A Comparative Study of Distributed Architecture In WSN

Arti Patel[1], Silky Pareyani[2]
[1, 2] Dept of Electronics and Communication
[1, 2] Gyan Ganga College of Technology, Jabalpur MP, India

Abstract- *An emerging class of Wireless Sensor Network (WSN) applications involves the acquisition of large amounts of sensory data from battery powered, low computation and low memory wireless sensor nodes. The topology of the WSNs can vary from a simple star network to an advanced multi-hop wireless mesh network. The propagation technique between the hops of the network can be routing or flooding. In computer science and telecommunications, wireless sensor networks are an active research area with numerous workshops and conferences arranged each year. The aim of this dissertation work is to improve the performance of the network by using the suitable routing algorithm. Assessing the use of asymmetric key generation in general and that of hybrid routing approaches that can discover the secured link, increase the energy efficiency, increase the number of alive nodes and extend the network life time of WSN through the use of the Cluster Head Selection Algorithm to deliver data in a WSN.*

Keywords- Topology, Acquisition, wireless sensor network, routing, flooding.

I. INTRODUCTION

The data gathered from wireless sensor networks is usually saved in the form of numerical data in a central base station (Server). If a centralized architecture is used in a sensor network and the central node fails, then the entire network will collapse, however the reliability of the sensor network can be increased by using distributed control architecture. This architecture uses the concept of packet switching. This architecture has a drawback that there may be a lot of traffic jam via nodes forwarding the packet towards the base station. It leads to a lot of propagation time and energy consumption during the propagation of data. Many protocols were proposed to competently use the optimum path to minimize the propagation time and to extend the data rate of the wireless sensor architecture.

Once wireless sensor architecture is deployed in disaster areas, polluted environments or high radiation region, battery recharge or replacement is impossible for human and wireless sensor architecture works until battery power of the entire sensor node get die. Hence the power consumption by the poor planed routing algorithm needs to be uninvolved. I would like to create an idea which would be successful in this type of situation. This will help to transmit the data through wireless sensor network whenever time management is the primary goal. I want to also give the idea for increasing the transmission rate.

II. WIRELESS SENSOR NETWORKS

A wireless sensor network (WSN) is basically a network where sensors are distributed to monitor physical or environmental conditions such as humidity, temperature, sound, radiation, pressure, etc. and to co-operatively pass their data values through the network to its main location. Today's modern networks are usually bidirectional; they have the ability to control sensor activity. The modern development of wireless sensor networks was originally motivated by military applications such as battlefield surveillance; today such networks are widely used in many industrial, commercial and consumer applications. The wireless sensor network (WSN) is built of nodes from some hundreds to thousands, where each node is connected to one or many sensor nodes. In the network, each such sensor network device has basically several parts: a radio transceiver, an external antenna, an electronic circuit for interfacing with the sensors and a power source, usually a main battery backup or an embedded form of energy harvesting. The sensed data records from all sensors are sent to gateway sensor node or base station from where user or observer can receive data records as shown in figure 1.

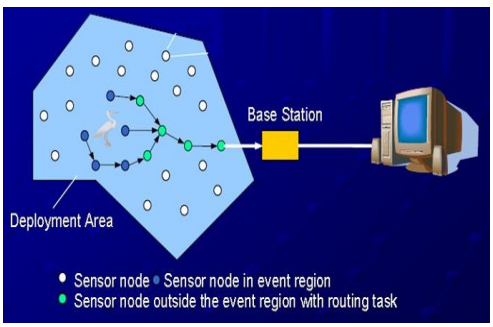

Fig-1 Wireless Sensor Networks [10]

A sensor node might vary in size from that of a one cube feet box to the size of a one cube centimeter box. The cost of sensor nodes is similarly variable, depending on the complexity, application and functionality of the individual sensor nodes. Size and cost limitations on sensor nodes result in corresponding limitations on resources such as computational speed, energy, memory, range and communications bandwidth. The geographical topology of the wireless sensor networks (WSN) can vary from a simple star network to an advanced multi-hop wireless mesh network. The signal propagation technique between the hops of the network can be called as routing.

III. EXISTING ROUTING MODELS IN WSN

The entire existing routing algorithm and data delivery model is based on the various models. Every model have different data delivery algorithms and used for specific purpose. Various routing mechanism is used to design a new routing protocol [9]. Every model has its own advantage and characteristics. Main Types of communication model in wireless sensor network are:

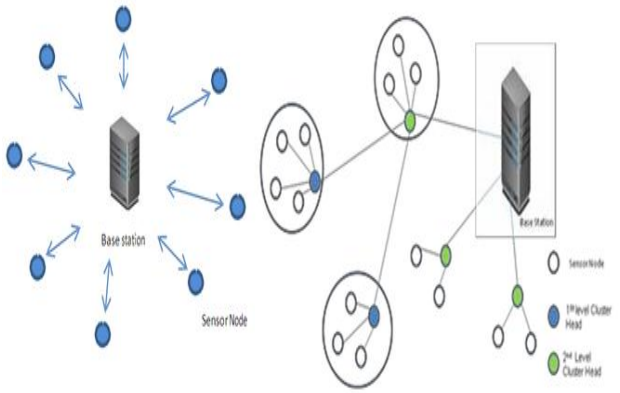

Fig-2 Direct communication and Clustering model of WSN

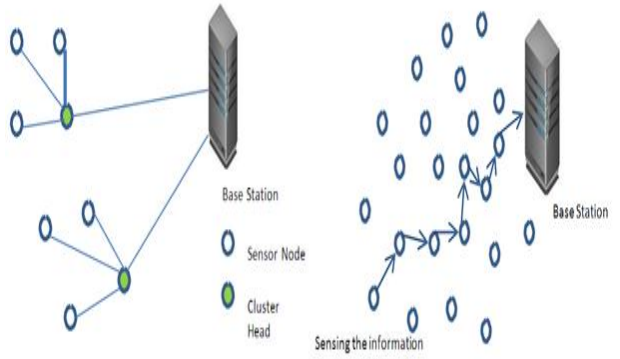

Fig-3 One hop and Multi hop model of WSN

Description

Wireless Sensor Network (WSN) consists of spatially distributed autonomous sensors to monitor physical or environmental conditions such as temperature, sound, Pressure etc. and to cooperatively pass their data through the network to a main location. The more modern networks are bi-directional, also enabling control of sensor activity. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance. In Indian – Pakistan border there is a problem associated with the illegal entries of the terrorists and army of enemy, that's why I have decided to make this dissertation for my country. Today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring and so on.

Directed diffusion is a well know routing algorithm for Wireless Sensor Networks (WSNs) that was designed in 2003. Directed diffusion saves energy by sending data packets hop by hop and by enforcing paths to avoid flooding.

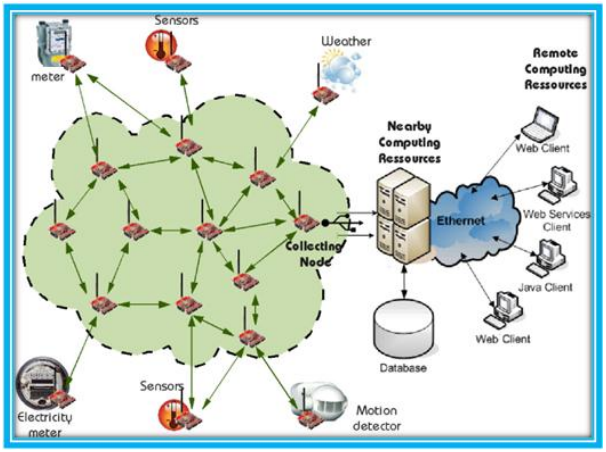

Fig-4 Typical multi-hop wireless sensor network architecture

The main disadvantage of directed diffusion is that it is not aware of the network and nodes status and as a result cannot compare potential paths to find the best or healthier path [1]. As an effort to try to overcome this disadvantage, we propose a network-aware protocol. The proposed protocol collects data about the available paths and uses these data to enforce healthier paths using machine learning. The data collection is done by adding a new stage called data collection stage. In this stage, the protocol designer can determine which parameters to collect then use these parameters in enforcing the best path according to certain criteria. In our implementation of this paradigm, we are collecting total energy on the path, lowest energy level on the path, and hop count [1].

We derive a general formula for the lifetime of wireless sensor networks which holds independently of the underlying network model including network architecture and protocol, data collection initiation, lifetime definition, channel fading characteristics, and energy consumption model. This formula identifies two key parameters at the physical layer that affect the network lifetime: the channel state and the residual energy of sensors [2].

Routing (and forwarding) is a core problem in networks for delivering data from one node to another. Today wireless networks are becoming popular because of their "3 Anys"– Any person, anywhere and anytime. Wireless ad hoc networks are termed as mobile distributed multi hop wireless networks without predetermined topology (preexisting fixed infrastructure) or central control. In this paper, we present a comprehensive review for routing features and techniques in wireless ad hoc networks. For more than a dozen typical existing routing protocols, we compare their properties according to different criteria, and categorize them according to their routing strategies and relationships [3].

IV. COMPARATIVE ANALYSIS

Table 1: Literature Work Comparison

Algorithm used	Kamil Samara	Yunxia Chen	Xukai Zou
Objective	Load Balancing	Lifetime Maximization	Classification of Protocols
Protocols Studied	TMAC	MAC (CSI, REI)	DSDV, CGSR, DSR, AODV, TORA, WRP, DST, ABR, SSA, GSR, FSR, CEDAR, ZRP, ZHLS, HSR
Architecture or Structure	Distributed	SENMA	Ad-Hoc (Flat or Hierarchical)
Channel Used	CC2420	Rayleigh Fading Channel	Wireless Ad Hoc Channel

The aim of this Paper is to improve the performance of the network by using load balancing therefore the improved lifetime will be obtained. Table no.-1 will be very helpful for this purpose. All the nodes carry equal load, so that there is no energy mismatching among them. The measurement may be done by any of the nodes. All the nodes will be dead almost simultaneously. It means the expected wasted energy level is almost zero. Hence the deployment may be done once.

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