Reduce the Control Overhead Geographic Opportunistic Routing in Mobile ad Hoc Networks

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Abstract
Ambulatory networks as a result of high mobility of nodes and routing are one of the most important challenges that will result in reduced network performance. So far, the routing methods based on the geographical location of those nodes act faced with more fortunate. Reducing the overhead associated with data location of nodes in the network, including the challenges of location services which is considered in the proposal to reduce the control overhead that we tried to take advantage of opportunistic routing protocol integrating the idea of geographical GPSR {Greedy Perimeter Stateless Routing} make this possible. We used NS2 for simulating and then improve on GPSR and new algorithms were compared. The results show that the proposed method is less control overhead and get rate is more than GPSR.

Key-words:
mobile ad hoc networks, opportunistic routing, control overhead, geographic routing.

1. Introduction

Due to increased wireless communications and the necessity of exploiting it in different areas, set up and use wireless networks is a high growth.

In this regard, the ambulatory networks in terms of having advantages such as lack of infrastructure pre-determined, lack of central management and the mobility and flexibility are considerable of interest. One of the main issues that arise in any type of network routing and find optimal routes from origin to destination. Wired and wireless network routing infrastructure access points are fixed the very important issue and it is difficult and requires specific measures and solutions, solve these issues in ambulatory network topology is constantly changing due to the lack of central control and the associated changes node location was very hard and needs more measures. In 2003 to reduce delivery delays, Vahdat and colleagues suggested that the epidemic routing algorithm is used in the public. The algorithm is proposed to coordinate database duplicate data, here ensures that a sufficient number of random data exchange to all nodes in the network that have all finally able to send and receive messages. Pyropouloss and colleagues in 2004, used a simple method called direct transmission which proposed routing. In this way, after the source node generates a message, it is stored in the buffer to carry out, once a destination node has to deal with and be able to deliver your message.

In 2007, Spyropoulos and colleagues to limit the overhead deliver a message provided the method which was called spray and focus. The first phase of play where we source the production of each new message, it also creates a number of L to forwarding token.

In 2005, Musolesi and colleagues provided Context-Aware Routing (CAR) algorithm that it is an asynchronous communication which was defined for message delivery. In this case, if the message cannot be delivered at the same time, a message is sent to the host with the highest probability of message that can be delivered.

In 2006, Burgess et al, defined a protocol for efficient routing of messages which called MaxProp that using anode which can transmit packets to schedule and determines that if the buffer is filled, the priority is to remove one package.

In 2004, Jain and colleagues raised a knowledge-based plan which according to the awareness of the characteristics of the network topology and traffic requirements defined as a knowledge oracle that every prophecy represent specific knowledge of the network.

In 2007, Boldrini and colleagues developed a method that called history based routing protocol for opportunistic networks (HiBOp) that used for decisions about where to stored data.

In 2012, Fan and colleagues apply a new algorithm called context-based adaptive routing (CBAR), which the information content and network theory used to calculate the allocation of Shafer-Dempster in node's basic reliability assignment function.

In 2012, Nguyen and colleagues have a content-based routing scheme called context information prediction for

Manuscript received June 5, 2017
Manuscript revised June 20, 2017

routing in opponents (CIPRO), to predict the content of the issue. This method uses a back propagation neural network (BNN) to predict emissions.

2. The geographic opportunistic routing (GeOpps)

Geographic opportunistic routing protocol (GeOpps), using the guidance system that proposed routes for cars that is closer to the destination node, which posts a good choice. During this process node if there is less time to get the package sent to that node.

In this paper, we propose to reduce the rate of control overhead in MANET to enhance network performance, enhance the rate of receiving data and routing topology chosen GPSR and we were able to make these changes in the topology to extent opportunistic, so that we get our goals. In fact, we've provided a method of geographic routing opportunistic than other methods which have less control overhead. For starting this work, we have used to improve GPSR protocol. In our proposed scheme, the nodes are moving with the motion random waypoint model and each node, self-aware of the previous position and the current position and velocity

3. The proposed method

The general idea is as follows choosing the next node to send the data, which is done in two stages. Thus, the forwarder node among its neighbors, have a series of moves in the direction approaching to the destination as a candidate and between them is the closest node to the destination or speed is like sending node, which is selected as the next hop. This process continues until the data reaches its destination. The number that is considered eligible between neighbors are selected as candidates and only control messages exchanged by the candidates, not all neighbors. So, there is no need to constantly update the tables on neighborhoods and each node, use instead of the neighborhood in a table's candidates, only if act as forwarder node. The candidate table complete with the function which is the two points reduces control overhead and also to enhance network efficiency. In this project, we offered a technique that is called dynamic next hop selection. Thus, while sending data to the next hop, every moment get a new possibility of replacing in the next hop, which is better than conditions there. All simulations have been performed by the network simulator NS-2 in version 2.34. Network mobility model in this simulation is random waypoint. The velocity of Knots are variables between 10 m / s to 50 m / s. Simulation of 1000 x 1000 mm in size is taken into account. The radio range is 250 meters and bandwidth is 2 Mbps. The number of nodes is considered in various simulations ranging form 20 to 100. The size of 512 bytes per packet is taken into account. CBR traffic model used by all sessions. A capacity packet of line 50 is determined. The simulation duration is 600 seconds. In the simulation results, using different figures have shown.

4. Simulation Metrics

To evaluate the performance of the proposed algorithm and compare it with different metrics GPSR algorithm simulation modes are evaluated. In this simulation, metrics to evaluate the performance of proposed protocols that have been studied are as follows:

• Detachable Control

• Packet delivery ratio

• The average delay from end to end

In the simulation results and charts, relating to the separation of the above metrics provided and the effect of our approach on this metric compared with GPSR algorithm is studied.

5. Assessment Parameters

5.1. Packet delivery rate = PDR

The number of data packets received at the destination specified rate data that pack they receive. In this section, the average rate of data simulations with a different number of nodes according to figure 1 and the average rate of receiving data. In simulations at different rates have been calculated in accordance with figure 2.

The delivery rate calculation method is as follows:

The total number of packets Sent/received = Number of packet delivery rate

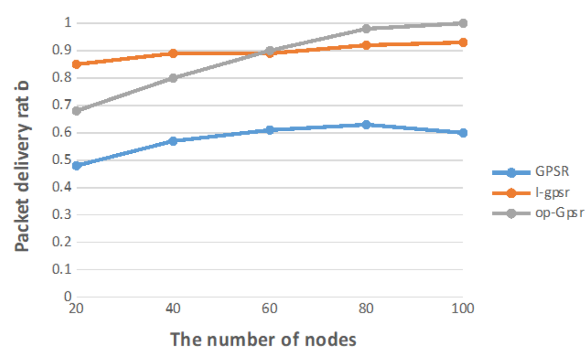

Fig. 1 packet delivery ratio varies with the number of nodes

Here the number of nodes due to greater connectivity, boost neighborhoods of a node and reduce deadlock, the delivery rate increased (Figure 1).

The environment is denser packet delivery ratio has increased.

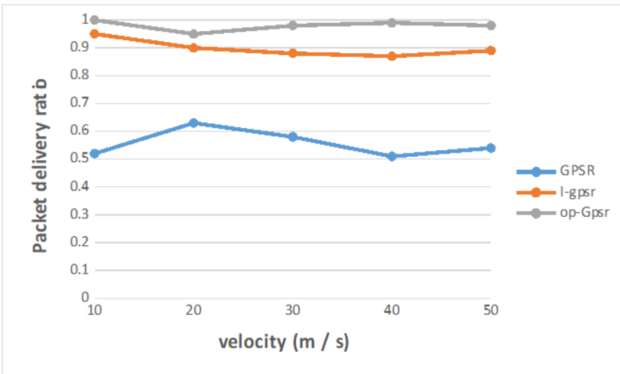

Fig. 2 packet delivery ratio at different speeds

The velocity is maximum speed here. The most set each time in order to get the model file has been moved. In GPSR, with increasing speed, the nodes are kept out of each other's neighborhood and the possibility of lost data packets become more. However, in OP-GPSR because each node update and the speed change is intended next hop to select the best next hop. As in figure 4-2 you can see, rate packet is better than GPSR.

5.2. The Control Overhead

Control overhead includes packages those are necessary to control activities, such as network routing is required. As we can see in figure 3, the proposed method is less than the usual methods of control overhead, because the proposed method of updating every moment of each node and prevent the exchange of mass hello_packet and each pack will be updated only if the redirect or change the speed of which is controlled to reduce overhead.

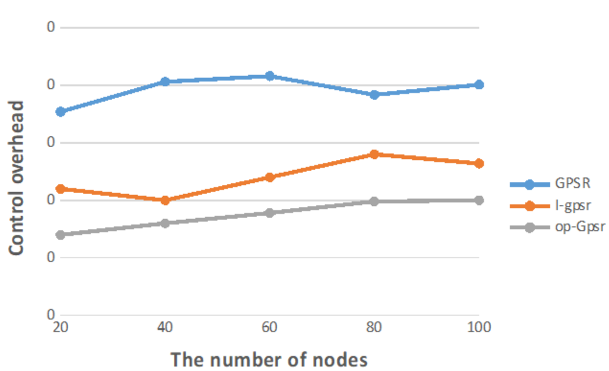

Fig. 3 The rate of control overhead varies with the number of nodes

Control overhead calculation method:

Data packets received / total control packages shipped = control overhead

Its following here:

Control overhead= packets sending (RTR && GPSR) / packets reciving (CBR && AGT)

In total, taking into the account of the amount of control overhead to the data received. As we can see in figure 3, in the proposed method of control overhead, the rate of due to receiving data packets dropped.

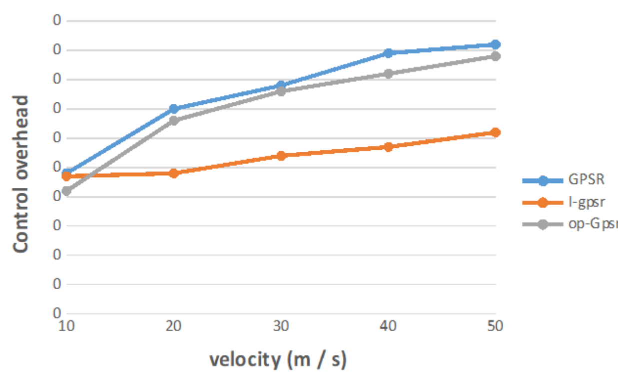

Fig. 4 The rate of control overhead at different speeds

As we see in figure 4, control overhead increases with increasing speed, because in the next node dynamically at high speeds faster than adjacent nodes that are removed and the constant need to re-announcement of a neighboring node that will increase the overhead control in the position itself. However, because the rate of receive data is high, and each node after having a certain time interval which is not obliged to update the information on the neighborhood. Also, less overhead than its GPSR.

5.3 The average end-to-end delay

The end-to-end transmission delay time for data packets defined end to end. This amount includes delays due to routing that have been created. The mean latency end-to-end in a number of different nodes (Figure 5) is calculated and checked.

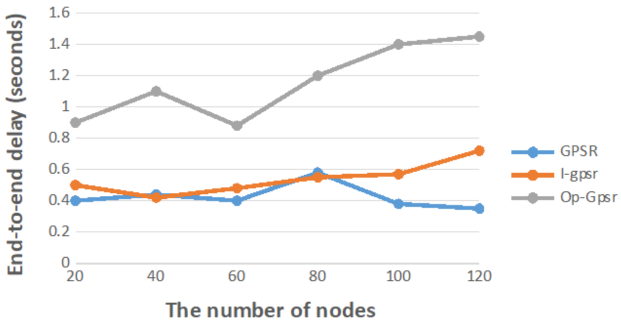

Fig. 5 The average delay of end-to-end with a number of different nodes

The method of calculating the average end-to-end delay as follows:

Number of packages / (release time depending on the source - given time depending on the destination) = Average end-to-end delay

As shown in the graph is the end-to-end delay increases own again, because we have used the method of dynamic next_hop selection that at any moment, it is possible to change the speed of the node or the arrival of a new neighbor node selected forwarder_node and resumed next_hop. However, despite its advantages, that increase has been delayed.

6. Summary and Conclusions

One of the most important issues in wireless ambulatory networks demonstrably is how to transfer data from the network nodes to the base station and choose the best possible route for transmission of information. Choose the best route may be based on factors such as energy consumption, fast response, and delay, get the rate of the accuracy of the data and affected. In opportunistic routing instead of selecting a node as the next hop apriority, moved relay node when data pack is determined. Opportunistic routing protocols transmit broadcast their profits to multiple nodes allows one to transfer and receive the same packet. Then, the receiver pack transmitter to choose one of them as the next match. In this paper, the proposed method using simulations and compare the results provided by the discussed methods. The various network parameters such as the amount of control overhead and delay end to end and the receiving the rate were analyzed. The results show that the proposed method increases the rate and also reduce the control overhead which is received.

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