

Energy efficient Two Stage Chain Routing Protocol (TSCP) for wireless sensor networks

ABSTRACT

Wireless sensor nodes are mostly used in extreme environments, especially at remote and hostile areas including battlefield, volcanoes and underwater. Thus, it is difficult to replenish the energy source of the sensor node once it is installed. In order to prolong the lifetime of the nodes, we propose a new routing algorithm that can achieve significant energy conservation in WSNs, known as Two Stage Chain Routing Protocol (TSCP). The main objectives of TSCP is to minimize the total energy consumption, achieve more load balancing and increase the network lifetime with more stability compared with other routing algorithms, for examples Chain-Cluster based Mixed routing (CCM) and Chain-Chain Based Routing Protocol (CCBRP). TSCP algorithm divides the sensor network into multiple chains and work within two stages. The first stage is dividing the nodes to horizontal chains that include all sensor nodes within the same row and the second stage is forming a vertical chain that includes all chain heads. The mechanism for selecting the heads in each row is sequentially chosen with all the heads belong to the same column. In the second stage, the node with maximum residual energy amongst the chain heads will be the main head that functions as a gateway to the base station. Simulation results show that TSCP outperforms CCM and CCBRP in overall energy conservation, network lifetime and stability.

Keyword: Wireless sensor network; TSCP; CCM; CCBRP; Chain protocol