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Delay Tolerant Routing Protocol Modeling for Low Power Wearable Wireless Sensor Networks

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Abstract: A structural model for packet store-and-forward routing protocols in Wireless Body Area Networks (WBAN) is presented in this paper. WBAN has been experimentally constructed in order to illustrate and capture on-body topology disconnections. The discontinuity of the topology outcomes of the presence of ultra-short transmission range radio links, unexpected Radio Frequency (RF) attenuation, and the mobility of the human posture. Energy harvesting model for ultra-short transmission range on-body sensor is proposed. Then, these sensors are used for demonstrating delay techniques for evaluating on-body single-copy Delay Tolerant Network (DTN) packet routing protocols. In this paper, source-to-destination packet routing delay for different protocols like, opportunistic, random-based, utility-based and other protocols that capture multi-scale neighborhoods in human postural mobility has been constructed and evaluated. Then, performance results of the proposed protocols are evaluated experimentally and compared with the results obtained via the model that is developed. Through multi-scale modeling of the on-body spatio temporal neighborhood of the link disconnection patterns, it is shown that the proposed protocols can provide enhanced routing performance compared with a number of existing opportunistic, utility and random based DTN packet routing protocols.