

## **Review of energy conservation using duty cycling schemes for IEEE 802.15.4 wireless sensor network (WSN)**

### **Abstract**

Energy conservation is one of the crucial issues in wireless sensor network (WSN). A significant solution to conserve energy is done by deploying duty cycle management mechanisms in the WSN applications. This paper reviews several duty cycle mechanisms in WSN such as Duty Cycle Learning Algorithm, adaptive media access control (MAC) protocol for efficient IEEE 802.15.4 (AMPE), distributed duty cycle management (DDCM), distributed duty cycle management low power broadcast (DDCM + LPB) and distributed beacon only period. These mechanisms change their parameters such as idle listening, packet accumulation and delay in the end device transmitting queue to improve the energy conservation in WSN. The performances of these different energy conservation mechanisms have been compared at the MAC layer of IEEE 802.15.4 standard. It is found that the DDCM + LPB has made approximately 100 % enhancement in terms of average energy efficiency as compared to the other mechanisms. DDCM + LPB has significant enhancements by adapting the duty cycle according to the network traffic load condition. Using this mechanism, the duty cycle is increased when the traffic load increases and vice versa. Its energy efficiency also outperforms the conventional DDCM by the average of 10 %.

**Keyword:** IEEE 802.15.4 standard; WSN; Duty cycle management; Energy efficiency