



**FACULTY  
OF MATHEMATICS  
AND PHYSICS**  
Charles University

**Advisor's evaluation of PhD thesis "Online Algorithms for Packet Scheduling"  
by Pavel Veselý**

The thesis considers two variants of packet scheduling problems, designs new online algorithms and analyzes them. It contributes several new results in this area of online algorithms, one of them solves a long-standing open problem unsuccessfully attacked by many researchers.

The main area considers the bounded-delay packet scheduling problem and has two distinct parts.

In the first part a new variant of the problem with lookahead is considered and both lower and upper bounds are proven for the case of 2-bounded instances. This part was published at ISAAC'16. Recently the algorithm was improved by Kobayashi, showing that the lower bound is tight for the given problem.

In the second part, the thesis gives an optimal algorithm for the general case of bounded-delay packet scheduling problem with competitive ratio equal to the golden ratio. While this value was conjectured, the problem was open and considered important for at least 10 years. Both the design of the algorithm and its analysis use novel ideas and complicated constructions developed by the candidate. This result is submitted.

The secondary area and the last part of the thesis considers a model with adversarial jamming coming from the area of distributed computing. The main results are the lower and upper bounds on the speedup needed for a 1-competitive algorithm. Again, these results are based on intricate constructions. These results were published at WAOA'17.

Overall, the thesis gives a thorough study of the given area, including a good survey. The technical results are excellent, I am also satisfied with their presentation. I consider this to be an excellent thesis.

I enjoyed working with Pavel. He is very strong in developing complicated structures and examples, both in the lower bounds and algorithms, often continuing after the point where many colleagues give up. It is very satisfying to see how he has been developing his skills and growing independence. Pavel was or is involved in several other projects without my participation. One of them is a result on

**Computer Science Institute of Charles University**

Malostranské nám. 2/25, 118 00 Praha 1

phone: 951554230, fax: 257531014

e-mail: sekretariat@iuuk.mff.cuni.cz

PSPACE-completeness of online coloring number, with his fellow student Martin Bohm, which received the best student paper at IWOCA'16. Another, more recent, is a project on parameterized approximation schemes led by Andreas Emil Feldmann, whose results were presented at STACS'18.

To summarize, the candidate has shown in-depth knowledge of the area and techniques of design of online algorithms and has proven strong new results. I fully support awarding the Ph.D. degree.

Sincerely Yours,

Jiří Sgall  
sgall@iuuk.mff.cuni.cz