

Self-Organized Data-Energy-Aware Clustering and Routing for Wireless Sensor Networks

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Overview

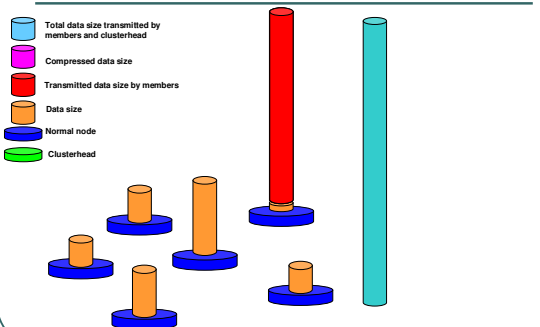
- Motivation
 - Self-Organization
 - Data size as a metric
- Proposed Clustering and Routing Protocol (DECRO)
- Evaluation of Proped protocol
- Conclusion and Future Work

Self-organizing systems

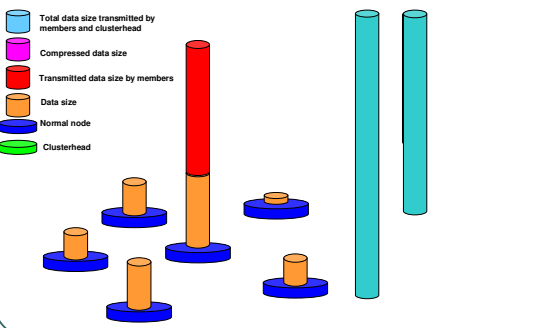
- In self-organizing systems, individual entities react by following common rules based on local environment without any centralized control.
 - Purely distributed, and no single point of failure!
- In our model:
 - Feedback using exchange of messages between neighboring nodes
 - All nodes follow the same rules





Data Size as a Metric

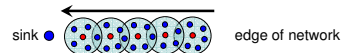


Data Size as a Metric

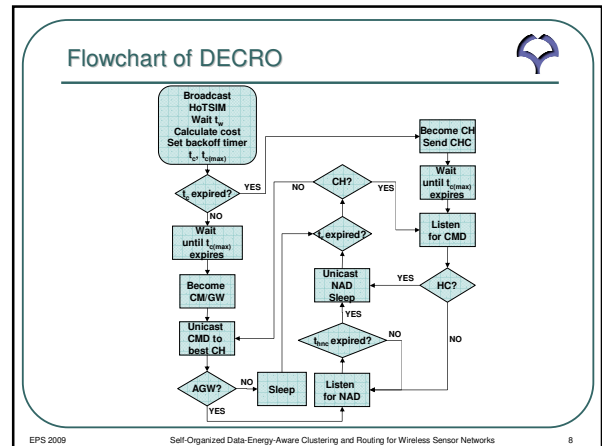
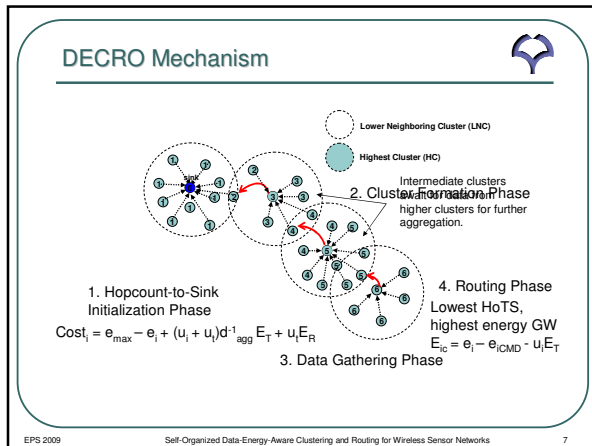


Proposed Protocol

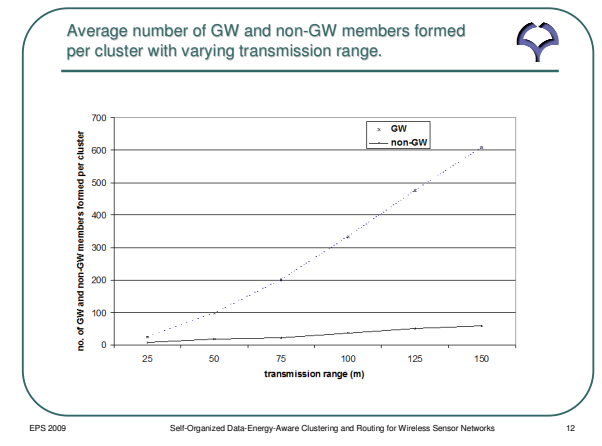
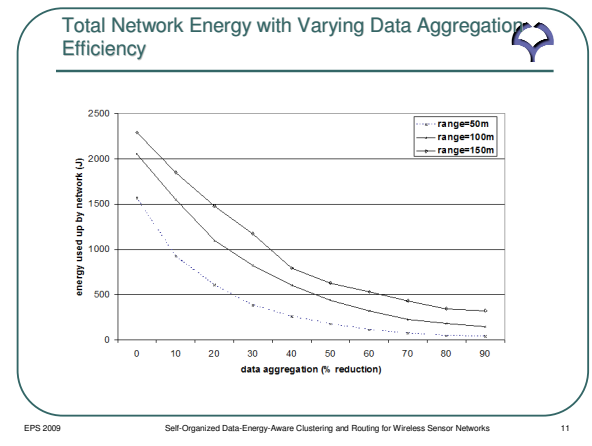
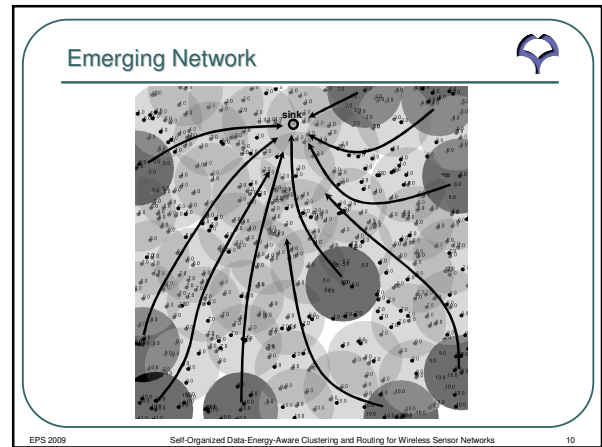
- A self-organizing Data-Energy-Aware Clustering and Routing (DECRO) protocol for Wireless Sensor Networks (WSNs)
 1. Performs a distributed cluster formation based on the data size and residual energy of nodes.  + 
 2. Clusters at the edge of network perform initial routing of data, intermediate clusters towards the sink further aggregate and forward data towards the sink.



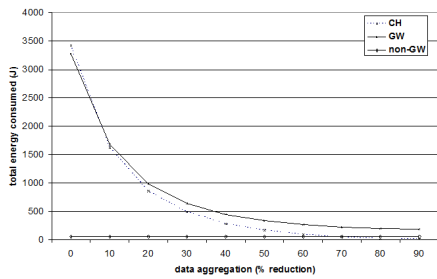
sink • edge of network
 3. Application: Suitable for quasi-concurrent reporting of all sensor data towards the sink.



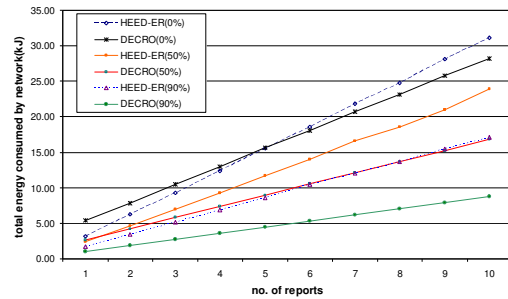
- ### Evaluation of DECRO
- Parameter Setup
 - 10,000 nodes uniformly distributed
 - Simulation area 500 m by 500 m
 - 500nJ/bit for transmitter and receiver circuitry
 - 100pJ/bit/m² transmitter amplifier
 - Nodes have variable data sizes of up to 8000 bits.
- EPS 2009 Self-Organized Data-Energy-Aware Clustering and Routing for Wireless Sensor Networks 9



Relative energy consumption of CHs, GWs, and non-GWs.



Total energy consumed vs number of reports for HEED-ER and DECRO with varying aggregation



Conclusion and Future Work

- Introduced DECRO, a self-organized clustering consisting of several phases.
- Suitable for quasi-concurrent reporting of sensors' data to the sink.
- Simulation results show the effectiveness of DECRO in efficiently gathering and reporting data to the sink.
- Future work should investigate the effects of various MAC-protocol implementations on the system.

Thank You.