T4P4S - A P4 compiler for a variety of targets

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Multi-target P4 compiler framework

T4P4S Compiler

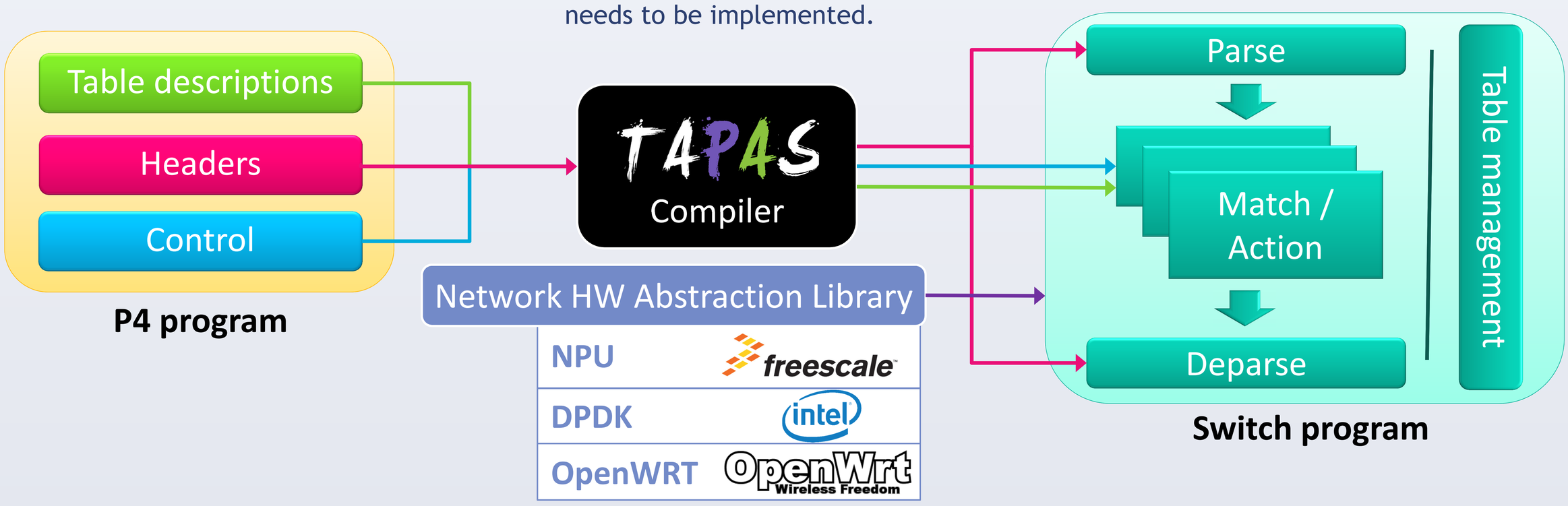
Our retargetable compiler (T4P4S - Translator for P4 Switches) turns a P4 code into a target independent C core program running on the top of a Network Hardware Abstraction Library (NetHAL).

NetHAL

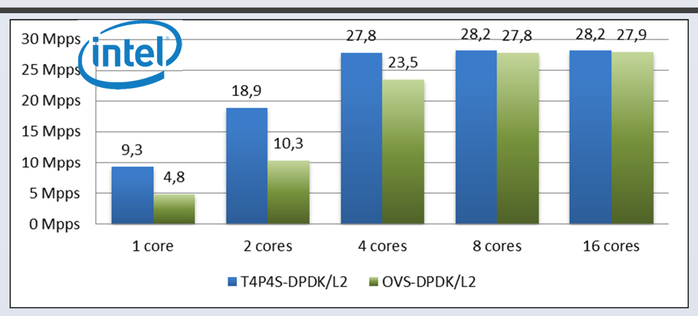
Hardware dependent operations are separated to the Network Hardware Abstraction Library (NetHAL) which improves portability: to support a new architecture, only a new NetHAL needs to be implemented.

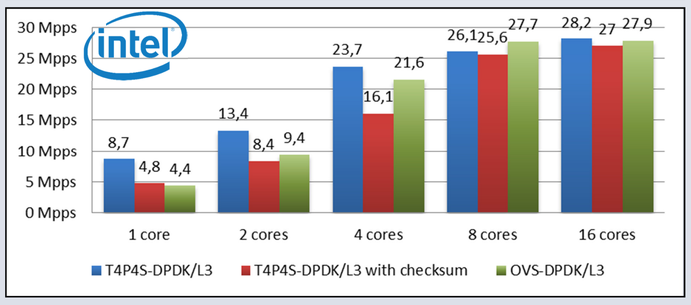
Switch program

To run the core program on a specific hardware the appropriate NetHAL needs to be linked. The compiled switch program then parse incoming packets, apply match-action rules and deparse messages before egressing.



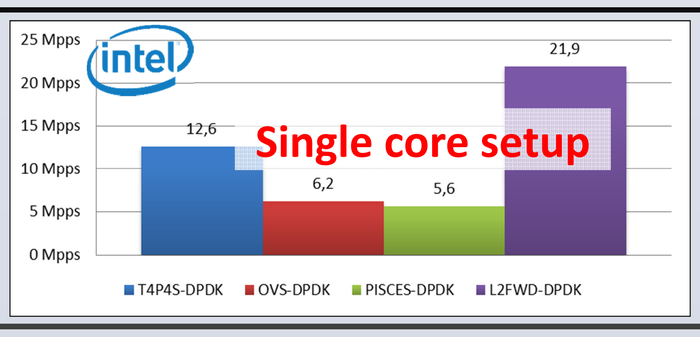
Performance measurements





Scenario 1: Intel DPDK target

- Two examples – test traffic with packet size 64B
  - a) **Simple L2 forwarding** – smac and dmac tables with 200 entries in each
  - b) **Simple L3 forwarding** – ipv4_lpm and nexthop tables with 200 entries in each
- **P4 and OpenFlow (OVS)** implementations
- Similar **testbed setup** as the demo setup below
  - Intel Xeon CPU E5-1660 v4 @ 3.20GHz 8C 16T 64GB RAM
  - 60Gb/s Mellanox cards (MT27700 Family)

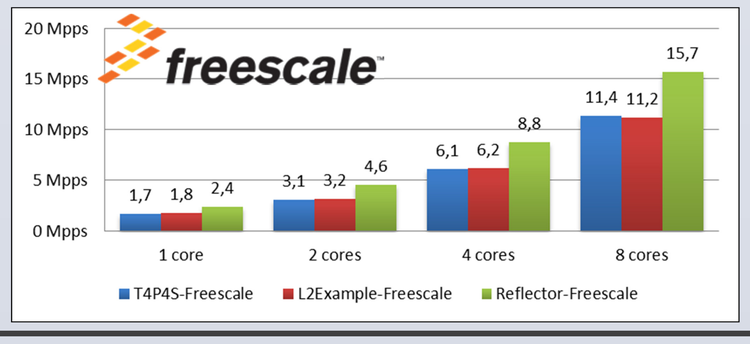


Scenario 2: Intel DPDK target

- **Simple L2 forwarding** as Scenario 1
- **P4, OpenFlow and native dpdk** implementations
- Similar **testbed setup** as the demo setup below
  - Intel(R) Xeon(R) CPU E5-2680 v3 @ 2.50GHz
  - 40Gb/s Intel cards (XL710 for 40GbE QSFP+)

Scenario 3: Freescale ODP-SDK target

- **Simple L2 forwarding** as Scenario 1
- **Comparison to** L2 example and Reflector implementations
- Similar **testbed setup**
- Traffic generator
  - Intel DPDK pktgen
- P4 switch node
  - **Freescale QorIQ LS2045A** board (8 x Cortex-A57 CPUs, 64-bit, 2 GHz, 2x8GB DDR4 RAM)



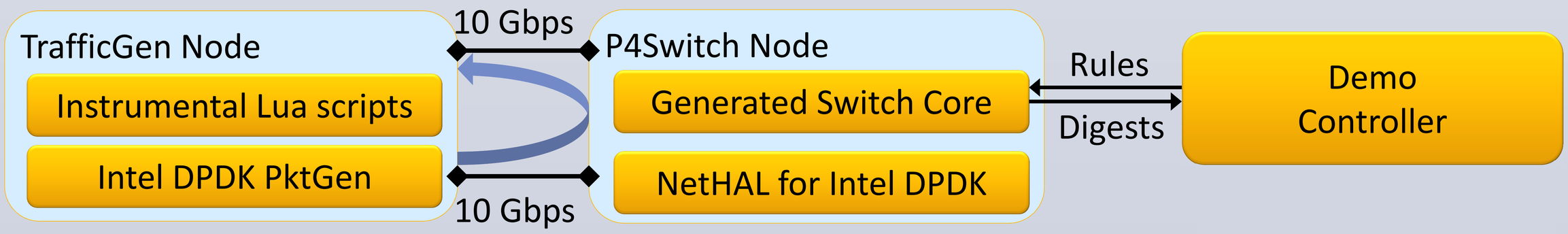
Demo setup

Small testbed deployed at Eötvös Loránd University with 2 nodes

- Intel Core i5-650 Processor, 2C/4T, 4MB cache, 3.2 GHz, 4GB RAM
- Intel Corporation 82599ES 10-Gigabit Dual port NIC
- DPDK 16.07

Use cases

- L2 forwarding with 2 tables
- L3 forwarding with 3 tables
- NAT example



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