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Challenge in Route Discovery Process of Dynamically Arranged Multitier Protocol in Wireless Network

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Abstract

In this paper we find the route discovery medium from wireless networks. Routing a packet from a sender to a receiver in an adhoc wireless sensor network, in which the nodes are open to move arbitrarily and organize themselves. Here we discovered a correct path for transmission of data according to route discovery problem. The main thing of the challenge is that in these types of networks there are no base stations so that the nodes themselves performs also functions such as switches and forwarding information to their receiver while coping with the dynamically changing network topology. A route between the sender and the receiver is available as soon as possible because each node contains routing tables which provide the information about the next node on the route. Routing table's management requires that every node to exchange routing tables with its neighborhood whenever a topology changed is identified then re-generates the routes based on the updated information. Different Protocols are define in which a route-discovery phase follow the transmission of a data. In addition to incurring delay due to the route discovery process there is no assurance that the route discovered is functional because of node mobility. In these protocols, the information on the route between sender and receiver is provided in terms of the network topology that means the route is provided by as a sequence of nodes. In this paper we find the route discovery with dynamically adhoc wireless networks because every route transmits the data according to path.

1. Introduction

The adhoc wireless sensor networks topology may change quickly and randomly which means that a large component of the network is limited bandwidth and each node's limited energy which has to be used for updating or gathering the routing information. To overcome the drawbacks between the routes and the network topology the routing protocols have been proposed in which each node stores information about the location of every other node [l], [5]. In this we define that the sender node S can compute the (geographic) area in which receiver node D is presented and transfer the packet to all nodes in D's direction. In this solution suppose that every node is aware of its current location via use of, Global Positioning System (GPS) receivers which are available at each node. The routing protocol explained in this paper join the advantages of reactive protocols such as the Dynamic Source Routing (DSR) protocol presented in [4], with the improved performance that is the location based solutions. In the DSR protocol when the sender node S of a data packet goes to transmit the packet to receiver D, it includes the complete route in the packet header ("source routing"). Each intermediate node on the designated route will forward the packet to the next node on the route itself until D. Using the location broadcasting mechanism described in our previous work [l], we maintain at each node a location table that contains for each other node its location given as GPS coordinates.

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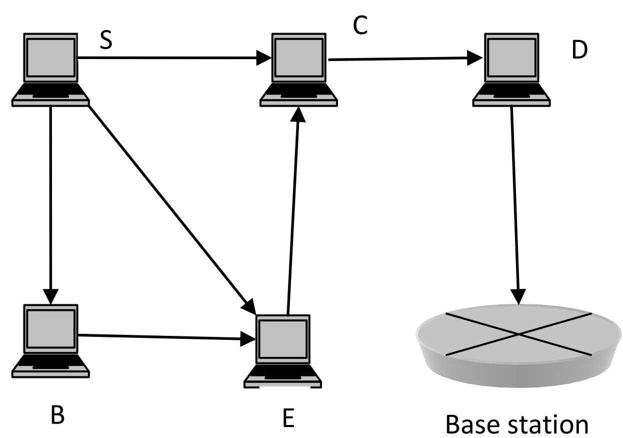

Fig: 1

The study defines that the location table may not only be used to establish the route of a given node from the sender to receiver but also provides a pictorial representation of the entire network topology. In a network topology each node not only knows the positions of all nodes but also can compute the neighbors of each node at the time it sent its last location update. Thus, figure 1 shows the route to the destination may be computed locally without the need for a route discovery phase and its associated delay that means when a new data packet is ready to be sent on a network from S to D then S constructs from its location table a representation of the network topology that is a graph representing the node connectivity. S locally computes a route to D (e.g., the shortest path, or the best path according to some routing criteria) and then, if a route physically exists between S and D, S transmits the packet that includes the route which is to follow to the first node on the computed route to D. With the use of simulation, we show that the average delay of routing a packet on a network between any two nodes is always less than the average delay of the solutions mentioned above. The reduced delay occurs since we eliminate the overhead of reactive protocols. Specifically, no route discovery phase is ever needed and no route maintenance needs to be performed (reporting of broken links that is edges that become unusable in the graph). There are several reasons why our solution is more bandwidth and energy efficient. Compared to location based routing methods, in our solution, a data packet is sent along a single route instead of to all the nodes in the direction of D so that the less copies of the same packet are generated on the network. As well, the location information that is disseminated is very small in terms of the number of bytes transmitted when compared with routing tables exchanged by proactive protocols. These properties make our protocol suitable for ad hoc networks with a higher packet arrival rate, where previous solutions become unstable.

2. Dynamic Source Routing Using GPS

Source routing is a process that used in a number of situations in wired networks or wireless networks (see, e.g., [3], [6]). The main functionality of source routing is that the sender of the packet determines the complete sequence or route of nodes by which the packet is to be forwarded. The sender explicitly attached this route in the packet header and identifying each forwarding “hop” by the identifier of the next node to which the packet is transferred on its way to the receiver. In the Dynamic Source Routing protocol [4] for wireless sensor networks the route discovery phase is basically used to dynamically discover a route to any other node in the network. The Dynamic Source Routing protocol is simple and flexible so that the routing procedure can be generated or implemented for selecting network paths to go across the network. For our study, we modify DSR to support an energy-aware routing policy.

3. Energy Saving Dynamic Source Routing

The Energy Saving Dynamic Source Routing (ESDSR) protocol is a next modified protocol of dynamic source routing (DSR) that combines the benefits of a broadcast power control mechanism and a load distribution process to save energy and maximize the overall lifetime of a wireless sensor network. [2, 11] ESDSR combines two approaches that try to minimize the amount of energy consumed during routing and the transmit power control approach minimizes total transmission energy. The main disadvantage of this approach is that it always select the same least-transmission power path which causes this path to be overused and hence 'die' faster than other paths. The load distribution process focus on equalization of power usage among different nodes by avoiding over-utilized nodes. The main disadvantage of this approach is that it presumes that the transmission energy is the equal for all the nodes in a network. Energy can actually be saved by transmitting at a lower power for closer nodes. ESDSR chooses a path as follows. First, it gives a score to each path. The ratio of the remaining battery power and the current transmission power of every node in the route path is determined. The minimum ratio along with the path is considered as the score. The path with the highest score is then chosen to be the one used for routing. ESDSR still performs route discovery and route maintenance in the same manner as DSR except that it stores the extra energy and power information in its route reply packets. [2] Shows results of this protocol from a simulation using ns-2.Compared to DSR, ESDSR can save energy resource per packet and can send more packets with the same battery power. We used the idea of selecting a path based on the remaining battery energy and implemented it on a real platform.

4. Power Efficient Data gathering and Aggregation Protocol

The PEDAP protocol is the extended version of the PEGASIS protocol. In the PEDAP protocol all the sensor nodes are designed into a minimum spanning tree. PEDAP assumes that the base station identifies the location information of all sensor nodes in a network and the base station can formulate the remaining energy of node based on some energy dissipation model. After some delay the base station frees the dead sensor nodes and re-generates the routing process for the network. In this protocol all sensor nodes only need to receive the routing information which is broadcast by the base station so that PEDAP protocol consumes less power source than the LEACH and PEGASIS protocols.

5. Multi-Tier Protocol

The Multi-tier Protocol (MTP) is an extension of the PEGASIS and PEDAP protocols. In MTP protocol each sensor node calculates its distance to the base station by calculating the signal strength from sender to the base station. After that the sensor nodes are divided into several tiers based on their distances to the base station. Data is transferred to adjacent tier nodes that are near to the base station which is similar to the PEDAP protocol. Eventually, the MTP protocol select a node that is closest to the base station to communicate with the base Station, using a mechanism similar to the PEGASIS.

6. Minimum Spanning Multi-Tier Protocol

In MSMTP protocol all the nodes in the network topology will transfer the required information or combined data to their neighbor nodes which are connected in Minimum Spanning Tree data structure by multi hop communication. A node of tier1 having highest energy will transmit network’s combined data to base station and similarly a node of highest energy from lowest possible tier id in a network is selected to transfer data to base station. By this way load is evenly distributed to all nodes of the sensor network. This will improve the overall system lifetime.

7. DAMTRP (Dynamically Arranged Multi-Tier Routing Protocol)

Dynamically Arranged Multi-Tier Routing Protocol is basically designed on data transmission of their neighbor nodes which are connected it in minimum distance structure by using Distance Vector Routing. A node of highest energy among highest rank Tier will transmit the whole network

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aggregated data to base station. This process is repeated until all aggregated data is transmitting over the network.

8. Network Model

The protocol assumes that 100 sensor nodes are distributed randomly in the network area of diameter 100m. In addition to data aggregation, each node of the network has the capability to transmit data to other sensor nodes as well as to BS. The aim is to transmit the aggregated data to base station with minimum loss of energy which in fact increase system life time in terms of rounds. In this work we consider sensor network environment where:

- Each node periodically senses its nearby environment & likes to send this data to BS.
- Base Station is placed at a fix location.
- Sensor nodes are homogeneous & energy constrained.
- Sensor nodes are dynamic & are uniquely identified time to time.
- Data fusion & aggregation is used to reduce the size of message in the network. We assume that combining n packets of size k results in one packet of size k instead of size nk

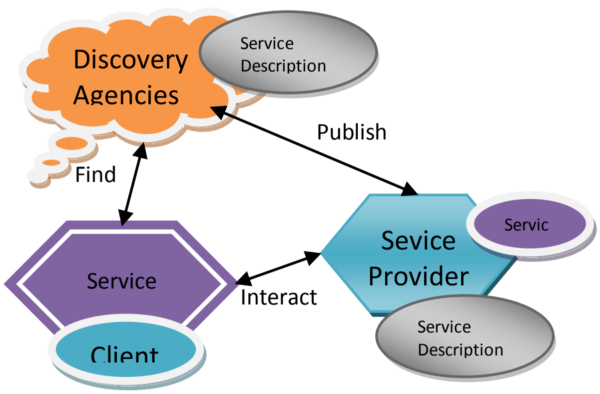

Fig: 2.

9. Discovery Network Model for Service Provider

In figure 2 shows the network model service provider which defines the root discovery model for different service provider which can have to find the appropriate root for client.

10. Conclusion

We have shown that an energy-aware dynamic source routing protocol can maximize the lifetime of a node in a network. We have shown that it is feasible to build such a protocol to run on a real embedded platform. While there are many improvements that can be made to our design and implementation, we have learned important concepts and lessons in the field of computer networks. We have learned about different routing protocols for mobile ad hoc networks, the difficulties of programming and using sockets with a network where the neighbors are not initially known, the problems associated with porting routing software to an embedded device, the details and design of dynamic source routing, and the challenges of testing on an embedded platform.

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