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An Optimized ERR for Data Concentric WSNs

P.BHARATHI
M.Tech (Networking),
Sri Manakula Vinayagar Engineering College,
Puducherry – 605106, India

E.KODHAI
Associate Professor, Department of IT,
Sri Manakula Vinayagar Engineering College,
Puducherry – 605106, India

Abstract— Wireless sensor network are best routing technique, the node drops all its energy before actually transferring the data given to it. This serves as a drawback where the data is not transferred completely resulting in bandwidth wastage and improper message delivery. To address this problem we formulate new routing techniques by which the data from one part is scheduled to reach the destination based on the computed Time to Live and available bandwidth. Other than forming a routing tree which may fail when overhearing occurs, split the data and place them into appropriate bandwidths where the bandwidth wastage is minimal. Therefore the process is divided into two steps: Identifying the throughput and the mean bandwidth, initiate the data such that a least amount of bandwidth is wasted. The PDR has been improved by 36% using the BGP routing and delay is reduced by 110ms for a fixed set of nodes in a wireless environment. The energy efficient routing postpones the node's early dead states and thus improving the TTL of the node.

Keywords— Wireless Sensor Network; wireless routing; mobile relay nodes; bandwidth; energy consumption; energy efficient routing.

I. INTRODUCTION

A wireless sensor network consists of a number of sensor nodes. A Wireless Sensor Network (WSN) contains hundreds or thousands of these sensor nodes. These sensors have the capability to communicate either among each other or directly to an external base-station (BS). A greater number of sensors allows for sensing over larger geographical regions with greater accuracy. To reduce communication costs minimize some nodes redundant sensor information and avoid forwarding data that is of no use. As nodes can observe the data they forward they can measure averages for example of readings from other nodes. For example, in detecting and monitoring applications, it is generally the case that communicating sensor nodes monitoring an environmental feature typically register similar values. This type of data redundancy due to the spatial correlation between sensor observations inspires the techniques for in-network data aggregation and mining. As sensor nodes get even very smaller, and sensor networks grow up larger in size, we believe that these bandwidth applications will become increasingly more imperative and important. Shared sensor network infrastructures therefore require a bandwidth allocation method, by which the nodes can decide how to allocate network bandwidth to sensor streams.

The allocation method has to handle traffic that exhibits a high degree of spatial correlation, when a group of nodes in close proximity all detect an event of interest. It has to be able to change bandwidth allocations in the network depending on observed phenomena. It however complicates the earlier existing security challenges for wireless sensor networks and requires new security techniques tailored specifically for this scenario. It provides security to aggregate data in Wireless Sensor Networks is known as Secure Data Aggregation in WSNs. Energy is a key concern in wireless sensor network design because, once the nodes are fixed into the environment, it becomes unusable to replace their battery power. Energy is a paramount concern to wireless sensor networks that must operate for an extended period of time on limited power supplies such as batteries. The data spreading schemes strives to achieve an even distribution of the traffic throughout the whole network, which helps in balancing the load on sensor nodes and increases the network lifetime. Another consideration is the topological deployment of nodes. The process of setting up the routes is greatly influenced by energy considerations. Since the transmission power of a wireless radio is proportional to distance squared or even higher order in the presence of obstacles, multihop routing will consume less energy than direct communication.

Sensors use their neighbors to send messages to nodes located out of their radio range. Possible applications of WSNs are endless, including habitat monitoring, fire detection, environment monitoring, etc. In many of these scenarios, there are applications in which a single sensor needs to send the same data to multiple destinations. Those applications can help from the use of multicast communications to reduce bandwidth consumption in the network. Multicasting is a technique used to deliver messages efficiently from a source to a set of destinations. Multicasting protocols help to minimize the consumption of network resources taking advantage of the fact that some parts of the paths from the source to the destinations can be shared by multiple destinations. The larger the path common, the lower global bandwidth consumption is obtained.

A main portion of energy expense of WSNs is attributed to multi-hop wireless communications. WSNs present an interesting field of research due to their several applications and their integration toward more complex network systems.

The difficulties in WSNs are usually related to their stringent constraints such as energy, bandwidth and memory. The main concept regarding these relaying nodes is that these nodes require processing energy for their transmission advance, thus more the number of nodes is the requirement of the processing energy. Whenever single link situation is considered, there is a tradeoff between the energy efficiency and the bandwidth efficiency for wireless multi-hop wireless sensor networks. A wireless sensor network (WSN) is data fusion, where observed data from sensors need to be aggregated to collectively reach an estimate of the underlying physical process of interest, subject to certain time delay constraints. In order to improve the network lifetime and survive, it is essential to sustain power during both data processing and communications.

The rest of this paper is organized as follows section 2 describe about the Related work section 3 describe about the problem definition section 4 describe the design algorithm and technique to identify section 4 describe the conclusion and future work then conclude.

II. RELATED WORKS

The foremost difference between the WSN and the traditional wireless networks is that sensors are extremely sensitive to energy consumption. Energy saving is the deciding issue in designing the wireless sensor networks [11]. Energy saving is the crucial issue in designing the wireless sensor networks. Since the transmission and reception consumes a lot of energy, one of the important issues in wireless sensor network is the inherent limited battery power within network sensor nodes. One of the main design issues for a sensor network is conservation of the energy available at each sensor node. Wireless sensor networks are providing many energy efficient/conserving routing protocols have been proposed for wireless sensor networks, the concentration of data traffic towards a small number of base stations remains a major threat to the network lifetime.

Bandwidth optimization

The wireless networks efficiency deals with the bandwidth and the energy efficiency of the networks that depends upon the energy supply of the nodes. This energy and bandwidth are related to it, the major constraints to be considered. Wireless Sensor Networks (WSNs) are mostly detecting events at a high/low frequency sampling that is adapted by a central unit, thus requiring additional resource usage in WSNs. Optimal sampling in WSNs focuses on how to assign the sampling rate under given bandwidth constraints [2]. A novel scheme, termed event-sensitive adaptive sampling and low-cost monitoring [2],[13]. Bandwidth-efficient cooperative authentication (BECAN) scheme for filtering injected false data in Wireless sensor Network. The BECAN scheme adopts cooperative neighbor router (CNR)-based filtering mechanism [9]. Message-Efficient clustering, in which node allocate local growth budgets to neighbors. The algorithm is used in Clusters of bounded size and low diameter, using significantly fewer messages [3]. Relationship between bandwidth and energy consumption is exploited to increase the lifetime of the sensors. A variable bandwidth allocation scheme that use time frequency slot assignments [6]. While the objective of these methods have reducing the bandwidth but some Limitations are occur in analyzing the performance of the current scheme for monitoring different high-frequency events and the event detection accuracy [13], To investigate how to prevent or reduce the gang injecting false data attack from mobile compromised sensor nodes [9], we consider the effects of timeouts and initiator rotation strategies occurs and this method is applied to a TDMA protocol, it can also be applied to a contention based protocols that need time synchronizations[6].

Energy Conservation

The main reason is that the sensor nodes located near a base station have to relay data for a large part of the network and thus deplete their batteries very quickly. Wireless sensor network made of sensor nodes capable of sensing and communication, relay nodes capable of communication, and base stations responsible for collecting data generated by sensor nodes, to be deployed in sensor field. The existing data transmission used difference techniques for energy consumption and maximize network life time such as hierarchical based routing protocols based on network structure [11],[4].To reduce the energy consumption has construction of a decentralized lifetime maximizing tree within clusters and minimizing the distance of transmission with minimization of energy consumption [2].To determine new locations for the base stations and a flow-based routing protocol to ensure energy efficient routing during each round and suggests that the base station be mobile; in this way, the nodes located close to it change over time [10],[5],[12].Selecting and prioritizing forwarder list to minimize energy consumption by all nodes. an energy-efficient opportunistic routing strategy, denoted as EEOR [8]. These all method are conserve energy but deliver the data with the some delay and Many issues and challenges For this method is have to chain of broadcast that is more message to send to find path this cause energy consumption is increase when send data to every unwanted node. The centralized system occurs the delay in request the date and the routing table cannot update changes. Overhead comes when every node structure is changing. To overcome to using the cluster gateway switch routing protocol.

III. PROPOSED SYSTEM

In this work deals with existing system which describes the Optimal Mobile Relay Configuration problem is challenging issues. When transferring little data, the optimal configuration is to use only some relay nodes at their original positions. As the amount of data transferred increases, three changes occur. To implement the proposed system, we need to address the following issues in figure.1shows given below.

1. Constructing an optimal routing tree
2. Adding new nodes
3. Relocating nodes

Constructing an optimal routing tree

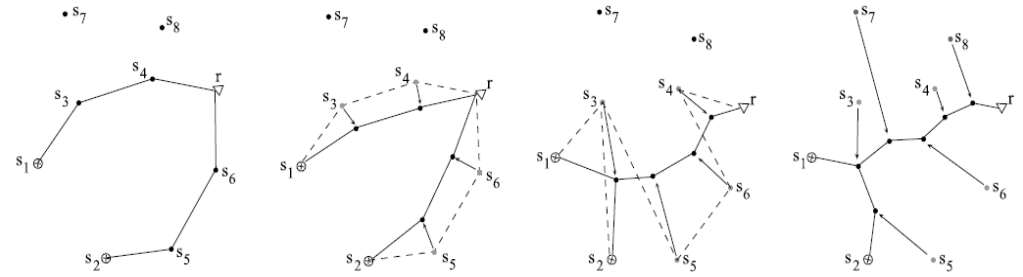
- Constructing an optimal tree has different constraints on the routing tree. When only utilization energy consumption, a shortest, path strategy yields an optimal routing tree given no mobility of nodes.
- Depending on the route constraints dictated by the application, we start our result at various phases of the algorithm.
- We start with the relay insertion step. Finally, with fixed routes, we employ directly our tree optimization algorithm.

Adding new nodes

- The sub problem of finding optimal position of relay nodes for a routing tree is assumed that the topology is fixed. We assume the node shape is a directed tree in which the leaves are sources and the root is the sink.
- The routing tree is optimized greedily by adding nodes to the routing tree exploiting the mobility of the inserted nodes. For each node that is not in the tree and each tree edge, we compute the reduction in the total cost along with the optimal position that joins the tree such that data is routed from.
- We repeatedly insert the outside node with the highest reduction value modifying the topology to include the selected node at its optimal position, though the node will not absolutely move until the completion of the tree optimization phase.
- After each node insertion occurs, we compute to reduce in total cost and optimal position for each remaining outside node for the two newly added edges.
- At the end of this process, the topology of the routing tree is fixed and its mobile nodes can start the tree optimization phase to relocate to their optimal positions.

C. Relocating nodes

- The three sub problems assume a centralized scheme in which one node has full knowledge of the network including which nodes are on the transmission paths to every source, the original real position.
- The centralized algorithm computes the optimal static tree and the optimal position of each node in the restructured tree, it obtain prohibitively high overhead in large-scale networks.
- Greedy geographic routing since it does not require global knowledge of the network although any algorithm with such property can be used.
- After a routing tree is constructed, the tree restructuring phase establishes. Network nodes are outside the tree will broadcast their availability to tree nodes within their communication range and wait for responses for a period of time.



(a) Optimal routing tree for $0 \leq m \leq 15$MB.

(b) Optimal configuration for 15MB$\leq m \leq$ 25MB: same topology but nodes relocate.

(c) Optimal configuration for 25MB$\leq m \leq 60$ MB. A new topology is used.

(d) Optimal configuration for 100MB$\leq m \leq$ 150MB: a new topology with more nodes.

Figure.1: Changing Topology

In this section, the proposed system is comprised each serving different problems of the existing work Cluster Switch Gateway Routing (CSGR) is a table-driven-based routing protocol where mobile nodes are grouped into clusters and each cluster has a cluster head. This grouping also introduces a form of hierarchy. A cluster head can control a group of ad hoc hosts, and clustering provides a framework for code separation, channel access, path routing, and bandwidth appropriation. To elect a cluster head, a distributed cluster head selection algorithm is used. Although using a cluster head allows some form of control and coordination, it does impose reliance from other nodes within the cluster. Route election algorithm is used to measure the density of the routes providing the best significant path to the destination.

Gateway protocol selects only one route to a destination as the perfect path. When multiple routes are given destination endure, BGP must complete which of these routes the best. BGP puts the best path in its routing table and advertises that path to its BGP If the paths have the same MED values, select the path accomplished via EBGP over one learned via IBGP. Leach Based Energy Conservation (LEACH) is a hierarchical protocol in which most nodes transmit to cluster heads, and the cluster heads aggregate and compact the data and forward it to the base station (sink). Each node uses a stochastic algorithm at each round to determine whether it will become a cluster head in this round.

A distributed routing algorithm called Maximum Lifetime and Minimum Hop-count (MLMH) is then proposed with the aim that extends the lifetime while minimizes the maximal hop count of a source-based multicast tree in wireless sensor networks. In order to keep the nodes active as long as possible, it is essential to enlarge the lifetime of a given multicast tree. The relay nodes are Disposable when they need use it otherwise remove the nodes and the mobile nodes

are re-locatable i.e. Change its position. Mobile nodes are low cost and easy to use. We use efficient bandwidth (maximum bandwidth utilization) and energy conservation as result.

The major advantages of proposed system are 1) the relay nodes are Disposable when they need use it otherwise remove the nodes and the mobile nodes are re-locatable i.e. Change its position. 2) Mobile nodes low cost and easy to use. 3) We use efficient bandwidth (maximum bandwidth utilization) and energy conservation as result as shown in figure.2: System Architecture give below.

System Architecture

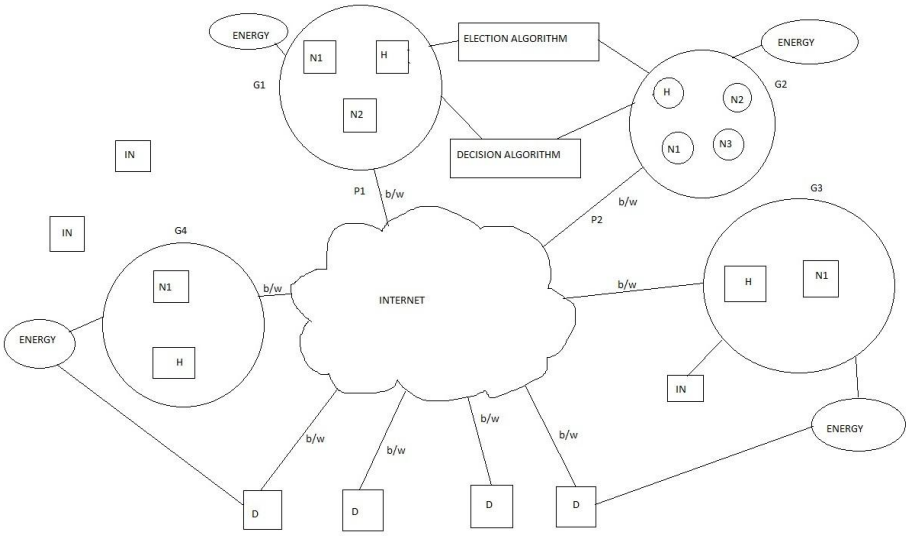


Figure.2: System Architecture

The expansion of the architecture diagram has been H- Head, B/w- Bandwidth Factor, G- Group, IN- Intermediate node, D- Destination. The rest of portion will discuss about conclusion and references.

IV. EXPERIMENTAL AND DISCUSSION

In this discussion, we will start with an introduction to the simulation tool called NS-2, the ways of configuring it to run sensor networks, implementation details of the Energy efficient optimized bandwidth utilization.

Simulation Tool

NS-2 is an event driven network simulator developed at University of California at Berkeley, USA, as a REAL network simulator projects in 1989 and was developed at with cooperation of several organizations. NS is not a finished tool that can manage all kinds of network model. It is actually still an on-going effort of research and development.

NS is a discrete event network simulator where the timing of events is maintained by a scheduler and able to simulate various types of network such as LAN and WPAN according to the programming scripts written by the user. Besides that, it also implements variety of applications, protocols such as TCP and UDP, network elements such as signal strength, traffic models such as FTP and CBR, router queue management mechanisms such as Drop Tail and many more.

Implementation of BPG technique

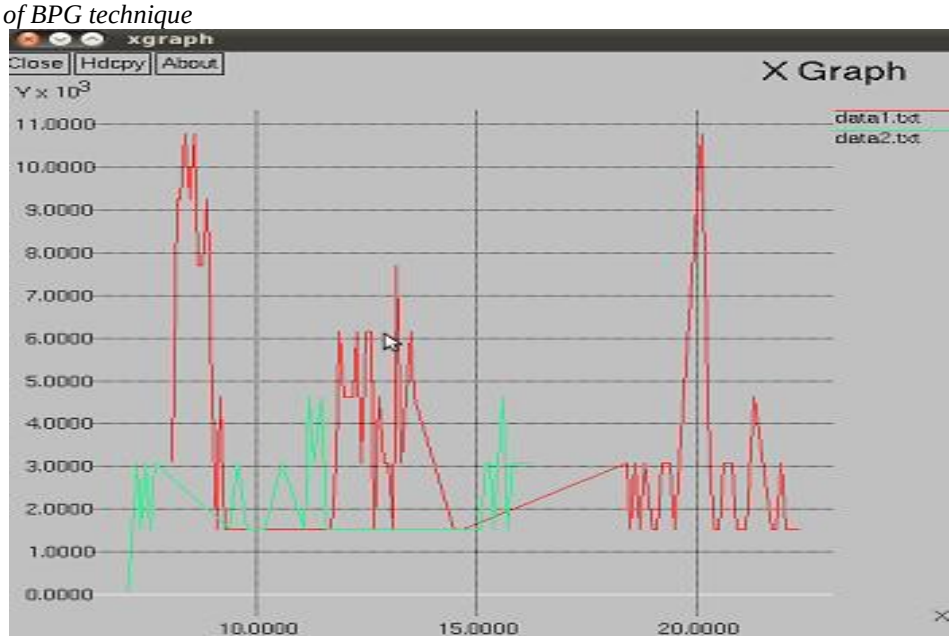


Fig.3: Routing based BGP

BGP determines the best path from source to each destination for a BGP used to comparing path attributes according to the following selection route sequence. When select a path with a reachable next hop and highest weight. If path weights are the same, select the path with the highest local preference value. GP selects only one route to a destination as the best path. When multiple routes to a given destination exist, BGP must determine which of these routes the best is. BGP puts the best path in its routing table and advertises that path to its BGP neighbors. If only one route exists to a particular destination, BGP installs that route. If multiple routes exist for a destination, BGP uses tie-breaking rules to decide which one of the routes to install in the BGP routing table.

Implementation of Energy efficient routing

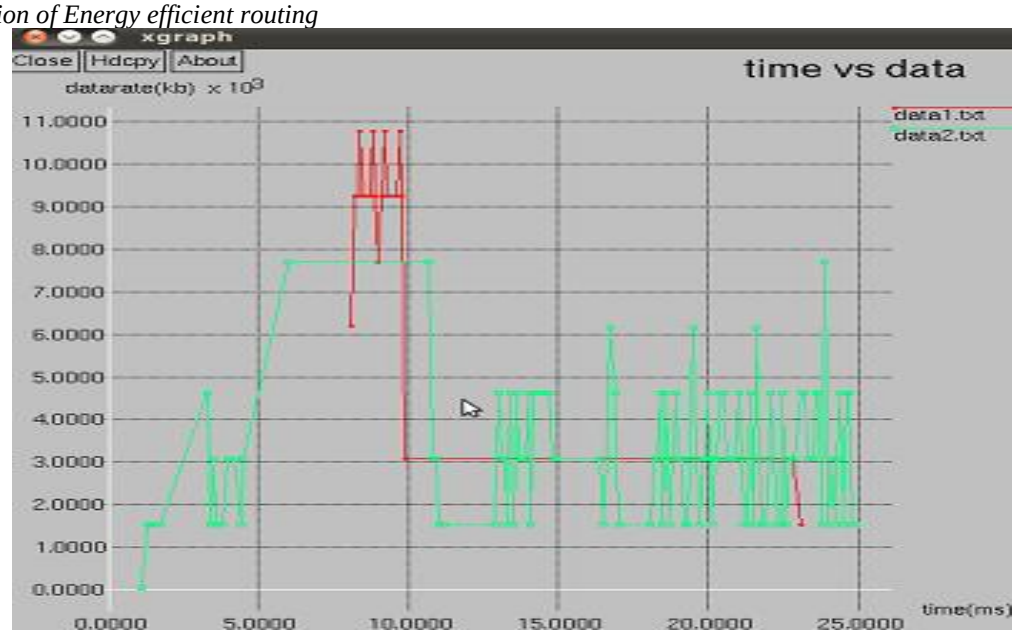


Fig.4: Energy based BGP

Energy efficiency is of vital importance for wireless sensor networks. In order to keep the nodes active as long as possible, it is essential to maximize the lifetime of a given multicast tree. Wireless Sensor Networks consist of large number of randomly deployed energy constrained sensor nodes. Sensor nodes have ability to sense and send sensed data to Base Station (BS). Sensing as well as transmitting data towards BS requires high energy. In WSNs, saving energy and extending network lifetime are great challenges. Clustering is a key technique used to optimize energy consumption in WSNs. In this paper, we propose a novel clustering based routing technique: Enhanced Developed Distributed Energy Efficient Clustering scheme (EDDEEC) for heterogeneous WSNs. Our technique is based on changing dynamically and with more efficiency the Cluster Head (CH) election probability. Simulation results show that our proposed protocol achieves longer lifetime, stability period and more effective messages to BS than Distributed Energy Efficient Clustering, Developed and Enhanced DEEC used in heterogeneous environments.

Performance & Evaluation Metrics

Table.1: Simulation Analysis

PARA METER	***ENERGY/JOULS***	***DATA SEND***	***DATA RECEIVE***	***ROUTE DROP***	***DELIVERY RATIO***
OMRC (Existing system)	2	526	235	287	44.67
	5	629	310	351	49.28
	10	629	310	351	**49.28**
BGP (Proposed system)	2	542	317	169	58.48
	5	837	578	282	69.05
	10	886	616	297	69.52
EBGP (Proposed system)	2	489	379	81	77.51
	5	816	694	133	85.04
	10	878	754	123	**85.87**

The performance metrics are ought to be used to measure the performance of the proposed system.

1) Energy saving

Energy savings of the proposed scheme is defined as the energy consumption in transmission, reception and the computations due to the extra nodes which incurs extra overhead. While using energy efficient routing approach is used to take the best path to route the data from source to destination. The routing must be done only selected routing path.

2) Bandwidth usage

Here Border gateway protocol is used to concern the bandwidth using based on the packet size. So the node used only the optimized bandwidth to transmit the data.

3) Packet delivery

Mobility-related packet loss may occur at both the network layer and the MAC layer. When using efficient routing technique the packet loss is reduced and the delivery ratio is improved then existing OMRC method because the battery drain is minimized while using energy efficient border gateway routing protocol.

Compared with existing system, the proposed work is used for Energy efficient routing technique such as Efficient Border Gateway Protocol (EBGP) is selected the best path to transmit the data. So the performance is 35% efficient.

V. CONCLUSION

For providers of composite uninterrupted services, it is essential to be able to minimize cases of bandwidth utilization and energy. One possible route to achieve this is to predict at runtime, which instances are in threat of violating energy routing constraints, and to apply various adaptation actions to these precedent only. However, it is not trivial to select which adaptations are the most cost effective way to prevent any violation, or if it is at all possible to prohibit a violation in a cost-effective way. Furthermore, we have used both simulated energy efficient routing and deterministic bandwidth search algorithm. We have evaluated these algorithms based on a manufacturing case study and have shown which types of algorithms are better suited for wireless energy efficient scenarios. The main current limitation is that adaptation is only considered on instance level that is, for each composition instance independently. We believe that the EERR adaptation model can be extended to this kind of WSNs and actions, but new approaches to predict violations and impact models are needed to this end.

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