

Thesis  
B.Sc.

Thesis  
M.Sc.

IDP

# Performance Evaluation of P4 with Cryptographic Co-Processor

## 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. In this thesis we want to study the performance impact of cryptographic functions in P4 programs, such as for example the performance impact of encryption in Virtual Private Networks (VPN).

As P4 was designed to be compiled to various hardware platforms, dedicated co-processors can be used for faster cryptographic functions. The Netronome SmartNIC is one of the first network cards with native support for P4 and with a dedicated cryptographic co-processor. Netronome offers an SDK which allows the P4 programs to be compiled directly for this SmartNIC, with the possibility to call external cryptographic functions.

With this thesis, you will learn about the following topics:

- P4 programming language,
- Secure protocols based on encryption and message authentication code,
- Performance evaluation of packet processing devices.

## Your Task

- Implementing P4 programs and cryptographic functionalities for Netronome SmartNIC
- Detailed performance analysis of the impact of cryptographic functions using black box measurements
- Fine-grained analysis of latency behavior
- Comparison with other related software and hardware approaches

This thesis allows to study recent research trends and work with brand new hardware. Prior experience with P4 is not necessary.

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