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Octopus: A Fault-Tolerant and Efficient Ad-hoc Routing Protocol

Roie Melamed
CS Department, Technion

Idit Keidar
EE Department, Technion

Yoav Barel
EE Department, Technion

Abstract

Mobile ad-hoc networks (MANETs) are failure-prone environments; it is common for mobile wireless nodes to intermittently disconnect from the network, e.g., due to signal blockage. This paper focuses on withstanding such failures in large MANETs: we present Octopus, a fault-tolerant and efficient position-based routing protocol. Fault-tolerance is achieved by employing redundancy, i.e., storing the location of each node at many other nodes, and by keeping frequently refreshed soft state. At the same time, Octopus achieves a low location update overhead by employing a novel aggregation technique, whereby a single packet updates the location of many nodes at many other nodes. Octopus is highly scalable: for a fixed node density, the number of location update packets sent does not grow with the network size. And when the density increases, the overhead drops. Thorough empirical evaluation using the *ns2* simulator with up to 675 mobile nodes shows that Octopus achieves excellent fault-tolerance at a modest overhead: when all nodes intermittently disconnect and reconnect, Octopus achieves the same high reliability as when all nodes are constantly up.