Guidelines for Student Reports

ROUTING IN WIRELESS SENSOR NETWORKS (WSNs) USING SMART ANTENNAS

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Abstract

Mainstream WSNs nodes are usually equipped with omnidirectional antennas so the transmission energy is irradiated uniformly throughout the space surrounding the node and a sensible amount of energy is wasted if the sender requires to communicate only with a subset of the nodes in its physical proximity. In several applications, the network nodes are randomly deployed, therefore the whole wireless architecture should be characterized by a highly-dynamic and reconfigurable topology for guaranteeing an energy-efficient transmission. In such a framework, the adoption of a smart system at the wireless communication interface is a possible solution not only for RF-energy saving, but also, for maximizing the efficiency in the data exchange among the network nodes, increasing the network coverage and connectivity, and for implementing additional functionalities useful for improving (at the physical layer) the security and privacy. These systems generally provide higher SINR by directing the beam pattern towards the direction of the desired signals and by placing suitable nulls of the radiation pattern along the interferers. The integration of smart antennas in wireless sensor networks is a challenging for improving the system capacity, the quality of service, and the power control.

Moreover, the software layers controlling the smart antenna configurations are mostly missing, notably including dedicated routing schemes that leverage off the antenna's functionality to build efficient multi-hop routing paths.

The goal of this thesis is to address the above challenge, by devising a routing solution for WSNs using a novel parasitic elements smart antennas system developed within our department.

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