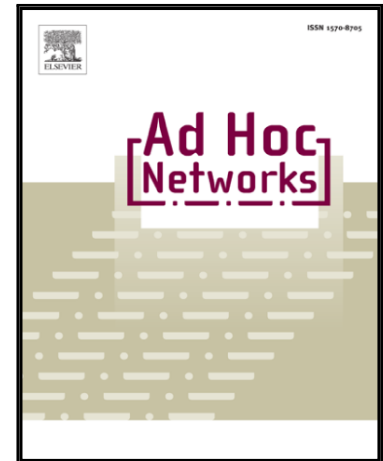


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Neighbor Oblivious and Finite-State Algorithms for Circumventing Local Minima in Geographic Forwarding[☆]

Chandramani Singh^{a,*}, Santosh Ramachandran^b, S. V. R. Anand^c, Malati Hegde^c, Anurag Kumar^c, Rajesh Sundaresan^c

^aDepartment of ESE, Indian Institute of Science, Bangalore, India

^bQualcomm Corp. R&D La Jolla, California, USA

^cDepartment of ECE, Indian Institute of Science, Bangalore, India

Abstract

We propose distributed link reversal algorithms to circumvent communication voids in geographic routing. We also solve the attendant problem of integer overflow in these algorithms. These are achieved in two steps. First, we derive partial and full link reversal algorithms that do not require one-hop neighbor information, and convert a destination-disoriented directed acyclic graph (DAG) to a destination-oriented DAG. We embed these algorithms in the framework of Gafni and Bertsekas [1] in order to establish their termination properties. We also analyze certain key properties exhibited by our neighbor oblivious link reversal algorithms, e.g., for any two neighbors, their t -states are always consecutive integers, and for any node, its t -state size is upper bounded by $\log(N)$. In the second step, we resolve the integer overflow problem by analytically deriving one-bit full link reversal and two-bit partial link reversal versions of our neighbor oblivious link reversal algorithms. We also discuss the work and time complexities of the proposed algorithms.

Key words: Wireless sensor networks, Routing protocols, Link reversal, Distributed algorithms, Finite bit width

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*Corresponding author

Email addresses: chandra@dese.iisc.ernet.in (Chandramani Singh)

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