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Novel approach for cluster head selection in mobile ad hoc network using NS2

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ABSTRACT

In recent time huge development going on in the field of the wireless sensor network and this network divided into two groups which are known as MANET and VANET. Our main work is to design an algorithm in such a way that the network parameter is optimized efficiently. So the cluster head can't communicate with other nodes. That the same time, the congestion will occur and packet can't be transferred to the nodes. It will take more time to complete the packet transmission. This approach illustrates that the proposed method is a routing protocol. The proposed research we have used no of connection in a group or cluster. Every cluster has a cluster head and the cluster head directly interconnects with the improper place. The results of the proposed method are a comparison with existing Leach Protocol. Here the base connection is located to equal distance of a cluster and it's directly communicating to the cluster connection. This method is increasing to life instance of a network. As compare LEACH and Proposed method, we have noticed proposed method-have better force, lifetime, less delay, better transmission and consumed less time. LEACH Protocol is based on the cluster to make a comparison of native parameters so that we design the proposed method cluster based. The cluster used no of the group to increase the performance. This consist of many advantages which are listed below. Existing Number of groups is low. We can analyze a number of groups here. Every group's stage check in this proposed research. Proposed method routing protocol has a better result as compared to LEACH protocol. As cluster-head dies, series is rebuilt to bypass the deceased node. So the initial topology is not affected. Head node receives all the aggregated data moreover transmits further to cluster-head.

Keywords— *Data multi hop, MANET, Routing protocol, Dynamic Source Routing (DSR), Ad hoc On-demand Distance Vector routing (AODV), Cluster*

1. INTRODUCTION

A multi-hop network is a type of wireless network that uses more than one wireless node to transmit its information from a source node to a destination node. These nodes freely and dynamically self-organize themselves allowing them to interconnect seamlessly within a specific range. This concept is around for close to 20 years now and currently applied to various consumer electronics and military applications. The concept evolved from single-hop networks where the information is transmitted through a single hop. One of the most common single-hop networks is the Bluetooth Piconet where two nodes can seamlessly transmit information to one another if they are within the transmission range. Mobile ad-hoc network (MANET) is a type of multi-hop network [1-2]. In this type of network, each node is free to move independently in any direction and hence the nodes change their links frequently. MANET has been a popular research topic since mid-1990. In contrast to protocol cellular networks, there is no master-slave relationship between the base station and the mobile users. MANETs is used in several applications like vehicular communications, military applications, emergency first response, and public safety response.

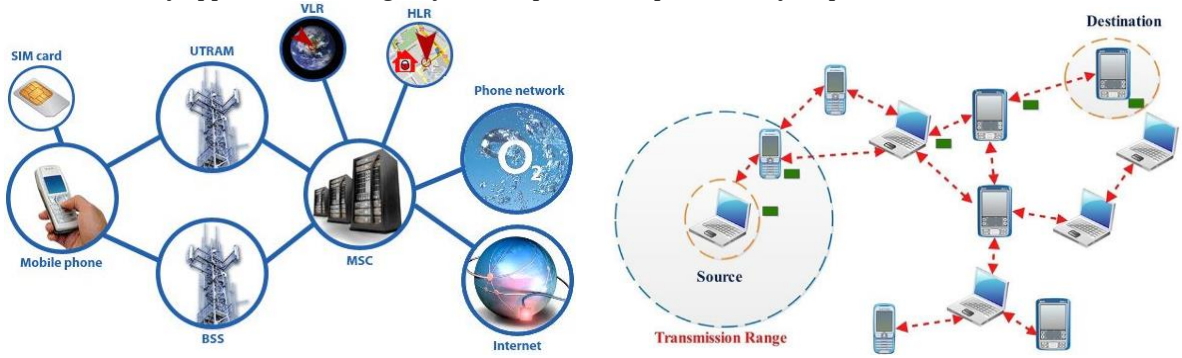

Fig. 1: Mobile and MANET network

2. RELATED WORK

AODV routing is an extensively accepted routing protocol for Mobile Ad hoc Network (MANET). The inadequacy of security considerations in the design of AODV makes it vulnerable to black hole attack. In a black hole attack, malicious nodes attract data packets and drop them instead of forwarding. Among the existing black hole detection schemes, just a few strategies manage both single and collaborative attacks and that too with much routing, storage, and computational overhead. This paper describes a novel strategy to reduce single and collaborative black hole attacks, with reduced routing, storage, and computational overhead. The method incorporates fake route request, destination sequence number, and next hop information to alleviate the limitations of existing schemes [6]. MANET, in fact, is a self-sufficient group of cellular consumers which talk to each other with the help of cellular nodes, described by certain wireless links. In these applications, in order to offer quality services for MANETs, many routing protocols have been designed. In this paper, a novel method that detects and prevents the supportive black hole attack on MANETs is developed. The proposed method is based on adaptive fuzzy inference system for MANET in order to detect and prevent the cooperative black hole attack [7]. The popular protocol utilized in MANET is AODV protocol and is simulated using NS2. The simulated results of the proposed method are compared with that of an adaptive method, wherein source node checks all nodes activity by using DAT table that maintains from-node-to-next-node's information and declares black hole node by channel overhearing method. It is observed that the proposed method based on adaptive fuzzy logic system shows better performance as compared to the adaptive method in terms of throughput, end-to-end delay, and packet delivery ratio [8]. In this author can facilitate future researches such that various techniques of improving energy efficiency in LEACH can be probe quickly. Here presented modifications in LEACH network for optimization challenge during focusing on factors like as energy efficiency, scalability, reliability, mobility flexibility, QoS maintain Data latency and Node Deployment. WSN is an ad hoc network. Here every mobile is clear with restricted energy. Every node composed the data than convey to the cluster-head. The data is transfer over the network each mobile consume some energy in receiving data, sending data. The lifespan of the network depends on how much energy spent in each transmission. The protocol plays an important role, which can lessen the delay while offering high energy effectiveness and the long span of the network lifetime. The planned system will recover the obtainable LEACH protocol [9-10]. The planned work is implementing on WSN to improve the network life in case of the chain-based protocol. The main difficulty with the cluster network is to discover the next nearest for communication. Here the upgrading is done for presented LEACH protocol.

3. METHODOLOGY

In our research work, all nodes maintain a nearest node table to access the data to nearest which is known as table-driven technology. All nodes to absent in the transmission range r of the distribution node. All nodes receive data communication in the transmission range and update its update record table. After that every node estimates it distances from nearest nodes. Calculate node weights with the help of this equation.

$$W_i = RE_i \times \sum_{j=1}^{n} \frac{1}{d^2(v_i, v_j)}$$

In the written equation W_i is the weight of every node i and $d\ (v_i,v_j)$ is the distance between two nodes i and node j. Every node broadcasts its weight inside the given transmission range. A node which has the highest weight among all it's nearest in transmission range r is selected as Cluster Head (CH).

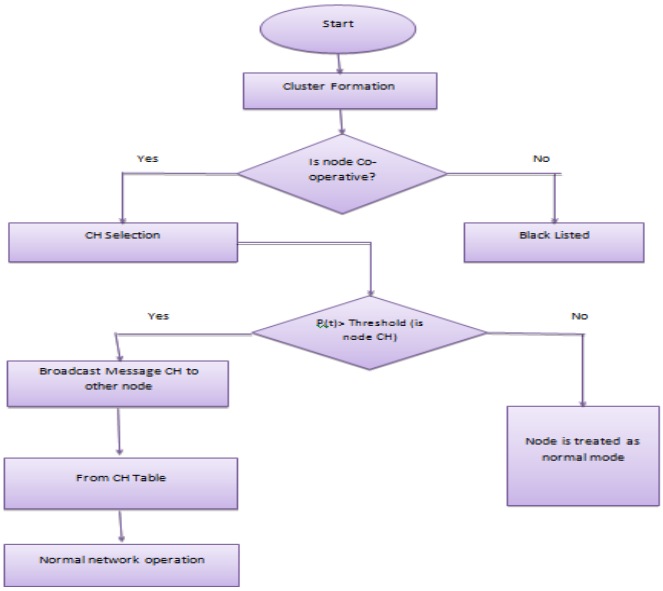

Fig. 2: Proposed system block diagram

3.1 Chain Formation Phase

For cluster formation using the chain in the proposed method, here the main process is started from the node behaviours such as speed of the node, energy of the node, transmission range and time, after measuring all these parameters, the chain process start. The first node of the chain having the high energy and transmission speed as compared to the second node, this comparison process is going on till the end of the node. Here in the chain formation phase starting node has the high energy and speed but as well as the last node of the network has low energy and speed. Chain formation inside the cluster is the initial phase because basically in this process an energy comparison process applies.

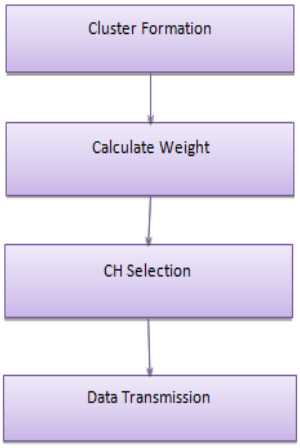

Fig. 3: Cluster formation process model

3.2 Cluster Formation

The cluster formation is a combination of no of node and group that contains the nodes ID and cluster head to find out it as a result of other messages. The nodes contain a message from their CH. The node broadcast message to every node in the cluster. The cluster head has the information of every node with their node ID. The nodes change the position and state but node ID remains the same in anywhere of the network. Here first cluster head checks every node that is active or node if it is active then communication with that node till node is trusted if the node is not trusted then cluster head make the block that node ID for communication till node goes back in previous state or trusted state.

Table 1: Simulation Table with parameters values

Parameters	Value
Number of nodes	20-100 (Variable)
Energy in Joules	0.5J (Homogeneous)
Area size	40m × 440m
Transmission range	70m
Cluster- Head position	At origin (0m × 0m)
Packet size	200 bits
Control packet	248 bits
Transmission speed	100 bits/sec
Bandwidth	5000bits/sec

4. SIMULATION RESULT

The actual performance of research work is carried out with help of network parameters with base work. Energy Efficient based cluster protocol in MANETs is being estimated with the help of simulation on network simulator. To estimate the final performance following parameters are illustrated Packet Deliver ration, throughput, an end to end delay and energy consumption. The network is considered by 40m X 40m with numbers of nodes are 36 that are distributed randomly in mobile field.

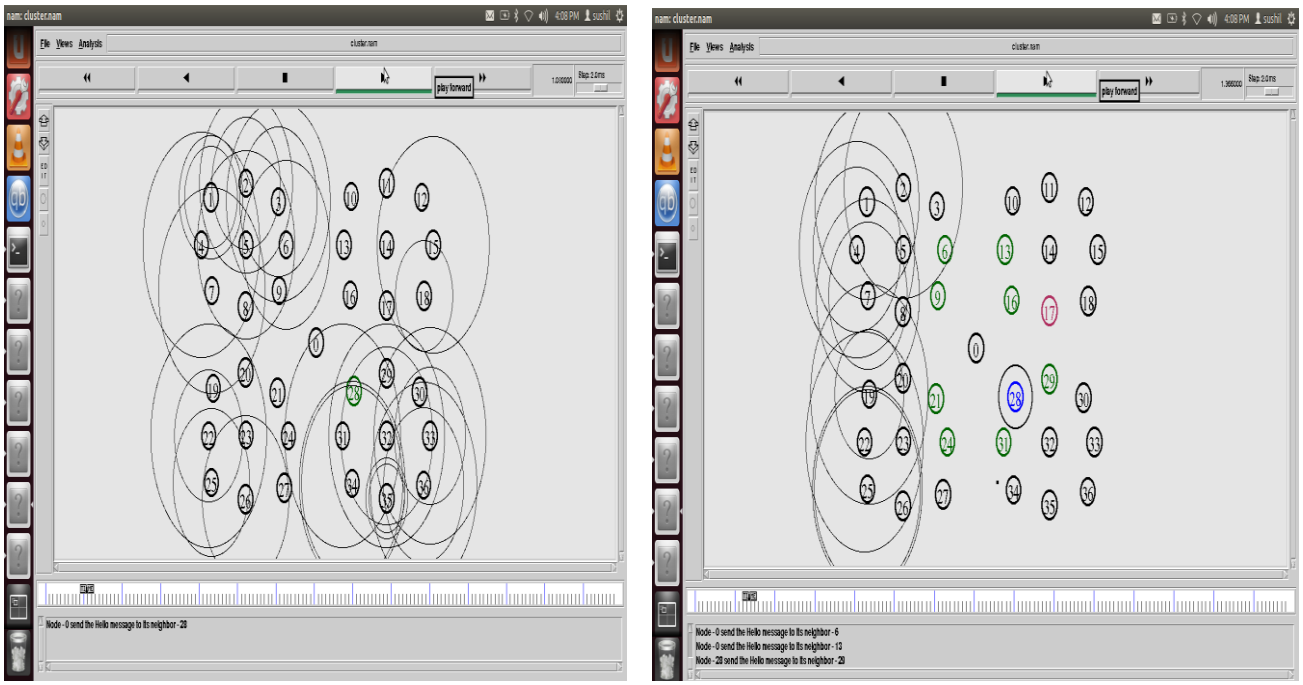

Fig. 4: Formation of cluster and communication started between nodes

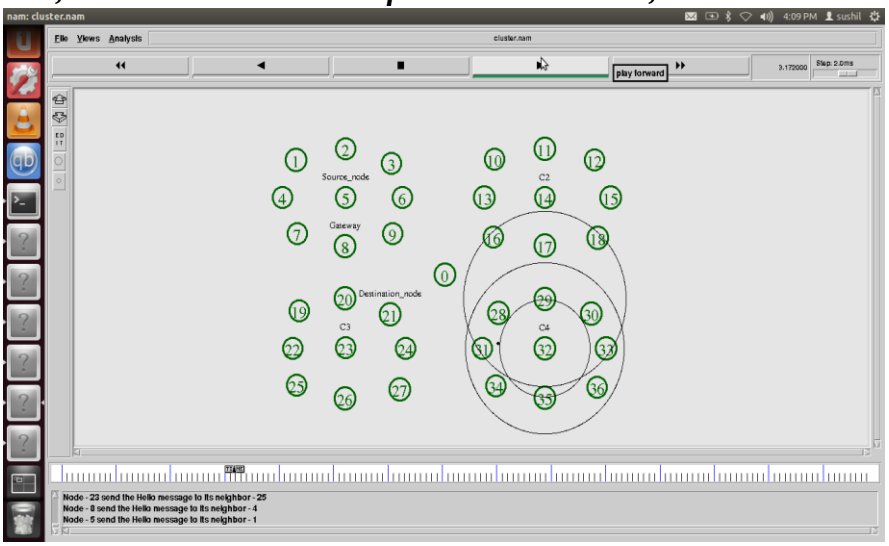

Fig. 5: CH is engaged to send the information to the nearest node

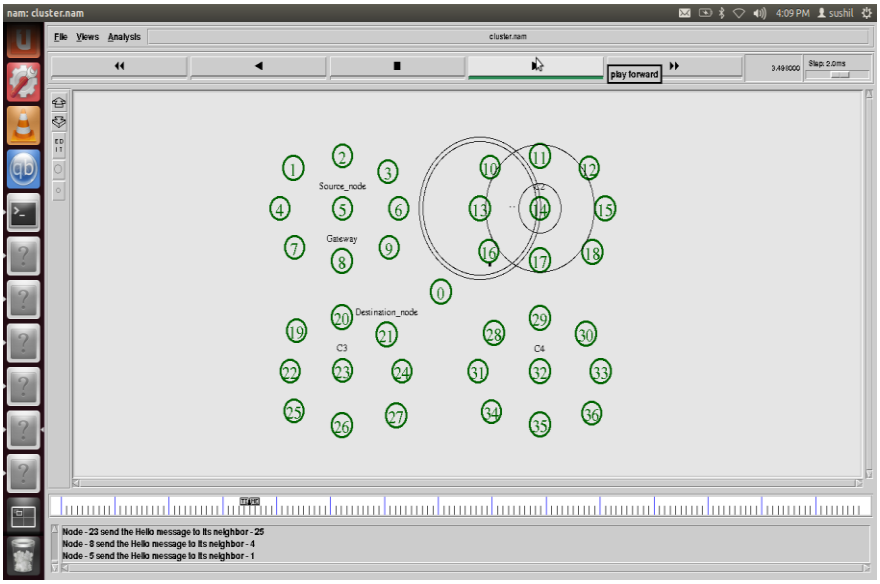

Fig. 6: CH is active to transmit data to nearest node

Following are the results, calculated by using performance.awk script. Using the output we plotted the bar graphs of the following parameters. The result is carried out by NS-2 simulator using following parameters.

4.1 End to end delay: Number of rounds vs. delay graph shows the comparison between the reading of cluster-head selection and choosing a new cluster head.

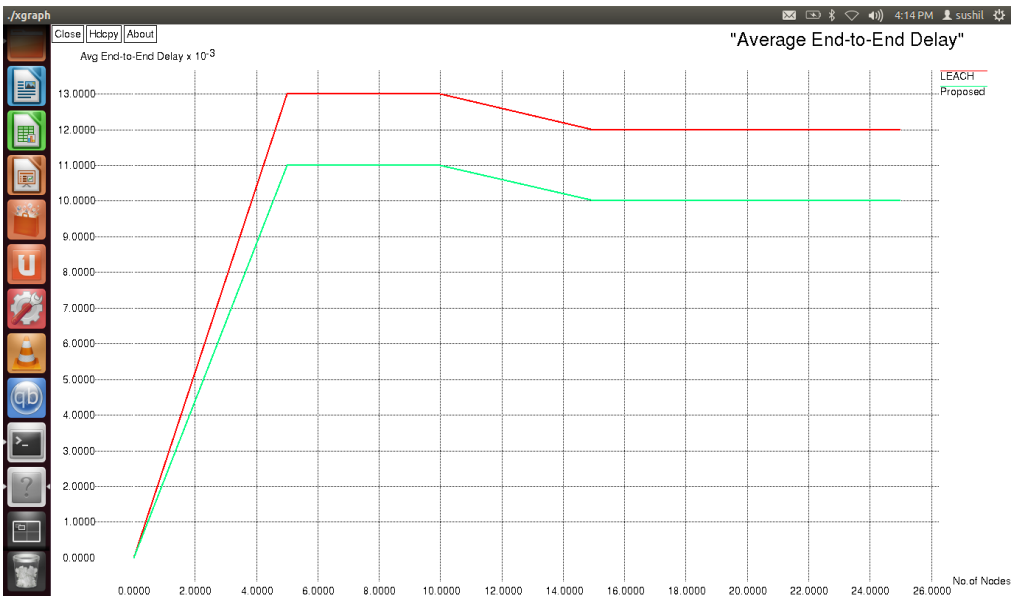

Fig. 7: Average end-to-end delay

4.2 Energy consumption: The energy consumption comparison graphs between calculate the total energy using in the whole scenario.

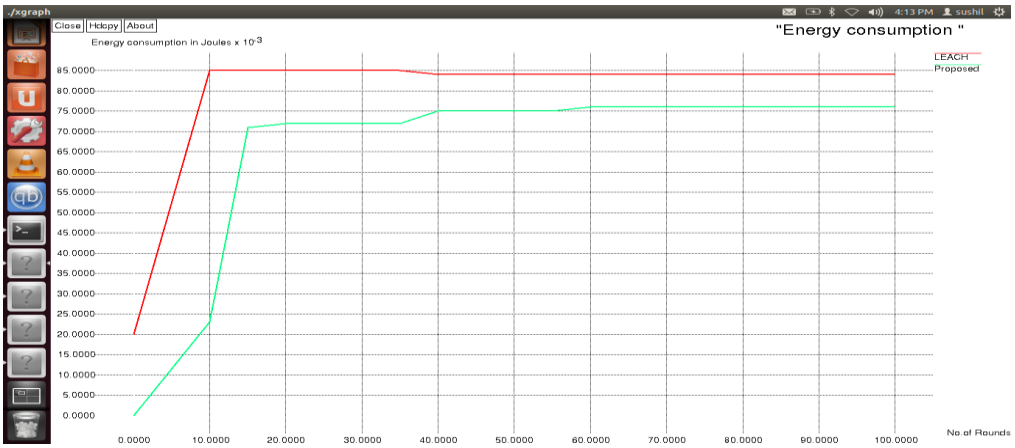

Fig. 8: Average energy consumption

4.3 Throughput: It is one of the dimensional parameters of the network which gives the fraction of the channel capacity used for useful transmission selects a destination at the beginning of the simulation that is, information whether or not data packets correctly delivered to the destinations.

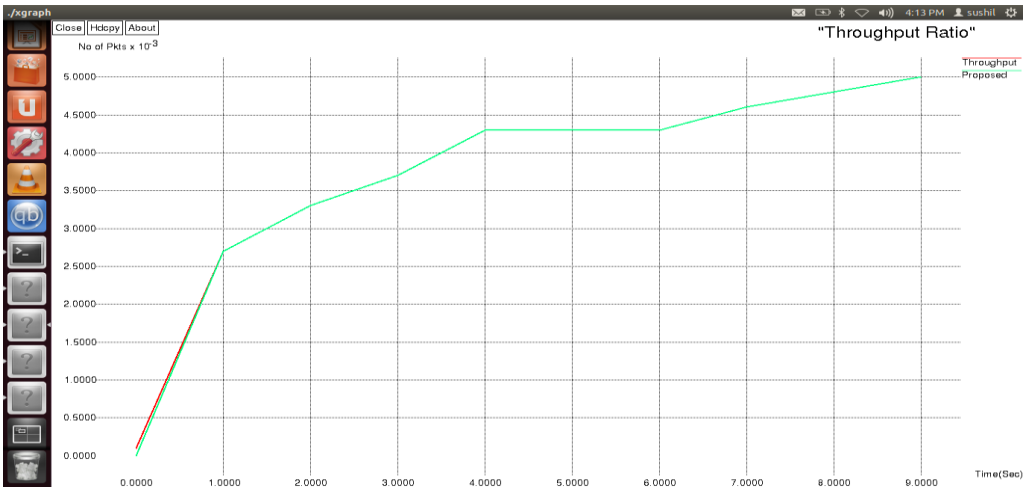

Fig. 9: Throughputs ratio

4.4 Packet delivery ratio: It is the ratio of the number of data packets received by the CBR sink at the final destinations to the number of data packets originated by the application layer at the CBR sources.

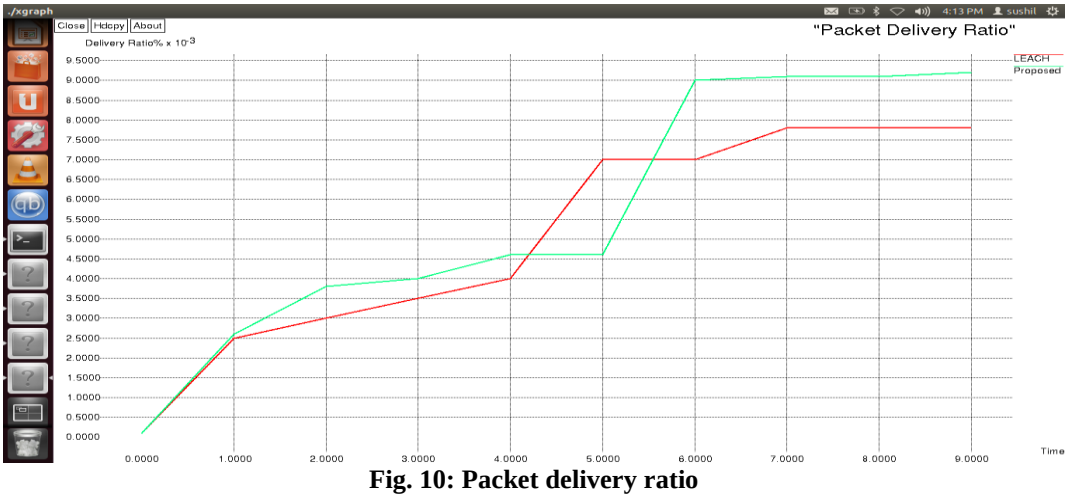

Fig. 10: Packet delivery ratio

5. CONCLUSION

In our research work, energy-based cluster head selection algorithm in MANET routing protocol is executed. The executed protocol is energy based on packet transmission in the cluster. The Proposed system is when the new node is entered the cluster is sometimes the new node will be the cluster head. Because the head node can communicate to the gateway in every transmission at the time cluster head energy level is decreased. When the cluster head reached in minimum energy level doesn't to transmit the packets to the new node will become a cluster head because the new node has a maximum level of energy. So the proposed algorithm has increased the throughput that is better than the existing algorithm. Here shown the graphical and numerical value

comparison between the existing and proposed protocol as clearly seemed here proposed protocol having the best performance as compared to existing because of the high energy protocol based cluster head selection, so that simple energy comparison measures the cluster head and rest node working as a cluster. Further, this work can be enhanced using IoT, AI and deep learning concept.

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