

Thesis  
B.Sc.

Thesis  
M.Sc.

IDP

# TSN – Cyclic Queuing and Forwarding Shaper on Linux

## Motivation

Time Sensitive Networking (TSN) [2] is a group of standards to support time-critical traffic and guarantee, among other properties, low-latency and high reliability. IEEE 802.1Qch Cyclic Queuing and Forwarding (CQF) [1] introduces double buffering on bridged networks to synchronize the individual transmissions in a cyclic way. This allows to have bounded latencies only depending on the number of hops and the set cycle time. The bounding is completely independent from the network topology and other network parameters. Linux Traffic Control (TC) already implements different TSN standards such as for Asynchronous Traffic Shaping or Credit-Based-Shaper.

The goals of this thesis are to design a model on how to use CQF on Linux, to implement and evaluate a prototype, and to describe and analyse the differences and potentials of using CQF in practice compared to theoretical simulations.

## Your Profile

- General interest in computer networks
- Experience with C Programming
- Interest in Linux Kernel Programming

## Your Tasks

- Conducting research on CQF and TSN
- Model a possible approach for the implementation
- Implement a prototype
- Evaluate and discuss the results

## Literature

- [1] IEEE/ISO/IEC International Standard - Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 1Q: Bridges and bridged networks - AMENDMENT 7: Cyclic queuing and forwarding. *ISO/IEC/IEEE 8802-1Q:2016/Amd.7:2019(E)*, pages 1–34, 2019.
- [2] N. Finn. Introduction to time-sensitive networking. *IEEE Communications Standards Magazine*, 2(2):22–28, 2018.

## Contact

Florian Wiedner                      [wiedner@net.in.tum.de](mailto:wiedner@net.in.tum.de)  
Christoph Schwarzenberg        [schwarzenberg@net.in.tum.de](mailto:schwarzenberg@net.in.tum.de)

