R E V I E W
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concerning materials submitted for participation in a competition for awarding the academic position of "Professor" in the field of higher education 5. Technical Sciences, professional field 5.3. "Communication and Computer Engineering", scientific specialty "Communication Networks and Systems", (Wireless Communications and Cybersecurity in WiFi Networks, Internet of Things (IoT) and Cybersecurity Systems)

In the competition for the academic position of "professor", announced in the State Gazette, issue 48/13.06.2025 and on the website of TU-Gabrovo for the needs of the Department of Communication Equipment and Technologies at the Faculty of Electrical Engineering and Electronics, Assoc. Prof. Krasen Kirov Angelov, PhD – TU-Gabrovo participated as a candidate.

1. Brief biographical data

The candidate for participation in the competition, Assoc. Prof. Krasen Angelov, PhD was born in Gabrovo on 06.10.1980. In 1999, he graduated from secondary specialized education in the specialty "Electrical equipment of industrial enterprises" at the Technical School of Mechanics and Electrical Engineering "Dr. Nikola Vasiliadi" – Gabrovo. In 2003, he received a Bachelor's degree, and in 2005 - a Master's degree in the specialty "Communication Equipment and Technologies" at the Technical University – Gabrovo. In 2016, the candidate acquired an educational and scientific degree "Doctor" in the scientific specialty "Communication Networks and Systems" with the topic of the dissertation "Research on the Possibilities for Transmitting Two-way Digital Information in the Upstream Channel of Cable Television Networks" at the Technical University – Gabrovo.

Professionally, from 2008 to 2016, the candidate was an assistant professor in the Department of Communication Equipment and Technologies, Faculty of Electrical Engineering and Electronics of the Technical University – Gabrovo. From 2016 to 2020, he held the position of "chief assistant" at the same department. In 2020, the candidate was elected to the academic position of "Associate Professor" in the field of higher education – 5. Technical Sciences, professional field – 5.3. Communication and Computer Engineering, scientific specialty – "Communication Networks and Systems".

In administrative terms, from 2023 to the present, Assoc. Prof. Angelov holds the position of Head of the Department of Communication Equipment and Technologies at the Faculty of Electrical Engineering and Electronics at TU-Gabrovo.

The education, professional experience, habilitation as an "Associate Professor", and the areas of scientific and professional expertise of the candidate are in the professional field, scientific specialty and scope of the competition.

2. General description of the submitted materials

In the competition documentation, Assoc. Prof. Krasen Angelov, PhD has submitted lists of all his works, of which a total of 43 scientific works were submitted for participation in the competition as follows: 26 scientific publications in publications that are referenced and indexed in world-renowned databases of scientific information (indicators В.4 and Г.7); 15 scientific publications in non-refereed journals with peer review or in edited collective volumes (indicator Г.8); two textbooks (indicator Е.23).

The candidate has submitted an extended habilitation reference, which is based on 10 publications (indicator В.4). Thematically, they are related to the scope of the competition: wireless communications, communications for the Internet of Things and cybersecurity. All submitted scientific works are entirely in the scientific field of "Communication Networks and Systems" and the scope of the competition.

3. Reflection of candidate's scientific publications among the scientific community (known citations)

The scientific works of Assoc. Prof. Krasen Angelov, PhD have been popularized in scientific journals, as well as at conferences and forums in the country and abroad. From the presented list of citations and from a reference in the Scopus database, after removing self-citations by all authors, it is evident that there are 58 citations in scientific publications, referenced and indexed in world-renowned databases, of which 26 are declared for participation in the competition (indicator Д.12), and the candidate has an h-index of 5.

4. Overview of the content and results in the presented works

The publications submitted by the candidate in the competition for the academic position of "professor" are divided into three thematic areas of communication networks and systems, directly related to the competition.

The first thematic area "Cybersecurity in wireless communication networks" covers publications related to research and analysis of the following aspects:

- encryption algorithms, authentication and access control for data protection and ensuring the integrity and confidentiality of communication – a customized encryption algorithm with implementation of AES-128 encryption in Cipher Block Chaining (CBC) mode and key expansion has been developed and studied; a chaotic synchronization scheme between two identical new mathematical models of fourth-order hyperchaotic systems has been designed, which will serve as the basis for secure data transmission through chaotic masking over unprotected communication channels [publications В.4.8, Г.7.5];
- ensuring the security and management of data generated by IoT devices – the following have been developed: a methodology for analyzing the challenges associated with managing the huge amount of data in IoT; methodology for assessing the risk and categorization of security threats in IoT networks in order to select and implement appropriate countermeasures to increase security [publications Г.8.5, Г.8.6];
- application of machine and deep learning in intrusion prevention systems – developed models for integrating AI in image encryption systems and in intrusion detection and prevention systems [publications Г.7.1, Г.8.3].

The second thematic area "Communication technologies and applications in the Internet of Things" includes publications related to:

- synthesis of methodologies for optimal prediction and analysis of radio coverage of wireless communication networks 5G, WLAN (IEEE 802.11ax) and LoRaWAN in complex terrain conditions [publications В.4.6, Г.7.4, Г.8.7];
- modeling, research and analysis of the performance of communication networks and protocols for IoT: assessment of reliability in terms of access to channels in the physical layer of the network, performance of IoT communication protocols for the application layer, performance of LoRa modulation at different values of the spreading factor and comparison with conventional modulation formats [publications Г.8.12, Г.8.14, Г.8.15];
- development and research of experimental setups and practical experimental demonstration models and prototypes of systems related to the implementation and application of communication technologies and in particular LoRa in IoT: control and monitoring of internal lighting systems; measurement, visualization and control of electrical and non-electrical parameters of low-voltage power supply networks; architecture and demonstration prototype for remote intelligent management and control of a Smart Home; LoRa-based system for tracking and monitoring of vehicles and communication between them in a Smart City [publications В.4.5, Г.7.3, Г.7.7, Г.7.10, Г.7.12, Г.8.13, Г.8.1].

The third thematic area “Monitoring, control, management and optimization of resources in communication networks” that address the development of models and solutions oriented towards ensuring the Quality of Services, operability and reliability and effective management of communication networks:

- computer models for experimental study of factors affecting the quality of radio coverage in wireless communication networks [publications В.4.1, Г.7.2];
- models with advanced methods for channel coding, power control and signal amplification, intended for new generation mobile cellular networks [publications В.4.2, В.4.3, В.4.7, В.4.9];
- models for assessing and optimizing the performance of 5G NR mobile cellular networks by analyzing spatial data obtained using convolutional neural networks (CNN) and sequential data analyzed using long short-term memory (LSTM) networks [publications Г.7.6, Г.7.9];
- models for analyzing performance and solving optimization problems for high-speed multi-channel active and passive optical communication networks [publications D.7.8, Г.7.14, Г.7.15, Г.8.4];
- various universal integrated solutions with SDR-based monitoring and control systems in wireless communications are developed and studied [publications В.4.4, Г.7.11, Г.7.16, Г.8.2, Г.8.8, Г.8.9, Г.8.11].

5. General description of candidate's activity

5.1. Educational and pedagogical activity (work with students and postgraduate students)

The candidate is the author of curricula and lectures on the subjects “Wireless Communications and Cybersecurity in WiFi Networks”, “Broadband Mobile Networks”, “Access Control Systems”, “Security and Monitoring Systems”, “Internet of Things (IoT) and Cybersecurity Systems”, “Electromagnetic Compatibility”, “Information Cybersecurity Management Systems”, “Identification and Counteraction to Cyberattacks”, from the curricula of specialties in full-time and part-time education, educational and qualification degrees “Bachelor” and “Master”.

Assoc. Prof. Krasen Angelov is the author of a textbook on “Wireless Communications” and co-author of a textbook on “Digital Television Technologies” used in the educational process.

Under the scientific supervision of the candidate, over 110 graduates have successfully graduated in the educational and qualification degrees “bachelor” and “master”. Currently, Assoc. Prof. Krasen Angelov is the scientific supervisor of three doctoral students and has supervised one doctoral student who successfully defended his doctoral thesis in the doctoral program “Communication Networks and Systems”.

The above information gives me reason to assess the candidate's educational and pedagogical activity as very good.

5.2. Scientific and scientific-applied activity

In the documents submitted for participation in the competition, the candidate has declared 41 scientific publications (articles in journals and conference reports). Of these, 26 are in refereed and indexed publications in world-renowned databases of scientific information - Scopus and Web of Science, of which 3 have an **impact factor** and 8 have an SJR rank.

Of the publications submitted by the candidate - 6 are independent and 35 are co-authored (4 are with two authors, 14 - with three authors and 17 - with more than three authors, in 10 of them he is the first author). There are 15 articles and papers in scientific conferences in Bulgarian, and 26 in English. The candidate has published a total of 2 textbooks, one of which he is the author and the other - co-author.

The publications submitted for the competition do not repeat those applied for the acquisition of the scientific and educational degree "doctor" and the academic position "associate professor".

From the materials submitted for the competition, it is evident that the candidate has productive and regular participation in national and international scientific and educational projects: participation in 11 national projects is declared, of which in 4 he is the project manager, and in 7 he is a participant/researcher (indicators E.18 and E.20) and participation in 1 international project (indicator E.19).

The competition documentation presents in detailed and summarized tabular form evidence of fulfillment of the minimum national requirements and the requirements of TU-Gabrovo for holding the academic position “professor”:

Group of indicators	Indicators	Minimum required points by groups of indicators for holding the academic position of “Professor”	Declared points by groups of indicators for holding the academic position of “Professor”
А	Indicator 1	50	50
Б	Indicator 2	-	0
В	Indicator 3 or 4	100	138
Г	Sum of indicators 5 to 11	200	394,03
Д	Sum of indicators 12 to 15	100	260
Е	Sum of indicators16 to 28	150	261,92

Content	Minimum requirements of TU - Gabrovo for holding the academic position of “Professor	Declared indicators by the candidate for the academic position of “Professor”
Total number of publications (articles and papers)	30, of which at least 5 self-authored and 3 with IF (WoS)	41, of which 6 self-authored, 3 with IF (WoS), 8 with SJR (Scopus)
Number of known citations by other authors	20	26
Published textbooks/books	2	2
Published teaching aids	-	-
Number of successfully defended doctoral students	1	1
Project and contract management	3	4

5.3. Implementation activity

No implementation documents have been attached to the competition materials. Nevertheless, the candidate's publication activity shows his participation in the development and research of various demonstration modules and prototype systems for application in the concepts of the Internet of Things, Smart Home and Smart City. The developments are related to the conduct of the candidate's scientific research and educational activities.

6. Contributions (scientific, scientific-applied, applied)

Scientific contributions:

1. A modified image encryption scheme based on the OTP (One-Time Pad) algorithm is developed, consisting of chaotic synchronization and artificial neural networks (ANN) for improved security, efficiency, and resistance to various cryptographic attacks.

2. A model for predicting radio wave attenuation in a 5G network has been developed, based on a neural network combining spatial data from convolutional neural networks (CNN) with sequential data from long short-term memory (LSTM) networks.

3. A combined hyperchaotic synchronization system for secure communication over unprotected communication channels is synthesized and investigated, using chaotic masking based on two new mathematical models of fourth-order hyperchaotic systems.

4. A robust control for a class of nonlinear systems with parametric uncertainties is synthesized through modified input-output linearization via feedback with linear-nonlinear decomposition.

Scientific-applied contributions:

1. An innovative approach to categorization through clustering and cross-validation using various algorithms of the key roles and responsibilities of stakeholders and their impact on ensuring cybersecurity in IoT ecosystems is developed with the aim of effectively prioritizing and allocating resources to address the most critical security risks.

2. Models are developed for predicting and analyzing the quality of LoRaWAN network radio coverage in terms of its range, parameters, Quality of Service (QoS), and performance when configuration parameters are changed in a complex manner.

3. An improved approach for the design, construction, and deployment of low-energy mesh networks in an indoor scenario based on IQRF technology is proposed and investigated.

4. Advanced methods for controlling the power and signal level in next-generation mobile cellular networks are developed, based on centralized, distributed approaches and machine learning approaches.

Applied contributions:

1. A prototype of a universal integrated system for monitoring wired and wireless communication networks and communication nodes is developed and validated in real conditions.

2. Demonstration models and prototypes are developed for the implementation of an energy-efficient narrowband long-range (LoRa) communication network in the Internet of Things (IoT) concept for various applications: management and monitoring of indoor and outdoor lighting systems; real-time measurement, visualization, and control of electrical and non-electrical parameters of low-voltage power supply networks; remote intelligent management and control of home automation systems; tracking of vehicles in urban and non-urban environments.

3. Practical approaches are developed to optimize the energy consumption of LoRaWAN end devices with autonomous power supply in different modes of operation.

4. A physical layer model for downlink communication based on MATLAB 5G NR is developed and investigated for the purpose of realistic performance evaluation of 5G NR.

5. Approaches and models are developed and investigated for researching, analyzing, and evaluating performance and solving optimization problems in high-speed multi-channel passive and active optical networks using different formats for optical signal modulation (NRZ, RZ, CSRZ, DM, MDRZ), and various DCF-based dispersion compensation schemes.

I accept and highly appreciate the scientific, scientific-applied and applied contributions thus presented.

7. Assessment of the candidate’s personal contribution

The publications submitted by the candidate in peer-reviewed scientific journals indexed in the Scopus database (twenty-six in number under this competition) have been checked for plagiarism, which guarantees their originality. The remaining included works address similar scientific problems, which gives me reason to confirm the personal contribution of the author and the scientific significance of the results achieved within the framework of the competition documentation.

8. Critical remarks and recommendations

I have no critical remarks that would cast doubt on the candidate's main scientific, scientific-applied and applied contributions. As recommendations regarding the candidate's professional development, I will make the following:

- to invest efforts in the implementation of applied contributions in business and practice, as well as in the creation of useful models and the registration of patents

- to expand its publishing activities both in terms of publications with Impact Factor and in terms of the compilation of textbooks and teaching aids.
- to focus on participation in scientific forums and conferences outside the country and cooperation in research teams on major national and international projects.

9. Personal impressions

I have known Assoc. Prof. Krasen Angelov for two years. My personal impressions of the candidate are based on participation and joint discussions held during various scientific forums and expert groups. Assoc. Prof. Krasen Angelov stands out with his professional attitude, high academic ethics, and communication skills in a working environment. On a purely human level, he demonstrates a high degree of integrity and respect for others. He is able to listen carefully to different opinions and take them into account - a skill that is essential in academic discourse.

10. Conclusion:

Based on the review, I believe that the candidate, Assoc. Prof. Krasen Angelov, PhD, fully meets all the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria, the Regulations for its implementation, as well as the Regulations for the Acquisition of Academic Degrees and Occupation of Academic Positions at the Technical University of Gabrovo for the occupation of the academic position of "professor" in Professional field 5.3 "Communication and Computer Engineering".

In conclusion, I give a highly positive assessment of the candidate's scientific and academic activities and suggest Assoc. Prof. Krasen Kirov Angelov, PhD be elected to the academic position of "professor" in the field of higher education – 5. Technical sciences, professional direction – 5.3. Communication and Computer Engineering, specialty – "Communication Networks and Systems" (Wireless Communications and Cybersecurity in WiFi Networks, Internet of Things (IoT) and Cybersecurity Systems).

03.11.2025

Reviewer:
/Prof. Rosen Pasarelski, PhD/