# A Trust based Framework for Fault Tolerant Data Aggregation in Multimedia Wireless Sensor Network

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*Abstract*— A wireless sensor networks placed in random fluctuations which affect the real signal and it is not associated with environment, it is needed to create a complete framework that protects the correctness of the collected information. Here focusing on data aggregation, trust of a node and fault tolerance to decrease the error of the gathered information. Referring the architecture of multilayer aggregation, trust based data collection with fault tolerance is used in order to decrease the error and finally to produce aggregated outcome. By comparing trust values of node, we can evaluate the node whether the node transferring the data or node is fault. Here clustering technique is used to gather the information from the nodes.

***Key words:*** WSN, Framework, Clustering, Aggregation

## I. INTRODUCTION

Wireless Sensor Network facilitates a new technique for sensing and spreading information from various environments, with a centralized area or satellite. A WSN contains of a number of sensors spread across a geographical area, each sensor has wireless communication capacity and intelligence for signal transmission and networking of the data. The structure of WSN are tightly application dependent and many services are also dependent on application semantics**.** There is no single typical WSN application and dependency on applications is higher than in traditional distributed application. The application layer must provide functions that create effective new capabilities for efficient extraction, manipulation, transmission and representation of information derived from sensor data. In recent era WSN research including an overview of the various categories of WSN, a survey of WSN technologies and a discussion of present research prototype and industry applications. We focus on software layer that lies between the operating system and the applications on each side of distributed computer network. The study high lights that it connects software component or enterprise applications. By integrating sensing, signal processing and communication functions a WSN provides a natural platform for information processing.

Military surveillance, home healthcare or assisted living and environmental science are three major application areas for WSN. Revolutionary changes are possible in these areas by using WSN. Mobile wireless data communication which is advances both technology and usage of internet and the success of second generations cellular systems. We can view of truly ubiquitous computing and communication. The role and capabilities of short range data transaction are expected to grow, serving as a complement to traditional large scale communication most of oral communication between human beings occurs at distance of less than 10 meters. Two communicating bodies need to exchange the data as a licensed frequency bandwidth invites the use of developing technologies and deployment of wireless communication nodes.WSN is compatible interms of price portability, usage And ad hoc network for computing and communication devices such as PDA ,mobile phones and other communication devices. The base for building for complex ad hoc networks being started in terms of market acceptance, the realization of a critical growth is certainly positive.

## II. REVIEW OF PREVIOUS WORK

### A. *Problem Definition*

The goal of this project is collecting the data from the sensor nodes .Here we are going to make group of sensor for data aggregation process. In that one node is considered as cluster head. The cluster head selection is based on the residual energy, number of neighbors and the distance from the base station of the nodes. The cluster head collects the data from the nodes the process is called as aggregation. Aggregation reduces the amount of network traffic. It also decreases the energy requirement of the sensor nodes. Here we have aggregator which collects information .We are going to transfer the data in secure way, without any error, i.e., in the sense without any fault.

## III. PROPOSED WORK

In proposed work to achieve requirement of the project different models are used such as source model, trust model in order to increase the speed of computation DFS algorithm is used and it also explains fault tolerance how it occurs and types of faults.

### A. *Source model*

In WSN a source provides the new signal. Based on the spatial propagation characteristic, the source divided in to source without center and with center.

### B. *Trust model*

The trust model consist of a aggregator 'a', three sensor nodes s1,s2,s3 and one target't'. Here aggregator collects data from sensors with self data trust opinion based on temporal correlation and aggregator 'a' determines peer node trust opinion of each sensor using spatial correlation.

DFS Algorithm-It is type of algorithm used for finding tree or graph structure. It is proposed in 19$^{th}$ century .this algorithm uses two parameters time and space. In all computer science theories DFS algorithm is used. DFS algorithm applications are specific.DFS searches various paths but it is depends on depth.

## IV. PERFORMANCE ANALYSIS MODULE

This module performs processing of output result set to compute the various performance metrics required to

 

analyze the performance of flow slice based routing. This module includes following Units

- AWK scripts to compute various performance metrics.
- Plotting graphs for the performance metric to analyze the performance.

Figure shows the Node Deployment Algorithm. The input to this algorithm contains Number of Nodes and Distance between Nodes. The output contains the map of Node ID and Position of Node.

The DFD is also called as bubble chart. It is a simple graphical formalism that can be used to represent a system in terms of the input data to the system, various processing carried out on these data, and the output data is generated by the system.DFS algorithm is used in large geographical area and one cluster head.

### *A. Node Deployment Algorithm*

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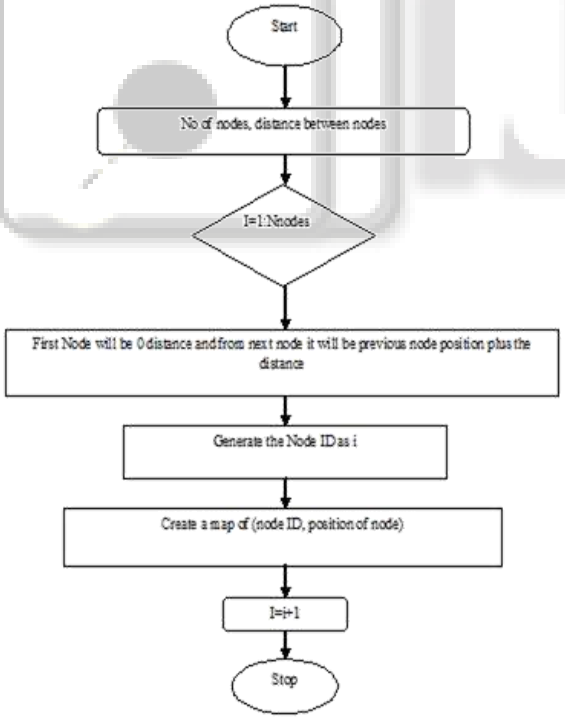


Fig. 1: Node deployment algorithm

- First select the number of nodes and the distance between the nodes.
- Then initialize I=1 for N nodes.
- At the first node is at 0 distance and from next node it will be previous node position plus the distance.
- Next step is to create the node ID.
- Creating the map for node ID and position of node.
- Then increment i value and the steps are repeated for N nodes.

### *B. System Module*

#### *1) Topology Module*

This module involves building Wireless Network topology, topology consisting of mobile nodes, each node working with multiple channels.

#### *2) Network design*

An ad hoc network is a set of autonomous nodes that combines topology without any support of networking infrastructure. An ad hoc network consists of hundreds or thousands of nodes. In ad hoc network communication between the nodes is multi hop with omni direction with limited range of transmission .Here cluster technique uses pre scattered public keys, which includes trust model which is robust or may uses some methods of cryptographic. It follows some key organization protocol for new clustering. A clustering is a popular architectural mechanism for management function.

#### *3) Energy Module*

Energy model used to measure the energy in mobile host. It having initial energy in the node at the initial stage of simulation, this is called as initial energy. It also spends energy for transmit and receive. These are named as transmit power and receive power.

The energy model does not maintain means of communication state and it only maintains the total energy. Please note that the old energy model indeed maintains some radio states, few steps are used to convert them, and they are analyzed by the adaptive fidelity module.

### *C. System architecture*

In this project we are going to use multilayer trustworthy aggregation architecture. It consists of levels starting from zero to n. At the base level sensors are present and it follows aggregation method. First it collects data it transfers to the next upper level. And aggregator collects data and given to the sink node.

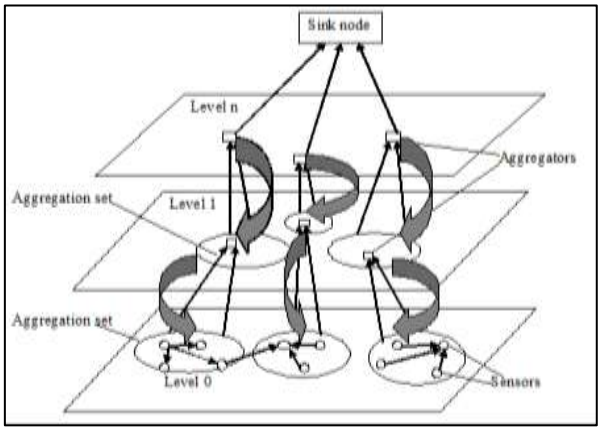


Fig. 2: System architecture

In system architecture consists of sensors, aggregation set, aggregator and sink node. For secure data transmission aggregation process is used in aggregation data is encrypted through some methods. Then collected data is send to the aggregator. In aggregator data is converted to original data. Finally the data is sent to the sink which having higher energy compare to neighbor nodes. Sink node is not movable but cluster head may change.

 

### D. System Design

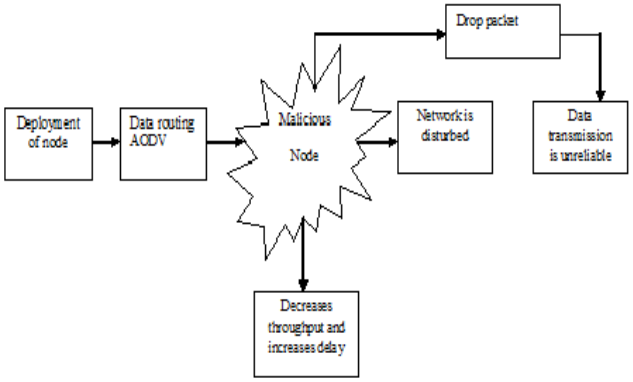


Fig 3:.System Design

System design is the process of defining the components, modules, interfaces, and data for a system to satisfy specified requirements. System development is the process of creating or altering systems, along with the processes, practices, models, and methodologies used to develop them.

### E. Graphs

Graphs are used to define various parameters. In this project parameters like delay, energy and throughput are considered.

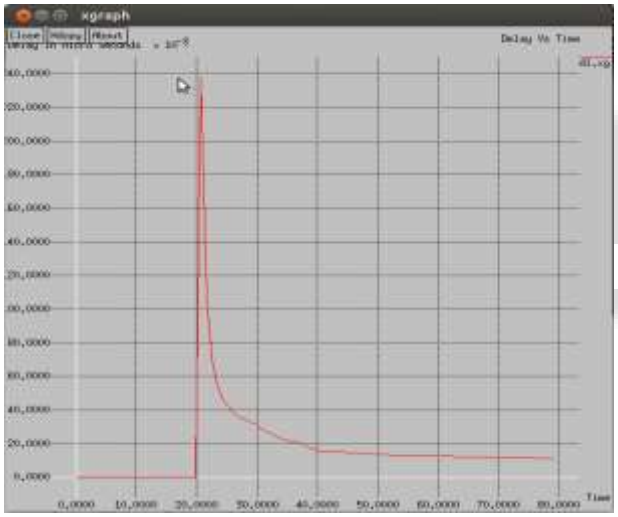


Fig 4: Delay graph

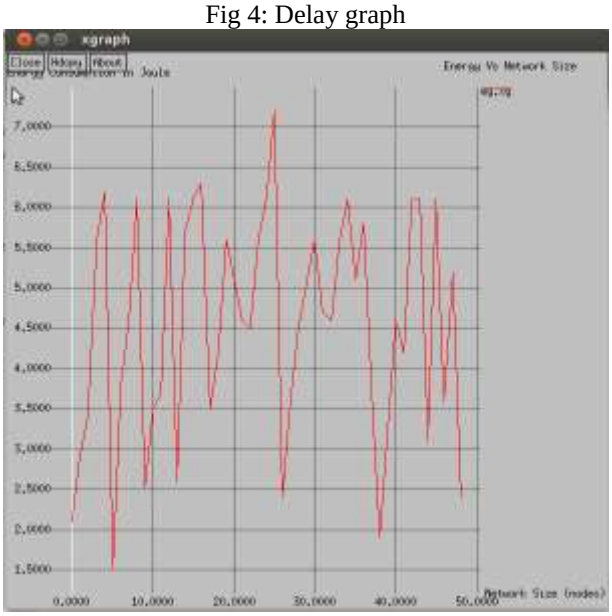


Fig 5: Energy graph

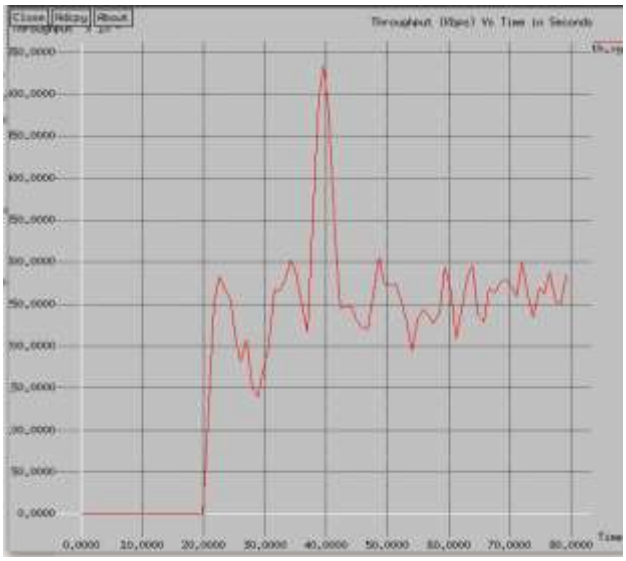


Fig. 6: Throughput graph

## V. Conclusion

We are used various modules, algorithms and flowchart output result set to compute the various performance metrics required to analyze the performance of trust worthiness of nodes. We are deployed fault node, formation of cluster and sink node for data aggregation. This framework can facilitate the functions of trust evaluation, data aggregation, and information checking with less communication overhead and energy consumption. Here comparing the reports from this sensor with those from its neighbors, the aggregator should determine the trustworthiness of this sensor still low and thus reduce the contribution to the aggregation process. Hence, it is light weight and practical. On the other part , in the proposed multilayer trustworthy aggregation architecture, we limit the communication only between the nodes in adjacent levels. Here we develop part of the architecture and we can also increase the levels. This is similar to the tree structure where lower layer children sending the data to the higher levels with confident. The simulation studies and graphs show how efficiently the framework work.

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