Fast and Quantitative What-if Analysis for Dependable Communication Networks (WHATIF)

Abstract

Communication networks have become a critical infrastructure of our digital society. The resulting stringent dependability requirements however stand in stark contrast to today's manual and error-prone approach to operate networks. The goal of this project is to design more automated approaches to manage and operate networks, ensuring policy-compliance and quality-of-service even under failures, hence disburdening human operators of their most complex tasks. The WHATIF project consists of four work packages: (1) support for fast and powerful automated what-if analysis, (2) accounting not only for logical properties (e.g., policy compliance) but also for quantitative aspects (e.g., performance, quality of service), (3) supporting automatic repair and consistent update of configurations (synthesis), (4) algorithmic toolbox and case study. This project is ambitious: we require that our approaches provide formal guarantees but at the same time are also efficient. To this end, we develop a novel methodology which enhances rigorous approaches (using formal methods and exact algorithm designs) with heuristic approaches (including under- and overapproximations and machine learning), to speed up executions without losing provable guarantees. We are well-prepared for this project and have recently made first groundbreaking contributions to the first work package of this project.

Scientific disciplines:

202038 - Telecommunications (60%) | 102031 - Theoretical computer science (30%) | 102019 - Machine learning (10%)

Keywords:

Communication Networks, Resilience, Algorithms, Formal Methods

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Principal Investigator:	Stefan Schmid
Institution:	University of Vienna
Collaborators:	Jiri Srba (Aalborg University) (Co-Principal Investigator)

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Further links about the involved persons and regarding the project you can find at

https://archiv.wwtf.at/programmes/information_communication/ICT19-045