

OPINION

**of a dissertation
for the acquisition of the educational and scientific degree “Doctor” in**

**in the field of higher education – 5. Technical Sciences
the professional field – 5.3 “Communication and Computer Engineering”
doctoral program – “Communication Networks and Systems”**

Author: Eng. Michail Georgios Angelakis

Topic: “Methods and Means for the Intelligent Monitoring and Control of Radio Channels in Wireless Communication Networks”

Member of the scientific jury: Col Assoc. Prof. Eng. Iliyan Tsvetanov Angelov, PhD

1. Topic and relevance of the dissertation work

Modern lifestyle is extremely dynamic and is associated with mobility of users of telecommunication services. The easiest way to get access to these services is to use various wireless technologies. The design and operation of wireless communication systems is associated with a number of challenges caused by the huge growth in the number of connected devices, the heterogeneous nature of traffic and the requirements for quality of service. This means that the radio environment is shared, dynamic, unpredictable and filled with a multitude of unintentional and intentional interferences.

This requires the development and implementation of modern methods and tools for monitoring of radio channels in wireless communication systems to ensure access to services, communication stability, security and the required quality of service.

The research in the dissertation focuses on the analysis of the main methods, the synthesis of models, the application of intelligent mechanisms and practically oriented tools and approaches for monitoring, controlling and solving optimization problems in the management of radio channels and ensuring quality of service (QoS) in wireless communication networks.

The dissertation is structured in four main chapters, which examine the current state and problems in providing monitoring and control of wireless communication networks, research and analysis of approaches for modeling, analysis and control of radio channels in wireless networks, building, research, monitoring and control of radio coverage in a wireless communication network are shown, and implementation of an experimental model of a universal system for monitoring and control of wireless communication networks is presented.

Based on the analysis performed and its correspondence with the formulated goal and main tasks in the dissertation, I believe that the doctoral student has delved into the topic of the dissertation in depth and the theses developed by him are relevant.

2. Research methodology

The dissertation has a total volume of 126 pages. Its content includes a list of abbreviations used, an introduction, four chapters with conclusions drawn after each chapter, a conclusion, contributions from the dissertation, a list of publications on the dissertation and a list of literary sources used. 95 literary sources are indicated.

The doctoral student has formulated as the main goal of the dissertation work to develop and research appropriate methods and tools for intelligent monitoring and real-time control of processes for reliable and efficient transmission and reception of wireless radio signals, as well as integrated intelligent processing for interference suppression by monitoring the dynamic state of the wireless connection channel in wireless communication networks.

The research methods used in the dissertation can be classified as analytical, simulation and practical and cover the dependencies of the parameters characterizing the implementation of the individual models.

The research methodology is aimed at synthesizing a complex methodology for multi-criteria analysis and assessment of the state of wireless radio channels and an architectural model for proactive monitoring of wireless networks. An innovative model of a wireless communication channel with an integrated intelligent algorithm for noise and interference suppression has been developed and studied by applying a specialized training module for filtration and precise reconstruction of information about the state of the channel during channel prediction. A specialized platform for intelligent monitoring has been developed, implemented and experimentally verified in a real environment, providing reliable collection and processing of data in real time about the state of the wireless infrastructure and proactive response through automation of signaling processes, event management and localization of problems in the radio channel of wireless communication networks.

I believe that the doctoral student has approached the selection of tools and means to solve the research problem adequately in accordance with the goal and objectives of the dissertation.

3. Contributions of the dissertation work

A reference is attached to the dissertation work, containing 3 scientific-applied and 3 applied contributions. I accept the proposed formulations of the contributions. The contributions are significant and useful through: developing a complex methodology for multi-criteria analysis and assessment of the state of wireless radio channels and an architectural model for proactive monitoring of wireless networks; criteria and algorithmic rules for automatic identification of anomalies and pre-emergency states have been formulated, which allow prediction of connection degradation; an innovative model of a wireless connection channel with an integrated intelligent algorithm for noise and interference suppression has been proposed and studied; a specialized platform for intelligent monitoring has been designed, software implemented and experimentally verified; software solutions for graphical interfaces have been developed to increase situational awareness; an automated module for signaling and event management has been developed.

Based on the above, I believe that the dissertation contains the claimed contributions.

4. Publications and citations of publications on the dissertation work

The validation of the results obtained in the dissertation is ensured through the 8 scientific publications (in Bulgarian) presented from participation in national scientific conferences. The content of the publications corresponds to the topic of the dissertation, covers to a large extent and provides the necessary publicity of the main research and conclusions presented in the dissertation.

The analysis of the submitted publications and the attached scientometric data report shows that 76.64 points were obtained for the group of indicators Γ , which significantly exceeds the minimum of 30 points according to the minimum national requirements. Of the 8 submitted publications, 2 are single-authored, which covers the additional minimum requirements of TU – Gabrovo (5 publications, of which 1 is single-authored).

From the above facts it follows that the candidate meets the minimum national requirements for acquiring the educational and scientific degree “Doctor” under Art. 2b, para. 2, 3 and 5 of the Law on the Development of the Academic Staff in the Republic of Bulgaria and the minimum quantitative requirements of TU – Gabrovo.

No evidence of citations of publications was attached to the dissertation, but this is not a requirement for obtaining the educational and scientific degree “Doctor”.

5. Authorship of the obtained results

A declaration of authorship has been submitted by the doctoral student. I am not aware of any facts or circumstances of plagiarism. This gives me reason to believe that the results obtained within the framework of the research are largely the merit of the doctoral student Eng. Mihail Georgios Angelakis and a personal authorial contribution.

6. Comments, recommendations and remarks on the dissertation work

I believe that the dissertation work of Eng. Mihail Georgios Angelakis and the scientific research work on it are fully and completely presented. The doctoral student has demonstrated the necessary level of in-depth technical knowledge, research skills, analytical, critical and creative thinking.

Regarding the content of the presented scientific materials in the dissertation, I could not point out any more significant critical remarks.

My recommendations are mainly related to the precision of the formatting of the dissertation work – units of measurement in Latin and Cyrillic are used and mixed (for example, for meter –m. and m), units of measurement used in popular science publications are used, along with those used in scientific publications (for example, for bit/second – bps, instead of bit/s), replacing lowercase n with a capital letter in the units of measurement (for example, for second – S instead of s), in some tables the units of measurement of the indicated data are not indicated, etc.

Monitoring the radio environment is the first stage in the concept of building cognitive radio communication systems. The results obtained in the dissertation are a good basis for further research in this direction.

It would be beneficial for the results obtained to be presented and published in international scientific forums and publications, indexed and referenced in global databases.

The above remarks and recommendations do not belittle the results obtained and the scientific value of the presented dissertation work and are intended to serve as useful guidelines in the future scientific and research development of the doctoral student and his aspiration to increase his visibility in the scientific world.

7. Conclusion

I consider that the presented dissertation **meets** the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria.

The achieved results give me reason **to propose** that the educational and scientific degree “Doctor” be acquired by Eng. Michail Georgios Angelakis in the field of higher education – 5. Technical Sciences, professional field – 5.3 Communication and Computer Engineering, doctoral program – “Communication Networks and Systems”.

05.08.2026

Member of the scientific jury:

/Col Assoc. Prof. Eng. Iliyan Angelov, PhD/