

Performance Analysis of Sensor Networks by using finite-source queueing systems

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The main aim of the present paper is to investigate the wireless transmission problem in sensor networks. We investigate a generalized model for the performance evaluation of wireless sensor networks. In order to study the performance measures and characteristics, a finite source retrial queueing model is introduced. The main goal is to investigate the relationship between the performance and the energy usage of the sensor network. The requests have two classes: Emergency request for urgent events and Normal requests for the other events. The RF unit can be in ON and OFF states.

For energy efficiency two operations are compared. In the first case, when the RF unit is in ON state the emergency request goes to the idle RF unit or joins the queue. When the RF unit is in OFF state, the emergency request waits for the end of the OFF state period in the queue. Normal requests can access only the idle, ON state RF unit. Other cases they join the orbit. In the second case the emergency requests can wake up the RF unit, which will start the service after a given initialization time. This initialization period can be not necessarily exponentially distributed (as in previous models [2]). A constant time is closer to the real applications.

The steady-state performance measures and probabilities are given by the help of a simulation tool.

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