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Prolonging wireless HART network lifetime using packet aggregation

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Wireless sensor networks are becoming more and more adopted into industrial plants and Wireless HART is the first wireless sensor network standard to emerge, which specifically is designed to support the specific requirements posed by the industry. Automation industry requires wireless sensor network devices to have a very long lifetime, often up to 5 - 10 years without a battery change. This puts requirements on how the wireless sensor network technology should be designed to minimize energy consumption while still fulfilling the application requirements. Packet aggregation is an essential technique in mission critical wireless sensor networks for achieving effective transmission and hence better power conservation. In this article we propose a flexible packet aggregation scheme for Wireless HART which reduces energy consumption of each device. The proposed scheme only requires a minor change to the Wireless HART standard but still preserves the end-to-end security and retains backward compatibility with non aggregating devices. We show by calculations that our proposed packet aggregation solution reduces energy consumption for a network by up to 50%, which will result in a significant increase in lifetime of Wireless HART devices.

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