

Data Dissemination In Wireless Sensor Networks

Elementrix Classes

INTRODUCTION

Data dissemination in Wireless Sensor Networks (WSNs) refers to the process of distributing data from one or more sensor nodes to a central node, known as the sink node, for further processing and analysis.

The goal of data dissemination is to collect data from the sensors in the network and deliver it to the sink node in a timely and reliable manner.

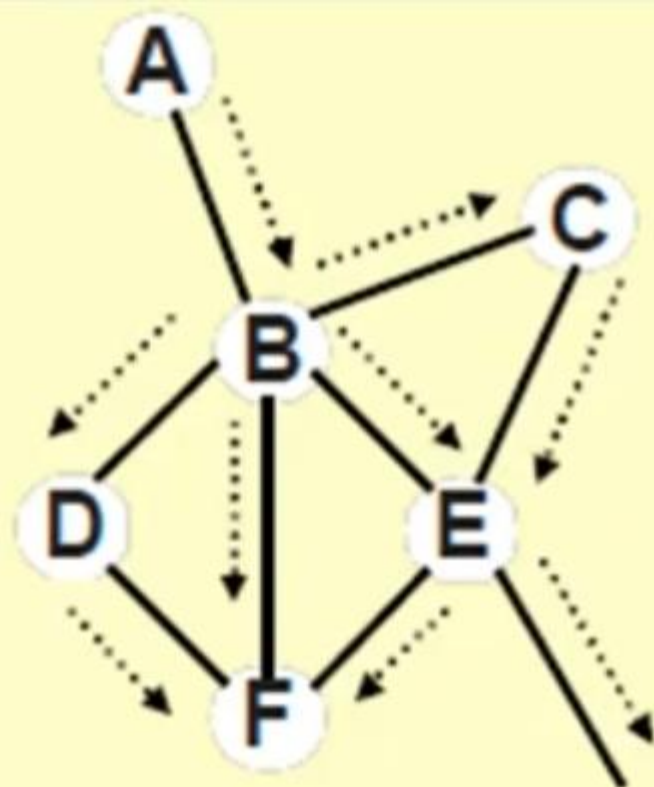
There are several methods for data dissemination in WSNs which are :

1. Flooding
2. Gossiping
3. SPIN

Flooding

Definition: Flooding is a data dissemination method in which a sensor node broadcasts its data to all of its neighboring nodes, and the process is repeated until the data reaches the sink node.

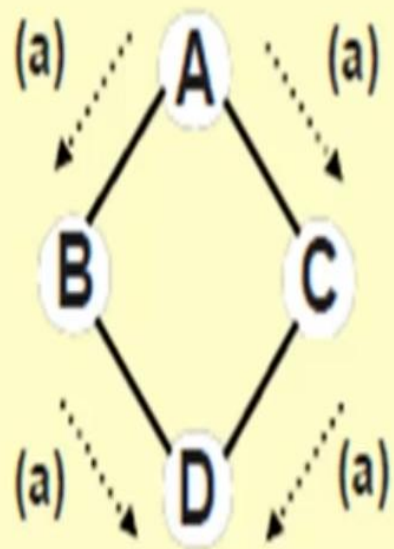
How it works: In Flooding, each node in the network acts as both a sender and a receiver of data. A sensor node broadcasts its data to all its neighbors, and each neighbor, in turn, broadcasts the data to all of its neighbors, until the data reaches the sink node.



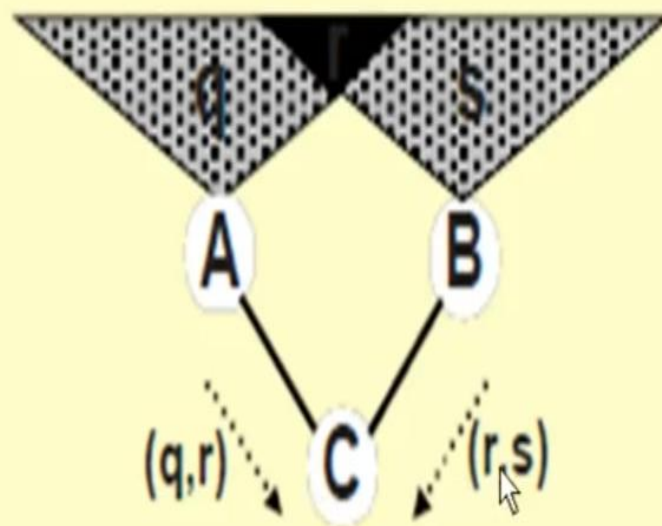
Limitations of Flooding:

- ❑ **Implosion:** Occurs when a node sends data to its neighbours, regardless of whether or not the neighbour has already received it.
- ❑ **Overlap:** Occurs when sensor nodes cover overlapping geographical area (wastage of energy and bandwidth)
- ❑ **Resource Blindness:** Occurs when nodes do not modify their activities based on the amount of energy available to them at a given time.

Implosion



Data overlap



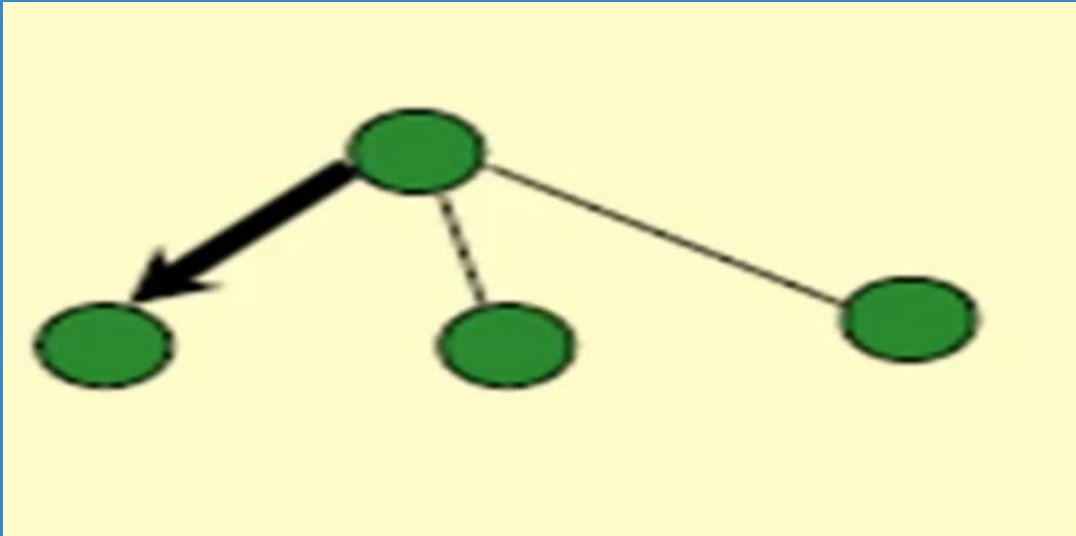
Gossiping

Definition: Gossiping is a data dissemination method in which each sensor node randomly selects a few neighboring nodes and exchanges data with them, and the process is repeated until the data reaches the sink node.

How it works: In Gossiping, each node acts as both a sender and a receiver of data. A sensor node randomly selects a few of its neighbors and exchanges data with them. This process is repeated until the data reaches the sink node.

Advantages:

1. Gossiping is efficient and scalable, as it reduces network congestion.
2. Gossiping avoids the problem faced in flooding approach like implosion.



SPIN (Sensor Protocol For Information via Negotiation)

It incorporates **negotiation and resource adaptation** to overcome the limitations of classic flooding.

- ❑ **Negotiation:** Nodes negotiate with each other before transmitting data to ensure that only useful information is transferred.

Eliminates implosion and overlap

- ❑ **Resource-Adaptation:** Each node has its own resource manager which keeps track of resource consumption.

Nodes poll before data transmission

SPIN-1

- ❑ It is a 3-stage protocol.
- ❑ Nodes use 3 types of messages to communicate:

ADV-To advertise new data

REQ-To request for data

DATA-for actual message

- ❑ **Advantages:**
 1. Simple
 2. Each node performs little decision making, therefore wastes little energy in computation
 3. Each node only needs to know about its single-hop network neighbors

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