Review of: "Optimized Low-Powered Wide Area Network within Internet of Things"

Lluís Casals Ibáñez[1]

1 Universidad Politécnica de Cataluna

Potential competing interests: No potential competing interests to declare.

The authors of “Optimized Low-Powered Wide Area Network within Internet of Things” argues that they evaluated a spreading factor allocation method based on Particle Swarm Optimization Algorithm, in terms of energy-efficiency, throughput, delay, etc.

This work needs a great improvement in several points:

- Abstract: The claimed results have to be supported by the main parameters, that is, what are the conditions who allows to get this results? Moreover, a result of 2.523e-17 joules seems very low: Is it per node? Per network? Real LoRaWAN networks are not able to get these results.
- Introduction: Authors cited a great number of related works and give the their main contributions. However, some of the cited works seems not having a direct relation with the central point of the present work, that is, energy efficiency.
  The technical description of LoRaWAN is spreaded along the paper. It would be better to concentrate these details in some point about LoRaWAN introduction.
  The statement of the problem is not clear, neither specific. It is better to explain in a direct way what is proposed, even when this is supported on other previous research works, and highlight the points that make the contributions of your work novel.
- Related work: It includes a large number of cited research works, giving their main contributions. In my opinion, it needs to focus more on highlighting the points where their work overcome or improve the cited works. We can, also, find references to works without a clear or direct link to the author's journal paper.
- The methodology section contains a general description of the IoT architecture. It would be better to included this description in the introduction or in an other specific subsection focusing on IoT and LoRaWAN description. In the description of the considered parameters of the study, authors need to be more specific and clear about what cases are taken into account in their study and analysis. In this sense, it needs to be clarified what parameters has been chosen in the simulation, for example, node density, transmission power, traffic load, bandwidth, etc.
- The proposed energy model is said to be based on reference 35 (in pdf version), however, the authors need to discus the details applied in the model. Moreover, it is not clear which class of LoRaWAN devices is considered in the study (A, B or C, or all). Finally, is not clear how the optimization technic (that is, PSO algorithm) is applied to choose SF on each node. It will be interesting to include information about the distribution of SF used per node.
- Results:

- Scenario 1: Need to be clarified what is the SF used without optimization. Figure 4.2 is referring to energy consumption but the showed values seem not to match with the explained in the text. Figures 4.2 and 4.3 do not show the units of the represented values.
- Mixed traffic loads: it would be better to define the delay parameter and, also, which model of mixed traffic the authors apply in the simulation.
  The number of nodes considered to study the choosen set of parameters is very limited. A more realistic LoRaWAN scenario may consist of hundreds or even thousands of nodes.

- Errors:
  - The SF description in subsection 3.3.3 has some errors: the authors wrote 2SF instead of 2^SF, that is, 2 to the power of SF.
    Moreover, the description of LoRaWAN parameters, for example, SF, CR or bandwidth, are **copied verbatim** from reference 28 (PDF version), or 5 (web version):
    - Noreen, U., Bounceur, A., and Clavier, L. (2017). A Study of Low Power and Wide Area Network Technology. 3rd International Conference on Advanced Technologies for Signal and Image Processing (2017), (pp. 1-6). IEEE.
  - In my opinion, that is **not tolerable** for a serious work to be published in a serious journal.
  - Some references are not correct or complete, for example, reference 18.

- Ohter general issues:
  - It is better to use “Figure 1” than “Figure below”.
  - The cite or reference numbering is not the same in the web version and in the PDF version of the paper.