IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 6, Issue 7, July 2017

Balanced Clustering in Mobile Adhoc Network using Conceded Cluster Head Node

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Abstract: Mobile ad-hoc network (MANETs) the network connectivity is not provided by base station. A very less infrastructure is required for MANET and it is self-configured network. The utilization of energy and stability are problem in MANET. The MANET has many disadvantages when it is used in large scale operation due to which the usage of resources increases and performance goes down. To perform better in large scale environment the clustering is proposed. In clustering the mobile node is grouped within range and one mobile node is elected as cluster head which is responsible for transmission in cluster. The various clustering algorithm are proposed for efficient transmission but dynamic behaviour of MANET, network division is difficult into cluster and cluster head election/selection operation. The conceded node cluster head for balance clustering in mobile adhoc network is proposed by calculation of energy and speed of mobile node cluster head is selected for efficient transmission.

Keywords: MANET, CH, CCH, Primitive node.

I. INTRODUCTION

Mobile ad hoc networks (MANETs) form of network where nodes connected to other nodes through wireless link. Mobile nodes in MANET [3] make interaction with other nodes through multihop wireless links. Infrastructure based mobile network and infrastructure less mobile network also known as mobile adhoc network are come under mobile adhoc network. In infrastructure based network nodes make interaction possible through fixed base station. Each node in infrastructure network is within the range. Wireless network which come under infrastructure are: - cordless telephone, cellular network.

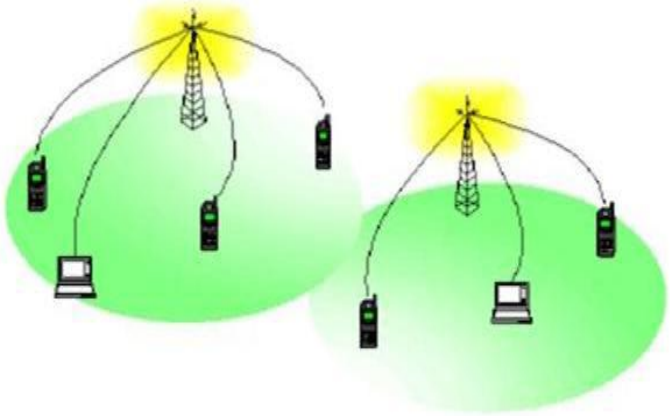

Fig 1. Infrastructure based wireless network [8]

Infrastructure less mobile network also considered as Mobile adhoc network is a self compose infrastructure less network. A Mobile [10] Ad Hoc Network composed of wireless nodes which can proceed freely and cooperate each other for passing data to one another. It does not comprises stable base station, every node in manet behave as router for providing route.

Mobile adhoc network [9] presents various advantages over conventional network includes minimize the cost of infrastructure, ease of establishment. Mobile adhoc network do not hold fixed infrastructure [10] like base station. Each node reacts as router as well as host. Each node[4] in the network acts as a router to interchange the information from source to destination node, mobile nodes are limited in power and memory. They are free to move anywhere in the network. These kinds of networks provide the communication in an inexpensive rate without any fixed infrastructure. It

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can often connect [5] with other nodes. Nodes can join and leave network anytime during its lifetime. Node of network [8] can be laptop, mobile phone, personal digital assistance, personal computer which are participating in network. These node have capability configure themselves. Mobile adhoc network uses multihop routing to furnish network connectivity.

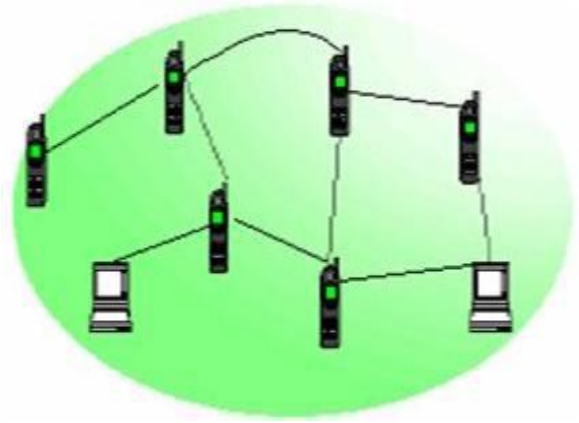

Fig 2. Mobile adhoc network [8]

1.1 Clustering in MANET

Energy utilization and stability are main problem in mobile adhoc network. To overcome these problem clustering method are used. By using clustering [3] of nodes within the network makes better utilization of resources by minimizing the amount of information propagate inside the network. The work of clustering method is to group a no of nodes into a number of overlapping clusters. Clustering is a method in which[5] network divided into interconnected substructures, called clusters. Clustering in MANET offers many advantages when compared with conventional networks. Mainly there are three types of nodes in cluster.

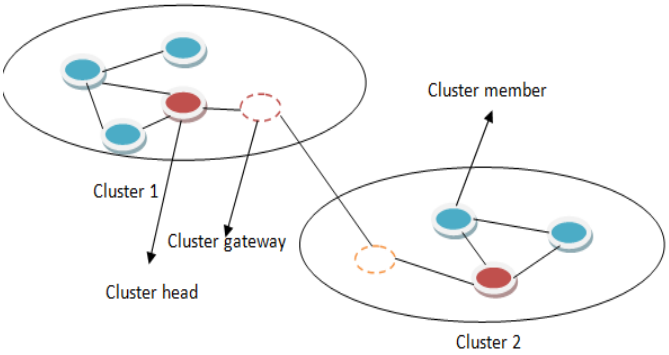

Fig 3 Cluster structure

Cluster head: - It is a[6] leader node that has a ability to link sensor network to the internet, coordinates all the nodes, keeps the records of nodes and paths.

Cluster member:-these are ordinary nodes which transmit information [3] to their cluster head which compresses this information and forward it to other cluster head.

Cluster gateway:-Non cluster [3, 7] head node used to provide connection between one clusters with another cluster.

II. RELATED WORK

Bhanu Rekha.S, Muthukumarasamy.s, k.thanigaivelu(2016) prposed[1] a balanced clustering in mobile adhoc network using extended and weekly connected dominated sets(EWCDS). They present protocol which handles non uniform load by making transmission more efficient using EWCDS. Using EWCD Switch not only manages various loads under various conditions but also maintains the battery level of nodes. They presents protocol which uses these

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mechanisms to improve performance in terms of throughput, energy consumption and inter-packet delay variation Balanced cluster group formation, packet are overcome by proposed algorithm also network lifetime is prolonged by sustaining the energy level of nodes by Extended And Weakly Connected Dominating Sets.

Piyalikar, Pritam Kar, and Mrinal Kanti Deb Barma(2016) stated that in cluster-based routing protocol, a cluster head[2] is responsible for routing and this cluster head keep maintain information like cluster associate ship, cluster connection, based on which it is easy to find dynamically the inter cluster routes. They presents new methodology referred to as forecast weighted clustering algorithm (FWCA) for electing a cluster head. FWCA calculates weight value for each node and select less weighted node as cluster head node.

Vijayanand Kumar, Rajesh Kumar Yadav(2016) studied that selecting cluster head[11] is an important task. They presents the dynamic weight adjustments by using soft computing. Soft computing consists non-deterministic algorithm such as fuzzy logic and neural networks. Weight based clustering algorithm shows the nature of artificial neural network with fuzzy behaviour on their node dynamics. In this work fuzzy model with weight correction adjustment mode implement on mobile node for providing a best cluster head.

RenuPopli et.al (2015) [3] stated that mobile adhoc network contains mobiles devices which are connected with each other by wireless link. Limited resources and dynamic topology nature of network are the main issue of mobile adhoc network. Clustering method provide a better utilization of resources. They proposed a secure and efficient cluster head selection algorithm which take an important variables of network like connectivity, energy and security for selecting efficient cluster head.

K.Gomathi, Dr.B.Parvathavarthini(2015) stated that mobile[4] adhoc network resources are used for large scale operations which creates various trouble like, bandwidth resource consumption, routing delay due to dynamic topology nature of mobile adhoc network. They present direct trust evaluation technique for finding the trust value of every nodes. The trust value can be evaluated based on matrix eg:- type of data forwarded, no of packet forwarded, data delivery rate, dropped etc. These trust values are than used to compare with predefined threshold value for selecting a cluster head and for creating clusters.

V.Preetha, Dr.K.Chitra (2014) [5] presents a survey on various clustering methodology for cluster formation and cluster head selection. The algorithm is classified under five categories depending on various parameters, identifier based clustering (nodes with minimum id elected as cluster head), connectivity based clustering(node with maximum number of neighbour nodes elected as cluster head), Mobility based clustering(most stable node in the network elected as CH), Power Aware clustering(CH is elected based on the energy level of node).

III. PROPOSED METHODOLOGY

1 Cluster Formation: the proposed Technique work on dynamic cluster development in which the node within area are combined together and group of node is designed called cluster in cluster formation process the energy, speed and range of each node is calculated is called composite value CV on the basis of CV cluster head section process is done and cluster is formed.
In our proposed technique CH and conceded cluster head CCH are selected with the highest value of CV. The two nodes with the highest value of CV are considered as CH and CCH CV1 and CV2 respectively.

Step 1. Cluster formation: - Initiate the network and dividing the whole network in some disjoint group called cluster.

Step 2. For every node, weighted control matrices will be calculated. Weighted control matrices denoted as **CV** here. The CV can be calculated on the basis of maximum energy and speed and range. Among the all nodes in cluster, find two nodes with higher composite value, and name these two node as **CH, CCH.**

Step3. Broadcast message nodes with highest CV as CH and CCH.

Step4: The primitive node will find the energy of non-cluster node, CH and CCH .If energy of Cluster head goes down then primitive node will replace CCH with CH and CCH with cluster member node having highest energy find by primitive selection technique.

Step5. If in case cluster head leaves and departed, the conceded cluster head node will elected as cluster head and Primitive node selection algorithm will replace the node.

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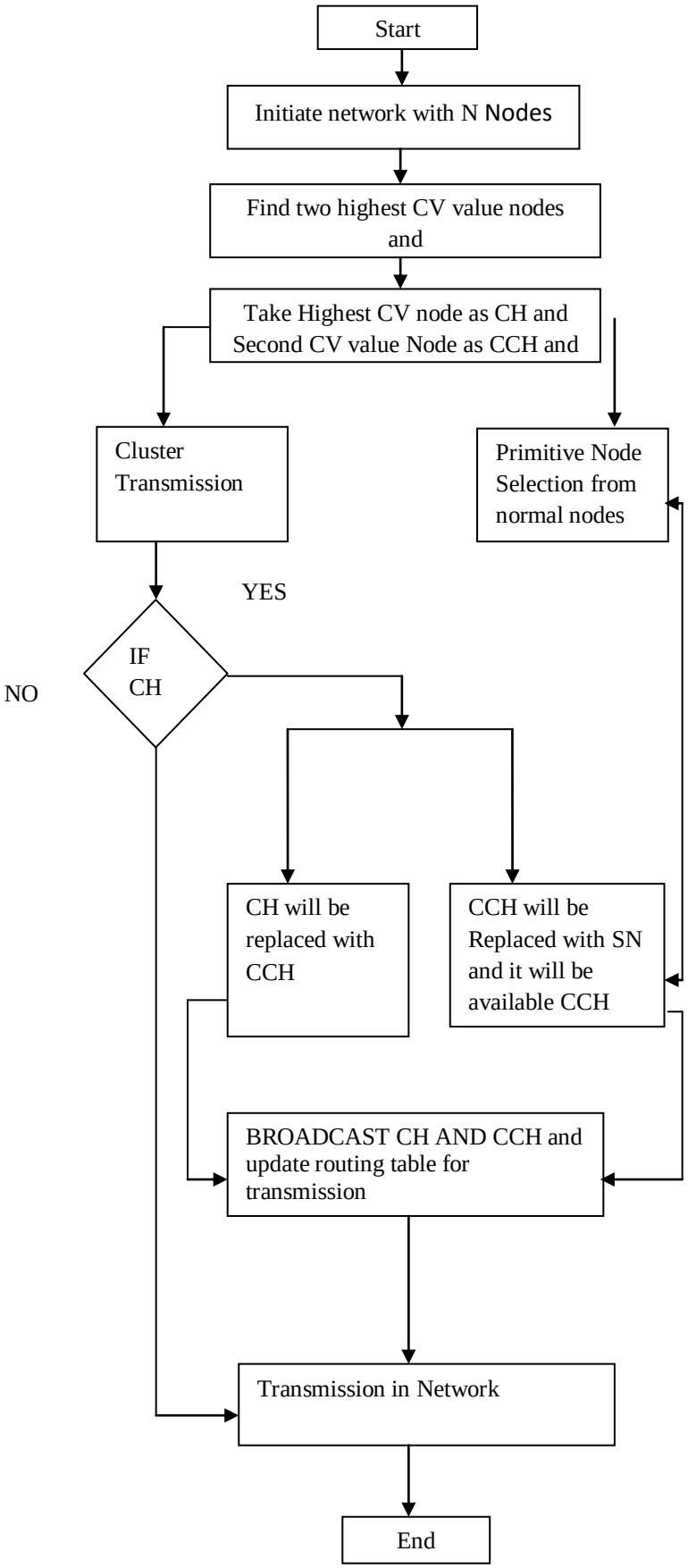
FLOW CHART



DOI10.17148/IJARCCE.2017.6735

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2 PROPOSED ALGORITHM

The proposed algorithm of dynamic technique for efficient dissemination to tackle the unstable topology of MANETs
NN: Normal Node
PN: primitive Node
CV: Composite Value(Range, speed, energy).
CH: Cluster Head.
CCH: Conceded Cluster Head.
SN: next selected CCH NODE

I Cluster Formation

In proposed algorithm the CCH will increase the life time of cluster for efficient routing
Step1. Begin

Step2. Initiate the network with NN{

Step3. Normal Node(NN) participates for the cluster head elections and finds the two Highest CV nodes.

Step4. Node with highest CV will be elected as cluster head and second as CCH.
Broadcast CH and CCH

Step5. Primitive selection done for finding node with highest energy will be saved as PN.
Cluster is formed; Transmission in network

II Cluster Maintenance

Step 1 Transmission Cluster Formation
If (CH leaves the network)
{
The CCH node will be replaced with CH and become Cluster head.
}

Step 2 Update CCH with Selected Node for new CCH
Broadcast CH&&NACH IN Network update routing table;
Step 3 Transmission in network;
}

Configuration Table

S. No.	Parameter	Value(s)
1	Simulator used	NS 2.35
2	Simulation Time	100 Secs
3	Simulation Area	1500 X 1500
4	MAC	802.11
5	Number of nodes	30
6	Speed of Nodes	2 to 16 (m/sec)
7	Mobility Model	Random Waypoint
8	Transmission Range	250m
9	Packet Size	512 KB
10	Traffic Type	FTP

IV RESULT AND ANALYSIS

1. Packet delivery Factor: the PDR is the ratio of packet received by destination and to destination the formula for calculation PDR=P1÷ P2 where P1 and P2 are sum of packets generated by source and destination the each source. The proposed technique result shown in Fig4 and Table shows with the increase of time packet delivery factor is better as compared to previous technique which shows

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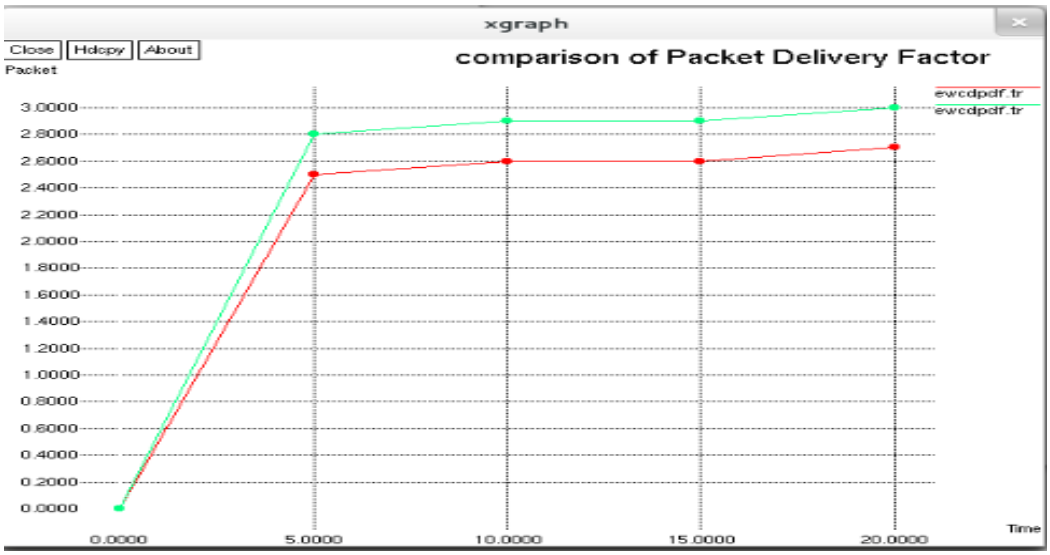

Fig4 comparison of Packet Delivery factor

Time	CCH	EWCD
0	0 0	0 0
5	5 2.8	5 2.5
10	10 2.9	10 2.6
15	15 2.9	15 2.6
20	20 2.11	20 2.7

Table comparison of Packet Delivery factor

2 Energy: The energy consumption be proposed technique after cluster formation and transmission shows that proposed energy is better. The result shown in fig 5 and table shows that proposed technique energy consumption is lower as compared to previous technique.

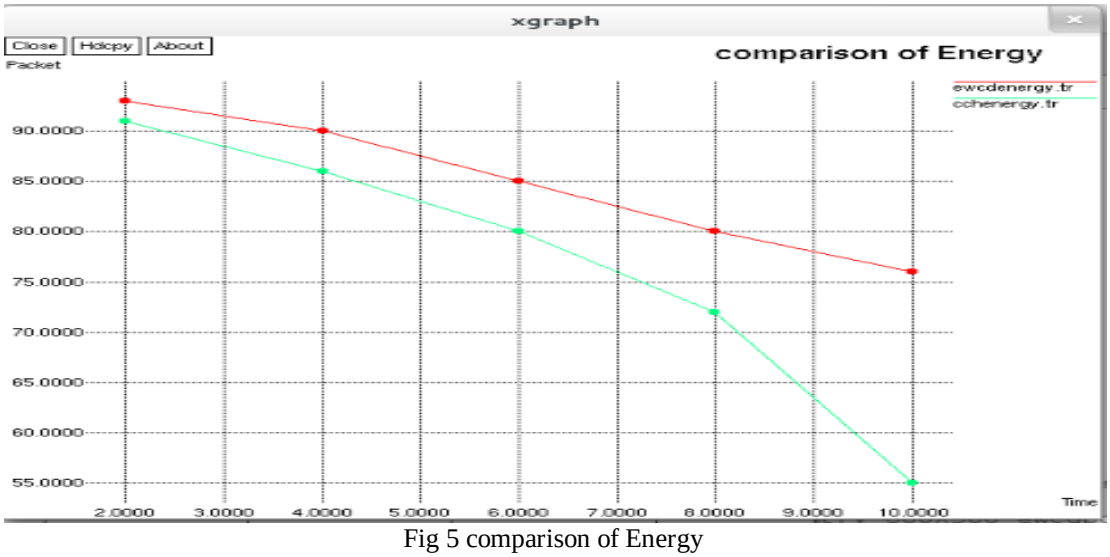

Fig 5 comparison of Energy

Time	CCH	EWCD
2	91	93
4	86	90
6	80	85
8	72	80
10	55	76

Table comparison of Energy

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3 Delay: The time taken by packet to reach the destination. Total time taken by packet to reach destination is called delay . the toatal time minus time taken by packet to reach destination is called delay the formula for : Avg. Delay=S/N where S is sum of time taken by node to reach the data and N is total packet received by destination the fig 6 and table shows that the proposed technique delay is less as compared to proposed technique

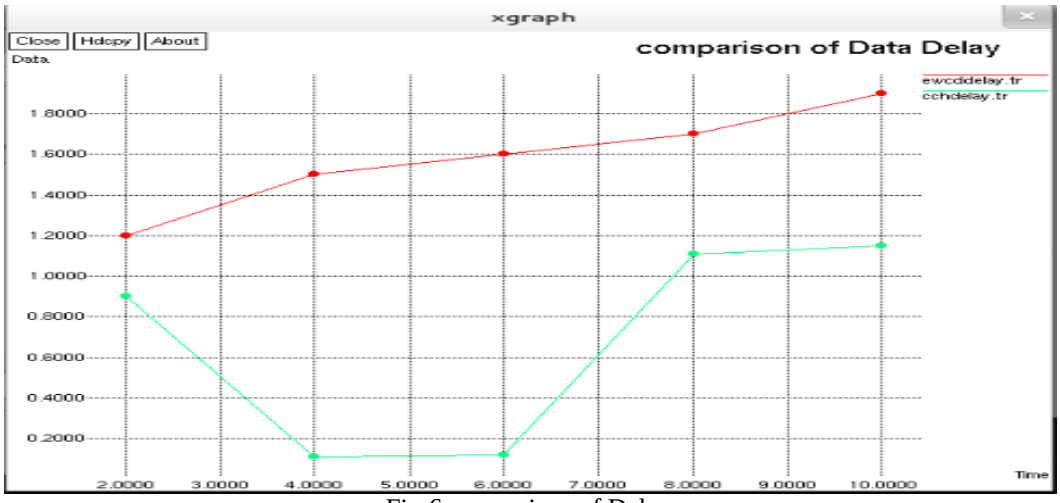

Fig 6 comparison of Delay

Time	CCH	EWCD
2	0.9	1.2
4	0.11	1.5
6	61	1.5
8	1.5	1.11
10	1.9	1.15

Table comparison of Delay

V CONCLUSIONS

the performance of previous and proposed technique shows that performance on the basis of Packet delivery factor, delay and energy. By comparing these Technique on the basis of various performance metrics we have reached to a conclusion that Proposed technique CCH is better than previous technique

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