A Stable CoveringSet-based Leader Election Algorithm (SCLEA) for Mobile Ad hoc Distributed Systems

Abstract

Leader election process is known as the task of selecting a particular node or a process to be a unique leader of the distributed system. Many algorithms were proposed for leader election in classical, wired distributed systems. However, with the advent of wireless communication technology, the domain of distributed computing becomes much wide, and the concept of leader election in such environments has been changed due to the dynamic topology resulted from nodes' mobility. The existing classical leader election algorithms do not adapt well in mobile ad hoc environments. In this paper, we propose a new leader election algorithm that is conscious about nodes' mobility and the dynamic topology of ad hoc networks. The main idea of our algorithm is to select a subset of the nodes to participate in the election process, the selected nodes should ensure coverage of other nodes and that are of low mobility. We show through mathematical analysis that our proposed algorithm, the "Stable CoveringSet-Based Leader Election Algorithm (SCLEA)" outperforms any other algorithm that depends on the simple flooding to perform leader election. The enhancement of our algorithm is advent in terms of reducing the message overhead associated with leader election process and minimizing the number of redundant ELECTION messages as much as possible.

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