

Clustering routing based on link quality estimation for disaster monitoring sensor network

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Abstract: The link quality of a wireless link under a disaster monitoring scenario is strongly uncertain. This uncertainty leads to characteristics of intermittent or regional connection and may further result in unstable or failed transmission of data. A clustering routing algorithm based on link quality is proposed to resolve this problem. Firstly, a link quality estimation model based on GBDT (Gradient Boosting Decision Tree) algorithm is constructed to determine the PRR (Packet Reception Rate) based on RSSI (Received Signal Strength Indication), LQI (Link Quality Indicator) and SNR (Signal to Noise Rate). Then clusters are established based on the estimated PRR to implement efficient data transmission among clusters. Afterwards two algorithms with power adaption ability, named LQE-PA for single hop and LQE-PAMH for multi-hop, are proposed. They include such indicators such as link quality and node residual energy and can transform a low quality link to a high quality one by power adaption transmission. The simulation results show that the algorithm outperforms other algorithms in terms of packet transmission success rate, network lifetime and network throughput.