The idea to infer the available bandwidth of a network path from end-host measurements dates back to packet pair probing and TCP congestion control. It has played an important role throughout the history of the Internet, with applications in monitoring, traffic engineering, and quality of service. In spite of numerous probing schemes, the foundations of bandwidth estimation are still not well understood. Most estimation methods are based on a simple network model, i.e. a single link with fluid constant rate cross-traffic. In case of multiple links and bursty traffic noticeable estimation bias occurs. These errors cannot be explained in current theories.

In this project we aim at developing a network calculus based methodology for measurement-based bandwidth estimation in networks of stochastic systems, such as schedulers under bursty cross-traffic or wireless links. We expect that a formulation in the probabilistic network calculus has the potential to yield important new insights, e.g. regarding the optimality of probing schemes, which can lead to better estimation methods. The connection with network calculus facilitates an experimental verification of known theory and permits the exploration of aspects that are beyond the state-of-the-art of today’s theories, for example scheduling of heavy-tailed traffic.

Project abstract:

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Project manager: M.Sc. Ralf Lübken

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