Energy Based Cluster Head Selection Algorithm in MANET

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Abstract-**Clustering is one of the important methods for prolonging the network lifetime in Mobile AD Hoc Networks. Clustering scheme is used here where cluster head node will play the role of transmitting packet from one cluster to the other. It involves grouping of nodes into clusters and electing cluster heads (CHs) for all the clusters. CH'S collect the data from particular cluster's nodes and forward the aggregated data to main node. A main challenge in MANET is to select appropriate cluster heads. MANET is self created and self organized by a collection of mobile nodes various mobile ad hoc network consists of devices with various characteristics in terms of transmission power, energy, and capacity. The Proposed system is when the new node is entered the cluster in sometimes the new node will be the cluster head. Because the head node can communicate to gateway in every transmission at the time cluster head energy level is decrease. When the cluster head reached in minimum energy level doesn't to transmit the packets so the new node will become a cluster head. Because the new node have a maximum level of energy. So the proposed algorithm is increased the throughput that is better than the existing algorithm**.

Keywords-MANET, Clustering, CBRP.

I. INTRODUCTION

Mobile Ad-Hoc Network (MANET) is basically a peer to peer network, which consist of moveable or mobile nodes interconnected by wireless links. MANET is a self-configuring infrastructure less network of mobile devices connected by wireless. These networks can be set up easily anywhere and at anytime. Each device in a MANET is free to move independently in any direction. It may frequently link with other devices. Under a cluster structure, mobile nodes may be assigned a different status or function, such as cluster head, cluster gateway or a cluster member. Cluster head selection is the process of selecting clusters heads. In a clustering, to select an appropriate cluster head in MANET and to improve the energy efficiently using cluster based routing protocol. A cluster head normally serves as a local coordinator for its cluster, performing intra-cluster transmission arrangement forwarding, and so on. In the network model that we are dealing with, we assume multi-hop network, where gateway nodes connect between different clusters if there is not direct communication between the cluster heads. Clustering is one of the basic approaches for designing energy-efficient, robust and highly scalable distributed sensor networks. This domain has been intensively studied because it is very useful when you want to achieve an energy-efficient message transmission through the network. A various mobile ad hoc network is a network in which each device will be having various characteristics in terms of energy,

transmission power, capacity etc. The two main phases of the clustering is that the clustering set-up and the clustering maintenance .In the cluster setup phase, cluster heads will be chosen among all the nodes. The cluster heads acts as the coordinator in the group of nodes. The cluster heads will help in the delivery of the packets to the destination. The responsibility of the CH is to communicate with all the nodes of its own cluster. However CH must be able to communicate with the nodes of other clusters as well, which can be directly or through the respective CH or through gateways. Communication is done in three steps. First of all the cluster head receives the data sent by its members, secondly it compresses the data, and finally transmits the data to the base station or other CH. Suitable cluster head can reduce energy utilization and enhances the network lifetime. Our aim in this paper is to provide an improved algorithm for cluster maintenance, which can be only achieved by a better head selection process.

In the existing system is only use cluster based routing protocol algorithm. This algorithm is not built in energy based concepts of cluster head selection. The proposed work is energy based cluster head selection. This algorithm use AODV routing protocol to transfer the packet. It can be used for large number of mobile nodes in the cluster.

AODV is basically an improvement of DSDV. But, AODV is a reactive routing protocol instead of proactive. It minimizes the number of broadcasts by creating routes based on demand, which is not the case for DSDV. When any source node wants to send a packet to a destination, it broadcasts a route request (RREQ) packet. The neighboring nodes in turn broadcast the packet to their neighbors and the process continues until the packet reaches the destination. This system is only use energy based cluster head selection algorithm that means when the cluster head energy is low that time don't transfer the packet so that cluster select the alternative cluster head. When the cluster head energy is low to enter the new node in the cluster. New node energy is high means that the node will be cluster head.

II. OVERVIEW OF HEAD SELECTION ALGORITHM

A. Cluster Based Routing Protocol Algorithm (CBRP):
Cluster based routing protocol (CBRP) [12] is an on-demand, hierarchical routing protocol that uses its cluster structure for routing, and where nodes are the basic elements to form a cluster. Every cluster has a cluster head, which acts as a controller within the base. Each cluster head acts as a momentary base station within its region or

cluster, and communicates with other cluster head with the help of a gateway.

B. Terms used in CBRP:

- *Cluster Head:* A cluster head, serves as a local director for its cluster, performing Inter-cluster routing and data forwarding. In our self-organized clustering scheme the cluster head only serves the purpose of providing a unique ID for the cluster, limiting the cluster restrictions.
- Cluster Gateway: A cluster gateway is a node which resides between two clusters and it is a non cluster-head node with inter-cluster links, so it can access adjacent clusters and forward information between clusters.
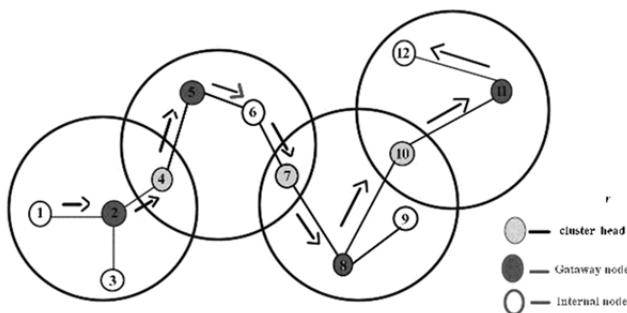- Cluster Member (Node): A cluster member is a node that is neither a cluster head nor a cluster gateway.

Fig.1

III. RELATED WORK

Soumyabrata Talapatra, Alak Roy "Mobility Based Cluster Head Selection Algorithm for Mobile Ad-Hoc Network" I.J. Computer Network and Information Security, 2014, 7, 42-49. This paper clustering concepts used in MANET. The proposed algorithm uses self-organizing principle for binding a node with the cluster. This can reduce the explicit message passing in cluster maintenance. As a result, there is no need of extra message passing during further cluster maintenance.

Arathy Nair, Mr.S.Kannan, Dr.S.Karthik "A Methodology for Cluster Head Selection to Improve Throughput and Channel Space Utilization in Power Heterogeneous MANET" International Journal of Innovative Research in Science, Engineering and Technology *Volume* 3, Special Issue 1, February 2014. The proposed algorithm for the cluster head selection algorithm. It includes the parameters such as battery power, transmission range, hop count and time to live (TTL). This can increase the throughput and channel space utilization of the network. This algorithm is much better than Existing algorithm.

Khalid Hussain, Abdul Hanan Abdullah, Saleem Iqbal, KhalidM. Awan, and Faraz Ahsan " Efficient Cluster Head Selection Algorithm for MANET" Hindawi Publishing Corporation Journal of Computer Networks and Communications Volume 2013.The proposed algorithm for the efficient cluster head selection algorithm. It includes cluster head can reduce the energy utilization and enhances the network duration. These factors include position of the

node with respect to further nodes, mobility, energy, trust, and throughput of the node.

V.Preetha, Dr.K.Chitra "Clustering & Cluster Head Selection Techniques in Mobile Adhoc Networks" International Journal of Innovative Research in Computer and Communication Engineering Vol. 2, Issue 7, July 2014. R.Aiyshwariya Devi,M.Buvana "Energy Efficient Cluster Head Selection Scheme Based On FMPDM for MANETs" International Journal of Innovative Research in Science, Engineering and Technology, Volume 3, Special Issue 3, March 2014.The proposed algorithm based on energy efficient cluster head selection algorithm. It includes an energy efficient CH selection scheme based on multiple Parameter decision making for MANET, to improve the performance of the entire network. The CHs can greatly contribute to overall system scalability, lifetime, and energy efficiency.

IV. METHODOLOGY

A. PROBLEM DEFINITION

In the existing system is only find in cluster head using cluster based routing protocol algorithm. This algorithm is not based in energy level of cluster head selection. The cluster head can communicate with other cluster heads, member nodes and gateways. That time the cluster head energy level is low. So the cluster head can't communicate with other nodes. That the same time the congestion will be occurs and packet can't be transfer in the nodes. It will take more time to complete the packet transmission.

B. PROPOSED WORK (AODV)

In the existing system is only use cluster based routing protocol algorithm. This algorithm is not built in energy based concepts of cluster head selection. The proposed work is energy based cluster head selection. This algorithm use AODV routing protocol to transfer the packet. This system is only use energy based cluster head selection algorithm that means when the cluster head energy is low that time don't transfer the packet so that cluster select the substitute cluster head. When the cluster head energy is low to enter the new node in the cluster. New node energy is high means that the node will be cluster head. So, our system does work more efficiently to select the cluster head than existing system. The procedure can be understood by following algorithm:

Step 1. Select source and destination node.
Step 2. Selected_node = source
Step 3. While (Selected node! = destination)
Step 4. Broadcast from Selected_node
Step 5. Select intermediate node by using AODV.
Step 6. Select Cluster Head and Cluster Gateway
Step 7. If Cluster head Energy! = High
{
New Node Will be Cluster Head
Go to step 4.
}
Else
{
Update present node = Intermediate node.
}

Step 8. End while.

It varies from one network to another network. In our scenario value is energy based cluster head selection for all the packets transmission.
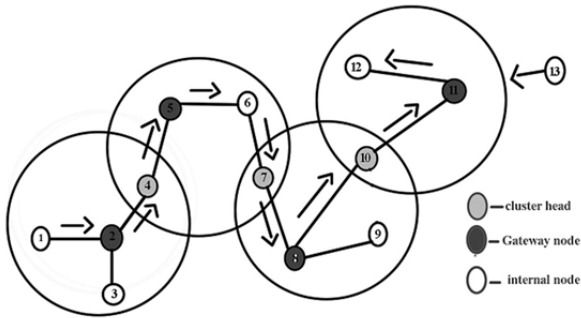

Fig:2

V.RESULT AND DISCUSSION

A. SIMULATION RESULTS

The proposed energy based cluster head selection Algorithm is simulated using NS2 simulator and compared to existing system. The aim of these simulation runs is to analyze the performance of the proposed EBCHS algorithm and to compare its performance with the existing system. There are 43 nodes placed randomly in the simulation environment use. Due to random dynamic topology, the source and destination are also selected randomly. The 43 nodes are divided into 4 clusters. Every cluster has 8 member nodes, one cluster head, one new node and 4 clusters have 5 Gateways.
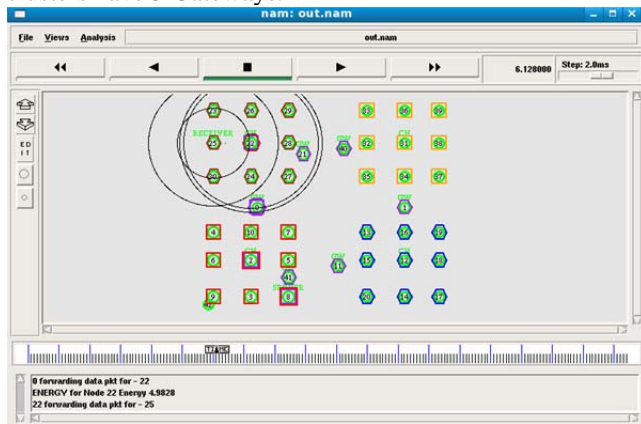

Fig 3: Packet Transmission

This fig shows the transmission of packets using selected paths and it shows the cluster head and gateway.
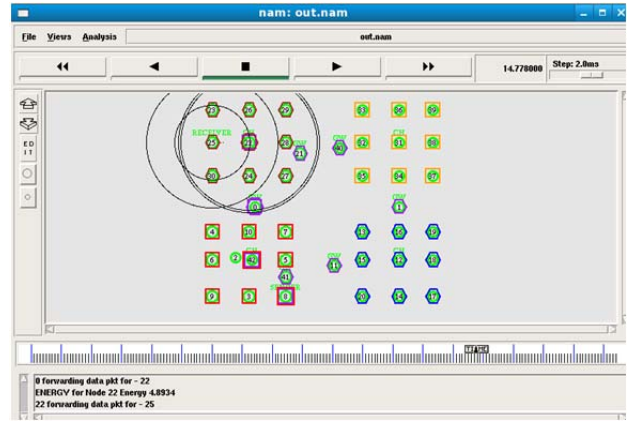

Fig 4: Energy Loss

This fig shows the loss of energy level in cluster head. So the energy level will be loss in the cluster head can't communicate with another cluster head and also the gateways. That time the new node will be enter in the group of clusters. The new node is full of energy so it became a cluster head.
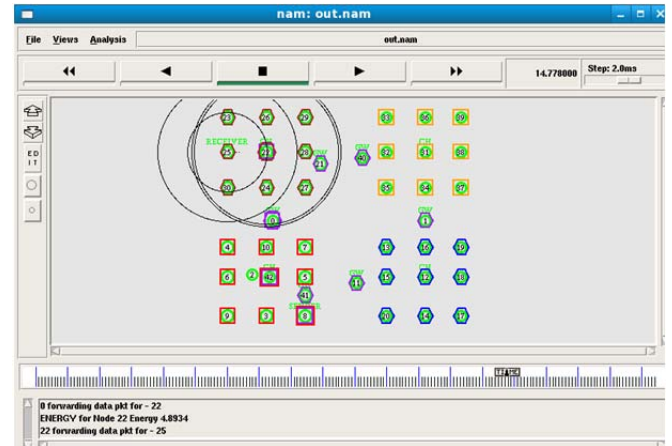

Fig 5: Packet Transmit With Alternative Cluster Head

This fig shows the new cluster head. Packets can transmit to sender and receiver through cluster head and gateway. The cluster head can communicate with other nodes. That time the cluster head energy level is low now the new node will be enter in the clusters. The new node can full of energy so the new node will be a cluster head. Now the packets can transmit with the new cluster head.

B. PERFORMANCE OF THE PROPOSED WORK

TABLE I.

Cluster	No. of Nodes	Distance	Generated	Received	Cluster Head	Energy
2(6-18)	6	204.3913	24	24	2	4.9032
2(8-25)	6	199.9945	24	24	2	4.9155
2(32-18)	4	188.2976	24	24	1	4.9038
3(17-25)	8	151.9910	24	24	3	4.9183

C.   CONCLUSION

In this paper, an EBCHS routing protocol is proposed, it is a modified version of CBRP. The proposed protocol is energy based on packet transmission in cluster. The Proposed system is when the new node is entered the cluster in sometimes the new node will be the cluster head. Because the head node can communicate to gateway in every transmission at the time cluster head energy level is decrease. When the cluster head reached in minimum energy level doesn't to transmit the packets so the new node will become a cluster head. Because the new node have a maximum level of energy. So the proposed algorithm is increased the throughput that is better than the existing algorithm.

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