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Identifying the Holes Using DHD Algorithm and also improving the System Performance by Using Temporary Nodes

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ABSTRACT: **In the present scenario Wireless Sensor Networks is one of the fast spreading technologies. Some holes will occur in the network, due to some random deployment, hardware issues or because of environmental factors. Hole is one of the problems which occur in WSN. Holes in the WSN are unavoidable because of the nature of the networks. Distributed Hole Detection Algorithm (DHD) is used, two phases will be there, first phase will be used for detecting the holes and second phase is used for healing the holes. Different forms and sizes of holes will be seen in rectifying the holes. Time consuming and energy consuming will be reduced. Node Placement Algorithm is also used for placing the node in correct position.**

***General Terms*: Wireless sensor Networks, Holes, Distributed Hole Detection Algorithm (DHD), Node placement algorithm**

INTRODUCTION

The Wireless Sensor Networks (WSN) [1] contains nodes and sensor nodes which are used for observing a region and communicating with other nodes. The main target of the sensor nodes is to gather the information from nodes and process that data to the sink or base station.[2] Major issues that affect the design and performance of a wireless sensor network are Quality of Service, Security, and Programming Models for Sensor Networks, Hardware issues, environmental issues and topology likewise. These issues may result in the Formation of different holes like routing holes, coverage holes, jamming holes and worm holes.

In Wireless sensor networks, [3] holes will occur due to some factors like environmental issues or internal structure of networks, external factors likewise. [4] Hole can be identified and recovered these holes are the obstacles for the communication of the nodes. We will identify that holes and recover those holes by using the proposed algorithm. Node destructions or node fails also occur in WSN these node fails will occur due to some issues like low density regions, energy is limited, due to some obstacles. [5]If there is more number of nodes in a region then there is a chance of losing the connectivity. [5] Multiple failures can be detected by using an local partition algorithm so that sensor nodes will know the damage in the network. Later complete routing information can be maintained so that sensor nodes can easily relocate the location and routes can be re-established from repaired node to sink node.

EXISTING WORK

In the existing system [6] Sensor nodes will periodically send the node information to the base station; the sensor nodes have some energy levels to transfer the data from node to base station. Whenever the energy levels are dropped these sensor nodes will fail in transferring the data. By this drop packets (data loss) will be more.

PROPOSED SYSTEM

In the proposed system holes will be detected where they are occurred after depletion. Holes will be recovered by using healing process. Hole will be in any form and size. When a node is failed another new node will be replaced in the place of fault node until then no data transfers will takes place. When a node is transmitting the data to the base station if the node energy levels are dropped then that node won't have the capability of transferring the data effectively so packet drops (data loss) will occur, these packet drops will be reduced by using the proposed algorithm

Distributed Hole Detection Algorithm (DHD): our DHD Algorithm allows us to discover the hole holes and heal the holes. In the first phase holes will be identified. In the second phase healing process will takes place, in healing process if node is present in the local area or within a limited area then only healing process will take place. Hole healing area allows a node to be recovered if it is present in the limited zone. The basic idea of our algorithm will also be in HHA. We will assign a number to the nodes after finding the fault node number that node will be healed. Hole Manager (HM) will be there, that HM node will calculate the distance between the two fault nodes and take the radius of a circle and calculate the distance. Therefore, to control the Hole Healing Area, we have to calculate the radius of the circle that defines the HHA (figure: 1). S0 node move A via to B point to used DHD algorithm.

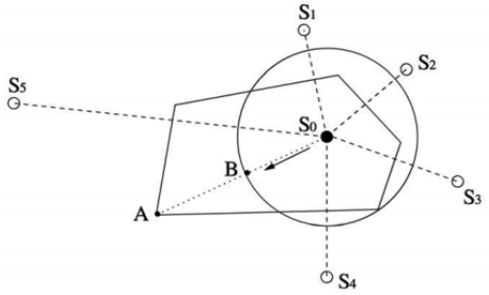

Figure: 1 Healing Process

In this fault node have to be identified first and then we will access that node for hole detection after that we will calculate the distance between the fault nodes and radius will also be calculated for healing process.DHD is an

algorithm that is used in wireless sensor networks for hole detection.

Algorithm:

Hole detection & Healing :
1) start the Hole timer and Neighbor timer
2) If hole time expires
– Develop the new hello message
• link
– node unique id
– Position information
– Transmit Hello message to all nodes
– Set new schedule message for next hello
3) If hello message acquired
– Check in neighbor table
• If sender information already exists
– Increase the expire time
• Else if it is recent one
– Create new entry
4) If neighbor timer expires
– If neighbor information expires
• Delete the node
• Set as failed neighbor node
• Share the information to next neighbors
– Set new schedule for next verification
5) If failure sharing receive
– If Hole id is same but not generated by own
• Make confirmation of node failure
• Calculate max distance from initiator
• Send to next node with own information
– Else if node own packet received
• Set as Hole Organizer
• Calculate hole distance
• Calculate hole center point
– Else
• If hop count < Threshold hop count
– Forward the message to next node
6) If the node is Hole Organizer
– Send healing message
• Update hole point
• Update Distance to hole
7) If healing message is received
– Checks the hole point & distance
– If its distance less then Hole Organizer distance
• Start moving to center point to the hole point

Node Placement Algorithm: Node Placement Algorithm is used to place the nodes in required or correct position for data transfer. In networks nodes are placed randomly, in some regions more number of nodes will be there so collision takes place packet drops will occur .In other case if nodes are densely placed, that is nodes are far away from each other so time consuming will be more for data transfer and some more energy must be spent on the nodes. To recover this type of problems node placement algorithm is used by this algorithm we can easily place the node where ever required by calculating the position of the node where to be place the node in future position**.**

Algorithm:

1. Arrange the nodes in particular or random place.
2. For every node
   -Update own position information
   -send hello message with the position information
3. If hello message is received
   Update own position
   Check the distance from sender (distance)
   If less than Threshold
4. Calculate future position
   -Set temporary position=current position
   -Set future position=temporary position +/- (distance/2)
   -Start the movement of node to Future position

In our proposed system we used hole detection and hole healing process for repairing the fault nodes also for reducing the packet drops while transferring the data from node to the base station by this process less energy is consumed. Node placement algorithm is used for placing the node in required position so that time consuming and energy for data transfer is also reduced.

EXPERIMENTAL RESULTS

Simulation of the proposed work is done by using NS2 and the results will be shown below. Holes may present in various forms and sizes. While sending the data from node to the baste station on regular basis if node energy is lost or reached to dead state then that information will be send to base station by using sensor nodes, by receiving that information base station will send some temporary nodes is replaced in the place of fault node for data transmission.
In the below screen shots Figure2 shows the node creation and temporary nodes, and base station node. Figure 3 shows the replacement of temporary nodes when the sender node energy levels are dropped replacement occurs. Figure 4 shows data transfer after the replacement of the temporary node by using some intermediate node data transfer will takes place through shortest distance by using some routing protocols. Figure 5 shows while transferring the data from sender node to the base station some packet drops will be seen in the below screen shot. Figure 6 shows the graph for the comparison of different attacks.

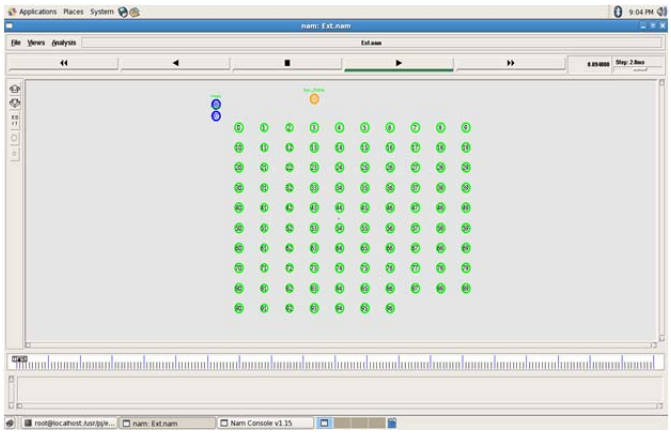

Figure: 2 Nodes are created

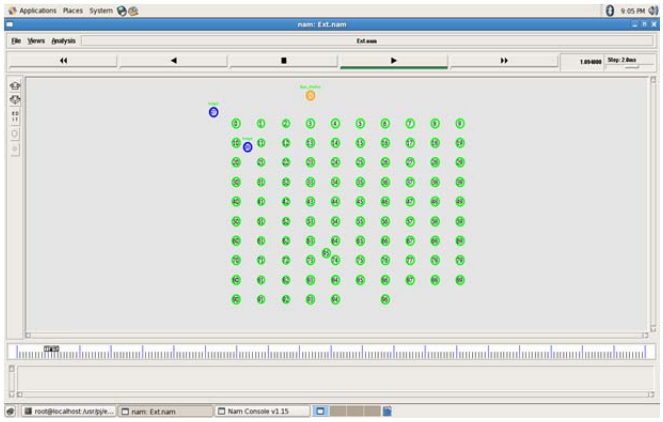

Figure: 3 Node Exchange

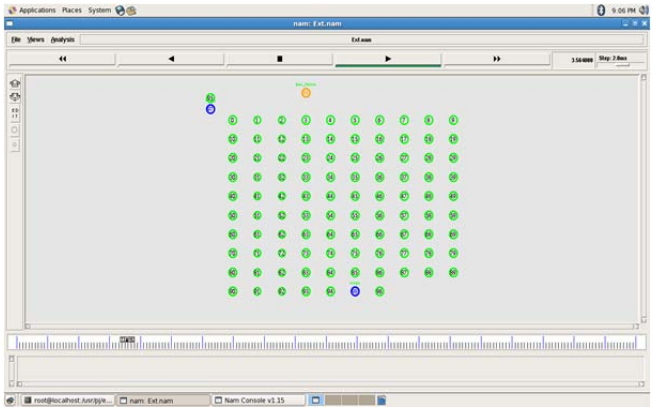

Figure: 4 Data Transfer

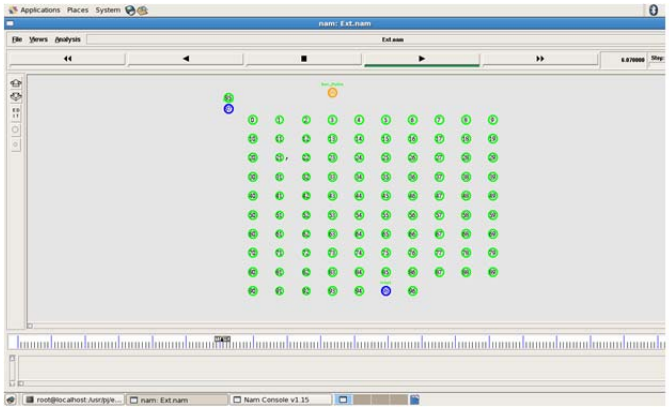

Figure: 5 Packet Drops

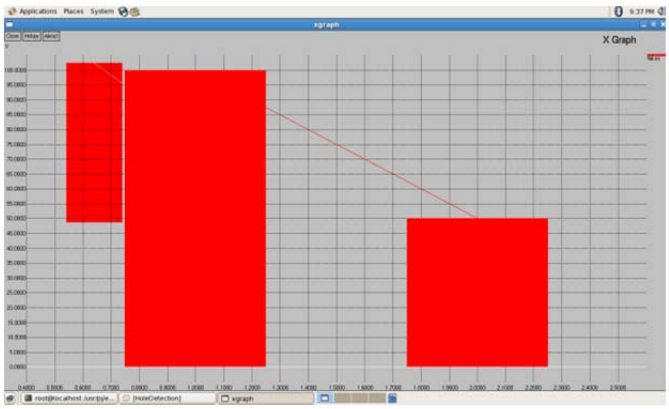

Figure: 6 X-Graph for comparison of detected different hole attacks

In x-axis 1.0000 refers are taken for existing technique where nodes will be 100% dead upon energy finished. In x-axis 2.0000 refers are taken for the proposed technique where nodes can be replaced with temporary node based on that we can detect different hole attacks in these proposed system when compare to existing techniques.

CONCLUSION

In this paper we proposed a two-phase protocol, in the first phase holes will be identified and in the second phase heal will be performed for covering a large area in wireless sensor networks. DHD algorithm is used for detection of holes in the network. By using DHD, in various situations despite of their number and size holes will be detected and identified. By using the node placement algorithm nodes will be placed in the limited zone for the data transfer from node to the base station. The major advantages of the proposed approach is to reduce the packet drops and also the energy consumption is less i.e. by replacing the node with the temporary node.

REFERENCES

[1] Akyildiz, Ian F., et al. "Wireless sensor networks: a survey." Computer networks 38.4 (2002): 393-422.

[2] Tanenbaum A.S., Computer Networks (Fourth Edition Ed.). Prentice Hall, 2003.

[3] Detecting Coverage Holes in Wireless Sensor Networks Jinko Kanno, Jack G. Buchart, Rastko R. Selmic, and Vir Phoha

[4] Hole Detection for Quantifying Connectivity in Wireless Sensor Networks: A SurveyPearl Antil and Amita Malik.s

[5] "Mobility-based Self Route Recovery from Multiple Node Failures in Mobile Sensor Networks "Shanthi Vemulapalli and Kemal Akkaya.

[6] "Redundant Actor Primarily based MultiHollow Restoration System for Mobile Sensor Networks" Leela Priya Inturu, Divyajyothi Amathi.

[7] On "Movement-Assisted Connectivity Restoration in Wireless Sensor and Actor Networks" ShiGuang Wang, XuFei Mao, Shao-Jie Tang, Xiang-Yang Li, , JiZhong Zhao, and GuoJun Dai.

[8] Sensor Networks: Evolution, Opportunities, and Challenges CHEE-YEE CHONG, MEMBER, IEEE AND SRIKANTA P. KUMAR, SENIOR MEMBER, IEEE.

[9] I.F. Akyildiz and I.H. Kasimoglu, "Wireless Sensor and Actor Networks: Research Challenges," Elsevier Ad Hoc Network J., vol. 2, pp. 351-367, 2004.