Fault Node Detection using Genetic Algorithm for A WSN

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Abstract- *This paper proposes a fault node recovery protocol to improve the lifetime of a wireless sensor network when some of the sensor nodes power down. The algorithm is based on the grade diffusion formula combined with genetic algorithm. The algorithm can bring about fewer replacements of sensor nodes and even more reused routing routes. Within our simulation, the recommended algorithm increases the amount of active nodes up to 8. 7 times, reduces the rate of data loss by about 98. 8%, and reduces the rate of your consumption by approximately 31st. 1%.*

Keywords- Buffer zone solution, grade diffusion algorithm, genetic algorithm.

I. INTRODUCTION

Recent advances in micro processing, wireless and battery technology, and smart sensors have enhanced data processing [1], [2] wireless communication, and detection capability. In sensor networks, each sensor node has limited wireless computational power to process and transfer the live data to the base station or data collection center. Therefore, to increase the sensor area and the transmission area the wireless sensor network usually contains many sensor nodes. Generally, each sensor node has a low level of battery power that cannot be replenished. When the energy of a sensor node is exhausted, wireless sensor network leaks will appear, and the failed nodes will not relay data to the other nodes during transmission processing. Thus, the other sensor nodes will be burdened with increased transmission processing.

This paper proposes a fault node recovery (FNR) algorithm 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. Using the FNR algorithm can result in fewer replacements of sensor nodes and more reused routing.

II. RELATED WORK

The buffer zone solution is dependent on defining nodes as safe or unsafe, and either using them as relay nodes, in case they are safe, or staying away from them as relay nodes in case they are unsafe. Also, traffic to unsafe nodes inside the mailing node's transmission area should be attempted passed in through safe nodes, if possible. The signal power of the Hello bouts can be applied as unbekannte to be able to determine which nodes are in, what is considered the safe zone and the unsafe zone with varying mobility speeds. The zone status of every next door neighbor must be added to each link entry in the Hello packets and announced to the other neighbors, to be able to support neighboring nodes in redirecting traffic to its risky neighbors. It is necessary to avoid routing a packet to a relay node which has the destination as an dangerous neighbor, if the source node has the vacation spot node as an risky neighbor. The routing stand of each node will be calculated based only on nodes in the safe zone, and if this leads to dividing, routes via nodes in the unsafe buffer region are included in the routing table. The basic principle of buffer zone redirecting is to use nodes in the safe area to frontward traffic. The nodes in the unsafe load zone should only be used for forwarding if it is impossible to obtain full connectivity without one. Topology set are traversed, no route changes to the already described routes are allowed.

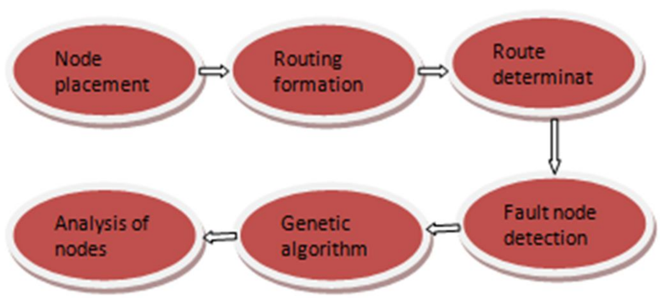
III. DIRECTED DIFFUSION ALGORITHM

A number of routing algorithms [3], [4] for wireless sensor networks have been proposed in recent years.C. Intanagonwiwat et al. presented the Sharp Diffusion (DD) algorithm in the year 2003. The goal of the DD algorithm is to minimize the data relay tranny counts for power management. The DD algorithm is a query-driven transmission process. The collected data is transmitted only if it matches the query from the sink node. Found in the DD logorithm, the sink node supplies the concerns in the form of attribute-value pairs to the other sensor nodes by broadcasting the query bouts to the complete network. Consequently, the sensor nodes send the data back to the sink node only when it fits the queries.

IV. GRADE DIFFUSION ALGORITHM

H. C. Shih et al. presented the Grade Diffusion (GD) formula [5] news to increase the ladder durchmischung algorithm using ant nest optimization (LD-ACO) for wi-fi sensor networks [6]. The GD algorithm not only creates the course-plotting for each sensor client but also identifies a set of neighbor nodes to reduce the transmitting loading. Each sensor customer can select a messfühler node from the arranged of neighbor nodes when its grade table falls short of a node able to perform the relay. The GD algorithm can also record some information regarding the data relay. In that case, a sensor node can select a node with a lighter loading or more available energy than the other nodes to perform the extra relay operation. That is, the GD algorithm updates the routing path in real time, and the big event data is thus brought to the sink node quickly and correctly. Whether the DD or the GD protocol is applied, the gradecreating packages or interested issue packets must first be broadcast. Then, the fühler nodes transfer the event data to the drain node, in line with the algorithm, when suitable incidents occur.

V. SYSTEM DESIGN



Program design is the process of defining the components, modules, interfaces, and data for a system to gratify specified requirements. Program development is the process of creating or modifying systems, together with the processes, techniques, models, and methodologies used to develop them. This kind of section contains description of functionality of the pieces of software used in building topology. This module involves building Wireless Network topology, topology composed of mobile nodes, each node working with multiple channels. Setting up Wireless Network Topology: This kind of includes environmental settings, client configuration, and topology creation. Setting the bandwidth and threshold: Each and every node in the network topology will be allocated with certain bandwidth and topology. Identifying the friends and neighbors: In order to identify the neighbors for a particular node Euclidian distance concept is utilized. Specifying the source, destination and data: From which node the information should be sent and which node must receive the data will be chosen. Also how much amount of information should be directed along with the time interval of sending the info will be specified. Indicating the simulation start some end time: In NATURSEKT 2 the complete transaction occurs within fraction of secs. The transaction can be viewed through the NAM window anytime. For this the simulation start time and end time will be specified.

There is a big difference between the buffer region solution and standard OLSR in conditions of the mean number of hops between a source and a destination. The quantity of hops per way is increased with the buffer zone solution, as it favors nodes in the safe zone as relay nodes. The increased hop length is a main disadvantage of the buffer zone solution. Initially, the increased hop span causes an increased amount of needed transmissions for the same end-to-end traffic streams, thus reducing the entire available capacity per traffic stream. Second, as the paths get longer, there is certainly an increased risk that the topology information kept by the forwarding nodes is wrong. There is a higher probability that the topology (both the real topology and the topologies given by the routing tables) changes while the packet is in transit between the source and destination nodes. Therefore, the risk of a packet loop, or a considerable detour, is increased. Both an increased average path length, an elevated associated risk of a packet detour and an increased risk of a packet cycle add to the likelihood of a Time-To-Live (TTL) exhaustion [11]. A too big buffer sector, however, brings about an needless higher mean number of hops between pairs of nodes in the MANET and a higher likelihood of network partitioning. Seeking a means to calculate the optimal scale the buffer zone, depending on parameters such as client mobility and network fill, is also a drawback to the buffer zone algorithm. Finally, buffer zone algorithm can be improved and prolonged, using standards in addition to distance to classify neighbor as safe or unsafe. These drawbacks and gaps provide room to enhancement or extension of the buffer zone criteria.

VI. CONCLUSION

In real wireless sensor systems, the sensor nodes use battery power supplies and so have limited energy resources. As well as the routing, it is important to research the optimization of sensor client replacement, reducing the replacement unit cost, and reusing the most routing paths when some sensor nodes are nonfunctional. This paper offers a fault node restoration algorithm for WSN depending on the grade diffusion protocol combined with an anatomical algorithm. The FNR formula requires replacing fewer mess fühler nodes and reuses the most routing paths, increasing the WSN lifetime and reducing the replacement cost. In the simulation, the proposed algorithm boosts the quantity of active nodes up to 8. 7 times. The number of energetic nodes is enhanced 3. 16 times on average after replacing typically thirty-two sensor nodes for each and every calculations. The algorithm reduces the rate of data damage by approximately 98. 8% and reduces the rate of energy Consumption by approximately 31. 1%. As a result, the FNR algorithm not only replaces sensor nodes, but also reduces the replacement cost and reuses the most routing routes to raise the WSN life span. importance of the work or suggest applications and extensions.

REFERENCES

[1] T. H. Liu, S. C. Yi, and X. W. Wang, "A fault management protocolfor low-energy and efficient wireless sensor networks," J. Inf. HidingMultimedia Signal Process., vol. 4, no. 1, pp. 34–45, 2013.

[2] F. C. Chang and H. C. Huang, "A refactoring method for cache-efficientswarm intelligence algorithms," Inf. Sci., vol. 192, no. 1, pp. 39–49,Jun. 2012

[3] J. H. Ho, H. C. Shih, B. Y. Liao, and S. C. Chu, "A ladder diffusionalgorithm using ant colony optimization for wireless sensor networks," Inf. Sci., vol. 192, pp. 204–212, Jun. 2012

[4] T. P. Hong and C. H. Wu, "An improved weighted clustering algorithmfor determination of application nodes in heterogeneous sensornetworks," J. Inf. Hiding Multimedia Signal Process., vol. 2, no. 2,pp. 173–184, 2011.

[5] H. C. Shih, S. C. Chu, J. Roddick, J. H. Ho, B. Y. Liao, and J. S. Pan,"A reduce identical event transmission algorithm for wireless sensornetworks," in Proc. 3rd Int. Conf. Intell. Human Comput.Interact.,2011,pp. 147–154.

[6] Z. He, B. S. Lee, and X. S. Wang, "Aggregation in sensor networkswith a user-provided quality of service goal," Inf. Sci., vol. 178, no. 9,pp. 2128–2149, 2008

[7] W. H. Liao, Y. Kao, and C. M. Fan, "Data aggregation in wireless sensornetworks using ant colony algorithm," J. Netw.Comput.Appl., vol. 31,no. 4, pp. 387–401, 2008.

[8] J. A. Carballido, I. Ponzoni, and N. B. Brignole, "CGD-GA: A graphbasedgenetic algorithm for sensor network design," Inf. Sci., vol. 177,no. 22, pp. 5091–5102, 2007.

[9] C. Intanagonwiwat, R. Govindan, D. Estrin, J. Heidemann, and F. Silva,"Directed diffusion for wireless sensor networking," IEEE/ACM Trans.Netw., vol. 11, no. 1, pp. 2–16, Feb. 2003.

[10] J. Pan, Y. Hou, L. Cai, Y. Shi, and X. Shen, "Topology control forwireless sensor networks," in Proc. 9th ACM Int. Conf. Mobile Comput.Netw., 2003, pp. 286–299

[11] S. Corson and J. Macker, Mobile Ad Hoc Networking (MANET): Routing Protocol Performance Issues and Evaluation Considerations. New York,NY, USA: ACM, 1999.

[12] E. M. Royer and C. K. Toh, "A review of current routing protocolsfor ad-hoc mobile networks," IEEE Personal Commun., vol. 6, no. 2,pp. 46–55, Apr. 1999.