

A Novel Protocol in Media Access Control for Wireless Body Area Network

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Abstract

Monitoring vital body sign is very important in medical science and is one of the basic requirements in this branch of science. This has been done manually in the past. With technology improvement in monitoring systems, automated system is used without human intervention. In these systems, sensors connect to patient's body and received data through sensors would be transmitted through wires connected to the central data system for displaying in its monitor. In this paper, we introduce implementing a media access protocol namely PO-MAC. In this protocol collected data through sensors would be transmitted to data center node (data center service node). For proposed implemented protocol evaluation obtained power transmission values, power consumption and delay rate is compared with 2 well known protocols in this area (scope).

Keywords

Monitoring; media access control; polling; Vital signs.

1. Introduction

Sensor networks are new generation in network that usually is consisted of many numbers of cheap nodes and connection between these nodes is wireless. The main purpose in these networks is collecting environmental data surrounded network's sensors. General operation procedure in these networks is collecting required data by nodes and then transmitting toward receivers. Traffic supervision, industrial automation, robots, control-monitor protection are significant applications of sensor networks [1]. Generally nodes consisted of 3 parts sensors, data processor and wireless data transmitter. Each node in addition to transmission part can measure one or more environmental parameters such as temperature, moisture, velocity of light and sound and is able to module environmental parameters independently. Data collection points are nodes with no environmental restriction and they accomplish control, supervision and interpretation of collected data in network through processing the collected data by environmental nodes. Collected data in wireless sensor networks (WSN) can be related with respect to time and location [2]. Body sensor networks (BSN) are kind of wireless body sensor networks (WBSN). Body sensor network (BSN) is a special purpose wireless sensor which with deploying wireless sensor nodes in one's body area can measure his biologic parameters and make his remote health monitoring possible, and is available in both wearable and implantable. These

systems also supervise physical activities such as environmental parameters. These systems with representing some services like medical supervision, offering medical and pharmaceutical information, enhancing people memory, controlling home-based devices and communicating in emergency cases can be a great help for people. Existing sensors in network are portable and tiny. Each sensor node usually is capable of receiving one or more vital sign and processing them, storing processed data and transmitting those data to other sensor nodes and or wireless body sensor network (WBSN) server. BSN has smaller number of nodes in comparing WBSN and it has a major effect on reducing power consumption, processing, storage, communicating sources, precision, throughput and transmission delay. Reason for the importance of applying BSN in medical world is exclusive opportunity made by these networks that has transferred medical care from hospitals to the patient's home [3], [4]. In recent years, vital body sign monitoring is proposed as a health wireless network application. Vital body sign monitoring tools that mostly are applied in health and medical centers have made an almost undesirable situation for patients because of their large electronic parts and connection through wires to the other sensors. This situation is due to factors like limited moving option and visible tools on patient's cloth. Part (A) is shown general LAN network used in health centers; where in these networks sensors transmit data through wire to data control center and then data will be sent to receiver unit through wire. In traditional network, implemented control unit is really irritating because of the wires used for connection. For creating WSN tiny connectable sensors is required capable of communicating with wireless data receiving section [7], [11]. In part (B) Fig. 1, wireless network in health center is shown. In this state sensors are equipped to wireless receiver-transmitter and transfer data to data center. Wireless control section that receives data through wireless sensors will transfer received data to receiving section for monitoring [7].

In this paper we describe implementing media access protocol in a wireless system which contains sensor nodes and central node for receiving data. Taking into account that nodes are wireless and with increasing number of sensor nodes in network, preventing collision of dispatched signals from nodes is critical. This implementation tries to describe