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Advance fault Node Recovery algorithm used for WSN

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ABSTRACT: A wireless sensor network equipped with hundreds or thousands of tiny sensors for sensing, computing and communication devices such as short-range communication devices over wireless channels distributed over a large area. The main goal of the WSN is to collect data from the environment and send it to a sink node. But due to environmental conditions, battery source limited life span and aging the node doesn't working known as faulty node. This reduces the life span of the deployed network. In the previous approaches two algorithms were considered namely Grade Diffusion algorithm and Direct Diffusion algorithm. In the current approach, a route discovery approach is proposed which reduces amount of power consumption and number of nodes becoming obsolete (dead) will be less as compared to Grade Diffusion algorithm. The proposed algorithm will also determine set of nodes known as "grades" which has two values namely 0 or 1. Each node will become 1 if battery is greater than threshold otherwise it will be 0. This process of finding the set of nodes whose battery power is less than threshold is called Fault Node Determination. The node will be replaced with new nodes of same node id this process is called Fault Node Recovery. The node recovery takes the set of nodes from the chromosome map which has failed and replaces them with new one with the same node ID.

Keywords: WSN, GRADE DIFUSION, Architecture FNRA

I. INTRODUCTION

A remote sensor system frequently contains hundreds or a huge number of sensor hubs outfitted with detecting, processing, and specialized gadgets, for example, short-extend specialized gadgets over remote channels. These hubs may be appropriated over an expansive zone; e.g., WSNs can do range observing for some wonder of hobby. In such an application, the primary objective of the WSN is to gather information from nature and send it to a sink hub. In the past methodologies two calculations were considered specifically Grade Diffusion calculation and Direct Diffusion calculation. In the Grade Diffusion calculation the source hub will show the RREQ bundles to every one of its neighbors and afterward the neighbors will telecast it its neighbors and the procedure rehashes until the RREQ parcel is gotten by the destination hub. In this way such a tremendous transmission of information will devour parcel of force and abatement the battery life by which the hubs in the system will turn into no more useful.

The Directed Diffusion calculation conquers the detriments of Grade Diffusion calculation by television the neighbors to just first neighbor set. After that hubs are grabbed taking into account bounce tally or principles and the measure of RREQ trade is diminished thus measure of force needed is less when contrasted with Grade Diffusion. However issue still continues as the quantity of courses found expands the battery force abatements and hub gets to be out of date sooner.

II. SYSTEM ARCHITECTURE

The system architecture of the implementation is as shown in the fig1. The nodes are deployed bounded within the area limits.

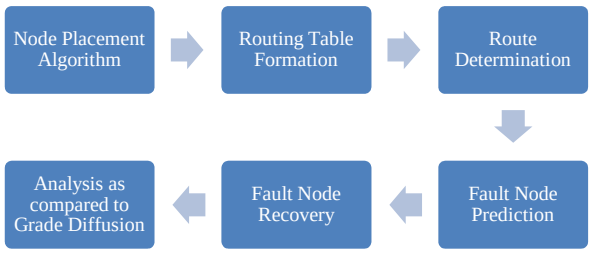

Fig .1. Architecture of FNRA.

(i) Node Deployment Algorithm. This calculation is in charge of arrangement of hubs in a specific region. This will position the hubs in the given zone.

(ii) Routing Table Formation. This is the calculation which is utilized to frame directing tables for each of the hubs. The directing table will contain data about different hubs in the system as far as hub id and separation of every hub w. r. t different hubs in the system.
(iii) Route Determination. This is the procedure which includes deciding the course from the source hub to destination hub with the guide of utilizing the control bundles and the course must be found in a manner that battery utilization is diminished and general system lifetime is additionally expanded.
(iv) Node Failure Detection. This is the procedure in which the hub's whose battery force is beneath than certain limit is resolved.
(v) Node Recovery. This is the procedure by which the hubs whose battery force is beneath limit are resolved and supplanted with the new hubs yet with same hub ID.

II. EXISTING SYSTEM

Now days all the researchers are using grade diffusion algorithm with genetic algorithm. The key concept of grade diffusion algorithm is assigning of two grades (0 & 1) to different node which are taking participate in route formation. The node whose power is greater than some predefined threshold power are known as active or alive node, nodes whose power is below than threshold power is known as dead node. So nodes are dead can't take participate in future route mapping. Hence in order to recover these nodes we have to go for very complex process. It will go for trial & error method for this route mapping & detecting faulty node. Hence it consumes lot of power, lot of processing time this is harmful to communication system. Along with this, it is failed to survive alive nodes while communication so it produces lots of dead nodes. Number of packets is to be loosed in 1 sec.

It uses data flow diagram, implementation diagrams, and algorithm also.

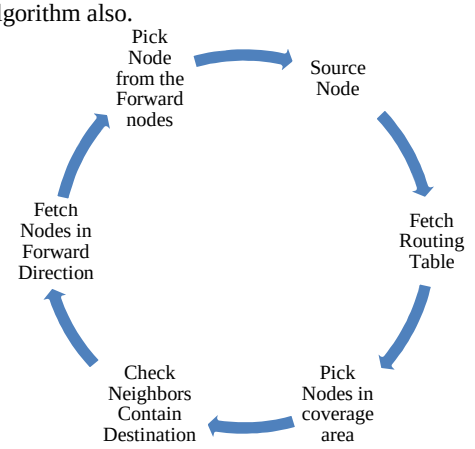

Fig. 2. Implementation of Grade Diffusion algorithm.

III. DESIGN DETAIL of FNRA

The design process of our project is totally dependent on three parameters & they are as follows:-
Grade Diffusion In grade diffusion every nodes are assigned in a sequence manner & then it is forwarded to network. **Source Routing** The main function of this is to find the route between source & destination. **Route Discovery** by sending a packet of information on either side of source node it will find the shortest path between source & destination.

1.1 Node Deployment In the first step of my project, it will ask for number nodes are to be required for deployment. In the 2nd step it will ask for physical separation in meters. Lastly it will ask for unique power for every node. Now the help given data from user it will draw or design a table in to the data base. Including all the information**.**

1.2 Routing Table Formation The fundamental concept of this module is to create the possible route between source & destination. It will operate on node id, with their positions. In this module facility has given to user create the topology; once topology was created we have to insert the values into the topology. Then only we can see contain of that topology.

1.3 Route Discoveries this algorithm is useful in discovering the shortest path between source & destination node. The working of all these nodes is totally dependent on threshold power. If a node having higher threshold power then it is in route & if node is not having threshold power then it is not the member. Any node can take part in route at once only because after participation it will lose it power. This algorithm is responsible to discover a shortest route as that of others without affecting power & minimum number of packet loss at minimum speed of processing.

1.4 Node Failure Detection & Recovery at the timing of routing a path between source & destination some of the nodes will take part, remaining will not take part. So the nodes which are taking part in to the route discovery will lose their power & considered as faulty node. Hence these faulty nodes are not used in future routing if any. Due to this system fails; to overcome from these problems we have to re assign the desired amount of power. My algorithm is used to minimize the number of hops, & produces a large set of alive nodes & minimum number dead nodes. This node recovery is used to recover the entire faulty node. By reinserting the values in to the topology we can re construct our faulty nodes.

IV. RESULTS

In this part we will observe the comparison of grade diffusion algorithm with the fault node recovery algorithm. We used following parameters to conclude.

Table 1: Comparison of packet loss.

Number of Packets Lost for Grade Diffusion Based Routing	
Iteration Number	Packet Loss For Grade Diffusion
1	600
2	6000
3	7000
4	7000
5	7000
5	7000
7	7280
8	7000
9	6000
This is the Packet Loss information for Fault Node Algorithm	
Number of Packets Lost for Fault Node Based Routing	
Iteration Number	Packet Loss For Fault Node
1	100
2	1000
3	1000
4	1000
5	1000
5	1000
7	1040
8	1000
9	1000

Table 2. Comparison of route discovery time.

Route Discovery Time in ms for Grade Diffusion Based Routing	
Iteration Number	Time Algo1
1	246
2	3411
3	2852
4	2453
5	5057
6	2831
7	2613
8	3204
9	6460
This is the Time information for Fault Node Algorithm	
Route Discovery Time in ms Using Fault Node Routing	
Iteration Number	Time Algo2
1	162
2	369
3	248
4	207
5	287
6	354
7	228
8	255
9	469

Table 3: Comparison of number of hops.

Number of Hops for Grade Diffusion Based Routing	
Iteration Number	Number of Hops For Grade Diffusion
1	85
2	85
3	85
4	85
5	72
5	72
7	72
8	72
9	72
10	88
11	128
This is the Hops information for Fault Node Algorithm	
Number of Hops for Fault Node Based Routing	
Iteration Number	Packet Loss For Fault Node
1	12
2	12
3	12
4	8
5	6
5	6
7	6
8	7
9	6
10	7
11	12

Table 4: Comparison of power consumption.

Power Consumption in mw for Grade Diffusion Algorithm	
Iteration Number	Power Algo1
1	15.8412458368964
2	15.8412458368964
3	15.8412458368964
4	15.8412458368964
5	12.6877813717523
6	12.6877813717523
7	12.6877813717523
8	12.6877813717523
9	12.6877813717523
10	15.7090983932816
11	24.0860738801895
This is the Power information for Fault Node Based Algorithm	
Power Consumption in mw for Fault Node Routing	
Iteration Number	Power Algo2
1	1.70532069434314
2	1.70532069434314
3	1.70532069434314
4	0.9556894164707
5	0.649984461192067
6	0.644752148289515
7	0.649984461192067
8	0.91859444338078
9	0.649984461192067
10	0.773883804291362
11	1.51965768375303

Table 5: Comparison of energy consumption.

Energy Consumption in mJ for Grade Diffusion Algorithm

Iteration Number	Energy Algo1
1	1922.31989088751
2	1922.31989088751
3	1922.31989088751
4	1922.31989088751
5	1597.43730514942
6	1597.43730514942
7	1597.43730514942
8	1597.43730514942
9	1597.43730514942
10	2133.87640059325
11	3519.37248869938

This is the Energy information for Fault Node Routing Algorithm

Energy Consumption in mJ for Fault Node Recovery Routi...

Iteration Number	Energy Algo2
1	137.841995766062
2	137.841995766062
3	137.841995766062
4	82.9328021227261
5	57.4972526643093
6	57.4972526643093
7	57.4972526643093
8	67.0801281083609
9	57.4972526643093
10	72.5662018573853
11	148.418648119966

Table 6: Comparison of dead nodes.

Number of Dead Nodes for Grade Diffusion Based Routing

Iteration Number	Dead Nodes For Grade Diffusion
1	1
2	1
3	25
4	19
5	19
6	19
7	19
8	19
9	24
10	40

This is the Dead Nodes information for Fault Node Algorithm

Number of Dead Nodes for Fault Node Based Routing

Iteration Number	Dead Nodes For Fault Node
1	1
2	1
3	6
4	4
5	4
6	4
7	5
8	4
9	5
10	10

Table 7:Comparison of dead nodes.

Number of Alive Nodes for Grade Diffusion Based Routing

Iteration Number	Alive Nodes For Grade Diffusion
1	49
2	49
3	25
4	31
5	31
6	31
7	31
8	31
9	26
10	10

This is the Alive Nodes information for Fault Node Algorithm

Number of Alive Nodes for Fault Node Based Routing

Iteration Number	Alive Nodes For Fault Node
1	49
2	49
3	44
4	46
5	46
6	46
7	45
8	46
9	45
10	40

Graphs.

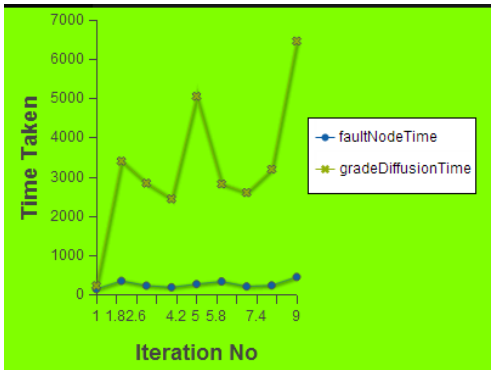

Fig. 3. Graph of processing time.

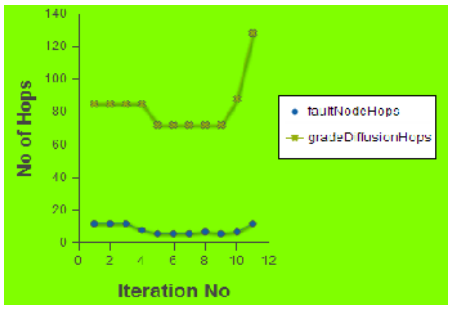

Fig. 4. Graph of no of hops.

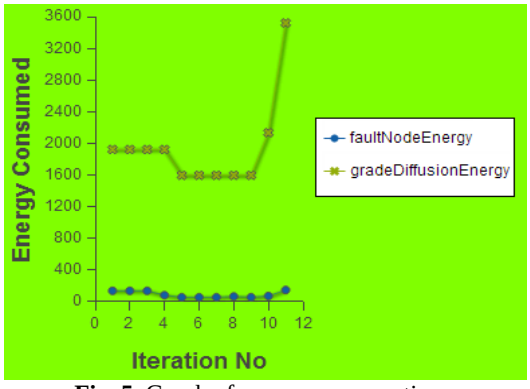

Fig. 5. Graph of energy consumption .

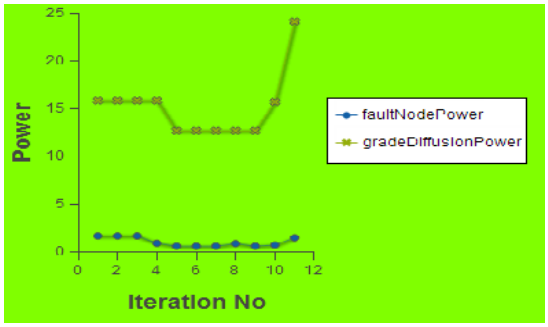

Fig. 6. Graph of power consumption

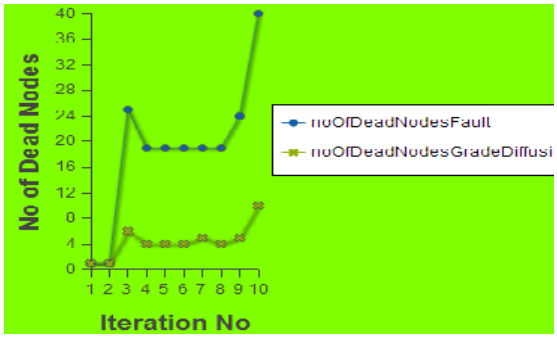

Fig. 7. Graph of dead node.

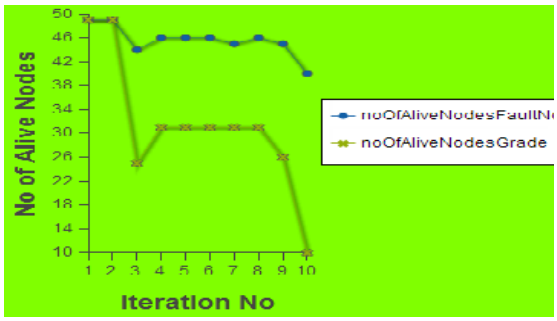

Fig. 8. Graph of alive node.

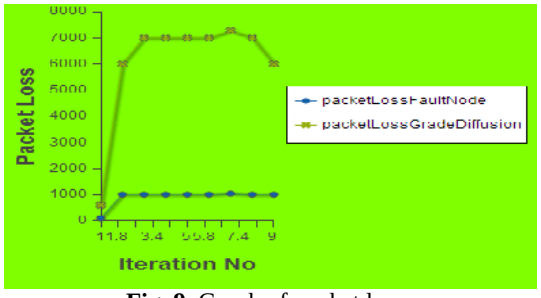

Fig. 9. Graph of packet loss

V. CONCLUSION

To overcome faulty nodes problems above algorithm was introduced. We conclude from above parameters that Advance Fault Node Recovery Algorithm is best suited for recover faulty node in wireless sensor networks.

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