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VIGOROUS METHODOLOGY OF USING RPCM IN WIRELESS SET - UPS

Dr. SIVAKUMAR K

Abstract — In wireless networks, the dataflow between the source and destination requires the optimal placement of nodes,so as to improve the network performance. It requires in finding out the nodes which will minimize the distance the data have to travel to reach the destination. In the existing routing protocol such as AODV causes the problems such as collision of nodes, delay in the packet transfer and data loss. This is because of the mobility of nodes in the wireless network. Thus this paper proposes a new routing protocol, Routing Protocol Based on Controlled Mobility (RPCM).The RPCM is intended to select the nodes path that minimizes the total travelled distance to reach the desirable position. The main aim of this paper is to show by simulation, how RPCM outperforms the routing protocol AODV in terms of throughput, average end-to-end data packet delay and energy spend to send a data unit.

Keywords - *Controlled Mobility, Routing Protocol, RPCM*

I. INTRODUCTION

The placement of nodes in a wireless network is an important and growing research field since the energy consumption and the lifetime of a network rest on the power used in the transmission and reception. There are many problems to face while creating a wireless networks and protocols such as getting good throughput minimizing data delay and minimizing energy waste. This power usage, in turn, depends on the mutual position of the pair of communicating nodes.

The main objective of research in wireless network is to find a trade-off between the length of routes and the number of nodes in each route, without taking into consideration the energy consumption. Now a days most of the wireless networks are driven by battery equipped devices. Thus it is necessary to minimize the energy consumption. This gave birth to the concept of self-organization for wireless networks, which is intrinsically tied to the capability of the nodes to move to different placements. In the last few years, the research community has taken much interest in the synergic effect of mobility of nodes and wireless networks. The opportunistic use of external mobility has been extensively investigated in the wireless networks for last few years. From many research works it has been found that a straight path between source and destination, which is a most energy efficient and also minimizes the cost of communication. Although many communication protocol for wireless networks have been proposed to the best of our knowledge, there is no routing protocol which will find a straight path between the source and destination. The routing protocols can be mainly divided into proactive routing protocols, reactive routing protocols and hybrid routing protocols. The proactive routing protocols are table-driven routing protocols. Thus it is having the overhead like table updations in high-mobility scenarios. In fact the wireless network uses the reactive routing protocols which are demand driven protocols. In reactive routing protocols the source will find the route to destination only when its needed. However the path discovery phase incurs in high energy costs. Here we are considering a system which is used by nodes to reach specific locations; then, for energy efficiency matters, it is convenient to use a table-driven system. Thus the minimum metric paths are based on two different power metrics:(i) minimum energy per packet, (ii) minimum cost per packet

In this paper the existing multihop routing protocol, AODV will be used mostly which will be used to find out improvements in terms of network performance as throughput, data delay, and energy spent per packet, by explicitly exploiting mobility capabilities of the wireless devices. By using the analytical results, have to find the efficiency of providing mobility control to the nodes. Based on these results, we consider jointly controlled mobility and routing strategies. We perform simulations through a well-known simulation tool to quantify the throughput, delay, and energy spent per packet compared with wireless network where AODV is used.Thus by comparing the existing protocol AODV,with the proposed concept controlled mobility,to show that the proposed system outperforforms the existing routing protocol

II. RELATED WORKS

Mostly the device's mobility has been regarded as a negative fact which causes the link break and disconnections. It has been understood that mobility of nodes can potentially used to improve performance of

Dr. Sivakumar K , Ph.D., MIEEE., Assistant Professor , College of Computer Science , King Khalid University - Kingdom of Saudi Arabia .(Email: rksivakumar@gmail.com)

the network. It can be found that mobility of nodes increases the capacity of the network[9]. Once the trade-off between delay and throughput has been characterized, some algorithms that attain the optimal delay for each throughput value have been proposed. Another model makes it possible to exploit the random waypoint mobility of some nodes, in order to design a routing algorithm that allows high throughput with low delays, where the delay depends on the nodes' mobility, while the throughput is independent of it [11] [12].

It can be showed that there is a trade-off among mobility, capacity, and delay in ad hoc networks[13]. A first step in taking advantage of the possibilities that mobility introduces has been made by the research community when predictable mobility became an important research focus. In fact, researchers studied about specific network objectives, under a random mobility-based communication paradigm; without considering the mobility of the sinks, for example in military applications, is based on soldier or fire fighter movements, and thus, it is predictable, in substance [13]. However the existing research in wireless sensor networks considers sink movement based on random mobility and the problems of the sink, in many practical applications, can be determined in advance.

In reference [12] its proposed a predictable mobility-based algorithm, which uses the existing dissemination protocols and it is based on the random mobility-based communication paradigm. It shows the improvement and the various advantages of using the predictable mobility-based communication paradigm as the energy consumption decreases and the network lifetime increases. The mobility of nodes has also been exploited to help in packets delivering [16]. In this works, the node routing tables are updated with link state and trajectory information, which are received from other nodes. The problem of routing related to the predictable mobility has also been analyzed by [14].

The paths are created by the movements of nodes, which will deliver the message that they are carrying when they find other suitable nodes. The space-time routing framework leverages the predictability of nodes motion. Controlled mobility has been a hot research topic of the robotics community for many years. It concerns the motion coordination of a group of robots for a common objective, typically the coverage of a geographical area. In [15], the authors consider the problem of deploying a mobile sensors network composed of a distributed collection of nodes equipped with locomotion capability. Such mobile nodes use their ability to move in order to maximize the area covered by the network.

The research approach is based on a potential-field approach and nodes are treated as virtual particles, subject to virtual forces. The concept of controlled mobility is also used by [15] by considering a hybrid network with both static and mobile nodes, which fully exploits the movement capability of the sensors. Previously the research community jointly considers mobility and routing algorithms [2], but the solution which is proposed is based on the base station as the only controlled mobile device. In this work we are interested to consider the mobility of devices in a controlled fashion along with the routing algorithm. Specifically, we focus our proposal on the analytical results obtained in [7] that shows the potential advantages which can be obtained through controlled mobility. Thus here we are going to implement a new protocol RPCM in a well-known simulation tool ns2.

III. PROBLEMS AND SOLUTIONS

In this project we are considering a well known routing protocol AODV as the existing routing protocol. We have to check further improvements in terms of network performance as throughput, data delay, and energy spent per packet, by explicitly exploiting mobility capabilities of the wireless devices. In the AODV routing protocol it will uses the request and reply packet for finding the path between the source and destination.

The normal working of AODV is triggered when a node have to discover and maintain a route to another node until the two nodes need to communicate unless the former node is opening its services as an intermediate forwarding station to maintain connectivity between two other nodes. When the local connectivity of the mobile node is of interest each mobile node can become aware of the other nodes in its neighbourhood by the use of several techniques including local no system wide broadcasts known as hello messages. The routing tables of the nodes within the neighbourhood are organized to optimize response time to local movements and provide quick response time for requests for establishment of new route.

Since the nodes are movable, it is not applicable to find a fixed path between the source and destination. In AODV it will cause inconsistencies between the nodes. Once the source node gets a reply packet, it will start the data transmission. When the packets are passed through movable nodes, it will causes the collision of nodes forming droppage of data. Thus here its causes packet losses between the source-destination path. In this case

its very difficult to transmit data through wireless networks in a convenient manner .

Solutions

In the existing protocol it is inconvenient to find a fixed path between the source and destination. Thus it is necessary to control the nodes between the source and destination. This concept can be called as controlled mobility. In this paper it is proposed a new routing protocol Routing Protocol Based on Controlled Mobility (RPCM) which will takes the advantages of existing protocol AODV with the proposed concept controlled mobility. By using RPCM we can find a straight path between the source-destination pair.

IV. IMPLEMENTATION

Here we are describing about the implementation details about the project. First we have to implement the existing routing protocol AODV in the wireless networks. In this paper we are considering all the nodes are movable. Then we have to implement the proposed routing protocol RPCM in the wireless nodes in which the source and destination nodes are static. Finally we have to compare both wireless scenarios to show the implemented protocol outperforms the existing routing protocol.

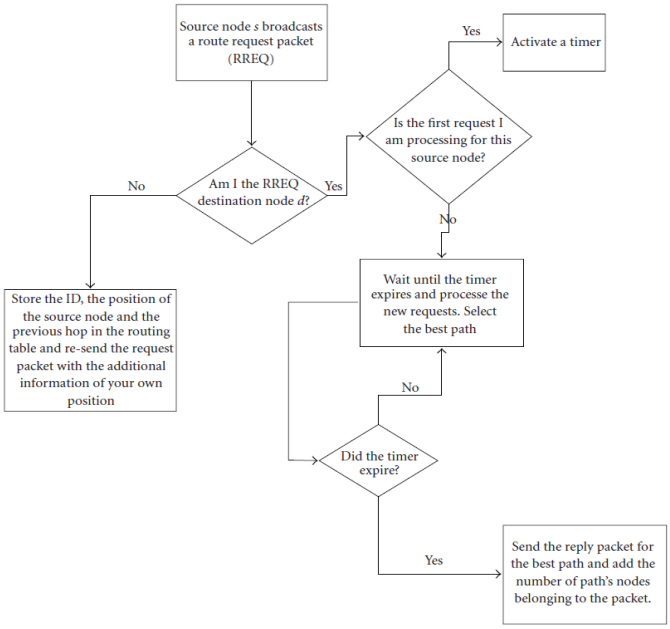
1) AODV Routing Protocol

The routing protocol AODV is implemented in the wireless networks in which all the nodes are movable. AODV protocol is a demand driven protocol in which routes are determined only when it is needed. In AODV the source will broadcasts a Route Request (RREQ) to the destination. In the destination node it will generate a reply packet (RREP) and broadcasts to source node. Then source node will starts sending data packets towards destination. It is according to the nearer nodes in the source-destination pair.

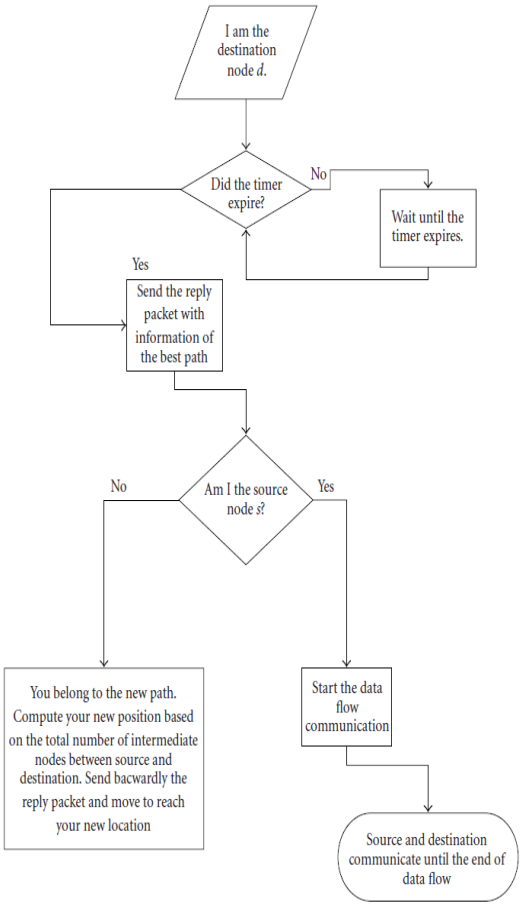
2) Routing Protocol Based on Controlled Mobility (RPCM)

In the RPCM, we will apply the Route Request phase of the AODV protocol, with some additional information such as the nodes' position. When a source node s needs to establish a communication with a node d. The source node will broadcast a Request Packet, which will be forwarded by its neighbours. Each node includes in the request packet its geographical coordinates in the network. Once the Request Packet reaches the correct destination, the node d will not send a Reply Packet immediately, but it will wait for processing other requests

The source node starts a request phase by sending a Route Request and every intermediate node stores the position of the previous node, the ID of the previous node, and rebroadcasts the request packet. The mechanisms to avoid loop and control packet storms are the same as in AODV Once the Request Packet reaches the destination node, if the request is processed for the first time, the destination node d activates a timer and continues to process other Request Packets of the same source node s. Otherwise, d compares the previous path with the current path and selects the best one. Once the timer expires, d sends a Reply Packet to the first node of the selected path in the backward direction. This node computes its new position depending on the number of nodes involved in the path information and forwards the Reply Packet to the following node in the backward direction Thus the nodes will move to the evenly spaced position on the straight line between the source and the destination..It can be shown in the below flow chart.



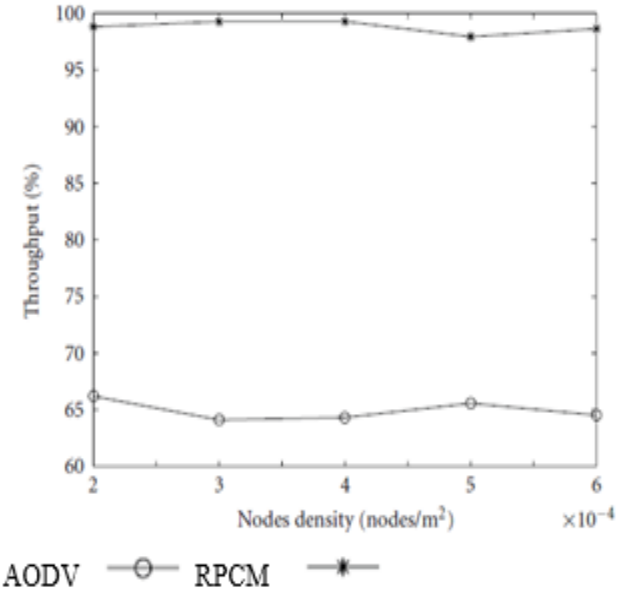
Once the source node s receives the Reply Packet, all the nodes belonging to the path have already moved to their new position and s will start the data communication flow..The reply phase of the RPCM can be shown below.



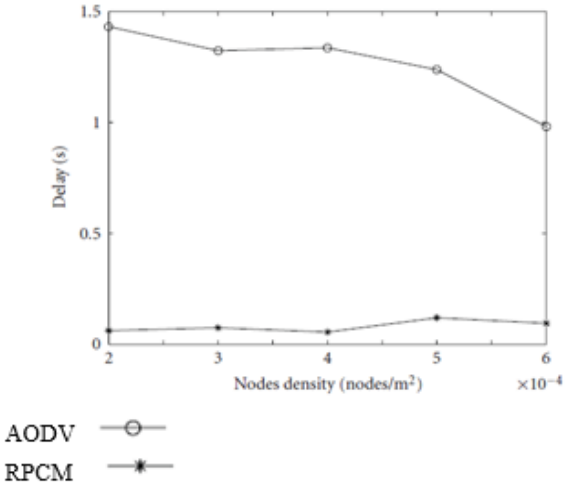
V. EXPERIMENTS AND RESULTS

The simulations have to be done using the well known network simulator, ns2, in order to evaluate the effects of controlled mobility in the routing process in comparison with the AODV protocol. For evaluating we are considering the three main output parameters (i) throughput, (ii) delay, (iii) energy spent for received packet.

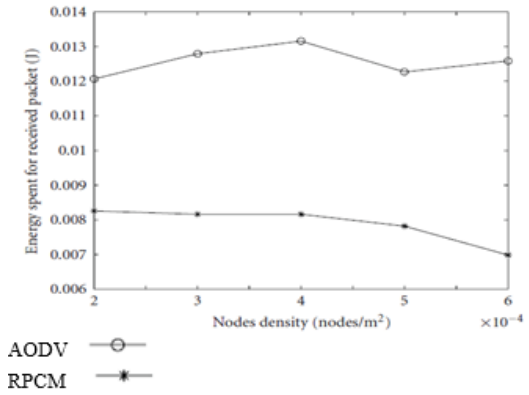
We will perform the simulations which consist of increasing nodes density for a fixed number of flows f = 6, in terms of throughput. It can be shown as



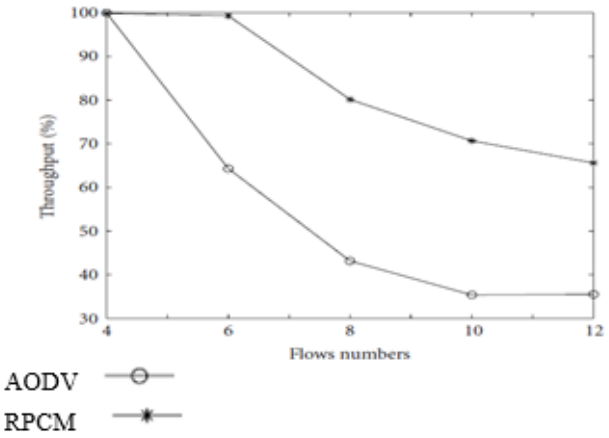
Next we have to perform simulation which consists of increasing nodes density for a fixed number of flows f = 6 ,in terms of delay. It can be shown as



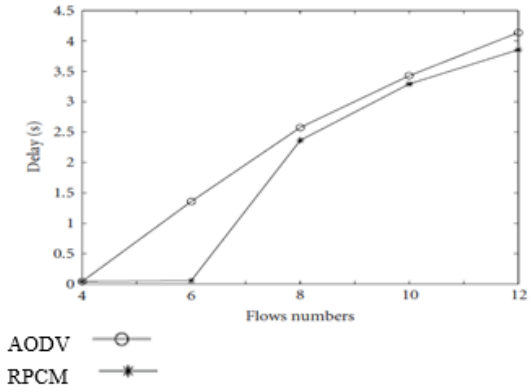
Here it consists of increasing nodes density for a fixed number of flows f = 6,in terms of energy spent for received packet can be shown as



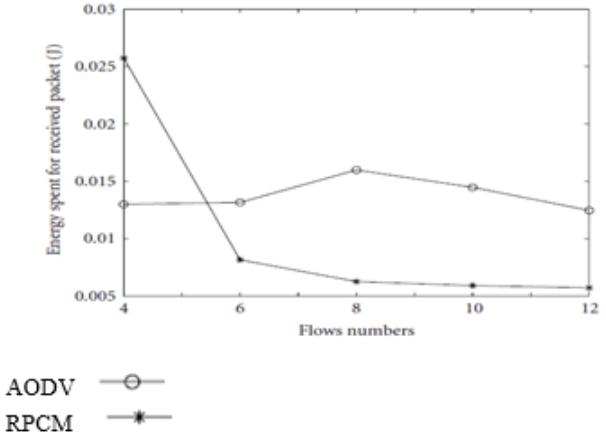
Then we will perform simulation in which flows varies between 4 and 12 and the nodes density is set to ρ = 4,in terms of throughput it can be given as



Then we will perform simulation in which flows varies between 4 and 12 and the nodes density is set to ρ = 4,in terms of delay it can be given as



We can perform simulation in which flows varies between 4 and 12 and the nodes density is set to ρ = 4,in terms of energy spent for received packet it can be given as



The result shows that for all the output parameters our proposed RPCM out performs the AODV achieving 30%, 80% and 40% of improvements for throughput, delay and energy spent for received packet, respectively. The behaviour of the RPCM scheme is more robust and scalable than the AODV, since it is almost constant for all output parameters when density, while in the AODV scheme, delay and energy spent are affected by the nodes density.

VI. CONCLUSION

The concept of controlled mobility has been taken previously as an analytical point of view, such as a mobile base stations in the network .In this research, we are implementing the controlled mobility as a new design dimension thus forming a new routing protocol. The main objective of this paper is to evaluate the performance of the new routing protocol with a well known network simulator ns2.By using the network simulator we can able to consider many applications of the network. Thus its possible to have extensive simulation to show how our proposed protocol outperforms the existing protocol AODV.

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