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FACULTY OF EGINEERING AND TECHNOLOGY

WSN (MCS-033)

LECTURE -22

Umesh Kumar Gera
Assistant Professor
Computer Science & Engineering

OUTLINE

- Data gathering
- Direct transmission
- PEGASIS
- Binary scheme
- MCQ
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Data gathering

The aim of data gathering is to transmit data that has been collected by the sensor nodes to the base station. Data gathering algorithms aim to maximize the amount of rounds of communication between nodes and the base station, one round means that the base station has collected data from all sensor nodes. Thus, data gathering algorithms try to minimize power consumption and delay of the gathering process.

Data gathering may seem similar to data dissemination, but there are some differences. In data dissemination, also other nodes beside the base station can request the data while in data gathering all data is transmitted to the base station. In addition, in data gathering data can be transmitted periodically, while in data dissemination data is always transmitted on demand.

1. Direct transmission

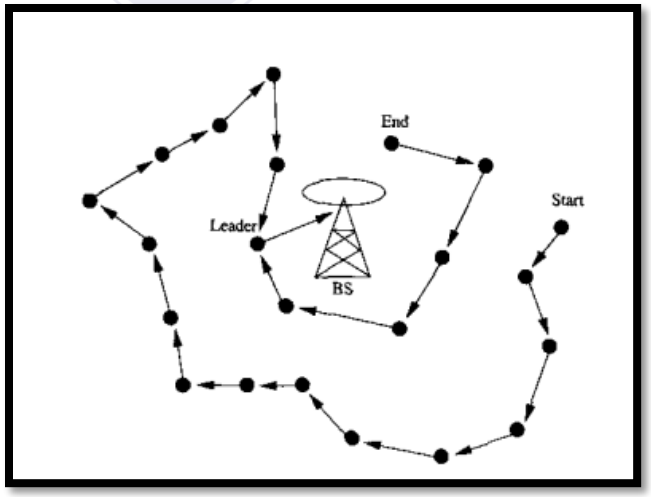
In direct transmission method all sensor nodes send their data directly to the base station. While direct transmission is a simple method, it is also very ineffective. Some sensor nodes may be very far away from the base station, thus amount of energy consumed can be extremely high. In addition, sensor nodes must take turns when transmitting data to the base station to avoid collision. Thus, the delay is also very high. Overall, direct transmission method performs very poorly since the aim of data gathering approaches is to minimize both the energy consumption and the delay.

2. PEGASIS

Power-Efficient Gathering for Sensor Information Systems (PEGASIS) is a data gathering protocol that assumes that all sensor nodes know the topology of the whole network. PEGASIS aims to minimize the transmission distances over the whole sensor network, minimize the broadcast overhead, minimize the amount of messages that are sent to the base station, and to distribute the energy consumption equally between all nodes.

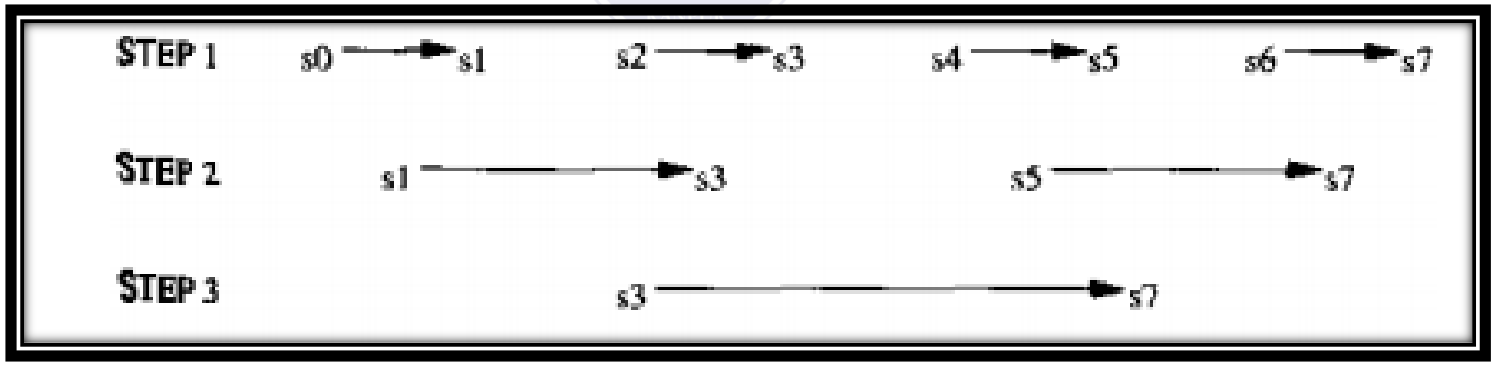
2. PEGASIS

In PEGASIS a chain of sensor nodes is constructed using a greedy algorithm starting from the node farthest from the base station. This chain is constructed before the data transmission begins and is reconstructed if nodes die out. During the data transmission, nodes aggregate the data and only one message is forwarded to the next node. The node that is selected as a leader then transmits all the data to the base station in a single message. The delay of messages reaching the base station is O(N) where N is the amount of sensor nodes in the network. An example of PEGASIS is shown in Figure below. Data is transmitted from both ends of the chain to the leader, which sends all data to the base station.



3. Binary scheme

Binary scheme is also a chain-based scheme like PEGASIS. It classifies nodes into different levels. All nodes that receive message at one level rise to the next level where the amount of nodes is halved. Transmission on a one level occur simultaneously to reduce delay. An example of the binary scheme is shown in Figure 4 below. Nodes s1, s3, s5 and s7 receive messages on the first level and thus they rise to the next level. On the second level nodes s3 and s7 receive messages and finally node s7 forwards all data to the base station.



3. Binary scheme

Biggest advantage of binary scheme is a very low delay of only O(log2N), where the N is the amount of nodes. Thus, binary scheme has significantly lower delay than PEGASIS in large sensor networks. However, binary scheme relies on simultaneous transmission which are possible if the nodes communicate using CDMA, but the scheme does not work with all networks. Other disadvantages include non equal distribution of energy consumption, nodes that are active on several levels consume more energy than nodes that are only active at the first level. This might lead to the situation where some of sensor nodes die earlier than others. In addition, transmission distances may become long in high levels, which leads to a high power consumption

MCQ

1. Draw the pictographic view of Electro-magnetic spectrum.

2. List any four design goals of WLANs.

3. Write down the challenges in designing a Sensor Network.

4. Explain the concept of Rumor routing.

5. What do you know about beacons? Explain.

REFERENCES

- https://www.academia.edu/25414253/UNIT-2_MAC-1_2.1_Issues_in_Designing_Mac_Protocol_for_Ad_Hoc_Wireless_Network
- https://pdfs.semanticscholar.org/f921/bde77a607cb69ca7127ebe7f68a04d412677.pdf