

**Doctoral School of Information and Biomedical Technologies**  
**Polish Academy of Sciences (TIB PAN)**

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**SUBJECT:**

Mixed-Integer Linear and Nonlinear Programming Methods for Energy Aware Traffic Control in Clouds and Internet of Things Systems

**SUPERVISOR:**

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**DESCRIPTION:**

Methods of increasing the energy efficiency of clouds and Internet of Things systems are becoming an important issue for network operators and IT companies. As observed, significant savings can be obtained by consolidating loads and flows during periods and in areas of reduced traffic. The reasons for this are twofold: first, traffic load tends to follow periodic patterns; second, there are large reallocations of people and businesses, especially in times of global crises such as the pandemic and its aftermath. The idea is to temporarily shut down or put to sleep certain parts of a system and to meet the demands of users through the rest of the system. The most effective solutions are based on online optimization. Unfortunately, realistic models involve a big number of binary variables and lead to NP-hard problems that cannot be solved in an acceptable time. This is the reason behind the big amount of interest in the development of numerical algorithms which will enable getting an approximate solution to these problems in a possibly short time. The work will consider both wired and wireless networks.

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