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RESEARCH ARTICLE

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ANALYSIS AND IMPROVEMENT ENERGY AWARE ROUTING FOR LOW ENERGY NODE IN WIRELESS SENSOR NETWORKS

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ABSTRACT: In the field of wireless networking there is another form of networking which is called as wireless sensor network. A type of wireless networking which is comprised on number of numerous sensors and they are interlinked or connected with each other for performing the same function collectively or cooperatively for the sake of checking and balancing the environmental factors. This type of networking is called as Wireless sensor networking. In this paper based on literature survey the author identified many network effective problem .Low energy node also one network effective problems. When data transfer on network then due to Low energy node packets (data) lost is increase and performance of network decreased. So to avoid low energy node problem the author proposed low energy node detection and replacement algorithm. The author will implement existing & proposed algorithm using ns-2 simulator.

Keywords: Wireless Sensor Network, AODV, DSR, DSDV,NS-2.

INTRODUCTION

All Wireless Sensor Networks have emerged as an important new area in wireless technology. In the near future, the wireless sensor networks are expected to consists of thousands of inexpensive nodes, each having sensing capability with limited computational and communication power [1] , [2] and [3] which enable us to deploy a large-scale sensor network. Wireless sensor nodes have emerged as a result of of a software architecture that bridges the gap between raw hardware capabilities and a useful system.

recent advances in low-power digital and analog circuitry, low-power RF design and sensor technology. Sensor networks are distinct from traditional computing domains. [10],[13]Their Design assumes being embedded in common environments, instead of dedicated ones. As these devices are deployed in large numbers, they will need the ability to assist each other to communicate data back to a centralized collection point.[11] A critical step towards achieving this goal of cooperative mini device is the design

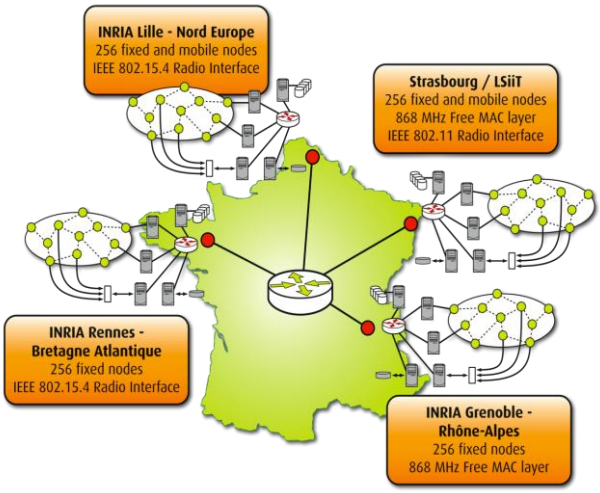

Fig 1 Wireless Sensor Network Architecture

The design of WSN is influenced by many challenging factors. They are following:-

- **Node deployment:** Node deployment in WSN is application dependent and affects the performance of the routing protocol. [15]The deployment can be either deterministic or randomized. In deterministic deployment, the sensors are manually placed and data is routed through pre-determined paths. However, in random node deployment, the sensor nodes are scattered randomly creating an infrastructure in an ad hoc manner.
- **Energy consumption without losing accuracy:[16]** In a multihop WSN each node plays a dual role as data sender and data router. The malfunctioning of some sensor nodes due to power failure can cause significant topological changes and may need rerouting of packets and reorganization of network.
- **Data Reporting Model:** [17] Data sensing and reporting in WSN is dependent on the application and the time criticality of the data reporting. Data reporting can be categorized as either time-driven (continuous), event-driven, query-driven, The routing protocol is highly influenced by the data reporting model with regard to energy consumption and route stability.
- **Node/Link Heterogeneity:** In [4] many studies, all sensor nodes were assumed to be homogeneous, i.e., having equal capacity in terms of computation, communication, and power. However, depending on the application a sensor node can have different role or capability. The existence of heterogeneous set of sensors raises many technical issues related to data routing.
- **Fault Tolerance:** [18] Nodes may fail due to power failure, physical damage etc. This may require actively adjusting transmit powers and rerouting packets through regions of the network where more energy is available.
- **Network Dynamics:** Routing messages from or to moving nodes is more challenging since route stability becomes an important issue, in addition to energy, bandwidth etc.
- **Transmission Media:** [9]In a multi-hop sensor network, communicating nodes are linked by a wireless medium. The traditional problems associated with a wireless channel (e.g., fading, high error rate) may also affect the operation of the sensor network.
- **Coverage:** [10] In WSN, each sensor node obtains a certain view of the environment. Hence area coverage is also an important design parameter in WSN.
- **Data Aggregation:** [12] Since sensor nodes may generate significant redundant data, similar packets from multiple nodes can be aggregated so that the number of transmissions is reduced.
- **Data aggregation:** Data [6] aggregation is the combination of data from different sources according to a certain aggregation function. Quality of Service: In some applications, data should be delivered within a certain period of time from the moment it is sensed; otherwise the data will be useless. Therefore bounded latency for data delivery is another condition for time-constrained applications.

PROBLEM FORMULATION

We work with a large sensor area network with[7] dense sensors , there are some nodes that has to bear the heavy traffic load then over the time such sensor goes weak and they start losing the packet. [8] This packet loss is bearable up to some threshold value, but as the packet loss exceed this [19],[20] level it disturb the whole network and now any kind of data transfer over this node is not reliable. Because of this there is the requirement of some such approach that can resolve this error.

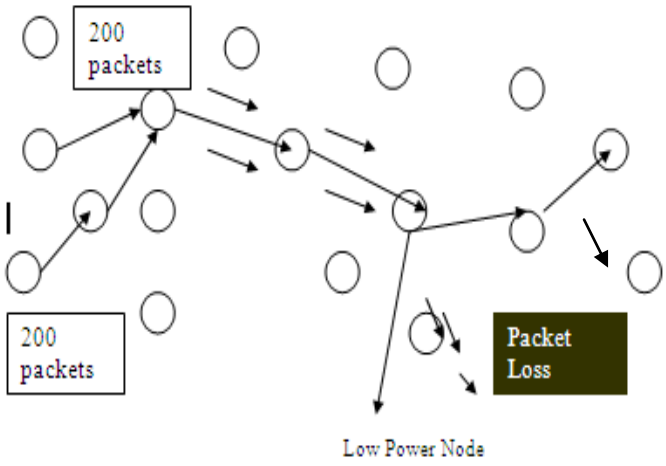

Fig. 2 Heavy traffic load on low energy node

If this node is the center node or some other maximum load nodes, the problem is very critical. It starts losing useful information. So [14] we need to use some approach to overcome this problem.

Existing Algorithm

/*S is the source node and D is the destination node, the network defined is dynamic*/

{

1. Find all the nodes that occur in path between source and the destination. These nodes are representing by Node List (1 to N).
2. for i=1 to N
3. {
4. If (Packet Loss Node List (i)) > MAX_THRESHOLD_VALUE)
5. {
6. then Packet Loss Node = low energy node.
7. {

}}}

PROPOSED WORK

We are representing reliable data transfer over the network in case of a Wireless Sensor Network. To solve this problem the proposed system identify the low power nodes, because in sensor area network it is not possible to track all the nodes always

The proposed work is divided in two phases

1. Locating the Low Energy Node
2. Define it in the list of Block Nodes/Critical Node
3. Find alternate node such that efficiency of system should not degrade and transfer the packets of low energy node through this node.

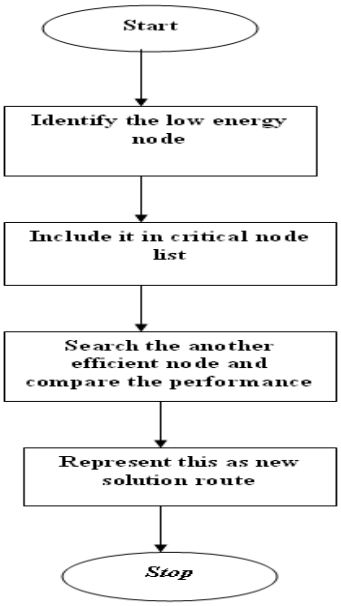

Fig. 3 flow diagram

Now the proposed system will be represented as an approach or the framework to resolve the above said problem. These steps (Fig. 3.2) are implemented by using NS2.

The proposed algorithm we will use for solve the problem of low power nodes in wireless sensor network. In this algorithm we follow the following step:-

Proposed Algorithm(S,D)

/*S is the source node and D is the destination node, the network defined is dynamic*/

{

1. Find all the nodes that occur in path between source and the destination. These nodes are representing by Node List(1 to N).
2. for i=1 to N

{

```
3.      if(PacketLoss(NodeList(i))> MAX_THRESHOLD_VALUE)
4.      {
5.      find the list of compromising nodes for Node NodeList(i). This list is represented by Compromising(1 to K)
6.      Select any of the compromising node from this list and use it in place of node dropping the data packet
NodeList(i)=Rand(Compromising,1,k)
7.      if K= 0  /* if there is no compromising node*/
8.      {
9.      NodeList(i)=Include New Node
10.     }
11.     }
12.     }
}
```

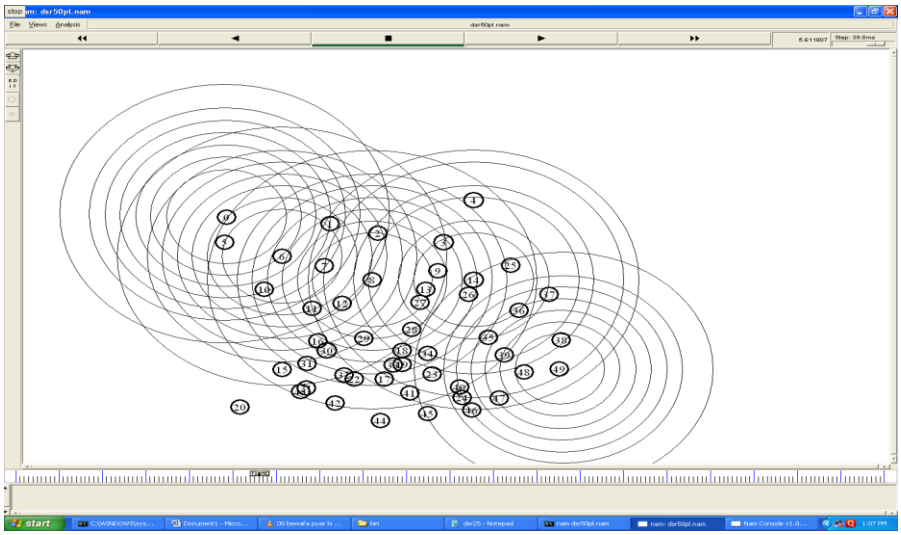

Fig. 4 WSN with 50 nodes

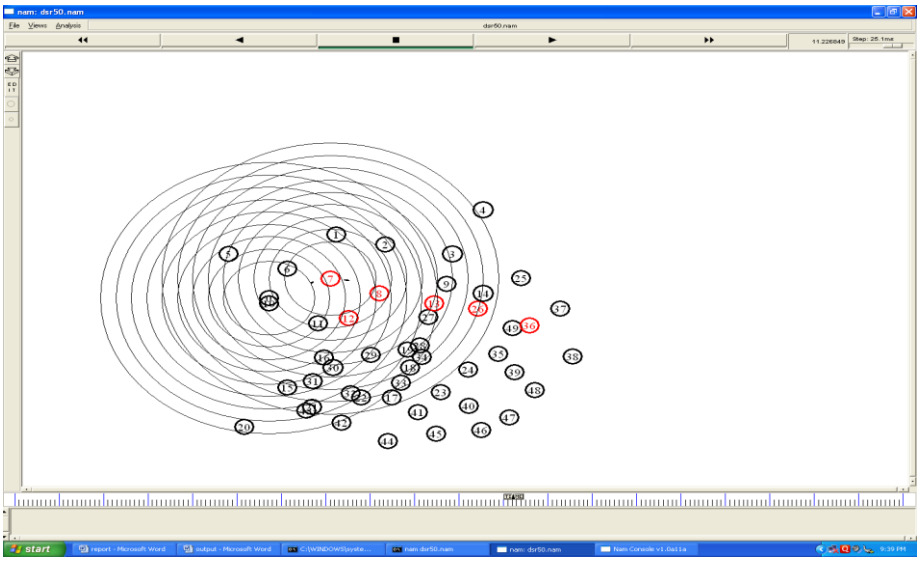

Fig. 5 locating of low energy nodes

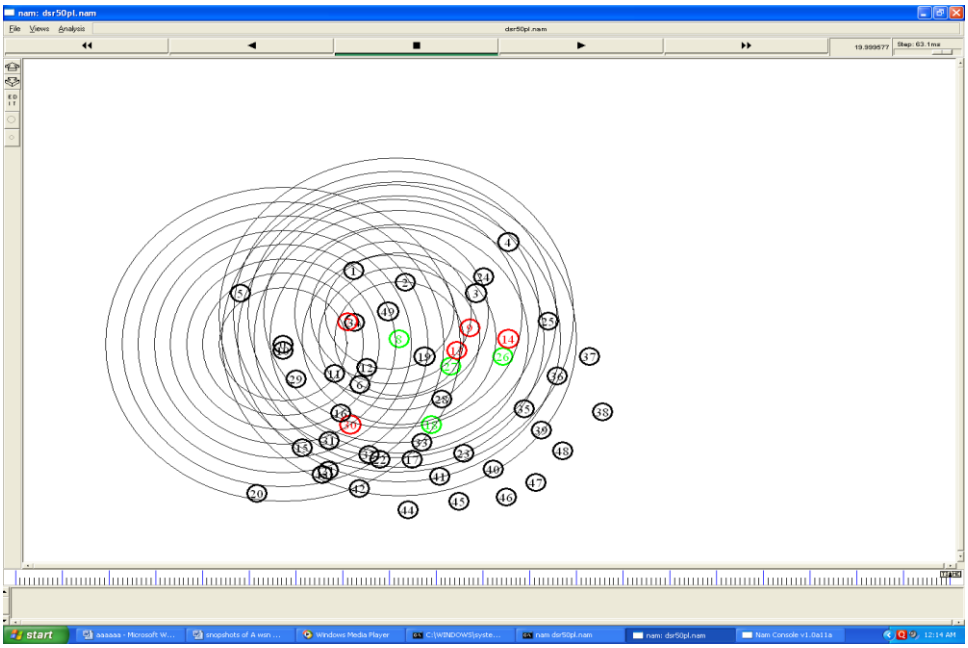

Fig. 6 replacement of low energy nodes

RESULT

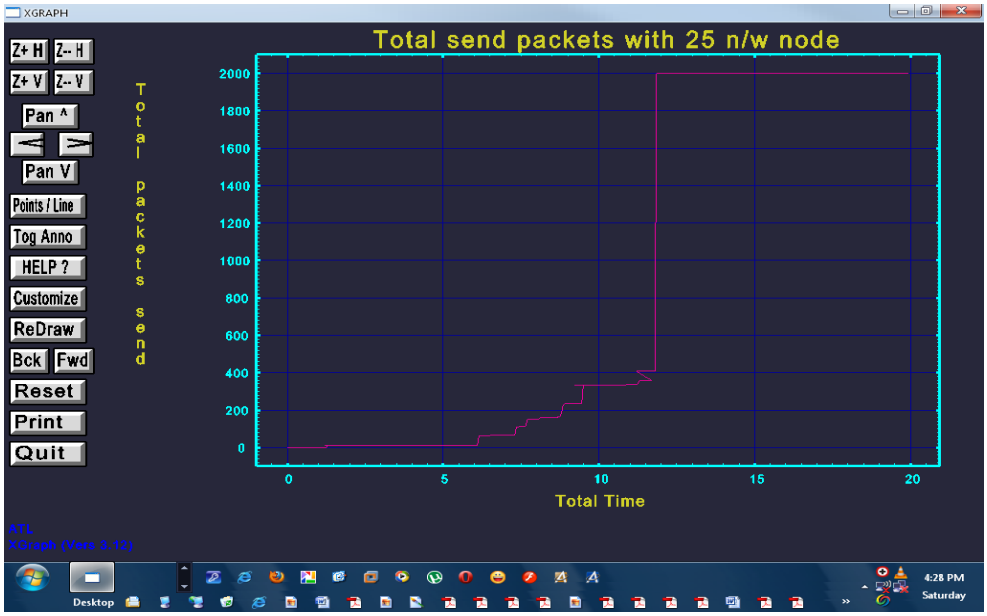

Fig.7 Total no of packets send in existing & proposed system.

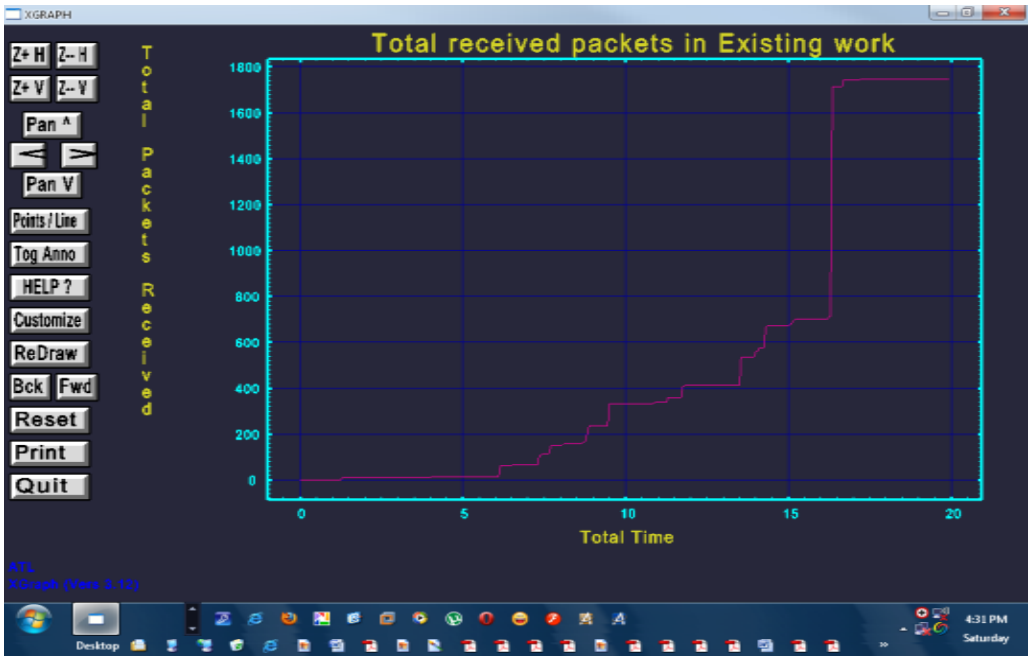

Fig 8 packets received in existing work

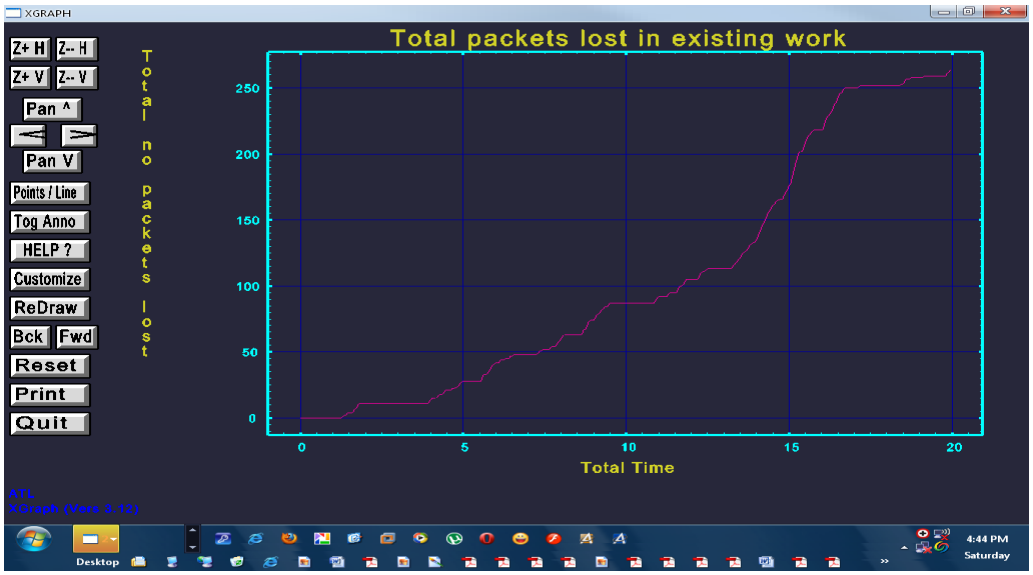

Fig 9 Packets lost in Existing work

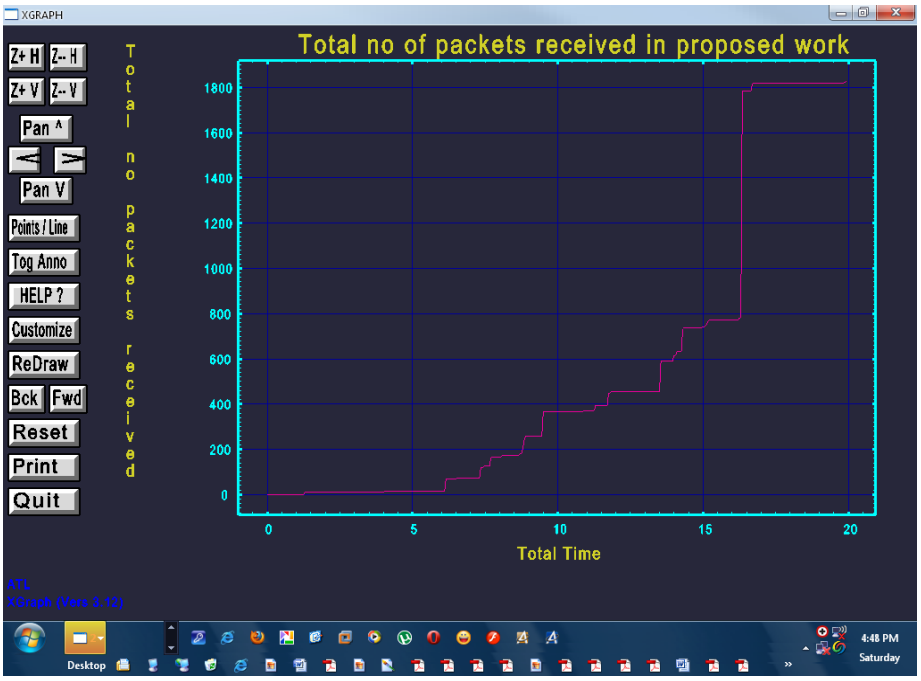

Fig 10 Packets received in proposed work

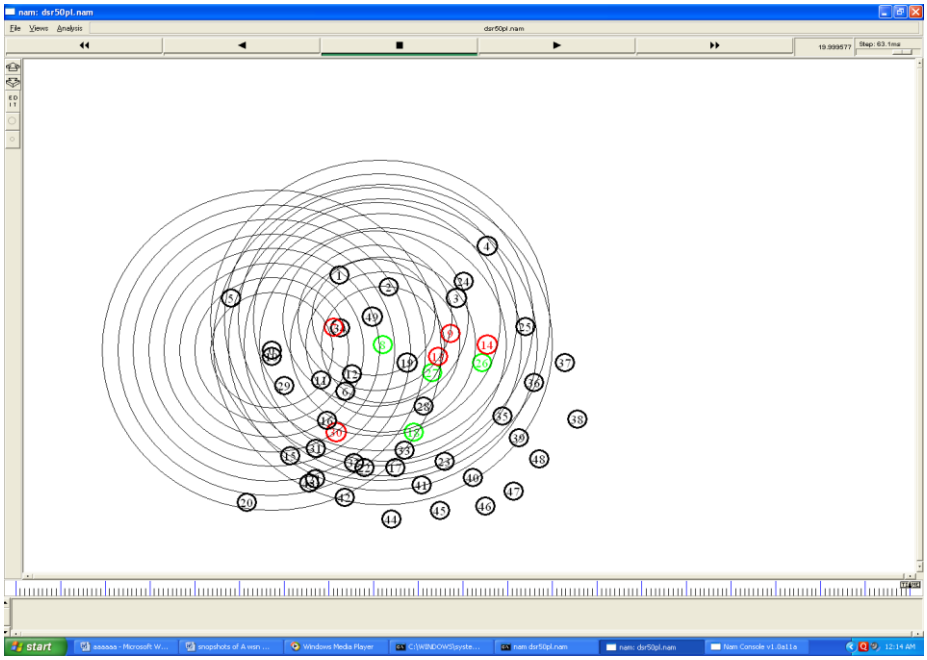

Figure 11 replacing all low energy nodes

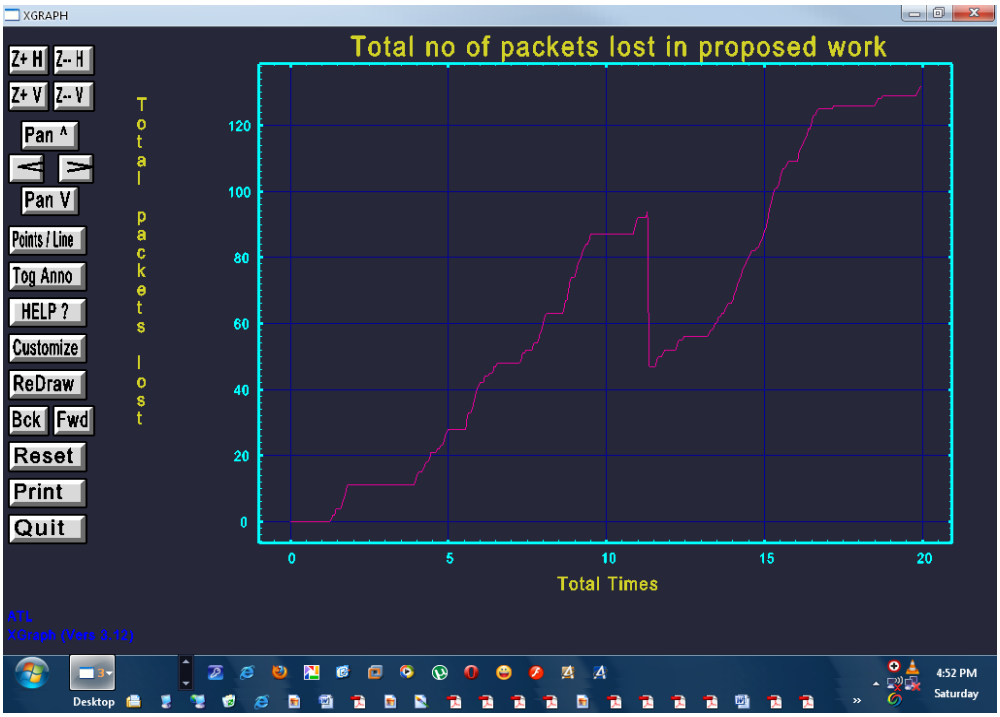

Fig 12 Packets lost in proposed work.

Fig 13 packets received in existing work and proposed work.

Fig 14 Packets lost in existing and proposed work

Table 1: The comparison between existing work and proposed work

Metrics	Existing work	Proposed work
Total no of packets transmitted	2000	2000
Total no of packets received	1750	1810
Total no of packets lost	250	190

In table 1 shown the comparison between existing work and proposed work .Based on metrics on transmitted packets, received packets and lost packets respectively .So based on the comparison between existing and proposed worked the author solved the problem of low energy node in wireless sensor network. Based on all parameters proposed work show best result instead of existing work.

CONCLUSION

The proposed algorithm is implemented using NS-2 .The author detected the weak sensor node over the network. By using proposed algorithm the author will make node replacement low energy node to high energy nodes. The algorithm provides better solution for handling the packet loss due to low energy nodes (weak nodes) over the network.

FUTURE WORK

In this proposed work we defined the whole concept respective to a specific topological representation network. We can enhance our work by using different topological areas. We can also extend it to different kind of network like manet, wimax etc.

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