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Common Entry Eradication and Cluster Elimination in MANETs (CEECE)

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Abstract - **Mobile Ad hoc Networks is a collection of wireless mobile nodes, which form temporary networks without relying on any existing infrastructure or centralized administration or standard support services regularly available in wide area networks to which the host may normally be connected. Clustering is the process of building hierarchies among nodes in the network. In this approach an ad hoc network is partitioned into group of nodes called as clusters. In this paper, we proposed an algorithm CEECE to eradicate cluster formation by removing the common entries that will ultimately optimize the performance of network structure. The result analysis carried by me is done using NS-2 simulator.**

Keywords: Manets, Clusters

I. Introduction

In an ad hoc network, mobile nodes communicate with each other using multihop wireless links. There is no stationary infrastructure; for instance, there are no base stations. Each node in the network also acts as a router, forwarding data packets for other nodes. MANET technology allows a set of mobile uses equipped with radio interfaces (Mobile nodes) to discover each other and dynamically form a communication network. MANET incorporates routing functionality into mobile nodes so that they become capable of forwarding packets on behalf of other nodes and thus effectively become the infrastructure. The primary goal of such an ad hoc network routing protocol is to discover and establish a correct and efficient route between a pair of nodes so that messages may be delivered in a timely manner. Route construction should be done with a minimum of overhead and bandwidth. The MANET can be divided into several clusters. Each cluster is composed of one cluster head and many normal nodes, and all the cluster heads form an entire dominating set.

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The cluster head is in charge of collecting information (signaling, message, etc.) and allocating resources within its cluster and communicating with other cluster heads. And the normal nodes communicate with each other through their cluster head, no matter they are in the same cluster or not. The concept of our model is based on CPACL-AODV and DSPO protocol that has been given on basis of cross layer design. [2][3]. CEECE algorithm given in this paper is enhancement of above written algorithm. As the complexity increases with the increase in number of hops under transmission the efficiency decreases. In this paper, I have worked on eradication of cluster formation by eradicating common entries in the clusters which ultimately increases the efficiency.

II. System Model

The network model consists of an area of 1500 X 1500 m. Protocol is AODV. Number of packets taken are 10,15,20,25. Packet size taken is 512 MB. Simulation time taken is 200 sec. Topology used is Random Ray Point. Traffic can be CBR (Constant Bit rate) or VBR (Variable Bit Rate). Number of connections taken are 5,10,15,20. Numbers of nodes taken are 50, 60, and 70. Mobility considered is 10 m/s. Path loss is 4 and time slot considered is 10 sec.

Area	1500 X 1500 m
Protocol	AODV
No. of Packet	10,15,20,25
Packet Size	512 MB
Simulation Time	200 sec
Topology	Random Ray Point
Traffic	CBR / VBR
No. of connections	5,10,15,20
No. of nodes	50, 60, 70
Mobility	10 m/s
Path loss	4
Time slot	10 sec

III. Common Entry Eradication and Cluster Elimination Algorithm (CEECE)

A. Cluster

Cluster (*hierarchical*) structure helps better utilize the radio band resource in a MANET.

A cluster structure facilitates routing events in a MANET. A cluster structure makes a MANET appear smaller and more stable in the view of each mobile node. [4].

Multi-cluster, multi-hop wireless network should be able to dynamically adopt itself. Some nodes, known as cluster-heads, are responsible for formation of clusters each consisting of number of nodes (analogous to cells in a cellular network) and maintenance of topology of network. The set of all cluster-heads are called Dominant set. A cluster-head is responsible for resource allocation to all nodes belonging to its cluster and monitors communication within a cluster. In a cluster, objects are mutually closer to each other than to objects in other clusters. The Cluster structure need to be maintained as the new mobile nodes may enter the network and the existing nodes may move out or lose their battery power. It occurs in the case of both Cluster Heads and Member Nodes. Prediction of the geographical position of the Mobile Node is called mobility prediction. The past positions or the history is used in predicting the future positions. Based on this value Clustering is performed. When it is compared to the Original Position the resulting Cluster Formed are the same [5]. Thus Signals sent from the member nodes to the Cluster-Head regarding the current position can be minimized by eradicating the common entries. This will result in less consumption of power and bandwidth. Also this technique can help in collision detection in case of airplanes without the support from fixed base infrastructure.

Clustering : To divide mobile nodes in a MANET into different virtual groups and to allocate mobile nodes geographically near into the same cluster based on some rules.

The manager node- CH (Clusterhead) – in clustering has responsibility for many functions such as cluster maintenance, routing table updates, and the discovery of new routes.

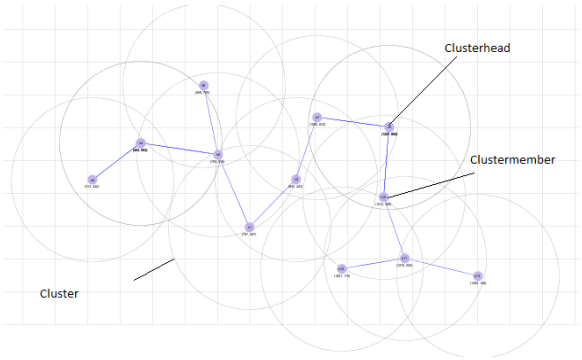


Fig.ure 1

Roles: - Clusterhead (CH) -Cluster member (CM) - Cluster gateway (CGW)

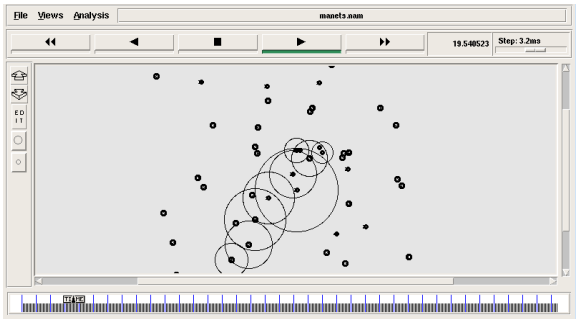


Figure. 2

The figure above shows cluster formation that causes the link speed to decrease and ultimately whole transmission stops.

B. Common Entry Eradication and Cluster Elimination Algorithm (CEECE)

This algorithm is derived from our simulation that we carried using NS-2 simulator.

```
Set centralized_node== node (0)
While ( Ring_Search (n) ==True)
{
Set node_location=GPS Reading
Generate Postion_Signal
If (Node_location==Common)
{
 Change_direction (node (n))
}
 Else
{
 Reset_GPS
}
Maintain GPS_Table
```

cluster_formation( )

{
Relay_node(S)
S (Node, Current_location, Location_changed)
Maintain location_change_table
Check for common entries
If(entry_common)
{
Transmit Hello
Ack (Random)
Send refine_msg
Trace_route
}
Exit
Check for common entries
Exit
}

This algorithm can be explained by taking an example of two airplanes flying at different altitudes in opposite direction. Consider two planes A & B moving in opposite direction at same altitude, now they may cause overhead collision due to combining path similar to cluster formation. Now if we apply this algorithm for path modification, the plane will exchange messages and thus will prevent common pair problem and will cause airplanes to change in position, thus preventing accident.

IV. SIMULATION RESULTS AND ANALYSIS

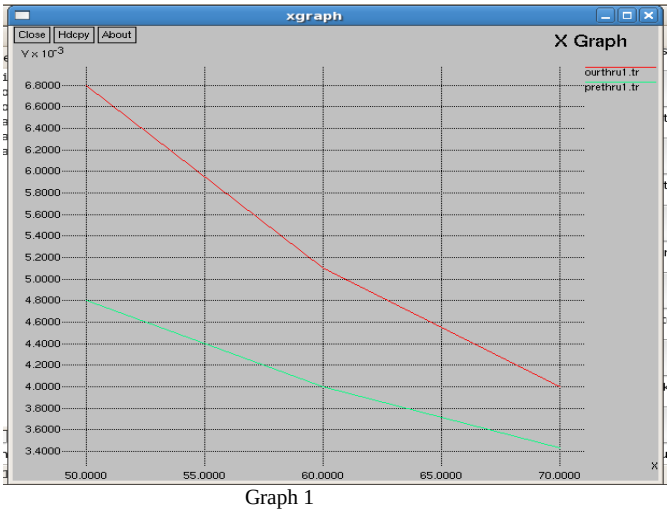
A. Performance Metrics

We simulated the MANET's for hop and calculated the results for Network Efficiency and Throughput of the network structure. I have taken values as constant to compute the results. The simulation has been performed for the area ranging over 1500 X 1500.

B. Graphical Analysis

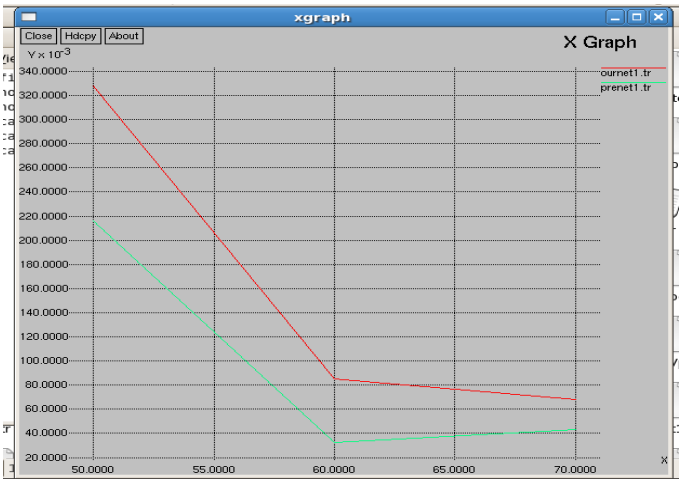
The Graphical analysis is carried out by comparing the trace file of newly designed and previous version of protocol. The comparison is carried out by use of x graph of ns2.The graphs taken by me are as follows:

No. of nodes taken: 10,15,20,30
No. of Packets: 20
Time: 200 sec



Graph 1

The graph1 shows the increase in throughput as compared to previous. The Increase in throughput is up to 17% as compared to previous.



Graph 2

The graph2 shows the increase in Network Efficiency as compared to previous. The Increase in Network Efficiency is up to 22% as compared to previous.

V. Conclusion

We have analyzed Throughput and Network Efficiency for clustering and improved model for handling cluster elimination using CEECE algorithm. Our model proposed increased both Throughput and Network efficiency as compared to previous model. Further work can be carried out on different metrics i.e. bandwidth, end to end delay and other parameters.

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