Bahan Ajar

Chapter 11

Materi Pembelajaran

Matakuliah :

WIRELESS SENSOR NETWORKS

Kode Matakuliah : SKO 20428

Prodi : SISTEM KOMPUTER

Dosen Pengampu Matakuliah:

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A Sensor Node

May need to fit into a matchbox-sized module Smart dust mode

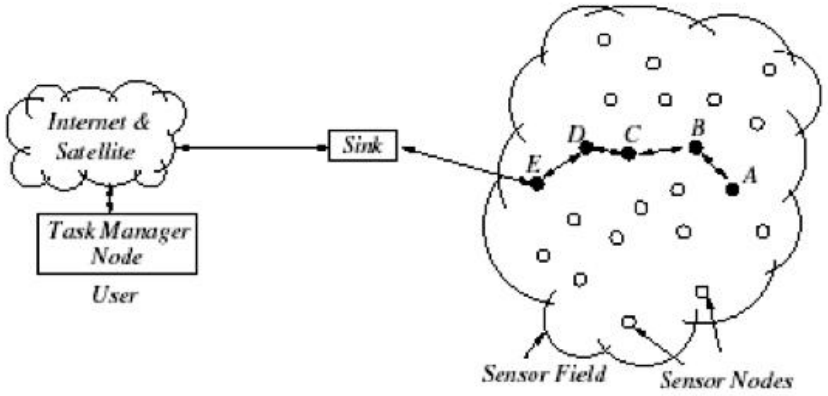
- 4 MHz Atmel AVR 8535 micro-controller
- 8 KB instruction flash memory
- 512 bytes RAM
- 512 bytes EEPROM
- TinyOS – 3500 bytes of code

Each sensor node are assumed to be equipped with a GPS unit Or a limited number of nodes have GPS and help others to figure out their locations

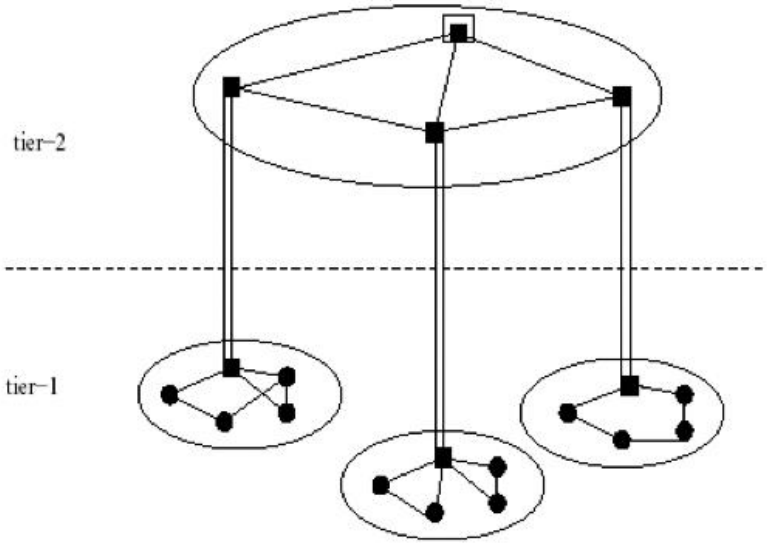
Communication Architecture

- Basically of two types

Flat



Hierarchical



Classification of Sensor Networks

- Proactive Networks

The nodes in the network periodically switch on their sensors and transmitters, sense the environment and transmit the data of interest.

- Reactive Networks

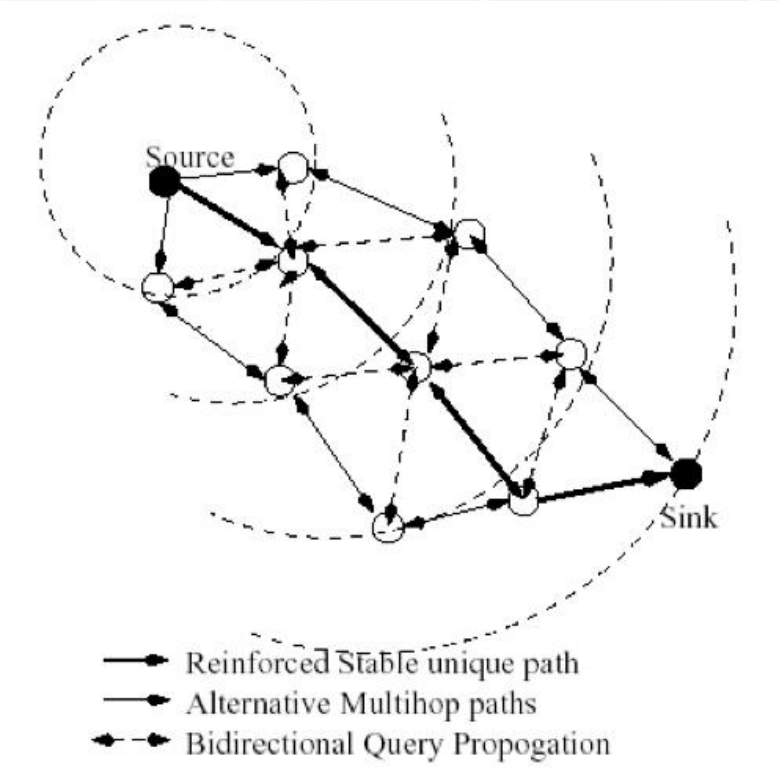
In this scheme the nodes react immediately to sudden and drastic changes in the value of sensed attribute.

- Hybrid Networks

Combaining

Basic Routing in Sensor Networks

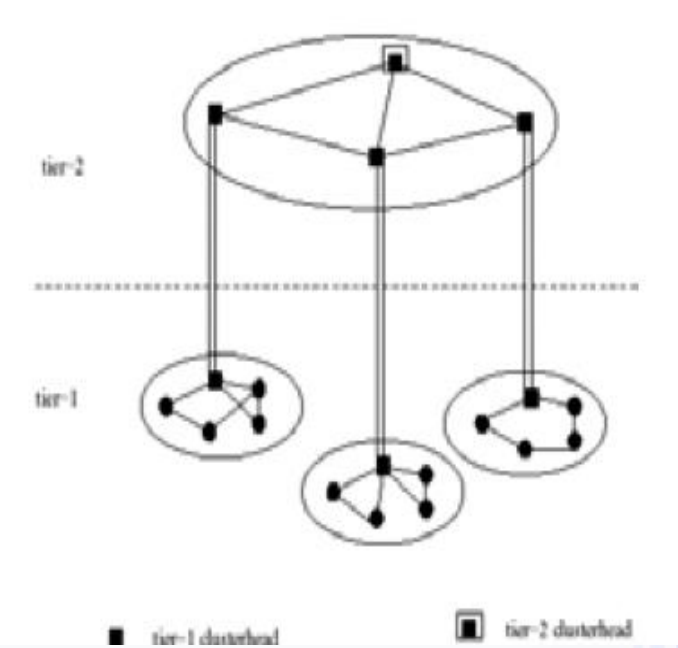
The query is flooded throughout the network (Flat).



Does not fully exploit the feature of sensor networks that adjacent nodes have similar data.

Hierarchical Sensor Network Model

- Each cluster has a cluster head (CH) which collects data form its cluster members.
- CH aggregates the data and sends it to the BS or an upper level cluster head.
- All the nodes transmit only to their immediate CH.
- CH at increasing levels in the hierarchy need to transmit data over relatively longer distances (energy consumption)



Wireless Sensor Networks Hierarchical -vs- Flat

Hierarchical	Flat
Reservation-based scheduling	Contention-based scheduling
Collisions avoided	Collision overhead present
Reduced duty cycle due to periodic sleeping	Variable duty cycle by controlling sleep time of nodes
Data aggregation by cluster head	Node on multi-hop path aggregates incoming data from neighbors
Simple but non-optimal routing	Routing is complex but optimal
Requires global and local synchronization	Links formed in the fly, without synchronization
Overhead of cluster formation throughout the network	Routes formed only in regions that have data for transmission
Lower latency as multi-hop network formed by cluster-heads is always available	Latency in waking up intermediate nodes and setting up the multi-hop path
Energy dissipation is uniform	Energy dissipation depends on traffic patterns
Energy dissipation cannot be controlled	Energy dissipation adapts to traffic pattern
Fair channel allocation	Fairness not guaranteed

Tugas Mandiri (teori):

1. Jelaskan metode Routing Flat model dan Hirarki Model dari Sensor Network.
2. Apa keuntungan dan kerugian menggunakan Routing Flat model dan Hirarki Model? Jelaskan.
3. Jelaskan kondisi ideal untuk bisa menggunakan Model tersebut.

Tugas Mandiri (praktikum):

Rancang komunikasi Routing Flat model dan Hirarki Model menggunakan Network Simulator.

end