Masterprojekt SoSe 2022:
Virtual Function performance benchmarking

Holger Karl
Internet Technology and Softwarization

Rubens Figueiredo
BISDN GmbH

Hagen Woesner
BISDN GmbH

Communication networks have to support new services with stringent requirements concerning latency, data rates, or dependability. These requirements come from human-oriented services as well as from sensors, cars, etc. To support these requirements, the network infrastructure has to expanded and upgraded; easier and continuous upgrades will become necessary. Such upgrades pertain to network elements like switches, routers, firewalls or intrusion detection systems.

These network elements are conventionally realised using dedicated hardware, able to deal with high packet rates. Alternatively, powerful general-purpose hardware could be employed to run software applications that execute the same *network functions* (NF) – as this hardware is typically virtualized, a common name for this approach is *Network Function Virtualization* (NFV). Here, the hope is to improve network resilience, flexibility, maintainability and standardization; a possible downside is high hardware cost and high energy consumption for such commodity hardware.

But many hardware alternatives exist to run NFs. In addition to general-purpose CPUs, Field-Programmable Gate Arrays (FPGAs) or smart network interfaces (SmartNIC) are promising platforms. All these options have different tradeoffs between flexibility of programming, cost, performance and other metrics. It is not obvious which platform is best suited for which type of NFs.

It is hence necessary to develop an approach to identify the best platform by benchmarking various NF and hardware combinations. The project proposed here will develop a toolset for profiling and benchmarking NFs. We will start by identifying currently available benchmarking tools, understanding different types of traffic profiles, and building a systematic framework for evaluation of NFs. The project provides opportunities to work with real hardware, develop an understanding of a new generation of communication networks and their typical use cases and contributing with features to open source projects.

This project is offered in cooperation between BISDN GmbH, a Berlin-based startup in the telco industry, and the Internet Technology and Softwarization group. Working language of the project will be English. For any questions, please contact Holger Karl, holger.karl@hpi.de.