International Journal of Engineering Research and General Science Volume 3, Issue 4, July-August, 2015
ISSN 2091-2730

Energy Based Selection For Position Update in MANETs

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Abstract— In this paper work we propose a position update method that uses geographical coordinate to update the location of node and unknown node problem for the effective data transmission and communication in Wireless Network. In this approach, adaptive location update approach for topographical routing which dynamically sets the occurrence of location update information based on the mobility dynamics and the furthering outlines of the nodes in the network.

In this the relevancy of the proposed approach; the results are compared with the results of one of the better existing approach. Adaptive position update based on On-demand learning (ODL) and mobility prediction (MP) to reduce the power consumption.The proposed approach is implemented using MATLAB R2009b. The results are explained by finding out all the retrieved relevant information by estimating the stability and usability.

Keywords— Adaptive Position Update, Periodic beaconing, Mobility Prediction, On-Demand Learning, Mobile Ad-Hoc Network (MANET), Wireless Ad-Hoc Network (WAN), Graphical User Interface (GUI).

1. INTRODUCTION

With the progress on the semiconductor technology, wireless sensors' capabilities of computation, storage may not be limitations in future. However, how to consume energy efficiently is still one of the most challenging problems in wireless ad-hoc networks (WAN) researches.

The main goals of the research presented in this paper are to:

- Prolong the network lifetime of WAN to deliver more packets;
- Balance the energy consumption of nodes and achieve energy conservation;

In geographic routing, nodes need to maintain up-to-date positions of their immediate neighbors for making effective forwarding decisions. Periodic broadcasting of beacon packets that contain the geographic location coordinates of the nodes is a popular method used by most geographic routing protocols to maintain neighbor positions. We contend that periodic beaconing regardless of network mobility and traffic pattern does not make optimal utilization of the wireless medium and node energy. For example, if the beacon interval is too small compared to the rate at which a node changes its current position, periodic beaconing will create many redundant position updates. Similarly, when only a few nodes in a large network are involved in data forwarding, resources spent by all other nodes in maintaining their neighbor positions are greatly wasted.

1.1 Objective

The main objective of this work is to introduce an Adaptive Location Update in Wireless Sensor communication; it provides the meaningful information or geographical location about the node in network as well as with the information about the unknown node for better transmission of data. In this approach, the Adaptive Location Update strategy for geographic routing, which dynamically adjusts the frequency of position updates, based on the mobility dynamics of the nodes and the forwarding patterns in the network with the Unknown node problem resolution when it exist to increase the efficiency of this method. When an unknown node problem exist, in our approach we select the best node for the route discovery or data transmission and three dimensional criteria in the given network to increase the efficiency of existing approach based on adaptive position in wireless network.

1.2 Contributions

Adaptive Location Update in mobile Ad-hoc network provides the current position of nodes in network for better and effective transmission of data and information. Some methods are based on On-demand learning about the position and some are based on frequently learning. In this proposed work, an approach for the Adaptive Location Update strategy for geographic routing, which dynamically adjusts the frequency of position updates based on the mobility dynamics of the nodes and the forwarding patterns in the network with the Unknown node problem resolution when it exist to increase the efficiency of this method by introducing the phenomenon of selecting node from exist ones or unknown node and expand the existing approach with three dimensional.

2. PROPOSED METHODOLOGY

2.1 Problem Formulation

The motivation behind Q. Chen [11] concept was that the Adaptive Position Update strategy to address location problems. The APU scheme employs two mutually exclusive rules. The MP rule usage mobility estimate for evaluating the accuracy of the position estimation and adapts the beacon updating intermission consequently, in its place of usage periodic beaconing. The ODL rule permits nodes beside the data sending paths to preserve a correct observation of the local topology using replacing beacons in answered to data packets that are overheard from new neighbors. This method's result specified that the APU approach produces few same quantity of beacon above as further beaconing patterns then completes improved packet sending ratio, average end-to-end delay and energy consumption.

In this approach author did not focus on the unknown node problem, if it exist then there is no criteria defined to select which node take part in the transmission route, existing node or unknown node.

So, we propose an approach that updates the location of node and unknown node problem for the effective data transmission and communication in wireless network. In this approach, adaptive location update approach for topographical routing which dynamically sets the occurrence of location update information based on the mobility dynamics and the furthering outlines of the nodes in the network. Here the unknown node is the node previously which is not in the active network but now it is ready to take part in the transmitted network.

Suppose U is the unknown node and E is the existing node and U_p and E_p are the initial power of node respectively. In mobile ad-hoc network (MANET) we consider a node as a dead node if it has less than 20% of its initial power. So, to increase the effectiveness of the network we consider the best node. To identify the best node we assume three scenarios.

1st Scenario:
The node which has more than 20% power of its initial power is considered best node.
If U_{pc}> 20% of U_p (here U_{pc} and U_p is the current power and initial power of unknown node) is consider a best node.

2nd Scenario:
If both nodes have the less than 20% of its initial power; in this case we focus the stability issues (the node which has more stable comparative to other node) i.e. in this case existing node E is the best node for transmission.

3rd Scenario:
If both nodes have the more power of its initial power then we consider the maximum power node.
If U_{pc}> 27 % of U_p and E_{pc}> 25 % of E_p then we consider the U node for further transmission.

3. RESULTS AND DISCUSSION

3.1 Performance Measures:

For calculating stability of the proposed approach, existence of node is estimated in certain circumstances and is used for the evaluation of results. We estimate the stability of node when both existing node and unknown node have the power less than 20% of their initial power.

If U_{cp} < 20% U_p and E_{cp} < 20% E_p
Here, U_{cp} and E_{cp} are the current power of unknown and existing node respectively
And U_p and E_p are the initial power of unknown node and existing node respectively

Then we estimate the stability of node, which has the maximum stability in the network, is consider for further transmission. Obviously, existing node has the maximum time duration in the network so we consider the existing node in this case.
The usability is essential as it helps in determining how probable an unknown node is used for further transmission in the network. And usability helps in increasing the overall life of the network.

3.2 Quantitative Result Analysis:

For quantitative result, the proposed approach is tested on four scenarios and two parameters are used for this: usability and stability.
For performance comparison, the result of proposed work is compared with existing work based on APU. The results explain that the proposed work helps in increasing the overall life of the network. Therefore the proposed work has higher usability and stability than

International Journal of Engineering Research and General Science Volume 3, Issue 4, July-August, 2015
ISSN 2091-2730

the existing work. The comparison of the Adaptive Position Update routing based on ODL and prediction rule and proposed work on the basis of usability and stability is depicted in table 3.1

Table 3.1 Performance Comparison of Adaptive Position Update and proposed work on the basis of usability.

Scenarios	APU	Proposed
U_p>20% and E_p<20%	Existing node used	Unknown node used
U_p<20% and E_p>20%	Existing node used	Existing node used
U_p>20% and E_p>20%	Existing node used	Depend which node has the maximum power
U_p<20% and E_p<20%	Existing node used	Existing node used

It can be clearly seen from the table 3.1 that proposed work increases the usability of node. The value of usability is greater than the existing approach. It may be possible that the value of usability is equal to the existing approach when unknown node has the less power

3.3 Snapshots of Results in GUI Implementation:

In this section the snapshots of GUI are presented which gives the result of whole process as well as summarizes the implementation aspect of the proposed approach.
The snapshots of GUI in step-wise manner are shown below:

Initial window at start of execution
Figure 3.1 depicts the initial window at the start of execution

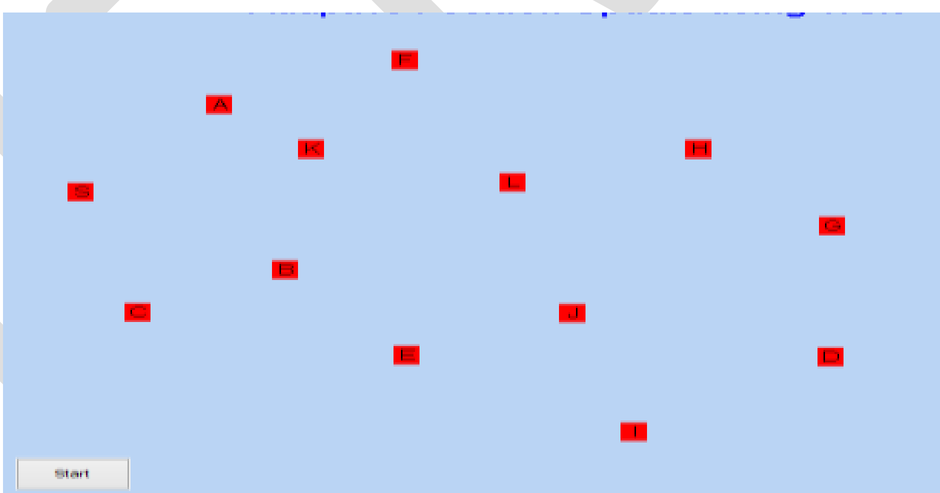

Figure 3.1: A snapshot of initial window

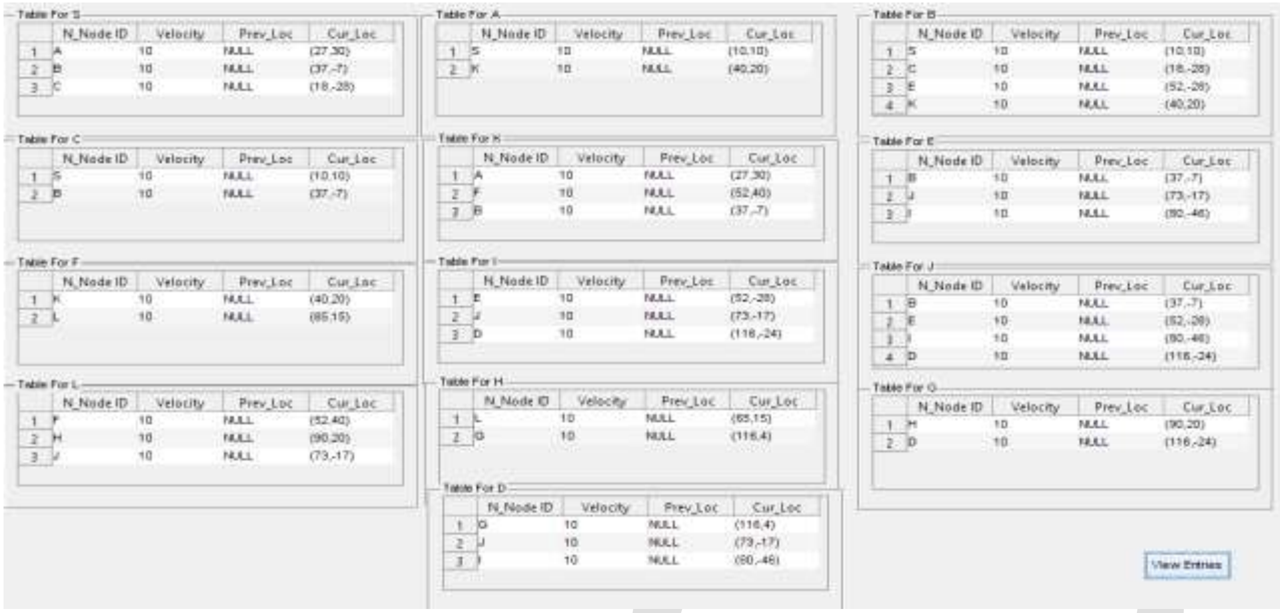

Table For S

	N_Node ID	Velocity	Prev_Loc	Cur_Loc
1	A	10	NULL	(27,30)
2	B	10	NULL	(37,-7)
3	C	10	NULL	(18,-28)

Table For A

	N_Node ID	Velocity	Prev_Loc	Cur_Loc
1	S	10	NULL	(10,10)
2	K	10	NULL	(40,20)

Table For B

	N_Node ID	Velocity	Prev_Loc	Cur_Loc
1	S	10	NULL	(10,10)
2	C	10	NULL	(18,-28)
3	E	10	NULL	(52,-28)
4	K	10	NULL	(40,20)

Table For C

	N_Node ID	Velocity	Prev_Loc	Cur_Loc
1	S	10	NULL	(10,10)
2	B	10	NULL	(37,-7)

Table For K

	N_Node ID	Velocity	Prev_Loc	Cur_Loc
1	A	10	NULL	(27,30)
2	F	10	NULL	(52,40)
3	B	10	NULL	(37,-7)

Table For E

	N_Node ID	Velocity	Prev_Loc	Cur_Loc
1	B	10	NULL	(37,-7)
2	J	10	NULL	(73,-17)
3	I	10	NULL	(90,-46)

Table For F

	N_Node ID	Velocity	Prev_Loc	Cur_Loc
1	K	10	NULL	(40,20)
2	L	10	NULL	(65,15)

Table For I

	N_Node ID	Velocity	Prev_Loc	Cur_Loc
1	E	10	NULL	(52,-28)
2	J	10	NULL	(73,-17)
3	D	10	NULL	(116,-24)

Table For J

	N_Node ID	Velocity	Prev_Loc	Cur_Loc
1	B	10	NULL	(37,-7)
2	E	10	NULL	(52,-28)
3	I	10	NULL	(90,-46)
4	D	10	NULL	(116,-24)

Table For L

	N_Node ID	Velocity	Prev_Loc	Cur_Loc
1	F	10	NULL	(52,40)
2	H	10	NULL	(90,20)
3	J	10	NULL	(73,-17)

Table For H

	N_Node ID	Velocity	Prev_Loc	Cur_Loc
1	L	10	NULL	(65,15)
2	G	10	NULL	(116,4)

Table For G

	N_Node ID	Velocity	Prev_Loc	Cur_Loc
1	H	10	NULL	(90,20)
2	D	10	NULL	(116,-24)

Table For D

	N_Node ID	Velocity	Prev_Loc	Cur_Loc
1	G	10	NULL	(116,4)
2	J	10	NULL	(73,-17)
3	I	10	NULL	(90,-46)

View Entries

Figure 3.2: A snapshot of neighbors' location matrix

The location of the neighbor nodes with their ID and velocity is shown in figure 3.2

Scenario 1st

If Existing node has higher power of its initial power and Unknown node do not have then existing node is consider for the forwarding transmission.

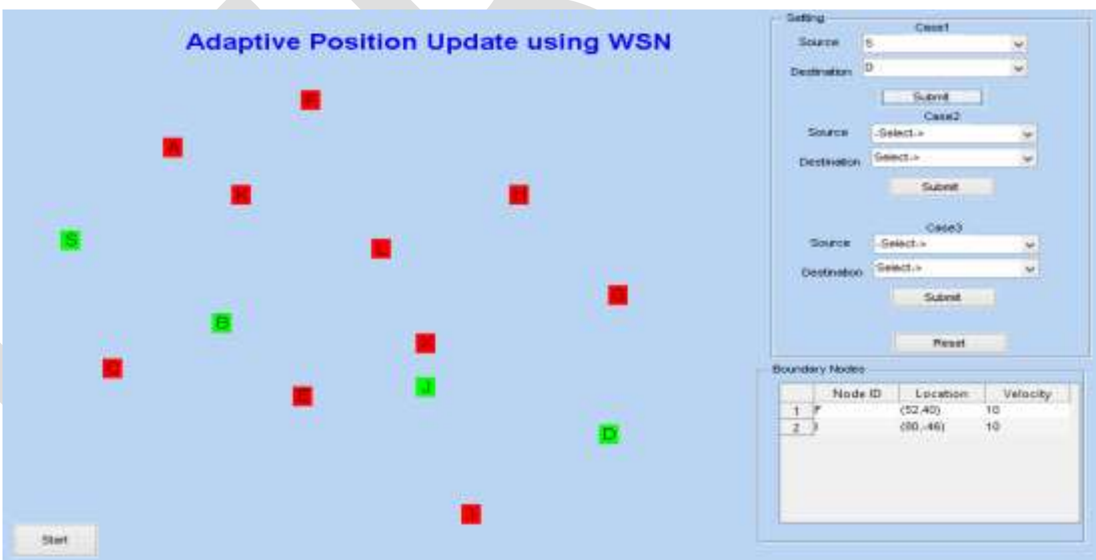

Figure 3.3: A snapshot of forwarding routing Path with Existing node J

Scenario 2nd

If Unknown node has higher power of its initial power and existing node does not have then unknown node is consider for the forwarding transmission.

Figure 3.4: A snapshot of Routing path with the selection of unknown node X

Scenario 3rd

If Existing node and unknown node have the lesser power to their 20% of initial power then existing node will take part in the transmission due to stability issue.

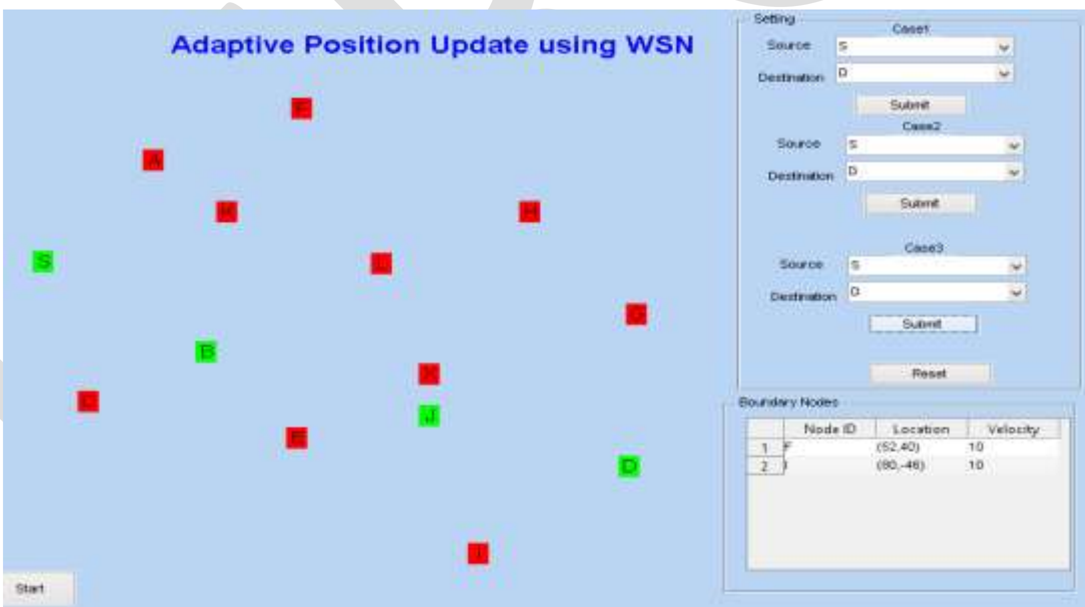

Figure 3.5: A snapshot of forwarding routing Path with Existing node J

Scenario 4th

If Unknown node has higher power of its initial power and existing node also has but unknown node has higher power comparative to existing node then unknown node is consider for the forwarding transmission.

Figure 3.7 A snapshot of Routing path with the selection of unknown node X

4. CONCLUSION AND FUTURE SCOPE

4.1 Conclusion

In this paper, geographical location update has been described to provide better transmission.The Ad-hoc networks come to be very widespread everybody is using these networks because the distributed nature of wireless ad-hoc networks makes them appropriate for a variability of requests and uses where central nodes couldn't depend and may increase the scalability of systems compared to wireless managed systems, though theoretic and real confines to the total dimensions of such systems or networks have been acknowledged. In geographic routing, nodes required to manage current locations of their instant neighbors, for creating operative furthering conclusions. Episodic broadcasting of beacon messages that contain the geographic position coordinates of the nodes is a common technique used by most topographical routing protocols to sustain neighbor locations. We resist and reveal that episodic beaconing regardless of the node mobility and traffic outlines in the network is not striking from both update price and routing concert points of view.

In this paper an Adaptive Location Update in Wireless network communication; it provides the meaningful information or geographical location about the node in three dimensional formats in network as well as with the information about the unknown node for better transmission of data. In this approach, the Adaptive Location Update approach for topographical routing, which dynamically sets the occurrence of location update information based on the mobility dynamics and the furthering outlines of the nodes in the network with the Unknown node problem resolution when it exist to increase the efficiency of this method . When an unknown node problem exist, in our approach we select the best node for the route discovery or data transmission in the given network to increase the efficiency of existing approach based on adaptive position in Ad-hoc network.

4.2 Future scope

The proposed model can be further extended to develop a location update, which is cohesive with the unknown as well as false node problem. Thus, the concerned areas make effective through the some other parameter such as distance as well as power consumption parameters.

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