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Survey on Retransmission Model for Enhancement of WSN Lifetime

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ABSTRACT

In wireless sensor Networks can be widely used for variety of applications, various requirements and characteristics such as environmental monitoring, habitat monitoring, health care, animal tracking and surveillance. A Wireless sensor network is a network which is a collection of sensor nodes which are self controlled through the radio links. Each node in the wireless sensor network has the ability of processing separately which contains numerous memory, Transceiver and power resources These detecting devices i.e. sensors are legally responsible for data transmission from source location to destination location. To introduce the important models for lifetime model, sensor failure model, energy consumption model, sleep/wakeup model, routing model and retransmission model in WSN, are developed to aid in the analysis of WSN lifetime. Energy efficiency is the essential criteria for network lifetime enhancement. Therefore, consumption of every limited resource must be considered. The sensor network should have a lifetime long enough to fulfill the application requirements.

***Key-Words*:** Wireless sensor Networks; Retransmission; Lifetime; Energy; Node deployment

INTRODUCTION

Typically a Wireless sensor network consists of a large number of spatially distributed autonomous sensor devices or sensor nodes. These sensors can sense, measure and gather information about the surrounding environment. They can also transmit the collected data to the sink node or base station where users receive the information as shown in fig 1

Technically, it is a large scale; self-organizing and multi-hop network and each sensor have a battery that supplies energy needed for monitoring and data Transmission. Because each battery having a limited capacity, and in most cases it is inconvenient or

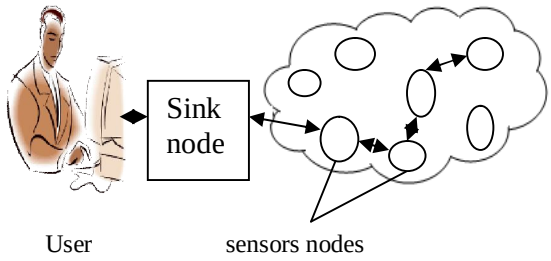

Fig 1 Structure of WSN

Even impossible to replace or recharge those batteries, the lifetime of WSN largely depends on the energy consumption.

RELATED WORK AND CONTRIBUTIONS

D.Isabel, D. Falko, [1] developed a network lifetime has become the key characteristic for evaluating sensor networks in an application specific way. The availability of nodes, the sensor coverage, and the connectivity have been including in network lifetime. One new method is the ability to express the service disruption tolerance of a network. Another new method is the notion of time-integration.

G. Anastasi, M. Conti, M.D. Francesco, A. Passarella,[2] showed how to reduce the energy consumption of nodes, so that the network lifetime can be extended to reasonable times.The concept is firstbreak down the energy consumption for the components of a typical sensor node, and discuss about the energy conservation in WSNs. Then present a systematic taxonomy of the energy conservation schemes, which are subsequently discussed in depth. Finally, concluding with insights for research directions about energy conservation in WSNs.

Z. Bojkovic, B.Bakmaz,[3] presented that designing architectures and protocols, maintaining connectivity and maximizing the network lifetime stand out

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as critical considerations.WSNs are formed by a large number of inexpensive nodes, which has an impact on protocol design and network scalability. Sensors havean enable range of applications where the objective is to observe an environment and collect information about the observed phenomena or events. This extended to emergence of a new generation sensor networks called sensor actuator networks. In this work, dealing of WSNs deployment, started with mobility-based communication in WSNs. Then introduce the service-oriented SANETs as an approach to build.

Laki, Shri.R.N.Shukla, [4] explained about the how to advances in wireless communication technology and sensing technology. In sensing technology can be used for a wide variety of applications and characteristics, such as environmental monitoring, health care, factory automation and military. Typically a sensor consists of a large number of spatially distributed autonomous sensor devices. Discuss the Sensor placement techniques in wireless sensor networks.

Z.Rosberg, R.P.Liu, T.L.Dinh,Y.F.Dong,S.Jha,[5] described wireless sensor network deployments are expected to be in unattended terrains where link packet error rate may be as high as 70% and path length could be up to tens of hops. The energy efficiency of a comprehensive set of statistically reliable data delivery protocols is analyzed. Simulation and experiment results confirm our theoretical findings and demonstrate the advantages the hybrid system in boosting energy efficiency, reducing end to end delay, and in overcoming the avalanche effect. Most of the data link layer protocols contain a retransmission function. This meaning, if the message received is incorrect or loss, the message cannot be received within the time interval; a retransmission command will be executed. Obviously, retransmission will consume additional energy.

MODELS FOR WSN

To analyzing the lifetime of WSN, several models are developed as follows.

1 Lifetime Model: Several lifetime models for WSN are given in [1]. To discuss only consider mission completion for a WSN, and particularly the time when either the coverage or the connectivity drops below a predefined threshold [6]. As a result, the lifetime of the WSN can be expressed as

$$\text{Lifetime}=\min (t_{\text{connectivity}}, t_{\text{coverage}})$$

Where $t_{connectivity}$ and $t_{coverage}$ are the times, when connectivity and coverage cannot satisfy the respective requirements.

H. Zhang, J.C. Hou. [7] Explained that if the radio is at least twice as much as the sensing range, complete coverage of a convex area implies connectivity among the set of sensor networks. In this situation, the life time will only depend on whether the coverage requirement can be achieved or not.

2 Energy consumption Model: The energy consumption for transmitting and for receiving m bits of data. The data consists of two parts. First part is sensing data and other part is acknowledgement (ACK response), transmitting both parts will be consuming the energy.

3 Failure Model for sensors: A sensor is a typically electrical component, whose lifetime usually follows the exponential distribution. Its reliability at time t, denoted by R (t), can be written as

$$R(t) = e^{-\lambda i}$$

Where λ is the failure rate.

4 Sleep/wakeup Model: In order to save energy, sleep/wakeup protocols have been widely applied in WSN [2]. Obviously, sensors can put their radio in the low-power sleep mode when needed. Among various sleep/wakeup protocols, this model focused on the probing environment and Adaptive Sleeping (PEAS) protocol.

In PEAS, all nodes are initially sleeping mode. When a sensor wake up, it sends a probe message or data within its probing range, R_p. any active nodes within R_p should send back a reply or response message. A sleeping sensor can be activated when the response number cannot satisfy its density requirement. Otherwise, the sensor goes back to sleep mode again. The Coverage rate of the WSN largely depends on its density requirements. In this way, Energy can be saved and used the least number of sensors to satisfy the coverage goal.

5 Routing Model: In GPSR [Greedy perimeter stateless Routing] preferred to forward the packet of a sensor to the neighboring sensor which is in its radio range and is geographically closest to the destination. Here there is a higher chance to minimize the number of forwarding operations.

6 Retransmission Model: For most protocols used in WSN, a retransmission mechanism is essential. There are two kinds of retransmission mechanisms, Hop-by-Hop and End-by-End, depending on the packet should be forwarding sensors can hold messages.

First mechanism is the sensing data are transmitted hop by hop. If the receiver receives and verifies the data, it will send an ACK response the transmitter. If the transmitter cannot receive ACK response, it will retransmit the sensing data. For one sensing data, it has one maximum retry times. This is a typically Hop-by-Hop retransmission mechanism. Sensors have memory, and will store all transferring data until they are received by the next hop. Second mechanism is End-to-End retransmission mechanism sensors do not have memory, and if the sink node cannot receive the sensing data, it could only be retransmitted from the source end.

Path Loss Model denoted by [PL (d)] and expressed as

$$PL(1) = {}^{20}\lg\left(\frac{4\pi f}{c}\right)$$

Where f = band width, c= speed of light=299792458m/s.

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CONCLUSION

A new framework is proposed to improve the network lifetime. It is focused that how transmission affects the node deployment optimization considering lifetime of wireless sensor networks and retransmission mechanisms are utilized.

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