

REVIEW

**by prof. PhD eng. Georgi Ilinchev Popov,
Technical University-Sofia**

**on the competition for the academic position of "professor" at NBU,
in the PN 5.3. "Communication and Computer Engineering",
announced in the State Gazette issue 85 / 08.10.2024
with candidate: assoc. prof. PhD Rosen Ivanov Pasarelski**

The review was prepared in accordance with Annex 3 to the Regulation on the Development of the Academic Staff of NBU, indicating a sample structure for a review for a competition to occupy an academic position of professor at NBU.

I. Assessment of compliance with the minimum national requirements and the requirements of the New Bulgarian University

According to Order Z-RK-84/18.12.2024 of the Rector of NBU, I am a member of the Scientific Jury, in a competition announced for the academic position of "professor" in the professional field 5.3 "Communication and Computer Engineering" and published in the State Gazette, issue 85 / 08.10.2024. Only one candidate participated in the competition - associate professor PhD Rosen Ivanov Pasarelski.

The documentation submitted by associate professor PhD Rosen Ivanov Pasarelski fully complies with the minimum national requirements established by the ZRASRB, as well as the internal requirements of the NBU National Academic Council for scientific and teaching activities in the field of higher education 5. Technical Sciences and PN 5.3 "Communication and Computer Engineering".

In terms of the number of points in the measurable legal indicators related to the relevant scientific field and professional field, such as scientometric indicators and indicators that reflect measurable academic results in teaching activities, the candidate associate professor Rosen Pasarelski exceeds and positively meets all the conditions for participation in the competition for the academic position of "professor" in this field at NBU.

II. Research (creative) activity and results

1. Assessment of monographic work

A monographic work entitled "New 5G mobile cellular systems. Study of the interaction between 4G-LTE and 5G systems: architecture, network functions, interfaces and protocols" was submitted for the competition, with ISBN: 978-619-233-282-2.

This work is essentially a study of modern mobile cellular technologies, covering key aspects from 4G-LTE systems to the new fifth generation 5G. The main focus of the study is directed at the analysis of the interaction between these two generations, which is presented through

various aspects such as network functions, radio resource management, security and multiple access methods.

The aspects of the study can be summarized as follows:

1. Network architecture

The monograph examines in detail the architecture of 4G and 5G systems, focusing on their main structural elements. The characteristics of the base stations, network elements and the technologies used for data transmission and processing are described. Special attention is paid to the differences between the architectural approaches of the two systems, including the transition to virtualization and decentralized management in 5G networks.

2. Network functions and radio resource management

The author analyzes network functions, including their management, allocation and optimization. The processes for managing radio resources in different load scenarios, as well as the efficient use of the frequency spectrum, are examined in detail. The study emphasizes the ability of 5G systems to significantly improve the capabilities for dynamic radio resource management compared to 4G-LTE.

3. Security

Security is considered as a key component of modern mobile networks. The monograph presents an analysis of the existing risks and problems related to security in 4G and 5G, as well as approaches to their minimization. The emphasis is on innovations in 5G networks, such as the use of cryptographic methods and improved authentication protocols.

4. Multiple Access Methods

The paper includes mathematical analysis and models of multiple access methods used in 4G and 5G systems. Both traditional approaches used in 4G-LTE and new methods introduced in 5G to improve efficiency in processing large volumes of data and devices are presented.

5. Interaction between 4G and 5G systems

Particular attention is paid to the interaction between the two generations of mobile networks, which is of key importance for the smooth transition to 5G. The processes of integration of the existing infrastructure with new technologies, as well as the possibilities for joint operation of the two systems in hybrid networks, are studied.

The monograph offers contributing results both in scientific and applied terms. The scientific value of the work is expressed in the in-depth and analytical presentation of the studied systems, while the applied value focuses on the practical aspects of the optimization of radio signaling in 5G.

The author uses a wide range of specialized literature and scientific sources, which enrich the study and give it a solid theoretical foundation. The text is structured consistently and logically, demonstrating in-depth knowledge of the research topic.

The monograph includes mathematical analyses and models that clarify the processes of multiple access, as well as a comparative analysis of the optimization of radio signaling in 5G. These models are supported by specific examples and calculations that further increase the value of the study.

The assessment of the monographic work is high, as it emphasizes the author's excellent competence in the field of mobile communications. The study is distinguished by a detailed understanding of the functions, interfaces, channels and protocols of 4G and 5G systems. At the same time, the work has high scientific and applied scientific value, which makes it significant, contributing to the field of professional direction 5.3 "Communication and computer technology".

2. Evaluation of the author's scientific and applied scientific contributions

I accept the presented contributions of the author in the monographic work. The contributions show significant scientific and applied value in the field of telecommunications technologies. Extensive studies of key interfaces and protocols in 4G LTE networks demonstrate a deep understanding of the architecture and functioning of these systems, with an emphasis on radio resource management and security highlighting important aspects of network efficiency and reliability. Mathematical analyses and models for OFDM and OFDMA in LTE contribute to a better understanding of frequency multiplexing and optimization of network resources.

The analyses of 5G systems are distinguished by the consideration of complex network functions and interactions, including integration with non-3GPP networks and the study of the next generation radio network architecture (NG RAN). Research on the interaction between 4G and 5G networks is of great importance for the smooth transition and interoperability between the two technologies.

Of particular value is the analysis of Non-Orthogonal Multiple Access (NOMA) in 5G, which represents a novelty in transmission methods in next-generation networks. Mathematical models and comparative analyses between NOMA and OFDMA provide a clear picture of the effectiveness and applicability of these methods, supporting the optimization of radio signaling in 5G networks. In summary, the candidate's contributions stand out and cover key aspects of the development and optimization of 4G and 5G systems, which makes them significant, both from a scientific and an applied point of view.

3. Assessment of the contributions in the other attached publications made after the appointment of the academic position "associate professor"

Regarding the announced competition for "professor" in professional field 5.3 "Communication and computer technology" at NBU, the candidate has submitted a total of 29 publications, which show solid scientific activity and contribution in the field of professional field. The evaluation of these works is based on various criteria such as innovation, practical applicability, theoretical depth and scientific impact.

I would note some of them by research area as:

- Research on 5G technologies - Publications such as "Neural Network Architecture to Predict Radio Wave Attenuation in a 5G Network" and "Implementation and Analysis of a Customized Encryption Algorithm in 5G Networks for Educational Purposes" show modernity and innovation. The study of methods for optimizing 5G networks through artificial intelligence and personalized encryption algorithms demonstrates important contributions to the field of professional direction 5.3 "Communication and computer technology", especially regarding the security and efficiency of radio signaling.
- Research on IoT and LoRa - The publication "Application and Performance Analysis of LoRa End Devices for Monitoring of Indoor Lighting Systems" focuses on the application of LoRa technology for the Internet of Things (IoT), which is particularly relevant for monitoring and control in smart cities and buildings. This research paves the way for more efficient and low-power solutions in the field of connected devices.
- Application of artificial intelligence in cyber security - The article "Application of Artificial Intelligence and Machine Learning in Cybersecurity" examines the role of artificial intelligence and machine learning in cyber security, which is an essential topic in the modern digitized environment. This research provides new opportunities to improve network security through automation and adaptation to new threats.
- Analysis of data and communications architectures - Publications such as "Network Concepts and Data Storage Protocols" and "Storage System

Architecture Concept and Reference Model" show significant contributions to the analysis and optimization of network architectures, as well as storage methods data. These studies are valuable for designing resilient and secure data systems, especially in cloud and enterprise environments.

- Research on VoIP Technologies - Articles dealing with VoIP protocols and security, such as "Signaling Protection Mechanisms in VoIP Networks", are important in the field of Voice over Internet Protocol technologies. This is an area that has deep application in telecommunications services and is relevant to enterprise and public networks.
- State-of-the-art research developments in telecommunications - Publications such as "Approaches and Mechanisms for Increasing Capacity and Indoor Radio Coverage of Mobile Cellular Networks" and "Research on Network Functions and Reference Architecture of 5G Mobile Systems" show a deep understanding of current issues and opportunities in mobile networks. They provide valuable analysis to improve the coverage and capacity of cellular networks, especially in indoor environments.

I can note that it is possible for the author to broaden the focus of his publications, as some of them concentrate on relatively narrow areas and technologies such as VoIP and data security publications, which may limit the scope of scientific impact. Expanding the research topics may contribute to the wider applicability of the results.

In summary, I can emphasize that the publications show in-depth knowledge and a significant scientific and applied scientific contribution in the field of professional direction 5.3 "Communication and computer technology". They contribute both theoretical and practical solutions to current problems in communication networks and systems. The author's scientific work demonstrates strong analytical abilities and an innovative approach to the topics covered, which is why I rate it positively and highly.

4. Citation from other authors

In connection with the current competition for a "professor" at NBU, the candidate Rosen Pasarelski has presented a detailed reference and analysis of the citation of his publications. The data were collected and provided by the NBU library, showing that the total number of citations of his works amounts to 46. These citations come from various sources, including Scopus, Web of Science, Central and Eastern European Online Library (CEEOL), eLIBRARY.ru and Google Scholar. These databases are widely recognized in academic circles and offer a reliable reflection of the researcher's scientific contribution.

Furthermore, it is emphasized that five of associate professor Pasarelski's publications have been cited in a scientific monograph, which is important evidence of the integration of his research into a broader context and their use for academic and practical purposes by other scientists.

Particularly significant is the citation of his publications in the prestigious Scopus database, where 8 citations have been registered. Scopus is a global database that tracks scientific publications in many different fields and is recognized as one of the most rigorous in terms of including quality scientific papers. Citation in this platform is a sure indicator of the high quality and significance of the candidate's scientific contribution.

In summary, the scientific papers of associate professor PhD Rosen Pasarelski enjoy wide recognition and citation by other researchers, which confirms the high quality of his scientific results and the positive assessment they receive nationally and internationally.

5. Evaluation of the results of participation in research and creative projects and application of the obtained results in practice

Associate professor PhD Rosen Pasarelski presents participation in 12 national and international research projects focused on current topics such as 5G, IoT systems and the impact of electromagnetic fields on human health and others. The projects in which he participated, such as "Planning, design and optimization of wireless communication platforms, services and solutions for 5G and IoT" and "Measurement, research, analysis and prediction of the impact of operating electromagnetic fields of mobile devices on the health and quality of life of the population in densely populated areas", are of great importance for the application of scientific achievements in real communication systems and health research.

The participation of associate professor PhD Rosen Pasarelski in a project funded by the European COST program is clear evidence of his active engagement in international scientific research. The COST program, which promotes the coordination of scientific research in Europe, provides an opportunity for knowledge exchange and joint work on innovative and multidisciplinary projects. The involvement of associate professor Passarelski in such a prestigious project highlights his capacity to contribute to scientific developments of global importance, while demonstrating his ability to work in a team with leading experts from different scientific and cultural backgrounds. This commitment further testifies to the high level of his research skills and openness to innovation.

The participation of associate professor PhD Rosen Passarelski in the project BG051PO001-3.1.07-0062 "Improving interdisciplinary skills and interaction with business of telecommunications specialists" is important and multifaceted. The project, funded under the grant scheme BG051PO001-3.1.07, aims to update the curricula in higher education. As a member of the team, associate professor Passarelski contributes with his expertise in telecommunications technologies, which is essential for adapting the curricula to the current needs of business. The project not only strengthens the links between academia and business, but also offers opportunities for the development of interdisciplinary skills in students. associate professor Pasarelski's participation in the development of strategies for interaction with industry demonstrates his commitment to educational reform and the provision of quality educational programs that meet the real needs of employers.

The publications of associate professor Rosen Pasarelski, the result of scientific projects and indexed in Scopus, confirm the applicability of his research in an international context. His contribution, both in research and in educational activities, is highly appreciated.

III. Learning and teaching activity

1. Auditory and non-auditory employment, work in the electronic training module "MOODLE - NBU", provision of student practices and internships, work with students and doctoral students.

The assessment of the work of associate professor PhD Rosen Pasarelski in the context of classroom and extracurricular employment, work with the electronic learning module "MOODLE - NBU", the provision of student practices and internships, as well as interaction with students and doctoral students, shows his commitment and effectiveness in the educational process. His work with the "MOODLE" platform is at a high level. He has integrated various electronic resources and tools that improve the learning process and provide access to a variety of materials. The implementation of interactive elements and assessment tools in the modules has helped students develop their skills for independent learning and critical thinking.

Associate professor Pasarelski's participation in organizing and providing student practices and internships is extremely important. He actively engages with business and industry, which allows students to gain practical experience in real working conditions. His interaction with students is distinctive. He shows patience and a desire to be a mentor to

young learners, providing constructive feedback and guidance. Students appreciate his approach, which is also evident from the excellent student evaluations for him.

Associate professor PhD Rosen Passarelski teaches academic disciplines in the doctoral program "Telecommunications" and actively works with doctoral students in the Department of "Telecommunications", being the scientific supervisor of two successfully attested doctoral students.

The candidate shows responsibility and commitment in working with Erasmus students, actively participating in establishing contacts and concluding agreements for the exchange of students and teachers within the framework of the Erasmus+ program.

All disciplines that associate professor Passarelski leads are in the professional field for which the competition is announced.

In summary, the work of associate professor PhD Rosen Passarelski in the field of classroom and extracurricular employment, e-learning, organizing practices and interacting with students and doctoral students demonstrates his commitment to quality education. His contribution not only enriches the educational process, but also prepares students for a successful career in the field of telecommunications. My assessment is positive and high.

IV. Administrative and public activity

1. Participation in collective management bodies of the NBU

Associate professor PhD Rosen Pasarelski is an active member of the management bodies of the New Bulgarian University.

He is part of the Council of the Department of Telecommunications. In the period from 2005 to 2015, he held the administrative position of director of the bachelor's program "Telecommunications".

From 2021 to July 2024, he was director of the program council of the Department of Telecommunications.

He is currently the Head of the Department of Telecommunications.

Assoc. Prof. Rosen Pasarelski is also a member of the faculty council of the Faculty of Distance, Electronic and Continuing Education, and has recently been a member of the Academic Council of NBU.

The candidate shows enviable activity and commitment to the structures and collective management bodies of NBU.

I highly appreciate the administrative and public activities of the candidate.

V. Personal impressions of the candidate

I have known associate professor Rosen Pasarelski for a short time, but I can say that he is an extremely committed and competent specialist in the field of telecommunications. His participation in numerous projects and academic initiatives, as well as his activity in professional associations, testify to his deep understanding of current trends and problems in the sector.

Additionally, his leadership of a bachelor's and doctoral program, as well as his successful mentorship of doctoral students, shows that he not only possesses theoretical knowledge, but also actively transfers his skills and experience to the new generation of specialists. His role as editor-in-chief of a scientific journal and participation in accreditation processes emphasize his commitment to maintaining high standards in education and research.

His ability to communicate and collaborate with different partners demonstrates important social competence, which is necessary for the successful development of projects and programs in modern conditions of globalization.

Although I have no personal collaboration with associate professor Rosen Pasarelski, information about his work and commitments indicates that he is an exceptional professional and a prominent figure in the field of telecommunications.

VI. Opinions, recommendations and notes on the activity and achievements of the candidate

I will make the following recommendations for the candidate's future professional activity:

- To publish more often in journals with a high impact factor and open access, so that his works can be promoted and cited more;
- It is important that the candidate continues to develop and update the curricula by including new topics related to the latest technologies and trends in the telecommunications sector, for example artificial intelligence in telecommunications and cyber security. Organizing seminars and workshops with industry professionals could enrich students' learning and better prepare them for the challenges of the labor market.
- I recommend associate professor Pasarelski to strengthen contacts with companies and professional associations in the telecommunications industry, in order to provide more internships and practices for students. Active cooperation with business can help adapt the learning process to industry needs and create new opportunities for students' career development.

In summary, associate professor PhD Rosen Pasarelski is not only a valuable teacher of the New Bulgarian University, but also an important factor for improvement and development in the academic environment. With his in-depth knowledge and commitment to high standards, he is able to contribute significantly to the growth and success of the Department of Telecommunications, as well as the university structure and community in its entirety.

CONCLUSION

Based on my assessments and conclusions in the review, I can state with confidence that the candidate Rosen Ivanov Pasarelski fully meets all the requirements for occupying the academic position of "professor", in accordance with the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB), the Regulations for its implementation, as well as with the internal normative base of the New Bulgarian University.

In conclusion, based on all the above, I give a high and positive assessment of the overall scientific and academic activity of the candidate. I personally support and recommend to the esteemed members of the Scientific Jury to support the candidacy of associate professor Rosen Ivanov Pasarelski for the academic position of "professor" in the professional field 5.3. "Communication and Computer Engineering" at the New Bulgarian University, Department of "Telecommunications" and to be elected by the Academic Council.

Date 06.01.2025

Signature

/Prof. PhD eng. Georgi Ilinchev Popov/