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## **BIDIRECTIONAL DATA CENTRIC ROUTING PROTOCOL TO IMPROVE THE ENERGY EFFICIENCY IN WIRELESS SENSOR NETWORKS**

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### **ABSTRACT**

A wireless sensor network (wsn) is made up of spatially distributed autonomous sensors to monitor physical or environmental conditions and cooperatively pass their data through the network to a main location. Wireless sensor network are data data centric protocol, and the graph results prove that bidirectional data centric protocol has higher percentage in disseminating data at a fixed centric. The challenge remains in designing a good routing protocol which can address the issues such as energy awareness, adaptability, and computational speed and network lifetime. But in wsn the main area of concentration is in routing data in an efficient manner such that minimal energy resources' are used. But in a network, consumption of energy is mainly due to the routing of data. Protocols like classical flooding, gossiping, spin (sensor protocol for information via negotiation) and dd (directed diffusion can reduce the consumption drastically. But these can undergo a drawback of data redundancy, resource blindness and packet loss. To overcome this disadvantage , we present a novel protocol called bidirectional data centric protocol which has a meta data descriptor and the data is send in the shortest path based on source and sink interest. On performing simulation of bidirectional energy level.

**Keywords:** WSN, Routing Protocols, Spin, Directed Diffusion, Bidirectional Data Centric Protocol.

### **I. INTRODUCTION**

Sensor networks consist of a large number of small sensor devices that have the capability to take various measurements of their environment. For instance, such measurements can include acoustic, magnetic, and video information. Each of these devices is equipped with a small processor and wireless communication antenna and is powered by a battery making it very resource constrained. These sensors are typically scattered around a

sensing field to collect information about their surroundings. In this paper, we introduce bidirectional routing protocol, protocol to transmit information to sink node when there is a drastic change in the sensed and also when the sink request for particular data using metadata. In this proposed protocol, total number of packet transmissions is less and use of meta data memory. Therefore a significant amount of total energy can be saved. Bidirectional datacentric routing protocol is implemented using c++ programming language and evaluated using network simulator 2. The rest of the paper is organized as follows. Section II surveys related works. Section III gives the system models and presents the problem statement. The proposed bidirectional datacentric routing protocol is described in section iv. Performance analysis of bidirectional data centric routing protocol and comparison with SPIN and Directed Diffusion protocol is discussed in section V. Finally, in section VI we conclude the paper with a direction for future work.

**Interest Propagation:** When sink node wants some information from source nodes it sends out its query to its neighbour sensor nodes. The corresponding query is carried by interest packet. The sensor node receives the interest packet can temporarily store the packet and search for all of the matching target data as shown in figure 1 (a).

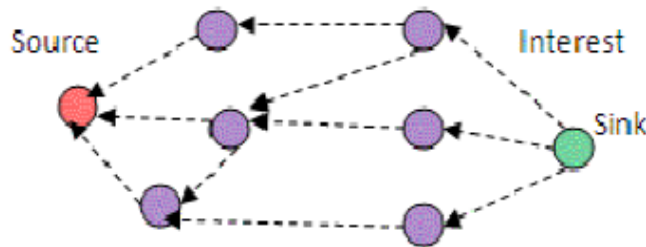


Figure 1(a): interest propagation.

**Initial Gradient Setup:** Using Gradient in DD, the data propagation direction with minimum cost principle. Propagation of interest packets setup the gradient in the network for delivering data to the sink. Gradient is a reply link to a neighbour node from which the interest was received as shown in figure 1(b).

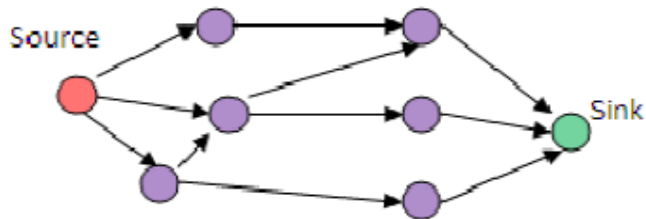


Figure 1(b): Initial Gradient Setup.

**SPIN (Sensor Protocol for Information via Negotiation)**

SPIN is a negotiation-based information dissemination protocol suitable for WSN. It is based on the concept of metadata. Meta-data is a description of data which in database, it can be used to describe table. In SPIN sensors use metadata to concisely and completely describe the data collected. SPIN is a data-centric routing protocol. It fits under event driven

data delivery model in which the nodes sense data and disseminate the data throughout the network by means of negotiation. SPIN nodes use three types of messages for communication:

- ADV- When a node has new data to share; it can advertise this using ADV message containing Metadata.
- REQ- Node sends an REQ when it needs to receive actual data.
- DATA- DATA message contains actual sensor data.

## **System model and problem statement**

### **A. System model**

In our research the wireless sensor network consists of various sensor nodes scarcely distributed. The network structure is layer based each node has the capacity to sense multiple types of data. And data are transmitted in the form of Meta data. Here both the base station and nodes have the capacity to transmit data.

### **B. problem statement**

Disadvantages of SPIN protocol

- The source node on receiving the data sends ADV message to all neighboring nodes, this results in unwanted computation.
- The node does not reply to ADV message if the sensor node dies out.
- SPIN: selective transmission is not supported in the existing SPIN protocols.
- Data advertisement method of SPIN protocol does not guarantee data delivery.

Disadvantages of DIRECTED DIFFUSION protocol:

- Directed Diffusion cannot be applied to all sensor network applications since it is based on a query-driven data delivery model.
- The applications that require continuous data delivery to the sink will not work efficiently with a query-driven on demand data model.
- The naming schemes used in Directed Diffusion are application dependent and each time should be defined a priori.
- The matching process for data and queries might require some extra overhead at the sensors.

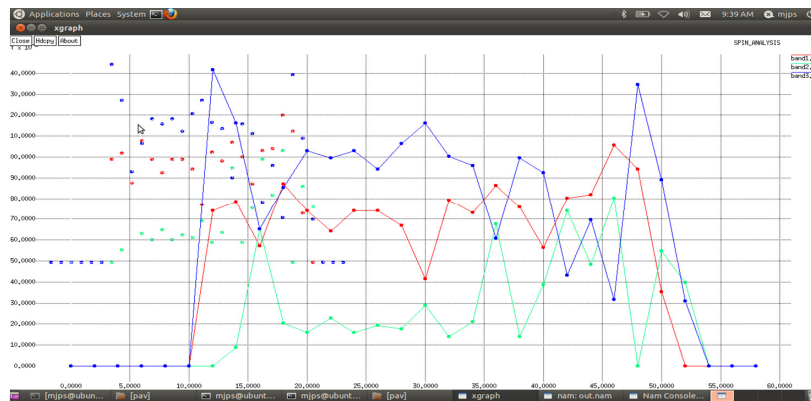
## **BIDIRECTIONAL DATA-CENTRIC ROUTING**

The novel protocol conserves energy by becoming active only when changes occur in the network, broadcast data and provides guaranteed data delivery. When there is a need for continuous it sends data without waiting for sink to send its interest. It uses two way hand shake protocol thereby using less energy comparing to the existing protocols. The sink sends interest in the shortest path there by conserving energy.

Key advantages

- Data redundancy is eradicated.
- Overcomes resource blindness.

## Performance analysis



The bandwidth and the life time of nodes increases compared to the protocols DD SPIN

## CONCLUSION

In this paper, we have proposed a BIDIRECTIONAL DATACENTRIC routing protocol using Meta data descriptor for WSN. Here the data is sent whenever there is a drastic change in the data sensed or only when the base station request for data. We have compared its performance with existing SPIN and Directed Diffusion protocol. But one major problem is that security in future we will try to provide it and try to resolve redundancy of advertisement message.

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