



SELECTION OF ENERGY EFFICIENT CLUSTER HEAD USING CEERA: IMPROVED CLUSTERING BASED ENERGY EFFICIENT ROUTING ALGORITHM FOR AD HOC NETWORKS

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ABSTRACT

There are several IP routing protocols, with competing features, developed for wireless ad hoc networks. These protocols have varying qualities for different wireless routing aspects. It is due to this reason that choice of a correct routing protocol is critical. Energy efficient clustering formation in MANET is one of the major issue because energy of one node in clustering may affect all other nodes and also effect on the life time of the Clustering Head. In this paper, propose a new algorithm technique – which is “clustering based energy efficient routing algorithm (CEERA)” a new weightage based and dispersed flexibility extrapolation-based weighted clustering algorithm with local clustering-heads. Also implement the energy efficient techniques for selection of clustering head form minimization of energy consumption. This algorithm CEERA with selections technique reduce the routing overhead, increase the network life time.

KEYWORDS : Ad-hoc networks, CEERA, Clustering Head, Energy Strength, mobility.

I. Introduction

Mobile ad-hoc network (MANET) [1] is a type of ad hoc network that can change locations and configure itself on the fly. Because MANETS are mobile, they use wireless connections to connect to various networks. This can be a standard Wi-Fi connection, or another medium, such as a cellular or satellite transmission. MANET every node finds the route by route request. Routing protocol plays a crucial role to send the data from source to destination that discovers the optimal path between the two communication nodes. Each protocol has its own rules (algorithm) to finds the route or maintenance the route. There are various routing protocol proposed by researchers. MANETs [2] are facing various challenges for e.g. No central controlling authority, Mobility models, limited power ability, continuously maintains the information required to properly route traffic. Mobility models are also a factor that puts a deep impact over the performance of a MANET and need to be concerned. An efficient clustering method should be able to partition a MANET quickly with little control overhead. Due to the dynamic nature of MANETs, optimal clustering formations are not easy to build. To this end, clustering based Energy Efficient Routing Algorithm (CEERA) protocols and energy efficient techniques for selection of clustering head form minimization of energy consumption have been proposed.

II. Clustering Algorithms in MANET

2.1 Clustering Based Energy Efficient Routing Algorithm (CEERA)

Calculation of the Clustering Based Energy Efficient Routing Algorithm is based on Weightage of cluster head. This technique is implemented as per Weightage rules so this is known as weightage based Energy Efficient Clustering Based Algorithm (WB-EECBA). WB-EECBA is an enhancement of predictable CBA. In this protocol, the weight of each node is measured as metric for Clustering head selection. In WCA re-election takes place with the occurrence of certain events i.e., when there is a demand for it. Node parameters like degree of connectivity, mobility, transmission power and available battery power are considered for selection of a cluster head and are given different weights depending on the network scenario.

2.2 FRAMEWORK/STRUCTURE OF ALGORITHM

Initially when a node is invoked trust value of the node will be calculate that either the node is trusted or node. if the node will be trusted then it will be registered [20] as one of node of MANET. Otherwise the trust value of the node will be calculated again until it starts behaving well. Once the node will be registered network

establishment will be divided into two parts: setting up of cluster and maintenance of cluster.

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Step 1 Procedure calculate trust;
Step 2 If (Node_Invoked i == "Trusted_Behaviour") Then
Step 3 If (I ∈ Then Trust_Value = +ve;
Step 4 Begin
Step 5 Call Register_Node
Step 6 Store_value := i(+ve);
Step 7 End
Step 8 Else Trust_Value i = -ve;
Step 9 Begin
Step 10 Call initial_invocation
Step 11 End
  
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Fig 1: Structure of Algorithm CEERA

In this paper, we propose an algorithm technique – which is CEERA is based on weightage value and minimized the flooding strategies. A relative study of the above declared Clustering algorithms lead to the observation that the show of Improved Weighted Clustering algorithm (EWCA) is the best. Conversely, EWCA does not reflect neighbour Cluster heads for Cluster head election procedure it is emphasis that clustering maintenance and formation at low cost the resources. That reduce the routing overhead and efficient use of resources. The rest of this paper is organized as follows. Section 3 reviews some related work; Section 4 gives a simulation environment; Section 4 gives a results; we conclude with Section 5.

III. Related work

In this section, we give a brief discussion of work related to clustering in Mobile Ad-hoc Network. ZANG Chunhua et al. in their paper proposed a new protocol called KHPCBRP (K Hop Passive Clustering Based Routing Protocol) on the basis of CBRP in which the routing request packets (RREQ) is used to complete the Cluster formation and the Prepared Cluster Head (PCH) is used for reducing re-Clustering overhead.

V. Sathiya Priya et al. in their paper developed a loose-virtual-clustering-based (LVC) expelling rule for power heterogeneous MANETs, i.e., LEPH. They developed routing schemes to optimize packet forwarding by avoiding data packet forwarding through high-power nodes.

Haidar Safa et al. in their paper have designed and implemented a dynamic energy efficient Clustering algorithm that increases the network lifetime. They proposed a model that elects first the nodes that have a higher energy and less mobility as Cluster-heads, then

periodically monitors the Cluster-heads energy and locally alters the Clusters to reduce the energy consumption of the suffering Cluster-heads.

Nocetti, F. G et al. describe the advances in dynamic street lighting introduce new functionality for control and maintenance of the street lighting infrastructure. Vital elements in this infrastructure are the powerful controlling devices that control separate groups of light poles and collect information from the system.

IV. Simulation Environment and Research Methodology

Extensive research work has been done on the performance evaluation of routing protocols using NS2 network simulator. It simulates the network graphically and its graphical editors mirror the structure of actual networks and network components. The users can design the network model visually. The modeller uses object-oriented modelling approach. The nodes and protocols are modelled as classes with inheritance and specialization. Different methods and simulation environments give different results for clustering in MANET routing protocols performance. The main problems which came into lime light while implementing the paper are following:

- Battery Drainage of Cluster heads.
- Data drop during the communication.
- Lower Stability of the network due to dynamic allocation of Cluster Heads.
- The movement of nodes out of boundary of Cluster head and declare itself as Cluster head

All problems are handled by Clustering based energy efficient algorithm, Broadcasting range and formation of clustering. The proposed CEERA algorithm pay attention toward the clustering head formation and avoid re-election of clustering head (CH) keeps it's alive. Clustering head formation will have done by the weightage value of the nodes.

A. Clustering Based Energy Efficient Routing Algorithm (CEERA):

Calculation of the Energy efficient clustering Algorithm is based on Weightage of cluster head. This technique is implemented as per Weightage rules so this is known as weightage based Energy Efficient Clustering Based Algorithm. This is an enhancement of predictable CBA. In this protocol, the weight of each node is measured as metric for Clustering head selection. Weightage of each node can be calculated as:

- 1). Calculate the weightage of each node where j is weightage value of nodes $j = \text{higher battery strength of node} + \text{less mobility of clustering nodes}$.
- 2). Calculate the node-weight as the least of all node weights included in clustering.
- 3). To select the clustering head the one having the maximum weightage value.

B. Selection Technique's for Cluster head:

In CEERA, Energy consumption and network life time carried out simulations on ns2 simulator. It allows the users to design and study communication networks, devices, protocols, and applications with flexibility and scalability.

Table 1. Parameters for simulation

Parameters	Values
Area	1200 * 700 meter
No of Node	32
Simulation Duration	1000s
Physical/Mac layer	IEEE 802.11 at 2Mbps
Data packet size	500 bytes
Initial energy per node	3 Joules
Data Rate	2.0
Propagation medium	Omni Antenna
Simulation Time	15 Minutes
Transmit Power	0.05
Mobility	Constant bit-rate, random waypoint model with no pause time

V. RESULTS ANALYSIS

The results show differences in performance between considered routing protocols, which are the consequence of various mechanisms on which protocols are based. We carried out our simulations with 32 nodes [22]. I have implemented this model in ns2. Ns2 is a discrete event simulator written in C++ and OTcl [12].

5.1 Selection Procedure for Cluster Head

In figure 7, Clustering Based Energy Efficient Routing Algorithm (CEERA) set the range of Cluster head when they require to increase the energy and signal of selected nodes.

Check the possibility of range of nodes then increase the range from current value R to R+ΔR.

Step 1: Scenario of Terminal to run the Ns2

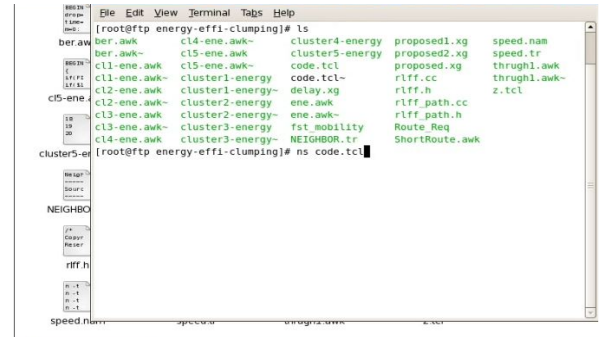


Figure 2: Terminal of Ns2 for cluster

When the node is selected, then check the previous range value of energy and signal of nodes. For efficient clustering head formation in which clustering head based on energy and signal values. When network node is selected then set the range. If network value is decreased, then again set the range value.

Step 2: Scenario of calculated weightage of all nodes

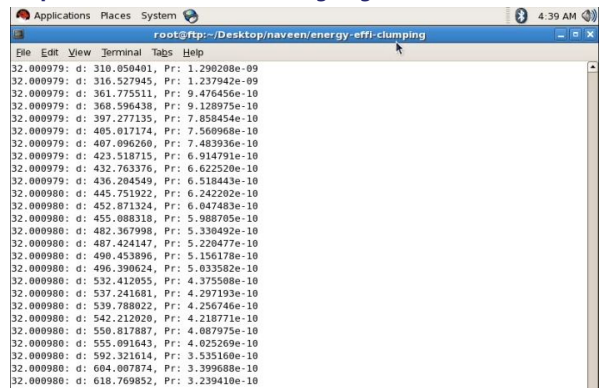


Figure 3: Calculate the weightage value of node 32.

Step 3: Scenario of formation of cluster head.

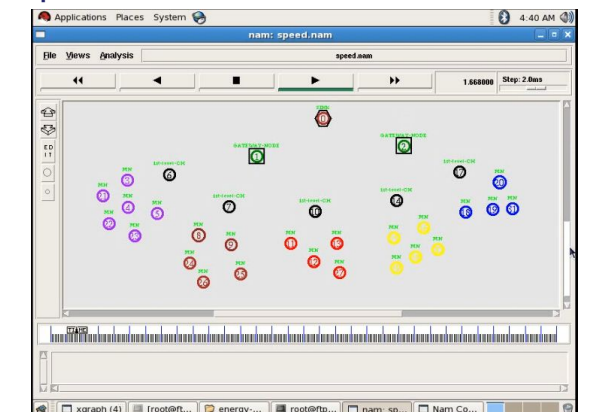


Figure 4: Represents the formation of cluster head and assign member nodes.

Step 4: Scenario of CEERA for neighbour detection of Clustering Head.

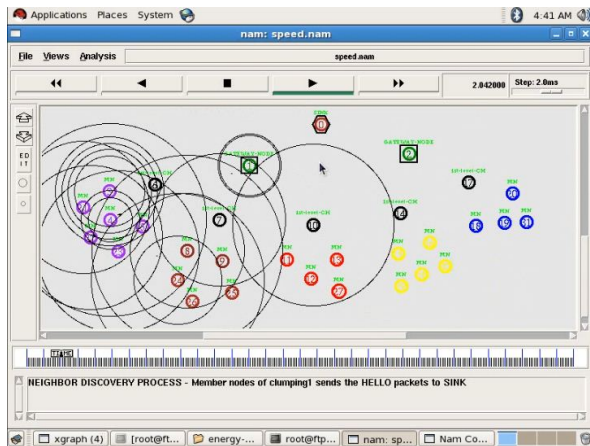


Figure 5: Neighbor Discovery Process of clustering head 1.



Figure 6: collection of data from cluster head and forward it to base station

Step 5: Scenario of election of Clustering Head to forward data when intermediate nodes runs out of energy.

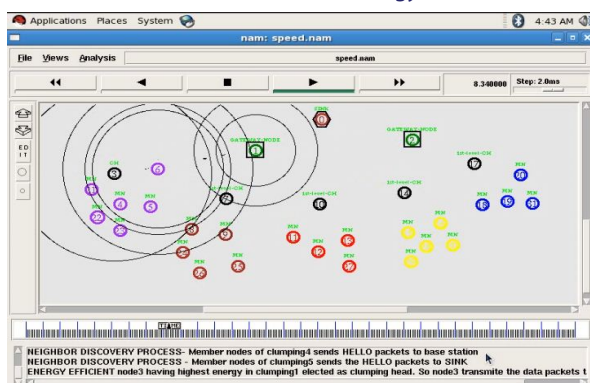


Figure 7: Re-election of Clustering head 3 using Energy Efficient Techniques.

When the signal level is increased as well as energy level is also increased. Select the highest value of nodes and assign the clustering head. While assigning the clustering head in clustering formation then network life is increased.

VI. CONCLUSION

In this paper, we have presented an investigational study on

weighted based clustering algorithm for routing protocols in MANETs and related different methodologies. Finally, we conclude that strut Clustering Based Energy Efficient Routing Algorithm (CEERA) protocol approach has long life time then the existing energy efficient clustering due to the less power consumption of the head node. We conclude that Efficient Clustering Based Algorithm in which highest weight node and create cluster head node in clustering network. Finally, through the adjustment of range, Check the possibility of range of nodes then increase the range from current value for base station in each logical cluster. Select the highest value of nodes and assign the clustering head. While assigning the clustering head in clustering formation then network life is increased. Its emphasis on the clustering maintenance and formation at low mobility rate and Efficient Energy Clustering. The main motive of this paper is to keep alive the head node and avoid re-election of clustering head

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