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ENERGY EFFICIENT SENSOR-TO-SINK ROUTING ALGORITHM FOR WIRELESS SENSOR NETWORKS

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Abstract

Energy-efficient forwarding becomes important if resourcesand battery lifetime are limited such as in WirelessSensor Networks (WSNs).Beyond these inherentlimitations, both the possibility of node mobility and energy conserving protocols that power down nodesintroduce additional complexity to routing protocols that depend on up to date routing or neighborhoodtables. Geographic routing is an attractive localized routing scheme for WSNs due to its desirablescalability and efficiency. Maintaining neighborhood information for packet forwarding can achieve a high efficiency in geographicrouting, but may not be appropriate for WSNs in highly dynamic scenarios where network topology changes frequently due to nodesmobility and availability.We propose an online routing scheme, which can provide loop-free, fully stateless, energy-efficient sensor-to-sink routing at a low communication overhead without the help ofprior neighborhood knowledge. Each node first calculates its ideal next-hop relay position on the straight line toward the sinkbased on the energy-optimal forwarding distance, and each forwarder selects the neighbor closest to its ideal next-hop relay positionas the next-hop relay using the Request-To-Send/Clear-To-Send (RTS/CTS) handshaking mechanism.Simulation results and theoretical analysis show that ourscheme significantly outperforms existing protocols in wireless sensor networks with highly dynamic network topologies.

Keywords: Geographic routing, greedy forwarding, beaconless routing, discrete delay.