TRUST AND EFFICIENT BASED AUTO SIMULATION ACCESS IN WIRELESS SENSOR NETWORKS

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ABSTRACT

Sleep wake-up scheduling is one of the fundamental problems in wireless sensor networks, since the energy of sensor nodes is limited and they are usually unrechargeable. The purpose of sleep wake-up scheduling is to save the energy of each node by keeping nodes in sleep mode as long as possible and thereby maximizing their lifetime. Unlike most existing system that use the duty cycling technique,which incures a tradeoff between packet delivery delay and energy saving, the proposed approach, based on the reinforcement learning technique, enables each node to autonomously decide its own operation mode (sleep, listen, or transmission) in each time slot in a decentralized manner. Simulation results demonstrate the good performance of the proposed approach in various circumstances.

I. INTRODUCTION

In recent years an efficient design of a Wireless Sensor Network has become a leading area of research. A Sensor is a device that responds and detects some type of input from both the physical or environmental conditions, such as pressure, heat, light, etc. The output of the sensor is generally an electrical signal that is transmitted to a controller for further processing. Wireless Sensor Network (WSN) can be defined as a self-configured and infrastructure-less wireless network to monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants and to cooperatively pass their data through the network to the main location or sink where the data can be observed and analyzed. A sink or base station acts like an interface between users and the network. One can retrieve required information from the network by injecting queries and gathering results from the sink. Typically a wireless sensor network contains hundreds of thousands of sensor nodes. The sensor nodes can communicate among themselves using radio signals. Wireless sensor devices can be equipped with actuators to "act" upon certain conditions. When it comes to energy consumption, one often encounters difficulty, as evaluation and optimization of the network as a comprehensive model that takes the energy consumption into account hardly exists. The main operational sustainability concern in WSN is its energy resource constraint. This brings in recent years that a great number of energy efficient routing protocols have been proposed for WSNs based on the network organization and the routing protocol operations. A few of them are discussed below.

However, the low data rate is not always maintained in wireless sensor networks which often have to deal with event-driven scenarios where a sudden event rapidly increases traffic load within the network. A traffic-adaptive duty cycle adaptation mechanism was proposed in order to provide responsiveness to traffic rate variations for TR-MAC protocol contributed a sleep scheduling method to reduce the delay of alarm broadcasting. Their method uses staggered wake-up schedules to create unidirectional delivery paths for data propagation, significantly reducing the latency of the data collection process. When a node detects a critical event, it creates an alarm message and quickly transmits the message to a centre node along a predetermined delivery path. The center node then broadcasts the alarm message to the other nodes along another predetermined delivery path. Their approach works very well if packets are delivered in the designated direction, but it is not efficient when packets are delivered in other directions jointly designed an asynchronous sleep/wake-up scheduling approach and an opportunistic routing protocol. In the sleep/wake-up scheduling approach, each node wakes up for a wake period of length and then enters the sleep mode for a sleep period of length alternately.

B.Fu, Y.Xiao, X.Liang [6], provided a description of PEGASIS-LEACH (P-LEACH), a near optimal cluster-based chain protocol that was an improvement over PEGASIS and LEACH both. The LEACH protocol is based on cluster formation, where all nodes in a network organize themselves in a local cluster and select a cluster head, which collects information from the non-head node and transmits it to the base station. PEGASIS protocol, a chain of sensor nodes is formed and leader node is selected for each round randomly. A leader of a particular round collects the data, fuses the data, and sends the data to the base station. Thus in P-LEACH, the cluster formation technique of LEACH was used in the chain based architecture of PEGASIS. presented a survey of state-of-the-art routing techniques in WSNs. The design challenges for routing protocols in WSNs followed by a comprehensive survey of routing techniques were outlined and introduced an enhancement over the LEACH protocol. The protocol called Power-Efficient Gathering in Sensor Information Systems (PEGASIS) is a near optimal chain-based protocol.

II. EXISTING SYSTEM

Most existing studies use the technique of duty cycling to periodically alternate between awake and sleeping states. In most existing duty cycling-based sleep/wake-up scheduling approaches, the time axis is divided into periods, each of which consists of several time slots. In each period, nodes adjust their sleep and wake up time, i.e., adjusting the duty cycle, where each node keeps awake in some time slots while sleeps in other time slots. In the proposed self-adaptive sleep/wake-up scheduling approach, the time axis is directly divided into time slots. In each time slot, each node autonomously decides to sleep or wake up.

DISADVANTAGES OF EXISTING SYSTEM:

- Consume more energy.
- High packet delivery latency
- Decrease network lifetime.

III. PROPOSED SYSTEM

- In this paper, a self-adaptive sleep/wake-up scheduling approach is proposed, which takes both energy saving and packet delivery delay into account. This approach is an asynchronous one and it does not use the technique of duty cycling.
- This approach is the first one which does not use the technique of duty cycling. Thus the tradeoff between energy saving and packet delivery delay, which is incurred by duty cycling, can be avoided
- Unlike recent prediction-based approaches, where nodes have to exchange information between each other, this approach enables nodes to approximate their neighbors' situation without requesting information from these neighbors.

3.1 ADVANTAGES OF PROPOSED SYSTEM:

- The proposed approach provides a new way to study sleep/wake-up scheduling in WSNs.
- Maximize network lifetime.

Improve packet delivery ratio.

IV. IMPLEMENTATION

the corresponding analysis are presented. The simulation was implemented using JAVA programming language and was run on Windows 7 Professional SP1 system with Intel Core i5 3.4-GHz CPU and 8GB RAM. "Node" is programmed as a class and each node is an object of this class. To simulate an area, a 2-D array is defined, which represents the coordinates of an area. The length of the row of the array represents the length of the area and the length of the column of the array represents the width of the area. For the connection of two nodes, if two nodes are in the communication range of each other, the two nodes are connected. For time implementation, a JAVA function is used to read the system time. To measure the time length of delivering a packet, system time is read at both beginning of and end of the delivery. Then, the time length of delivering a packet can be obtained using the system time read at the beginning of the delivery minus the system time read at the end of the delivery.

Algorithm 3: Normalize()

Suppose that in state s, there are m available actions, i.e., $a_1, a_2, \ldots, a_m$;
Let $d = min_{1 \le k \le m} \pi(s, a_k)$, mapping center $c_0 = 0.5$ and mapping lower bound $\Delta = 0.001$;
if $d < \Delta$ **then**
  $\rho \leftarrow \frac{c_0 - \Delta}{c_0 - d}$;
  for $k = 1$ *to* m **do**
    $\pi(s, a_k) \leftarrow c_0 - \rho \cdot (c_0 - \pi(s, a_k))$;
for $k = 1$ *to* m **do**
  $r \leftarrow \sum_{1 \le k \le m} \pi(s, a_k)$;
  $\pi(s, a_k) \leftarrow \frac{\pi(s, a_k)}{r}$;
return $\pi(s)$;

To evaluate the proposed self-adaptive approach (recorded as SA-Mech.), we build a platform using JAVA to test it in comparison with four other approaches: 1) two-radio- MAC (TR-MAC)

[20]; 2) DW-MAC [48]; 3) EM-MAC [29]; and 4) AS-MAC [26]. TR-MAC is an on-demand approach. DW-MAC is a synchronous approach. EM-MAC and AS-MAC are asynchronous approaches. Through comparing with these approaches, the performance of the proposed approach can be objectively demonstrated. The reason for selecting these approaches is that TR-MAC and DW-MAC are the most efficient on-demand approaches and synchronous approach, respectively.4 Both EM-MAC and AS-MAC are the latest asynchronous approaches,5 but, to the best of our knowledge, their performance has not been compared yet. Thus, we select both of them in our simulation. These approaches are described in detail as follows.

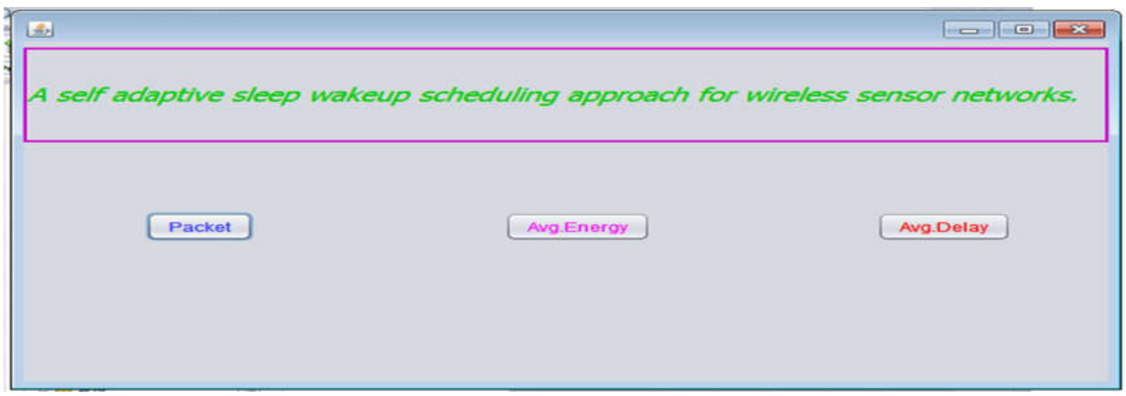
1) TR-MAC: In TR-MAC, two radios are used, where one is for waking up neighbors and the other is for sending packets. Unlike traditional on-demand approaches, in TR-MAC, when a node has a packet to transmit it does not wake up its entire neighborhood but selectively wakes up several neighbors which have previously engaged in communication through rate estimation.

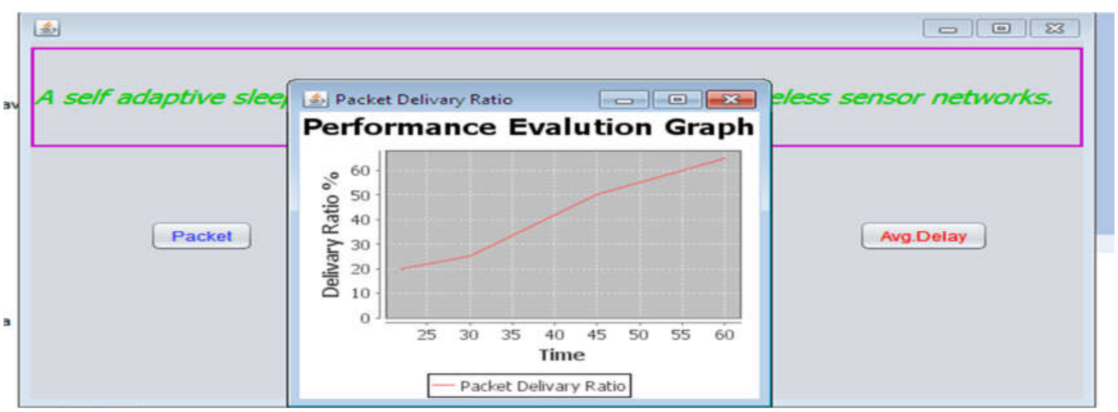
2) DW-MAC: DW-MAC is a synchronized duty cycle MAC protocol, where each cycle is divided into three periods: a) sync; b) data; and c) sleep. DW-MAC has to synchronize the clocks in sensor nodes periodically during the sync period. DW-MAC then sets up a one-to-one proportional mapping between a data period and the following sleep period. In a data period, the sender will send a scheduling frame to the receiver. Based on the time interval after the beginning of the data period and the duration of the scheduling frame transmission, both sender and receiver will set up their wake-up time interval during the following Sleep period to transmit/receive the packet.

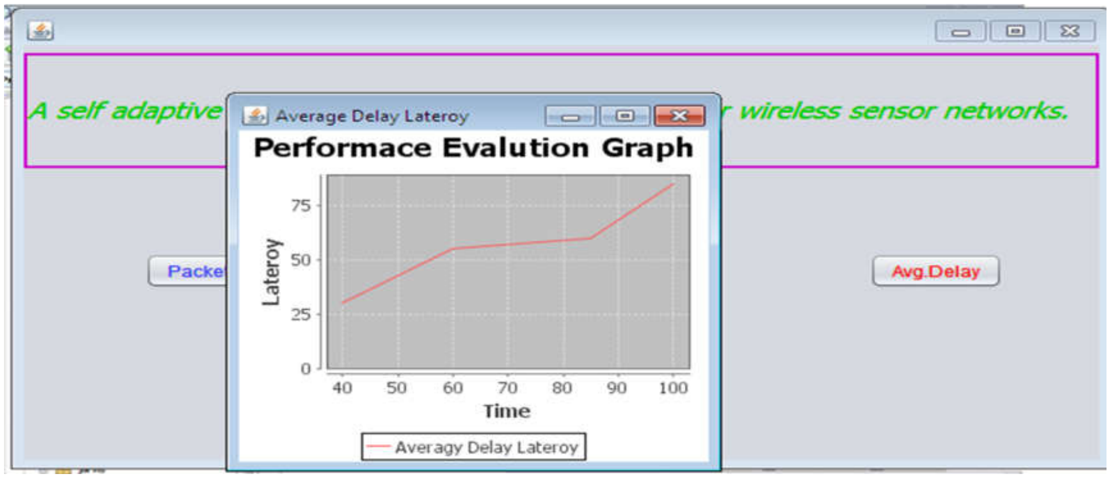
3) EM-MAC: In EM-MAC, each node uses a pseudorandom number generator: Xn+1 = (aXn + c) mod m to compute its wake-up times, where m > 0 is the modulus, a is the multiplier, c is the increment, Xn is the current seed and the generated Xn+1 becomes the next seed. In this simulation, m = 65536, each node's a, c and Xn are independently chosen following the principles suggested by Knuth [50]. By requesting the parameters, m, a, c, and Xn, from a receiver, a sender can predict the receivers future wake-up times and prepare to send data at those times. EM-MAC does not need synchronization but it requires nodes to exchange information before nodes can make predictions.

4) AS-MAC: In AS-MAC, nodes wake up periodically (but asynchronously) to receive packets. Nodes intending to transmit packets wake up at the scheduled wake-up time of the intended target nodes. Neighboring nodes have to communicate periodically to exchange information about wake-up schedules to avoid long preambles at the beginning of transmission. In addition, we also compare SA-Mech. with its synchronized version, SA-Mech.-Syn. In SA-Mech.-Syn, it is assumed that a sink node periodically broadcasts a special packet to the entire network to synchronize the nodes' clocks.6 The aim of introducing SA-Mech.-Syn for comparison is to test how the introduction of synchronization will affect the performance of SA-Mech.

V. SCREEN SHOTOS







VI CONCLUSION

Scheduling is thoroughly detailed by explaining the different types of scheduling mechanism. Self-adaptive sleep wake-up scheduling approach is explained in detail along with the algorithm used where it proposed an alternative approach based on game theory and the reinforcement learning technique. PLEACH Routing Protocol for improving energy efficiency in the Self-Adaptive sleep/wake-up scheduling approach in wireless sensor networks is proposed and incorporated. The performance of P-LEACH routing protocol is compared with the existing gossiping routing protocol in the self-adaptive sleep/wake-up scheduling approach. With simulation, it is observed that P-LEACH protocol performs much better than the gossiping routing protocol in terms of energy consumption, throughput, packet delivery ratio and an end to end delay. The Network Simulator 2 is used for the software implementation and for evaluating the performance of the protocol. Based on the simulation results, it is determined that the proposed P-LEACH routing protocol performs better than the gossiping routing protocol in terms of energy and lifetime of the network. The simulation results validate that the proposed approach could extend the network for WSNs applications

VII. FUTURE SCOPE

In future, This can be extended to open and mobile networks, where nodes can dynamically enter into or leave the networks and they may move around in the networks. Such openness of networks and mobility of nodes will introduce new challenges. In the proposed approach, a node's approximation of another node's behaviour is based on their past interactions. If the network is highly mobile, neighbours of each node may always change. Thus it may be difficult to converge in this situation. This issue can be solved in the future work. Also, the malicious nodes detection and removal will be performed in the future work.

VIII. REFERENCES

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