

# О P I N I O N

by **Corr. Member Lyubka Doukovska, DSc**  
from the Institute of Information and Communication Technologies,  
at the Bulgarian Academy of Sciences,  
on the Thesis for awarding educational and scientific degree PhD,  
under the Scientific Field: **4. Natural Sciences, Mathematics and Informatics**,  
the Professional Area: **4.6. Informatics and Computer Sciences**,  
the Scientific Specialty: **01.01.12. Informatics**

Author of the PhD Thesis: **Tasho Dimitrov Tashev**

PhD Thesis Title: **Algorithms for conflict-free scheduling of a packet crossbar switch node**

In accordance with Order No. 65 from 27.02.2023 of the Director of the Institute of Information and Communication Technologies, I have been appointed as a member of the Scientific Jury regarding the PhD thesis of **Tasho Dimitrov Tashev** for awarding the educational and scientific degree “Doctor of Philosophy” (PhD).

As a member of the Scientific Jury I have received:

1. Order No. 65 from 27.02.2023 of the Director of the Institute of Information and Communication Technologies.
2. Dissertation for the educational and scientific degree PhD.
3. Abstract of the dissertation for the educational and scientific degree PhD.
4. Copies of the publications included in the PhD thesis.
5. Accompanying documents according to the procedure for the defense of the PhD thesis.

In order to form the final evaluation of the PhD thesis, the requirements of the *Development of Academic Staff Act in the Republic of Bulgaria* are implemented the specific requirements in the Act's Institutional Regulation shall be taken into consideration, where the respective norms are:

1. Pursuant to Art. 6 (3) of the *Development of Academic Staff Act in the Republic of Bulgaria*, PhD thesis should contain scientific or scientific-applied results, which represent an original contribution in science. The PhD thesis must indicate that the candidate has in-depth theoretical knowledge of the relevant specialty and ability for independent research.

2. According to Art. 27 (2) of the specific requirements in the Act's Institutional Regulation, PhD thesis should be presented in a form and volume corresponding to the specific requirements of the primary unit. The PhD thesis should contain: a cover page; content; introduction; exhibition; conclusion - a summary of the results obtained with a declaration of originality; bibliography.

The PhD thesis consists of 145 pages. Its structure includes introduction, five chapters, the PhD thesis scientific contributions, directions for future research, list of dissertation publications, list of citations, request for originality and list of 130 cited sources.

The aims of the PhD thesis are to gain methodological experience in the use of the Generalized Networks apparatus in the modeling of conflict-free scheduling algorithms for a matrix switch packet switch with input buffering of the "virtual output queues" type and to propose a new algorithm and its formal OM model for contention-free scheduling in a matrix switch packet switch. To approve a methodology for large-scale computer simulations of its throughput, providing an unambiguous comparison of different algorithms.

To accomplish this, the following tasks have been set:

1. To specify models using the Generalized Nets (GNs) apparatus of classical algorithms for conflict-free scheduling in a switch matrix packet switch, thereby gaining methodological experience from the application of the GNs apparatus to working algorithms.

2. To synthesize a new algorithm for conflict-free scheduling in a packet switch with a matrix switch and obtain its specification in the form of an GNs model.

3. To propose inbound traffic patterns realizing uniquely different loads for computer simulations of the throughput of conflict-free scheduling algorithms.

4. To develop a procedure for calculating an accurate upper bound on the throughput of contention-free scheduling algorithms in a matrix switch packet switch, to unambiguously adequately compare the contention-free scheduling algorithms.

I find that the aim and the problems formulated reflect the topicality and significance of the presented PhD thesis, as well as the possibility to apply the results obtained in the engineering practice.

Seven publications are included in the presented list of publications on the PhD thesis. Five of the publications are referenced in Scopus, two of them in WoS, one publication is referenced in eLibrary and one is in a national conference proceedings. The data thus presented give me reason to conclude that the research has been provided with the necessary publicity. Proof of this is the presented list of 6 citations.

I accept that the contributions so formulated could be considered to have scientific and common application. This separation would allow detailing the results obtained in accordance with the specificity of their significance. Such defined contributions can be defined as enriching the existing scientific field with new knowledge.

The PhD abstract has a volume of 51 pages. It faithfully reflects the essence and content of the PhD thesis, including the purpose, subject, object and tasks of PhD thesis research and the ways of their realization.

In order to form the final evaluation of the PhD thesis, the requirements of the *Development of Academic Staff Act in the Republic of Bulgaria* and its Implementation Rules are to be taken into account, so I should note that all remarks made by me during the preliminary discussion of the PhD thesis are reflected in its final version.

**In conclusion**, I accept that the requirements of the *Development of Academic Staff Act in the Republic of Bulgaria* and the specific requirements in the Act's Institutional Regulation are fulfilled. After my introduction to the dissertation thesis and its publications, an analysis of their significance and the contributions they make, I give my positive assessment and I recommend to the Honorable Jury to award the educational and scientific degree PhD to **Tasho Dimitrov Tashev** in the Scientific Field: **4. Natural Sciences**,

**Mathematics and Informatics, the Professional Area: 4.6. Informatics and Computer Sciences, the Scientific Specialty: 01.01.12. Informatics.**

18.04.2023

Sofia

Signa

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