ABSTRACT

Wireless Body Area Network (WBAN) is a subclass of Wireless Sensor Networks (WSN) where WSN uses IEEE 802.15.4-based protocols. The protocol used in the WBAN is IEEE 802.15.6 where the protocol is the development of the IEEE 802.15.4 protocol. WBAN is a health monitoring sensor network with limited resources, so we need an energy efficiency to keep the WBAN network working for a very long time. The Medium Access Control (MAC) protocol can help in achieving a reliable and energy efficient WBAN.

The study was conducted by comparing the performance of dynamic scheduling on the protocol used in scheduling research on WBAN is IEEE 802.15.4 and IEEE 802.15.6 through two scenarios. Scenario I tests the GTS on and off method. Scenario II is done testing the best method from scenario I with the Polling method. The IEEE 802.15.4 protocol uses the Guaranteed Time Slot (GTS) off method with Carrier Sense Multiple Access-Collision Avoidance (CSMA-CA) for regular data transmission and GTS on with Time Division Multiple Access (TDMA) for sending priority data. The latest method used by the IEEE 802.15.6 protocol has a Polling system for sending data. Performance analysis test uses the Quality of Services (QoS) performance evaluation parameters, energy efficiency, and fairness index.

The results of the study show that each protocol performance has different advantages depending on its use. The use of the IEEE 802.15.4 protocol with GTS on is better for sensors with low data rates (<5 Kbps), where the average throughput increases by 36.5% and 30% energy efficient. Whereas GTS off has the advantage of smaller packet loss at the number of nodes <6, faster latency, and fairness index approaching 1. In sensors with high data rates (> 5 Kbps), the IEEE 802.15.6 protocol is better because it has data saturation a high rate with an increase in average throughput of 78.5%, faster latency, smaller packet loss, energy efficiency by 75%, and a fairness index close to 1.

Keywords: WBAN; MAC; IEEE 802.15.4; IEEE 802.15.6; GTS; Polling.