WHOO - WSN Hybrid rOuting prOtocol

The recent technological advances in electronics and wireless communications have made possible the realization of tiny inexpensive autonomous devices capable of monitoring physical or environmental conditions which can communicate with each other, typically using a radio transceiver, organizing themselves to form a Wireless Sensor Network (WSN), capable of routing measurement data toward the end user.

WSNs have a number of features that make them a huge improvemente over raw sensors installations. Raw sensors' position must be determined before deployment, while a WSN allows a random node deployment, making it a simple and quick operation: this is made possible by the self-organizing capabilities of WSNs' protocols. Another feature of WSN is the computational power of nodes: they do not send raw data to users as raw sensor do, instead they can process and transmit the required and partially processed data only, granting a lower bandwidth cost and higher performance. These features make WSN apt for a wide range of applications: surveillance, fire detection, mapping of the environment, precision agriculture, monitoring of human physiological data, drug administration, home automation, nuclear and biological attack detection and many others.

At the same time, ever-increasing widespread Mobile Ad-hoc NETworks (MANETs) are opening brand new opportunities in environmental monitoring. WHOO proposes an original solution for WSN/MANET integration based on the primary design guideline of opportunistically exploiting MANET overlays impromptu formed over the WSN to improve and boost the data collection task of typical WSN. On the one hand, WHOO adopts a cross-layer approach that exploits MANET connections to differentiate and speed up the delivery of sensed urgent data by pushing them over low-latency MANET paths. On the other hand, it takes advantage of local cross-layer visibility of the WSN data collection procedures and protocols to carefully control and limit WSN-MANET coordination overhead. WHOO can obtain significant QoS improvements via differentiation, by granting faster delivery times to urgent data with a very limited cost in most common execution scenarios.

WHOO (WSN Hybrid rOuting prOtocol) is a project developed at the Laboratory of Advanced Research on Computer Science, University of Bologna that tackles these problems proposing novel solutions that enables opportunistic MANET-WSN integration to enable QoS-differentiated routing on WSNs.

More informations about the architecture of WHOO can be found in the architecture and documentation sections.