

# 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: Iskren Pavlinov Yankov**

**Topic of the dissertation: Innovation, Methodology, and Design of a Model for Cyber Defense and Cybersecurity of Communication Networks and Systems of Government Structures and Institutions**

**Member of the scientific jury: Assoc. Prof. Egnar Ibrahimova Yozdikililer PhD, University of Telecommunication and Posts, Sofia**

## 1. Topic and relevance of the dissertation work

The topic of cyber defense and cybersecurity of communication networks and systems is particularly relevant in the modern world, where cyber attacks are an everyday occurrence. Every organization must take measures and implement tools to protect its data, applications, networks and systems. Modern requirements and regulations require organizations to prevent the leakage of personal and confidential data. The creation of methodologies for organizing the protection of networks and systems greatly helps organizations to effectively implement countermeasures against cyber attacks.

## 2. Research methodology

The purpose of the dissertation is formulated on the basis of a thorough and reasoned analysis of the current state of the problems related to cyber defense and cybersecurity of communication networks and systems of state structures and institutions.

The third chapter shows a simulation study and analysis of two attack methods used by cybercriminals in the modern world. Both studies use ready-made software solutions - Microsoft Network Monitor and Hidden-Tear.

Each chapter is summarized and conclusions are drawn from the main results obtained. Overall, in my opinion, a significant amount of scientific research work has been carried out.

The tasks set in the dissertation are adequate to the problem and have been solved in the required volume and at a high scientific level.

## 3. Contributions of the dissertation work

As a result of the research within the framework of the dissertation work, the following scientific and applied contributions have been achieved:

### *Scientific and applied contributions*

3.1. A review of cybersecurity has been carried out, the existing regulatory framework in the Republic of Bulgaria and abroad has been studied, and significant cyberattacks against state and private institutions in historical terms have been analyzed. The impact of various malicious software (computer attacks) on the functionality of computer systems and networks has been studied and analyzed.

3.2. A concept has been developed and empirically confirmed that the integration of local protective mechanisms into a single global cybersecurity system significantly increases the effectiveness of protection against modern cyberthreats.

3.3. A new model has been introduced in which local and global protective systems work synchronously in the transfer and protection of data, ensuring continuity and reliability of processes.

3.4. A model has been created that allows effective interaction between local and cloud infrastructures using encrypted communication tunnels, which guarantees the integrity and security of data. This approach represents a novelty in the field of cyber defense at the state level.

#### *Applied contributions*

1. An analysis was made and each of the components of the proposed new model was studied, which proved the operability of the cyber defense approach at local and global points, and the time limits from system infection and threat detection to their neutralization were studied.

2. An algorithm for encrypting information in communication tunnels was developed for the created model to ensure the reliability of the connection and data integrity.

3. The possibility of defining the cyber defense of systems using three approaches is identified: an approach with local protection, through the Cisco Meraki MX, Cisco Umbrella, Cisco Defense Orchestrator systems, which is entirely cloud-based, and in a cloud module Cloud Security Device Connector. This local protection grows into a State Cloud structure of Cyber Defense, and the third approach is through the construction of two types of Disaster Recovery Centers.

4. Schemes and topologies with an analytical sequence for applying the model have been developed, as well as the stages and methodology of actions have been described in order to provide initial data for the creation of a cyber defense and cyber protection system adaptable to each infrastructure.

I accept the contributions formulated and declared by the doctoral student, as I believe that they have the significance of novelty in the issue under consideration and are an extension of existing knowledge.

#### **4. Publications and citations of publications on the dissertation work**

A total of 5 publications were submitted with the dissertation, which meet the minimum requirements for obtaining the educational and scientific degree "Doctor". All publications presented on the topic of the dissertation are independent.

One of the publications is in English at an international scientific session abroad, the rest are in Bulgarian and are participations with reports at an international symposium in Bulgaria and at a national scientific conference with international participation.

No evidence of citations of the publications was submitted with the dissertation, but this is not a requirement for obtaining the ONS "Doctor".

#### **5. Authorship of the obtained results**

Judging by the publications, it is clear that the doctoral student has been working hard on this topic for several years. The authorship of the contributions to the dissertation work is also indicated by the fact that one of the publications is co-authored and the others are independent. This, as well as the specific style of presentation of the author, give me reason to have no doubt about the leading role of Mag. Inf. Iskren Yankov in the preparation of the publications.

#### **6. Comments, recommendations and remarks on the dissertation work**

I believe that the dissertation achieves the stated goal, and the defined tasks are fulfilled at a high scientific level and the dissertation has a complete character. I express a slight criticism that it is necessary to add specific facts about settings and configurations of devices and software products so that they can perform the necessary actions to protect the systems, instead of describing the built-in functionality of devices and systems.

I recommend that in the future the doctoral student continue his research work together with colleagues from TU Gabrovo, and that the results obtained be presented and published in international conferences and in refereed journals with an "impact" factor (WoS) or Scopus rank.

## 7. Conclusion

I do not know the author personally. My Opinion is based on the materials provided to me in advance.

The topic of the dissertation is current and well developed. The issues raised and the related research, as well as their justification, are satisfactorily significant and comprehensively described in the work.

I believe that the presented dissertation meets the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria. The achieved results give me reason to propose to the esteemed jury to award the educational and scientific degree "Doctor" to Iskren Pavlinov Yankov in the field of higher education - 5. "Technical Sciences", professional direction - 5.3. "Communication and Computer Engineering", doctoral program - "Communication Networks and Systems".

13.12.2024

**Member of the scientific jury:** /signature/  
/Assoc. Prof. Egnar Yozdikililer, PhD/