МИНИСТЕРСТВО НА ОТБРАНАТА
ИНСТИТУТ ПО ОТБРАНА „ПРОФЕСОР ЦВЕТАН ЛАЗАРОВ”
София 1592, бул. „Проф. Цветан Лазаров” № 2, факс: 02/92 21 808, http://di.mod.bg

ИНСТИТУТ ПО ОТБРАНА - РНКИ
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OPINION

by Associate Professor Dr. **Alexander Asenov Kolev**,
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on a competition for the occupation of an academic position "Associate Professor" for a civil employee, in the field of higher education 5. "Technical sciences", professional direction 5.3. "Communication and computer technology", (Communication networks and systems),
at the Defense Institute "Professor Tsvetan Lazarov", announced in the "State Gazette", no. 61/18.07.2023 in accordance with Order No. 288/04.07.2023 of the Director of the Defense Institute "Professor Tsvetan Lazarov"

with the candidate:
Dr. Eng. **Grigor Raykov Velev**, former long-term employee of the Defense Institute "Professor Tsvetan Lazarov"

1. **General characteristics of the candidate's scientific-research, scientific-applied and pedagogical activities**

In the current competition for the occupation of the academic position of "Associate Professor" for a civilian employee, announced in the State Gazette, issue 61 of 18.07.2023, the only candidate is Dr. Eng. Grigor Raykov Velev.

Dr. Eng. Grigor Velev has submitted an author reference with a total volume of 21 publications. 19 scientific works have been submitted for review by the scientific jury under this competition, of which 1 monograph, 1 book based on a dissertation and 17 articles and reports presented and published in the period from 2011 to 2023. The distribution of those submitted for review titles are: 5 in English, 14 in Bulgarian.

The works presented as scientific achievements in practice and enrichment of existing knowledge are in the field of application of communication and information technologies in the interest of defense. More specifically, the research is in the field of mobile self-organizing networks, network routing, sensor networks, automated information systems.

Dr. Eng. Grigor Velev is a researcher and implementer in the professional direction of the announced competition. He participated in working teams, including as a leader, on international and departmental scientific projects, initiatives and developments, the most important of which are: "European network of Cybersecurity centers and competence Hub for innovation and Operations", "Homemade Explosives and Recipes characterisations", "CyberTwin" and "Malicious Network Activities Monitoring and Data Analysis". A significant part of the candidate's scientific activity is for the benefit of the processes in the Bulgarian Army, specifically on the stationary digital integrated communication system, acquisition and visualization of sensor information using various types of unmanned aerial vehicles.

2. Evaluation of the candidate's special training and activity

Dr. Eng. Grigor Velev holds a master's degree obtained at the Military Academy "G. S. Rakovski" - Sofia, specialty "KSH, operational tactical, liaison

troops" in 1997. The candidate obtained the educational and scientific degree "Doctor" after successful training in doctoral studies and defense of a doctoral dissertation in 2018 in professional direction 5.3 "Communication and computer technology, PhD program "Radio transmission and radio reception technology". He has been working in his scientific field for the last 10 years or more. According to the attached documents, his significant scientific and practical appearances can be traced after 2011.

He completed educational and qualification courses in the country and abroad, among which: a course on the specialty "Installation, operation and combat use of tropospheric and radio relay stations" (1987), a course on working with SDH, PDH, SRAL radio systems and control systems EM-OS (1998), "Digital Communications Course" (2001), SDH 1660 SM Job Course (2004), Network Manager Training Course (2005), "Strategic Course. Performance of leadership positions in the national security and defense system' (2011).

I believe that the candidate possesses the necessary professional, research, entrepreneurial, promotional and personal qualities that are necessary for the occupation of the academic position of "Associate Professor" according to the announced competition.

3. Main scientific results and contributions

I accept the claim for the contributions proposed by Dr. Eng. Grigor Velev as substance and application according to the submitted documents.

I define the obtained results and contributions in the total volume of works as:

– Enrichment of existing knowledge: monograph (II.1.1), book (II 1.2); publications (II.2.1, II.2.2, II.2.3, II.2.5, II.2.6, II.2.7, II.2.8, II.2.10, II.2.12, II.2.14, II.2.15, II.2.16) ;

– Application of scientific achievements in practice: works (II.2.9, II.2.11, II.2.17, II.3.1, II.3.2, II.3.3, II.3.4, II.3.5, III.1, III.2, III.3, III.4, III.5, III.6, III.7).

The main results and contributions of the candidate are traceable in three main groups of research and development.

Research related to mobile self-organizing networks and their routing models

Research has been done on routing protocols of mobile self-organizing networks (MANETs) [II.2.2, II.2.5, II.2.7]. A review of the methods andthe modeling whines in this subject area. A formal description of processes and algorithms is presented. To the proposed model [II.1.2, II.2.12] of MANET, an algorithm for determining a route when applying the AODV protocol is presented. The AODV protocol is modified according to a proposed model in which the state parameters of the intermediate devices along the route are taken into account. At the tactical level, a hierarchical cluster routing model for MANETs is developed. The model uses a logical division of subnets in order to manage the mobility of the units of the organizational group.

An approach is proposed for dividing MANET into clusters [II.2.12], taking into account the reception level of the signal from the main node and limiting the number of cluster members. The master node is selected based on the power output of the device and its degree of communication connectivity. The proposed approach allows increasing the stability of the cluster structure, and therefore the routing efficiency in MANET.

By applying the theory of generalized network models, the processes of the proposed hierarchical cluster routing are presented. According to the theory, intuitionistic fuzzy estimates of the parameters of the used kernels model the performance of routing in MANET-networks [II.2.10]. By performing simulation studies, the performance analysis of the proposed modified AODV protocol compared to the existing one has been performed. An analysis of problems [II.2.6] related to the security and vulnerability of MANET networks has been made. The main types of attacks that are applicable in such networks are defined. Attention is paid to machine self-learning methods [II.2.16] and their importance for improving the performance, efficiency and management of 5G networks is indicated.

Research related to communication systems and technologies

Prospective technologies for building telecommunication networks are

analyzed and an approach for their application in building communication systems with military application is proposed. [II.2.1, II.2.3]. Regarding the development of the defense strategy, the role of technological innovation has been brought forward [II.2.14]. The influence of technological progress in the development of defense strategy is examined.

The monograph [II.2.1] is devoted to telecommunication technologies, established standards and proven principles with application in digital communication systems. The process of designing a departmental telecommunication system is presented. Specific solutions are indicated, meeting the requirements set for it and its construction. Attention is paid to the application of cloud technologies in communications and activities with the provision of information services [II.2.17] with a proposal of an approach for using software solutions in the joint work of work teams.

In the materials [III.1, III.5, III.7] there are specified developments of system and technical requirements, as well as work projects [III.2, III.3, III.4] for building a departmental communication and information system. Programs and methods for the acceptance of the systems into operation are presented [II.4.1, II.4.2, III.6].

Research related to the acquisition of sensory data to support decision-making

A study of the problems was carried out, main tactical requirements and characteristic parameters were defined to ensure the operation of the technical means in a situational awareness system. The scope of the system is the interior of the buildings, with the possibility of presenting the data in real time with the application of an electronic map [II.2.8, II.2.9, II.2.11, II.3.11]. An analysis of typical cases of situations with increased cyber-risk in shipping was carried out [II.2.15]. In the course of the CYRADARS project research, solutions for the configuration of "honeypot" type security modules have been studied [II.2.13].

The object of research is the possible procedures for obtaining, transmitting, processing and visualizing information about objects from the locality in the event of a declared crisis situation for a given area. In the

decision-making operation center, the extracted visual-sensory information is subjected to additional computer processing [II.4.3] in the interest of supporting decision-making.

The problems of achieving sustainability and energy efficiency of infrastructure objects and the related autonomous maintenance of optimal climatic conditions are discussed in [II.3.4]. The issues of countering cyber-attacks and investigating Internet connectivity as a source of threat in departmental computer networks are addressed in [II.3.5].

Out of all the 19 works presented to the scientific jury for review, of which one is a monograph, the candidate is the sole author of ten of them, and in two of the co-authored publications he is in first place. In this way, his personal contribution is confirmed.

I am not aware of receiving any reports of plagiarism in the candidate's works.

4. Evaluation of the significance of the contributions for science and practice

Dr. Eng. Grigor Velev demonstrated its high scientific training, knowledge, skills and scientific achievements in 7 scientific projects with international participation, 5 national scientific projects and research, as well as in other technical projects and developments. The candidate is on the author team of the published textbook "Computer Networks and Communications".

The candidate has submitted a list of 17 citations, of which 2 are in scientific publications, referenced and indexed in world-renowned databases and 15 are in peer-reviewed collective volumes. Citations faithfully reflect results traceable to the papers submitted for review.

5. Critical notes on peer-reviewed works

A careful review of the applicant's submitted scientific papers for review shows a very good level of content and layout. I cannot make any substantive critical remarks.

The author should seek more publication opportunities with inclusion in recognized international databases of scientific output.

6. Conclusion

The works submitted for review cover the minimum scientometric indicators defined in the Regulations for implementing the RASRB for professional direction 5.3. Communication and computer technology.

Everything presented so far allows me to assess the materials for participation in the competition **positively**. The attached materials and documentation fully meet the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Rules for its Implementation, and the Rules for the Terms and Conditions for Occupying Academic Positions at the Defense Institute "Professor Tsvetan Lazarov".

7. Evaluation of candidates

Having carefully analyzed the presented scientific production in terms of the significance and content of scientific and applied contributions, I positively assessed the scientific activity of the only candidate in the competition, Dr. Eng. Grigor Raykov Velev.

I recommend the respected members of the current scientific jury to **vote for** the awarding of the academic position "Associate Professor" in the field of higher education 5 "Technical sciences", professional direction 5.3 "Communication and computer engineering", scientific specialty "Communication networks and systems", to a Dr. Eng. Grigor Raykov Velev..

Jury member:

SIG

Date: 26.10.2023 / Assoc. Prof. Dr. Alexander Kolev /