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Fault Routing Node Detection Using DUAL in Wireless Sensor Networks

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Abstract- Wireless sensor networks are an essential tool for monitoring distributed remote environments and major difficulties are identifying the fault node. The extinction of damaged sensor measurements in WSNS will cause not only a dispossession of network quality of service, but also a huge load on the limited power.

In this project proposes Diffusing Update Algorithm map-reading protocol to make certain that the given route is recalculated globally whenever it might causes a map-reading loop. DUAL evaluate the data received from other routers in the topology table and calculate the major and minor routes. The major path is usually lowest metric to reach the destination, and the unneeded path is the second lowest cost. There may be various descendants and various practical successors. Both descendant and practical descendant are preserving topology table, but only the successor are added to the routing table and used to route packets.

The Wireless Sensor Network is existence but also reduces the cost of replacing sensor nodes. Here we use Diffusing Update Algorithm (DUAL) for improving existence of a wireless sensor networks previously various of sensor node`s are failed. By using this algorithm we can identify result in less replacement of sensor node`s further more useful routing path. so, the algorithm not only enhance The algorithm planned in this paper is based on the Grade Diffusing algorithm, through the purpose of replace fewer sensor nodes that are not working otherwise we have useless battery and of reuse the most quantity of routing paths. Finally this optimization enhances the WSN lifetime and reduces sensor node replacement cost.

I.INTRODUTION

In this Period, I include concentrated the basic concepts of wireless antenna network which can be applied to the project. In this project wireless antenna network is mainly done in order to extract the information from the data and transform it in to understandable language and is used for future use.

A wireless antenna network(WAN) is a computer network having of spatially spread autonomous plans by means of sensors to helpfully observe physical or green conditions such as temperature, sound ,vibration ,pressure motion or pollutants at special locations. The development of wireless antenna networks was originally forced by military applications such as combat zone surveillance. Through wireless sensor networks are used in many civilian application areas as well as environment and surroundings monitor health care applications home automation pass through direct.

Studied Concepts of Customized program:

In this Period, These applications for WSNs are several and various. They are used in scalable also monitor data that manufacturing applications to would be complex costly to screen using wired sensors. They may possibly be deployed in desert area the monitor several environmental unpredictable without the need to refresh and change their power supply would remain for many years. They may possibly form a boundary regarding a possession monitor the development of intruder in the temporary in sequence from one node to another node. Hereby lot of uses for WSNs.

These type applications of WSNs consist of tracking, controlling, monitoring. The numbers of functions are environment monitor, traffic monitoring, object tracking, nuclear reactor calculating traffic monitoring fire detection etc. In a typical application a WSNs is extend in area where it is intended to gathering information throughout its sensor nodes.

- Green monitor
- Haunt monitor
- Services surveillance
- Record tracking
- Health check monitoring
- Smart spaces
- Route Monitoring

II.RELATED WORK

The traditional approach to wireless sensor network routing include the A ladder diffusion algorithm using ant colony optimization for wireless sensor networks and Genetic Algorithms and Engineering design (GA) and Grade Diffusion (GD)algorithm. The algorithm proposed in this paper is based on the DUAL algorithm. This algorithm main focus is less replacement of the sensor nodes and increasing the node life time and reduced the sensor node cost.

Wireless sensor network is a collection of distributed autonomous sensors for monitoring the environmental condition, immense amount of small, low cost, self power plants that are competent of sense, compute and communicate. Recent advances in MEMS technology have enable low power and multifunctional sensor nodes that are small in size and the development of low-cost and converse in small distances. Neat sensor nodes are low power procedure ready with one or more sensors a computer recollection a control bring a data lines and an

actuator. A various kinds of automatic chemical biological visual thermal and attractive sensors are attached to the sensor node for measuring the property of an surroundings. These sensor nodes are closely deploy within the phenomenon or shut down. The nodes are deploying randomly in set of measures to improve and keep an industry IT infrastructure in the event of failure relief operations. If any event is changed then it is sensed for communicating the organization location with the multi hop message among two end nodes is carried out through no. of intermediate nodes.

A. A ladder diffusion algorithm using ant colony optimization for wireless sensor networks:

In wireless sensor networks network life time is considered as major issue. The life time of the WNSs will be enhanced while the load is uniformly distributed to the nodes in the network because of this all the nodes consume power similarly and the network become prepared. This work they used static and dynamic mobility analysis for showing the sink mobility and active sink on system presentation in WSNs. By analyzing this work, there is some relationship between the sink mobility and active sink with the presentation of the map-reading protocols by the means of power consumption, consistency of network and the life time of a network This work discuss the efficiency of wireless sensor network through some engineering concepts they are

- Energy consumption decreases the energy in well-organized shortest path routing algorithms.
- Compared with Termite, AODV and FF algorithm the suggested algorithm is high that is greater than in mobile sink node.
- The efficiencies of energy is high compared with various algorithms
- The network lifetime of the suggested algorithm is increased compared with wireless sensors.

B. Genetic Algorithms and Engineering design:

This paper represents the fixed approach to antenna system map-reading contain the DDA and the GD algorithm. The algorithm planned in this scheme is from the Grade Diffusion algorithm through target of replace fewer antenna node that are in effective have useless battery and of reuse the most number of routing paths. These optimizations will ultimately enhance the WSN existence and decrease antenna nodes stand-in cost.

Genetic algorithm used in must representation clear explanation to your problem as a genome or chromosome. The genetic algorithm then creates a people of solution and apply inherent operator such as alteration and intersect to change the solution in arrange to locate the best one.

This arrangement outlines some of the fundamentals of genetic algorithms. The three most important aspects of using inherent algorithms are: (1) definition of the intent role, (2) definition and implementation of the inherent demonstration, and (3) definition and performance of the inherent operator. The generic genetic algorithm should work reasonably well. Further than that you can try many special variations to recover presentation, find out the multiple optimal geniuses - if they exist, or parallelize the algorithms. The long-term value presentation improvement of computational system has ended them beautiful for some type of optimization.

C. Grade diffusion algorithm

The Grade Diffusion (GD) algorithm is in 2012 to improve the LD-ACO for wireless sensor networks. The Grade Diffusion algorithm not only creates the routing for both sensor nodes but also recognize a set of national nodes to decrease the diffusion data. Each antenna node can select a sensor node from the place of national nodes after its evaluation table lacks a node able to perform the dispatch. The GD algorithm can also record some information regarding the data relay. Then a sensor node can select a node with a lighter loading or more accessible power than the additional nodes to perform the extra transmit operation. That is the GD algorithm updates the routing path in real time and the event information is thus send to the sink node quickly and correctly. Whether the Direct Diffusion or the Grade diffusion algorithm is applied the grade generates packages or interested query packet should be broadcast. Then sensor nodes transfer the event information to the sink node according to the algorithm when suitable events occur.

D. Directed diffusion for wireless sensor networking

In this paper Directed diffusion the most important goal of the DD algorithm is to reduce the data relay transmission counts for power management. DD algorithm several elements are using for diffusion algorithms: gradients, interests, data messages. An important meaning is a doubt or a cross-examination transmission protocol.

Consists of several essential data is name using attribute value pairs a sense charge is distributed all through the antenna arrangement as an importance for name information this diffusion sets up gradient within the system calculated to represent events establish flow towards the originator of benefit along various paths sensor network reinforce one or a small number of these paths.

An intelligence task is distributed all through the antenna network as an importance for name of data. This distribution set positive gradient inside the network planned to represent events information same the importance. Especially aggrades route state formed in every node to receive an importance. The grade direction is set toward nearest node from which importance is traditional. Events start flow towards the originator of benefit beside several grade paths. The sensor network reinforces one or a small number of these paths.

E. A Fault management protocol for low energy and efficient wireless sensor networks:

Fault management protocols for WSN are primarily used for three architectures: centralized architecture, distributed architecture, hierarchical architecture. The advantages of the centralized architecture are that it has a simple network structure, and has a higher accuracy in terms of fault management; drawback is that the management node has high resource. Hierarchical architecture uses middle-level

management nodes, each management node is responsible for some regional nodes, and upload the information to higher-level nodes, each management region is independent some hierarchical management.

This paper combines the distributed architecture and hierarchical architecture, introduces a new management device, which can locate the failure node and analyze the failure. Based on this new architecture, we propose LPS-FMP (Low Power the Speed-the Fault Management Protocol), a fault management protocol which can respond quickly to abnormal failures.

III. DIFFUSION UPDATEALGORITHM (DUAL)

Cisco's EIGRP routing protocol is used **D**iffusing **U**pdate **Al**gorithm for ensuring that a given route, it is recalculated globally whenever it might cause a routing loop and the full name of the algorithm is DUAL. EIGRP is depends on routing within an independent system and DUAL is give responds for routing topology and dynamically change routing tables of the router automatically. EIGRP uses a possibility condition to ensure that only loop-free routes are ever selected. The feasibility condition is conservative when condition is true, no loops can occur, but the condition might under some circumstances decline total routes to a destination although some are loop-free. When no feasible route to a destination is available, DUAL algorithm invokes Diffusing Computation to ensure that all traces of the problematic route are eliminated from the network. At which point the normal Bellman Ford algorithm is used to improve a new route.

OPERATION

DUAL uses three separate tables for the route calculation. These tables are created using information exchanged between the EIGRP routers. The information is different than that exchanged by link-state routing protocols. In EIGRP, the information exchanged includes the routes, the "metric" or cost of each route, and the information required to form a neighbor relationship (such as number, timers, and K values). The three tables and their functions in detail are as follows.

Routing table having maximum route(s) to a destination and these routes are the successors from topology table. DUAL calculate the data expected from other routers in topology table and calculates the primary (successor) and secondary (feasible successor) routes. The primary path is typical path with least metric to attain destination, and the unnecessary path is with the second lowest cost and there may be various successors and several possible successors. Both successors and possible successors are maintained in the topology table, but only the successors are added to the routing table and used to route packets for a route to become a feasible successor, its RD must be smaller than the FD of the successor. If this possibility condition is met, there is no way that adding this route to the routing table could cause a loop.

The possible successors are additional to routing table when every successor routes to destination fail. If there is no possible successor in if all the successor routes to a destination fail, the possible successor becomes successor and topology table, a query process is initiated to look for a new route.

Neighbor table is having information on further directly with connected routers and separate table exist for every sustain protocol (IP, IPX, etc.). Every entry corresponds to a neighbor with description of network interface and address. In addition, a timer is initialized to generate the periodic detection of whether connection is alive. This is complete through "Hello" packets. If a "Hello" packet is not received from a neighbor for a particular time period, the router is implicitly down and deleted from neighbor table.

Topology table includes metric (cost information) of every route to several destinations within the autonomous system. This information is received from neighboring routers contained in the Neighbor table. The primary (successor) and secondary (feasible successor) routes to a destination will be denoted with information in topology table with other things every entry in the topology table contains the following:

"FD (Feasible Distance)":The consideration metric of a route to a destination within the autonomous system.

"RD (Reported Distance)": The metric to a destination as present by a neighboring router. RD is used to calculate the FD, and to conclude that if the route meets the "feasibility condition".

Route Status: A route is noticeable that it is either "active" or "passive". "Passive" routes are stable and can be useful for data transmission. "Active" routes are being recalculated, and/or not available.

SYSTEM ARCHITECTURE

In this Period, I have designed the Overall Architecture of the project that shows the workflow of the entire proposed system.

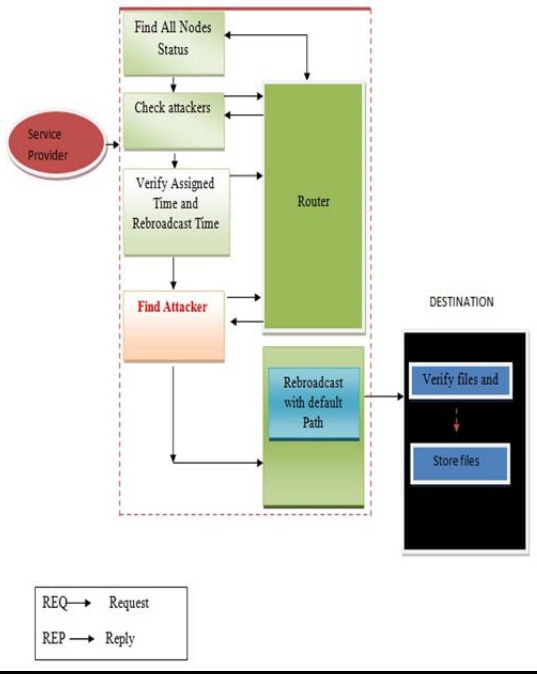

Fig 1 - System Architecture

Several latest algorithms are future for the map-reading problem in WSN.

The map-reading mechanism cover full interested in kindness the natural features of WSNs down through the design requirements with application. The charge of maintain route in WSNs is not trivial since power limitations and unexpected change in node position. Break down root repeated and random topological changes. To reduce power expenditure map-reading technique future in the literature for WSNs occupy some well known routing procedure as well as procedure special to WSNs. Clustering and data aggregation, in-network processing data-centric methods and deferent node role assignment be employed.

Nearly the entire of the map-reading protocol can be classified according to the system construction as at location-based hierarchical. Additionally these protocols can be classed into query based negotiation based multipath based coherent based and Quos base depending on the procedure operation. In at networks all nodes play the same role while hierarchical protocols aim at clustering the nodes so that collect head can do some aggregation and decrease of data in arrange to save power location based protocols operate.

The location in order transmits information to the desired region rather than the whole system. The last group includes map-reading approach that is based on the procedure function which varies according to the approach used in the protocol. In this project we explore these map reading techniques in WSNs that have been industrial in current being and extend a classification for these protocol.

SIMULATION

In these networks uses 31 nodes in simulation tests and these can be arranged in the NS2 simulator. Dimension geography of X and Y axis is 1200X1200. Here the minimum hop-count among nodes is given by using the distance between dual nodes. In a network various node pairs are selected randomly, based on each likely distance between node pair. Every node pair has different paths these may be traced by the protocol. In the network to reach the one hop neighbor we utilize all nodes. The one hop neighbor has some forwarding candidates and these can be cache by the sender using MAC interception for receiving packets. To reach the destination, the protocol uses the routing table for several possible paths. Here candidate list is maintained by the terminal. The NS2 simulation is done and we have analyzed Throughput, delay and packet delivery ratio for the flow taken. A simulation of the diffusion update algorithm as described in the experiment was designed based on 3-D space using 100 x 100 x 100 units, and the scale of the coordinate axis for each dimension was set to at 0 to 100. The transmission range of the nodes was set to 15 units. The sensors were distributed uniformly over space. There are three sensor nodes randomly distributed in 10 ×10×10 space, and the Euclidean distance is at least 2 units between any two sensor nodes. Therefore, there are 3000 sensor nodes in the 3-D wireless sensor network simulator, and the center node is the sink node. The data packages were exchanged between random source/destination pairs with 90 000 event data packages. In our simulations, the energy of each sensor node was set to 3600 Ws that is the actual available energy. Each sensor consumed 1.6 Ws when it conducts a completed data transformation (Rx + Tx). In the GA algorithm, the population size was 20; the crossover rate was 50%; and the mutation rate was 2%. The DUAL, FNR and GD algorithms were implemented.

The active nodes mean that the sensor node has enough energy to transfer data to other nodes, but some sensor nodes can be deleted from the active nodes list if their routing tables do not have a sensor node that can be used as a relay node, or if they are not in the routing table of any other sensor nodes.

The DUAL algorithm 3000 sensor nodes available but FNR and GD algorithms have 2931 and 256 sensor nodes respectively. This new algorithm enhances the number of active nodes by 9.1 and 11.2 times, respectively. The DUAL algorithm has the most active sensor nodes compared with the FNR and GD algorithms because the algorithm can replace the sensor nodes after the number of nonfunctioning nodes exceeds the threshold, by using the GA algorithm.

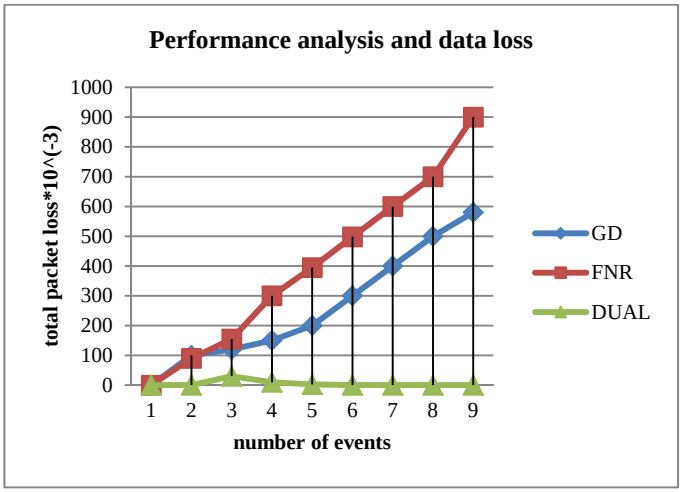

Fig. 2. Performance analysis and data loss

Fig. 2 compares the total data loss using the DUAL algorithm to the total data loss using the FNR and GD algorithms. In this simulation, event data was destroyed and recorded into the loss count if the data had already been relayed over 20 times. Moreover, sensor nodes might detect the same event when an event appeared and transfer it to the sink node in this simulation setting. Hence, the total data loss might exceed threshold events. Therefore, sensor nodes can detect more events and transfer them to the sink node if the WSN lifetime is increased.

In Fig. 2, the DUAL algorithm exhibits smaller data losses because the algorithm can replace fewer sensor nodes and reuse more routing paths if the number of sensor nodes that are nonfunctioning exceeds the threshold. After the simulation, the DUAL algorithm had only suffered 11,025 data losses, but the FNR and GD algorithm had suffered 912 462 and 913 449 data losses. This new algorithm can reduce data loss by 98.8% compared to the traditional algorithms.

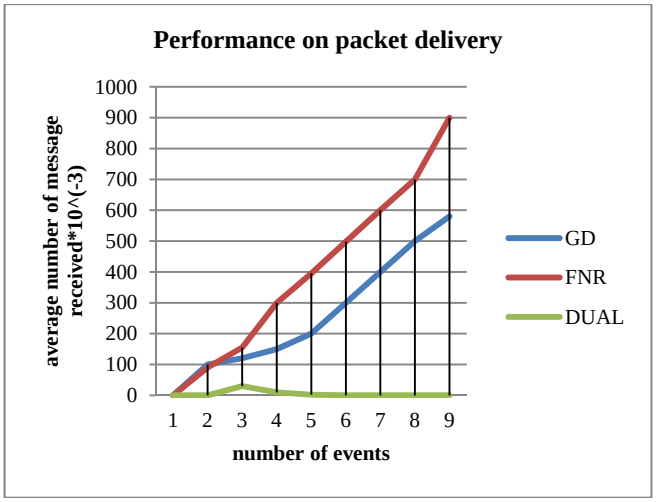

Fig. 3. Performance on packet delivery

Fig. 3 compares the average energy consumption of a WSN managed using the DUAL algorithm to the average energy consumption using the FNR and GD algorithms. The FNR and GD algorithms allow the WSN to consume more energy after 8,000 events because the inside nodes re energy-depleted, but the outside nodes continue to attempt to transfer event data to the sink node through the inside nodes until they are also energy-depleted. After 90 000 events, the FNR and GD algorithm-managed WSNs had consumed 3495.17 Ws and 3298.29 Ws, respectively.

The proposed algorithm increases the WSN lifetime by - replacing some of the sensor nodes that are not functioning. In addition to enhancing the active nodes and reducing the data losses, the DUAL algorithm reduces the relayed energy consumption by reducing the number of data relayed, as the replaced sensor nodes are usually used the most. After 90,000 events, using the proposed algorithm, the WSN had consumed only 2407.68 Ws, and, compared to using the DD and GD algorithms, exhibited a reduction in energy consumption of 31.1% and 27%, respectively.

After that, we experiment different node densities in our simulation environment to compare the average energy consumption. The simulate result is shown in Table I. We can find that the DUAL algorithm has the least average energy consumption in all case, and it can save 31.73% energy at most in Table I. Hence, the DUAL algorithm has the best energy saving performance no matter under any node densities.

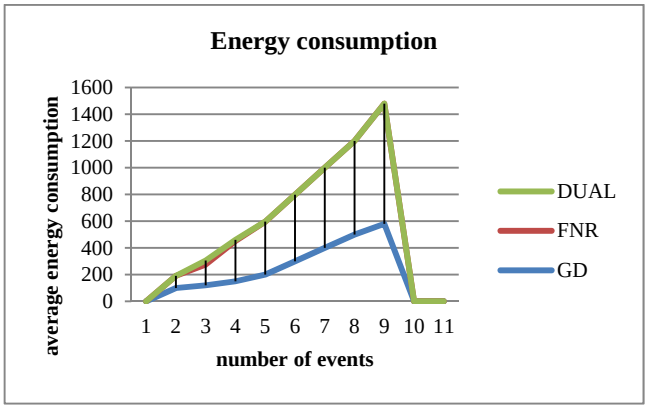

Fig. 4. Energy consumption

The average number of messages that reach the sink node when each algorithm manages the network is compared in Fig. 4. Using the FNR and GD algorithms, the sink node can receive no messages after 8000 events because all of the inside nodes are energy-depleted, and the WSN lifetime is ended. This proposed algorithm replaces energy-depleted sensor nodes to increase the WSN lifetime. Therefore, the average number of messages received using this algorithm is higher than when using the other algorithms.

By using this algorithm, the sensor nodes are not only replaced, but the replacement cost is reduced, and more routing paths are reused, hence total number of sensor nodes recovered.

CONCLUSION

The process in real wireless sensor networking system is identifying simple path for sending data to sink node from all nodes. In this process first it searches for sink node where it is available and select on path from starting node to sink node. If fault node is occur then it takes time for receiving data by sink node at this time searching starts form another path and fault node is recover and it increases life time of node in between the process of searching new path. This process is repeated until complete recover of all nodes and proposed DUAL algorithm is increase the more number of active nodes. At the end of procedure it completely recovers all nodes and identify simple path for sending data to sink node. In this algorithm, it is not only restore the sensor nodes but also decreasing the most routing paths and replacement paths, increasing life time of wireless sensor network.

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