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IMPROVING THE TRANSMISSION PERFORMANCE BASED ON MINIMIZING ENERGY IN MOBILE ADHOC NETWORKS

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Abstract
Networking is collectively no of mobile nodes allocate users to correctly detect a distant environment. These wireless mobile networks want strong but simple, scalable, energy efficient and also self organize routing algorithms. In Mobile technology small quantity of power electronics and less power radio frequency have permit the expansion of small, comparatively economical and less power nodes, are associated in a wireless mobile networkIn this study we proposed method are: energy effectiveness, energetic occurrence zone and multiple hop TRANSMIT, taking into concern between the energy of transmit nodes and distance from the transmit node to the trusted neighbor node, link weight energy utilization and distance are measured as most important constraint for decide on greatest possible path from Zone Head (ZH) to the neighbor node. In this we use the different constraints and lessen the quantity of distribution messages during the Transmit node choice point to decrease the energy utilization of the complete network.

Keywords:
Residual Energy, Routing Algorithms, Zone Head Function, Energy Consumption, Node Selection

1. INTRODUCTION

In Mobile technology small quantity of power electronics and less power radio frequency have permit the expansion of small, comparatively economical and less power nodes, are associated in a wireless mobile network. In structure of energy consumption, three are some essential circumstance of a node can be recognized: intellect, data procedure and data interactions. Data communication, use great quantity of energy while transmitting or receiving packets. Diminish the number of exchanges by eliminate or collective redundant data will certainly save a huge quantity of energy, which finally leads to the network long life. Routing protocol for mobile adhoc network is extremely complicated because it should be simple, scalable, energy utilization and robust to operation with a very huge number of nodes with their constraint and also to be self-reconfigure to node collapse and adjust of the network topology. Simple type of routing protocol is flat-based. In a flat topology, each node performing the same task and has the identical task as additional mobile nodes in the system. The single gateway structure is not robust for a bigger set of mobile nodes to wrap up wider area of network. To allow the structure to deal with additional weight and to be capable to cover a huge area without corrupting the service, networking zoning has been function in a number of routing approaches. This kind of routing algorithms partition nodes into zones. High energy nodes can be used to process and send the information while little energy nodes can be used to absolute the identifying the target. This way that pattern of zones and assigning extraordinary tasks to Zone Head (ZH) to be a great amount contribute to on the whole system scalability, life span and energy effectiveness. In zone-based, the ZH nodes lessen data incoming from nodes that belong to the individual ZONE and send a total packet to the trusted neighbor. Zone-based routing method is a well ordered way to lesser energy consumption surrounded by a zone and by performing data aggregation and to reduce the number of transmitted messages to the trusted neighbor. Due to this uniqueness, ZONE-based routing explanation is recognized procedure with particular advantages allied to scalability and well-organized interactions. zone approach is also essentially two-layer routing, anywhere one layer is used to select ZH and the other layer is use for broadcast directly to the neighbor node (one-hop) or decide on for a sequence of Transmit nodes from ZH to TND (multiple-hops).

2. RELATED WORK

LEACH (Fan and Song, 2007) is one of the zone based protocols. The method of LEACH has been inspiration for many other routing protocols, especially Multi-hop LEACH or M-LEACH [6] (Heinzelman et al., 2002). AODVMPR (Arvind and Sharma, 2013) is Ad hoc On Demand Distance Vector Multipoint TRANSMIT Routing Protocol (AODVMPR). AODVMPR is used to overcome the issue of energy and the looping problem in a single routing protocol. This protocol helps to improve the traffic on the network. We use AODV and in AODV we use MPR which reduce the flooding of control message. In multipoint TRANSMIT each node has computed a multipoint TRANSMIT set. If any node which is not in the multipoint TRANSMIT set than this node cannot broadcast the packet. [9] Zhu and Wang (2011) propose a more precise logical model to track the energy consumption due to various reasons and a simple energy-efficient routing scheme PEER to improve the performance during path discovery and in mobility scenarios. PEER protocol can reduce up to 2/3 path discovery overhead and delay and 50% transmission energy consumption. [7]Kang et al. (2012) PEAODV routing protocol adapts the continuous mobility by reflecting the position and energy of nodes improve the safety of route and extends the node life by making the balanced energy consumption considering residual energy of nodes. [2] Chang and Tassiulas (2000) Flow Augmentation Routing protocol (FAR) using the graph optimization algorithm include node cost in the link cost, data generation nodes of all the nodes to improve the energy efficiency. [8] Li et al. (2001) Online Max Min routing (OMM) says select the max-min path among a number of best min power paths [4](Doshi and Brown, 2002) Minimum Energy Routing (MER) tells adjust the transmission power just enough to reach the next hop node in the given routing path [3] (Chen et al., 2010) tells that Power control in wireless sensor network based on nearest neighbor algorithm.

3. PROPOSED METHOD 1

The function of anticipated method is fragment into rounds and every round has two phases one for structure zones and decide on ZH and transmit node selection. Structure ZONES and electing ZH methods. When an occurrence is notice in the network, nodes near to the occurrence become construct an energetic. Individuals nodes transmit REQ_ZONE message (containing the node ID Ni, the quantity of enduring energy Reng(i) and expressive information of the data D(i) to their neighbors. meant for the duration of a time Ti each node receives REQ_ZONE messages from all the other nodes and implement the Zone Head function. After Ti the node that has the greatest function sets itself as ZH and this ZH accumulate the node ID of every one of nodes, then form a TDMA allocate for each node a time slot. The every one of non-ZH nodes can this time slot for broadcast their intellect data to the Trusted Neighbor Node (TND), in order to categorize to avoid the conflict on data transmission. The ZH accept data from all other nodes, collect and aggregates it and then will select transmit nodes to form a route to the TND. Transmit node choice and construct a route: Initially, the ZH transmit a REQ_TRANSMIT message to all nodes surrounded by its range. Each transmit node that collect this message compute its remaining energy Reng(i)and their location, place the outcome hooked in to an ACK_TRANSMIT messages and sends reverse to the ZH. After in receipt of the ACK_TRANSMIT from every one of nodes, the ZH calculates the distance from this node to ZH and the TND, then calculate maximum Transmit node function:

$$F_{TN}(K)=\frac{R_{erg}(K)di(ZH,K)COS_{\alpha}\forall_{K}\in sp}{di(K,TND)} \quad (1)$$

$$MAXF_{TN}(K)\rightarrow\forall_{K}\in sp\text{ transmit node} \quad (2)$$

where, *SP* stand for a group of candidates for evaluate the Transmit node, node surrounded by the radio frequency of *ZH*. *K* stand for transmit node. The node that has the greatest value of Transmit node function is chosen as Transmit node. In the next hop, the Transmit node in turn serve up as to find the next Transmit node and this process is continual until reaching the TND. According to this function, the preferred Transmit node should accept the following features: The Transmit node should have logically large quantity of residual energy Reng (*K*). In other words, the node with little residual energy (compared to other nodes) cannot be chosen as Transmit node. By using this method, the energy utilization of the entire network will be uniformly spread and this can lead to the excellent load balance.

The Transmit node should be located reasonably near the TND and comparatively far the *ZH*. The formula d (*ZH*,*K*)/*d*(*K*,*TND*) used to find the Transmit node that will be closer to the Trusted Neighbor Node (*TND*).The multi-hop path to be approximately straight away between the *ZH* and the *TND*, comparatively great cos αK while α is the angle connecting between *ZH*, node *K* and *TND*. The issue of *cosak* used to select a straight and short path towards the *TND*. This methods is to get the finest possible path to the *TND*, but in this method has two main limitations: First, every point the *ZH* look for its Transmit node depends on Transmit Node function, it have to send REQ_TRANSMIT message to each and every one nodes within its range and all the nodes have to put residual energy and distance to the ACK_TRANSMIT messages and send reverse to the *ZH*. This practice has to be repeated until getting the *TND*. In a more mobile nodes with thousands nodes, the best possible route is many-hop and leads to the huge number of control messages (REQ_TRANSMIT and ACK_TRANSMIT). If the αK is greater than $\Pi/2$ or $cos\alpha_K<0$, node *K* is excessively far away from the *TND* and cannot be chosen as the Transmit node. It tells that node K does not require to resend the ACK_TRANSMIT message. The ACK_TRANSMIT message is only significant when $cos\alpha_K>0$. This announcement is particularly significant because it can assist to lessen the number of ACK_TRANSMIT messages. Second, found on Eq.(1), the node that has comparatively huge residual energy, relative minute distance to the *TND* and comparative far distance to the *ZH*, relatively small angle value to the *TND* will be preferred as Transmit node. More accessible, three issues of Transmit-node function helps to find a straight and short path with nodes that have additional energy. That is why this function also helps to sense of balance the node's energy utilization of the complete network. The result of these three factors is used for transmit node function. When the *ZH* and its Transmit candidates are situated far from the TND and when the node's energy is large enough, the difference of two factors *d*(*ZH*,*K*)/*d*(*K*,*TND*) and *cosαK* of TRANSMIT candidates is relative large. The large differences of these two issues lead to the strong control of distance and angle value into the Transmit node function and also lead to the accurate selection of a short and straight path towards the *TND*. When move toward to the *TND* and when the node's energy is irrelevant, the angle value and distance of Transmit candidates are estimated while their energy still differ. Thus the TRANSMIT_node selection stage will have a partiality only the node that has more residual energy and does not give reflection at the distance and angle value. In this the path will become un straight with a series of nodes that have extra residual energy and this un straight path will lead to the waste of power utilization. From these factors, we believe that it is very important to maintain a balanced consequence of three factors (distance, angle value and energy) in TRANSMIT_node function in order to attain energy efficiency, particularly in case node's energy is insignificant. These two weaknesses of the main design features of our proposed method. Based on two weakness of proposed method, we proposed a new design features.

4. PROPOSED METHOD 2

Decrease the number of ACK_TRANSMIT messages and thus, create extended the lifetime of the whole network. Using new TRANSMIT node function in order to balance the consequence of three features are distance, energy and angle value. Approximating to future design, this operation is fragment into rounds, each round has two stages:

1) The initial stage is to create a structure zones for discover *ZH* and related to this one of earlier method
2) The next stage will be to some amount of different from this one and works as follows

Primarily, the *ZH* broadcasts EQUEST-TRANSMIT message: REQUEST TRANSMIT {IDZH, d(ZH, TND), flag) that take account of the ZH identification, IDZH, the distance d(ZH,TND) from ZH to the TND. The final parameter flag is the acknowledgement message has need of code with the default value 0. All the nodes that receive the REQUEST_TRANSMIT message will determine the $cos\alpha_K$ with α_K is the angle value between the ZH, node K and the TND. The $cos\alpha_K$ is calculated as follows:

$$Cos\alpha_K = \frac{di(zh,K)+di(ZH,TND)-di(K,TND)}{2di(ZH,K)di(ZH,TND)} \quad (3)$$

While the value of flag is 0, only the node that has the value $cos\alpha_K>0$ or α_K is a lesser quantity of $\Pi/2$ needs to respond by sending ACK-TRANSMIT message. This will reduce the sum of control message extensively, hence make longer the lifetime of the network. If there are no node that has the value $cos\alpha_K>0$, after the time period, the *ZH* resends the REQUEST_TRANSMIT Message with the new flag value (flag = 1). In this method, all the node that accumulate the REQUEST_TRANSMIT message have to reply the *ZH* by transfer the ACK_TRANSMIT message.

In both cases (Flag is 0 or 1), after in receipt of these ACK_TRANSMIT messages, the *ZH* decide the TRANSMIT_Node function:

$$F_{TN}(K) = \frac{\sin\alpha_k + di(k,TND)+1}{di(ZH,K)WR_{eng}(k)}$$

$$\text{Min}\, F_{TN}(K) \rightarrow \forall_K \in sp \text{ transmit node} \quad (4)$$

The node with minimum TRANSMIT_Node function is chosen as the TRANSMIT node. The importance of TRANSMIT_Node function in this case is the estimated cost of the path from *ZH* towards the *TND* passing the in-between node K. The node that have possession of the minimum value cost is chosen as TRANSMIT node. More definite, in order to improve the difficulty of method, a weight W is used for adjust the significance of residual energy on TRANSMIT_Node function.

5. POWER SAVING DATA GATHERING ALGORITHM

Life time optimized power saving data gathering algorithms: In this the residual energy and minimum hops of neighbor nodes are taken into account. We are using link weight function Ratio Weight Gathering Algorithm (RWGA). in this *i* stand for the node, K stand for the transmit node, EC stand for the energy consumption, di represents the distances, SP symbolize the set of nodes. where *x*, *y*, *z* and *r* are the positive constraint and called link energy expenditure, residual energy factor of transmission node, residual energy of receiving node, hope factor independently:

$$W_{iK} = [ECiK(TD,diK)]^X [1/\text{Re}(K)]^Y [1/\text{Re}(K)]^Z [\text{Hop}(i,K)]^r \quad (5)$$

In this they assume that given parameters:

- Sink node and other nodes are fixed with fixed location moreover; sink node has the topology information of complete network
- Regular nodes have same performance on preliminary energy, energy utilization parameters, radio communication power and communication radius
- Regular nodes have similar energy model
- Sink node collect data on a regular basis and ordinary nodes transmit data to sink node directly or multi-hop way
- Each regular nodes energy is restricted and sink nodes energy is not restricted

Data gathering algorithms are implemented in sink node. Once the set of connections starts, sink node begins to collect the data. Sink node transmit information query packets to other nodes. When nodes receive the packets from sink node. They record the no of hops from neighbor node to sink node. Node transmit the information to sink node have location, residual energy, quantity of transmission data. Sink node receives the information. RWGA start to calculate the best possible data gathering path to each node, sink node sends the information to same best possible gathering path. After positive time interval sink node transmit the certain query packets, update the certain topology information and determine the optimal path again. When sink node knows the all the location of all nodes and information and finished information query it will get the residual energy of all nodes.Initialization phase sink node collects the information such as location and residual energy quantity of transmission data and minimum hops.

While $(\text{Re}(K) > 0, i \in SP)$

- All w_{iK} are calculated according to formula
- Disjakra algorithm is used to construct the shortest path
- Each mobile node transmit the data to sink node along its shortest path
- $\text{Re}(K) = \text{Re}(K) - \sum K_{=N(i)CIJ(K,diK),i} \in SP$

6. PERFORMANCE EVALUATION

The Fig.1 shows the energy consumption per delivered packet in connection 30. Here, x-axis shows the cut-time in seconds and y-axis represents energy in Joule multiplied by a factor of 100 per packet. Speed is 30 m sec.

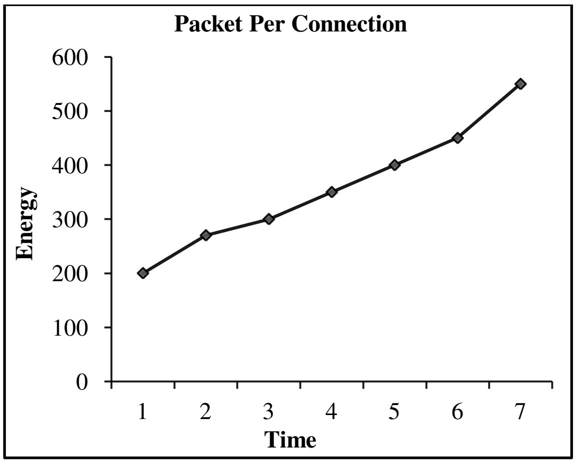

Fig.1. Packet per connection

The Fig.2 shows the energy consumption per hop in connection 30. Here, x-axis shows the cut-time in seconds and y-axis represents energy in Joule multiplied by a factor of 100 per hop. Speed is 30 m sec.

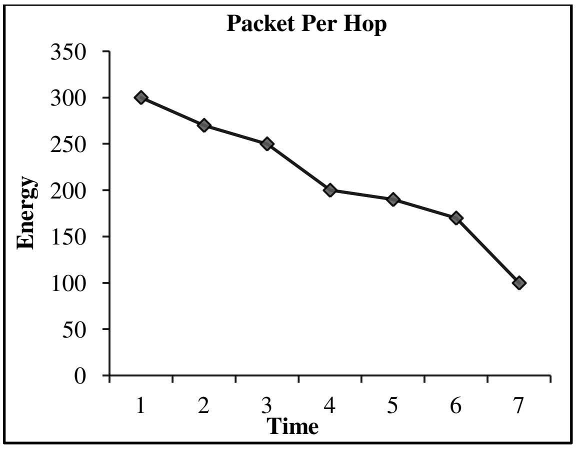

Fig.2. Packet per hop

The Fig.3 shows the throughput and network-lifetime providing the number of delivered packets with energy 250 J for connection 30. Here, x-axis shows the cut-time in seconds and y-axis represents number of delivered packets divided by a factor of 1000.

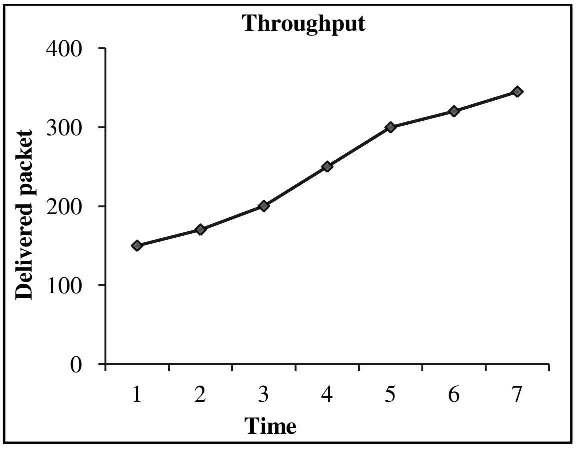

Fig.3. Throughput

7. CONCLUSION

In this study, we propose a new design for mobile adhoc network that is based on the energy efficiency but uses a new TRANSMIT Node function and Life time optimized power saving data gathering algorithm decrease the number of broadcasting messages. These main design features of the methods help to get better the energy consumption, thus extend the lifetime of the whole network and achieve better packet loss rate. difficulty of the first method is its load unbalance compared to the second design. In the future work, we uses the multiple path from ZH to trusted neighbor and also calculate the route errors, localization errors from ZH to trusted neighbor.

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