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A Survey On Scheduling Schemes With Security In Wireless Sensor Networks

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Abstract

Wireless Sensor Network (WSN) is highly distributed network of small and light weight node. The node has the limited battery lifetime. Packet scheduling is important in WSN to maintain fairness based on priority of the data and to reduce the end to end delay. Existing packet scheduling algorithm used were First Come First Served (FCFS), Preemptive, Non-Preemptive.

In this paper Dynamic Multilevel Priority (DMP) Packet Scheduling Scheme with the Bit Rate classification is proposed. The threshold value check mechanism is also proposed to prevent the deadlock situation. To provide security we will be implementing the RC6 security algorithm.

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1. Introduction

Wireless Sensor Network consists of various number of the nodes which are capable to collect the information from the environment and communicate through the wireless transceivers. The collected information is send to the sink node generally via multi hop communication. Sensor nodes are resource constrained in terms of energy, memory, processor, low range communication and the bandwidth. The nodes have the limited battery life time since they are charged through battery power³. Sometimes it becomes really difficult to replace the node in a hostile environment when the node is dead. This affects the network performance, so the sensor node energy is considered to be the most precious resource in the wireless sensor network, and efficient utilization of energy is needed to prolong the network life time which has been the focus of much of the research in the WSN. Sensor node spend their energy in transmitting the data, receiving the data and also in the relaying of the packets. Hence the important consideration is to design the routing algorithm that maximize the life time of the network.

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One another important consideration in real time data transmission of WSN is to schedule the packets at the sensor node which ensures delivery of different packets based on their priority and fairness without any delay. This results in saving the battery energy. Schedulers like First Come First Served (FCFS)¹³ process the data packets in the order of their arrival time and thus require lot of time to be delivered to the relevant base station (BS). However the main constraint is the sensed data should be delivered to the base station at the specified time period or before the expiration of the deadline.

The scheduling algorithms like sleep/wake scheduling can be classified based on different aspects which are as follows centralized, distributed, random and deterministic. The centralized scheduling requires a central node with sufficient computational capacity, in distributed scheduling the task is performed in a distributed manner so require low energy consumption, in the randomized scheduling the time is divided into periods and the deterministic approach is to decide whether a sensor should be active or at the sleep condition. So the sleep scheduling can be applied to the node when it has no task to perform in order to save the energy consumption of the node^{1,2}.

To provide the security in the system RC6 security algorithm is used, it is simple, fast and secure. It is an improvement of the RC5 algorithm. It is designed to achieve increased security and better performance. RC6 makes use of data dependent rotations. One new feature of RC6 is to use four working registers instead of the two, RC6 is modified it is designed to use four 32-bit registers rather than two 64-bit registers. This has the advantage that it can perform two rotations per round rather than the one found in a half-round of RC5^{14,15}.

The rest of the paper is organized as follows in section II we have discussed various existing real time scheduling scheme. Section III presents the literature survey. Section IV represents the proposed plan and the flow chart of the proposed plan. Section V concludes the paper.

2. Existing Real Time Scheduling Scheme

There are various existing real time scheduling scheme which are as follows:

2.1 Dynamic Conflict Free Transmission Scheduling (DCQS): It is a query based novel scheduling technique in Wireless Sensor Networks, it is designed to support in network data aggregation and in response to the workload changes it can dynamically adapt to the transmission. The advantage of the scheme is it has maximum query rate, low run time overhead and good rate control. The drawback of the scheme is throughput and query rate reduction^{9,10}.

2.2 Nearest Job Next (NPN): It consists of the mobile element (ME) server and the client. The client is the one which request the service and it is a simple and intuitive discipline which is adopted by the ME to select the next to be served request i.e. client. The advantage of the scheme is it has reduced travel distance, and the structure of the network is clustered. The drawback of the scheme is light traffic intensity should be considered¹¹.

2.3 Traffic Pattern Oblivious Scheduling (TPO): It can efficiently handle a wide variety of the traffic pattern by using a single TDMA schedule. The advantage of the scheme is less energy consumption, and it deals with any network full traffic pattern. The drawback of the scheme is the performance decreases with increasing traffic load¹².

2.4 Dynamic Multilevel Priority Packet Scheduling (DMPPS): It has three levels of the priority queues, based on the priority the data is placed in the priority queue, the last level of the virtual hierarchy does not have the priority queue and the levels are formed based on the hop distance from the base station. The advantage of the scheme is it is dynamic to the changing requirement and it is virtually organized. The drawback is that the packet priority cannot be changed during the execution time³.

2.5 First Come First Serve (FCFS): It is the simplest packet scheduling algorithm in which packets are processed as they come. The advantage of the scheme is it has minimal overhead, and no starvation. The drawback of the scheme is it is not stable and it gives poor performance¹³.

Out of all these schemes DMPPS is better scheme when compare to other schemes.

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