

Contention Window Adjustment in IEEE 802.11-based Industrial Wireless Networks

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Abstract : The use of wireless technology in industrial networks has gained vast attraction in recent years. In this paper, we have thoroughly analyzed the effect of contention window (CW) size on the performance of IEEE 802.11-based industrial wireless networks (IWN), from delay and reliability perspective. Results show that the default values of CWmin, CWmax, and retry limit (RL) are far from the optimum performance due to the industrial application characteristics, including short packet and noisy environment. An adaptive CW algorithm (payload-dependent) has been proposed to minimize the average delay. Finally a simple, but effective CW and RL setting has been proposed for industrial applications which outperforms the minimum-average-delay solution from maximum delay and jitter perspective, at the cost of a little higher average delay. Simulation results show an improvement of up to 20%, 25%, and 30% in average delay, maximum delay and jitter respectively.

Keywords : average delay, contention window, distributed coordination function (DCF), jitter, industrial wireless network (IWN), maximum delay, reliability, retry limit

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