Adaptive and Energy Efficient Data Gathering using Sink Relocation

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Abstract— A Wireless Sensor Networks (WSNs) consists of small-sized sensor devices, which are furnished with limited battery power. In this paper, an energy efficient routing protocol and sink relocation mechanism is proposed, which is to increase the lifetime of sensor node and also increase the performance. Sensor nodes which are present near the sink, will generally consume more battery power than other sensor nodes and this will become one of the major problem. Sink relocation is an extension method for efficient network lifetime and avoids too much energy consuming for a specific group of sensor nodes. Energy-aware multiple sink relocation (EAMSR) is proposed for moving strategy of mobile sinks in WSNs. This method is used to reduce the energy consumption of nodes. This approach uses data delivery latency. The regular network operation are relocating the sink is very challenging. The proposed methodology is using the information which is related to the residual battery of sensor nodes to adjust the transmission range of sensor nodes.

Key words: energy efficiency, sink relocation, wireless sensor networks

I. INTRODUCTION

A wireless sensor network (WSN) use sensors to monitor environmental and physical conditions, which consist devices that is spatially distributed. Sensor networks consist of a large number of small nodes. Sensing, computation, and communication are combined into a single device. The typical size of a node is in the range of millimetres or centimetres. The consumption of energy by a sensor node must be very low. Nodes may be scattered on the field and they may need to work for years without anyone changing or recharging their batteries. The infrastructure of a wireless sensor network consists of two components:

- Sink nodes
- Sensor nodes

The data packets are generated from all the sensor nodes in the networks are collected by base station and provide them to users. Here the base station is called as sink node. In WSNs, sensor nodes which perform multiple functions such as sensing, computing, collecting information from the environment, and communicating with other nodes. The main role of source nodes is to give information about the sensing or monitoring data to a special node called the sink node. This could be achieved by using multi-hop communication. Normally sensor nodes are battery-powered devices, charging batteries for sensor nodes is difficult. Operations such as sensing, communication, computation, consume the energy of sensor nodes and transmission of data is the important source of energy consumption. Once a sink receives the data packets, it processes and forwards it to the handlers.

II. EXISTING SYSTEM

A. Source and Sink:

A source is any entity in the network that provide information, and it also act as sensor node; it could also be an actuator node that provides feedback about an operation.

Sink nodes are considered as base stations in the network that receive and collect data packages which are generated from all the sensor nodes in the network.

A sink, on the other hand, is the entity where information is required. In typical WSNs, sensor nodes (i.e., source nodes) must report the sensing or monitoring data to a special node, called the sink, generally via multi-hop communication when receiving query messages sent by the sink.

B. Maximum Capacity Path:

A dynamic routing protocol, called Maximum Capacity Path (MCP), as the underlying routing protocol of the proposed sink relocation method. The relocating decision made by the sink will take the MCP routing protocol as the underlying message routing in order to gain the merit of prolonging network lifetime.

The MCP mainly consists of three procedure steps. They are,

1) Layering graph G into a layered network N
2) Determining the maximum capacity path for each sensor node
3) Routing performed and residual energy updated.

The MCP will iteratively perform the above three steps for each round of message reporting.

C. Sink Relocation:

Sink will be relocated when either the condition occurs, which means the residual energy of the nearby sensor nodes of the sink become small or the residual energy bottleneck of some routing paths falls a threshold (B/2). Then the sink relocation mechanism will be performed to relocate the sink to a new position, which can enlarge the network lifetime.

D. Disadvantages:

1) Sensors send additional information to the sink about their energy level.
2) Packet loss.
3) Only flexible for small scale networks.

III. PROPOSED SYSTEM

Energy consumption should be managed in an efficient way to maximize in the deployment network lifetime. If there is long distance between the sensor node and sink, transmission is not energy efficient since the transmission power is proportional to the quadruple of the transmission distance. It is based on number of nodes and it relocate sink periodically towards the distant nodes. The difference

between new strategy and what was already proposed is that there is no need for the sensors to drain their energy in sending additional information about their energy level. Each sink knows its own position, other sinks position and the locations of all the sensors. Therefore, from the number of hops to reach the nearest sink, it is possible to guess which sensors are more residual energy. Then the sink relocation mechanism will be performed. Multihop routing is performed than sensor to sink direct transmission for long distance as more energy could be saved. But multihop routing cause over use of the nodes close to the sink and makes them run out of energy quickly. Therefore unbalanced energy consumption is an important problem in direct transmission and multihop routing schemes. It can cause early collapse of the network due to the death of some critical nodes which results in significant reduction of network lifetime.

In this approach, efficient network lifetime extension method sink relocation is used, which avoids consuming too much energy for a specific group of sensor nodes. In this method, the technique of energy-aware transmission range adjusting to tune the transmission range of each sensor node according to its residual battery energy. If sink relocation condition occurs, sink relocation mechanisms generally take the nearby sensor nodes residual battery energy into consideration and then move the sink to a new position with a larger amount of total residual energy than others.

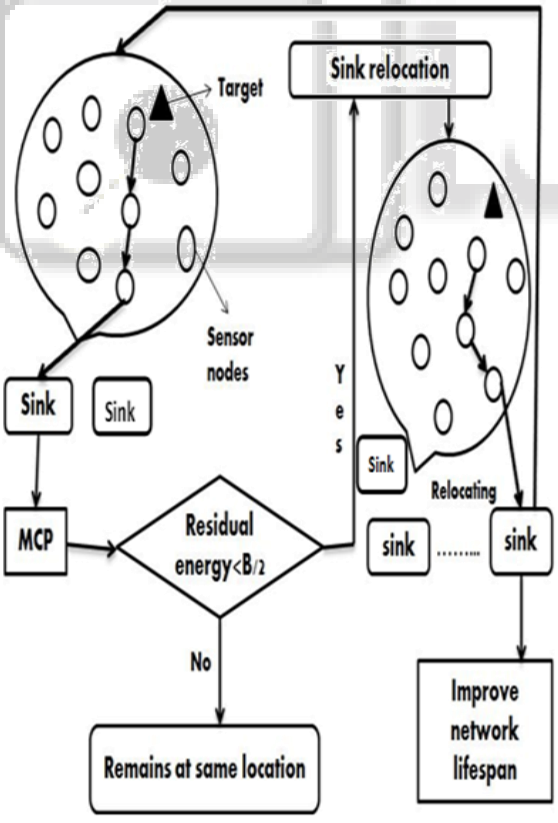

Fig. 1: Architecture of Sink Relocation

A. Advantages:

1) Flexible for large scale networks.
2) Network lifetime increased by their energy level.

IV. CONCLUSION

A sink is staying at a certain location for too long which may harm the lifetime of nearby sensor nodes, so to overcome this problem the sink is relocate. This approach can not only relieve the burden of the hot-spot, but also can integrate the energy-aware routing to enhance the performance of the prolonging network lifetime. Proposed an energy-aware multi sink relocation method (EAMSR), which adopts the energy-aware routing MCP as the underlying routing method for message relaying and it will scales to thousands of nodes and prevents from sending additional information about the energy level of each sensor nodes. Relocation is based on number of hop counts. This method can effectively enlarge the network lifetime of a WSN.

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