Three-Tier WBAN Communication: Design and Performance Evaluation

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Abstract: *Recent technological advancement in wireless communication has led to the invention of wireless body area networks (WBANs), a cutting-edge technology in healthcare applications.*

WBANs interconnect with intelligent and miniaturized biomedical sensor nodes placed on human body to an unattended monitoring of physiological parameters of the patient. These sensors are equipped with limited resources in terms of computation, storage, and battery power. The data communication in WBANs is a resource hungry process, especially in terms of energy. One of the most significant challenges in this network is to design energy efficient next-hop node selection framework. Therefore, this paper presents a green communication framework focusing on an energy aware link efficient routing approach for WBANs (ELR-W). Firstly, a link efficiency- oriented network model is presented considering beaconing information and network initialization process. Secondly, a path cost calculation model is derived focusing on energy aware link efficiency. A complete operational framework ELR-W is developed considering energy aware

next-hop link selection by utilizing the network and path cost model. The comparative performance evaluation attests the energy-oriented benefit of the proposed framework as compared to the state- of-the-art techniques. It reveals a significant enhancement in body area networking in terms of various energy-oriented metrics under medical environments.

Keywords: Wireless Body Area Networks (WBANs), health care applications, Energy aware link efficient routing approach (ELR-W), Next-hop node selection framework ,wearable sensors, routing protocol