

**Reviewer's opinion
on Ph.D. dissertation authored by**

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entitled:

Dynamic Resource Allocation for UAV-Aided Networks

1. Problem and its impact

After the preliminary Chapters, introducing the background and main elements of the system model, the dissertation discusses five different aspects of UAV-aided networks, from Chapter 3 to 7. Chapter 3 analyses the problem of UAVs optimal location (placement). With respect to many other research approaches present in the literature at the time the activity was carried out, the topic is treated with a very good level of detail. Chapter 4 provides a minor contribution on the topic of transmit power control. Chapter 5 includes additional elements in the analysis, namely the backhaul, the presence of buildings is considered under a 3D approach, and the opportunity of solar panels. Chapter 6 then integrates the elements discussed in previous Chapters. Finally, Chapter 7 addresses the problem of mesh networking among drones, accounting jointly for front and backhauls.

To this reviewer's opinion, Chapters 6 and 7 address the most important problems of UAV-aided networks, accounting for both front and backhaul and mesh networking. The problem has both scientific and practical value, in the second case both in the context of civil and non-civil applications.

2. Contribution

The investigation of UAV-aided networks, where drone base station's role is considered in a complex and complete context including front and backhaul, multiple UAVs, mesh networking, coverage and connectivity, represents a good contribution to the scientific literature. The novelty of the work contained is fair; as the candidate states, there is a broad literature on the topic. Nevertheless, the originality of the approaches is evident. The main contribution lies in the methodology which accounts for many different factors of the scenario. The above statement is testified by the fact that the candidate has a good number of papers presented at conferences, and only few minor international journal contributions (one letter, plus one submitted paper). The most relevant contributions to the scientific literature of the candidate in the given period were on topics different from the one of the thesis.

On the other hand, from the viewpoint of the practical application of the research outcomes, the thesis contains relevant contributions. The mesh networking approach to the fleet of drones has interesting applications in the field of military UAV networks. The joint consideration of front and backhaul links brings interesting scientific and practical insights on the design of UAV networks.

3. Correctness

Methodologically, the thesis' content is very robust. This reviewer did not find flaws in the formulations. Each of the sub-topics addressed were modelled with accuracy and the results appear as strong, clear

and well justified. All statements are correct and in line with international scientific standards. In several cases the candidate does not simply implement simulations, rather he provides very well described system models, sometimes mathematically analysed. From this viewpoint, the thesis shows very high standards.

4. Knowledge of the candidate

Throughout the entire work, the candidate shows excellent knowledge of the field he addresses. The first two Chapters introduce the topic of UAV aided networks addressing all aspects which are peculiar. Some of them deal with networking aspects, others with the flying platforms he is talking about, which he characterises accurately in terms of types, energy consumption and regulatory aspects. Those parts clearly show that the candidate is in full control of the field he has addressed, not only from the networking viewpoint, but also in broader terms (ICT). From the scientific viewpoint, the choice of the models, and the approaches to investigate the topic, show that the candidate has a deep understanding of the discipline and the methodologies to be used. The list of references is wide and includes papers that are essential to the topic. The ease of reading and the perfect organisation of the whole thesis also prove that he is in full control of the mass of outcomes achieved.

Other remarks¹

Very minor comment: here and there, there are few typos (one is in the first page of the abstract) which show the candidate would have needed to read the thesis once more.

5. Conclusion

Taking into account what I have presented above and the requirements imposed by Article 187 of *the Act on Higher Education and Science of the Polish Parliament* (Dz. U. 2018 poz. 1668 with amendments)², my evaluation of the dissertation according to the three basic criteria is the following:

A. Does the dissertation present an original solution to a scientific problem? (the selected option is marked with **X**)

Definitely YES *Rather yes* *Hard to say* *Rather no* *Definitely NO*

B. After reading the dissertation, would you agree that the candidate has general theoretical knowledge and understanding of the discipline of **Information and Communication Technology**, and particularly the area of?

Definitely YES *Rather yes* *Hard to say* *Rather no* *Definitely NO*

C. Does the dissertation support the claim that the candidate is able to conduct scientific work?

Definitely YES *Rather yes* *Hard to say* *Rather no* *Definitely NO*



Signature

¹ Optional

² http://www.nauka.gov.pl/g2/oryginal/2013_05/b26ba540a5785d48bee41aec63403b2c.pdf