An intelligent protocol to channel assignment in wireless sensor networks: Learning automata approach

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ABSTRACT

The optimal consumption of energy is one of the most important aims in Wireless sensor networks. Among influential factors in reducing the energy consumption ratio, we can mention intelligent allocation of channel to node and sending the data with the least rate of interference with other nodes. The successful execution of this act by MAC sub-layer depends on determining optimal values for factors such as percentage of duty cycle, random time to retest the channel an etc. Duty cycle, defined as the ratio of listening period to total period of listening and sleeping, is of great importance as the parameter of regulating node sleeping and listening time for ideal consumption of energy. There is presented an algorithm based on learning automat, called LA-MAC, which tries to reduce energy consumption by regulating optimally the duty cycle value, thereby increasing the lifetime of network. In this algorithm, each node is equipped with a learning automat which determines the value of duty cycle in terms of residual energy and preconfigured lifetime. The results of simulation in the environment of NS simulator confirm the efficiency of LA-MAC from four factors of the death time of the first node, end-to-end delay, average network lifetime and the number of survived nodes at the end of simulation, performed in two different scenarios while compared with A-MAC and S-MAC with various duty cycles.

INDEX TERMS

- **INSPEC**
  - **Controlled Indexing**
    access protocols , channel allocation , learning automata , wireless sensor networks
  - **Non Controlled Indexing**
    A-MAC , LA-MAC , MAC sub-layer , S-MAC , channel assignment , duty cycle value , energy consumption , intelligent protocol , learning automata approach , network lifetime , wireless sensor networks
- **Author Keywords**
  channel assignment , duty cycle , learning automat , wireless sensor networks