

OPINION

From: Prof. Stanislav Denchev Simeonov, PhD – Burgas State University “Prof. Dr. Asen Zlatarov”, member of the Scientific Jury according to Order No. 719/04.11.2025, of the Rector of the Technical University – Varna.

Regarding: Awarding of the educational and scientific degree “DOCTOR”

Field of higher education: 5. “Technical Sciences”

Professional field 5.3. Communication and computer technology

Specialization: “Computer systems and technologies”

Doctoral program “System programming”

Topic of the dissertation: Methods and means for uniform loading and increasing QoS in SDN-based networks

Author of the dissertation: Dimitar Nikolov Todorov

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1. Relevance of the problem developed in the dissertation.

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Modern computer networks are faced with constantly increasing requirements in terms of throughput, reliability and quality of service (Quality of Service – QoS). The massive use of cloud services, real-time multimedia applications, the Internet of Things (IoT), as well as the development of distributed computing architectures, lead to a significant increase in network traffic. They often contribute to its complexity. These trends pose serious challenges to traditional network architectures that rely on static control and routing mechanisms. Software-Defined Networking (SDN) provides a global view of the network state and creates prerequisites for dynamic traffic distribution and implementation of adaptive QoS policies.

The relevance of the topic is also enhanced by the need for scalability and automation in the management of large and dynamic networks. Manual configuration and static QoS mechanisms are inapplicable in environments with thousands of devices and rapidly changing traffic patterns. Therefore, increasing attention is paid to intelligent algorithms for uniform traffic distribution, including optimization and machine learning approaches integrated into SDN controllers.

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From a practical point of view, effective load management and QoS assurance in SDN networks have direct economic significance. Improving the usability of network resources, reducing failures and ensuring stable quality of services lead to lower operating costs and higher user satisfaction. This makes the study of methods and tools for uniform load and increasing QoS in SDN-based networks not only scientifically justified, but also practically significant.

The scientific goal of the dissertation is correctly defined: Research and development of means for uniform load and increasing QoS in SDN-based networks. In accordance with the main goal, the following tasks are set for resolution in the dissertation:

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- To define a system of indicators for precise assessment of the effectiveness of routing algorithms in software-defined networks;
- Using the system of indicators as a basis, to propose a static routing algorithm that discovers the connections between routing devices by sending instructions for their configuration, while respecting the requirements for balanced traffic distribution;
- To propose a dynamic routing algorithm that manages network traffic according to the load of different network paths, thus providing better QoS indicators of the network.

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The tasks set fully correspond to the goal of the dissertation. The doctoral student has approached the goal he set himself methodically correctly.

2. Indicating and assessing the most significant contributions in the dissertation, clearly stating the nature of the contributions:

The work clearly defines the contributions. They appear as a generalized expression of the conclusions made in each of the chapters. The indicated contributions specifically reflect the significance of the results obtained. I could summarize the contributions as follows:

A. Contributions that are reduced to obtaining new and confirmatory facts, and proving new aspects of existing methods using known methods and modernized technologies:

- A system of indicators for evaluating static routing algorithms in SDN-based networks is defined;
- A system of indicators for evaluating dynamic routing algorithms in SDN-based networks is defined;
- An algorithm for static traffic routing in SDN networks is proposed, which provides balanced traffic distribution and achieves improved quality of services;
- An algorithm for dynamic traffic routing in SDN networks is proposed, in which network traffic is managed according to network load;
- A system of indicators for evaluating SDN controllers is defined.

B. Contributions, reduced to obtaining specific results for implementation in practice:

- An SDN controller has been developed for the study of static and dynamic routing algorithms.

In general, the dissertation is distinguished by a thorough analysis of the research problems. Based on the detailed and systematic research conducted, the PHD student has proposed original scientific and applied results.

3. Critical notes on the presented work.

I have no significant critical notes on the presented dissertation.

4. Motives and a clearly formulated conclusion.

The topic of the dissertation is relevant and interesting. The work is complete in nature. The results obtained are sufficient for the ONS "Doctor". The publicity of the work is sufficient /the author gives 5 publications on his dissertation work/. The doctoral student has worked seriously on the dissertation work, has conducted in-depth research, has presented and analyzed the results, has made relevant conclusions, has scientific-applied and applied contributions. The legal requirements from the point of view of the doctoral procedures have been met. The scientific community has been given the opportunity to familiarize itself with the research conducted and the results obtained. I believe that the doctoral student has shown opportunities for independent scientific and research work. Taking into account the above, I believe that the requirements for developing a dissertation work for the educational and scientific degree "Doctor" have been met and I give a positive comprehensive assessment of the dissertation work. By evaluating the author's research work and published scientific production as a whole,

I recommend to the esteemed members of the Scientific Jury to initiate the procedure for awarding the educational and scientific degree "Doctor" to the PHD student Dimitar Nikolov Todorov in Professional Field 5.3 Communication and Computer Engineering.

Burgas
07.01.2026

Signature: _____
/Prof. Dr. Stanislav Simeonov/