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A Survey on Snapshot and Data Collection in Wireless Sensor Network

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***Abstract*—Wireless sensor networks have been applied to many applications since emerging. Among them, one of the most important applications is sensor data collection, where sensed data are continuously collected at all or some of the sensor nodes and forwarded through wireless communications to central base station for further processing. Data collection has been frequently proposed to reduce the number of message exchange in wireless sensor network. Most existing works studying the network capacity issue are based on Probabilistic Network Model. Cell-based Path Scheduling (CPS) algorithm for Snapshot data collection and Zone-based Pipeline Scheduling (ZPS) algorithm for Continuous Path Scheduling. This work proposes Cell-based Path Scheduling algorithm (CPS) and Zone-based Pipeline Scheduling (ZPS) algorithm. ZPS algorithm significantly speeds up the data collection process**

Keywords—Data collecetion; formatting; style; styling; insert (key words)

I. Introduction

Wireless sensor network is An autonomous, ad hoc system consisting of a collective of networked sensor nodes designed to intercommunicate via wireless radio. Wireless sensor networks (WSNs) have wide variety of applications and provide to many future. One of the most important applications is Sensor data collection where sensed data or information will be collected from physical world and forwarded through wireless communication networks. In wireless sensor node is powered by a battery and uses wireless communications. This results in the small size of a sensor node and makes it easy to be attached at any location with little disturbances to the surrounding environment. Such flexibility greatly eases the costs and efforts for deployment and maintenance and makes wireless sensor networks a competitive approach for sensor data collection comparing with its wired counterpart. In fact, a wide range of real-world deployments have been witnessed in the past few years. In this paper study data collection from sensor nodes to sink through two techniques as Cell-based Path Scheduling (CPS) algorithm for Snapshot data collection and Zone-based Pipeline Scheduling (ZPS) algorithm for Continuous Path Scheduling[2][3]. This paper An Acknowledgement Based Snapshot and Data collection in Wireless sensor Networks is going to be carried out to achieve the efficient data delivery over the lossy channels. For packet forwarding and performance of sensor node to sink via multiple levels of fusion and for sending acknowledgement. This acknowledgement will be sent with the help of AODV protocol.

II PROBLEM FORMULATION

Problem formulation consists of three parts**,** first part presents the literature survey, second part presents the problem that is defined as the result of literature survey and in the final partthe existing system is presented briefly

LITERATURE SURVEY

"Snapshot/Continuous Data Collection Capacity for Large-Scale Probabilistic Wireless Sensor Networks"IEEE-Proc Shouling Ji, Raheem Beyah and Zhipeng Cai

This paper proposed about Snapshot and Data collection based on Deterministic Network Model(DNM) where any pair of nodes in a network is either connected or disconnected. If two nodes are conneceted i.e there is a deterministic link between them,then as a successful data trasnmission can be guranted as long as there is no collision. Even without intereference, data transmission over a lossy link is successfully conducted with certain propability, rather then being completely guaranted. Therefore more practical N/W model for WSNs is the Probabilistic Network Model(PNM).

Techniques

a)Cell- based Multipath scheduling

It schedules multiple super nodes on multipath concurrently.

b)Zone-based Pipeline Scheduling

It significantly speeds up the CDC process by forming a data transmission pipeline.

Disadvantages

- Deterministic Network Model(DNM) is not practical and is too Ideal due to Transition region Phenomenon.
- Not efficient Data Delivery.

"A Delay-Aware Data Collection Network Structure for Wireless Sensor Networks"

Chi-Tsun Cheng, Member, IEEE, Chi K. Tse, Fellow, IEEE, and Francis C. M. Lau, Senior Member, IEEE

This paper deals with minimizing the delays in the data collection process and Energy saving in the Wireless Sensor Networks. Wireless sensor networks (WSNs) utilize large numbers of wireless sensor nodes to perform close-range sensing data. It uses the many to one network structure. The number of DCPs completed in a given period of time is important for reconstructing an accurate data. Here energy is conserved by clustering. With which each cluster, one of the node is elected as a Cluster Head(CH) and with the rest being Cluster Members(CM).The cluster head will collect data from its cluster members directly or in a multihop manner.

Technique

a) Multistage network formation algorithm

In the multistage network formation algorithm is based on the dynamic programming. To construct the proposed network structure while keeping communication distances among sensor nodes at low values.

Disadvantage

- Without increasing data collection durations.

"Distributed Minimal Time Convergecast Scheduling for Small or Sparse Data Sources," Y. Zhang, S. Gandham, and Q. Huang, IEEE

In this paper there are the two situation used in this paper: First is the length of the packets generated by nodes is much smaller than the maximum length of a data frame that can be transmitted in one time slot. Second is every node in the network has data to transmit and for those that have, may have lots of data that require more than one packet. Nature of convergecast leads to high probability of collision and data loss in the network. The paper is used as the CSMA MAC layers. Particularly when one adopts contention-based MAC protocols like CSMA for its simplicity and low overhead.

Technique

a) Distributed convergecast scheduling algorithm

The algorithm is significantly decreases the number of time slots required for converge-cast in linear and mesh networks. The proposed algorithm is applicable even when nodes have multiple packets to be sent to the base station.

Disadvantages

- It has the high cost of initialization.
- Adaptive to permanent node failures during converge cast.

"TIGRA: Timely Sensor Data Collection Using Distributed Graph Coloring," L. Paradis and Q. Han IEEE

This paper proposed that the nature of many sensor applications as well as continuously changing sensor data often imposes real-time requirements on wireless sensor network protocols. Our objective is to design a protocol for sensor applications that require periodic collection of raw data reports from the entire network in a timely manner. Latency in packet delivery is caused by the low transmission rates of the sensor devices, packet loss and corruption due to the link and node failures, packet collisions, and network congestion.

Technique

a) Traditional graph coloring algorithm

There are used in two steps used in this algorithm. First, interference constraints must be satisfied while maximizing spatial channel reuse. Second, multihop communication creates unique precedence constraints. Third, to be minimized during both the transmission scheduling stage and the data collection stage. The traditional graph coloring algorithm is used to node being able to send a message to and receive a response from all its neighbours during each communication round.

Disadvantages

- Each node generates a fixed amount of data to transport to the base station.

"Application-Aware Data Collection in Wireless Sensor Networks" Xiaolin Fang, Hong Gao, Jianzhong Li, and Yingshu Li

This paper is the first work to introduce the interval data sharing problem which is to investigate how to transmit as less data as possible over the network, and meanwhile the transmitted data satisfies the requirements of all the applications. This paper proposed Application by reducing communication cost of data collection with guaranteed error bounds. Each application requires a single data sampling during each task, studies the problem where each application requires a continuous interval of data sampling in each task instead.

Techniques

a) Greedy heuristic algorithm

It is used to find an approximate solution.

b) Monitoring algorithm

It is used to adaptively adjust the composition of node subsets according to changes of sensor.

Disadvantages

- Packet losses due to the limited bandwidth of sensor nodes.
- Communication traffic and potentially results in network congestions.

"Analyzing the Transitional Region in Low Power Wireless Links" Marco Zuniga and Bhaskar Krishnamachari

This paper proposed real deployments have a "transitional region" with highly unreliable links and that therefore the idealized perfect-reception-within-range models used in common network simulation tools can be very misleading. In this paper, mathematical techniques from communication theory to model and analyze low power wireless links. The primary contribution of this work is the identification of the causes of the transitional region and a quantification of

their influence. Specifically expressions for the packet reception rate as a function of distance, and for the width of the transitional region are derived.

Techniques

a)Modulation

Modulation techniques like ASK,FSK and PSK.

b)Encoding

Manchester and NRZ Encoding is used.

Disadvantages

- If parameters mentioned above are modified then the empirical model is either not valid or not accurate.
- A large number of the links in the network (even higher than 50%) can be unreliable due to the transitional region.

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Problem Definition

By the literature survey stated above the data delivery over the network is not efficient over lossy channels. In real applications, deterministic network model assumption is not practical due to the "transitional region Phenomenon". With the transitional region phenomenon, a large number of network links (more than 90 percent) become unreliable links, named lossy links

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Existing System

Wireless Sensor Networks (WSNs) are mainly used for gathering data from the physical world. Generally, data gathering can be categorized as data aggregation, which obtains aggregated values, for example, the maximum, minimum, or average values of all the data, and data collection, which gathers all the data from the network without any data aggregation. For data collection, the union of all the values from all the nodes at a particular time instant is called a snapshot. The problem of collecting one snapshot is called snapshot data collection (SDC). On the other hand, the problem of collecting multiple continuous snapshots is called Continuous Data Collection (CDC)[2]. To evaluate network performance, network capacity, which can reflect the achievable data transmission/collection rate, is usually used. Particularly, for unicast, multicast, and broadcast, uses unicast capacity, multicast capacity, and broadcast capacity to denote the network capacity, respectively[3]. For data collection, we use the data receiving rate at the sink, referred to as data collection capacity, to measure its achievable network capacity, i.e., data collection capacity reflects how fast data have been collected at the sink.

All of the above-mentioned works are based on the deterministic network model, where any pair of nodes in a network is either connected or disconnected. If two nodes are connected, i.e., there is a deterministic link between them, then a successful data transmission can be guaranteed as long as there is no collision. For the wireless networks considered under the deterministic network model, we call them deterministic wireless networks. However, in real applications, this deterministic network model assumption is not practical due to the "transitional region phenomenon" [6] (beyond the always connected region, there is a transitional region where wireless links are opportunistically connected). With the transitional region phenomenon, a large number of network links (more than 90 percent [6]) become unreliable links, named lossy links [1].Even without interference, data transmission over a lossy link is successfully conducted with certain probability rather than always successful or always failing. Therefore more practical Network model for WSNs is the probabilistic Network Model(PNM).

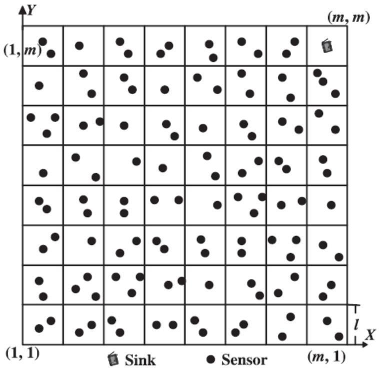
II. PRAPOSED SYSTEM

This paper studies the achievable Snapshot Data Collection and Continuous Data Collection capacity for probabilistic WSNs. First investigate how to partition a probabilistic WSN into cells and zones to improve the concurrency of the data collection process.

For a probabilistic WSN deployed in a square area, first partition the network into small cells. Abstract each cell to a super node in the data collection tree built for data collection. And then proposes two data collection schemes, the Cell-based Path Scheduling (CPS) algorithm and the Zone-based Pipeline Scheduling (ZPS) algorithm for Snapshot Data Collection and Continuous Data Collection, respectively. For the Continuous Data Collection problem in a probabilistic WSN, an intuitive idea is to employ a SDC method in a pipeline manner. However, this idea can only improve network capacity within a constant factor even in a deterministic WSN []. Therefore, by combining the CDG technique (a data gathering technique by exploiting the compressive sampling theory) and the pipeline technique, this paper proposes a novel ZPS algorithm for CDC in probabilistic WSNs. Taking the benefits brought by CDG and pipeline, ZPS improves the achievable network capacity significantly. For collecting N continuous snapshots, we theoretically prove that the asymptotic achievable network capacity of ZPS.

After doing this all still there is no guarantee of data delivery efficient over lossy channels. Consider if source forwards packet to sink and thinks it has reached and send second packet continue but sink has not got that packet thus packet has lost or packet reached delay. So how to get confirmed about packet reaching destination? Here it proposes answer for this question by sending an Acknowledgment to the source that packet it has sent reached successfully and send next sort of packets without delay. And hence completely making network more efficient and perfect. This acknowledgement is sent with the help of AODV protocol. Comparing with other protocols concluded that AODV is better for this work as AODV takes the interesting parts of DSR and DSDV, in the sense that it uses the concept of route discovery and route maintenance of DSR and the concept of sequence numbers and sending of periodic hello messages from DSDV. Routes in AODV are discovered and established and maintained only when and as long as needed. Fig 1 shows about the architectural diagram how nodes are divided and collection of data will be sent from source to sink.

Architecture Diagram



Advantages

1) By Acknowledgment based snapshot and data collection one can achieve efficient data delivery over lossy channel.
2) Zone-based Pipeline Scheduling (ZPS) algorithm, which significantly speeds up the Continuous Data Collection process by forming a data transmission pipeline.
3) Cell-based Path Scheduling(CPS) algorithm, which schedules multiple super nodes on multiple paths concurrently.

IV.CONCLUSION

This paper Snapshot and Data collection in Wireless sensor Networks is going to be carried out to achieve the efficient data delivery over the lossy channels. For packet forwarding and performance of sensor node to sink via multiple levels of fusion and for sending acknowledgement AODV protocol is used. For Snapshot Data Collection (SDC), this proposes a novel based Cell-based Path Scheduling(CPS) algorithm, which schedules multiple super nodes on multiple paths concurrently. And for Continuous Data Collection (CDC) here proposes a Zone-based Pipeline Scheduling (ZPS) algorithm, which significantly speeds up the Continuous Data Collection process by forming a data transmission pipeline and achieves a surprising network capacity. The simulation results also validate that the proposed algorithms significantly improve network capacity compared with the existing works.

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