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Distributed patching for mobile wireless sensor networks

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Abstract:

Mobile wireless sensor networks (MWSNs), the continuous movement of sensor nodes, may cause complete disconnection of the network or at best a part of it. The design of such networks should guarantee that all sensor nodes at all times have a path to the sink node(s). Prolonging the lifetimes of the MWSN is a crucial design issue but should not be at the expense of other essential functions such as connectivity. In this paper, we propose an energy efficient distributed framework for connectivity maintenance of MWSNs. In the proposed framework, sensor nodes of the MWSN schedule and control their radio frequency (RF) modules based on a dynamic coordinated reconstruction mechanism, some sensor nodes may lose their connectivity with the network due to mobility, depletion of energy and/or incurred faults. Two protocols are developed to patch up the disconnection of the MWSNs. The first protocol reestablishes the network connection consuming far less energy than state-of-the-art alternatives. However, it is capable of reestablishing the connection when no more than 20% of the MWSN backbone nodes lose connection concurrently. The second protocol extends this limit to operate when up to 35% of the MWSN backbone nodes lose connections simultaneously.

Keywords:

Mobile wireless sensor networks Patching up network backbone Energy efficient Connectivity Minimum connected dominating set

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