

Thesis  
B.Sc.

Thesis  
M.Sc.

## On the penalty of shaping — A spotlight on ATS

### Motivation

Asynchronous Traffic Shaping (ATS) is a new, evolving standard within the Time-Sensitive Networking group that guarantees latency bounds without requiring synchronization in the network [1]. Analysis of ATS in hardware setups of networks is required in addition to emulation and simulation approaches in existing work to assess the practical impact of this new standard.

Moreover, the drawback caused by shaping on latency or round-trip time is not known for practical use cases. Measuring the behavior and impact of implementations of ATS algorithms in real networks closes a gap towards the validation of provided bounds. For this purpose, we have prepared various tools to analyze the network. You will use these tools and our implementations of ATS algorithms to analyze the network.

This leads to the goal of this work, which is to analyze the available implementations of ATS, prepare experiments to compare the results with various theoretical and simulated results, e.g. [4, 2, 3] from previous work. This will allow you to provide practical insights into the ATS standard in general-purpose networks.

### Your Profile

- General interest in computer networks
- Experience with Python or similar language for data analysis

### Your Tasks

- Analyzing the existing solutions for packet path analysis, and ATS
- Conducting research on ATS and packet shaping
- Extracting information from packets
- Analyzing and evaluating extracted information
- Evaluating performed experiments

### Literature

- [1] N. Finn. Introduction to time-sensitive networking. *IEEE Communications Standards Magazine*, 2(2):22–28, 2018.
- [2] A. Grigorjew, F. Metzger, T. Hoßfeld, and J. Specht. A simulation of asynchronous traffic shapers in switched ethernet networks. In *2019 International Conference on Networked Systems (NetSys)*, pages 1–6, 2019.
- [3] E. Mohammadpour, E. Stai, M. Mohiuddin, and J.-Y. Le Boudec. Latency and backlog bounds in time-sensitive networking with credit based shapers and asynchronous traffic shaping. In *2018 30th International Teletraffic Congress (ITC 30)*, volume 2, pages 1–6. IEEE, 2018.
- [4] J. Specht and S. Samii. Urgency-based scheduler for time-sensitive switched ethernet networks. In *2016 28th Euromicro Conference on Real-Time Systems (ECRTS)*, pages 75–85, 2016.

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