DEAD END FREE TOPOLOGY MAINTAINANCE PROTOCOL FOR SINKTRAIL

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Abstract - Wireless sensor network uses a sensor to monitor and record physical condition of environment and organised the data at central location. There is sufficient flexibility in the movement of mobile sinks to dynamically adapt to various terrestrial changes, without requirement of GPS devices or predefined landmark. SinkTrail established a logical coordinate system for routing and forwarding data packets, making it suitable for diverse application scenario. SinkTrail protocol suffer from dead end while routing or forwarding data packets. Our proposal reduces the control overhead and find out alternative neighbourhood node if dead end situation occur in SinkTrail. It also find the shortest routing path using dead end free topology.The dead end phenomenon (also known as the local maximum problem) when performing geographic forwarding in wireless sensor network add some overheads forward the packet to the alternative route.

Keywords — SinkTrail Protocol, Greedy Algorithm, Dead End Free Topology.

I. INTRODUCTION

Wireless Sensor Networks (WSNs) have used in various real time application. Sensor is most important for Wireless sensor network. The sensor network for manual maintenance it will highly operated under few human interventions for high management complexity or hostile environment. Energy saving is more important for design of sensor network because sensor node battery have some limitation. Data collection recent research reveals that it allowing as well as leveraging sink mobility is more promising for energy efficient data gathering, rather than reporting data through long, multihop and error prone routes to a static sink using tree or cluster network structure. In the field animal or vehicles consider as a mobile sink they equipped with radio devices and send directly information to sensor. They provide a benefits for reduce energy consumption and shorter data transmission.

Mobile sink used for data gathering is a new challenge for sensor network application. Data gathering is important used of sensor network. More challenging work for researchers is that minimize the time for data gathering. This is better benefit for sink mobility. Now some mobile element scheduling protocol has been proposed. Using control sink mobility they achieve efficient data collection. But for purpose of data collection dead end problem may be occurred. Same problem occurred in SinkTrail. SinkTrail solved a problem of movement prediction for data gathering with mobile sink. SinkTrail although uses shortest path for routing data. It may encounter dead end during its routing. Our proposed is to modify SinkTrail protocol to find an alternative path if dead end occurs. Using Dead End Free Topology (DEFT),this issue of dead end can be overcome in SinkTrail.

In this paper chapter 2 gives details about literature review, chapter 3 discuss related work. Chapter 4 discusses proposed solution. Chapter 5 discuss related to simulation and result.Finally conclusion is given in chapter 6.

II. LITERATURE SURVEY

Chih-Hsun Anthony Chou,Kuo-Feng Ssu,Hewijin Christine Jiau,Wei-TongWang and Chao Wang et al. in [2] have proposed Existing topology maintenance protocols conserve energy by scheduling the network nodes to a sleep mode when a node is not currently involved in a communication activity. Based on the knowledge of the geographical locations of each of the nodes within the network, the GAF protocol divides the total network area into an arrangement of structured smaller grids such that each grid contains only one active node.

Yong Liu et al. in [3] and Subhabrata Sen et al. proposed on for every sensor in the network control using mobile sink movement to query. As well as for data gathering tour they intentionally minimize the length of each data for SinkTrail[4].
Keally et al. for the purpose of data reporting the predict a sink location using Sequential Monte Carlo theory.

Complexity of sinktrail is much lower using prediction techniques. For SinkTrail protocol inspiration Virtual coordinate routing is important[5].proposed by A.Rao, S. Ratnasamy proposed A greedy algorithm for data reporting using logical coordinates rather than geographic coordinates message [6].

In overall studied we had find that some proc and cors are available in SinkTrail.Using this we get detail information in problem defination.

III. PROBLEM DEFINATION

The Most of the Existing System uses Greedy Forwarding Approach. The Most Forward with fixed Radius (MFR) algorithm is widely used for next hop selection in geographic forwarding schemes [11]. In MFR, the current relay node always selects the neighbor closest to the destination as the next relay. However, when the current node cannot locate any neighbor closer to the destination than itself, the packet reaches a dead end. Several recovery strategies have been proposed for dealing with such an event. For example, in the scheme proposed by
Finn in [13], the current relay node recursively searches its neighbors neighbors to find a node closer to the destination than itself. Woo and Singh proposed a scalable location update-based routing protocol in which the current relay node interrogates its neighbors for an alternative route to the destination [12]. Meanwhile, in GPSR [6], the current relay node first creates a planar subgraph using the relative neighborhood graph (RNG) [3] and then routes around the dead end in accordance with the right-hand rule. Various intermediate node forwarding techniques have also been proposed to resolve the dead end situation by forwarding the packet to specific positions within the network [8], [9]. However, Frey and Stojmenovic provided a formal proof that these schemes cannot guarantee packet delivery in specific graph classes or even any arbitrary planar graphs [4].

Disadvantages of Existing

1. Energy consumption and energy cost on required large data packets

2. Required GPS devices to find sensor devices

3. Buffer management also plays a significant role in achieving our goal.

4. Bandwidth has a very fine impact on the buffer management scheme. Based on the available bandwidth the dynamicity of the threshold is dependent, so we need an effective & efficient bandwidth estimation technique. There is a traditional buffer management scheme RED (Random Early Detection) which works on threshold principle, but we are in the need to intelligently handle this threshold dynamically based on the available bandwidth.

Neighbourhood node selection problem occurred because of route and link selection. If we give a multiple path to each node then it have ability to select other node. For selection it first checks whether neighbour node available or not using node selection algorithm. Then checks whether neighbour node is active or in sleeping mode to the destination. After that they find selected node, it is near as compare to destination node. If its near to the destination node then checks charging capacity.Finnaly select it and forward packet to it. Loss of connection is a major issue in SinkTrail network. Sometime node is not a range or some internal problem occurs in node. At that time another route path is selected to a requested node. Then it make connection with then and perform operation as per its functionality. Packet Loss is a critical problem in SinkTrail protocol. Packet is a collection of data. It is very confidental. InWireless Sensor Network, packet loss is due to unavailability of sensor node. Some internal problem occurred in sensor node so its not working. Source node forward a packet to destination, but its not reach to a destination. Its working upto a battery power. If it active long time then its battery is discharged. If we give a facility to next node selection. So, such type of problem is not occurred and packet will be send from source node to destination node successfully. In this dissertation we focus our efforts on achieving following goals :

1. Solve a problem of neighborhood node selection.
2. Remove a loss connection condition in sensor node.
3. Remove packet losses and forward a packet to particular destination node.
4. Inactive a discharge node and remove it on a network also replace to another one.
5. Improve PDR and Throughput as compare to greedy forwarding.

All above problem can be solved using dead end free topology. As well as some in geographic forwarding poses major problem of dead end encounter. At that time Dead End Free Topology create some addition overhead and using construction operation via an alternative route they forward a packet to destination.

IV. PROPOSED SOLUTION

As per the problems discussed above the proposed protocols feature low-complexity and reduced control overheads.

We propose an improvement to the SinkTrail. Basically It is a proactive data reporting protocol and self adaptive for various application scenario. For the purpose of data collection in SinkTrail, mobile sink continuously move in relatively slow speed in the field. It broadcasted control messages at certain point using lower frequency for existing data gathering. The mobile sink shows the footprint of the position. This footprint is nothing but a virtual landmark. Using this landmark sensor can easily identify the hop count distance. In distance the sensor nodes coordinate represent the combined logical distance coordinate space constructed by the mobile sink. The coordinate of mobile sink is nothing but its hop count

distance from previous landmark to current location. At last problem of movement prediction for data gathering solve by using SinkTrail. In SinkTrail in place of greedy forwarding, if use a DEFT then its more beneficial for packet forwarding and data gathering.

As per our problem definition, here we explain Dead End Free Topology in detail. For deploying a wireless sensor network, energy consumption is fundamentally required.

The main role of various topology and control protocol is that turning off unnecessary node for energy conservation and maintain a constant level of routing fidelity. Same like that SinkTrail protocol commonly integrate with any routing scheme. whenever a packet encounters a dead end, additional overheads must be paid to forward the packet to the destination via an alternative route.

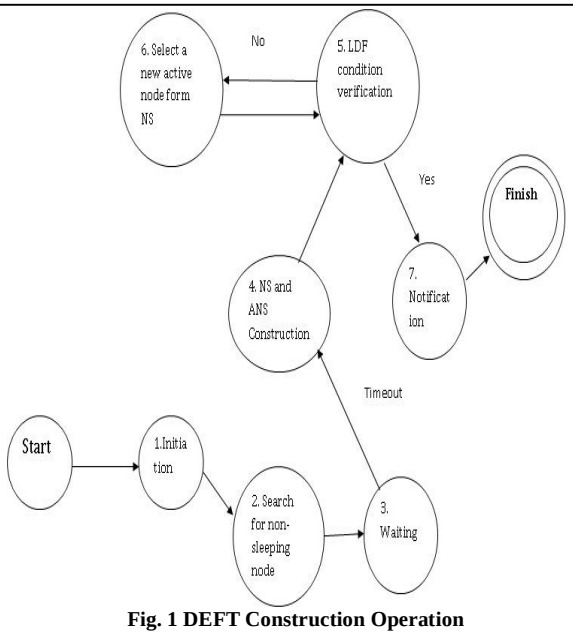


Fig. 1 DEFT Construction Operation

4.1 Working of DEFT

In geographic routing, a dead end situation occurs when the current relay node is unable to locate any neighboring node closer to the packets destination than itself. In working of DEFT ,an initial node is chosen randomly at prescribed periodic intervals and is then used as the starting point for a global topology construction process.

In constructing the topology, neighbouring node to the initial node are activated based on their ability to satisfy the local dead-end free condition.
The selected active neighbours then perform a similar activation procedure with their own neighbouring nodes. This construction process continue iteratively until all the active nodes satisfy the local dead-end free condition(LDF), and there for , by defination, the network satisfies the global dead-end free condition (GDF).

4.1.1 Dead End Handling in Geographic Forwarding

The Most Forward with fixed Radius (MFR) algorithm is widely used for next hop selection in geographic forwarding scheme. In MFR, the current relay node always select the neighbor closest to the destination as the next relay.

4.1.2 Dead End Free Verification

1. GDF Condition: The dead-end situation does not occur at any node in the network.
2. LDF Condition: If the transmission circle of the node is fully covered by the perpendicular bisectors with its neighbours, the node is dead-end free.

4.1.3 Dead End Free Topology Construction

Dead End Free Topology construction is divided into 7 state.

Initially, all the nodes are considered to be in an undecided mode, i.e.,the most appropriate mode for each node ie yet to be determined. The process commences when the sink randomly nominates a node to become an active node, hence causing the node to transit to state 1. In state 1 , the selected node (referred to hereafter as the initiator) sets its mode to active and enters state 2. The initiator then broadcast a message to search for nonsleeping neighbors and then transmit to state 3 for receiving response. Once a nonsleeping node receive the message from the initiator, it reports its operation mode to the initiator. When the initiators timer expire, the process move to state 4.

The initiators first adds all the nodes which have replied to its broadcast to a neighbour set,then adds those nodes which have replied to its broadcast to a neighbour set(NS). Then adds those nodes which are in an active mode to an active neighbour set (ANS), and finally transmit to state 5. From state 5 two transition are possible, i.e. to state 6 or to state 7, respectively. The process transmit to state 6 if the initiator fails to satisfy the LDF condition with the nodes in its current ANS: otherwise , it transmit to state 7(i.e., the initiator satisfies the LDF condition). In state 6, the initiator select a new active node from its NS using active node selection algorithm and then add this nodes to its ANS. The process then returns to state 5 to verify whether or not the updated ANS to satisfy LDF condition. In state 7, the node which have been selected by the initiator to be active nodes are notify and they have been designed at new initiators. Each of this node then perform a topology construction process describe above using its own local neighbour. Meanwhile, those node within a voronoi polygon enclosed by the perpendicular bisector between the original initiator and the nodes

in its ANS are notify to enter the sleep mode. The process then transmit to the end state i.e.,to Finish[2].

Advantages of proposed system :

1. Energy consumption is minimum.
2. It reduce a active node significantly.
3. Packet forwarding rate and ratio is high.
4. Required minimum number of active node.
5. PDR and Throughtput high as compare to existing forwarding technique.

On the basis of this rules and advantages they select nearest neighbour node for alternative path and gather data from destination node.

V. SIMULATION AND RESULT

We perform experiment to evaluate the PDR and throughtput.

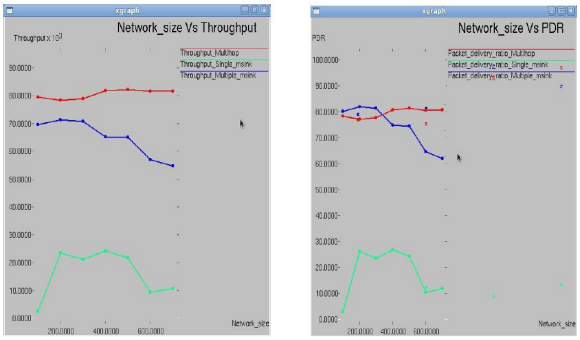


Fig. 2 Dead End Greedy Forwarding

In Fig.2 Graph show greedy forwarding simulation result.

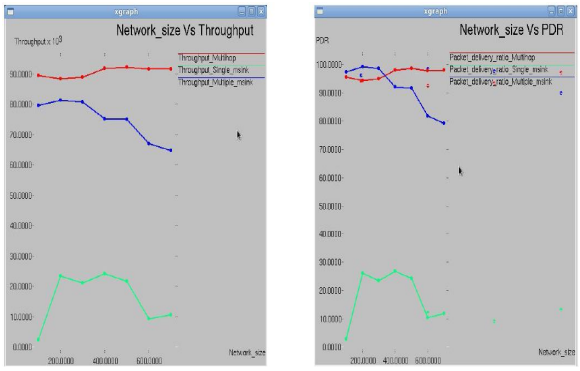


Fig. 3 Dead End Free Topology

In Fig. 3 Graph shows a dead end free topology simulation result. As it can be seen from the graph the proposed, archives the higher throughout and PDR ratio compared to the sinktrail with greedy approach. Finally we conclude that dead end free topology is more beneficial than greedy forwarding algorithm.

CONCLUSION

We proposed an improvement to a SinkTrail with Dead End Free Topology. This wireless sensor protocol various type of uses . But for data gathering dead end problem occur in SinkTrail. We integrated Dead end free topology maintenance protocol, designed as DEFT, for the construction of dead end free topologies for wireless sensor network using a minimum number of active nodes. DEFT is integrated with any MFR-based geographic forwarding algorithm to achieve a packet forwarding capability with low energy consumption and a minimum number of dead end event. The proposal may give the topology constructed by DEFT as dead end free in most simulated scenrios. Furthermore, even when positional error exist, DEFT ensures the only a limited number of dead end event take place. Thus our proposal is to modify SinkTrail for solving a problem of dead end.

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