ISSN (Online): 2349-7084
GLOBAL IMPACT FACTOR 0.238
ISRA JIF 0.351

INTERNATIONAL JOURNAL OF COMPUTER ENGINEERING IN RESEARCH TRENDS
VOLUME 2, ISSUE 1, JANUARY 2015, PP 8-12

Significance of DSSD towards Cut Detection in Wireless Sensor Network

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Abstract: WSN of sensor nodes are imagined to be sent in the physical environment to monitor a wide variety of genuine - world phenomena. A WSN can get differentiated into numerous connected components because of the disappointment of some of its nodes, which is known as a "cut". A traditional issue created by detachment of system is apportioning. Foreseeing those situating from where the system get divided into the distinctive allotment could be an exceptionally helpful peculiarity that can be given to applications in a WSN environment. Anyhow, being mindful of a future detachment in the system can help to guarantee a superior nature of administration by adjusting the application behavior. In this paper, problem of detecting cuts by the remaining nodes of a wireless sensor network has been mentioned. We followed DSSD (Distributed Source Separation Detection) algorithm that allows every node to detect when the connectivity to a specially designated node has been lost, and one or more nodes to detect the occurrence of the cut. The algorithm consists of a simple iterative scheme in which every node updates a scalar state by communicating with its nearest neighbors. When a set of nodes gets separated from a special node, that we call a “source node”, their states converge to 0 because “current is extracted” from the component but none is injected. These trends are used by every node to detect if a cut has occurred that has rendered it disconnected from the source.

Key Terms: Cut Detection,DSSD(Distributed Source Separation Detection), COS.

I.INTRODUCTION

A wireless sensor network is a collection of nodes organized into a network such that each node having sensing and processing capabilities. Each node has an RF transceiver, sensor, memory, powered by battery. Nowadays sensors are widely employed in various research fields since they can monitor temperature and hence whether forecasting can be made easier. They are randomly deployed in areas with sensors attached according to the applications for which they are being used. Since they are being powered up by batteries, energy consumption should be minimized in order to prolong the life of sensor nodes. In a network, sensor nodes communicate with each other so that results are obtained as part of their cooperatively combined work. Since each node needs to communicate with all the other nodes, wireless links are established between them. One of the challenges in WSN is to ensure that the network is connected. The connectivity of the network can easily be disrupted due to unpredictable wireless channels, early depletion of node’s energy, and physical tampering by hostile users. Network disconnection, typically referred as a network cut, may cause a number of problems. For example, illinformed decisions to route data to a node located in a disconnected segment of the network might lead to data loss, wasted power consumption, and congestion around the network cut. Several centralized algorithms have been proposed to efficiently detect a cut [1] [2] [3]. These algorithms attempt to detect a cut by assigning the task of network connectivity monitoring to a subset of nodes. In these schemes, each sensor node is able to autonomously determine the existence of a cut. A common aspect of existing cut detection

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algorithms is that they focus on a "binary problem": is there a cut in the network, or not? However, this may not be sufficient since, in some applications, despite the existence of a cut somewhere in the network, a sender can still communicate with a target node, if they are not disconnected by the cut. n these applications, detecting a cut to one sink node does not necessarily mean that a node in the disconnected network segment should refrain from reporting data, since the node may send its data to other connected sink nodes. In this paper, problem of detecting cuts by the remaining nodes of a wireless sensor network has been mentioned. We followed DSSD (Distributed Source Separation Detection) algorithm that allows every node to detect when the connectivity to a specially designated node has been lost, and one or more nodes to detect the occurrence of the cut. The algorithm consists of a simple iterative scheme in which every node updates a scalar state by communicating with its nearest neighbors. When a set of nodes gets separated from a special node, that we call a "source node", their states converge to 0 because "current is extracted" from the component but none is injected. These trends are used by every node to detect if a cut has occurred that has rendered it disconnected from the source. The source node may be a base station that serves as an interface between the network and its users. Since a cut may or may not separate a node from the source node, we distinguish between two distinct outcomes of a cut for a particular node. When a node u is disconnected from the source, we say that a Disconnected from Source (DS) event has occurred for u. When a cut occurs in the network that does not separate a node u from the source node, we say that Connected, but a Cut Occurred somewhere (COS) event has occurred for u. By "approximate location" of a cut we mean the location of one or more active nodes that lie at the boundary of the cut and that are connected to the source.

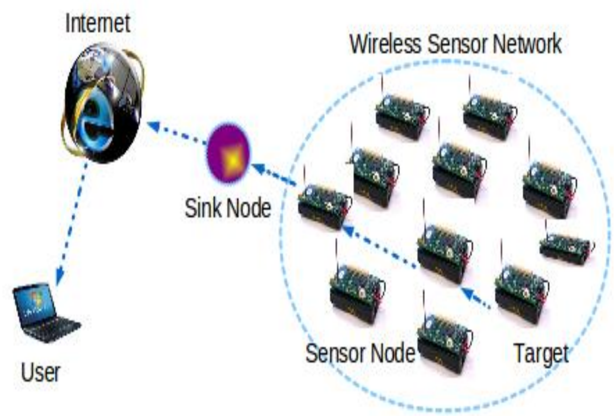

Fig 1: Illustration of Wireless Sensor Networks

II RELATED WORK:

A distributed algorithm CVD [4] scans the nodes of WSN parallel and edges are colored on the interval coded spanning tree for cut vertex detection. Here only the cut vertices are detected. It can be modified to include network reconstruction by informing source about the failure. A BFS based algorithm for cut edge detection is proposed in [5] but the cut edge detection is different from cut vertex detection. It should be noted that if a node is a cut vertex, then none of the edges incident on it is a cut edge and reversely if an edge incident on a node is a cut edge, that node is not a cut vertex. DDFS [6] is a tree based approach in which each time the message visits a node, a counter is incremented. Each leaf node sends it to parent node and parent node collects all indices received from its children. If the indices received by parent node are smaller than that of parent node, then that parent is called cut vertex. Time delay is much larger since DDFS has to traverse the edges serially. DDFS is sensitive to link/node fails due to serial nature. Previously an algorithm [7] was developed to repair network partitions. They have employed mobile nodes to replace the position of the failed nodes to establish network connectivity. They have considered wireless sensor network partition into two types-safe partition and isolated partition. Safe partition will have base station whereas isolated does not. So a mobile node will take a proper position in between safe partition and isolated partition to establish connectivity between them. After detecting the network partitions, base station sends a fresh number called epoch. Safe partition which is in contact with base station will receive the new epoch whereas isolated partition will be holding the epoch. Mobile node will adjust itself to a position to establish the connection between safe partition and isolated partition.

III BACK GROUND CUT:

Wireless sensor networks (WSNs) are a promising technology for monitoring large regions at high spatial and temporal resolution. Failure of a set of nodes will reduce the number of multi-hop paths in the network. Such failures can cause a subset of nodes –that have not failed –to become disconnected from the rest, resulting in a "cut". Two nodes are said to be disconnected if there is no path between them. SOURCE NODE: The source node may be a base station that serves as an interface between the network and its users. Since a cut may or may not separate a node from the source node, we distinguish between two distinct outcomes of a cut for a particular node. COS AND DS: When a node u is disconnected from the source, we say that a DS (Disconnected from Source) event has occurred for u. When a cut occurs in the network that does not separate a node u from the source node, we say that COS (Connected, but a Cut Occurred Somewhere) event has occurred for u.

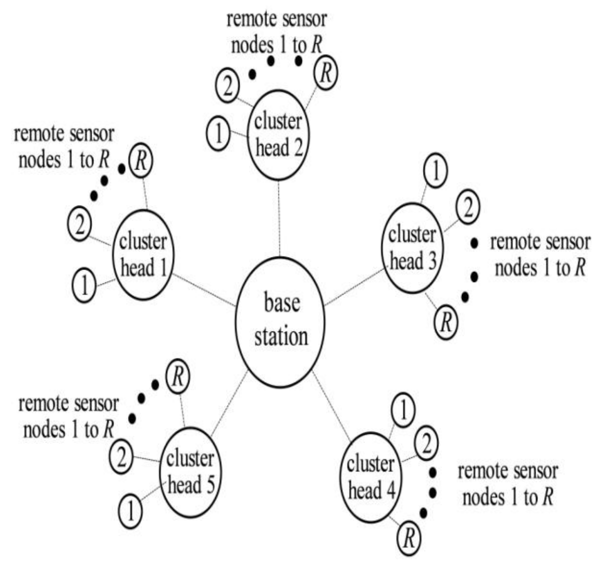

Fig 2.Data Timed Sending (DTS) Energy

IV PROPOSED SYSTEM

Proposed system follows distributed source separation detection algorithm that allows every node to monitor the topology of the (initially connected) graph and detect if a cut occurs. The algorithm consists of every node updating a local state periodically by communicating with its nearest neighbors. The state of a node converges to a positive value in the absence of a cut. If a node is rendered disconnected from the source as a result of a cut, its state converges to 0. By monitoring its state, therefore, a node can determine if it has been separated from the source node. In addition, the nodes that are still connected to the source are able to detect that, one, a cut has occurred somewhere in the network, and two, they are still connected to the source node. The DSSD algorithm involves only nearest neighbor communication, which eliminates the need of routing messages to the source node. This feature makes the algorithm applicable to mobile nodes as well. Since the computation that a node has to carry out involves only averaging, it is particularly well suited to wireless sensor networks with nodes that have limited computational capability. The failure of sensor nodes should not affect the overall

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task of the sensor network. This is the reliability or fault tolerance issue. Fault tolerance is the ability to sustain sensor network functionalities without any interruption due to sensor node failures. The reliability fault tolerance of a sensor node is modeled in using the Poisson distribution to capture the probability of not having a failure within the time interval

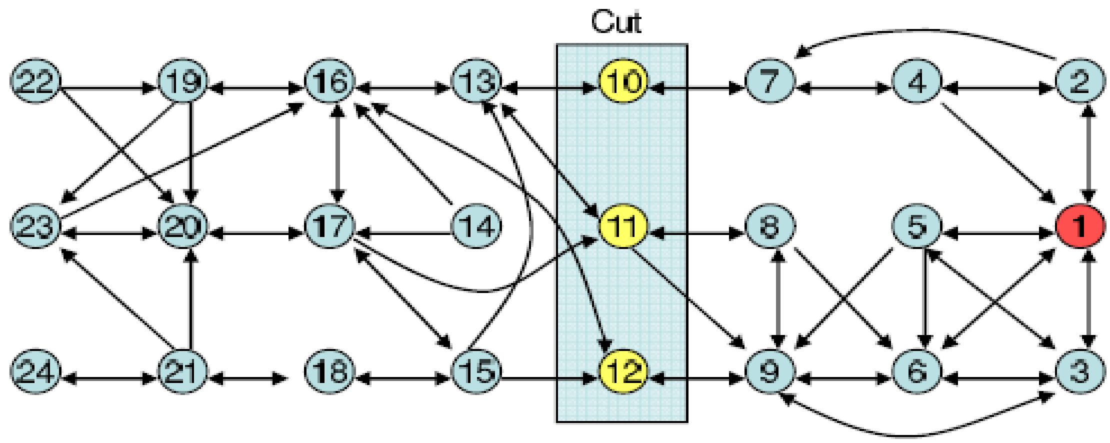

Fig 3. Cut Detection nodes in WSN

V PERFORMANCE

Two important metrics of performance for the proposed system algorithm are (1) detection accuracy, and (2) detection delay. Detection accuracy refers to the ability to detect a cut when it occurs and not declaring a cut when none has occurred. DS detection delay for a node i that has undergone a DS event is the minimum number of iterations (after the node has been disconnected) it takes before the node switches its DSi flag from 0 to 1. In proposed system, source has to continuously monitor the position of the nodes to make sure the data is being carried through the path to the destination without loss. In any case, if the position of the nodes change and the source doesn’t make a note of it then the packets will be lost and eventually have to be resent. The cut vertex was detected by removing each node and seeing whether network is disconnected or not. If the network is disconnected, then that node is termed as cut vertex else not. Proposed system identifies the cut vertices and then informing the source and destination so that source can initiate the regeneration of a new path. This avoids packet loss to the maximum extend thus improving the efficiency in data transmission. The path selection, maintenance and data transmission are consecutive process which happen in split seconds in real -time transmission. Hence the paths allocated priory is used for data transmission. The path allocated previously is now used for data transmission. The data is transferred through the highlighted path.

VI CONCLUSION

A wireless sensor network can get separated into multiple connected components due to the failure of some of its nodes, which is called a “cut”. In this paper, problem of detecting cuts by the (PRINT) nodes of a wireless sensor network has been mentioned. We followed DSSD algorithm that allows every node to detect when the connectivity to a specially designated node has been lost, and one or more nodes to detect the occurrence of the cut. The algorithm consists of a simple iterative scheme in which every node updates a scalar state by communicating with its nearest neighbors. When a set of nodes gets separated from a special node, that we call a “source node”, their states converge to 0 because “current is extracted” from the component but none is injected. Since a cut may or may not separate a node from the source node, we distinguish between two distinct outcomes of a cut for a particular node. When a node u is disconnected from the source, we say that a Disconnected from Source (DS) event has occurred for u. When a cut occurs in the network that does not separate a node u from the source node, we say that Connected, but a Cut Occurred somewhere (COS) event has occurred for u. These trends are used by every node to detect if a cut has occurred that has rendered it disconnected from the source.

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