

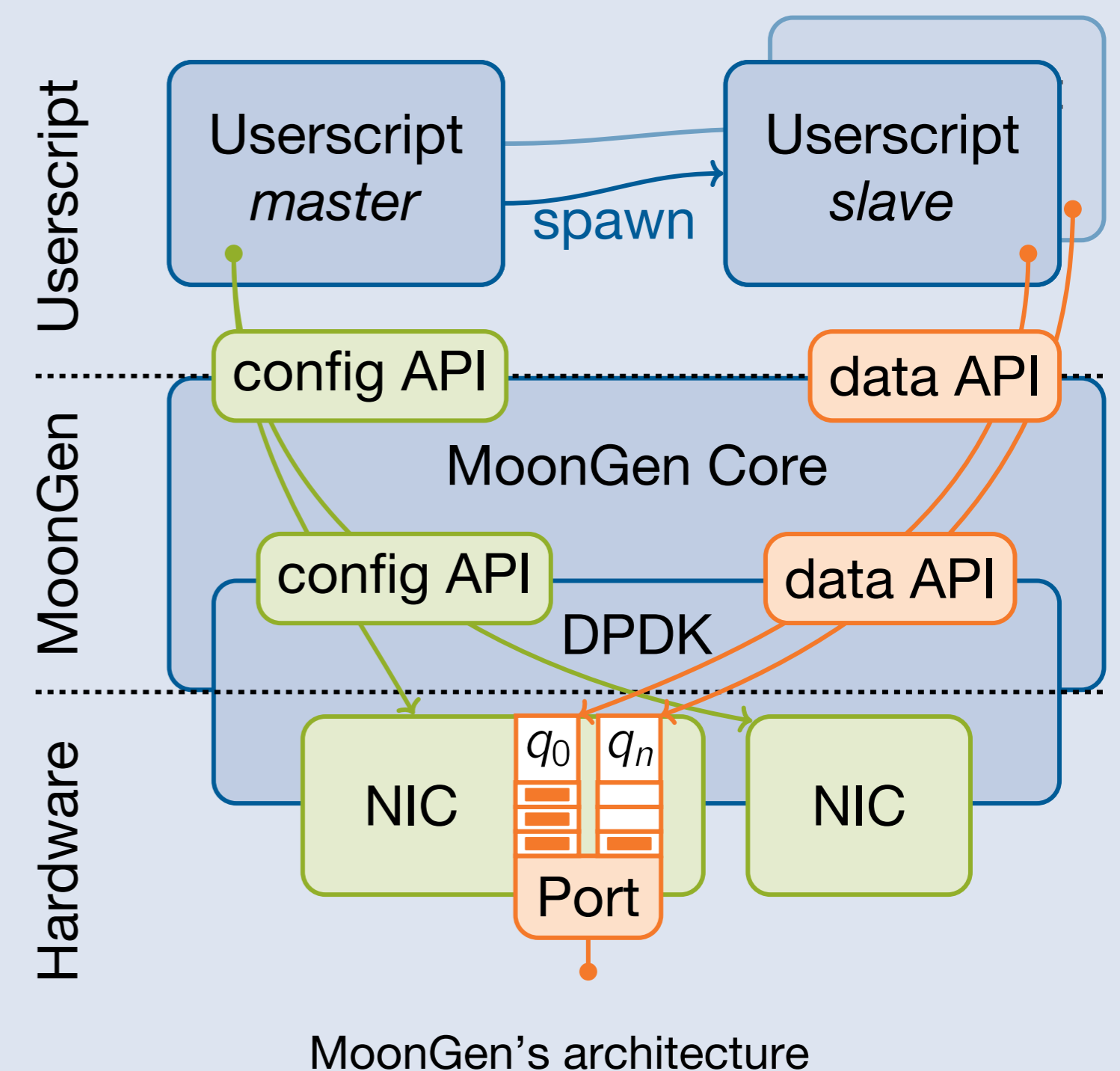
MoonGen

Packet Generator & Latency Measurement

Features & Architecture

MoonGen is a *scriptable high-speed packet generator* built on a Intel's Data Plane Development Kit (DPDK) as backend offering a wide range of features:

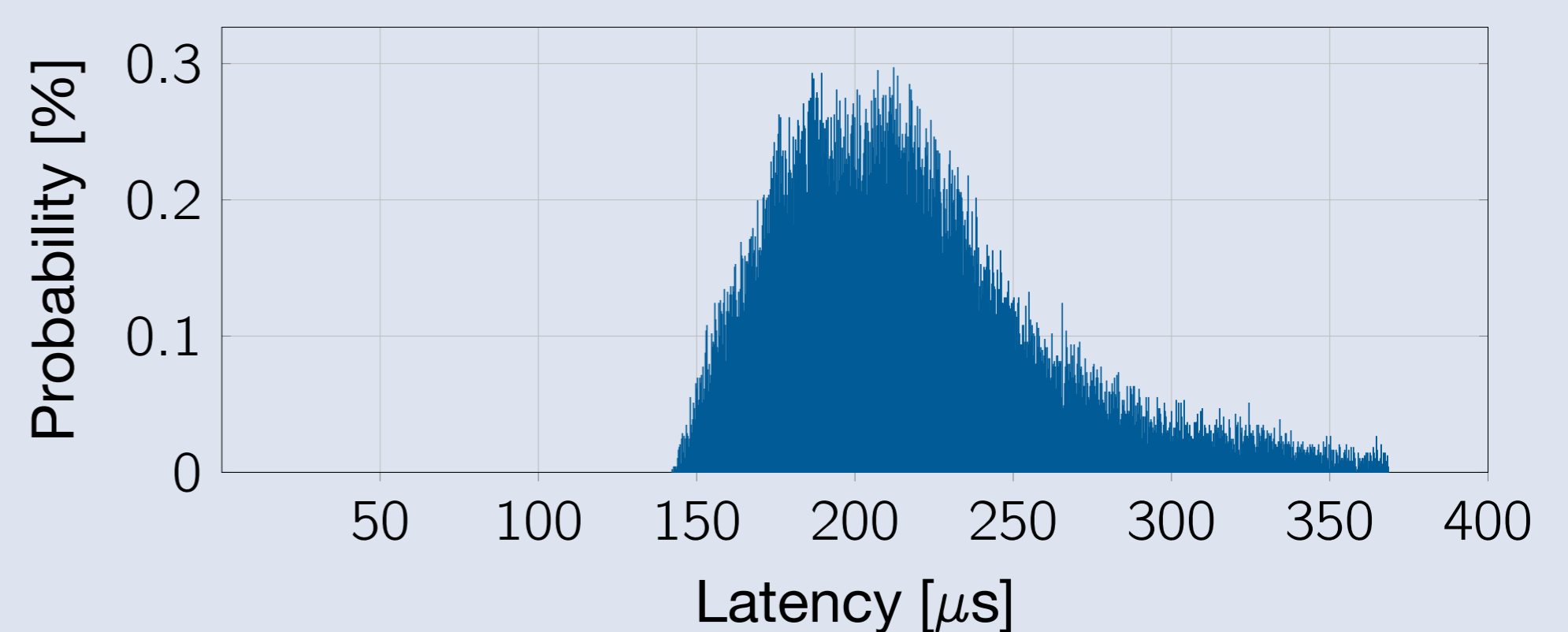
- ▶ **Speed:** ≥ 10 Gbit/s with minimal sized packets using a single CPU core
- ▶ **Flexibility:** Configuration & packet crafting in user-controlled Lua scripts
- ▶ **Efficiency:** Code optimization to generate fast scripts using LuaJIT
- ▶ **Precision:** *Sub- μ sec delay measurements* on Intel 10 Gbit NICs
- ▶ **Parallelization:** *Multi-core support* for rates beyond 10 Gbit/s



Latency Measurement Feature

- ▶ MoonGen reuses hardware features originally designed for the Precision Time Protocol (PTP)
- ▶ Timestamping happens in hardware shortly before/after sending/receiving
- ▶ Precision of ± 3.2 ns on Intel X540 10 Gbit NICs
- ▶ Limitations: Packets must look like PTP packets: only UDP and PTP layer 2 packets are supported

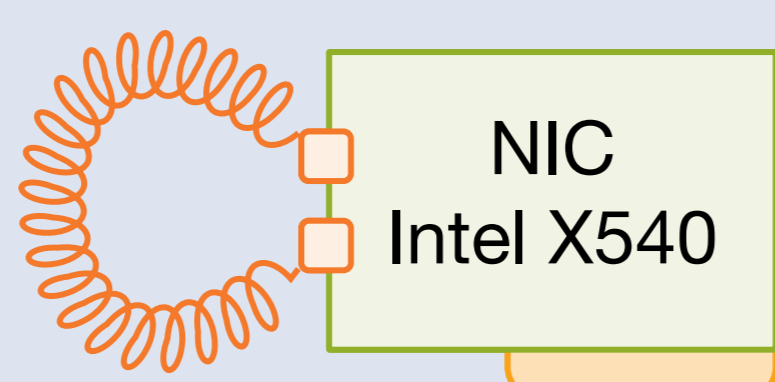
Latency Measurement Example



Latency distribution of traffic forwarded through a VM running on top of Open vSwitch at a load of 322k packets/s.

Latency Measurement Demo

- ▶ Cable length determination through time-of-flight
- ▶ Demo setup uses an unaltered Intel X540 dual port NIC



More Information

Additional information and source code of MoonGen is available at:



<https://github.com/emmericp/MoonGen>