

Thesis
M.Sc.

IDP

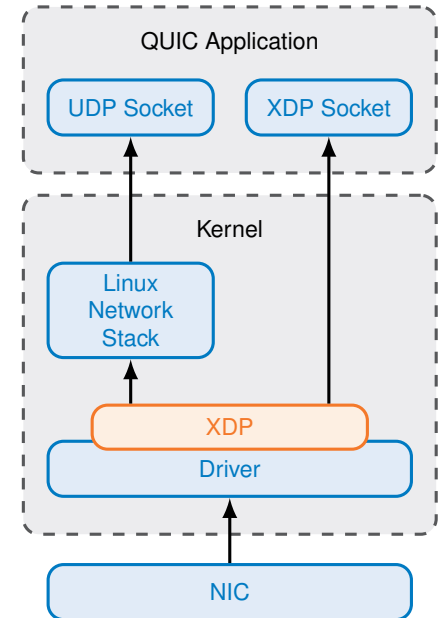
Accelerating QUIC with XDP

Motivation

The transport protocol QUIC aims to provide secure, fast, and reliable connections. QUIC was standardized by the Internet Engineering Task Force (IETF) in 2021. It is based on UDP and uses TLS 1.3 for encryption. [1]

XDP is a high-performance data path allowing networking applications to bypass large parts of the kernel network stack [2].

By combining QUIC and XDP, Microsoft achieved a significantly better performance [3]. Other companies like Amazon and LiteSpeedTech have also been working on QUIC implementations with XDP support.



Goal

The goal of this thesis is to look at existing QUIC implementations with XDP support and evaluate their performance. Especially, you will look at MsQuic, the QUIC implementation of Microsoft. You will look into the implementations in more detail with the help of profiling tools. If time permits, you can implement XDP support for an existing QUIC implementation that does not yet support XDP.

Your Tasks

- Familiarize yourself with the topics (QUIC, XDP, eBPF)
- Perform measurements with existing QUIC implementations supporting XDP
- Evaluate the performance in detail in a hardware testbed

References

- [1] <https://www.rfc-editor.org/rfc/rfc9000>
- [2] <https://prototype-kernel.readthedocs.io/en/latest/networking/XDP/introduction.html>
- [3] <https://techcommunity.microsoft.com/t5/networking-blog/balance-performance-in-msquic-and-xdp/ba-p/3627665>
- [4] Jaeger et al., "QUIC on the Highway: Evaluating Performance on High-rate Links", IFIP Networking 2023.

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