Prolong network lifetime of WBAN using MAC adaptation scheme

Kusuma B V[1], Mrs. Hamsaveni N[2],

[1]*M.Tech Student, DCN, Department of ECE, SJBIT, Karnataka, India*
[2] *Assoc. Professor, Department of ECE, SJBIT, Karnataka, India*

ABSTRACT

WBAN is one of the major technologies used now a day. There is lot of demand in the field of medicine. A wireless communication link can be established to operate autonomously. Various sensors and home equipments are connected outside and inside of human body. The main goal of the project is to prolong the life of nodes by using adaptive energy efficient MAC protocol. The idea of contention window is used to decrease the consumption of energy which is suitable to the various traffic conditions. A wban node can seek and discover a verbal exchange community to broadcast information for faraway server for storage space. A wban will encompass a number of small nodes and gateway node which might be tiny bright gadgets.

Keyword: *Adaptive energy efficient, WBAN, Wireless communication, Contention Window, MAC protocol.*

1. INTRODUCTION

A Wireless Sensor Network (WSN) includes hundreds or heaps of low value nodes which can either have a fixed location or randomly deployed to monitor the surroundings. WSNs are a trend of the beyond few years, and that they involve deploying a big quantity of small nodes. The nodes then experience environmental modifications and document these different nodes over flexible network architecture.

In WBAN the intercommunication of wireless devices can be added to the human body. In WBAN the sensors are attached to the human body to check the conditions. In wireless sensor networks one of the main problems is energy consumption which in turn decreases the life of the sensor networks.

Figure 1 shows the architecture of WABN. It consists of intra-ban communication, inter-ban communication and beyond-ban communication. In intra ban communication the sensor nodes are placed on the human body and sent to the personal servers. Here the communication is between the level1 and level2 communication. The access point senses the data from personal device. Later the communication is between the level2 and level3. The data collected in the access point is sent to the medical server, emergency etc through internet.

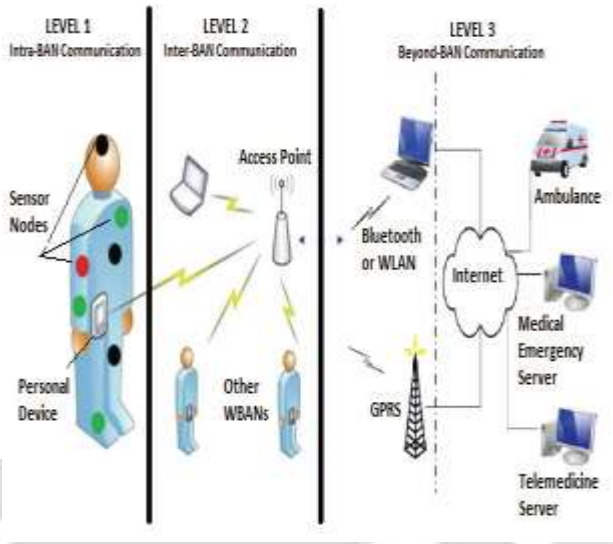

Fig 1: Architecture of WBAN

2. LITERATURE SURVEY

In the paper [1], it explains the smallest amount use of type I/II and maximizes the sleep time between effective data transmission with the help of energy efficient MAC protocol by flexible state switching. In addition, we want to broaden some approach to further reduce the complexity such as synchronization and previous data change and additionally take away the possibility of time put off resulted from the iterative retransmission that allows you to guarantee low energy intake and the QoS of facts transmission on the identical time in our future work.

In the paper [2], it explains an Enhanced MAC (EMAC) protocol for WBANs in this paper. The EMAC integrates relay, adaptive topology adjustment and power control to save energy. Performance evaluation is conducted in the human body scenario. Compared with IEEE 802.15.4 MAC, the network lifetime of EMAC can be extended by 106% at most. In the future, we will consider improving EMAC in the light of specific duty cycle conditions of the devices to increase the efficiency of the protocol.

In the paper [3], a multi hop scenario is used based on SMAC protocol which judges the suitability in WSN applications. The most valuable parameters in the mission critical applications are throughput, packet delivery ratio and residual energy. In many of the applications industrial tracking and military operations, unexpected shift of the triggering event performs very fast and consistent feedback, or else the system will be failed.

3. SYSTEM DESIGN

Figure 2 shows the data flow diagram of the proposed system.

Initialize the node parameters of the WBAN. Then the energy consumed by each node is checked for every t seconds. Later if the traffic is different than adjust the window size otherwise go to MAC parameters. The traffic is classified into different classes here we considered Blood pressure, temperature and Audio. If there is any emergency data then the duty cycle is changed otherwise it will be in the idle state. If the data rates are more than adjust the window size.

The transmission will be checked for every ‘t’ seconds, if the transmission is more than the expected calculate the probability of different traffic classes. If the emergency data is present change the value of the contention window, if there is no emergency data than the contention window size will be decreased based on the value of probability p. Then the values of throughput delay, energy consumption, packet delivery ratio and overhead values are found by using the simulation results.

In the existing method SMAC protocol is used to increase the life of sensor nodes, In the proposed system we are going to introduce adaptive contention window and the dynamic duty cycle that is adaptive energy efficient

MAC protocol is used, but in the enhancement even though we introduced the error in the audio there gradual increase in throughput, decrease in delay, and decrease in power consumption so that the life of the sensor node increased.

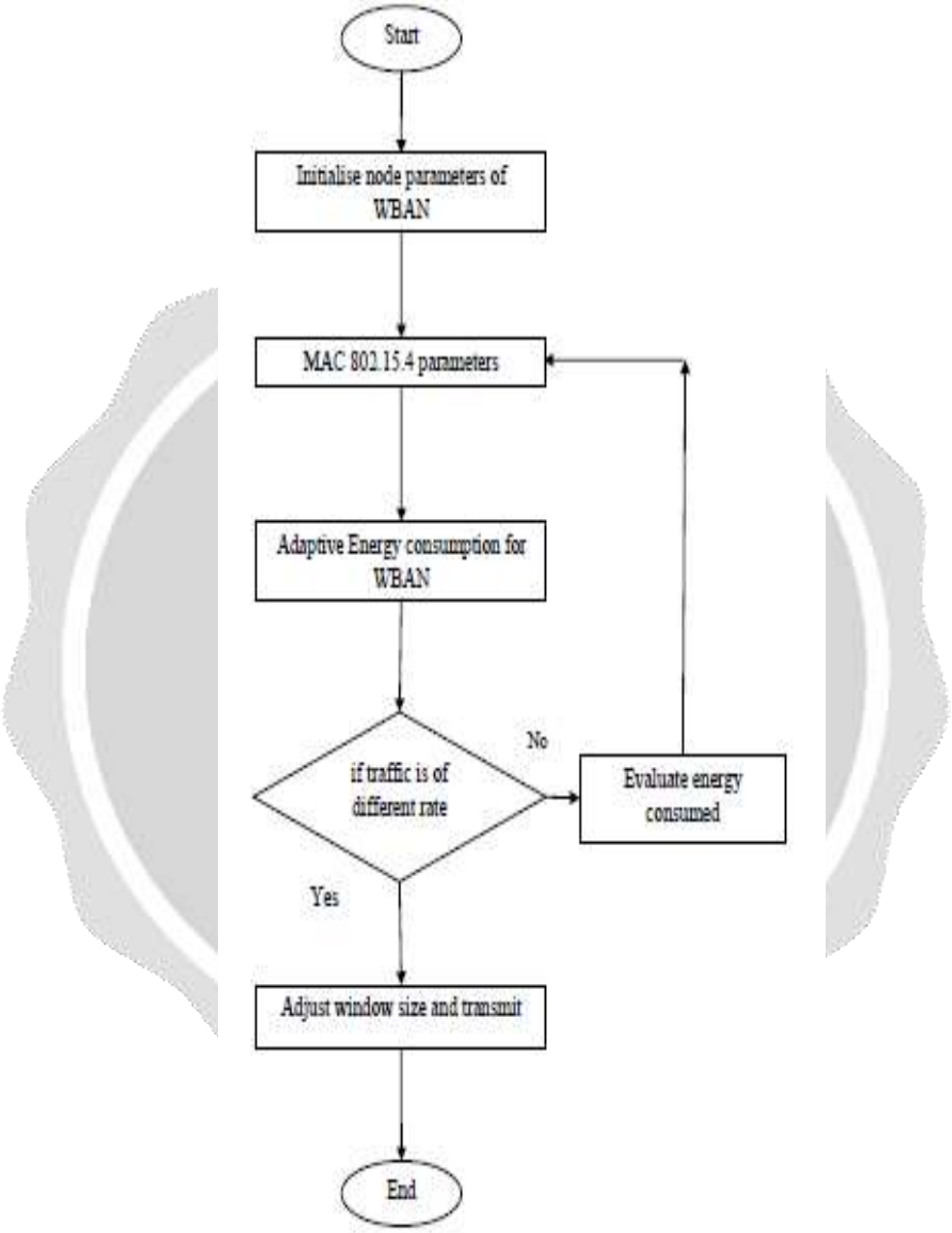

Fig 2: Design Flow

4. EXPERIMENTAL RESULTS

The developed protocol gives the simulation results with the help of NS 2.35 tool. It comprise of common sensor node, access points, clusters, wban, medical server, physician server, emergency, PDA. All the nodes are formed randomly all over the area.

Figure 3 shows the sensor nodes, clusters and the wban coordinators.

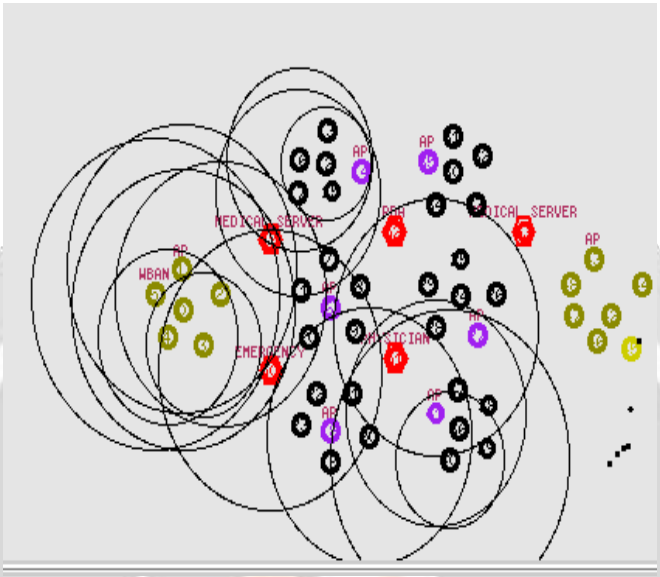

Fig 3: Sensor nodes, clusters and BAN coordinators

Figure 4 shows the throughput study between the Existing (SMAC), Proposed (AEEMAC), and Enhancement (Introducing error models). It shows an increase in throughput existing protocol obtains 227.06kbps, proposed system obtains 376.46kbps, and in enhancement we get 443.99kbps. Therefore we can conclude that there is an increase in throughput compared to the existing and proposed system.

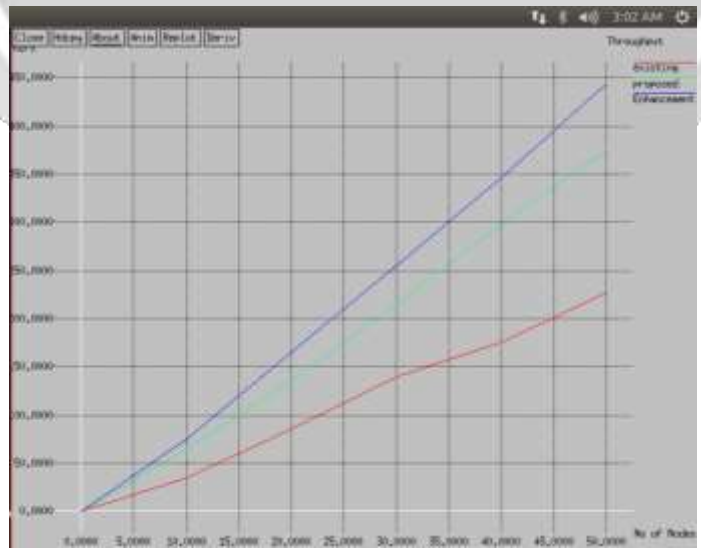

Fig 4: Comparison of throughput for the existing, proposed and the enhancement protocols.

Figure 5 shows the delay values between the Existing (SMAC), Proposed (AEEMAC), and Enhancement (Introducing error models). It shows decrease in delay, existing protocol obtains 372.456ms, proposed system obtains 236.46ms, and in enhancement we get 41.1987. Therefore we can conclude that there is an decrease in delay compared to the existing and proposed system.

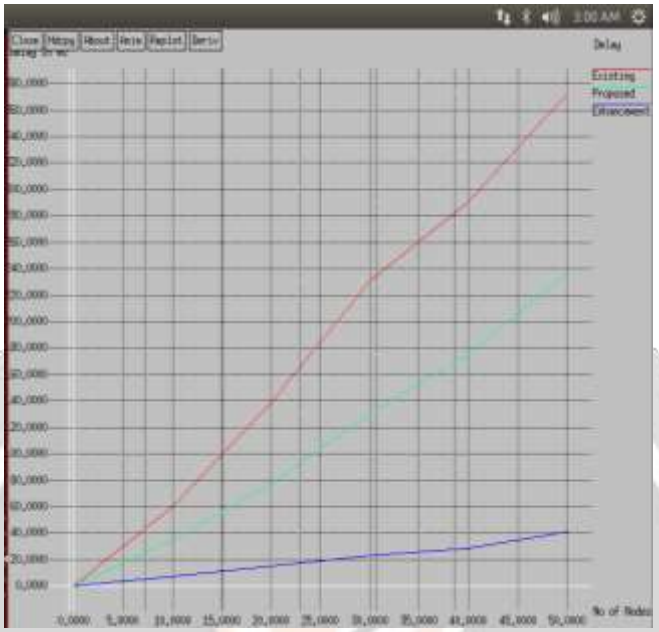

Fig 5: Comparison of delay for the existing, proposed and the enhancement protocols.

Figure 6 shows the energy values between the Existing (SMAC), Proposed (AEEMAC), and Enhancement (Introducing error models). It shows decrease in delay, existing protocol obtains 372.456ms, proposed system obtains 236.46ms, and in enhancement we get 41.1987. Therefore we can conclude that there is an decrease in energy compared to the existing and proposed system.

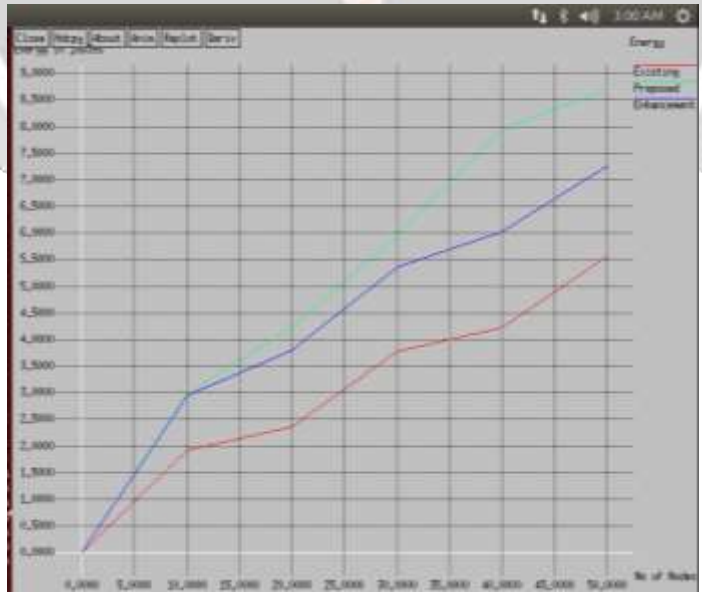

Fig 6: Comparison of energy values for the existing, proposed and the enhancement protocols.

5. CONCLUSIONS

From the simulation results obtained we can conclude that there is increase in throughput, decrease in delay and decrease in power consumption which increased the life of the sensor nodes. In this work we used adaptive energy efficient MAC protocol to increase the life of sensor nodes and also we introduced error models which also decreases power increases the life of sensor nodes.

6. REFERENCES

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