An Efficient Scheduling Scheme To Improve The Quality of Service In Wireless Sensor Network

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Abstract- *Wireless sensor networks are mainly deployed to monitor the environmental conditions and to transfer the sensed data to the destination. The environmental conditions are monitored periodically to identify abnormal activities in the environment. The timely detection of environmental changes will protect humankind from various calamities like earthquakes, fire accidents, etc. Thus these sensed data need to be transmitted to the destination within a short period of time only then timely countermeasures can be taken to protect the humankind. These time critical data need to suffer from no delay in the network. But the wireless network is prone to data loss due to the wireless nature and the mobility of the nodes. Thus to avoid the delay and the dropping of the sensed data, the sensed data can be scheduled before transmission. The scheduling can transfer the packets in some order avoiding the packet drop problems and the priority can be given to the packets. So, the time constrained packets can be scheduled to transmit first. This avoids the delay of time sensitive data to be reached in the destination. This paper deals with the various scheduling schemes that can be opted in the wireless network and the pros and cons of using each scheduling scheme is also discussed. The proposed customized priority scheduling scheme improves the quality of service of the sensed data when compared with the other scheduling schemes.*

I. INTRODUCTION

Wireless Sensor Networks (WSNs) can be defined as a self-configured and infrastructure-less wireless network to monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants and to cooperatively pass their data through the network to a main location or sink where the data can be observed and analyzed. A sink or base station acts as an interface between users and the network. One can retrieve required information from the network by injecting queries and gathering results from the sink. Typically, a wireless sensor network contains hundreds of thousands of sensor nodes. The sensor nodes can communicate among themselves using radio signals. A wireless sensor node is equipped with sensing and computing devices, radio transceivers and power components. The individual nodes in a wireless sensor network

- Area monitoring
- Transportation
- Health applications
- Environmental sensing
- Industrial monitoring
- Military applications

II. METHODOLOGY

Scheduling is done based on some parameters. Not all scheduling schemes schedule the data in the same order but based on the different scheduling schemes, the order in which the data is transmitted to the destination also varies. This differentiation between various scheduling schemes is based on the parameter on which it is focusing. The major parameters for scheduling the packets may be based on reliability, delay, jitter, and bandwidth. Delay refers to the time by which the data is postponed or late. For example: in wireless sensor networks, a sensor sensing the changes in the temperature in the industrial environment needs to transmit the data to the controller room within 5 seconds. In this case, if the data is not delivered within the 5 seconds and exceeds the threshold of 5 seconds then the data is said to suffer from delay which is not acceptable because if the temperature exceeds a particular limit there may occur fire accident in the industry due to the explosion of machinery parts. To avoid such fire accidents the temperature data needs to reach the controller room within a limited time limit only then countermeasures or timely actions can be taken to avoid the accidents. In such environments, the scheduling scheme should focus mainlyon the delay parameter. Here if security is considered a major role, then due to the security mechanisms delay arises. Time-critical data received ina highly secure way with delay is totally useless and leads to a lot of damage. Thus, the primary focus must be on the delay parameter in such environments. Reliability refers to trustworthiness. That is in wireless sensor networks, the sensed data which is received at the destination needs to be reliable without any false information. The data is said to be reliable if the received data is exactly the same as the sent data. This is achieved only through high security. The wireless network is vulnerable to

unauthorized users due to its broadcast nature and wireless nature. Thus, security plays a major role in transferring reliable data. For example: in the Email application, the email sent by the sender needs to be reached at the receiver side without any modification or overhearing problem. Because the email message may carry sensitive information like account details, transaction details, business information, personal details like id, password, insurance details, etc. 15 Thus this type of data needs to be packaged in a tight security environment. In this case, the delay is tolerable whereas the security issue is highly intolerable. So by keeping reliability as a major parameter the scheduling scheme should be chosen in such a way it should not compromise security.

III. SYSTEM TOOLS

A tool for investigating the dynamic dynamics of communication networks is called Network Simulator (NS), which is a discrete event-driven network simulation tool. The modeling of many protocols over wired and wireless networks is greatly supported by Network Simulator 2 (NS2). For wired and wireless simulations, it offers a highly flexible framework that supports a variety of network components, protocols, traffic patterns, and routing types. TCP, UDP, HTTP, and DHCP are just a few of the network protocols that are supported by the simulation package known as NS2. Additionally, this package makes it simple to create several forms of network traffic, including constant bit rate (CBR), available bit rate (ABR), and variable bit rate (VBR). In academic settings, this simulation software is highly well-liked. NS2 has been developed using the C++ programming language and OTcl. OTcl is a relatively new language that uses object-oriented aspects. It was developed at MIT as an object-oriented extension of the Tool command language (Tcl). The well-known NS3 [23] and OMNeT++ network simulators are those that are examined in this chapter. Although many additional simulation functions and a helpful graphical user interface are offered by other well-liked tools, most notably the Cisco Packet Tracer, it was decided to investigate these tools since they are particularly well-liked for research.

IV. PARAMETERS TO BE DONE

4.1. Delay:

The Floyd – Warshall algorithm is a novel approach tothe routing method of WSNs. The nodes present in a wireless sensor network constitute the tags, routers, and coordinators. This algorithm has the flexibility that the accessible shortest distance between every two nodes can be determined at any instant in time. Hence, any node can behave as the sensor node or active tag, and any node can be the coordinator as per the user's choice or according to field requirements. Thus, the coordinator can be placed in the place of any node position and then check the shortest path available.

In this algorithm, it has been considered that if any router node is present which does not acknowledge the receipt of data (even though received successfully) to its immediate sender, then the sender will not understand the presence of the receiver node.

Here the above network diagram consists of 6 nodes and these nodes are connected to each and every node in the wireless sensor networks to transmit the data her we assume that the data transfer in this node are based on the parameter.

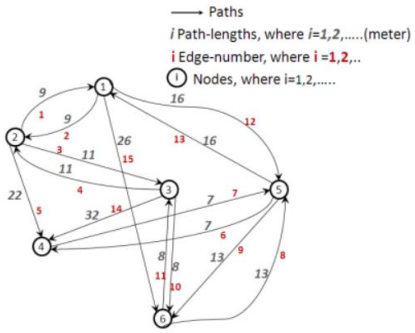

Fig 4.1 Nodes and interconnection of Floyd warshall algorithm

4.2 Energy Consumption:

In wireless sensor networks, there is a finite supply of energy. In actuality, a low-power sensor network's lifespan may be extended by reducing power usage. Small, independent devices with wireless networking capability make up wireless sensor networks. One of the most important concerns is decreasing power consumption in order to further boost the applicability in real-world applications. For the assessment of wireless sensor networks, a correct power model is also necessary. The energy parameters of the sensor node are measured in order to determine lifespan estimates. Given the variety of applications that may benefit from such a technology, research in this field has increased during the last several years.The suggested model's predicted lifespan for a battery-operated sensor node can be increased.

Artificial fish swarm algorithm (AFSA) is a class of swarm intelligent optimization algorithms stimulated by the various social behaviours of fish in search of food. AFSA can search for global optimum through local optimum value search of each individual fish effectively based on simulating

of fish-swarm behaviors such as searching, swarming, following, and bulletin. This paper presents an overview of the AFSA algorithm by describing the evolution of the algorithm along with all the improvements and its combinations with various algorithms and methods as well as its applications in solving industrial problems.

AFSA (artificial fish-swarm algorithm) is one of the best methods of optimization among swarm intelligence algorithms. This algorithm is inspired by the collective movement of the fish and their various social behaviors. Based on a series of instinctive behaviors, the fish always try to maintain their colonies and accordingly demonstrate intelligent behaviors. Searching for food, immigration, and dealing with dangers all happen in a social form and interactions between all fish in a group will result in intelligent social behavior.This algorithm has many advantages including high convergence speed, flexibility, fault tolerance, and high accuracy. This paper is a review of the AFSA algorithm and describes the evolution of this algorithm along with all improvements, its combination with various methods as well as its applications. There are many optimization methods that have an affinity with this method and the result of this combination will improve the performance of this method. Its disadvantages include high time complexity, lack of balance between global and local search, in addition to lack of benefiting from the experiences of group members for the next movements.

The searching individual behavior can be described as follows: 1. Communication: the basic communication relation is kept between the searching individual. If an individual finds a better goal, then sends a signal to the other individual, the others move forward to the better goal by a step; 2. Reconnaissance: If the individual does not receive the signal of his companion, then implement reconnaissance according to his and the swarm's historical experience. If finds a better goal, one moves forward to the position by a step. If finds a better goal, then sends a signal to his companion; 3. Move: If the searching individual does not receive a searching companion's signal, and does not find a better goal, it moves a step randomly. If finds a better goal, then sends a signal to his companion.

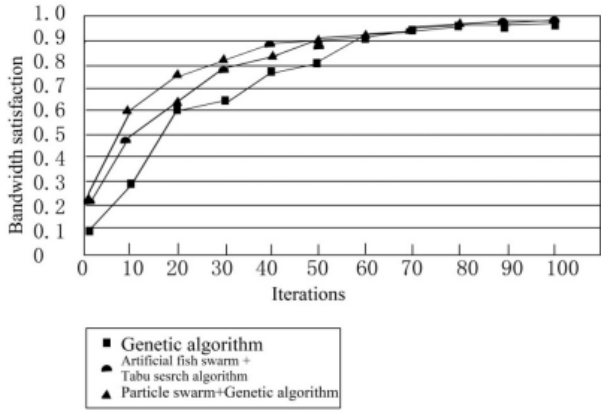

Fig 4.2 The energy consumption on the Artificial fish swarm algorithm

V. CONCLUSION

Wireless sensor network plays a wide area in recent wireless environment. The sensed data to be sent to the receiver are to be transmitted at faster rate with minimal delay and effective utilization of resources. Thus, an effective scheduling scheme should be used for transmitting the packets. Based on the application and the environment in which the sensors are placed, the customized priority sensor scheduling scheme can be used. The various scheduling schemes that can be used in wireless sensor networks and its importance are discussed. By comparing all of these scheduling schemes, Customized Priority scheduling scheme is preferred to perform better in wireless sensor environment.

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