



















- [9] M. He, S. Cheng, T. Ma, and S. Lv, "A Bit Error Rate Optimization Method for WSN Node Energy Consumption," 2020, pp. 84–95.
- [10] B. Su, Z. Qin, and Q. Ni, "Energy Efficient Uplink Transmissions in LoRa Networks," *IEEE Trans. Commun.*, vol. 68, no. 8, pp. 4960–4972, 2020.
- [11] B. Paul, "A Novel Energy-Efficient Routing Scheme for LoRa Networks," *IEEE Sens. J.*, vol. 20, no. 15, pp. 8858–8866, 2020.
- [12] M. Nurgaliyev, A. Saymbetov, Y. Yashchyshyn, N. Kutybay, and D. Tukymbekov, "Prediction of energy consumption for LoRa based wireless sensors network," *Wirel. Networks*, vol. 26, 2020, doi: 10.1007/s11276-020-02276-5.
- [13] Y. Song, J. Lin, M. Tang, and S. Dong, "An Internet of Energy Things Based on Wireless LPWAN," *Engineering*, vol. 3, no. 4, pp. 460–466, 2017, doi: <https://doi.org/10.1016/J.ENG.2017.04.011>.
- [14] C. Tunc and N. Akar, "Markov fluid queue model of an energy harvesting IoT device with adaptive sensing," *Perform. Eval.*, vol. 111, pp. 1–16, 2017, doi: <https://doi.org/10.1016/j.peva.2017.03.004>.
- [15] Semtech Corporation, "LoRa Modulation Basics," 2015. <http://www.semtech.com/images/datasheet/an1200.2.2.pdf>, (Access Date: 25 August, 2020).
- [16] T. Bouguera, J. F. Diouris, J. J. Chaillout, R. Jaouadi, and G. Andrieux, "Energy Consumption Model for Sensor Nodes Based on LoRa and LoRaWAN," *Sensors (Basel)*, vol. 18, no. 7, p. 2104, 2018, doi: doi:10.3390/s18072104.
- [17] L. Casals, B. Mir, R. Vidal, and C. Gomez, "Modeling the Energy Performance of LoRaWAN," *Sensors (Basel)*, vol. 17, no. 10, p. 2364, 2017, doi:10.3390/s17102364.
- [18] T. Deng, J. Zhu, and Z. Nie, "An improved LoRaWAN protocol based on adaptive duty cycle," in 2017 IEEE 3rd Information Technology and Mechatronics Engineering Conference (ITOEC), 2017, pp. 1122–1125.
- [19] A. Lavric, A. I. Petrariu, and V. Popa, "Long Range SigFox Communication Protocol Scalability Analysis Under Large-Scale, High-Density Conditions," *IEEE Access*, vol. 7, pp. 35816–35825, 2019.
- [20] Y. Jaradat, M. Masoud, I. Jannoud, and D. Zaidan, "The Impact of Nodes Distribution on Energy Consumption in WSN," in 2019 IEEE Jordan International Joint Conference on Electrical Engineering and Information Technology (JEEIT), 2019, pp. 590–595.
- [21] LoRa Alliance®, "LoRa Alliance - LoRaWAN," 2020. <https://lora-alliance.org/> (Access Date: 30 August, 2020).
- [22] T. Elshabrawy and J. Robert, "The Impact of ISM Interference on LoRa BER Performance," in 2018 IEEE Global Conference on Internet of Things (GCIoT), 2018, pp. 1–5.
- [23] R. Sanchez-Iborra and M.-D. Cano, "State of the art in LP-WAN solutions for industrial IoT services," *Sensors*, vol. 16, p. 708, 2016, doi: 10.3390/s16050708.
- [24] D. M. Mount, "CMSC 754 - Computational Geometry. Lecture Notes., 2002. <http://www.cs.umd.edu/~mount/754/Lects/754lects.pdf>. (Access Date: 8 August, 2020).
- [25] B. A. da Silva and R. M. de Moraes, "Consumo de Energia em Função da Taxa de Transmissão e do Tamanho do Pacote em Redes Ad Hoc Aloha de um Salto," in *Anais do XVII Workshop em Desempenho de Sistemas Computacionais de Comunicação*, 2018, doi:10.5753/wperformance.2018.3321.