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Consistent & Trivial Routing Approach for In- Network Aggregation in Wireless Sensor Network

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ABSTRACT— *A wireless sensor network (WSNs) consists of many sensor nodes and these networks are deployed in different applications for monitoring environmental conditions. These sensor nodes are limited energy which limit the lifetime of a sensor network. In WSN's nodes are densely located, so there is duplication of data as multiple nodes sensing same event. Such duplication of data is responsible for wastage of node energy. Since energy saving is one of the important issues. So, data aggregation, data fusion should be used for saving energy. Data aggregation is effective method. It eliminate redundancy and to minimize the number of transmission. In this paper we present an efficient, trivial data aggregation strategy based on tree & cluster formation which eliminates such data duplication and improves node energy, efficiency & provides the best aggregation quality when compared to other existing systems, regarding scalability, communication cost, delivery efficiency, aggregation rate and aggregated data delivery rate. These node structures are then used to route packets to sink in an efficient manner. This helps in building efficient wireless sensor network.*

Keywords— Data Aggregation, Information Fusion, In- Network Aggregation, Routing Protocol, Routing Tree.

1. INTRODUCTION

A Wireless Sensor Network (WSN) consists of many sensor nodes and these nodes are spatially distributed devices that are having sensing as well as communication facility. These devices cooperatively sense physical or environmental conditions from different locations. WSN means as a network of various nodes that can sense the environment condition and communication of the information collected from the monitored area through wireless links; and then this data is forwarded by means of multiple hops to a sink node. Sensor nodes are energy-constrained devices therefore energy consumption is generally related with the amount of gathered data, because communication is often the most expensive activity in terms of energy. Sensors are in responsible for sensing data from remote area. The sink node accepts data from various users, contacts to the network to get answers, and returns them to users. Storage nodes stores data from sensors and look for queries from the sink node.

A sensor network consists of multiple stations called sensor nodes, each of which is lightweight, small and portable. Each sensor node is having a transducer, microcomputer, transceiver and power source. A strategy to optimize the routing task can be provided by the intermediate sensor nodes along the routing paths.

Data aggregation is nothing but process of aggregating the data from many sensors to eliminate redundant transmission and provide fused information to the base station. The important aim of data aggregation algorithm is to gather and aggregate data in an efficient manner so the lifetime of the network increases by decreasing the number of packets sent to sink node or base station so that it reduces the communication costs and energy consumption. The routing protocol of sensor networks are divided into two sub routing protocol: (1) flat routing protocol and (2) tree- based or cluster-based) routing protocol. But the Cluster- based algorithms with data aggregation can achieve significant energy savings in WSNs and will be effective in increasing the network Life.

2. LITERATURE SURVEY

2.1 Routing techniques in wireless sensor networks:

A survey By J. Al-Karaki and A. Kamal (IEEE Transaction on Wireless Communications)

Wireless sensor networks consist of many nodes with sensing, communications capabilities. Many routing protocols have been specifically designed for WSNs where energy saving is an essential design issue.

Various Routing protocols in WSNs may differ depending on the type of application and network design.

3. SYSTEM ANALYSIS

3.1 Existing System

WSNs are data-driven networks so there is a large amount of information. So it needs to be routed by using a multi hop fashion to a sink node. This sink node acts as a gateway to a monitoring node or station.

The solution to this problem was given by ―In FRA and SPT Scheme. But this scheme has two main drawbacks:

1. The strategy to optimize the routing task is to use the available processing capacity of intermediate sensor nodes. This is called as in-network data aggregation.

2. Data aggregation is a best strategy for saving energy in WSNs Because of redundancy in data gathered by the nodes, in-networking aggregation can be used to decrease the communication cost by forwarding only smaller aggregated data.

Disadvantages:

- This strategy will not do the maximum data aggregation;
- This scheme, does not calculate the number of hops and clustering.

3.2 Proposed System

The proposed algorithm to Aggregation aware routing algorithms perform an important role in event based WSN's the Main algorithm [1], which is consistent, reliable Data Aggregation Aware Routing Protocol for WSNs. In proposed algorithm we extensively compared with other known routing algorithms [2], the InFRA and SPT, regarding scalability, delivery efficiency, and aggregation rate. This Reliable Routing Approach is using Power strength and distance for In-Network Aggregation in Wireless Sensor Networks.

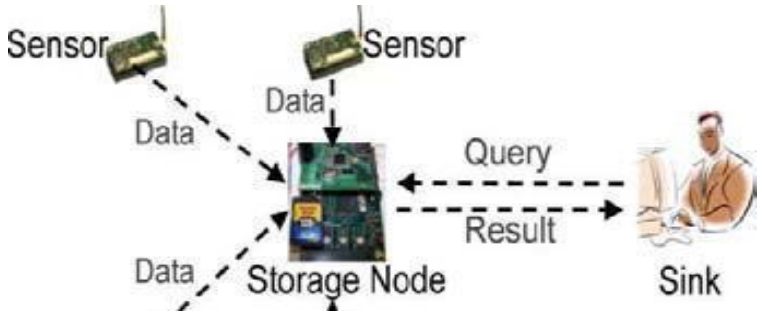

Figure 1**:** Structure sensor network

4. IMPLEMENTATION

1. Algorithm: Data Routing for In-Network aggregation for WSN's.

2. Building the Hop Tree using the power strength in addition to Hop count to calculate shortest path.

3. Cluster creation phase.

4. Routing creation and Hop Tree updating.

5. Route Repair phase.

4.1 ALGORITHM: Data Routing for In-Network Aggregation for WSN's

The main goal of our proposed algorithm is to build a routing tree with the shortest paths that connect all source nodes to the sink while maximizing data aggregation [3],[4]. Our proposed algorithm considers the following nodes in the routing infrastructure creation:

- Collaborator node: It w i l l detect an event also reports the collected data to a coordinator.
- Coordinator node: It will also detect an event and collect sent by collaborator, and then aggregating it forwarding the result to the sink.
- Sink node: It will receiving data from coordinator nodes and collaborator nodes.
- Relay node: It will just forwards data to the sink node.

In the proposed algorithm first we create routing tree with the shortest paths that connect all source nodes to the sink node. This will maximizing data aggregation rate.

The proposed approach is divided into four steps: setup step, cluster creation step, inner cluster routing step and route repair step. This phase is started by the sink node sending the Hop Configuration Message to all nodes. The HCM message contains two parts: Hop_ID and HopToTree, where Hop_ ID is node identifier of the HCM message and HopToTree is the distance measured in hops.

Algorithm 1. Setup step

#Number of nodes n

Base station can transmit k levels; i _k

1. For each level k, message transmitted by Base station

2. If (Nodes does not assign previous level and receive new message or Base transmit level k=1)

3. Assign level k

4. End if

5. End for

6. Base station broadcast message.

7. Each node calculates the distance from the BS based on distance.

Algorithm 2. Cluster creation step

1. for every (node n)

2. if node n highest energy level then n becomes head cluster(CH).

3. n broadcasts an message for its cluster nodes.

4. Else n is not Cluster head.

5. n become member of cluster.

8. End if.

9. for each (Cluster Head)

10. Each cluster member communicates to the CH.

12. End for

Algorithm 3. Inner cluster step

1. For each (level k)

2. for each Cluster Head

3. CH takes the data from the cluster node which is member

4. Aggregate the data If (k ==1)

5. Cluster head transmits data towards Base station.

6. Else Cluster head broadcasts data in the next level.

9. End if, for, for.

Algorithm 4. Route Repair phase

The route created to send the data towards the sink node is unique and efficient since it maximizes the points of aggregation.

5. CONCULSION AND FUTURE WORK

Aggregation aware routing algorithms are very important in event based WSN. The cluster-based algorithm with data aggregation can useful in energy savings. The proposed approach, a cluster based routing protocol will consider the residual energy of nodes to extend the lifetime of sensor networks.

In proposed algorithm has some key aspects required by WSNs aggregation aware routing algorithms such as a reduced number of messages for setting up a routing tree, maximized number of overlapping routes, high aggregation rate, and reliable data aggregation and transmission.

As future work, spatial and temporal correlation of the aggregated data will also be taken into consideration as well as the construction of a routing tree that meets application needs. I also plan to modify this algorithm to that will select nodes that will be part of the communication structure.

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