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Optimal Multicast Capacity and DelayTradeoffs in MANETs

Abstract:

In this paper, we give a global perspective of multicast capacity and delay analysis in Mobile Ad Hoc Networks (MANETs). Specifically, we consider four node mobility models: (1) two-dimensional i.i.d. mobility, (2) two-dimensional hybrid random walk, (3) one-dimensional i.i.d. mobility, and (4) one-dimensional hybrid random walk. Two mobility time-scales are investigated in this paper: (i) fast mobility where node mobility is at the same time-scale as data transmissions and (ii) slow mobility where node mobility is assumed to occur at a much slower time-scale than data transmissions. Given a delay constraint D, we first characterize the optimal multicast capacity for each of the eight types of mobility models, and then we develop a scheme that can achieve a capacity-delay tradeoff close to the upper bound up to a logarithmic factor. In addition, we also study heterogeneous networks with infrastructure support.