Abstract

We describe a model for energy-efficient communication over wireless sensor networks, inspired from nature, where timing and silence are used to convey information. This model employs pulse communication, where nodes can either emit a pulse or remain silent. The pulse conveys no information except for its existence. We calculate the average and worst case communication complexity for binary symmetric functions and construct protocols that achieve them. We also discuss extensions over higher input alphabets. We then study the tradeoff between energy efficiency, calculated as number of required pulses, and delay to compute a function. We show that, depending on the application, our model can outperform the traditional approach in either of these aspects.