Priority Based Reliable Health Care Data Communication in WBAN

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Abstract— **In response to advancements in the internet of medical things (IoMT), miniaturized and intelligent sensor devices are beginning to be used to monitor health remotely and unobtrusively in, on, or around the human body. Collectively, these monitoring sensors form the Wireless Body Area Network (WBAN), which is crucial to gathering data. These small sensors are becoming increasingly popular because they offer features such as flexibility, mobility, and real-time monitoring. WBAN requires reliable and highly secure communication as it requires real-time monitoring and critical data. This proposed model presented Abnormality Based Channel Allocation Technique (AB-CAT) is to perform data aggregation through multi-hop data transmission and allows the aggregating node in the network should send abnormal values immediately with little delay if they detect abnormal values. In addition this technique greatly reduced the delay of critical data packets and other priority data packets as well as channel access delays. The simulation has been performed through Network Simulator-2 (Ns-2) and the results showed that AB-CAT techniques had better performance in healthcare monitoring environments with regard to throughput, reliable data delivery and delay.**

Keywords— data aggregation, priority, throughput, network lifetime.

I. INTRODUCTION

Over the past few years many people die just because there is a delay in receiving medical care for the patient. The researchers found that if the illnesses of the people are detected soon enough, they can be cured. The best solution for these issues is provided by network called WBAN.WBANs are capable of monitoring physiological vital signals by using IoT-based sensor nodes anywhere, anytime. Due to their small size, these sensors are ergonomically comfortable for users and do not interfere with their normal activities. When a BAN is properly set up, it can alert the doctor or hospital well before the incident occurs. Physicians are alerted through various types of alarms or messages if any unusual changes are detected. The objective of medication is to improve the quality of life of the user. Medication may save a life in the future [2]. [1] proposed a secure hash message authentication code. A secure hash message authentication code to avoid certificate revocation list checking is proposed for vehicular ad hoc networks (VANETs). The group signature scheme is widely used in VANETs for secure communication, the existing systems based on group signature scheme provides verification delay in certificate revocation list checking.

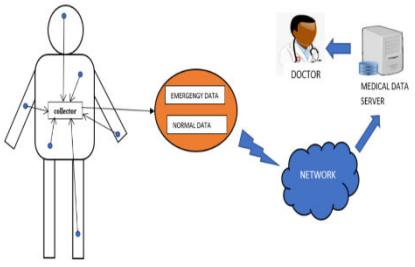

Fig.1. Health care data security in WBAN.

Patients with long-standing diseases require continuous monitoring. This is because limited resources make it difficult to continuously attend to every patient, both inside and outside the hospital

[3]. Due to the small sensor size, WBAN requires many factors such as low latency, low power consumption, reliability of data delivery, efficient bandwidth use, minimum delay and maximum throughput. With this various challenges in BAN applications, it is extremely important to ensure the reliability of BAN healthcare applications [4].

In this work we proposed a technique AB-CAT. The technique can perform a data aggregation and an emergency data packet could be prioritized first to be transmitting to the server. This technique provides reliable data transmission and avoids data loss through multihop transmission.

The work in this paper is segregate in this fashion: section 2 illustrate previous researches; section 3 clear up the motivation of the proposed work and terminologies; section 4 demonstrate the performance; section 5 concludes the research.

II. RELATED WORK

Rather, new procedures are to be created or variations of existing strategies are required which consider the exceptional qualities of IoT-based WBAN. Memon et al. [5] developed a protocol TLD-RP (Temperature, interface dependable and Delay-mindful Routing Protocol) to select a path to forward the sensed data by considering link reliability, asymmetry property and delay in order to improve the efficiency, link stability in wireless body sensor network (WBSN) and its performance has evaluated for various load size. The proposed protocol by Abdullahi Abdu Ibrahim et al.[2] provided NEAT protocol which can prioritized the packed based on evaluation of data emergency and its only give importance to send the high emergency packet and neglect the regular packet, thus leads to the improvise the energy efficiency and Quality of service QOS.). In [6] Rajiv R et.al. Introduced a priority with mobility aware clustering Routing Algorithm (P-MACRON) for high distribution of packet by allocating fair weightage to individual nodes .and this algorithm used scheduling strategy to implement self-healing but it is topology dependent.

[13] discussed that Helpful correspondence is developing as a standout amongst the most encouraging procedures in remote systems by reason of giving spatial differing qualities pick up. The transfer hub (RN) assumes a key part in agreeable correspondences, and RN choice may generously influence the execution pick up in a system with helpful media get to control (MAC). In [9] developed a multi-hop Priority-based Congestion- Avoidance Routing Protocol for wireless body area networks that uses IOT-based heterogeneous sensors. [11] discussed because of various appealing focal points, agreeable correspondences have been broadly viewed as one of the promising systems to enhance throughput and scope execution in remote interchanges. [10]. D.Sethi et,al. developed a protocol Reliable data transfer with low energy consumption (EERDT) protocol give high throughput, reliable and power efficiency. In single-hop communication the critical data is transferred directly to the base station. EERDT protocol is increased network stability and most of the data transferred to base station.

III. METHODOLOGY

In this work, we proposed Abnormality Based Channel Allocation Technique (AB-CAT) for WBAN. In our network routing model the nodes are assumed as body of the patient. The nodes in the network clustered into three sections based on the abnormality of patient data .The aggregated node collects the packets from these networks and assign the priority according to the life critical data. The higher prioritization 1 is assigned for highly life critical data, 2 is assigned for emergency data and the lowest priority for normal data. The fig.1 demonstrates the prioritized node packets.

Red colour: Life critical data node (1

Navy Blue: Emergency node (2)

Sky Blue: Normal node (3)

Green: Aggregating node (AG)

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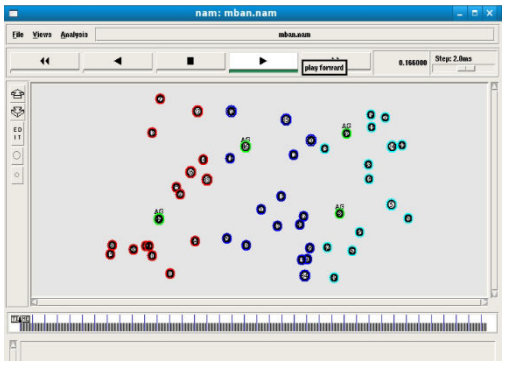


Figure 2: Network model

The section I &II is a static. Section III is assumption it can move. Data based on priority, compare to normal data packet emergency data have higher priority. Node will identify what type of data or node is collecting. whenever it collecting a data node will identify, what type of data is collecting. In this case, the priority provided to node is the same as a data priority. Periodically all the nodes are supposed to communicate with respective aggregate node. All the nodes are must communicate with aggregate node. If not means aggregate node will inform. Aggregate node can simply go for collecting the data to sending into the server. The Server can say collected and missed data. Because server knows totally how many patients are there (Assumption). [7] discussed that the activity related status data will be communicated consistently and shared among drivers through VANETs keeping in mind the end goal to enhance driving security and solace. Along these lines, Vehicular specially appointed systems (VANETs) require safeguarding and secure information

correspondences.. Priority number is attached with every priority packet. Emergency packets allocated earlier to normal data the current process cannot replace the ongoing process because there is some problem may arise.

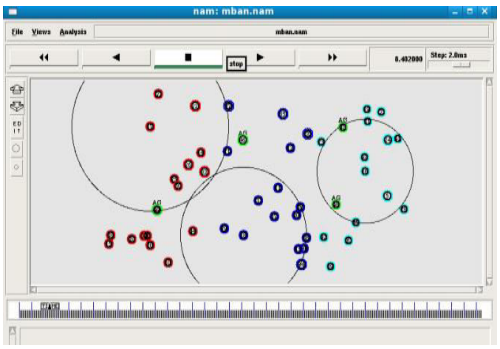


Figure 3: Final stage

Figure 3 is the final stage of our simulation work and it is indicate the (normal, emergency and critical) data's are all communicate with the nearby aggregation node in the wide range network.

IV. SIMULATION AND RESULT DISCUSSION

Network simulator NS-2 is used to obtain the simulation results. Based on the results of simulation, we evaluate delivery ratio, delay, and throughput.

A. Delay

Delay means Total time taken by the receive time to send time. The delay is able to found by the packet delivery ratio, that is defined as the ratio of packets received time by the destination those generated by the source at the send time. . Delay is an important parameter for emergency data to require error free data. Compare to other data packet (low, normal) delay is less for emergency data packet.

Packet Received time - packet Send time =Delay. (1)

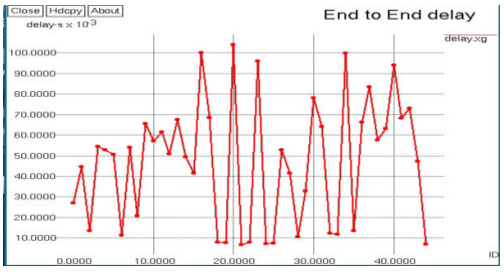
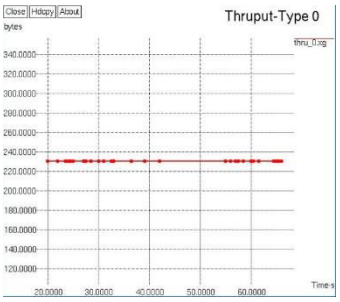
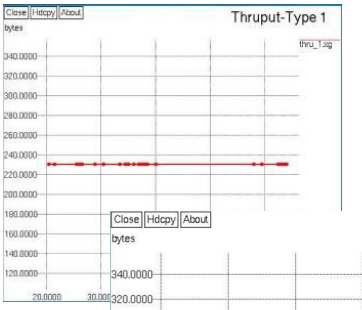


Figure 4: End-to-End Delay

B. Throughput

Throughput can be defined as the Number of bytes successfully send at fixed amount of time .A WBAN contains medical data that is life-critical, therefore it needs to have the most throughput and least packet loss. According to their priority to human life, data packets are categorized into emergency and normal data packets. A data packet that contains an emergency has a greater throughput than a normal data packet.





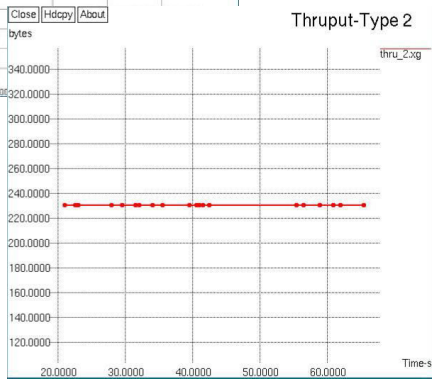


Figure 5: throughput type 0

Figure 6: throughput Type 1

Figure 7: throughput Type 2

Figure 8: throughput

C. Packet Delivery Ratio(PDR)

The packet delivery ratio (PDR) is defined as, the ratio of number of packets received at the destination to the number of packets send from the source. We get a high delivery ratio when the performance is better. Because all the packets are send within a time constraint and there is no loss in data transmission.

No.of Packet received /no.of packet send= PDR (2)

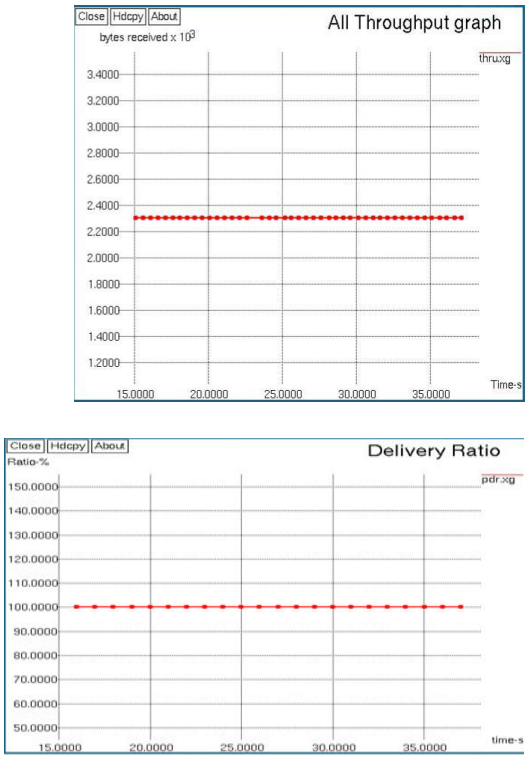


Figure 9: Packet Delivery Ratio

CONCLUSION

These days the remote body region network is broadly utilized in numerous fields. In medical care, there is a critical use of WBANS that remotely serve the specialist and the patient. In healthcare, there is a significant application of WBANS that remotely serve the doctor and the patient. In this paper we propose an Abnormality Based Channel Allocation Technique (AB-CAT). This technique can perform a data aggregation and an emergency data packet could be prioritized first to be transmitting to the server. This technique provides reliable data transmission and avoids data loss through multihop transmission. From the simulation result reveal the AB-CAT performs network lifetime, packet delivery, traffic load, throughput and delay. In future, we are planning to implement the AB-CAT technique with more parameter to make efficient routing protocol and mainly focused on mobility of sensor nodes based on body movement.

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