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A Survey on Reliable and Secure Communication in Wireless Sensor Network In The Presence of Faulty Nodes

Shaiqua S. Sayed [1], Prof. Archana A. Nikose [2]

Department of Computer Science and Engineering
Priyadarshini Bhagwati college of Engineering
Nagpur – India

ABSTRACT

From last few years Wireless Sensor Networks have gained attention of lots of researchers in various applications. Wireless sensor network (WSN) is one of most essential network technology which is widely adopted and applied in recent monitoring and control applications. In WSNs, it is essential to maintaining the communication between sensor nodes for all the time. . In this network the key issues are targeted the life time and fault node discovery and recovery technique is investigated and a new feasible and efficient solution is developed.. This paper proposes an efficient detection and recovery algorithm PADRA (Partition Detection and Recovery Algorithm) to identify a faulty node efficiently and to recover the Wireless Sensor Networks.

***Keywords*:-** WSN, HOP, Partition, Recovery Algorithm, PADRA. Etc.

I. INTRODUCTION

Latest advances in MEMS (Micro-electro-mechanical systems) [1] wireless sensors are made of small, inexpensive, low power tiny devices. Sensor nodes are equipped with capability of local processing, wireless communication, internal memory and battery source. Sensors are generally have limited capabilities due to internal battery source. Thousands of sensor node are usually deployed to operate in attended mode to sense physical parameters and transmit this information to the base station through wireless communication called as wireless sensor network. Sensor nodes send the sensed data to base station through single-hop or multi-hop transmission and then base station make further decisions. The positions of sensor nodes need not to be pre-determined because sensor network protocol has self-organized.

As the sensors are hugely spread and enormous in numbers, the possible occurrences of faults in the network are also much more as a fault surface increased. So, to detect the faulty node and to replace the faulty node an efficient algorithm is proposed. Besides the sensors have many issues related to energy, routing, security, coverage, etc., and so the proposed efficient detection and replacement algorithm takes these issues in to account and performs the fault detection and recovery mechanisms. Failure of sensor node occurs when the battery gets completely discharged. Due to this the topology of the network changes and degrades the quality of the network services. Following are causes sensor node; failure of any hardware module, e nvironmental reason, enemy attacks, incorrect communication, and congestion in network.

Fault is an unintentional defect that finally channelizes to the cause of an error. An error corresponds to an inaccurate system state. Such a state may lead to a failure. Therefore preventing a WSN network with faulty node to perform secure reliable and efficient communication with limited use of energy and coverage an efficient detection and replacement algorithm take such issues like routing, security, coverage, energy etc., into account and performs the fault detection and recovery mechanisms.

A wireless sensor network operates in a critical environment, and also with limited computing and sensing capabilities capable of sensing, computing and wirelessly communicating. The wireless ad hoc networks such as mobile ad hoc network and wireless sensor networks are frequently uses the on demand kind of protocols. The main advantage of these routing protocols, these are establishing the routing path when it desired. Therefore, it is lightweight and efficient in working, due to less information stored in routers and they preserve the battery or other computational resources due to less periodic updating processes.

Therefore, Most of the ad hoc on demand routing protocols is working on two different phases, in first phase using the control message exchange the route discovery is performed. Using this discovery a number of paths between source and destination is obtained by routing protocols. After that the routing

protocol decided the most appropriate route and uses the selected path for transmitting data. During mobility the nodes move independently in random manner and in any direction. Thus, if the existing route of communication is abandoned due to mobility and energy, the routing protocols are tries to recover this path using route maintenance. If the route is recoverable than routers repair the previous route and enable the communication and if it is not, then route discovery process is again initiated for new route discovery. Therefore, it is required to improve the performance during the path break conditions and recovery of both options.

To distinguish a fault node and to supplant it, numerous techniques are proposed. The main test in wireless sensor network is to enhance the fault tolerance of every node furthermore give an energy productive fast data routing service. Fault Management for WSNs is not the same as traditional networks. Late research has built up several schemes and techniques that arrangement with distinctive types of faults at diverse layers of the network.

II. LITERATURE SURVEY

1: Guowei et al. Proposed a Dynamical Jumping Real-time Fault-tolerant Routing Protocol (DMRF) [2]. When a node fails, network congestion or void region occurs then the transmission mode will switch to jumping transmission mode leading to reduced transmission delay and guarantees the data packet to be sent to its desired destination within the specified time limit. Each node can dynamically adjust the jumping probabilities to increase the ratio of successful data transmission by using feedback mechanism. This mechanism results in reduced effect of failure nodes, congestion and void region and reduced transmission delay, reduced number of control packets and higher ratio of successful transmission

2: Ameer A. Abbasi et al. proposed a Least-Disruptive topology Repair (LeDiR) algorithm [3] in 2013. LeDiR relies on the local view of a node about the network to devise a recovery plan that relocates the least number of nodes and ensures that no path between any pair of nodes is extended. LeDiR is a localized and distributed algorithm that leverages existing route discovery activities in the network and imposes no additional pre failure communication overhead.

3: Fault node recovery (FNR) Algorithm [4] to enhance the lifetime of a wireless sensor network (WSN) when some of the sensor nodes shut down, either because they no longer have battery energy or they have reached their operational threshold. The algorithm is based on the grade diffusion algorithm combined with the genetic algorithm. Using the FNR algorithm can result in fewer replacements of sensor nodes and more reused routing paths. Thus, the algorithm not only enhances the WSN lifetime, but also reduces the cost of replacing the sensor nodes.

4: Yenegur et al. [5] authors are discussing about the sensors in a wireless sensor networks (WSNs) are having tendency to fail, due to the energy depletion, hardware failures, environmental conditions etc. Fault tolerance is one of the critical issues in WSNs. The existing fault tolerance mechanisms either consume significant extra energy to detect and recover from the failures or need to use additional hardware and software resources. The proposed algorithm enhances the lifetime of a sensor nodes shut down and it depends on ladder diffusion algorithm combined with the genetic algorithm. It can result in fewer replacements of sensor nodes with more reused routing paths and also increases the number of active nodes, reduce the rate of data loss with reduced energy consumption.

5: Dheer Singh1&Er.Amit Kumar et al. [6] authors proposed a faulty node recovery technique. They proposed a recovery of faulty node in two ways first is Recovery through Inward Motion (RIM) and second one is Least Distance Movement Recovery (LDMR).

6:Sushant Patial et al. [7] authors discussed about Fault Tolerance in MANETs network, where he come with a technique called Check pointing and Rollback Recovery Algorithms that is a Check pointing, is a technique for inserting fault tolerance into computing systems. It basically consists of taking a snapshot of the current application state, storing it on some memory area and later on using it for restarting the execution from that particular point in case of failure. It is a fault tolerant technique in which normal processing of a process is interrupted specifically to preserve the status information necessary and then to allow resumption of processing at a later time.

7: Ladder diffusion and ACO An algorithm based on ladder diffusion and ACO (Ant colony optimization) [3] is proposed to solve the major pointing issues of power consumption and transmission routing problems in wireless sensor network scenarios. The defined ladder diffusion algorithm is employed to route paths for data relay and trans- mission majorly

in the wireless sensor networks, also with a tendency to reduce both power consumption and time required for processing to create and maintain the routing tables and also avoiding the generation of circle routes in parallel. Another advantage is, to ensure the safety and reliability of data transmission in WSN, their algorithm also provides backup routes to avoid wasted power consumptions and processing time when rebuilding and maintain the routing table in case part of sensor nodes are missing. According to the experimental results, the proposed algorithm not only reduces power consumption by 52.36%, but also increases data forwarding efficiency by 61.11% as compared to the directed diffusion algorithm.

III. CONCLUSION

From the last few years, Wireless Sensor Networks have got the attention of lots of researchers due to their real time applications. Fault tolerance is the major issue of Wireless Sensor networks. If a node get fails it divide the network and affect the network performance. In this paper, we have studied the node recovery techniques in WSNs, specially, mobile sensor networks or movable sensor networks. The fault tolerant plays an important role for making the reliable communication between the sensor networks. The sensor nodes may be failed due to energy depletion, link failure, range failure and damaged nodes. The Efficient fault detection and recovery algorithm will not only identify a faulty node also recover it in order to save the energy. Hence a technique called PADRA resolve some problems.

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