

## Enhancing the stability of the improved-LEACH routing protocol for WSNs

### ABSTRACT

Recently, increasing battery lifetime in wireless sensor networks has turned out to be one of the major challenges faced by researchers. The sensor nodes in wireless sensor networks use a battery as their power source, which is hard to replace during deployment. Low Energy Adaptive Clustering Hierarchy (LEACH) is one of the most prominent wireless sensor network routing protocols that have been proposed to improve network lifetime by utilizing energy-efficient clustering. However, LEACH has some issues related to cluster-head selection, where the selection is done randomly. This leads to rapid loss of energy in the network. Improved LEACH is a LEACH alternative that has the ability to increase network lifetime by using the nodes' residual energy and their distance to the base station to select cluster-head nodes. However, Improved LEACH causes reduced stability, where the stability period is the duration before the death of the first node. The network stability period is important for applications that require reliable feedback from the network. Thus, we were motivated to investigate the Improved LEACH algorithm and to try to solve the stability problem. A new protocol is proposed in this paper: Stable Improved Low Energy Adaptive Clustering Hierarchy (SILEACH), which was developed to overcome the flaws of the Improved LEACH protocol. SILEACH balances the load between the nodes by utilizing an optimized method that considers the nodes' distance to the base station and their residual energy to select the cluster-head nodes and considers the nodes' distance to the cluster head and the base station to form clusters. The simulation results revealed that SILEACH is significantly more efficient than Improved LEACH in terms of stability period and network lifetime.

**Keyword:** Improved LEACH; Network lifetime; Node stability; SILEACH; WSN