It ensures that the best cluster head is selected and increases the lifespan of the cluster by reducing energy consumption. In order to minimize the number of transmissions and further reduce energy consumption, network coding is used on cluster heads. I have used the structure of flow-based queues when conducting intermediate node coding to increase coding possibilities.

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