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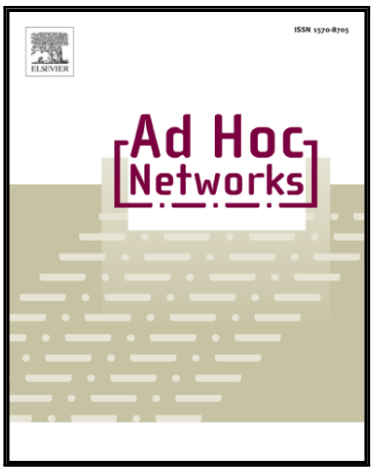


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# A Novel Contention/Reservation Medium Access Control Scheme for Single-Hop Wireless Networks

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**Abstract—The major challenge pertaining to single-hop wireless networks is to design a medium access control (MAC) scheme to efficiently utilize the scarce wireless bandwidth; whereas the most popular solution, IEEE 802.11 distributed coordination function, achieves only limited performance because of the considerable idle time and the high rate of transmission collisions caused by the backoff procedure at high loads. In this paper, we propose a novel contention/reservation MAC scheme, which aims at ensuring low control overheads and collision-free data transmission to maximize system performance. Our scheme provides an efficient control contention resolution algorithm which resolve one or at least one successful reservation in a time frame, thus only a few numbers of control minislots are necessary for a number of active mobile stations contending for reservations. Moreover, with the help of the broadcast messages from the Access Point, all mobile stations determine a nearly-round-robin and collision-free data transmission schedule in a distributed manner, and also implicitly resolves the well-known hidden terminal problem. Extensive simulation results demonstrate that the proposed MAC scheme achieves exceptional system performance under a wide range of traffic loads and various system parameters, and also shown to be robust even when under attack by malicious mobile stations.**

***Index Terms*—IEEE 802.11 distributed coordination function (DCF), Wireless local area network (WLAN), Contention-resolution algorithm, Medium Access Control (MAC).**

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