Detection Of Connected But A Cut Occurred Somewhere (CCOS) In Wireless Sensor Networks
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Abstract
A wireless sensor network is able to obtain detached into several connected components owing of the crash of some of its intersection, which is entitle such as “cut”. Herein, we deem the problem of detecting cuts as a result of the lasting nodes of a wireless sensor set of connections. Wireless Sensor Network (WSN) be pretended of few or huge number of sensor nodes and individual sink node. One of the decisive challenges in WSN is cut initiation as a substitute of enlarge the life sensor nodule. Feeler node is petite device conjured of 3 important units as wireless communication (transceiver) unit, sensor unit and processing unit and equipped with imperfect power supply by means of batteries. Because the node has limited energy trade in, these nodes are posing in sleep mode to preserve energy which facilitates to prolong network existence. In this paper we will converse sleep scheduling based energy conservation protocol with broadcast tree used to save succession of sensor intersection. Inside tree sink node act as root node and the nodes with higher energy perform as branch node and node through low energy works as leaf node. The leaf nodes are put to sleep and branch node vestiges conscious. The tree is renovated periodically to assess energy in all nodes. Omission easiness in network is accomplished by keep two paths as of each node to sink node. Dishonourable resting on the existing system, we can thwart the cuts in network.

Keywords-- Cut, iterative computation, redundancy, simulation, Wireless sensor networks.

I. INTRODUCTION
Wireless sensor networks (WSNs) have appeared as a promising new technology on the way to monitor considerable regions at high spatial and temporal resolution. The nodes which are less significant in size and lesser in cost make striking for widespread deployment and also causes the disadvantage of low operational reliability. A node may fail due to some environmental issues; such failures can cause nodes that have not failed to become disconnected from the rest, resulting in a “cut”. Two nodes are supposed chosen disconnected if there is no path linking them. When a node “u” is disconnected from the source, then we can say as DOS. When a cut arise in the network that doesn’t sustain a node from source node then we can say that as CCOS (Connected, but Cut Occurred Somewhere). Cut detection means first detect the DOS event when it occurs then detect CCOS event by which are nearer to the “cut” and approximate location of the cut. Here Approximate Location means the location in which one or more active nodes lie at the boundary of the cut and that are connected from source. The cut in the network prevents the data to reach from source node to the destination. So, there are two ways to trounce the problem of “cuts” in the set-up.
First, if a node were able to sense the occurrence of a cut, it could simply wait for the network to be repaired and ultimately reconnected, which set aside onboard energy of multiple nodes and prolongs their lives. On the other hand, the ability of the source node to detect the occurrence and location of a cut will allow it to undertake network refurbish. Thus, the ability to detect cuts by both the disconnected nodes and the source node determination conduct to the increase in the operational lifetime of the network as a whole. A method for repairing a disconnected network by mobile nodes erstwhile projected. In this paper, we propose an algorithm to detect the cuts in the network called “Distributed and asynchronous cut detection algorithm”. This algorithm authority to distinguish DOS and CCOS events in the set of...
connections. This algorithm involves only local communication between neighbouring nodes and is robust to temporary communication failure between node pairs.

II. DISTRIBUTED CUT DETECTION ALGORITHM

A. DOS Time is measured with a discrete counter \( k = -\infty, \ldots, 0, 1, 2, \ldots \). We model a sensor network as a time-varying graph \( G(k) = (V(k), E(k)) \), whose node set \( V(k) \) represents the sensor nodes active at time \( k \) and the edge set \( E(k) \) consists of pairs of nodes \( (u, v) \) such that nodes \( u \) and \( v \) can directly exchange messages between each other at time \( k \).

By an active node we mean a node that has not failed permanently. Considered here are undirected, i.e., \( (i, j) = (j, i) \). A path from \( i \) to \( j \) is a sequence of edges connecting \( i \) and \( j \). In terms of these definitions, a cut event is formally defined as the increase in the number of components of a graph due to the failure of a subset of nodes (as depicted in Fig. 1). The number of cuts associated with a cut event is the increase in the number of components after the event. First, we want to enable every node to detect if it is disconnected from the source (i.e., if a DOS event has occurred). Second, we want to enable nodes that lie close to the cuts but are still connected to the source (i.e., those that experience CCOS events) to detect CCOS events and alert the source node. Fig. 1 provides a motivating example.

![Fig. 1. Examples of cuts and holes. Filled circles represent active nodes and unfilled filled circles represent failed nodes. Solid lines represent edges, and dashed lines represent edges that existed before the failure of the nodes. The hole in (d) is indistinguishable from the cut in (b) to nodes that lie outside the region R. A. CCOS. The algorithm for detecting CCOS events relies on finding a short path around a hole, if it exists, and is partially inspired by the jamming detection algorithm proposed in. The method utilizes node states to assign the task of hole-detection to the most appropriate nodes. When a node detects a large change in its local state as well as failure of one or more of its neighbours, and both of these events occur within a (predetermined) small time interval, the node initiates a PROBE message. Each PROBE message \( p \) contains the following information:]

III. BACKGROUND:

A. Node Failure

The node failure is expected to be quite common in WSN, due to their extremely limited energy budget and environmental degradation. This scenario is mostly true for the sensor networks that are deployed in harsh and dangerous environments for such as forest fire monitoring. When a number of sensors fail for whatever may be the reason the resulting network topology may be disconnected which in result is considered as a failure of set of nodes. The nodes that have not failed become disconnected from the source (i.e., if a DOS event has occurred). Second, we want to enable nodes that lie close to the cuts but are still connected to the source (i.e., those that experience CCOS events) to detect CCOS events and alert the source node. The hole in (d) is indistinguishable from the cut in (b) to nodes that
Fig.1 Example of cut and hole. Here filled circles represent nodes and solid lines represent edges.

IV. CUTS IN WIRELESS SENSOR NETWORKS:

ONE of the unique challenges in mobile ad-hoc networking environments is the phenomenon of network partitioning, which is the breakdown of a connected network topology into two or more separate, disconnected topologies.[3] Similarly sensors become fail for several reasons and the network may breaks into two or more divided partitions so can say that when a number of sensor fails so the topology changes. A node may fail due to a variety of conditions such as mechanical or electrical problems, environmental degradation, and battery reduction. In fact, node failure is expected to be quite common anomaly due to the typically limited energy storage of the nodes that are powered by small batteries. Failure of a set of nodes will reduce the number of multihop paths in the network. Such failures can cause a subset of nodes – that have not failed – to become disconnected from the rest of the network, resulting in a partition of the network also called a “cut”. Two nodes are said to be disconnected if there is no path between them.[1]. And As we know that sensors has Disconnectivity from the network is normally referred as a partition of the network of cut in the wireless sensor network, which arise many problems like unreliability, data loss, performance degradation. Because of cuts in wireless sensor network many problems may arise like a wired network means data loss problem arises, means data reach in a disconnected route.

V. PROBLEMS DUE TO CUTS:

As mentioned above if any node breaks down then the network is separated into different parts so the topology of the network changes but still network works. But because partition affects reliability, data loss, QOS of the network, efficiency, data processing speed. Because if any data passes unfortunately in a wrong route so data loss occurs this also shows unreliability of the network.

VI. CUT DETECTION IN WSN:

We consider the problem of detecting cuts between nodes of a wireless sensor network. We assume that there is a special designated node in the network, which we call the source station or node. Suppose source station may be a base station that serves as a mediator 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 got disconnected from the source, we can say that a disconnection from Source station so can say that event has happened for u. When a cut happens in the network that does not separate a node u from the source node, we can say that connected, but a Cut Occurred Somewhere so can say another event has occurred for u. [1] 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. Nodes that detect the occurrence and approximate locations of the cuts can then alert the source node or the base station. [1].

VII. CUT DETECTION TECHNIQUES:

Kleinberg describes detection of network failure paper [10]. The problem of network partition in sensor networks has been raised in several papers. As noted by Shrivastava et. al. [9], the challenges posed by the possibility of network partitioning in WSNs has been recognized in several papers (see, e.g. [10], [11], [12]) but the problem of detecting when such partitioning occurs seems to have received little attention. As we concluded after the study in paper[2], the work done by Shrivastava et. al. is the only one that develop the anomaly of detecting partitions in wireless sensor networks. They developed a scheme for detecting o linear cuts, which is a linear separation of n nodes from the base station. Kleinberg et. al. have studied the problem of detecting network failures in wired networks, and proposed schemes for the case when k edges fail independently. In paper [2] Shrivastava developed a simple, low-overhead technique to find and locate the cuts or partitions or break point of the network in sensor networks. In this paper, they tried to reduce the communication cost for detecting linear cuts by using only a small number of sentinel nodes. Different sets of sentinels however, may lead to communication costs, and an important second-order optimization would take this effect into account. Another way to minimize the communication in the network would be to
make the cut detection more decentralized. These are both very practical questions and natural directions for future work. In this paper we have limited ourselves to linear cuts. This is an important and natural class of cuts, but a richer set of cuts would include circular cuts, rectangular cuts, and polygonal cuts [10][9].

Advantages of Proposed work:

The DCD algorithm is distributed and asynchronous. It is robust to the temporary communication failure between the node pairs. The algorithm is iterative and has a fast convergence rate which makes it independent of size of network. Elimination of redundant information at destination node. It saves on-board energy of multiple nodes and prolongs their lives. The source node has the ability to detect the occurrence and location of a cut which will allow it to undertake network repair. The ability to detect cuts by both the disconnected nodes and the source node will lead to the increase in the operational lifetime of the network as a whole

VIII. CONCLUSIONS

The DCD algorithm that is proposed enables every node to detect DOS events and CCOS events and determines the approximate location of the cut. The algorithm is successfully and effectively simulated in JAVA platform. For certain scenarios the algorithm is assured to detect connection and disconnection to the source node without any error. By simulation of the proposed algorithm is effective in case of disconnecting probability, network connections and communication overhead. If a component that is disconnected due to a cut gets reconnected later the nodes can detect such reconnection from their states. Though we have got expected results we have drawback of detection of CCOS events only limited to 2D Euclidean spaces. We proposed an additional approach to the actual algorithm by adding additional parameters which solve the occurrence of duplication of information at the destination node and expected results have found through which the efficiency of the algorithm has been enhanced. Application of the DCD algorithm for node separation and reconnection to the source node in mobile networks is a ongoing research.

IX. REFERENCES


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