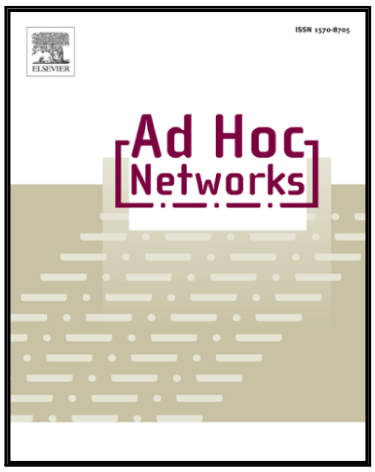

Optimizing Floor Reservation and Contention Resolution in Wireless Random Access

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PII: S1570-8705(18)30548-1
DOI: https://doi.org/10.1016/j.adhoc.2018.08.001
Reference: ADHOC 1731

To appear in: *Ad Hoc Networks*

Received date: 30 May 2017
Revised date: 27 June 2018
Accepted date: 2 August 2018

Please cite this article as: Mohammad Hossein Bateni, S. Jamaloddin Golestani, Ali Mohamad Doost Hoseini, Optimizing Floor Reservation and Contention Resolution in Wireless Random Access, *Ad Hoc Networks* (2018), doi: https://doi.org/10.1016/j.adhoc.2018.08.001

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Abstract

In this paper, we propose a novel *wireless random access scheme*, combining the CSMA/CA mechanism with two control signals for initiating new transmissions and announcing receiver busy status, respectively. We also develop a *time-space framework* of performance analysis, enabling separate study of the temporal and spatial efficiency of the random access, i.e. the scheme's ability for contention resolution and efficient performance in time, and its ability to provide for concurrent transmissions in space. Based on this framework and using both analysis and simulation, we show that the proposed scheme outperforms the IEEE 802.11 DCF, in terms of the overall afforded throughput, and also in terms of the temporal or spatial aspects of performance, when considered alone. The proposed scheme introduces a new approach to wireless random access problem, which can help fulfill the targeted requirements of future networks.

Keywords: Wireless Random Access, Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), Floor Reservation, Request Pulse (RP).