Reducing delay and jitter for real-time control communication in Ethernet

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***Abstract*—The aim of this paper is to develop an approach for cheap and deterministic control communication using Ethernet. A half-duplex Ethernet network populated with a small/medium number of Media Access Controllers (MACs) is used for timed real-time communication. Data packages are sent at well defined times to avoid collisions. Collisions mainly occur due to jitter of the transmitter system, so that arbitration (similar to CANopen) is necessary. In this paper, simulation models using a Binary Exponential Backoff (BEB) scheme and a Linear Backoff scheme are developed. This paper analyzes and investigates how the backoff time affects the performance of the Carrier Sense Multiple Access protocol with Collision Detection (CSMA/CD) in a basic Media Access Controller (MAC), in terms of data arrival characteristics, i.e jitter and delay. We propose to assign different minimal back-off times for each of the CSMA/CD controller units to minimize packet collisions. Simulated tests show the advantage of our approach over a standard CSMA/CD setting.**

***Keyword*—CSMA/CD, Ethernet, Binary Exponential Backoff, Linear Backoff, network model.**

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