ABSTRACT

There are many works related to wireless sensor networks (WSNs) where authors present new protocols with better or enhanced features, others just compare their performance or present an application, but this work tries to provide a different perspective. Why don't we see the network as a whole and split it into groups to give better network performance regardless of the routing protocol?

For this reason, in this thesis we demonstrate through simulations that node's grouping feature in WSN improves the network's behavior. We propose the creation of a group-based architecture, where nodes have the same functionality within the network. Each group has a head node, which defines the area in which the nodes of such group are located. Each node has a unique node identifier (*nodeID*). First group's node makes a group identifier (*groupID*).

New nodes will know their *groupID* and *nodeID* of their neighbors. End nodes are, physically, the nodes that define a group. When there is an event on a node, this event is sent to all nodes in its group in order to take an appropriate action. End nodes have connections to other end nodes of neighboring groups and they will be used to send data to other groups or to receive information from other groups and to distribute it within their group. Links between end nodes of different groups are established mainly depending on their position, but if there are multiple possibilities, neighbor nodes could be selected based on their ability λ, being λ a choice parameter taking into account several network and nodes parameters. In order to set group's boundaries, we can consider two options, namely: i) limiting the group's diameter of a maximum number of hops, and ii) establishing boundaries of covered area.

In order to improve the proposed group-based architecture, we add collaboration between groups. A collaborative group-based network gives better performance to the group and to the whole system, thereby avoiding unnecessary message forwarding and additional overheads while saving energy. Grouping nodes also diminishes the average network delay while allowing scaling the network considerably. In order to offer an optimized monitoring process, and in order to offer the best reply in particular environments, group-based collaborative systems are needed. They will simplify the monitoring needs while offering direct control.

Finally, we propose a marine application where a variant of this group-based architecture could be applied and deployed.