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FACULTY OF EGINEERING AND TECHNOLOGY

WSN (MCS-033)

LECTURE -16

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OUTLINE

- Introduction of Data dissemination in WSN
- Data dissemination in WSN Methods
- MCQ
- Reference

Data dissemination in WSN

A data dissemination is a process by which data and queries for data are routed in the sensor network. In a scope of data dissemination, a source is the node that generates the data and an event is the information to be reported . A node that is interested in data is called sink and the interest is a descriptor for some event that node is interested in. Thus, after source receives an interest from the sink, the event is transferred from the source to the sink. As a result, data dissemination is a two-step process. First, the node that is interested in some events, like temperature or air humidity, broadcasts its interests to its neighbors periodically. Interests are then propagated through the whole sensor network. In the second step, nodes that have requested data, send back data after receiving the request. Intermediate nodes in the sensor network also keep a cache of received interests and data.

Data dissemination in WSN Methods

There exist several different data dissemination methods.

1. Flooding
2. Gossiping
3. SPIN
4. Cost-field approach

DATA DISSEMINATION IN WSN

1. Flooding

In flooding method each sensor node that receives a packet broadcasts it to its neighbors assuming that node itself is not the destination of the packet and the maximum hop count is not reached. This ensures that the data and queries for data are sent all over the network.

Flooding is a very simple method, but is has several disadvantages. In flooding duplicate messages can be sent to the same node which is called implosion. This occurs when a node receives the same message for several neighbors. In addition, the same event may be sensed by several nodes, and thus when using flooding, neighbors will receive duplicate reports of the same event, this situation is called overlap. Finally, many redundant transmissions occur when using flooding and flooding does not take into account available energy at sensor nodes. This wastes a lot of network's resources and decreases the lifetime of the network significantly

2. Gossiping

Gossiping method is based on flooding, but node that receives the packet forwards it only to a single randomly selected neighbor instead of sending it to all neighbors. The advantage of gossiping is that it avoids the problem of implosion and it does not waste as much network resources as flooding. The biggest disadvantage of gossiping is that since the neighbor is selected randomly, some nodes in the large network may not receive the message at all. Thus, gossiping is not a reliable method for data dissemination.

3. SPIN

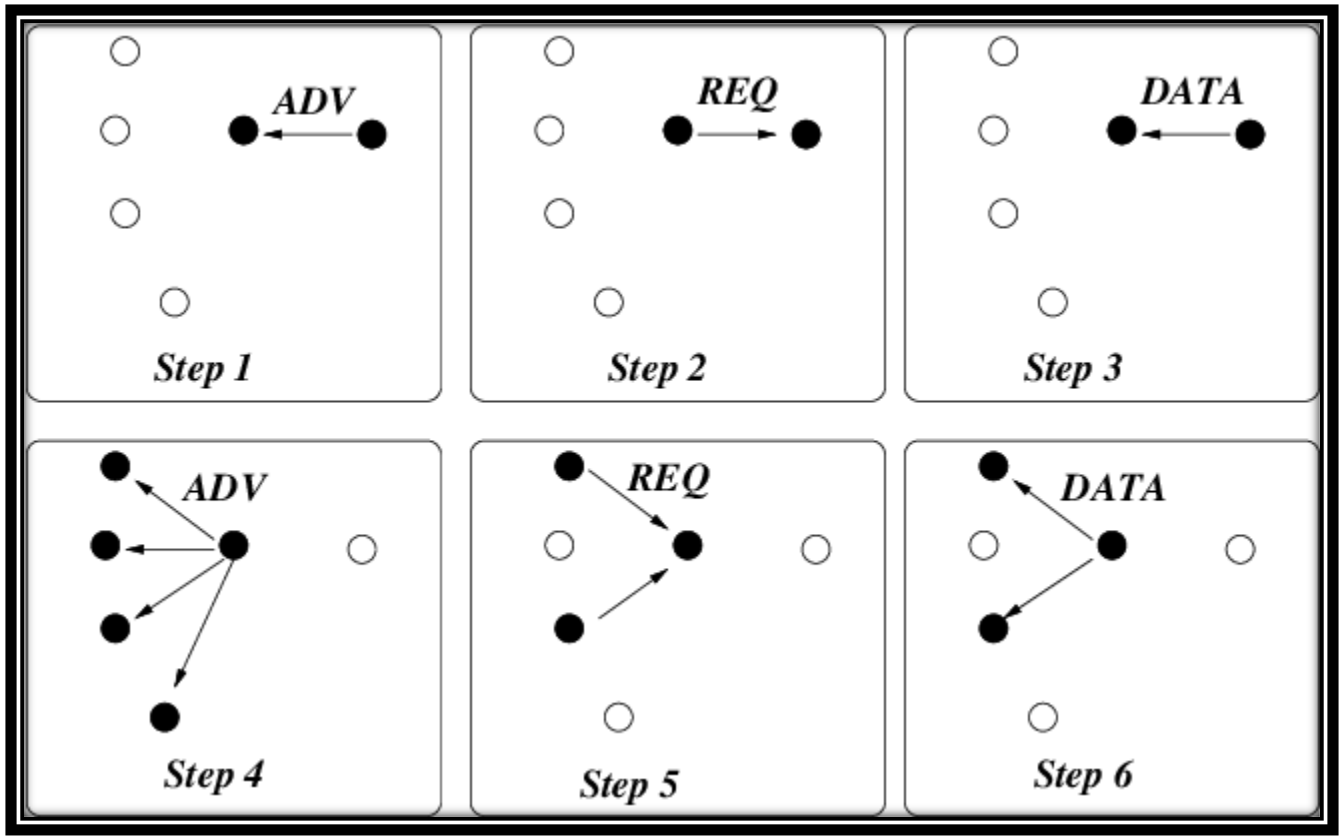
Sensor Protocols for Information via Negotiation (SPIN) use negotiation and resource adaption to address the disadvantages of basic flooding. SPIN uses data-centric routing, nodes are advertising their data and they will send the data after receiving a reply from interested nodes. SPIN uses three types of messages: ADV, REQ, and DATA. The sensor node that has collected some data sends an ADV message containing meta-data describing the actual data. If some of node's neighbors is interested in the data, the neighbor sends a REQ message back. After receiving the REQ message, the sensor node sends the actual DATA. The neighbor also sends ADV message forward to its neighbors, thus data is disseminated through the network. Figure below describes ADV-REQDATA exchange of SPIN

3. SPIN

In the figure, node A advertises its data using an ADV message, its neighbor node B replies with a REQ message and thus node A sends actual data to the B. Node B also forwards ADV messages to its neighbors. Improved version of SPIN, SPIN-2 uses an energy or resource threshold to reduce participation of nodes. Thus, only those nodes that have sufficient amount of resources participate in ADV-REQ-DATA exchange. SPIN is more efficient than flooding since the negotiation reduces the implosion and overlap. Resource adaptation in SPIN-2 prolongs the lifetime of the network: sensor nodes with low resources do not have to participate in ADV-REQ-DATA exchange and as a result they can collect data for a longer time.

DATA DISSEMINATION IN WSN

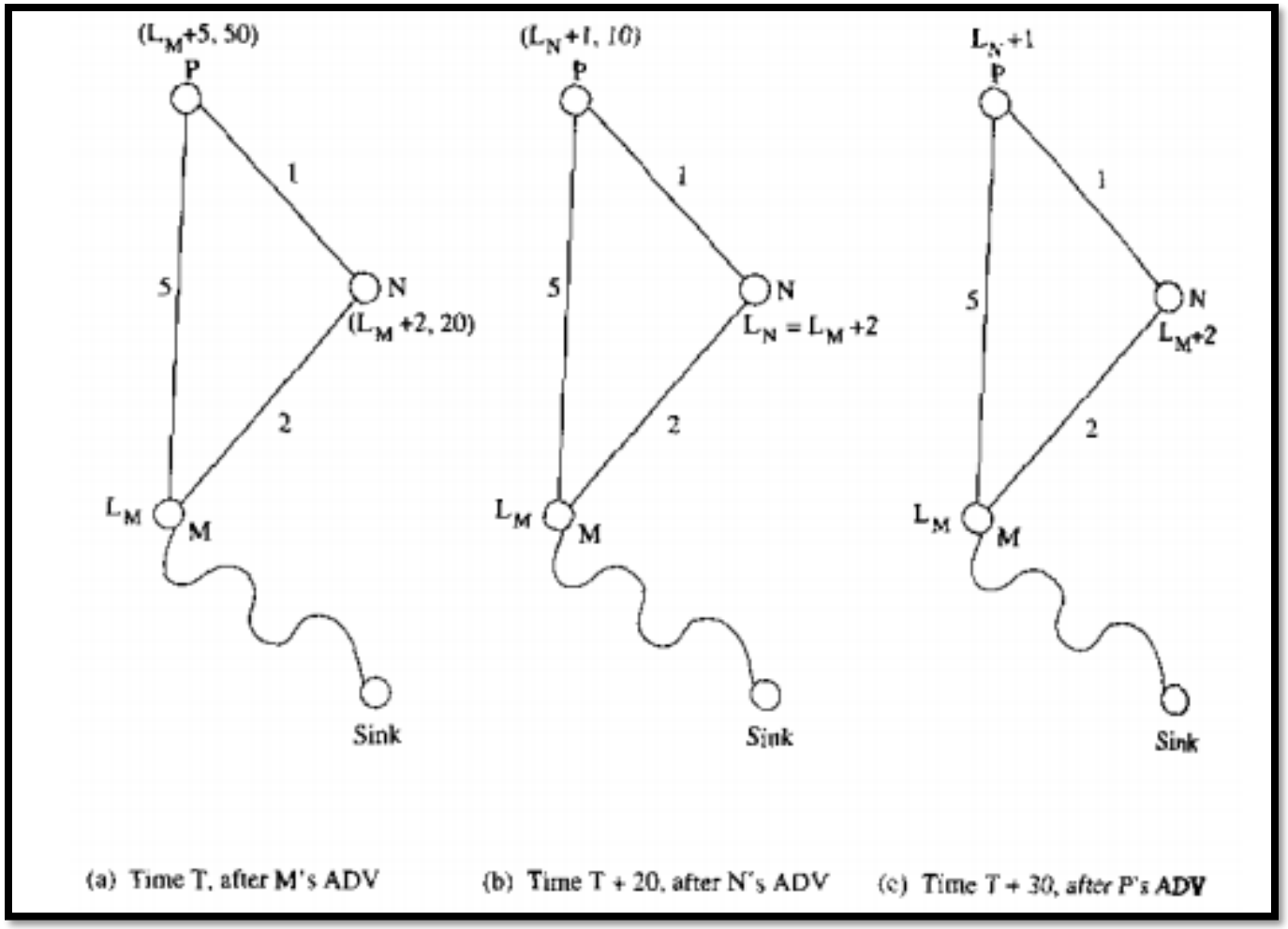
3. SPIN



4. Cost-field approach

The aim of the cost-field approach is to solve problem of setting paths to the sink. The cost-field approach is a two-phase process, first the cost field is set up in all sensor nodes, based on some metric like a delay. In the second phase, data is disseminated using the costs. The cost at each node is the minimum cost from the node to the sink, which occurs on the optimal path. With the cost-field approach explicit path information does not need to be maintained. In the first phase of cost-field approach, a cost field is set up starting from the sink node. The sink node broadcasts an ADV packet with cost set to 0. When node N receives an ADV packet from node M, it sets its own path cost to min(LN, LM+CNM), where LN represents the current total path cost from sink to node N, LM is the cost from node M to sink, and CNM is the cost from node N to M. When forwarding cost to other nodes in the network, cost-field approach uses back-off timers to avoid transmission of non-optimal costs. Otherwise cost-field approach would resemble flooding which is very ineffective. This means that node N will broadcast received ADV message forward only after time γ*CNM has passed, γ is the parameter of the algorithm. Figure below shows an example of setting up the cost field and it also describes how back-off timers work.

4. Cost-field approach



MCQ

1) Battery-driven systems are those systems which are designed taking into consideration mainly _____ ( )

(a) Battery and its internal characteristics (b) An electrolyte medium (c) Environmental impact (d) None of the above

2) _____ effect is concerned with the recovery of charges under idle conditions.

(a) Recovery capacity effect (b) Rate capacity effect (c) Battery scheduling (d) None of the above

3) Explain the differences between Proactive routing protocols and Reactive routing protocols.

4) Give the classification of routing protocol based on routing topology.

5) Describe about various types of hybrid routing protocols.

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