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Survey on Implementation of VGDRA and its Comparative Analysis

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ABSTRACT
In wireless sensor networks, exploiting the sink mobility has been considered as a good strategy to balance the nodes energy dissipation. Despite its numerous advantages, the data dissemination to the mobile sink is a challenging task for the resource constrained sensor nodes due to the dynamic network topology caused by the sink mobility. For efficient data delivery, nodes need to reconstruct their routes toward the latest location of the mobile sink, which undermines the energy conservation goal. In this paper, we present a virtual grid based dynamic routes adjustment (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. Simulation results demonstrate reduced routes reconstruction cost and improved network lifetime of the VGDRA scheme when compared with existing work.
Keywords-*Routes reconstruction, energy efficiency, mobile sink, wireless sensor networks.*

INTRODUCTION

Wireless Sensor Network (WSN) a self-organized network of tiny computing and communication devices (nodes) has been widely used in several un-attended and dangerous environments. In a typical deployment of WSN, nodes are battery operated where they cooperatively monitor and report some phenomenon of interest to a central node called sink or base-station for further processing and analysis. Traditional static nodes deployment where nodes exhibit n-to-1 communication in reporting their observed data to a single static sink, gives rise to energy-hole phenomenon in the vicinity of sink. In addition, several application environments naturally require sink mobility in the sensor field e.g., in a disaster management system, a rescuer equipped with a PDA can move around the disaster area to look for any survivor. Similarly, in a battlefield environment, a commander can obtain realtime information about any intrusion of enemies, scale of attack, suspicious activities etc. via field sensors while on the move. In an Intelligent Transport System (ITS), sensor nodes deployed at various points of interest junctions, car parks, areas susceptible to falling rocks, can provide early warnings to drivers (mobile sink) well ahead of their physical approach. The proposed scheme enables sensor nodes to maintain nearly optimal routes to the latest location of a mobile sink with minimal network overhead. It partitions the sensor field into a virtual grid of K equal sized cells and constructs a virtual backbone network comprised of all the cell-headers.

LITERATURE SURVEY

Various virtual structure based data dissemination protocols have been introduced in WSN.
VGDRA: A Virtual Grid-Based Dynamic Routes Adjustment Scheme for Mobile Sink-Based Wireless Sensor Networks [1] Abdul Waheed Khan, Abdul Hanan Abdullah, *Member, IEEE*, Mohammad Abdur Razzaque, *Member, IEEE*, and

Javed Iqbal Bangash presented how to construct the virtual infrastructure and how to maintain fresh routes towards the latest location of the mobile sink. We design a virtual infrastructure by partitioning the sensor field into a virtual grid of uniformsized cells where the total number of cells is a function of the number of sensor nodes. A set of nodes close to centre of the cells are appointed as cell-headers which are responsible for keeping track of the latest location of the mobile sink and relieve the rest of member nodes from taking part in routes re-adjustment. Nodes other than the cell-headers associate themselves with the closest cell-headers and report the observed data to their cell-headers. In this type of sink mobility, sink makes its next move freely in terms of direction and speed, whereas in controlled sink mobility scheme, the speed and /or direction of the sink is operated and controlled by an external observer or according to network dynamics.

Virtual Circle Combined Straight Routing (VCCSR) scheme was introduced by Chen et al. [2] which is the converge cast tree algorithm. It forms a virtual structure containing virtual circles and straight lines. A set of nodes are chosen as cluster heads along these virtual circles and straight lines, which forms a virtual backbone network.

Hexagonal cell-based Data Dissemination (HexDD) [3] proposed to constructs a hexagonal grid structure to address real-time data delivery while taking into consideration the dynamic conditions of multiple mobile sinks and event sources. Based on the six directions of a hexagon, HexDD defines query and data rendezvous lines to avoid redundant propagation of sinks data queries. Nodes send their data to nearest border line which is then propagated towards the center cell. Nodes along the border line store and replicate the data. Sinks data queries are forwarded towards the center cell and as soon as it approaches a border line node with the relevant data stored, data delivery to the mobile sink starts using the reverse path. To cope with sink mobility, whenever the sink moves from one cell to another, it informs the center nodes as well as the border nodes along the route about the new cell where the sink is currently stationed.

In Quadtree-based Data Dissemination (QDD) [4] proposed by Mir and Ko in, a node upon detecting an event calculates a set of rendezvous points (RPs) by successively partitioning the physical network space into four quadrants of uniform sizes. After partitioning the network, QDD routes the observed data to those nodes which are close to the centroid of each partition. The mobile sink disseminates the query packet using the same strategy by querying the node at closest RP first, followed by the subsequent RP nodes till it reaches the required data report. In static nodes deployments, the same set of nodes become RPs repeatedly which results in early energy depletion of those nodes and thus decreases the overall network lifetime.

Hierarchical Cluster-based Data Dissemination (HCDD) in [5] proposes a hierarchical cluster architecture where the second level cluster-heads of the mobile sink are appointed as routing agents. The routing agents are responsible to keep track of sinks latest location information and all the cluster heads route their collected data to the nearby routing agents. When sink moves from one point to another, it informs the nearest routing agent via the closest cluster-head. The routing agent upon sink discovery broadcasts the sinks latest location information to all the other routing agents. In high sink mobility, nodes using HCDD suffer from high energy consumption.

CONCLUSION

In this paper, we proposed a novel Virtual Grid based Dynamic Routes Adjustment (VGDRA) scheme that incurs least communication cost while maintaining nearly optimal routes to the latest location of the mobile sink. Our VGDRA scheme partitions the sensor field into a virtual grid and constructs a virtual backbone structure comprised of the cellheader nodes. A mobile sink while moving around the sensor field keeps on changing its location and interacts with the closest border-line cell-header for data collection.

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