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SURVIVAL STUDY ON WIRELESS BODY AREA SENSOR NETWORK

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ABSTRACT

The purpose of this survival study is to develop wireless body area networks and also gives an understanding of what possibilities and challenges there are when using short range wireless communications in this domain. In wireless communications recent technologies are developed .one of the most important and powerful usage of new sensor network is the wireless body area sensor network. Wireless body area sensor network it has the integrated circuits, these circuits are enabled low power, intelligent, miniaturized, invasive/non-invasive micro and nano-technology sensor nodes strategically placed in or around the human body to be used in various applications such as personal health monitoring. The sensor platforms and network coordinator are built from off-the-shelf wireless sensor platforms. The nodes communicate wirelessly using standards-based IEEE 802.15.4 and a novel power-efficient TDMA scheme. The paper explores survival study of the IEEE 802.15.6.

INTRODUCTION

A number of economic and technical developments are introduced in health care system that is the wireless body area sensor network. One of the most promising developments is the wireless body area sensor network. Wireless body area sensor network is a wearable device communicating one node to another. WBASN consist of biosensor networks and it capable of sampling and sensing.

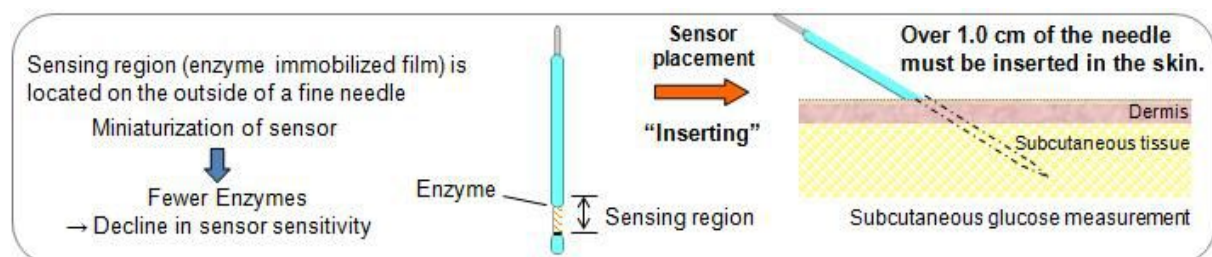


Figure 1: sensing the body

The figure1 indicate the sensor region are sensing the body, measuring the subcutaneous glucose measurement.

To monitor the activities of human body, the required frequencies should be in acquiescence with the communication standards and protection of the tissues and organs of the body. WBAN is an assemblage of invasive and non-invasive sensor devices which have prolonged battery life and operate on low power, thus holds promise to obtain timely information regarding crucial body parameters and movements.

WBAN standards are designed for the purpose of medical applications but its applicability covers a broad range including gaming, authentication and security, education, entertainment, sports, training and military purposes.

WBAN is responsible for sending biological signal to the personal server this will send to the medical server. Used several technologies such Bluetooth,IEEE 802.15.4 and IEEE 802.15.6. My research work is survey about the IEEE 802.15.6.

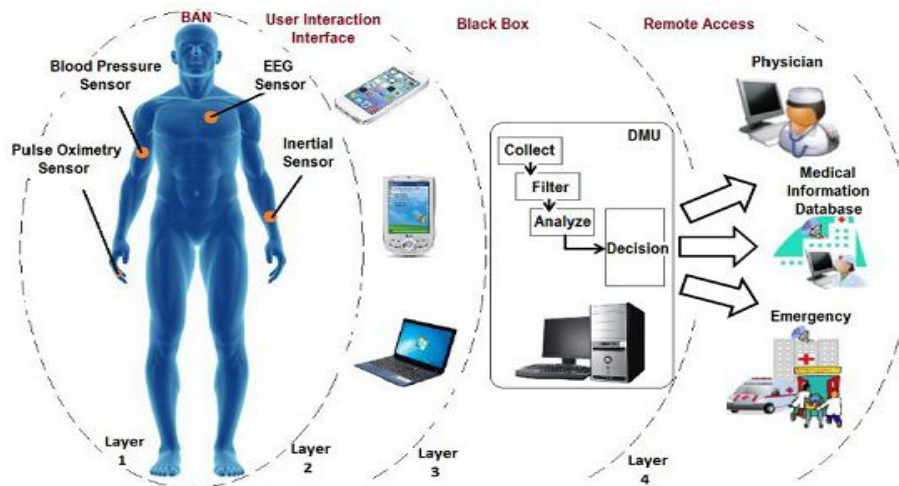


Figure 2. The four-layer typical architecture of an eHealthcare system.

Applications of Wireless Body Area Networks

1. Telemedicine and Remote patient monitoring
2. Rehabilitation and therapy
3. Biofeedback
4. Ambient assisted living

Wireless Body Area Network Technologies

Zigbee/IEEE 802.15.4
WLSN
GSM
Bluetooth
ISM (Instrumentation scientific and medical)
MISC (Medical Implant Communication Service)
WMTS (wireless medical telemetry service)
Ultra Wide Band technology (UWB)

Requirements of WBAN

- Energy Efficiency
- Bit Rate
- Security and Reliability
- Network Topology
- Signal Processing

Classification of wireless sensor network and Technologies

The following figure is about the wireless sensor network and technologies are described.

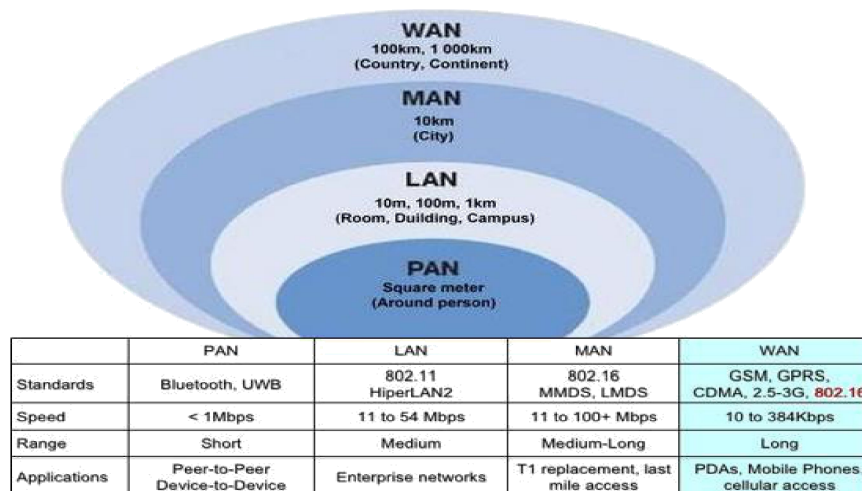


Figure 3: Classification of Wireless networks and Technologies

Some of the networks and the standards are explained such as Bluetooth, 802.11 etc.. speeds are started from <1 Mbps to 384 Kbps. Our survey is about the IEEE 802.15.6 standard support verity of health care monitoring and consumer electronics applications.

IEEE 802.15.6

802.15.6 has been specifically designed for WBAN applications, as the standard caters for medical and non-medical applications, it cannot deliver optimal low power performance for life signs monitoring applications. Timmons and Scanlon developed MedMAC, a MAC protocol, for ultra low power WSN applications. In experiments where MedMAC was compared with 802.15.6, it was found that MedMAC displayed a marked improvement in energy consumption with an energy saving of between 25.6%–33.2% for packet rates ranging from 1–10 kb/s.

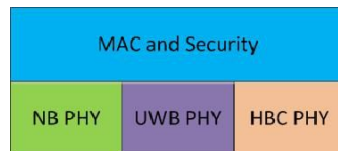


Figure 4: IEEE 802.15.6 high level architecture

Objective of study

To reduce the consumption of energy in applications based on WBAN, several protocols and standards were designed. In our study, we have analyzed and compared the performances of two MAC protocols namely, Zigbee MAC (IEEE 802.15.4) and Baseline BAN MAC (IEEE 802.15.6). The comparisons were done on the basis of following three parameters:

- (i) Throughput
- (ii) Total energy consumption
- (iii) Latency, recorded during the transmission of data signals.

The objectives of my work are accomplished by performing the following sub tasks:

- To analyse ZigbeeMAC protocol, based on IEEE 802.15.4
- To analyse BaselineMAC protocol, based on IEEE 802.15.6
- To compare the protocols on the basis of above mentioned parameters.



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Techniques and algorithm of protocols

The most advanced emerging communication network Wireless Body Area Network (WBAN). WBANs serve a variety of applications including healthcare, personal entertainment, advance sports training, live events, aviation, natural disasters, consumer electronic devices, etc. Human body conditions are measured by the physiological parameters by WBAN, such as sugar level, temperature, heartbeat, etc., and forward it to the medical server via an intranet/internet facility.

Security in IEEE 802.15.6

In December 2011, the [IEEE 802.15.6](#) task group approved a draft of a standard for [Body Area Network](#) (BAN) technologies. The draft was approved on 22 July 2011 by Letter Ballot to start the Sponsor Ballot process. Task Group 6 was formed in November 2007 to focus on a low-power and short-range wireless standard to be optimized for devices and operation on, in, or around the human body (but not limited to humans) to serve a variety of applications including medical, consumer electronics, and personal entertainment.

The main aim of IEEE 802.15.6 standard is to provide the confidentiality, authentication, integrity, privacy protection, and replay defense. All nodes and hubs must choose three security levels: unsecured communication (*level 0*), authentication but no encryption (*level 1*), and authentication and encryption (*level 2*). During the security association process, a node and a hub need to jointly select a suitable security level. The security association in the IEEE 802.15.6 standard is based on four key agreement protocols that have security problems

RESULTS AND DISCUSSION

Energy Consumption is considered as one of the important parameters to be taken into consideration while designing a MAC protocol for WBAN. Therefore, the total energy consumed by both the protocols was evaluated, while they were subjected to different conditions and were represented in the form of graphs as shown below.

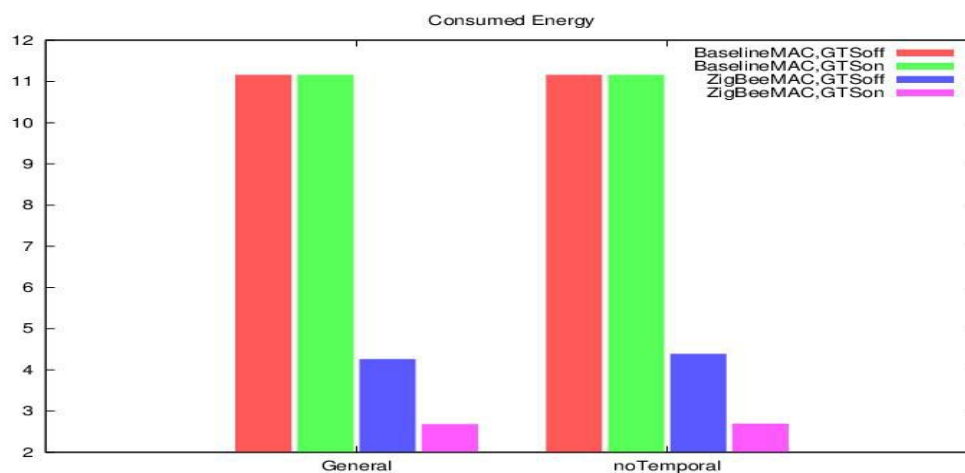


Figure 5: Consumed Energy

The results as shown in the above graphs demonstrated that the Baseline BAN MAC protocol has more energy consumption compared to the Zigbee MAC protocol. Furthermore, the temporal variations generally did not affect the energy consumption, but a significant reduction in energy consumption was observed for Zigbee MAC protocol, when GTS mode was turned ON.

CONCLUSION

In this paper, we discuss about the IEEE 802.15.6 security and the energy consumption compared to the Zigbee MAC protocol. The general and the non temporal with the different number of nodes are discussed. The



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proposed MAC algorithms are used in WBAN. It is used to dynamically adapt the BO and SO concurrently by considering the content requirements of application. The central controller PAN and coordinator compute the estimated WBAN network requirements. During the process the energy consumption and the throughput are compared with other protocols. The proposed IEEE 802.15.6 is important for the event reporting. In future, the behavior of MAC algorithm can be further extended in cluster tree topology

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