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Data dissemination Issue and protocol in WSN a survey

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Abstract- There are a few special features of WSN like restricted battery life, bound computing routing capabilities etc. for the reason that of these particular features of wireless sensor networks, routing algorithms of mobile ad-hoc networks are not appropriate. The current data dissemination system is not energy-efficient for this problem several algorithms and routing protocols are used over the past decade. There are many protocols are used to determine the best way for energy utilization in wireless sensor networks. This paper tries to study most of the data dissemination protocol used in WSN. Finally most of the protocols will categorized and analyzed. We try to design an algorithm which keeps in account the battery life of nodes and uses more and more nodes with better battery life.

INTRODUCTION

In the present human race there have no time among the peoples. Thus, the people depend upon technology. Cellular system and Mobile ad-hoc network (MANET) are the traditional wireless networks. WSN is a technology on which people depend to sort out most common issue. WSN have unique characteristics for example severe energy, computation and storage constraint and WSN consist the devices which have limited capabilities called wireless antenna nodes. By this there is collection of information which is gathered from the environment by sensor and communicates with other nodes. It is applied in a wide range of distributed, remote and Wireless sensing function. Wireless sensor network perform its main role in the principle of sensing various parameters. It consists of number of nodes. Nodes mean number of computer that Connect and form a network. Wireless Sensor Network includes Battery, Sensor, Microprocessor, Memory and Radio.

The major characteristics of a WSN include: Using batteries or energy harvesting power consumption can be occur possibilities of point failures Wireless nodes Communication failures Heterogeneous points means different environments condition in the case of crop Improvement in large geographical area Handle the harsh ecological situation

Easy to use

Frequent topology change

Self Configurable

Data Redundancy

Sensor node is a small computer including its component and interfaces which have limited memory, limited power, sensors, microprocessor and radio transceiver. The support stations are main part of the WSN by a lot of computational, energy and communication property. In these days a new method which is applied in information

communication technology accelerates the communication between different industries. So to construct a successively new invention in agriculture environment a better sensor hardware services for farming environments is required.

NETWORK ARCHITECTURE FOR WSN

In WSN, architecture of wireless sensor network is introduced in a two way first is a Sensor Node architecture and Second is architecture of Wireless Sensor Network.

Sensor Node Structure

A Sensor node is consisting of four components: a sensor (for sensing), microprocessor (for processing), a Radio (for communication) and Battery (for power).

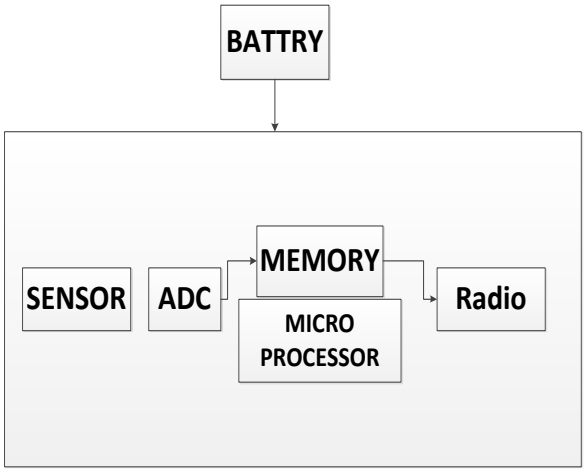

Figure.1 Sensor Node Structure

Sensors Unit: Sensor unit consist of two or more sensor which is used for monitor according to their condition or environment. It also consist of analog-to-digital converters (ADCs) which convert analog to digital signal and then fed for further processing. When we construct a sensor node after that their future purpose is depend upon the sensors.

Power Source: Power source in WSN has its own purpose and advantage. It plays an important role. The power source consists of power battery to drive other component of the sensor node system. There are some smart nodes which gather enough energy to maintain themselves from light or vibrations.

Radio: Radio consists of small range radio which is used for communication, data transmission and receives by the help of radio channel. It contains two parts Radio spreader and Radio receiver.

The Electronic Brain: The sensor nodes consist of electronic brain or we can also say processing unit. It consists of a microprocessor or microcontroller and a few flash memories. Also it uses connectors to contain extra processes and sensors in an easy way. The MEMS nodes also have an analog-digital converter i.e. modulation and demodulation can arise. The main motive of the electronic brain is to deal with collect data and make decisions and store data in its memory. After the storage of the information microprocessor section of the electronic brain put the information in packages of data format so that transfers of data arise with great efficiency. After it microprocessor transmits these packages to radio for broadcasting. For the establishment of effective network the brain communicates with other motes.

The electronic brain is a base of sensor node which is interacts with sensor and radio.

2.2 Network Architecture

Network architecture of WSN includes big amount of sensor node that deploy inside a region of interest and inside the region there are one or more than one base stations is located.

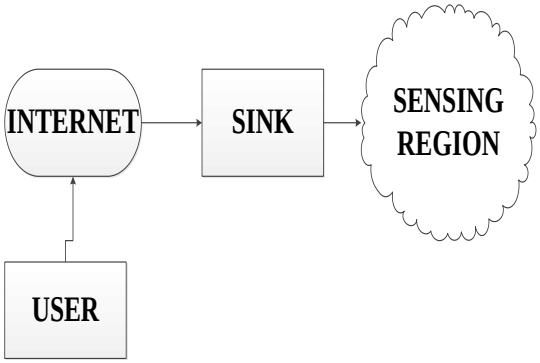

Figure 2. Sensor Network Architecture

RELATED WORK

3.1 Routing and Network deploying issues in WSN

There is many limitations under WSNs, for example, limited battery, processing unit, and bandwidth. The networks propose challenges and routing issues has important aspects in WSN. The design challenges in WSN include following aspects:

Limited energy capacity: Sensor Network consists of battery for energy or power that has limited capacity. Limited energy is a major face for system designer within hostile environment. Such as, in battlefield it is not possible to contact sensor and boost batteries. While the battery reaches certain threshold it become faulty and it decrease the performance of the sensor network.

Sensor location: location of the Sensor is another challenge of WSN for network design and routing. Design and routing protocol is based on location either it will be set in the Global Positioning System (GPS) or use localized system.

Data Aggregation: Wireless sensor node can make unneeded information (redundant data); same packet can be aggregated from various nodes by this the quantity of transmission will be compact. Data aggregation method is use to get better energy utilization.

Scalability: Sensor should not be able to scale in term of energy, processing, sensing and communication. A couple of sensor is not capable to communication in both the direction. It is done by routing protocol because it should be capable to balance the network size.

Data delivery Model: The data delivery model is based on function of the sensor network. It has various phases continuous data delivery, event-driven, query-driven and hybrid. In continuous, every sensor transmits information from time to time. In Event-driven and query-driven, the transmission of information is trigger then information is delivered when a query is produce by the sink node. In Hybrid model it uses a combination of these three data delivery model which are mentioned above. The routing protocol in WSN is greatly influenced by this model.

Energy efficient Routing

The sensor node have some limited resources so, there is a need to improve the efficiency of a network and lifetime of the network by designing an effective and awareness protocol.

In WSN Routing protocol is divided into two parts first is Network structure based and second is based on protocol operation. Routing protocol based on network structure in WSN is divided into three types: Flat based Routing (known as Flooding), Hierarchical based routing (known as Clustering) and location based routing (known as Geographic).

4.1 Flat based routing*:* All the nodes in flat based routing play the same role. By dense deployment and dynamic environment of the sensor node there is no possibility to allocate global identifiers to every node. This thought is early work on data centric routing in this Base Station transmit query to certain region and waits for response from sensors located in the selected region. Data centric routing is use to save energy by elimination of redundant data for example SPIN and Directed Diffusion.

Sensor Protocols for Information via Negotiation (SPIN): Jamal N. Al-Karaki et. al, proposed a family of adaptive protocol called SPIN that dissemination all the data at every node in the network assuming that all nodes in the network are base-stations. This enables a user to query a node and get the required information immediately. SPIN negotiate with each other before transmitting data. Negotiation help to eliminate redundant data in the network throughout the transmission and only useful information will be transfer. SPIN is a 3-stage protocol use three types of messages ADV, REQ

and DATA to communicate. ADV is used for Advertise new data, REQ is used request data, and DATA is the actual message itself.

Directed Diffusion: Jyoti saraswat proposed a popular data aggregation paradigms for WSNs called Directed Diffusion. Directed Diffusion is data-centric and all nodes in this are application-Aware. It is used to achieve energy savings and processing data in the network (e.g. Data Aggregation). In Directed Diffusion the sink Queries the sensor nodes if the specific data is available by flooding some tasks. The main idea of this paradigm is to combine the data coming from different sources by eliminating redundancy, minimizing the number of transmission for saving network energy and prolonging its lifetime.

4.2 Hierarchical based routing*:* In Hierarchical based routing all nodes have its own purpose and play different role in sensor network. It has special advantages related to scalability and efficient communication. In Hierarchical architecture, higher energy nodes can be used to process and send the information while lower energy nodes can be used to sensing the nearest targeted region. Thus, it is efficient to lower energy consumption in a sensor network. Some Hierarchical protocols are LEACH, TEEN & APTEEN, and PEGASIS & Hierarchical PIGASIS

LEACH: LEACH stands for Low Energy Adaptive Clustering Hierarchy and it was the first Hierarchical cluster based protocol which includes distributed cluster Formation. In LEACH, its task is rotating between all the nodes on the base of duration. LEACH is a self organizing and adaptive clustering protocol in which sensor nodes will organize them into local cluster and cluster member select the cluster head (CH) to avoid large amount of energy consumption and incorporate data aggregation which reduce the quantity of messages sent to the sink node. When sensor networks goes down or fail and it cannot able to do anything then LEACH protocol is used in the network. So, LEACH is very effective protocol to increase the long life of the network. The operation of the LEACH protocol is divided into two phases a) a set-up phase to organize the network into cluster, CH advertisement, and transmission schedule creation b) a steady-state phase for data aggregation, compression, and transmission to the sink. LEACH algorithm is modified in the form of two-level hierarchy LEACH (TL-LEACH) which includes two levels of cluster head rather than a single one. The advantage of TL-LEACH is that it reduces the amount of nodes that transmit information to the base station which help to reduce the total energy usage.

PEGASIS & Hierarchical PIGASIS: PIGASIS stands for power-efficient gathering in sensor information system which is optimal chaining based protocol. PEGASIS is an improvement over LEACH. In PEGASIS, only one node is selected from the chain and selected node can send the information to the base station (sink) and every node transmit and receive from its neighbor node; the information is collected and moves from node to node, then information can be aggregated and send to the sink node. Figure shows chain construction using the greedy algorithm in which node 0 connected to the node 3, node 3 connected to the node 1, and node 1 connected to the node 2. If a node fails then the chain is reconstructed again in a same manner except the dead node. In each round data is collected, each node receives data from its neighbors, aggregate the data and transmit it to the other neighbor in the chain.

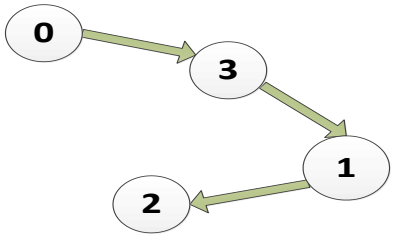

Figure.3 Chain construction using the greedy algorithm.

PEGASIS is further improved in the form of Hierarchical-PEGASIS.it allows concurrent transmission when the nodes are not adjacent. As compared to LEACH, these two algorithms are not suitable for heavy-loaded network. When amount of node is very large in WSN, the delay of

data transmission is very obvious, so they do not well or suitable in sensor network.

TEEN and APTEEN: TEEN stands for Threshold sensitive energy efficient sensor network. In TEEN protocol, sensor node senses the medium continuously but the data transmission is done less frequently. In TEEN, sensor node of a cluster senses and responds the senses data to its CH. The CH sends the aggregate data to the upper level CH until the data reaches the sink. So, in this way TEEN based on hierarchical grouping. It is valuable for application wherever the user manage a complexity between energy efficiency, data accuracy, and response time dynamically. If the user is not able to reach threshold value then TEEN is not suitable for application where periodic report are needed.

APTEEN stands for adaptive periodic threshold sensitive energy efficient sensor network protocol which overcome the limitations of the TEEN for example capture periodic data collection and react according to the time critical actions. So, APTEEN is a hybrid clustering-based routing protocol which allows the sensor to transmit sense data periodically and react to every swift change in the value of sensed element by reporting their CHs. The architecture of both APTEEN & TEEN are same based on hierarchical clustering. APTEEN supports three different query i) historical query, to analyze past data values ii) One-time query, to take a snapshot view of the network iii) Persistent query, to monitor an event for a period of time. It guarantees lower energy dissipation and large number of sensor alive.

Categories	Representative Protocol
QOS based protocol	SAR, SPEED, Energy aware routing
Data centric Protocol	SPIN, Directed Diffusion, Rumor Routing, COUGAR, ACQUIRE, EAD, Information-directed routing, Gradient based routing, Energy aware routing, Information-directed routing, Quorum-based information dissemination, home agent based information dissemination
Mobility based protocol	SEAD,TTDD, Joint mobility and Routing, Data MULES, Dynamic Proxy tree-based data dissemination
Multipath-based protocol	Sensor-Disjoint multipath, Braided multipath, N-to-1 multipath Discovery
Heterogeneity based protocols	IDSQ, CADR, CHR
Location based protocols	MECN, SMECN, GAF, SPAN, TBF, BVGF, GeRaF

4.3 Location based routing: location based routing protocol; location information is required to calculate the distance between two particular nodes on the bases of signal strength so that energy consumption can be estimated. There are many location based protocol used in ad-hoc network and it is useful or makes effective then we transplant those research in wireless sensor network.

MECN and SMECN: MECN stands for Minimum Energy Communication Network used to set up and maintain low energy GPS (related with mobile sensor). MECN identifies Relay region for every node. It includes two major phase: Enclosure graph construction and cost distribution. In the first phase, it based on the immediate locality of the sensor. It is a directed graph which includes all the sensor nodes as its vertex set and edge set is the union of all the edges

between the sensor and neighbor within the enclosure region.

PRESENT WORK

At present instant of time, many investigates have been carried out and many are going on to effectively reduce the power consumption of the wireless sensor nodes used to transmit data about the moisture present in the soil. Researchers are done keeping in view that the power requirement are minimum and the circuitry is also light and simple. In order to maintain a healthy sensor node environment, we need to consider the basic terminology of the working of the sensor network. The continuous transmission of data is also a problem and the power source is also exhausted. As the wireless sensor nodes, most probably, depend on the exhaustible power source such as a chemical battery, the continuous deployment of energy used for sensing and processing of data and transmission of data in the form of radio waves add up in power feeding at a higher level. This forms the basic reason for the main issue of power feasting.

6.1 Research Methodology: MATLAB is a high level technical computing language. It includes interactive environment for algorithm, data analysis, data visualization and numeric computation. MATLAB is used to solve technical computation faster than traditional languages like C, C++ and FORTRAN. We can use MATLAB in a wide range including image processing, test high-performance language for scientific compute. It integrates computation, program and imagining environment. In addition,. These aspects make MATLAB is a brilliant tool for teaching and research.It has great built-in routines that enable a very wide diversity of computations. It also has easy to use pictures commands that make the visualization of results directly available. Specific needs are collected in packages referred to as toolbox. There are toolboxes for different thing like image processing, image gaining, symbolic computational techniques, signal processing, control theory etc.

CONCLUSION

In this paper, we discuss about wireless sensor network and its characteristics, architecture. There are many issues in wireless sensor network such as data aggregation, limited battery, data scalability etc. To improve these issues, various protocols we studied are very efficient.

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