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Performance Analysis of Fault Detection in Round Trip Delay and Path Wireless Sensor Networks

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Abstract- In recent years, wsns detect to the fault sensor node based on round trip delay using path in wireless sensor networks. Portable sensor node is low cost in Wsns . Measured in the round trip delay time and number of sensor node. Existing method is used to large value of sensor node, identification of sensor node time and distance . it is used to linear selection path, disadvantages are data loss, more number of path, complexity. in this proposed method using distributed autonomous sensor software implementation in NS2.it is detected fault sensor node and malfunction ,in this analysis time and path using discrete Rtp. real time applicability in received signal strength ,separate wavelength for end of the node avoid the data loss and complexity. Hardware implementation using ZigBee and Microcontroller .Equal to the hardware and software implementation. It is overcomes to the data loss. comparing the threshold and Rtd time. Finally, the algorithm is tested under different number of faulty sensors in the same area. Our Simulation results demonstrate that the time consumed to find out the faulty nodes in our proposed algorithm is relatively less with a large number of faulty sensors existing in the network.

Index Terms— Faulty sensor node, round trip delay, round trip path, Wsns.

I. INTRODUCTION

The advanced in wireless communication technologies enabled large scale wireless sensor networks (WSNs) deployment. Due to the feature of easy of deployment of sensor nodes, wireless sensor networks (WSNs) have a vast range of applications such as monitoring environment, military, medical, industrial and rescue missions . Wireless sensor network is composed of large number of sensor nodes. The event is sensed by the low power sensor node deployed in neighborhood and the sensed information is transmitted to a remote processing unit or base station ,To deliver crucial information from the environment in real time it is impossible with wired sensor networks whereas wireless sensor networks are used for data collection and processing in real time from environment . The ambient conditions in the environment are measured by sensors and then measurements are processed in order to assess the situation accurately in area around the sensors. Over a large geographical area large numbers of sensor nodes are deployed for accurate monitoring. Due to the limited radio range of the sensor nodes the increase in network size increases coverage of area but data transmission i.e. communication to the base station (BS) is made possible with the help of intermediate nodes. Depending on the different applications of wireless sensor networks they are either deployed manually or randomly. After being deployed either in a manual or random fashion, the sensor nodes self-organize themselves and start communication by sending the sensed data. These sensor networks are deployed at a great pace in the current world. Access to wireless sensor networks through internet is expected within 15 years. There is an interesting unlimited potential in this wireless technology with various application areas along with crisis management, transportation, military, medical, natural disaster, seismic sensing and environmental. In general the two types of wireless sensor networks are: unstructured and structured. The structured wireless sensor networks are those in which the sensor nodes deployment is in a planned manner whereas unstructured wireless sensor networks are the one in which sensor nodes deployment is in an ad-hoc manner. As there is no fixed infrastructure between wireless sensor networks for communication, routing becomes an issue in large number of sensor nodes deployed along with other challenges of manufacturing, design and management of these networks. There are different topologies that have been proposed for these issues.in this sensor node identify failure and malfunction node. These two categories which are infrastructure less and infrastructure based have their own cons and pros. In the first category which is the infrastructure based networks, both voice and data with good quality of service from source to destination is carried but infrastructure is required. In second category which is infrastructure less networks have constraints with limitation in bandwidth, power and range.

A wide range of wireless sensor network applications are:
Underwater sensor networks that are used for monitoring of fisheries and coral reefs . as these networks use equipment's that are lighter, smaller and less power consumption. This application of WSN has many challenges that include data collection, event detection, high data rates and sparse deployment of nodes.
Other applications of WSN include:

- Outdoor/indoor monitoring of environment.
- Monitoring of health.
- Factory and process automation.

Structural Monitoring Machine Monitoring Process Monitoring

II. NETWORKING TOPOLOGIES

We can use several network topologies to coordinate the Wireless sensor network gateway, end nodes, and router nodes. Router nodes are much similar to end nodes in that they can store measurement data, but they also can be used to pass along measurement data from other nodes . The first, and most basic topology, is the star topology, in which each node maintains a single, direct communication link with the gateway. This topology is very simple but restricts the overall distance that our network can achieve. To increase the distance that a network can cover, you could implement a cluster, or tree, topology. In this more complex architecture scenario, each node still uses only one communication path to the gateway but can use other nodes to route its information along that path. This topology suffers from a typical problem, however. If a router node goes down, all the nodes which depend on that router node also lose their communication links to the gateway. The mesh network topology reduces this issue by extensively using redundant communication paths to increase reliability of the system. In a mesh network, nodes maintain multiple communication links back to the gateway, so that if a router node goes down or does not work properly, the network automatically reroutes the data through a different sets of path. The mesh topology, although very reliable, suffers from an wide increase in network latency because data must make multiples of hops before successfully arriving at the gateway

II. PROPOSED METHOD

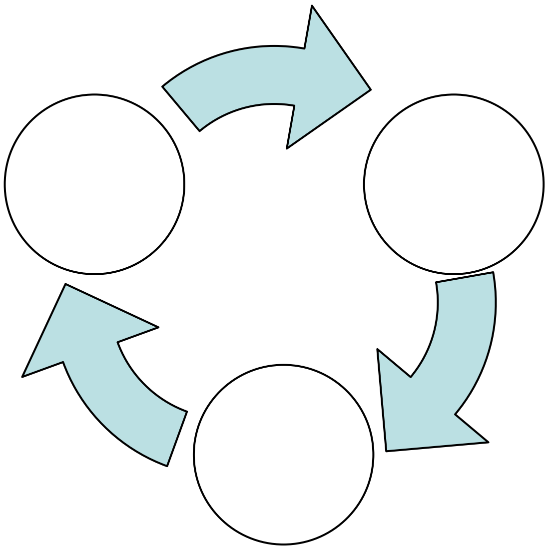

Figure :1

Changed topology and protocol .it is used to alternate path .in this paper result in number of nodes and delay using round trip path. Coverage vs number of nodes avoid to the data loss .it is improved the efficiency.

III. NODE SELECTION

Coverage is one of the most important issues in WSNs and it has been studied extensively in recent years. In most cases, "coverage" means area coverage. And K-coverage can be described as that every point in the monitored field is covered by at least K sensors. In [16], the authors consider that it is hard to guarantee full coverage for a given randomly deployment area, even if all sensors are on-duty. Small sensing holes are not likely to influence the effectiveness of sensor networks and are acceptable for most application scenarios. It's enough to meet the application's requirements if the active nodes in the network could maintain reasonable area coverage—coverage expectation.

Coverage mechanism is to choose a subset of active nodes to maintain the coverage expectation. We introduce into clusters the notion of "intra-cluster coverage", which selects some active nodes within clusters while maintaining coverage expectation of the cluster. Utilizing the idea proposed in our research , cluster head randomly chooses m' nodes according to equation

$$Pcov=\sum_{i=k}^{m} C^{I} (r/R)^{2i}(1-r^2/R^2)^{m-i}$$

where P cover is the coverage expectation of sensing field determined by specific applications; and r is sensing radius, R is cluster radius; m' is the number of active nodes. For example, distributing 200 nodes in a 100×100m2 field, r = 12m, R = 30m, then the average number of cluster members is 60 or so. With intra-cluster coverage, if P cover = 99% which means 99% of sensing field is expected to bemonitored, 27 members should be active in each cluster to ensure 1-coverage of the cluster and 38members to ensure 2-coverage. If Pcover =95%, only 16 nodes and 25 nodes should be active to ensure 1-coverage and 2-coverage respectively. Fig (2) circular topology used in this method any one link fail or fault another link or path is using topology

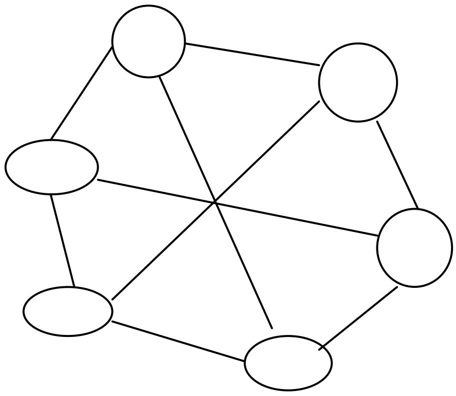

Figure: 2

Simulation Parameters

Parameters	Value
Network Filed	*(0,0)~(100,100)*
Node numbers	*10~100*
Sensing radius	*characterization*
Sink position	*(50,200)*
Initial energy	*2 J*
Data packet size	*525 Bytes*
Broadcast packet size	*20 Bytes*
Data Cycles per round(*L*)	5

IV. SIMULATION RESULT

The improved efficiency scheme will be applied in a real wireless sensor network system. It is expensive to run schemes on the hardware of the system, so the feasibility and accuracy of the schemes should be verified before being applied. Therefore, simulation becomes the best alternative way of testing, evaluating and verifying. We programmed the data loss and improved efficiency scheme using Visual NS2. We compared the change of fault detection accuracy of the RTD time with varying node failure ratios for different average numbers of neighbor nodes. Hundred nodes are randomly deployed in the network, as shown in

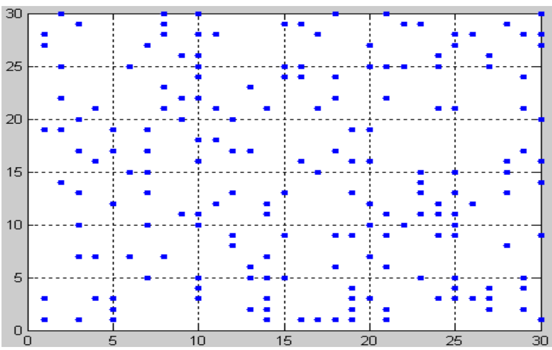

Figure:4.1 Number of sensor nodes using simulator

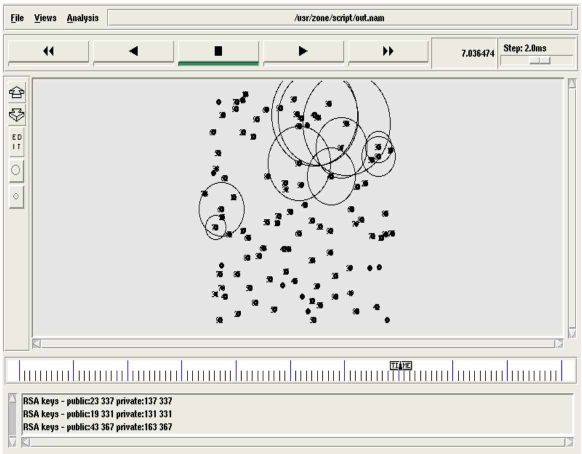

Figure :4.2 Round trip path

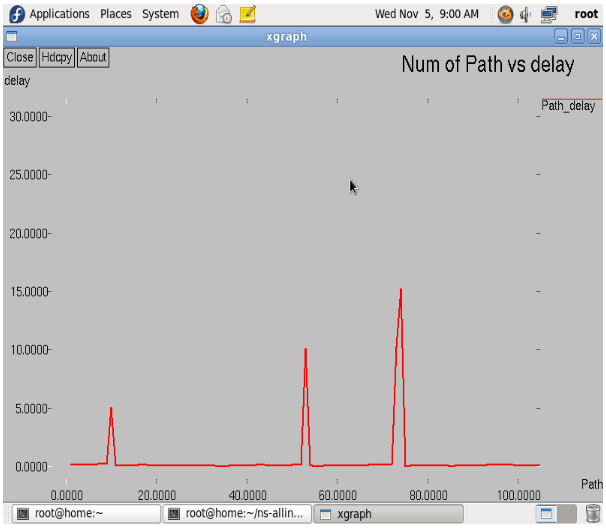

Figure:4.3 Num of path and delay

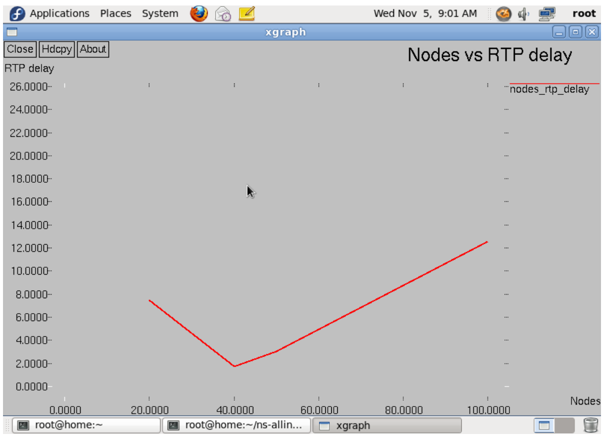

Figure:4.4 Nodes and delay

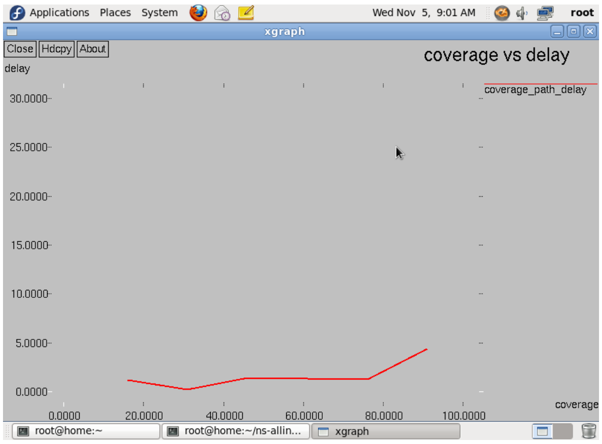

Figure :4.5 coverage and delay

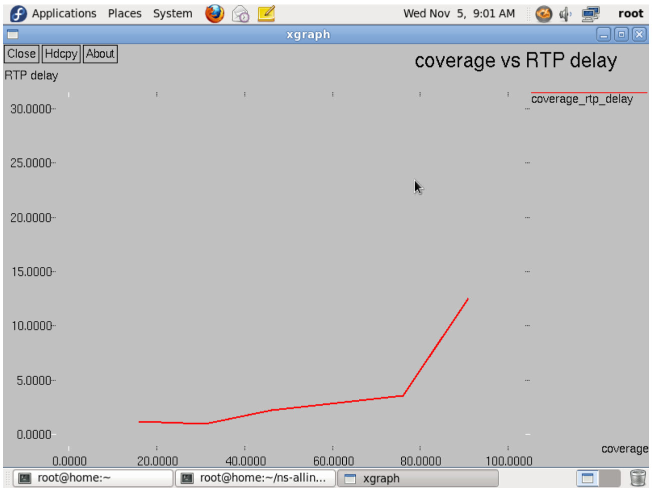

Figure : 4.6 coverage and round trip path delay

For evaluation of the proposed method, we use two metrics; the delay and coverage. The delay is the time duration in which all packets generated by all nodes reach the BS. The coverage is the average rate of successful data delivery over the channel and it is measured in data packets per time slot. In simulations, the WSN consists of 100 sensor nodes randomly distributed within a circular area with radius of 100 units. The BS is located in the center of the circular area.

V.COMPARISON GRAPH

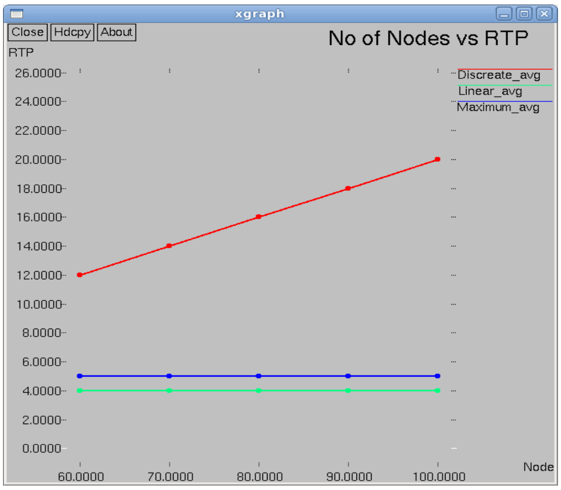

Figure : 5.1 nodes and delay

By applying the proposed method to WSNs, delay and coverage performances significantly improved. The performance of the proposed method depends on the network topology. Compared to the topologies with low and high 2 ratios, in the topologies with the medium 12 ratios, the percentage of performance improvement in the proposed algorithm is more.

VI. CONCLUSION

For the node whose actual status is normal, if the number of nodes which is initially diagnosed as possibly normal (RTD) in its neighbor nodes is less than half of the total neighbor nodes, the round trip delay time node fault detection scheme will misdiagnose the normal node as faulty. Modification is made to the detection criterion of and an improved efficiency scheme is proposed to address this short coming. Simulation results show that the fault detection accuracy of the improved sensor node out performs the for different average numbers of neighbor nodes and node failure ratios. It can also be applied to wireless sensor networks where there are high neighbor nodes and the node failure ratio is less.

Future Work for number of sensor nodes in this corresponding path.it will reduce detection time and avoid data loss.

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