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A BPN Based Parameterized Prediction Methodology in MANETs

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Abstract: In recent days, the usage of wireless networks is huge in all the environments. But the developments of routing protocols for wireless networks are not saturated till date. Even though researchers are having more number of routing protocols, the end user is not satisfied in all the solutions. The research directions where user's satisfaction lies in battery life optimization power during heavy data transfer and delay due to the dynamics on the environment. In this study, researchers propose a solution for maintaining the battery life of the node using parameters such as initial energy, transmission power and reception power. The parameters are combined with a back propagation methodology. The proposed solution may be applicable for all the protocols independent of their usage.

Key words: Back propagation, energy, optimization, reception, transmission, intelligence

INTRODUCTION

Data transfer is the acronym for networks. It's independent of environment where the data transfer is happening through wired or wireless mediums. Especially, on the interest and people's choice leads to wireless networks for mentioned purpose. Unsaturated research is running in the field of wireless networks globally. Though, researchers are having more commercial versions of the wireless protocols in MANETs; the end users experience is not feeling well. Because if a routing protocol is developed by concentrating on data transfer rate, the node will down faster. Otherwise, if researchers keep their eye on security, transfer rate fails down. Likewise the parameters performance measures used for determining the life time of a node in and such an environment is tedious. And also, the parameters are completely dependent to each other. So, manipulation of those parameters will give us more variation instead of that researchers can predict the behavior of such parameters using statistics.

LITERATURE REVIEW

The research on energy efficient AODV protocol proposed a selection mechanism and battery life management. The disadvantage in the mentioned research is lesser preservation of nodes battery capacity. The thesis on intelligent caching in on demand routing protocol for MANETs (Sara *et al*., 2009) is discussing about usage of cache memory in every nodes intelligently. Relevant to the discussion, the unnecessary maintenance of routing information in cache memory leads to the wastage of memory. The concept on energy efficient location aided routing protocol for wireless MANETs (Shobha and Rajanikanth, 2009) is illustrating about the maintenance of position table for tracking the node mobility. In turn the maintenance of routing table combined with position table leads to more consideration of energy. The entry on an effective location based power conservation scheme for MANETs (Mikki, 2009) maintaining the average distance after first hope neighbors as a metric for discovery. The thesis clearly showed that the node needs to calculate average distance frequently which leads to loss of energy. The theory on secure route discovery for dynamic source routing in MANETs (Kaabneh *et al*., 2009) revealing the power of authentication using digital signatures for secured transfer demonstrated its effectiveness. When the key size is small and for large entities the repeated calculations for authentication leads to energy dissipation.

DATA TRANSFER SELECTION MECHANISM

The problem statement that researchers are concentrating on this study is preserving the battery life. Probably on heavy data transfer, the life of the battery will go down. The solution, researchers stress here is to stream line the data transfers so that battery life can be sustain the process of streamlining can be done through maximum and minimum limits for data transfer. Mainly the initial energy of node, transmission and reception power used for sending and receiving data will decide the life of the battery.

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Using these three parameters, researchers can fix up the maximum and minimum limit of data transfer rate. In a dynamic wireless MANET, researchers can get the statistics of all the above parameters easily. By creating a table of statistics for these parameters, researchers can predict the behavior of any node in the wireless MANET environment and by taking a line from neural networks turned to be a Back Propagation algorithm can be used to train the network using the mentioned parameters.

Algorithm:

Step 1: Get the value of initial energy.
Step 2: Trace the values of transmission power and reception power.
Step 3: Repeat step 1 and 2 to create statistics.
Step 4: Initialize the weight matrix with least positive value and provide the value for learning parameters.
Step 5: Get a statistical profile from step 3.
Step 6: Frame the parameters using the function f(E, t_p, r_p) here 'f' means Sigmoid.
Step 7: Perform multiplication for step 4 with step 6.
Step 8: Pass the output values of step 7 into an inverse activation function:

$$f(x)=\tan^{-1}(h(x))f(x)=\tan^{-1}(h(x))$$

Step 9: Repeat step 4-8 for thousand times with a regular interval of hundred times.
Step 10: Generate the values for minimum and maximum data transfer.

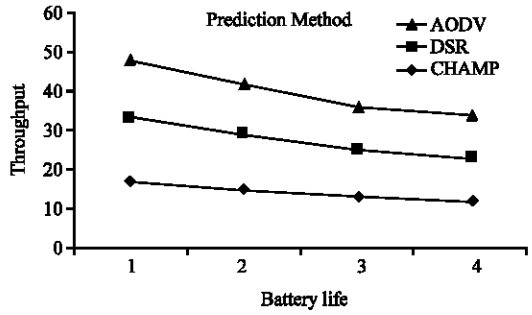

Fig. 1: Performance comparison: Normal Method

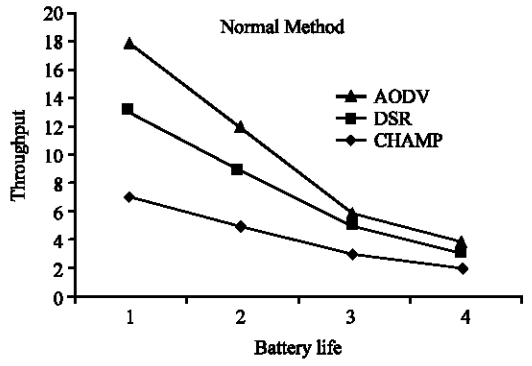

Fig. 2: Performance comparison: Prediction Method

EXPERIMENTAL ANALYSIS

Using ns-2 simulator, the entire simulation is performed. Back Propagation algorithm is implemented in C-language. Scripts are used to combine the feature of back propagation with the simulation environment. Fifty wireless nodes are generated. AODV, DSR and CHAMP are the protocols considered for simulation purpose. The size of the area is 720×640. Mobility Model is chosen as random waypoint. The speed of the node varies from 1-30 m sec^{-1}. Figure 1 illustrates that CHAMP performances well compared to other protocol when there is no prediction for battery life.

Figure 2 illustrates that CHAMP performances well compared to other protocol when prediction is included for battery life. Also, AODV and DSR performance is quite well compared with the module without prediction.

CONCLUSION

This study entirely concentrating an intelligence which needs to work for the maintenance of battery life of a node. Using the parameters such as initial energy, transmission and reception power of the node is considered for prediction. On testing with various MANET protocols under research have given various levels of improvement in the maintenance of battery life. Throughput is the metric, researchers have considered for evaluating the research work. On taking to further research directions, neural network can be replaced with fuzzy logic, artificial intelligence, Markov's rule and Genetic algorithms. And also, new parameters are needed to be invented for further improvement.

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