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A Virtual Grid-Based Dynamic Routes Adjustment (VGDRA) Scheme for Wireless Sensor Networks Based on Sink Mobility

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Abstract - *Basic building blocks of a wireless network are small devices which are communicating over wireless links with the help of a fixed networked infrastructure. The main aim still remains to conserve energy in these devices. One of the methods of achieving this is using the portable and mobile nature of sink. To balance the energy excretion of nodes, this has always been a good technique to follow. But, due to continuous movement of the node, sending data to the node (aka data dissemination) becomes a very difficult task. For completion of this task, other nodes need to make new paths for every new location of the mobile node. Hence, network suffers loss of energy. In this project, we work around the ground problem of conserving the network energy while dynamic routing of information path towards the sink.*

Key Words: Sensor Nodes, Energy Efficiency, Wireless Network, Routing Reconstruction, Mobile Sink.

1. INTRODUCTION

Wireless sensor networks are created by small devices communicating over wireless links without using a fixed networked infrastructure. More detailed routing algorithms are essential for the applicability of such wireless networks, as energy has to be conserved in low powered devices and wireless communication always leads to increased energy consumption [7]. The method of selecting best paths in a network is called routing. Routing is executed for many types of networks. Routing conducts packet forwarding in packet switching networks i.e. the transfer of logically addressed network packets from their source in the direction of their final destination, through intermediate nodes. WSN has been widely used in various environments. E.g. in Disaster management system, a rescuer can check for any survivor around the affected area using a PDA device [5]. In an intelligent transport system, sensor nodes located at various places like car parking's, area expecting falling of rocks, can give early warnings to drivers (mobile sink) at an earlier time than their physical approach. Also in an area where a battle is fought, a commander can acquire information about trespass of enemies, attacks etc via field sensor on the move. In this approach, dynamic network topology is used because the mobile sink keep on changing its position thus for efficient data delivery, nodes should keep the track of latest position of mobile sink. In virtual structure, just a set of nodes covered in the sensor field participate in creating a track of mobile sink's location. Collisions are reduced by this method and retransmissions like in other data dissemination protocols e.g. Directed Diffusion are also reduced [4]. The sensor field is divided into k equal sized cells. Nodes that are close to centers of the cells are selected as cell headers. These cell headers comprise a virtual backbone network. The objective of this virtual structure is to lessen energy consumption by minimizing the routes re-adjustment cost. With virtual grid routing scheme, just a small group of cell headers participates in routes readjustment according to the latest location of mobile sink, which reduces the communication cost [3].

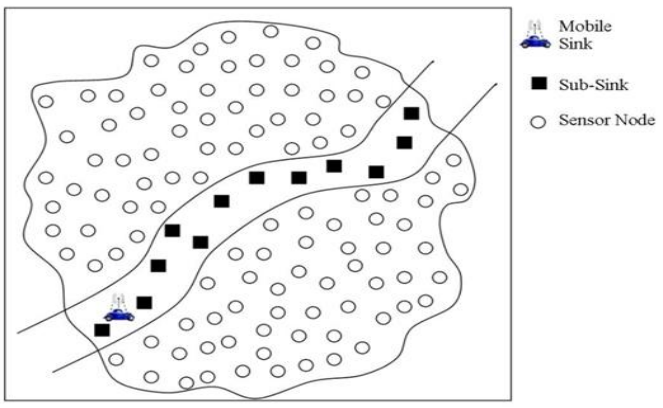

Fig-1: System Architecture of VGDRA

Recently, more and more people are aware that the networked micro-sensor technology will be a promising technology and start to engage in the research of the wireless sensor technology. Wireless sensor networks (WSNs), which are composed of a large number of low-cost, low-power, multifunctional sensor nodes randomly deployed to obtain data from the physical environment in a self-organized manner

via wireless communication, brings a significant change for information perception [1]. Up to now, the wireless sensor technology has been applied to different application domains, such as health care, military surveillance and tracking, and environmental monitoring. However, the battery capacity of micro-sensors is limited and batteries are unable to be replaced by humans in an unreachable environment. Hence, energy efficiency is always considered as a key problem full of challenges which hinders the development of the wireless sensor technology [6].

Traditional static node deployment shows n-to-1 communication. This makes that sensor nodes in the vicinity of sink consume more battery power than other regular nodes and also leads to the hotspot phenomenon more easily. For this purpose, sink mobility is proposed to alleviate the hotspot problem which prevents local nodes from suffering more workload. The hotspots will be changed as the sink moves, which extend the network lifetime significantly [8]. Sink mobility also has security benefits where mobile sinks are more difficult to track than static sinks. Previous static sinks are placed in a fixed position. An attack to static sinks, e.g., destroying sinks and stealing sensitive information, would come very easily. However, if sinks have mobility, the adversary has to track and locate the mobile sink before attacking the sink carrier, which makes mobile sinks more resistant than static sinks. Moreover, mobile sinks can link the isolated network segment by accessing the portions of the network to improve the network connectivity, which is impossible for static sinks to realize. Despite a lot of benefits, sink mobility also brings a series of new problems, such as data dissemination, routes adjustment and energy dissipation. Locating the sink is a primary problem for data dissemination that source nodes have to know the destination location. Unlike static sink scenarios, the network topology becomes dynamic as the sink changes its own position. Frequent location updates give rise to frequent unpredictable topology change [10]. Once the sink gets to a new position, it must broadcast its latest location to the whole network thereby causing significant overhead.

Wireless sensor networks are created by small devices communicating over wireless links without using a fixed networked infrastructure. More detailed routing algorithms are essential for the applicability of such wireless networks, as energy has to be conserved in low powered devices and wireless communication always leads to increased energy consumption. In current system, the administrator manually decides which ping packet to be sent. Sending programs between every pair of edge ports is neither extensive nor scalable [11].

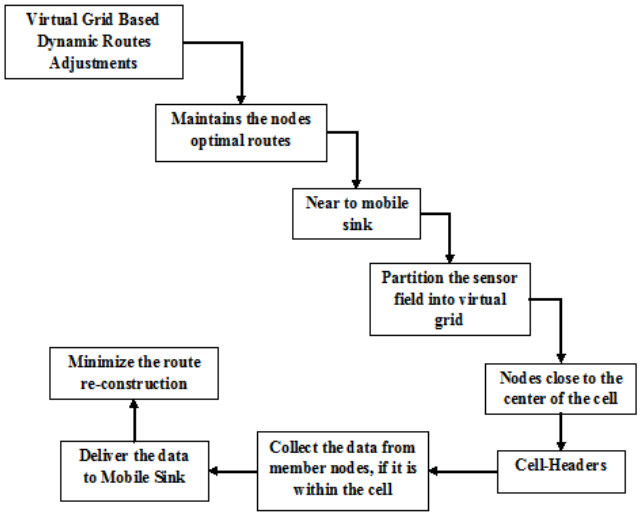

Fig-2: Block Diagram of VGDRA

This system is enough to find minimum set of end-to-end packets that travel each link. However, doing this need away of abstracting across device specific configuration files generating headers and links they reach and finally calculating a minimum set of test packets. It is not designed to identify failures caused from failed links and routers, bugs caused from faulty router hardware or software, and performance problems. The common causes of network failure are hardware failures and software bugs, in which that problems manifest both as reachability failures and throughput/latency degradation [4]. To overcome this we are proposing new system.

2. RELATED WORK

Dr. Mohammed Ali Hussain, Dr. K. Satya Rajesh[2] has providing scalable and efficient routing services in underwater sensor networks (UWSNs) are very challenging due to the unique characteristics of UWSNs. Firstly, UWSN soften employ acoustic channels for communications because radio signals do not work well in water. Compared with radio frequency channels, acoustic channels feature much lower bandwidths and several orders of magnitudes longer propagation delays. Secondly, UWSNs usually have very dynamic topology as sensors move passively with

water currents. Some routing protocols have been proposed to address the challenging problem in UWSNs. However, most of them assume that the full-dimensional location information of all sensor nodes in a network is known in prior through a localization process, which is yet another challenging issue to be solved in UWSNs. This paper surveys recent routing protocols for sensor networks and presents a classification for the various approaches pursued among that location based is the main concept. Moreover, protocols using
Contemporary methodologies such as network flow and QoS modeling are also discussed.

Gowri K, Dr Chandrasekaran M.K and Kousalya K[7] have says an In WSN, due to continuous message passing, congestion and energy minimization are the primary issues which must be resolved. The base study deals with the efficient path selection for the mobile sink, which collects the data only from the rendezvous points (RP) in the WSN. The nodes which are not RPs will send the data to the nearest RP. Here the mobile sink travels in a specific path, so that nodes which are far from the RPs are unable to deliver the data (packet loss), because of which metrics like throughput, reliability and efficiency gets decreased. In the proposed technique, a novel scheme called HRP (Heuristic based Representative Point selection); a Grid based Dynamic Routes with multiple mobile sinks is proposed for periodic data collection from WSN. Unlike the existing solutions, it improves the data delivery performance by employing multiple mobile sinks and reduces the congestion considerably, the proposed scheme does not allow packet drop at such situation. Thus there diction in packet loss ratio reduces the number of retransmission, which saves the energy of sensor node and improves the network lifetime. It aims to optimize the trade-off between nodes energy consumption and data delivery.

R.Valarmathi and R.Birundha[1] have summarized in wireless sensor networks, exploiting the sink mobility has been considered as a good strategy to balance the nodes energy dissipation. Nodes need to reconstruct their routes toward the latest location of the mobile sink for efficient data delivery. The virtual grid based dynamic routes adjustment (VGDRA) scheme used to minimize the routes reconstruction cost of the sensor nodes while maintaining nearly optimal routes to the latest location of the mobile sink. Here only a limited number of nodes to readjust their data delivery routes toward the mobile sink. Simulation results gives reduced routes reconstruction cost and improved network lifetime.

Dinu Gopal, Dr C D Suriyakala[4] have analyzed Wireless sensor network are highly distributed autonomous sensor nodes to monitor the environment. The self-organizing ability of WSNs permits one to access data from dangerous and hostile environments which otherwise would not be possible. Some potential applications of WSNs include: habitat monitoring, border patrol, battle field surveillance, remote health monitoring, early warning of natural disasters like forest fire, wildlife tracking, smart transportation, industrial process control and etc. Data dissemination in wireless sensor network consumes lot of energy, various protocols or scheme has been proposed over decades to reduce the energy consumption of wireless sensor network. Survey highlights variety of data dissemination schemes, each scheme has its own advantages and disadvantages. Various schemes are helpful to reduce the energy consumption of wireless sensor network by creating the virtual grid. Grid is constructed only when if there is no valid grid is present in sensor filed and if valid grid is present then be use the exiting grid which reduce the energy consumption of sensor node to create grid again and again if event is occurred. Sensor nodes have strong constraints on their energy usage and data transfer needs to be energy efficient, for maximizing the network lifetime.

3. PROBLEM FORMULATION

Introduction of sink's mobility helps to prolong the network lifetime by resolving the problem of energy-hole. The mobility would be especially useful in particular applications like in emergency situations where the sink can move around the disaster area and better estimate the emergency situation. However it brings new challenges for the data propagation. As the sink keeps on changing its location the topology of the network becomes dynamic. Hence the sensor nodes need to keep track of the latest location of the mobile sink whenever it changes its position.

This project aims to optimize the trade-off between the energy consumption and the data delivery performance using the mobile sink based WSN. The proposed scheme minimizes the network overhead by enabling the dynamic sensor nodes to maintain the nearly optimal routes to the latest sink's location. A

virtual backbone Network is constructed by partitioning the sensor field into a virtual grid of equal sized cells using virtual grid architecture. The main goal behind construction of such a virtual structure is to minimize the cost of re-adjusting routes so that the data is propagated to the mobile sink in an energy efficient manner. It also sets up communication routes in such a way that the end-to-end delay and the cost in terms of energy are minimized.

The Authors in [6] have says recently, a VGDRA scheme for mobile sink-based wireless sensor networks is introduced. This paper presents the proposed implementation of VGDRA, in which we are discussing the approach of efficient data delivery using communication of distance priority i.e. avoiding straight line communication which was used in previous VGDRA scheme. In this paper, we present a VGDRA scheme that aims to minimize the routes reconstruction cost of the sensor nodes while maintaining nearly optimal routes to the latest location of the mobile sink. We propose a set of
Communication rules that governs the routes reconstruction process thereby requiring only a limited number of nodes to readjust their data delivery routes toward the mobile sink.

4. PLANNING OF WORK

The whole system revolves around 2 basic tasks

1. Shortest path between source and sink
2. Efficient energy saving mechanism

In order to achieve both simultaneously, the proposed paper has divided the complete deployment area into several rectangular zones. In our implementation, we will make use of circular zones. This will enable to us to cover the complete area. Also, now zone headers can take full control of transferring the information to respective sink node, once the information is received.

5. CONCLUSION

In this paper we discussed about various Authors and their thought. For A Virtual Grid-Based Dynamic Routes Adjustment Scheme for Wireless Sensor Network Based on Sink Mobility, We can consider a network where 1 or multiple nodes are mobile. In that case, Firstly We divides our wireless network in small grids equally and then we will reroute construction, due to continuous routing, energy conservation could be difficult. So we can try to work around this problem where either the sink, source or multiple nodes are continuously moving.

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