Lossy Node Elimination Based on Link Stability Algorithm in Wireless Sensor Network

U.Palani, D.Saravanan, R.Parthiban, S.Usharani

Abstract-: ***A Wireless Sensor Network (WSN) is a specialized network significantly used for monitoring the desired locations. The major problem of the WSN is the loss of data at the instant of transmitting data between the base station and the sensor node. In order to reduce the data loss, link stability algorithm is used, in which an effective path for transmitting data to the destined node is selected. The lossy nodes are listed under black hole and the other nodes involved in the routing and hence the overall throughput delay minimization is improved in the network.***

Index terms: Link stability algorithm, lossy node elimination scheme.

I. INTRODUCTION

Nowadays, wireless sensors are widely used for many fields for sensing and monitoring purpose. Examples of wireless sensor used fields are temperature monitoring, structural health monitoring [12], bridge health monitoring and tsunami monitoring, and agricultural area and disaster area monitoring [11]. The working process of WSN is involved with the combination of many sensor nodes forming a network and is actively participating in sensing and collecting the data from the desired environment; also, the collected data are sent to the sink where the data are aggregated and transmitted to the base station [8]. In the wireless sensor network the major important problem is data loss [10]. The major causes of the data loss are failure of sensor node, data congestion [6] during data transmission and poor quality of the channel. The issue of data loss has been affects the security and reliability of WSN. Our proposed scheme use the lossy node elimination scheme based on link stability algorithm used to reduce the data loss in wireless sensor network. Link stability algorithm has measure of stability of link. According to Renu Sakthidasan et al [1], link stability is determined based on the three step process, which are: 1.Estimation of neighborhood stability based on Energy; 2.Estimation of neighborhood stability based on link loss and 3.Manipulation of lifetime of mobile nodes. The lossy nodes are detected and are listed under black hole category and so that the all other nodes are participated in the routing of the alert message which is to stop the communication with the black hole listed nodes. Moreover, the sensor nodes are dynamically arranged and which can be easily selected in this scheme [9]. The main focuses of the paper are: to increase the throughput level; to minimize the delay; to increase the reliability and to provide the low energy consumption.

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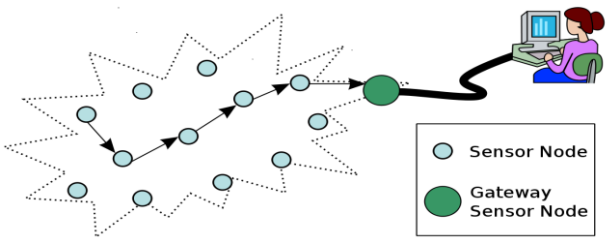

Figure 1 Data transmission from source to destination

II. PROBLEM STATEMENT

The WSN is used to create the smart environment with abundant sensors transmitting data using multi-hop as in figure 1, in which a problem of traffic is occurring at the time of data transmission in the same time. Traffic is the important reason for the occurrence of congestion, which is a major issue in the network. During congestion, data loss has taken place and no packets are delivered to the destination. This is the identified problem and it is addressed in this paper by using the proposed scheme of link stability based data loss reduction. The challenges to this problem are increased delay, increased energy consumption, space and time complexities.

III. RELATED WORKS

Morell Antoni et al [2] elaborately discussed the principal components involved in the data aggregation of the WSN with the strategies of Eigen-vectors.

Shivkumar S. Jawaligi G. S. Biradar [3] discussed the simulation-based study of load-based data collection in the harsh environment using mobile sink.

X. Xu, R. Ansari, and A. Khokhar [4], discussed the compressive sensing and proposed the Adaptive Hierarchical Data Aggregation with signal sparsity considerations. Priyamvadha, R. K. Aarthi Mohanasundaram [5] discussed the passive measurement of data transmission in distributed network environment using multicast routing techniques with the limitation is of increasing delay.

IV. PROPOSED SCHEME

In the proposed scheme, lossy node elimination is achieved based on link st ability algorithm. In order to achieve it, four modules: Network; Routing: Loss and

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Analysis modules are framed out. The sensor nodes are dynamically set up in the network module. An effective routing path is selected in the routing module. The percentage of data loss is determined in the loss module. The performance of the network is analyzed in the analysis module.

A. Network Module: Network module is used to setup the network.in this module to be select how many sensor nodes are used to communicate in these network as in figure 2. In this scheme, sensor nodes are dynamically setup nodes in the network that has been easily reach the destination.

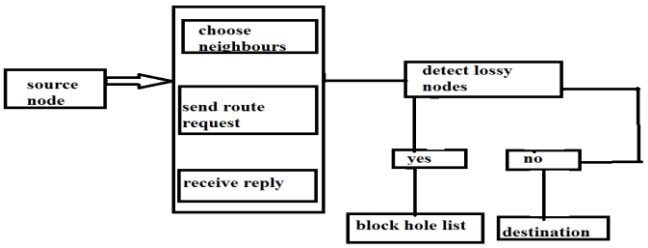

Figure 2 Network Module

B. Routing Module: In this routing module, the node trust is used. The proposed technique can be incorporated in any routing protocol with the chosen ad-hoc on-demand vector routing (AODV). In AODV protocol, route selection is done and shortest route is established during route establishment techniques and also route maintenance is done. Using of ad-hoc on-demand distance vector routing protocol, an easiest path to transmit the data is selected. Since the AODV routing protocol [7] is a reactive or on-demand routing protocol, a route between two nodes will be determined only when there is data to be transmitted. Each node's routing table only contains the next hop to a particular destination, so the information on the route to be traversed by a packet is distributed along all the nodes on the path.

C. Loss Module: In Loss module, percentage of data loss of every node is measured based on link stability algorithm. Also, it has to select an effective path to transmit the data. In the link stability algorithm, the effective path is selected based on three steps: 1.Estimation of neighborhood stability based on energy, in which step source node send the dummy packet of the nearest neighbors to check the neighbor energy level who is first to reply source of the selected neighbor. 2. Estimation of neighbor stability based on link loss, in which the selected nearest neighborhood for estimating the stability of link based on link loss in which node to highest packet loss and this node is consider as block hole list. 3. Manipulation of lifetime of mobile node and then finally mobile node lifetime is checked. This is the best way to select effective path to transmit the data and the process is continuously performed till the reach of the destination; then the data is transmitted by the source node to the destination. After transmission of data, block hole list is released for other purpose.

D. Analysis Module: In this phase, the proposed system has been fully evaluated by means of its performance such as its total numbers of packets delivered, number of packets transmitted etc. The analysis module is the most important in analyzing the performance of the entire proposed scheme. The performance of data loss is measured and the throughput level and the delay level are checked with the measurement of loss percentage of each node.

V.CONCLUSION

Data loss is the major issue in the data collection of WSN. This paper significantly focused on the link stability based data loss reduction scheme in order to eliminate the lossy node in wireless sensor network. Link stability is achieved using three ways, which are measuring the neighbor stability of the link, measuring the neighbor link loss and then manipulating the life time of mobile node. This technique is used to select the effective path to transmit the data with the usage of this algorithm to reduce the data loss.

In the proposed scheme, the nodes are arranged dynamically, which provided the easiest way to reach the destination. This improved algorithm is efficient with increased throughput level, minimized delay level, increased reliability and minimum energy consumption.

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