

OPINION

regarding a dissertation for awarding the educational and scientific degree
“Doctor” under the doctoral programme “Computer Systems, Complexes and
Networks”
professional field 5.3 “Communication and Computer Engineering”

The dissertation is submitted by Marieta Metodieva Haka
Academic supervisor: Prof. Dr. Eng. Veneta Panayotova Aleksieva
Dissertation topic: “Approaches to increasing the security of IoT networks”
Opinion submitted by: Assoc. Prof. Dr. Eng. Gergana Vasileva Spasova

1. Relevance of the problem addressed in the dissertation

The rapid development and widespread adoption of the Internet of Things (IoT) across various sectors—such as industry, healthcare, transport, smart cities, and households—creates new risks and vulnerabilities to network security.

The growing number of IoT devices necessitates an update of the approaches used to enhance security in this type of networks. IoT devices often have weak security standards, which makes them an easy target for hackers and cyberattacks involving theft of personal data, service disruption, and physical damage.

With the advancement of technology and the increase in threats, the development of effective protection measures is imperative. Solutions aimed at improving the security of IoT networks are crucial for ensuring reliability, safety, and trust in this technological sector.

The aim of the dissertation is to develop approaches for enhancing security in IoT networks implemented using ZigBee.

2. Identification and assessment of the most significant contributions in the dissertation, with a clear statement of their nature

I consider that the contributions of the dissertation have a scientific-and-applied and applied nature. The contributions presented as scientific are scientific-and-applied contributions.

Scientific-and-applied contributions:

- A system of indicators has been defined for evaluating simulation products used to study security in ZigBee networks.
- An analytical expression has been proposed for calculating the security level in ZigBee networks, along with a scale for determining the degrees of the security level.
- An adaptive approach has been proposed for improving the security level in ZigBee networks.

Applied contributions:

- A simulator has been developed for studying security processes in ZigBee networks.
- A prototype ZigBee IoT network has been developed, in which security has been experimentally studied and the proposed scale for determining the degrees of the security level has been applied.

The publications presented on the topic of the dissertation (5 in total, of which 4 are indexed in Scopus) provide evidence of the doctoral candidate's stated contributions and their involvement in implementing them.

3. Critical remarks on the submitted work

I have no critical remarks regarding the doctoral candidate.

4. Rationale and clearly formulated conclusion

My overall assessment of the doctoral candidate's work is positive. I consider that the submitted material complies with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for the Implementation of the Law on the Development of the Academic Staff in the Republic of Bulgaria.

I propose that the Scientific Jury accept the results and contributions of the dissertation and award Eng. Marieta Metodieva Haka the educational and scientific degree "Doctor" in professional field 5.3 "Communication and Computer Engineering", under the doctoral programme "Computer Systems, Complexes and Networks."

12.01.2026

Prepared by:
(Assoc. Prof. Dr. Eng. G. Spasova)