Enhanced the Routing Efficiency of Wireless Sensor Network Using Improved STR Protocol

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ABSTRACT
In current scenario ZigBee wireless sensor network suffered from distribution of power and route cost for the selection of root tree node and communicating node. The utilization of power factor in sensor network is limited due to this reason most of authors used the process of energy consumption for the increasing the life of network. In the process of improvement of ZTR protocol one protocol are available such are called as STR protocol. The STR protocol design on the principle of AODV and tree based routing mode selection based on limited power threshold factor. The research gap between ZTR and STR is sharing of information for the selection of tree node process. During the cluster node selection more power is consumed. Now reduction of this power effect used reference node selection mode for the selection of tree head and data transmission for the communicating node.The proposed method made in two factors one is measurement of power during formation of tree head and in second phase used the process of data for the reference node.

Keywords:-WSN, MWSN, ZTR, STR.

INTRODUCTION

Wireless sensor networks (WSNs) have gained worldwide attention in recent years, particularly with the proliferation in Micro-Electro-Mechanical Systems (MEMS) technology which has facilitated the development of smart sensors [18]. These sensors are small, with limited processing and computing resources, and they are inexpensive com-pared to traditional sensors. These sensor nodes can sense, measure, and gather information from the environment and, based on some local decision process, they can transmit the sensed data to the user.

Smart sensor nodes are low power devices equipped with one or more sensors, a processor, memory, a power supply, a radio, and an actuator. A variety of mechanical, thermal, biological, chemical, optical, and magnetic sensors Smart sensor nodes are low power devices equipped with one or more sensors, a processor, memory, a power supply, a radio, and an actuator [4]. A variety of mechanical, thermal, biological, chemical, optical, and magnetic sensors may be attached to the sensor node to measure properties of the environment. Since the sensor nodes have limited memory and are typically deployed in difficult to-access locations, a

radio is implemented for wireless communication to transfer the data to a base station (e.g., a laptop, a personal handheld device, or an access point to a fixed infrastructure). Battery is the main power source in a sensor node. Secondary power supply that harvests power from the environment such as solar panels may be added to the node depending on the appropriateness of the environment where the sensor will be deployed. Depending on the application and the type of sensors used, actuators may be incorporated in the sensors.

A WSN typically has little or no infrastructure. It consists of a number of sensor nodes (few tens to thousands) working together to monitor a region to obtain data about the environment. There are two types of WSNs: structured and unstructured. An unstructured WSN is one that contains a dense collection of sensor nodes. Sensor nodes may be deployed in an ad hoc manner into the field. Once deployed, the network is left unattended to perform monitoring and reporting functions. In an unstructured WSN, net-work maintenance such as managing connectivity and detecting failures is difficult since there are so many nodes. In a structured WSN, all or some of the sensor nodes are deployed in a pre-planned manner. The advantage of a structured network is that fewer nodes can be deployed with lower network maintenance and management cost. Fewer nodes can be deployed now since nodes are placed at specific locations to provide coverage while ad hoc deployment can have uncovered regions [6].

The rest of paper discuss as in section 2 discuss the Clustering in WSN. In section 3. Discuss the MWSN. in section 4 discuss proposed method. In section 5 discuss experimental result analysis and finally discuss conclusion & future work in section 6.

2. CLUSTERING IN WSN

Clustering has proven to be an effective approach for organizing the network into a connected hierarchy. In this article, we highlight the challenges in clustering a WSN, discuss the design rationale of the different clustering approaches, and classify the pro-posed approaches based on their objectives and design principles. To support data

aggregation through efficient net-work organization, nodes can be partitioned into a number of small groups called clusters [3]. Each cluster has a coordinator, referred to as a cluster head, and a number of member nodes. Clustering results in a two-tier hierarchy in which cluster heads (CHs) form the higher tier while member nodes form the lower tier. Figure illustrates data flow in a clustered net-work. The member nodes report their data to the respective CHs. The CHs aggregate the data and send them to the central base through other CHs. Because CHs often transmit data over longer distances, they lose more energy compared to member nodes. The network may be re-clustered periodical-ly in order to select energy-abundant nodes to serve as CHs, thus distributing the load uniformly on all the nodes [10]. Besides achieving energy efficiency, clustering reduces channel contention and packet collisions, resulting in better network throughput under high load.

Clustering has been shown to improve network lifetime, a primary metric for evaluating the performance of a sensor network. Although there is no unified definition of "network lifetime," as this concept depends on the objective of an application, common definitions include the time until the first/last node in the network depletes its energy and the time until a node is disconnected from the base station. Clustering has been extensively studied in the data process-ing and wired network literatures [7]. The clustering approaches developed in these areas cannot be applied directly to WSNs due to the unique deployment and operational characteristics of these networks. Specifically, WSNs are deployed in an ad hoc manner and have a large number of nodes. The nodes are typically unaware of their locations. Hence, distributed clustering protocols that rely only on neighborhood information are preferred for WSNs (however, most studies in this area still assume that the network topology is known to a centralized controller). Furthermore, nodes in WSNs operate on battery power with limited energy. Hence, the employed cluster-ing approach must have low message overhead. Finally, harsh environmental conditions result in unexpected failures of nodes. Hence, periodic re-clustering is necessary in order to heal disconnected regions and distribute energy consumption across all nodes. Periodic re-clustering is also necessary, as the parameters used for clustering (e.g., the remaining energy, node degree, etc.) are dynamic. The clustering techniques pro-posed for data processing typically consider static parameters, such as the distance between the nodes, and assume that nodes are more reliable [12].

3. MOBILE WIRELESS SENSOR NETWORKS (MWSN)

Information in a mobile wireless sensor network gets invalidated more quickly if all the nodes are moving. In the article, Hu and Evans introduce a localization algorithm dealing with these different characteristics. Their approach builds upon Monte Carlo Localization methods used in robotics to locate a mobile robot. There are at the moment few localization protocols specifically designed for mobile wireless sensors networks. This section presents the work of dierent groups that aim at enabling localization and supporting mobility in a sensor network or in a mobile ad-hoc network. Apart from the experiments with the Monte Carlo Localization, there are at the moment few localization protocols specifically designed with mobile wireless sensors in mind.

Mobility introduces a real-time component to the localization algorithms. Wireless sensor networks are usually considered delay-tolerant. To the contrary, mobility makes a sensor network delay intolerant: information gathering and location calculation should happen in a timely manner, dependent on the speed of both the nodes and the anchors [11]. This means that in a mobile wireless sensor network, methods relying on global knowledge such as calculating the number of hops or distances to all the anchors in the network are to be avoided. Similarly, a mobile node cannot really benefit from iterative localization techniques where the location estimation is refined whenever a node receives more information from the network.

Besides possible information decay, a localization algorithm deployed in a mobile wireless sensor network should be able to cope with the temporary lack of anchors. In other words, the algorithms should be able to produce a location estimate in such conditions if the application layer has a need for it. In such cases, the location estimation could easily be tagged as uncertain, providing a mean for the application to assess how much the results of the localization algorithm should be trusted [17].

4. PROPOSED ALGORITHM

In this paper improved the shortcut tree routing protocol for ZigBee wireless network. The ZigBee wireless network is well know personal area network for the communication in road traffic, hospital management and many more home appliance function through this network. In ZigBee wireless network basically used ZTR routing protocol. The ZTR routing protocol faced a problem of multiple flat branch scenario for the processing of information. In ZTR routing protocol some basic problem occurred during the selection of communication node. The process of communication composed with multiple nodes. For the purpose of enhancement ZTR protocol come with on demand distance routing protocol and its called shortcut tree routing protocol. The shortcut tree routing protocol is basically based on three architecture for the selection and design of network mode. Shortcut tree routing (STR) that significantly enhances the path efficiency of ZTR by only adding the 1-hop neighbor information. Whereas ZTR only uses tree links connecting the parent and child nodes, STR exploits the neighbor nodes by focusing that there exist the neighbor nodes shortcutting the tree routing path in the mesh topology.

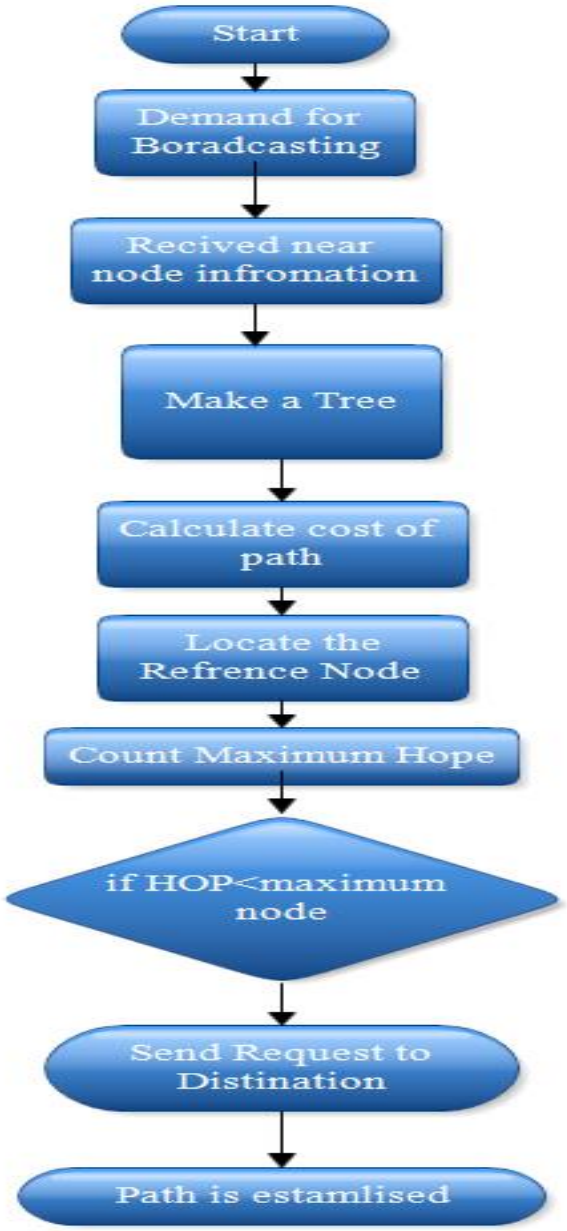

Figure 1: Show the improved proposed model of STR protocol.

WORKING PROCESS OF MODEL

In this section discuss the working process of proposed model in terms of on demand request and path establishment. The path establishment is final destination of proposed algorithm

1. Start: - in this process established the network and propagation model of signal for the purpose of broadcasting
2. Demand for broadcasting:- in STR protocol basically node broadcast the information for neighbors node.
3. Make tree:- in this section on the basis of information broadcast make all tree node for communication
4. Cost:- measure the cost of open free tree node
5. Reference node:- in reference node selection make node as reference node for the master node for the broadcasting of request
6. Hope:- count the maximum hop of tree node along with reference node and total tree node if hop is minimum then send request packet
7. Path: - finally path is established for the communication.

5. EXPERIMENTAL RESULT

Simulation is an experimental process in that process proposed a simulated model for wireless sensor network and put some standard parameter for valuation of result. In our research work perform energy minimization in wireless sensor network. The proposed model of ISTR written in MATLABscript language and scenario of network generated by TCL (tool command language), both function and script command provided by MATLAB simulator. MATLAB well knows research software of wireless network. The evaluation of performance of our proposed methodology in two parameter throughput of network and packet dropping of network.

Parameter	Value	Description
Environment size	100 * 100 ms	Area of simulation
Base station location (x, y)	50,170	
Node types	Mobile node	Relative load due to traffic.
Node speed	30m/s,40m/s,50m/s	Mobility time of node
Packet type	TCP/UDP	Application load
Packet size	500 bytes	Load
Base node	2	
Simulation time	200	Total time
Receiver node	one	Single destination

Table 1: Simulation Parameters.

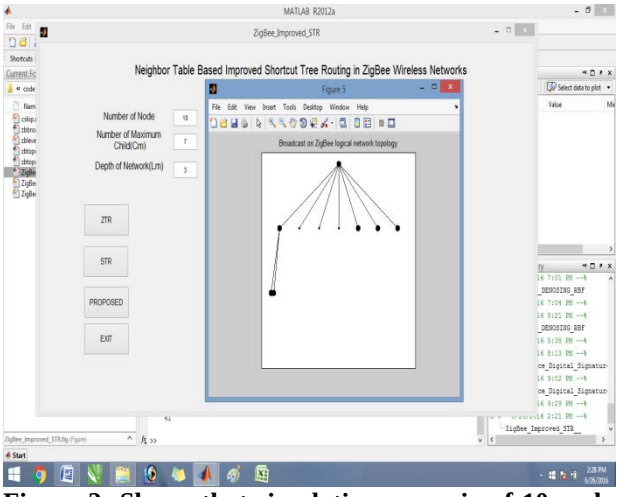

Figure 2: Shows that simulation scenario of 10 nodes for the performance evaluation of ZTR, STR and Proposed.

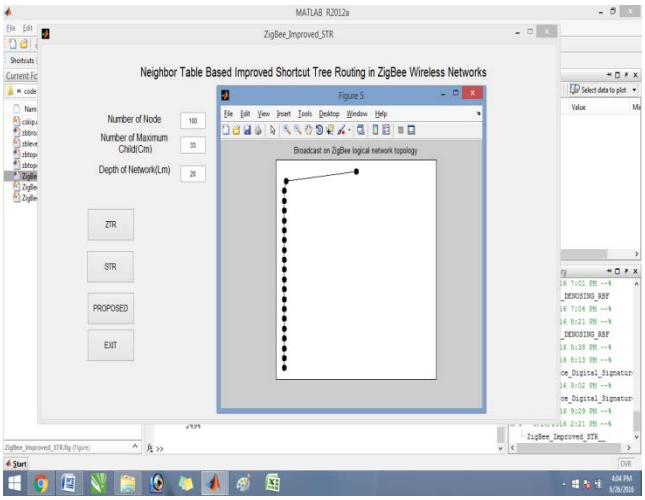

Figure 3: Shows that simulation scenario of 100 nodes for the performance evaluation of ZTR, STR and Proposed.

NODE VALUE	PDR	ROUTING OVERHEAD	END TO END DELAY	HOPCOUNT
10	0.0137	300	0.6678	41
20	0.0635	200	0.4852	127
40	0.1900	200	0.6694	380
70	0.6310	200	0.0105	1262
90	1.9260	100	0.5472	1926
100	2.5040	100	1.1851	2504

Table 2: Shows the comparative evaluation of ZTR method and Node Value.

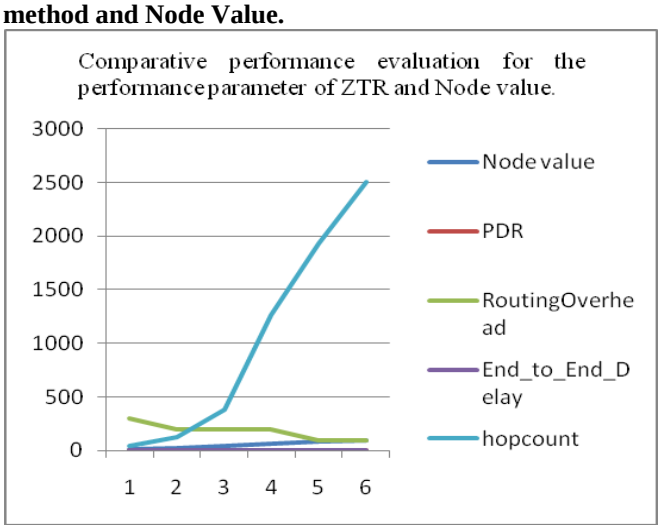

Figure 4: Shows the comparative performance graph of ZTR method with input of node value, number of maximum child and depth of network.

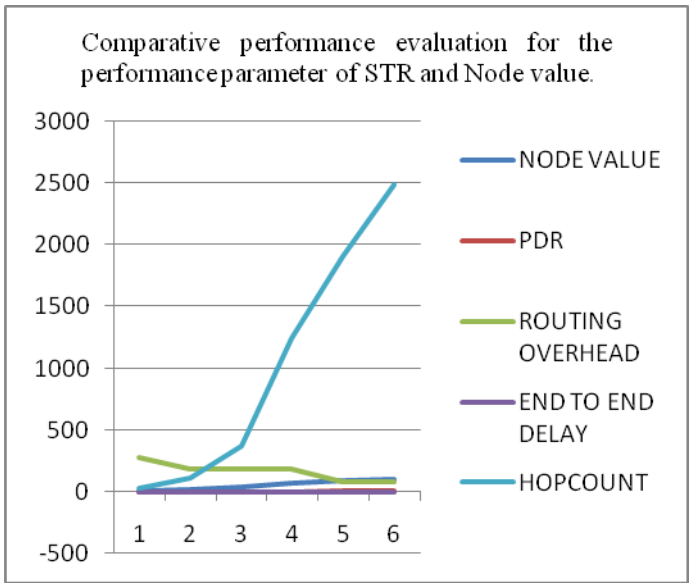

Figure 5: Shows the comparative performance graph of STR method with input of node value, number of maximum child and depth of network.

6. CONCLUSION AND FUTURE WORK

This paper provides minimization of energy consumption and minimization of routing cost for ZigBee wireless sensor network in concern of power consumption and life time of network. The proposed models give a better energy utilization factor for wireless sensor network. The proposed model ISTR implies in two section one is reference node and another node as Tree. The node end request for communication for next node in installed location of tree node. ISTR is a hybrid model of very famous reference node model and STR protocol for energy saving and minimum route cost for communication in wireless sensor network. Basically ISTR work as a route filter, because in modern trend traffic apply by the flooding a power that power is consumed by sensor node. Flooding blocks a provided bandwidth of communication and our network are jam without generation of any interference attack and jamming attack. So we design strong filter for unknown control request power on the time of node mobility. The diversity of network and service oriented traffic in wireless ZigBee sensor network further explored our research work in term of calculation of power node assignment, for the process as base node for controlling a message request of all mobile sensor node in communicating network. Now exploding of this works and optimized the process of reference node allocation and reduces the capacity of memory for the expanding of power allocation.

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