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A Survey on Enhancing Quality of Service in Wireless Sensor Networks

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ABSTRACT

In this paper, we analyses the capacity of the nature of quality of service (Qos) support in wireless sensor networks.Quality of Service is always an important parameter to check and analyses the performance of any sensor network. As far as concerned, many critical applications using WSNs has brought new Qos requirements on the network.Further, the characteristics of sensor networks i.e. sensors, networking communication protocols are also posing some challenges in the area of Qos support in WSNs. Thus in this paper we have proposed a new algorithm which is based on selection criteria of performance of a network by possibility of winning of a station and Possibility of collisions in the station which is calculated by taking path account the contention window and AIFS.By this algorithm maximum data can easily transmitted between the nodes to the destination without any data loss.We have taken the random values for Contention window and checked for results. We have taken four cases the station where we are getting the maximum Possibility there we will send the data first and will be having the better Qos. We have analyzed that by using this algorithm i.e. 90% data has been transferred successfully to the next station.

Keywords: Quality of Service (QoS), Wireless Sensor Network (WSN), Wireless Sensor Adhoc Network (WSAN)

1. INTRODUCTION

Quality of Service is always an important parameter to check and analyses the performance of any sensor network. Sensor network is a family of networks which are used in our daily life's to achieve various sensing activities with the main purpose of delivering services. Figure 1 showsWireless Sensor Network can be a wired or fixed network or can be wireless network. Some sensor networks can be used with fixed infrastructure which is fixed sensor network where the information collected from different source nodes are routed to destination by connecting[1] all the nodes to a fixed point such as ADSL or Ethernet Network. When connected to wireless infrastructure, the nodes of sensor node referred to a wireless sensor network communicate wirelessly using radio wave, etc.

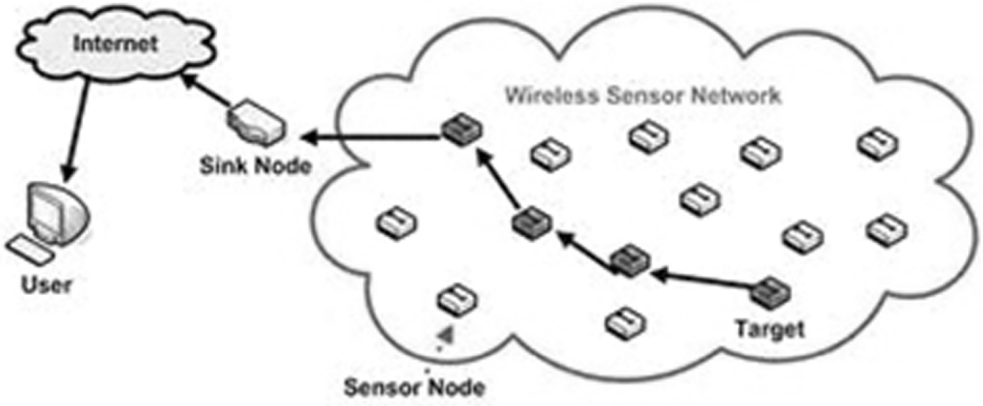

Figure 1: Wireless Sensor Network

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A wireless Sensor Network is Autonomous sensors which monitors and controls the physical conditions and converts and passes the data through the network to a main location. These Networks can be bi-directional which also controls the sensor activity. Each sensor network mode has several parts a receiver with antenna, a controller, an interfacing device and energy source usually a battery[1] Sensors will get information from the physical quantities or world which will be transmitted to actuator node with the help of communication techniques[2]. After receiving the information from sensors, it will be the actuators which will respond to the information. The base station is principally responsible for monitoring and managing the overall network through communications with sensors and actuators**.** A wireless sensor network is a supportive Qos user application with network loading functions[3].Qos is particularly the main area of research which is bandwidth, reliability, point to point transmissions in the wireless communication networks. Wireless Sensor network has certain advance features such as power consuming, low cost and are used for small distance communications

The efficiency of wireless sensor networks may be measured by (a) the lifetime of the WSN often expressed by the time spanning from the outset of the WSN and the time when the first sensor is battery depleted, (b) throughput is the rate of successfully[3] transmitting signal or packet over a communicating channel or Medium. In general, more the throughput better will be the response of the system, and (c) dela*y* is the time taken by the data packet to reach from source node to destination node. In order to improve the system, furthermore, the delay of WSAN should often be minimized. (d) packet loss switching is the rate of data packets that are not reached at the destination node during the communication process.

2. CHALLENGES IN SUPPORTING QOS IN WSNS

There are certain[4] challenges and issues which prevent the WSNs to provide better Qos for communication networks. The challenges are:

- *Resource Constraints*: As in Wireless Sensor Networks[3], Sensor nodes are usually low cost, low power which have only limited data processing capabilities, transmission rate, battery power and memory. Due to limitation of power, bandwidth and range of wireless communication are often limited. In presence of other constraints, Qos suffers the unavailability of computing nodes.
- *Unnecessary data*: More the number of nodes more will be the data generated. Thus the robustness and reliability of data delivery will be achieved. It unnecessary data use much costly energy.
- *Self-configuration*: Sensor networkshave the feature to sense data in large traffics and other physical and environmental conditions which is used to provide the given data. These nodes can be operated with self-configuration and maintenance capacity.
- *Power efficiency*: WSNs uses large number of nodes in the networks to send the data at the destination end. Power efficiency of sensor nodes with the passage of time is at the optimal level.
- *Disturbed mixture traffic*: Different applications use WSNs for transmitting[4] the data, inducing both periodic and aperiodic data. This feature is becoming more common and rapidly used with the increase in use of WSNs. These may be used for measurement of physical variables and can be used for certain purpose for controlling and monitoring the networks.

Besides certain challenges and issues which prevent the WSNs to provide better Qosfor communication networks, there are still some important issues and concerns which have to be resolve in order to have good networking environment for all the users which are

- *Applications*: Different service providers in WSNs are providing end to end service. In case of routing protocols, FIFO approach should be used; hence best features and soft wares are to be discussed to enable better QOS at used end interface.

- *Control mechanisms*: sensors can send data from source to destination nodes and that means lots of valuable energy is wasted as they the data which was sent to a particular node, donor require the data at that time, so that the quality of the application cannot be met.
- *Service Security*: In a general network system, there will be certain scenarios and issues depending upon different applications among which the necessary requirement is data confidentiality, integrity, authentication and availability.
- *Power management*: Power protection is big issue in WSNs. Basically life of nodes depends upon the battery power, which is being used to send[8] the data from source to the destination node, thus adversely affecting the life time of the network.

3. METHODS TO HAVE GOOD QOS REQUIREMENT IN WSNS

These are the parameters which will be taken into considerations to achieve good Qos in Wireless Sensor Networks.

a) *Over provisioning*: WSNs is a better solution which enables sensors to have high bandwidth, maximum sensor node in small size and enhances router capability to transmit data from source node to destination node without any lost in data packets[6].

b) *Networks Qos*: Application layer is very important for WSNs. In this approach, a different technique is to be used to establish the WSNs/Qos parameters which are used are delay, reliability, response time, data accuracy and fault tolerance in WSNs can be achieved.

c) *Packet scheduling*: It is one of the important Parameter which enables the nature of packets, which are as follows:

Real-time packet scheduling: Packets should be sending according to the priorities and Real time packets should be given highest priority between all the other packets which are being transmitted in the system**.** So that the data can reach the destination with possible minimal delay.

4. SIMULATION EVALUATION

We designed an algorithm which is based on Possibility of winning or colliding in a station for various values of AIFS and contention window[7]. Qos is the key for multimedia and military applications for Wireless sensor networks. In order to have better Qos at our desired destinations we need to control the parameters of networks provided that they give certain outputs and by analyzing that output we will know that station has better Qos. The station at which we are getting the maximum output we will send the data to that station for better QOS.

The proposed work is about the criteria for selecting the performance of a network by calculating the Possibility of winning of a station and Possibility of collisions in the station which is calculated by taking path account the contention window and AIFS[8].We have taken the random values for Contention window and checked for results. We have taken four cases the station where we are getting the maximum Possibility there we will send the data first and will be having the better Qos.

a) *Possibility of the winning*: The Possibility of winning means the maximum Possibility of which station has minimum numbers of collisions[9] and hence there will be successful transmission of the data. Figure 5 shows that Possibility of winning is Maximum with minimum number of collisions.

b) *Possibility of the collisions*: The Possibility could be computed using a simple trick. It is clear that the contest of the stations ends by either winning of a station or a collision. Figure 2 shows that Possibility of Winning and collision of different Stations Independently in which there will be more data loss. Thus, utilizing the complementary Possibility, we can put down

$$1 = P^{1}_{\text{win}} + P^{2}_{\text{win}} + : : : + P^{k}_{\text{win}} + P_{\text{coll}}$$

Figure 3 shows that Possibility of Winning and collision of different Stations independently with large number of collisions in which data loss will be reduced in comparison to figure 2. Hence figure 4 elaborates

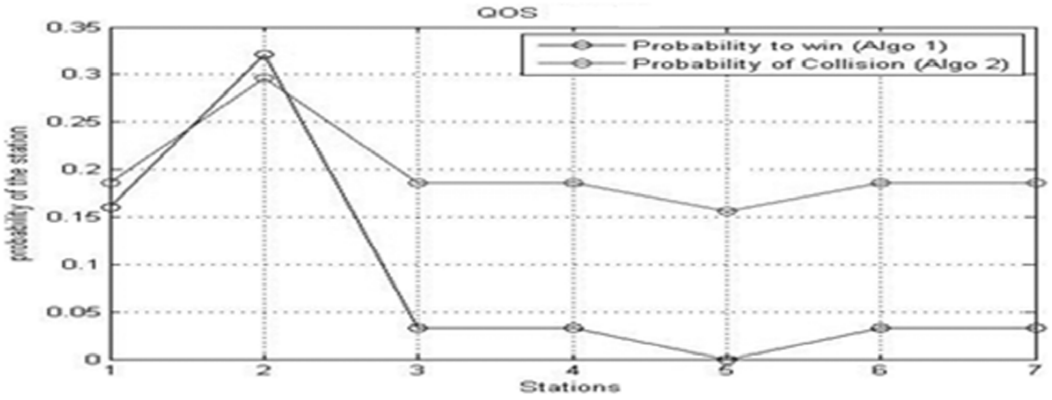

Figure 2: Possibility of Winning and collision of different Stations independently

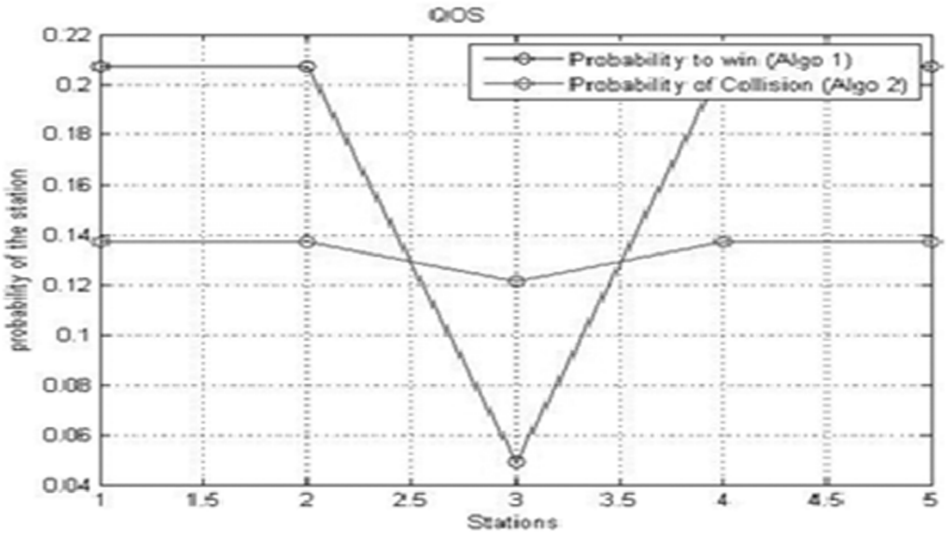

Figure 3: Possibility of Winning and collision of different Stations independently with large number of collisions

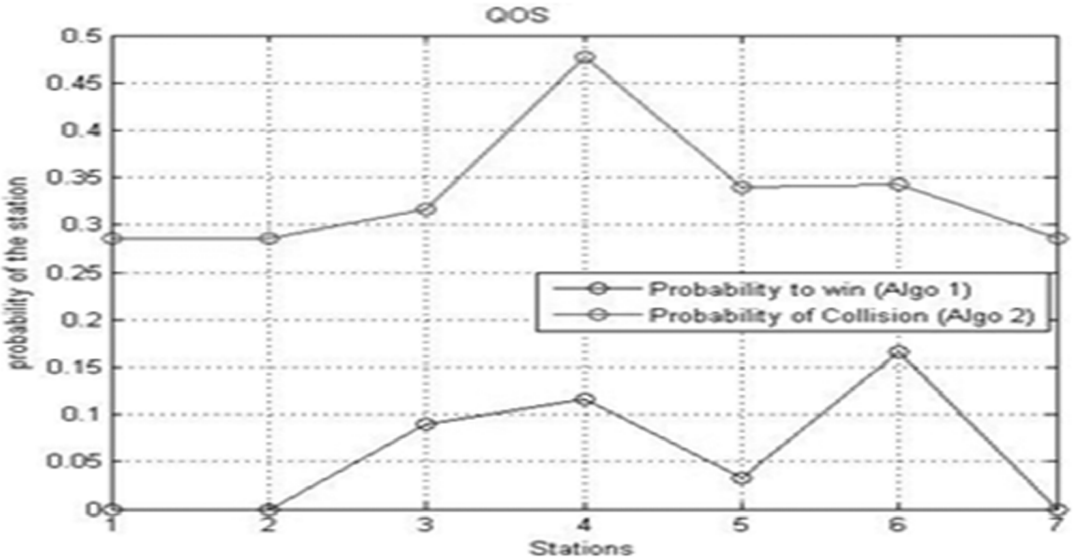

Figure 4: Possibility of Winning and collision of different Stations independently with more collisions

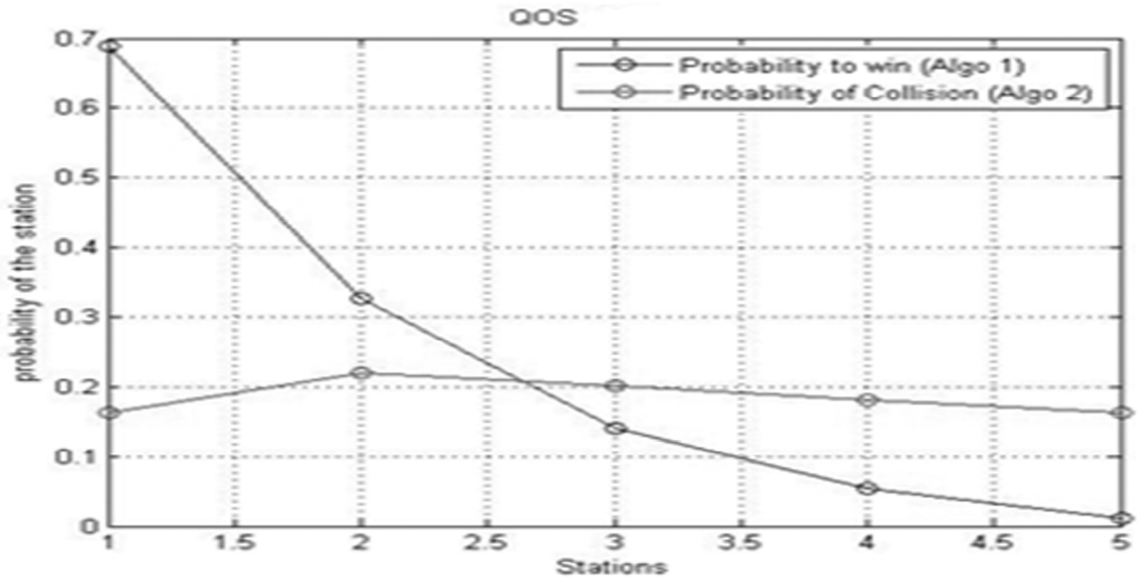

Figure 5: Possibility of winning is Maximum

more about the data loss as compared to figure 3 and figure 4. Figure 5 shows that Possibility of winning is Maximum with minimum number of collisions.

5. CONCLUSION

On the basis of our results, we can conclude that the best and optimized results are obtained in Figure 5 where the Possibility of winning or sending the data without collisions is maximum. If we want to use two stations at a time for better performance out of n number of stations, then we would prefer the last situation. We can conclude from our data that if we want to provide better Qos to any sensor network, we will use the algorithm that is Possibility of winning or number of collisions should be very less or small, so that maximum data can be shared or transmitted successfully to destination.

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