

Thesis  
M.Sc.

IDP,  
Guided  
Research

## Comparison of DPDK-enabled P4 software targets

### Motivation

P4 is a programming language intended to describe the behavior of packet processing systems. P4 was introduced in 2014 and can be used to define entirely new networks with new protocols which behave differently from the networks we currently use. Compilers exist for various targets (software, FPGA, SmartNIC, ASIC).



P4 programming language

The Dataplane Development Kit (DPDK) is an open-source collection of libraries and drivers for high performant packet processing. It runs in the userspace. There exist two P4 software targets built on top of DPDK, namely *t4p4s* and *p4-dpdk*. The architecture of both differs: while *t4p4s* generates code that is compiled and linked with the DPDK libraries, *p4-dpdk* generates specifications for the Software Switch (SWX) Pipeline of DPDK and is therefore interpreted in some kind of virtual machine.

In previous theses, the basic performance components of *t4p4s* and *p4-dpdk* has been analyzed. The goal of this thesis is to deepen the analysis, especially for the *p4-dpdk* target. Furthermore, both targets should be compared in detail with respect to their different architecture and the resulting performances for different use cases. In the end, the thesis should result in some guide containing the pros and cons of each target and in which cases one target outperforms the other.

### Tasks

The thesis requires diving into *DPDK*, *p4c*, *p4-dpdk*, and *t4p4s*:

- Get familiar with involved technologies and programs
- Systematically evaluate the performance and compare the different targets

### Requirements

- Experience with C/C++ programming is recommended
- Experience with Linux is required

### Sources

- <https://p4.org/>
- <https://github.com/p4lang/p4c>
- [https://doc.dpdk.org/guides/prog\\_guide/packet\\_framework.html](https://doc.dpdk.org/guides/prog_guide/packet_framework.html)
- <https://github.com/P4ELTE/t4p4s>

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