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Probabilistic Routing in On-body Sensor Networks with Postural Disconnections

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Abstract: This paper presents a novel store-and-forward packet routing algorithm for Wireless Body Area Networks (WBAN) with frequent postural partitioning. A prototype WBAN has been constructed for experimentally characterizing on-body topology disconnections in the presence of ultra short range radio links, unpredictable RF attenuation, and human postural mobility. A probabilistic packet routing protocol is then developed using a stochastic link cost, reflecting the body postural trends. The performance of the proposed protocol is evaluated experimentally and via simulation, and is compared with a generic probabilistic routing protocol and a specialized on-body packet flooding mechanism that provides the routing delay lower-bounds. It is shown that via successful modeling of the spatio-temporal locality of link disconnection patterns, the proposed algorithm can provide better routing delay performance compared to the existing probabilistic routing protocols in the literature.