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Maximizing Wireless Sensor Networks Life Time through Sink Mobility

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Abstract: *The main objective of this paper is to optimise wireless sensor network life time by moving the sink to a finite number of locations. If any node is having energy less than minimum, that node is not considered in communication path then alternate path is created by routing algorithm AODV. Information gathered by mobile sink can reduce the energy consumption of sensor nodes by reducing multihop communication, automatically network lifetime is improved.*

Key words: *Sensor, mobility, AODV, Routing, Energy, Optimization, Dimension., Protocol.*

I. Introduction

A.What is Wireless Sensor Network?

Wireless sensor node (simply sensor node) consists of sensing, computing, communication, actuation, and power components. These components are integrated on a single or multiple boards, and packaged in a few cubic inches.WSN usually consists of tens to thousands of such nodes that communicate through wireless channels for information sharing and cooperative processing.The basic philosophy behind WSNs is that, while the capability of each individual sensor node is limited .

B. What is the Problem existing in the current application?

Existing energy-conserving routing. The protocols aim at balancing the energy consumption instead of minimizing the absolute consumed power. The mobile sink approach, by further involving mobility, increases the dimension of such optimization problems.

C. What is the solution?

So to solve above mentioned problem , a framework has built is to optimising wireless sensor network life time by moving the sink to a finite number of locations. If any node is having energy less than minimum, that node is not considered in communication path then alternate path is created by routing algorithm AODV. Information gathered by mobile sink can reduce the energy consumption of sensor nodes by reducing multi hop communication, automatically network lifetime is improved. Initially it is developed to solve the problem involving a single sink, then we generalized this to approximate the original problem involving multiple sinks.

II. Design & Implementation

A).Design steps:

Sensor node wants to send data packet to sink node by moving sinks to the finite set of location
Algorithm: Node has information or Data packet
Step 1: First select a sensor nodes and make them as active by initializing active =1.
Step 2: Set up a Sink Node and initialize to 0.
Step3: Find Route from source node to sink node using AODV routing, protocol, a Hello packets are exchanged between them by sending RREQ to the Sink Node. If the path has found, then sink node sends RREQ in the same path.
Step 4: The Sensor Nodes senses the data.
Step 5: Sink nodes gather the information from neighbouring sensor nodes .
Step 6: If any Sensor node is having Energy less than minimum value (Threshold) then Calculate the battery life and drop that node, by passing Sensor node, again find route.
Step 7: If the Sensor nodes having energy larger than minimum value(Threshold) forward the data packet and calculate the battery life.
Step 8:Sink node will stay in the current position and gather the information till specified pausetime.After completion of the specified pause time sink node moves to the new location in the network.
Step 9:Repeat step 1,still simulation time is over.
Step 10.End of the algorithm.

B. Methodology
Functioning of the proposed sensor networks is given by.

Application Layer.
All the sensor nodes which are active are start sending or generating data, Sink node is equated to 0 ,to send data from current source node to destination node. The sensor will check if route exist to the destination or not , if route exists it will start sending a data if not there it will generate route request message .

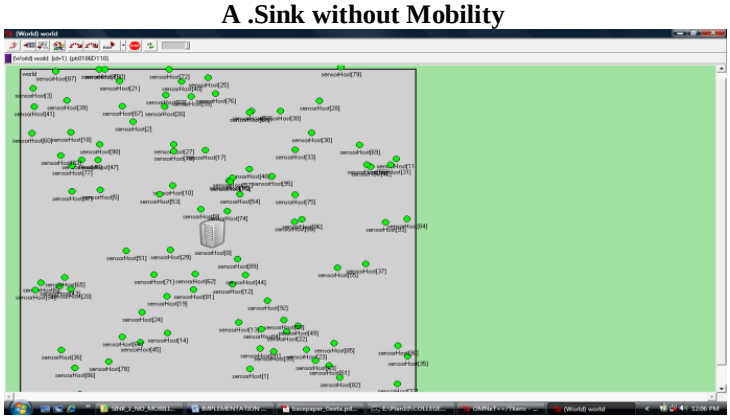
Physical Layer Energy Model
Energy is a phenomenon of physical layer and energy loss due to transmission and reception is much higher than that of idle time energy loss. Therefore in this project we assume that one unit energy is lost for every packet reception and three units of energy at the transmission time i.e.,when packet arrives from MAC layer node energy is given by.
Energy=Energy-loss

Energy Optimization through Mobility
The condition for mobility is that a sink move in such a point randomly in the network where at least one sensor is present and no other sink is present. A pause time is the time period for which a node waits in its current position before moving again.

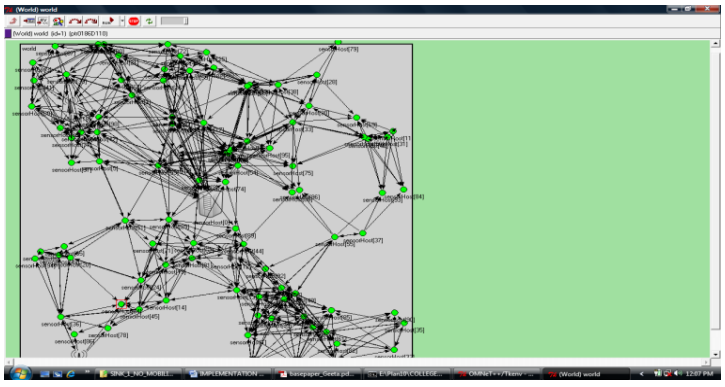
C). The implementation depicts wireless sensor network that consists .
-Sink without mobility.
-Sink with mobility.
-Multiple sinks with mobility.
A snapshot of the simulation scenario is shown in Figures. Every sensor in the network is assigned a defined transmission power . we assume that one unit energy is lost for every packet reception and three units of energy at the transmission time i.e.,when packet arrives from MAC layer energy is given by.
Energy=Energy-loss.

III. Interpretation Of Results

A .Sink without Mobility

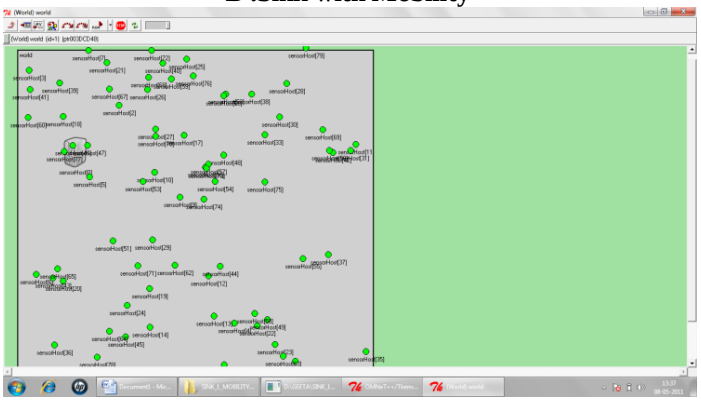


Sink in the middle and sensor nodes are across it

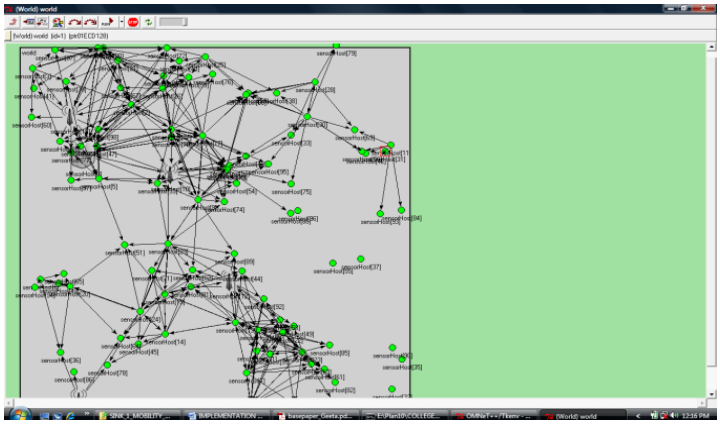


Radio links established

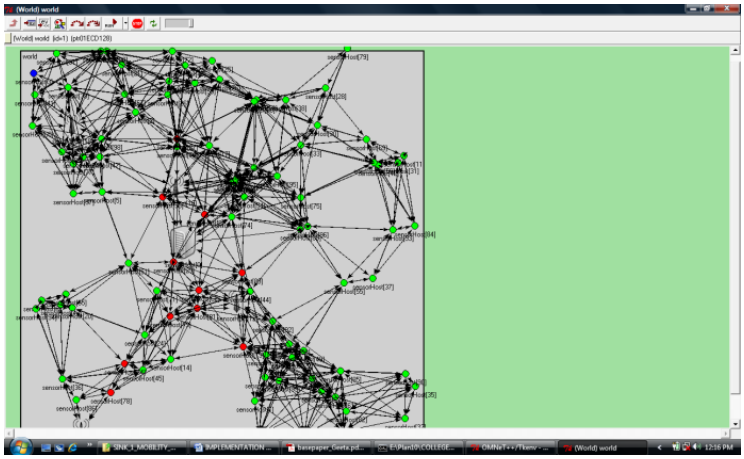
B .Sink with Mobility



Initial network structure

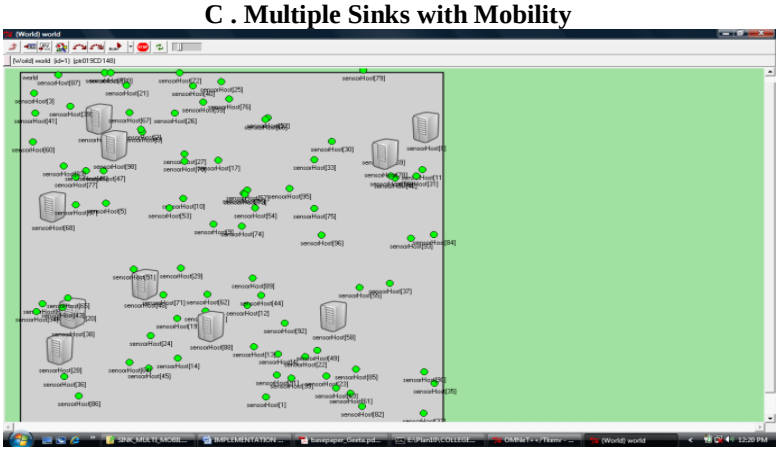


Sink node at Position 1.

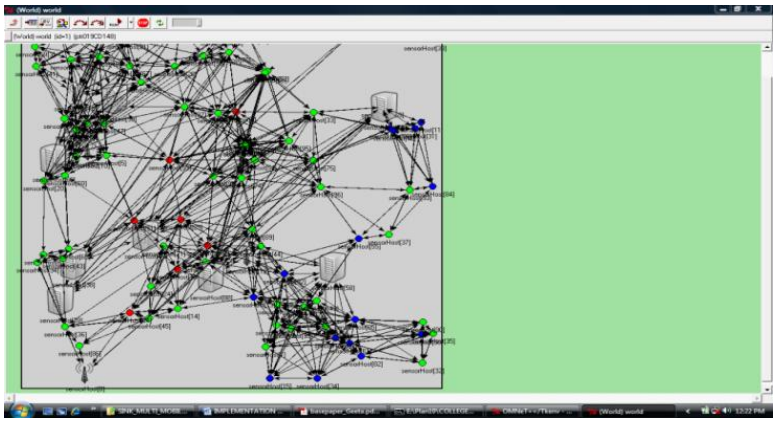


Sink node at position 2

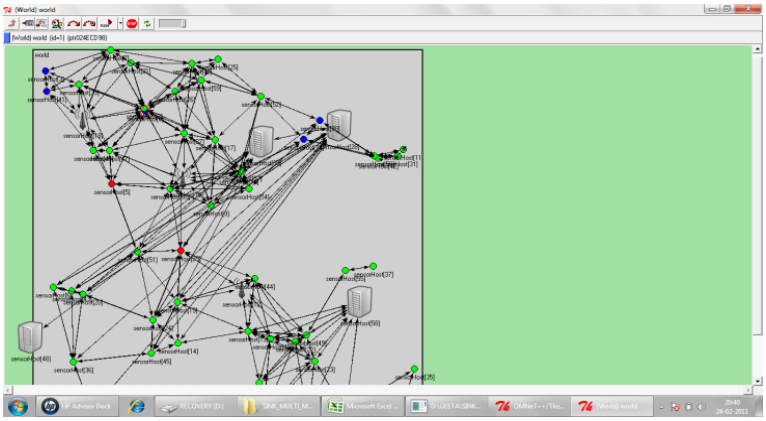
C . Multiple Sinks with Mobility



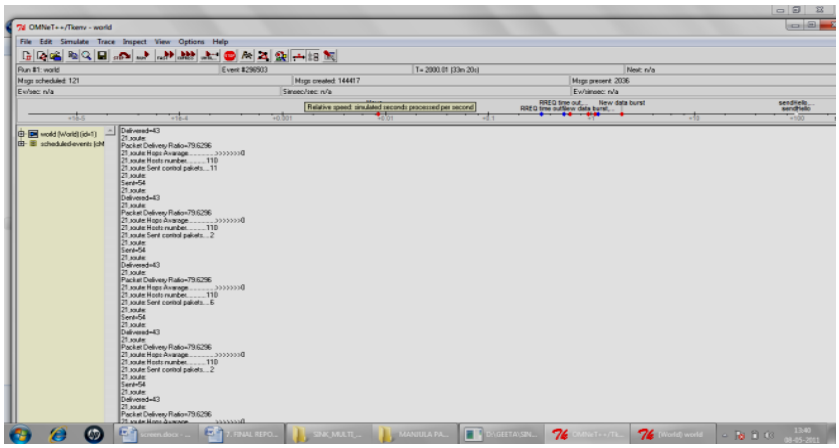
Initial Network Structure



Sink nodes at position1



Sinks nodes at position2



Final Result of Simulation

D.GRAPHS

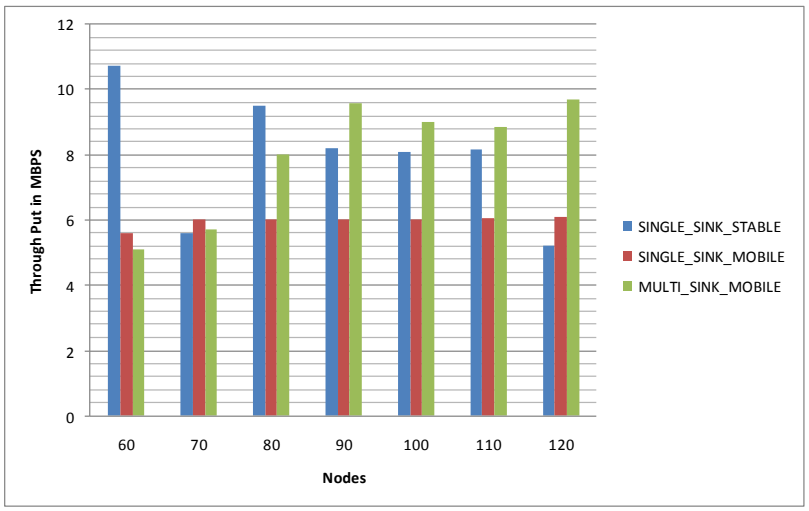


Figure 5.4: Nodes v/s Throughput

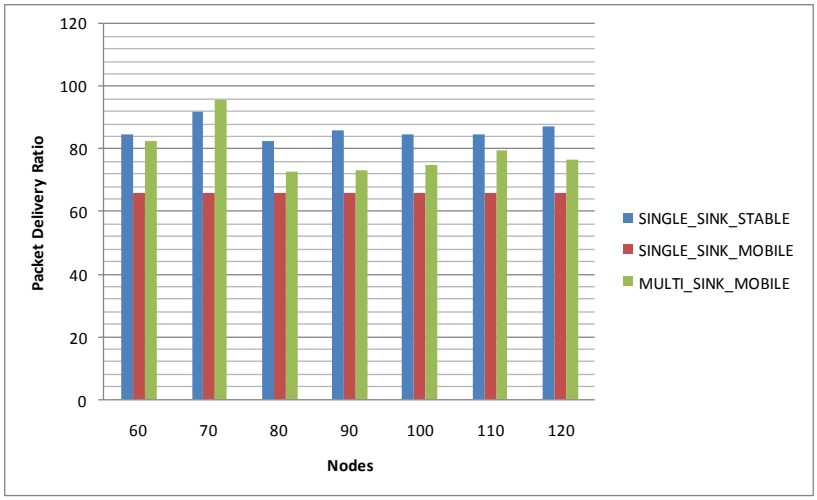


Figure 5.5: Nodes v/s Packet Delivery Ratio

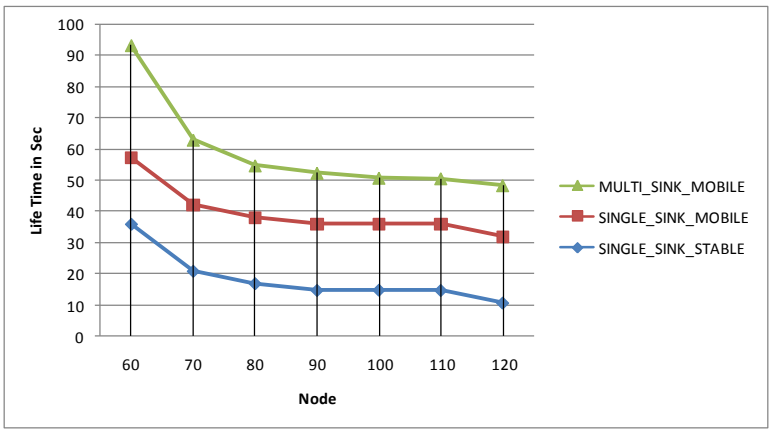


Figure 5.6: Nodes v/s Network Life Tim

IV. Applications

- Area monitoring
- Environmental monitoring
  -Air pollution monitoring
  -Forest fires detection
  -Greenhouse monitoring
  -Landslide detection
- Industrial monitoring
- Agriculture etc.

V. Conclusion And Future Enhancements

This paper explains that how the energy conservation can be reduced by moving the sinks in a planned way therefore subsequently distributing the power consumption across the networks. Initially problem is solved by involving a single sink, then generalized this to approximate the original problem involving multiple sinks. Finally, the results demonstrate that network lifetime can be significantly improved using this technique and also results in better packet delivery ratio and low bit error rate.

Further it can be used for node maintenance protocol (battery replacing or recharging for sensor nodes).The protocol can be extensible to any sensor architecture. This design work considered static sensor nodes but same can be extended for dynamic (moving) nodes as well.

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