Chair of Network Architectures and Services
TUM School of Computation, Information, and Technology
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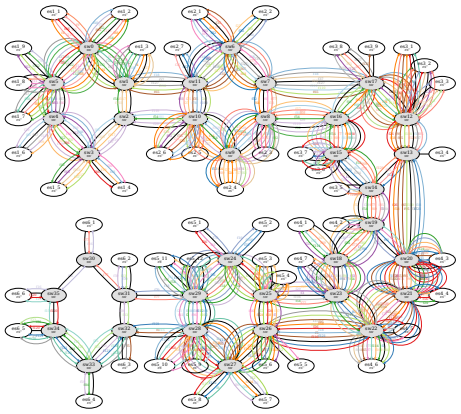
Thesis B.Sc.

Delay-Bound Analysis in TSN-ATS

Motivation



Back-Pressure routing (BPR) [1] aims to optimize network throughput by considering the occupancy of network interface queues. Reducing the queue backlog often comes with a lower packet delay and an overall increased throughput. It also comes with decreased end-to-end delays. One drawback of BPR is, that only considering queue occupancy values can lead to unnecessary long paths and therefore increased resource use leading to lower throughput. Different approaches exist that address this drawback such as [2]. Time Sensitive Networking (TSN) is a group of standards focusing on reliable data transmission with high reliability and low delays over Ethernet. Asynchronous Traffic Shaping (ATS) is one standard from the TSN family which is able to achieve these goals without requiring synchronization of clocks between the network nodes, which is usually a requirement. The goal of this thesis is to compare estimated delay bounds to delays measured in a testbed environment. Routing is employed for determining suitable paths for the offered load through the network.

Your Task

- Familiarize yourself with TSN-ATS and back-pressure based routing algorithms
- Choose and design suitable network topologies
- Apply routing algorithms to suitable traffic specifications, calculate delay bounds
- Measure delays in a testbed environment
- Analyse the results and evaluate their quality

Requirements

- Basic knowledge of routing principles and computer networks
- Experience using Linux and Bash programming
- Experience developing software in Python3

Literature

References

[1] L. Tassiulas and A. Ephremides. Stability properties of constrained queueing systems and scheduling policies for maximum throughput in multihop radio networks. In *29th IEEE Conference on Decision and Control*, pages 2130–2132. IEEE, 1990.

[2] L. Ying, S. Shakkottai, A. Reddy, and S. Liu. On combining shortest-path and back-pressure routing over multihop wireless networks. *IEEE/ACM Transactions on Networking*, 19(3):841–854, 2010.

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