Minimized Location Services in Android Mobile Ad oc Network

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Abstract

The location service in a mobile ad-hoc network (MANET), where each node(Android device) needs to maintain its location information by frequently updating its location information within its neighboring region, which is called neighborhood update (NU) and occasionally updating its location information to certain distributed location server in the network, which is called location server update (LSU). By continuously updating the Location information into location server will increase the cost. So, we update the user location server periodically. When mobile user is moving from one region to another region, it will update their location information into a location server to assist the neighbour nodes. To update this information in an minimized way we have designed an optimal stochastic frame work by formulating the location update problem at a node as a markov decision problem (MDP) ,under a widely used Markovian mobility model. For the securely updating of the location information in the NU and LSU we have provided with the Advanced Encryption Algorithm and for the maintenance of the route between the mobile devices in an adhoc network an Cross Layer Adhoc On Demand Distance Vector (CLAODV) routing protocol has been used.

1. Introduction

In recent years, the number of Smartphone users has increased by many folds. Current generation of Smartphone's has better storage, battery, computing capabilities and they come equipped with short range communication technologies like GPS, Bluetooth and Wi-Fi. These improved capabilities coupled with staggering rise in number of users, has prompted growing interest in Smartphone applications that helpusers to communicate with each other directly over the internet. The objective of this paper is to develop an application which is used to connect the mobile devices in an Ad-hoc network with efficient and effective performance results. With this application a group of people can connect to each other in a limited region where no existing network is available, or the use of it is too expensive. In these situations, it would be convenient to create a local decentralized network. Decentralized networks are also known as "peer-to-peer" or "ad-hoc networks". Because of the decentralized nature of such networks, there is no need of existing infrastructure to manage communication. Today's mobile technology makes such network possible, since it is becoming increasingly common to have built-in antennas for wireless communication. There are many applications which can exploit wireless ad-hoc networks: Various military operations, search-and-rescue operations, data collection for science purposes, file/information sharing, and text communication and entertainment purposes e.g. in the form of multi-player games. From the different applications stated above, it is implicit that each wireless device should be able to communicate with any other device in the network. Since the location of the mobile devices are not fixed with respect to other connected mobile devices, so the device needs to frequently update its location information to some other devices. There are basically two location update operations at a device to maintain its up-to-date location information in the network. One is to update its location information to its neighboring devices. This type of updates is nothing but neighborhood updates (NU). The second operation is to update its location information to location server whenever it moves out the range of the existing region. This type of update is known as location server update (LSU).The Wireless ad-hoc networks are typically dynamic and scalable, because of the mobility of the devices and the decentralized management. The limitations of wireless mobile ad-hoc networks are, typically the power supply (a battery), its computation power and small memory size. Due to the

following limitations we have to design a frame work which should reduce the overhead on the mobile devices for that purpose we formulate the location update problem at a device as a markov decision problem (MDP),under a widely used Markovian mobility model. This project is using a security mechanism such as Advanced Encryption Standard (AES) to transfer the data securely. Next, the routing is done with Cross Layer Ad-hoc On-Demand Distance vector (CLAODV) routing technique. The physical and MAC layer information are collected in this method.

2. Related Work

The location updates problem in mobile ad-hoc networks due to the overhead such as cost and bandwidth has not been formally addressed to minimize the overhead. In [6], the authors analyze the minimized location updates strategy in a hybrid position-based routing scheme, in order to achieve the minimizing overall routing overhead. Although, a closed-form optimal update threshold is obtained in [6] it is only valid for their routing scheme. On the contrary, our analytical results can be applied in much broader application scenarios as the cost model used is generic and holds in many practical applications. On the other hand, the location management problem in mobile cellular networks has been extensively investigated. A similar stochastic decision formulation with a semi-Markov Decision Process (SMDP) model for the location update in cellular networks has been proposed in [7]. However, there are several fundamental differences between our work and [7]. First, the usage of the CLAODV protocol here is unique to the location update problem in mobile ad-hoc networks [8],Since there are two different location update operations (i.e., NU and LSU); secondly the usage of AES algorithm for the securely transfer of file is not been discussed in [7].

In existing adhoc network, there is a Tradeoff between the operation costs of location updates and the performance losses of the target application in the presence of the location errors (i.e., application costs). On one hand, if the operations of Node Updating and Location Server Updating are too frequent, the power and communication bandwidth of nodes are wasted for those unnecessary updates. On the other hand, if the frequency of the operations of Node Updating and/or Location Server Updating is not sufficient, the location error will degrade the performance of the application that relies on the location information of nodes. The common issues related to existing system are as mentioned below

- Cost is very high
- Wastage of Bandwidth
- Power consumption very high
- Performance reduced

3. Problem Formulation

We consider a Mobile Ad hoc Networks (MANET) in a finite network. The whole network is partitioned into small regions and the location of a device is identified by the co-ordinates of the region it resides in. The size of the region is set to be sufficiently small such that the location difference within a region has little impact on the performance of the target application. The distance between any two points in the network is discretized in units of the minimum distance between the centers of two regions. In [11], a novel approach for routing in MANETs has been presented keeping in view the dynamic nature of wireless devices.

In proposed work, the location based information of a mobile user updating via through neighboring nodes. In proposed system the location updates are done frequently to its adjacent devices. If, the mobile user moving from one region to another region, the location information is updated into a location server. The location server will reply to the old region about the position of the device in the network. The mobile user is taking the decision to update the location based information using Markov Decision Method. The data will transfer securely using AES method. The routing is done by cross layer adhoc on-demand routing vector method.

In networks, security is a challenging aspect in MANETS. The MANETs suffer from various attacks and threats such as misbehavior and clone devices. Moreover, attacks occur across multiple layers. A CLAODV approach combined with adaptive AES is used to combat all forms of malicious mobile devices. The cross layer AODV does not need any major modification in original AODV. Handling of RREP and RERR packets (Wang & Garcia-Luna-Aceves, 2002), of basic AODV are left as they are. And no other function of routing layer including communicating with the MAC and network layers is changed The CLAODV results in improved packet delivery ratio and average end to end delay performance in heterogeneous networks, which are most important for best effort traffic. As all the mobile devices operate on batteries, the power consumption becomes important issue.

So, CLAODV routing protocol which adopts cross-layer design mechanism and energy aware metric to improve the reduction in energy consumption [9]. Through using the CLAODV protocol Quality of service is also achieved in the MANET [10]. The issues

which have been overcome in the proposed system are given below

- Power consumption reduced.
- Security is high.
- Cost is reduced.
- Overall performance is increased.

4. Overall Architecture

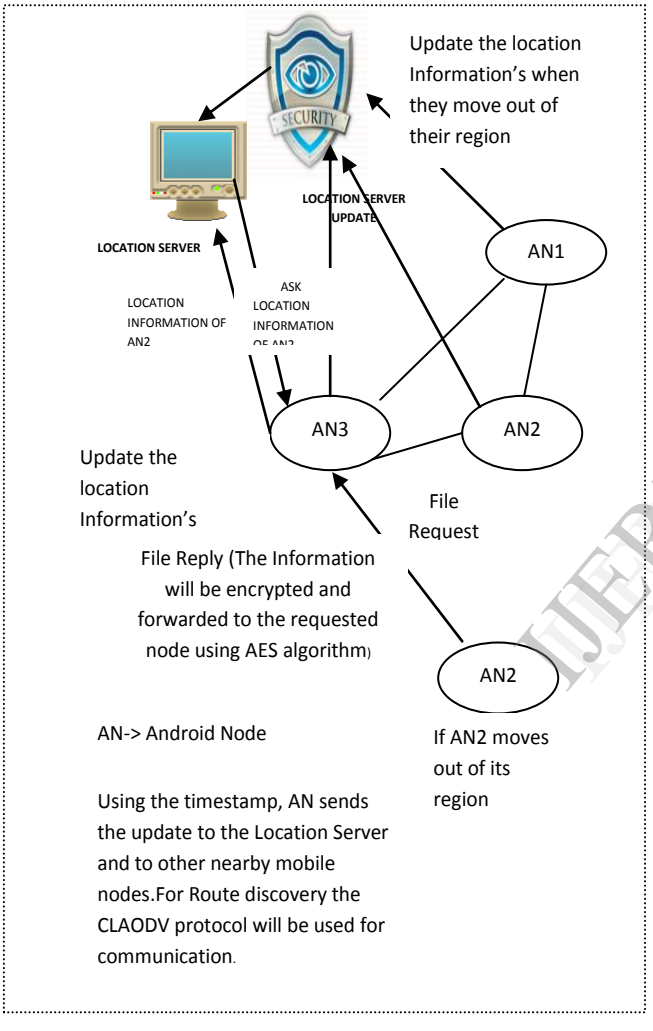

Figure 3.1Overall Architecture

In fig 3.1, there are some mobile devices which are indicated as nodes (AN1, AN2, AN3) and location server. Android mobile nodes will update location information to its adjacent nodes and when mobile node moves out of the region then it update information to the location server.

5. Simulation Results

In the simulation graphs, the location updates are quoted in between the existing system and the proposed system where the better performance has been achieved in proposed system. In the fig 4.1 shown below it provides the data in between update message and time taken in minutes to update the message. In the fig4.2 it corresponds with respect to percentage of location update accuracy.

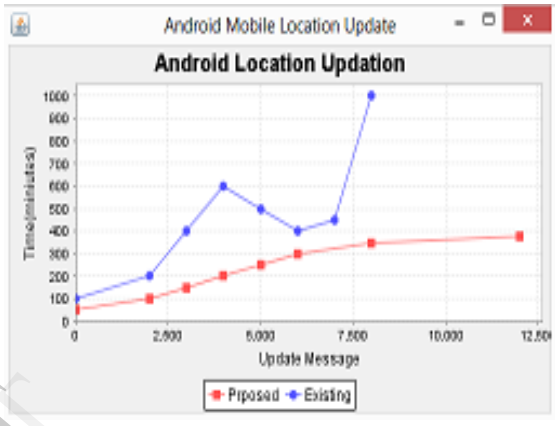

Fig 4.1

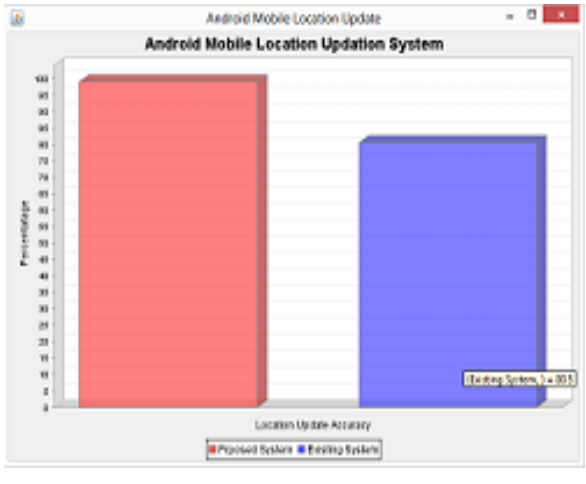

Fig 4.2

6. Conclusion

The proposed routing algorithm is implemented for ad-hoc network. The implementation is carried using network simulator and android emulator tool. The proposed model can satisfy the consistency and optimality requirements thus providing a Quality of Service for data transmission in a ad-hoc network. This

mechanism can make use of the bandwidth more efficiently than the previously existing systems. From simulation experiments, we have found that CLAODV have many advantages. Compared to the classic AODV, CLAODV not only can afford more prompt and accurate local topology information to nodes, but also can remarkably decrease protocol overhead and improve protocol efficiency.

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