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Abstract - This paper is survey about life time enhancement techniques used in wireless sensor networks. In wireless sensor network the lifetime of network is more concentrated area for researchers. Many factors are taken into account for the maximization of life time of wireless sensor networks, such as minimizing the power consumption, low cost operation, optimal routing algorithms, forwarding of residual power to every node to avoid the abbreviated of power in nodes, using improved version of protocols and also communication models. In the past few decades the fast explosive growth in the wireless sensor application needs a substantial modification in the infrastructure of networks. This study show the result of the techniques and hindrance present in the techniques.

Keywords -- Star Algorithm, Distributed Algorithms, Delay-Tolerance, Fuzzy Approach, Mobile Sink Node, Probabilistic scheduling controller, Wireless Sensor Networks

I. INTRODUCTION

The one of the main objective of the wireless sensor network is optimize the lifetime of network by taken many considerations. For notice fritter away of power for many operation like radial of data to sink node form every nodes or vice versa, data acquisition, data processing, load traffic , overhead of message passing. These are a bit reason for depressing the lifetime of wireless sensor networks. This study shows some of the techniques used for widen the endurance of the networks.

Wireless Sensor Network (WSN) is a network of huge number of distributed sensor nodes. That sensor node is equipped with radio antennas in sensors nodes to sensing and transfer the data. Each node in the. wireless sensor networks are used for gathering information needed by environments and are particularly useful in unattended situations where terrain, climate and other environmental constraints may hinder in the deployment of wired or conventional networks. The infrastructure, implementation, and function of a sensor network requires the integrating of many orderliness of including signal processing, networking and protocols, embedded systems, information management and distributed algorithms. Such networks are most depend on stiff resource environments, for example with battery operated nodes are hostile interfered.

These constraints indicate that sensor network problems are best approached in an unfavorable manner, these involves in making a new infrastructure for application layers and making major design trade-offs across the layers. One of the main factor of wireless sensor network is high power consumption. Sensor nodes are depending on scarce resources like power. While far-reaching networks aim to achieve a improved quality services. Sensor network protocols most focus on power abbreviated. They must have traditional pact mechanisms that give the option for protract the network life at the cost of lowerand it thresh out the network or higher transmission rate.

Fig1. Sensor Network In fig 1. shows A sensor network is possessed of a large number of sensor nodes, which are most deployed either inside the aspects or near to it. The place of sensor node is not to intend in fixed place. This allows random operation in accessible area. This indicates the sensor networks also capable for possessing self organization.

In other hand the special feature about sensor network is it is able to co-operate with on-board processor. The advantages of sensor network are rather than sending the raw data to the neighbour node It send the processed data. The advent of new concepts in wireless sensor network like micro-fabrication embedded micro processor. This enables the improvisation of application wireless sensor networks in defense service. For example sensor nodes in the wireless sensor networks are operated without any restriction. They are equipped with microprocessor and capable amount of memory for signal processing.
In addition, sensor nodes are equipped with one or more sensing devices like acoustic microphones, video, etc. The operation of wireless sensor networks depend on favorable communication ranges deployed in local nodes.

1.1 Problem Statement

Analysis on wireless sensor networks a bit reason for diminish the lifetime of sensor networks are power Consumption, frequent radial of data to nodes, load traffic, overhead of message passing, energy hole between the nodes and sink nodes. we take a account of techniques like distributed algorithms in delay tolerance, Probabilistic scheduling controllers for maximizing the lifetime of networks, Fuzzy Approach and A-Star Algorithm, Advancement in routing protocol in multichannel sensor network sand communication models.

II. METHODOLOGY

2.1. Distributed Algorithms In Delay Tolerance:

The lifetime of the networks is defined as until the first node of fails due to power depletion. To maximizing the life time of networks. The mobility of sink node is one of the traditional method [1]. The mobility of data collection points (sinks) for the purpose of increasing the lifetime of a wireless sensor network with energy-constrained nodes. Linear programming is the solution for the joint problems of determining the movement of the sink and the joining time at different points in the network that induce them maximum network lifetime. In this techniques the wireless sensor nodes is modeled as a directed graph and the nodes indicated as vertices then link between the nodes are noted as edges.

The goal of this paper is to find a distributed algorithm that solves the lifetime maximization problem associated with DT-MSM. The decisions to be made include how long the sink should stay at each potential stop, and how to route the data to the sink when it stops (including deciding the amount of data transmitted at various nodes), subject to a maximum tolerable delay. The paper has two main contributions. First, our algorithm is both distributed and mostly local. The overall solution is broken down into smaller decision problems and each decision can be done locally in a sensor node. For the most part, only local information at a node itself and at its neighbors is needed.

In general, distributed algorithms are more useful and preferable for networking problems because they can be readily built into network protocols and become network control algorithms.

Local algorithms have the additional benefit of restricting the control traffic to be among locally interacting nodes.

Second, we analyze our algorithm and show that it converges to the optimal objective value for the lifetime maximization problem in the long-run average sense, and that the long-time average of the virtual queue sizes is bounded.

Results

We consider the results of the either simulation or numerical experiments to verify the correctness of our algorithm. First, It show that our algorithm achieves expected optimal objective results that solve the problem present in (4)-(5). Then Lyapunov drift and the queue size evolve is also take into account for the optimal solution. The experiments consist of 50 sensor nodes deployed with 25m radius between the ranges. Generating the six sink nodes for mobile node for visiting. The cost calculation of transmitting the one bit of data to the next neighbour node depends on the distance. Transmission of the node is occurring within the favorable range only. Based on the algorithm it’s the convergence result is primal optimal solution (10)-(16) is obtained by the CPLEX linear programming solver.

Discussion

We discuss our algorithm is currently uses virtual queue sizes and other virtual quantities, such as virtual traffic volumes, for control. To make the network is more adaptive the algorithm has to be compromise the load traffic while the algorithm is being executed. It may be possible to derive simpler, suboptimal or heuristic algorithms based on the insights gained from studying the optimal algorithm in this paper. The heuristics of this algorithm is reviewed compared with optimal solution and also including various engineering costs. The formulation of the problem is enriched incrementally. The movement of the sink node and time is non negligible, location of the sink node is becoming decision variable. Deriving heuristic algorithms in a principled way, as advocated above, may be a good strategy to meet the challenge.

2.2. Probabilistic scheduling controllers

The design of power-aware lifetime maximization algorithms for sensor networks is a forthcoming area for researcher. Normally the performance of the sensors remains the same throughout the life time of the network, the power decay on the performance of individual sensors as well as of the complete network. For notice, the footprints of power decaying in the sensor nodes are taken for consideration. And relate the performance of a sensor to its remaining power. The probabilistic scheduling controllers that compensate for the effects of the decrease in power while maintaining an adequate probability of event detection under two sensing models.
First one is Boolean and the second one is non-Boolean. The probabilistic scheduling controllers is to establish that the desired performance levels are indeed maintained throughout the lifetime of the network. Despite the numerous approaches to conserving power that have been proposed, one issue that still requires attention is the effect of power decay on the performance of individual sensors as well as the performance of the entire network. The coupling between power and performance depends on the type of devices used. For example, if a system consists of vision-based sensors, power levels may be related to the maximally available frame rate; for RF or radar-based sensors, the footprint area may be reduced as the power decreases; and in communication in networks, latency issues may arise due to reduced power levels. In this paper, we explicitly couple the performance of a sensor network comprised of RF or radar-based sensors with their power consumption. Moreover, we use this coupling to design controllers that ensure that the network maintains a desired level of performance throughout its lifetime.

The network under consideration in this paper consists of randomly deployed sensors in a region of interest. The random deployment allows us to use well-established tools from probability theory and stochastic geometry. We will, in fact, model the random deployment as a stationary spatial Poisson point process, and borrowing formulations from stochastic geometry, we will model the sensor coverage problem using the germ-grain model. We will subsequently design a controller that schedules the duty cycles of the sensors so that a constant probability of event detection is ensured throughout the lifetime of the network in the presence of decaying power levels. The probability of event detection will serve as the performance criterion, and we start with Boolean sensing schemes (i.e., an event is detected when it lies in the footprint of a sensor that is on) and derive sensor scheduling control laws for persistent and non-persistent events. We also propose non-Boolean sensing models and derive similar scheduling schemes for such sensing models. The preliminary findings along these lines were presented in [7].

Result

The non-linear control law for duty cycle scheduling is used for maintains the desired performance. Its measure throughout the lifetime of sensor networks. To verify the objective of this scheme, we again run a series of Monte Carlo simulations with the parameters. The probabilistic scheduling controller maintains the desired performance throughout the lifetime of the network.

The lifetime of the network is also depends on the performance of the network, stationary spatial Poisson point process. To establish the relationship between the desired performance criterion and the lifetime of a sensor network, Both persistent and non-persistent events and proposed scheduling schemes for both of these scenarios that maximized the lifetime of the network. Moreover, we examined two sensing models, Boolean and non-Boolean, in order to incorporate different physical sensing characteristics. The results were validated by Monte Carlo simulations of the proposed controllers, which showed that the proposed schemes maintained the desired performance throughout the lifetime of the network.

2.3. Fuzzy Approach and Star Algorithm

Wireless sensor networks (WSNs) are used in many applications to gather sensitive information then the information is forwarded to analysis for the results. Resource availability is taken for consideration when designing the wireless sensor networks (WSN). The power consumption is inherent problem in the wireless sensor networks it is characterized by multihop routing and a many-to-one pattern of the traffic.

The imbalance in the energy of the wireless sensor network is a main problem. To network lifetime using a combination of a fuzzy approach and an approaches of star algorithm. The combination of both approaches is used to determine the optimal routing path from the source to the destination by favoring the highest remaining power in battery with least number of hops, and without overhead of traffic loads.

A. Fuzzy Approach

The goal of the fuzzy part is to determine the optimal value of the node cost and its denoted as NC(n) of node n that depends on the remaining energy RE(n) and the traffic load TL(n) of node n.

In Wireless sensor network the fuzzy approaches consider two variables, Remaining Energy of node as RE(n) and Traffic load of node as TL(n). Two parameters are passed into the fuzzification and outputs are calculated by defuzzification with the performance analysis of interference engine. Rule base is common for both fuzzification and defuzzification.

In fuzzy approach with two input variables RE(n) and TL(n), and an output NC(n), with universal calculation[0…5],[0…10], and[0…1], respectively. In fuzzy approaches use five membership functions for each input and an output variable, the fuzzified values are processed by the inference engine, which consists of a rule base and various methods to inference the rules.
The rule base is simply a series of IF-THEN rules that relate the input fuzzy variables and the output variable using linguistic variables each of which is described by fuzzy set and fuzzy implication operator AND, IF Remaining energy (n) of node is very high and Traffic Load (n) of node is very low THEN NC(n) is very high. All these rules are processed in a parallel manner by a fuzzy inference engine. Any rule that fires contributes to the final fuzzy solution space. At the end, the defuzzification finds a single crisp output value from the solution fuzzy space. This value represents the node cost.

B. Star Algorithm

In the new routing method, the base station prepares the routing schedule and broadcast it to every node. The main objective of the star algorithm is used to find the optimal route from the node to the base station is applied to each and every node. It create tree structure in order to search optimal routing path from a given node to the base station. The tree node is explored based on its evaluation function f(n). The function we used is given as: f(n) = NC(n) + (1/MH(n)). Where NC(n) is the node cost of node n, which takes value [0…1], and can be calculated by one of the two approaches. Then remaining energy and the traffic load of node n to calculate the optimal cost for node n. MH(n) is the short distance from node n to the base station is calculated by fuzzy approaches. As a result, the node n that has largest f(n) value will be chosen as the optimal node.

Result

The effectiveness of the proposed method in terms of balancing energy consumption and maximizing the lifetime of network, the result A-star search algorithm and with those of Fuzzy approach for two different configurations of network areas. The above two approaches uses the same parameters minimum multihop and minimum traffic load from the source node to the sink node. The A-star algorithm is shown to outperform existing maximum lifetime routing algorithms in literatures such as Genetic Algorithm, Warshall algorithm [14] and AODV algorithm [15]. The fuzzy approach is also shown to exhibit better performance over existing maximum lifetime routing algorithms in literatures such as Online-Maximum-Lifetime-heuristic (OML) [16] and Minimum Transmit Energy (MTE) [17]. Experimental results obtained under various network scenarios in [16], [17], [14], [15] indicate that both the Fuzzy approach and star algorithm give optimal performance in terms of the network lifetime as well as the average energy consumption.

Discussion

In wireless sensor networks where nodes operate on limited battery energy efficient utilization of the energy is more noticeable thing. The network lifetime is highly related to the selection of the route. The efficient transmission of data is depend on the optimal path from node to node and to prolong the overall networks lifetime. The combination of both Fuzzy approach and star algorithm. This method is capable of selecting the optimal routing path from the source node to the sink by favoring the main objective. The above method is evaluated and compared with other methods under the same criteria in two different network topological area. The results shows the efficient of the new approach with regards to enhancement of the lifetime of wireless sensor networks with randomly scattered nodes.

2.4 Reliable Routing Scheme

A. Multipath Based Routing Protocols

Multi-path routing is an interesting outing method for wireless sensor networks. The multi-path routing has the advantage to achieve load balancing and is more resilient to route failures. There are a lot of multi-path routing protocols that belong to this scheme for wireless sensor networks and the performance evaluations of them may show that they take advantage of the lower routing overhead, the lower end-to end delay and the alleviate congestion in comparison with single-path routing protocols.

B. Routing On-demand Acyclic Multipath (ROAM):

The ROAM presents an on-demand distance-vector algorithm called Routing On-demand Acyclic Multipath (ROAM). It uses a concept called feasible distance to maintain routes and loop freedom. ROAM detects network partitions by requiring nodes to send update messages to neighboring routing whenever there is a change in distance to a certain destination.

C. Label-based Multipath Routing (LMR):

The LMR broadcasts a control message throughout the network for a possible alternate path. During the process, labels are assigned to the paths the message passes through. The label information is used for segmented backup path search if a disjoint path is not achievable. The LMRs designed to use only the localized information to find disjoint paths or segments to protect the working path. With one flooding, LMR can either find disjoint alternate paths or several segments to protect the working path. In LMR, after the nodes, on the working path, have reinforced one of their links, as the link to form a working path, they broadcast a label message to the rest of their neighbours. Both, the reinforcement and label messages, take an integer, termed label. The value of the label is increased by 1 by each working node which then broadcasts a new label message. Every working node should remember this value as its own node label.
The label messages are forwarded towards the source along all the paths which the exploratory data messages pass through. A node receiving two or more label messages will forward the one with smaller label value only.

The idea is to make the label message from the node closer to the sink go as far as possible so that the disjoint paths are possible to be found. The working nodes do not forward the label messages from any other nodes. Every node should remember all labels it has seen and the associated neighbours. It node receive more messages with the same label value from different neighbours, only the first one is recorded to find a shortest backup path. The label information can reduce the routing overhead and backup path setup delay. However, to find the possible alternate paths, LMR incurs overhead, a flooded label message, and a label reinforce message and a backup exploratory message.

D. Hierarchy-Based Multipath Routing Protocol (HMRP):

The HMRP employs a hierarchical concept to construct an entire sensor network. Each sensor node (involving the sink node) just needs to broadcast the layer construction packet once and maintain its own CIT (Candidates Information Table). When a sensor node disseminates a data packet, it only needs to know which parent node to transfer, without to maintain the whole path information. This can reduce the overhead of the sensor node. Although HMRP has to compute some information to record in the CIT of the sensor node, the energy expense is less than transmission and reception.

E. Gradient Broadcast (GRAB):

The GRAB, is designed specifically for robust data delivery in order to deal with the unreliable nodes and fallible wireless links. It builds and maintains a cost field by propagating advertisement (ADV) packets in the network. As soon as a node receives an ADV packet containing the cost of the sender, it calculates its cost by adding the link cost between itself and the sender to the sender’s advertised cost.

It compares this cost to the previously recorded one and sets the new cost as the smaller of the two. As it obtains a cost smaller than the old one, it broadcast ADV packet containing the new cost. GRAB controls the width of the band by the amount of credit carried in each node receives messages an allowing the sender to enhance the robustness of the network of the data delivery.

The advantage of GRAB is that it relies on the collective efforts of multiple nodes to transmit the data, without consideration of the interference of individual nodes and it is really robust. On the other hand, It may have overhead by sending redundant data.

F. Cluster-Based Multi-Path Routing (CBMPR):

CBMPR combines cluster-based routing and multipath routing efficiently. The CBMPR makes use of cluster network to find multiple paths, that provide independent paths, decrease routing control overhead and improve the networks scalability. As in all the hierarchical protocols, CBMPR sets cluster heads and member nodes. The nodes in the networks send HELLO messages regularly. A cluster member adds its IP address; a cluster head adds the IP address of its cluster member, into its HELLO message. A cluster head keeps tracks of all the IP addresses of its cluster member in its routing table. Moreover, the cluster head keeps a neighbour table, which contains all the IP addresses of its neighbour cluster head. The CBMPR is a multipath protocol as it sets up multiple paths from the source node to the destination node.

G. Directional Geographical Routing (DGR):

In a novel multipath routing protocol DGR is presented. This protocol is a very interesting solution to the problem of real time video streaming over a bandwidth and energy constrained WSN from a small number of dispersed video sensor nodes (VNs) to a sink by combining forward error correction (FEC) coding. In DGR an active Video Sensor Node (VN) broadcast to its direct neighbours a packet concatenating all the data and FEC packets of a video frame. As soon as these nodes receive the concatenated packet broadcasted by the VN, they select their own payload according to the identifiers and the sequence numbers of the corresponding packets of these nodes, in the concatenated packet. Then these node unicasts the assigned packets to the sink via the respective individual paths, where the multipath routing layer sets up 3 paths between the source and the sink. Moreover, each path uses a different initial direct neighbour.

H. Directional Controlled Fusion (DCF):

The main ability of the DCF is the jointly consideration of data fusion and load balancing. Also a key parameter in DCF named multipath fusion factor can provide the trade-offs between multipath-converging and multipath-expanding in order to satisfy specific QoS requirements from various applications. In DCF one source node is selected as the reference source per round based on some criteria (maximum of the remaining energy, distance from the centre of the target region, or distance to the sink). The first step is for every source node to start a Reference-Source-Selection-Timer (RSSTimer). At the RSSTimer a random value to each timer based on a specific criterion is set. In this step a small value of RSSTimer indicates that a source has higher eligibility as the reference source.
The next step is the monitoring of the RSS-Timer. The source whose this value expires first will be selected as the reference source and will broadcast an election notification message within the target region. When other source nodes receive this message, they will cancel their RSS-Timers and know the reference source’s location piggybacked in the message.

The next step is the reference source to initiate the construction of the reference path and the side sources to transmit the control packets

2.5 Communication Model Scheme

A. Query-Based Routing Protocols

In Query-based routing protocols, the destination nodes propagate a query for data (sensing task) from a node through the network and a node having this data sends the data which matches the query back to the node, which initiates the query. These queries are usually described in either normal language or high language definition. In directed diffusion the BS (Base Station) node sends out interest messages to sensors. When the source has data the source sends the data to the interested gradient path. To lower energy consumption, data aggregation (e.g., duplicate suppression) is performed end route

B. Active Query forwarding In sensor networks

The ACQUIRE views the network as a distributed database where complex queries can be further divided into several sub queries. The Base Station (BS) node sends a query, which is then forwarded by each node tries to respond the query when it receive the query to the query partially by using its pre-cached information and then forwards it to another sensor node. If the pre-cached information is not updated. The nodes collect the information from neighbours within a look-ahead of hops. Once the query is being resolved completely, it sent back through either the reverse or shortest-path to the BS. Hence, ACQUIRE can deal with complex queries by allowing many nodes to send responses

C. Duty cycle

Information gathering is a fast growing and challenging field in today’s world of computing. Sensors are tiny devices that are capable of gathering physical information like light, heat, motion of an object or Environment. Wireless sensor network consist of autonomous sensor nodes that can be deployed for monitoring areas such as, forestfire, glaciers, deep oceans etc.[18][19]. Sensor node is made up of four basic component namely sensing unit, processing unit, transceiver unit, power unit. The nodes can self organize themselves to form a multi-hop network and transmit the data to a sink. In a energy constraint WSN, each sensor node has limited power energy for which enhancement of network lifetime becomes a major challenge.

In a distinctive wireless sensor network, the network traffic meets at the sink. There is a large amount of data flow near the sink. The area around the sink is known’s as the bottle neck zone. Heavy traffic load imposes on the sensor node near the sink node. The nodes in the bottleneck zone consume more energy, referred as energy whole problem. Failure of such nodes inside the bottleneck zone leads to wastage of network energy and reduction of network reliability.

In an energy constraint wireless sensor network all node in active condition is not practical. The sensor node saves energy by switching between active and sleep states. The ratio between the time during which a sensor node is in active state and the total time of active/dormant states is called duty cycle. Usually for a dense WSN the duty cycle of a node is very low. A duty cycle can be can be classified into two main types: random duty cycle[20] and coordinated duty cycle[21]. In earlier of the random duty cycle, the sensor nodes are turned on and off independently in random fashion. In later the sensor nodes coordinate among themselves through communication and message exchanges. However, it requires additional information exchange to distribute active and sleep states schedules of each nodes. Hence, The random duty cycled WSN are not complex to design as no overhead is required. The random duty cycle uses an multi path based packet forwarding[16] for improving reliability and packet delivery in the network. Specifically, random duty cycled considered the problem of reducing heavy traffic flow in the bottleneck zone.

D. Network coding

Network coding technique is a methodology for enhancing an lifetime of a wireless sensor network. Network coding[18] was first introduced in an wired networks to solve bottleneck problem and to increase the throughput. However, The broadcast nature of wireless network and the variety of links make an network coding more enchanting in wireless sensor network. A network coding layer include network coder nodes has enclosed all over the sink. The network coding layer is the most overloaded region of bottleneck zone since network coding uses an single hop communication. There is a two group of nodes namely, relay nodes and network coder nodes. The nodes are named depending upon their network. A group of vulnerable nodes in the bottleneck zone transmit using network coding based communication. The other group of nodes in the bottleneck zone act as a simple relay nodes. These relay nodes forward the received packet towards the sink.

The functionality of network coding layer is check its role. Whenever a node enter into the bottleneck zone. The network coding layer maintains received queue and a sensed queue. On receiving a packet a node put the packet in received queue.
If sensed queue is not a empty pick a packet from the head of the received queue and also from head of the sensed queue and generate (XOR) encoded packet. However, the received packets is already processed as an encoded packets then it is discarded by the node, if the node is not an encoder node, it act as a simple relay node and transmit the received packet to the sink. Here the decoding procedure is performed only at the sink which process all the gathered data in the wireless sensor network. The lost packet require more energy consumption for the retransmission, so it needs an sophisticated routing protocols.

Hence multi path kind of routing technique are used for better reliability with less latency of packet delivery. By using multipath forwarding routing multiple reception of data flow occur. In such a scenario, network coding based approach reduces the traffic inside the bottle neck zone and help in restricting further redundant transmissions. The network coding technique improves the capacity of an information network with better utilization of bandwidth. The duty cycle and network coding technique can be merged to utilize the network resources efficiently. Finally the network coding based approach which reduces the traffic flow inside the bottle neck zone for maximizing the lifetime of Whole Wireless sensor network.

III. CONCLUSION

The paper is survey about what are the techniques are used in the wireless sensor networks for enhancing the life time of networks. Inputforward both advance techniques and some of a bit previous techniques ,we cross more over important techniques but still some of the improved enhancements needed. The future work will be centering on solar plates to notice what is the contribution for reducing the power consumption and enhance the lifetime of sensor networks.

REFERENCE


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