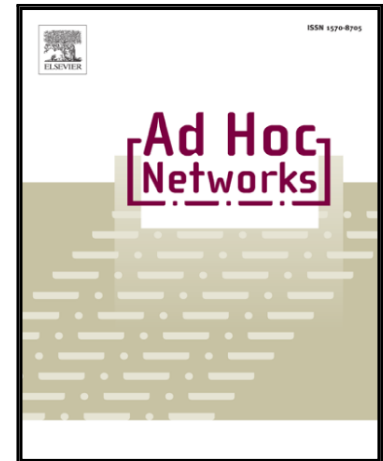


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On the Rate of Successful Transmissions in Finite Slotted Aloha MANETs

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Abstract

Mobile ad hoc networks (MANETs) with Aloha MAC protocol (A-MANETs) represent a class of important and attractive networks. This paper studies the Rate of Successful Transmissions (RST), a performance index that measures the average amount of successful transmissions, in a practical A-MANET with finite number of nodes and a class of “uniform-type” mobility models. We first develop a new theoretical framework for the temporal modeling of the concerned finite A-MANET, and prove that as time evolves the network converges in distribution to a Binomial point process. With the help of the convergence property of the network and stochastic geometry theory, we then provide our analysis on the RST. In particular, we show that although it is highly cumbersome (if not impossible) to derive the exact expression for the RST of the concerned network, it is possible to have very efficient approximations to the RST under the typical nearest neighbor/receiver transmission policy, which are accurate up to an additive asymptotic error vanishing ex-

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