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A Review Article on Routing Protocols of Wireless Body Area Network

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Abstract: A body area network is a wireless network having wearable computing devices. Wireless body area network (WBAN) is a sub field of wireless sensor network (WSN). Wireless body area network can be used to monitor the various health parameters of human body and in this number of sensors are implanted on human body to monitor various activities like blood pressure, temperature, heart rate etc. In this paper we define two routing protocols that is cluster based routing protocol and temperature based routing protocol. Among these two we find that temperature based routing is better.

Index terms: Body area network, wireless sensor network, routing protocols, energy efficiency, cluster heads.

1. INTRODUCTION

Wireless sensor network composed of large number of tiny sensors that are capable of transmitting sensing via wireless links. Wireless sensor network is a wireless device that is used to monitor certain types of applications some of them are like environment monitoring [1] agriculture field monitoring and smart phones. Wireless body area network is a sub field of wireless sensor network. A key application in wireless body area network is health monitoring .In health monitoring application sensors are implanted on the human body to monitor parameters like blood pressure, blood temperature, heart rate, etc. By using this technique in hospital it reduces the patient expenditure. A wireless body area network can be situated in the clothes, or on the human body or inside the skin.

A single network of wireless body area network can be treated as personal sensor network "PSN .With the help of wireless body area body area network patients are monitored regularly without headache of doctors to go and visit in patients room. There are some disadvantages in wireless body network. The major disadvantage in wireless body area network is to recharge the batteries. The basic need is some energy efficient routing protocol [2] [3][4] so that we can continuously monitor the health of patients for longer duration. Different layers used different techniques so make a network more efficient. There are many error control techniques such as automatic repeat requests (ARS) and foward error correction (FEC) that is used in physical and data link layers so it can make more energy efficient. In wireless terminals, data transmission starting and stopping time schemes can be used so it can facilitate switching within different operations.

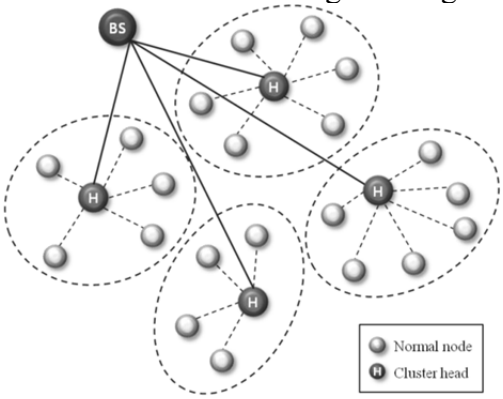
Moreover a fixed time slot can be given for receiving or transmission so with the help of this fixed time slot it can also reduce energy consumption up to some extent. A wireless body area network can be used in number of applications where we can store our personal information and can be share with other individual or central database. A typical wireless radio is operates in four parameters: transmit, receive, sleep and idle mode. In the transmission mode maximum energy is consumed and in the sleeping mode least energy is consumed. To make it more energy efficient circuits can be partially turned off during its idle mode.

2. Routing protocols in Wireless body area network

2.1. Cluster Based Energy Aware Routing protocol in WBAN

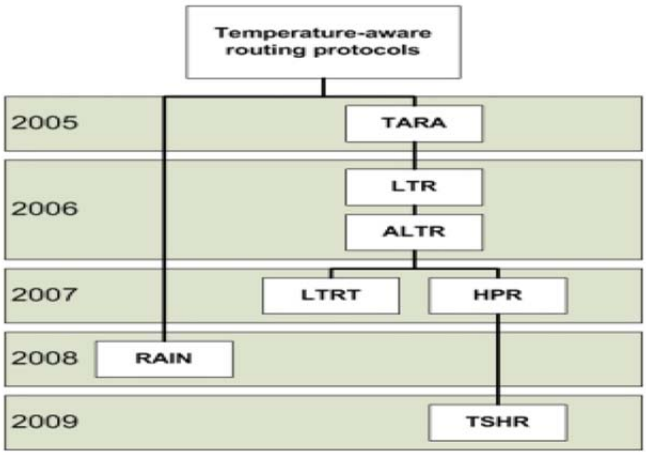
Various energy efficient a protocol has been proposed to increase the efficiency of protocols, clustering is one of them. Clustering is a technique which helps to decrease the consumption of energy in sensor nodes. In Cluster based routing protocol there are eight sensor nodes that placed on human body. In cluster based routing, if the previous one cluster has not spent more energy and still has left some energy that is remaining and that remaining energy is larger than threshold level then we use it again by making it cluster head for next round .In this way energy is saved which we wasted to select the new cluster head but if the cluster head has energy that is less than threshold level then it is replaced by new cluster head and then the replaced cluster has large energy than threshold level.

A cluster based routing protocol is a protocol that uses clusters for communication instead of direct communication to their base station. In the cluster based body area protocol, the network is divided into different regions. In each and every region the cluster head is responsible for collecting information from the sensor nodes. The cluster head and the cluster method were proposed so we can reduce the distance of transmission and we get a energy efficient, better throughput results. In cluster based protocol, cluster heads are placed in each cluster and the cluster heads were selected on the neighbouring nodes basis.



2.2. Temperatures Aware Routing Protocol

In the temperature aware routing protocol it takes node temperature as a main parameter to take decision in routing path. The propose of this routing protocol is to slow down the rate of rise temperature and to keep the node temperatures below down the safety temperature level which helps to keep the human body safe?



(a) TARA (Thermal Aware Routing Algorithm)
This is the first routing algorithm that introduced the temperature as a metric in routing protocol. TARA considers two sources as a major source of heat that is power dissipation and antenna radiation of node circuitry. Here in TARA it is assumed that there is no temperature sensors are takes place in inside the node.

(b) LTR (Least Temperature Routing)
This protocol is based on TARA protocol. Its setup phase is similar to TARA: every node communicates to their neighbours and gathers information about temperature by observing all the activities. The improvement in LTR is lies here only in how the packet is forwarded in the network.

(c) ALTR (Adaptive Least Temperature Routing)
This is the adaptive form of LTR. In ALTR the new parameter that is introduced is named as MAX HOPS ADAPTIVE. Whenever a packet is received its hop count value is calculated. If its value is lower than MAX HOPS ADAPTIVE then packet is routed in similar way as LTR routed. If the value is greater than MAX HOP ADAPTIVE then it is routed using shortest path algorithm instead of being packet discarded.

(d) LTRT (Least Total Routing Temperature)
This is basically a hybrid between shortest hop routing algorithm and least temperature routing protocol. Basically, LTRT is designed to select the route that has minimum temperature takes place from sender to receiver. Moreover, it is designed to maintain the network bandwidth and to reduce the hop count.

(e) HPR (Hotspot Preventing Routing)
This is an improvement of ALTR and LTR. In HPR two phases takes place that is setup phase and routing phase. Its main aims are to avoid the formation of hotspot and to decrease the average packet delay. HPR routes packet from sender to destination by using minimum hops unless the packet is discarded if the hop count are exceeded by MAX_HOPs. Here in HPR packets maintain the list of recently visited nodes so it avoids loops.

(f) TSHR (Thermal Aware Shortest Hop Routing)
It is almost similar as HPR. In similar way it has two phases that is setup and routing phase and in similar way makes use of threshold. The only difference is that there are two types of threshold are introduced that is dynamic and fixed threshold.

3. Conclusion

In this paper there are two routing protocols that are cluster based routing protocol and temperature based protocol. Among these two routing protocols ,temperature based routing is found better because in temperature based routing ,temperate considers as a main temperature to evaluate any kind of results which helps to increase the performance of all types of parameters.

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