

An implementation of a deeply programmable SDN switch based on a hybrid FPGA/CPU architecture

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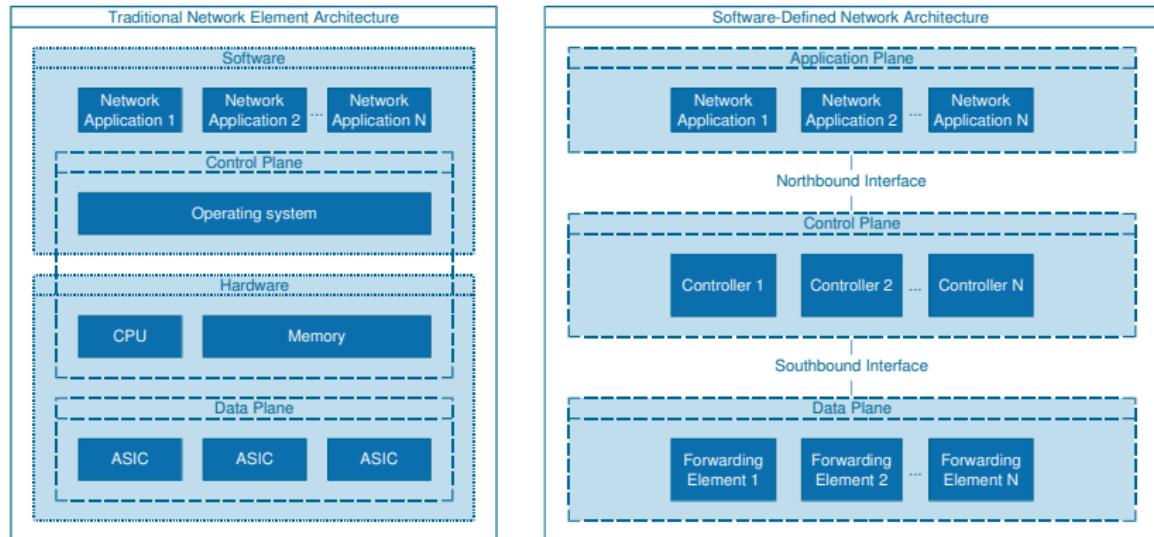
University of Sarajevo
Faculty of Electrical Engineering
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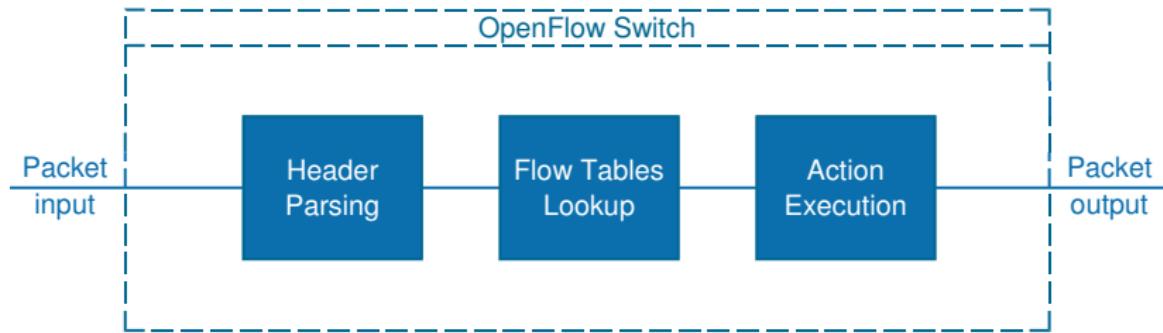
Introduction

Transition from traditional to SDN architecture



Introduction

OpenFlow switch architecture

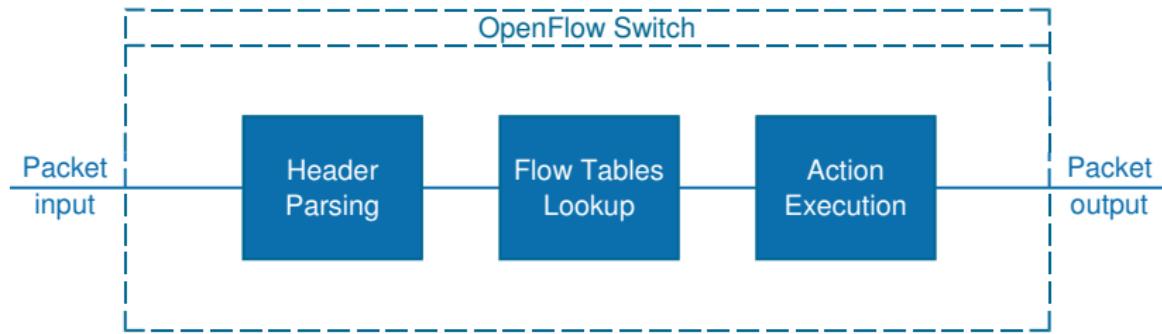


- ▶ Flow-level granularity
- ▶ Limited support for new protocols
- ▶ Absence of advanced packet processing functionalities (e.g. encryption, transcoding, DPI)

Root cause – a very limited switch programmability

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OpenFlow switch architecture

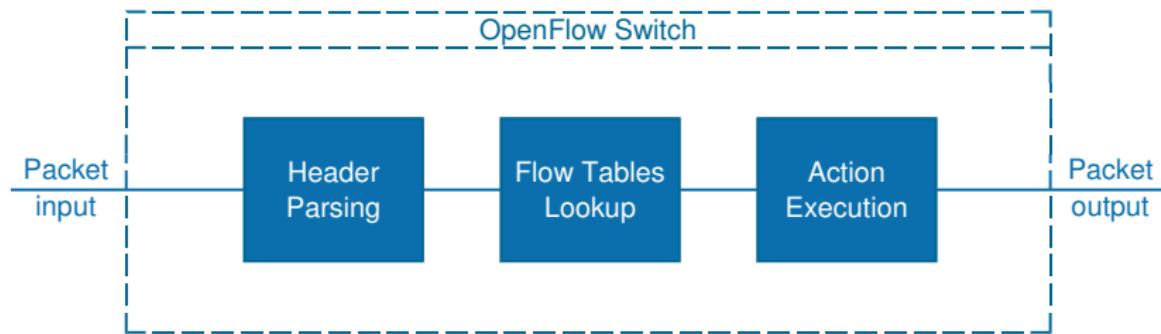


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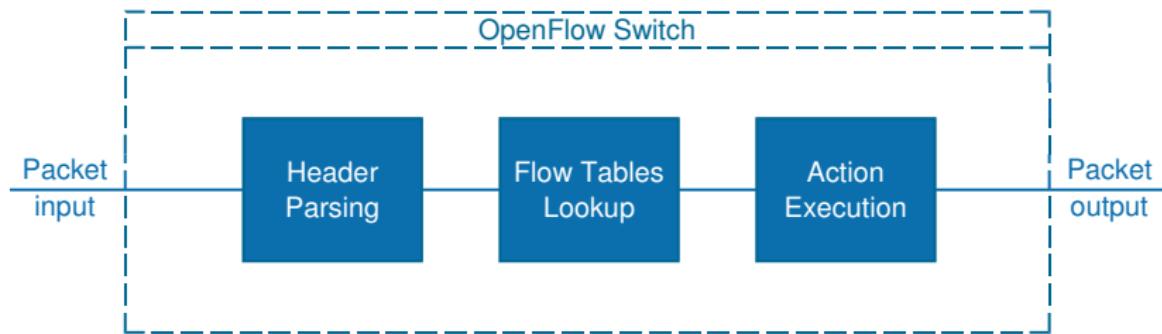


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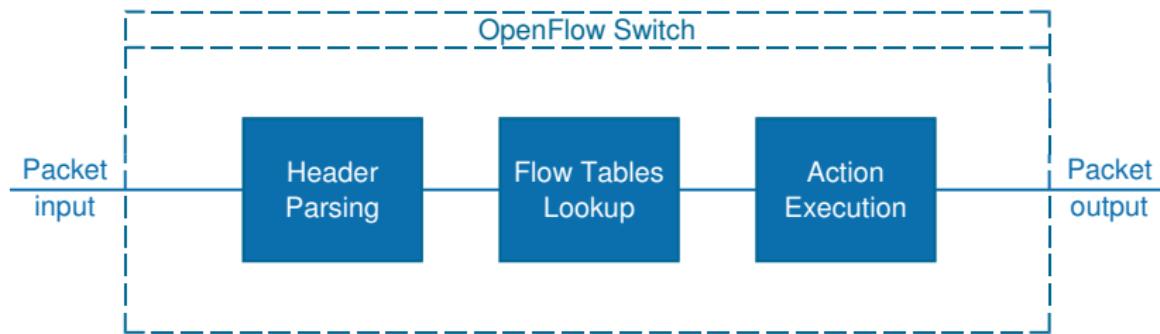


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To overcome OpenFlow switch limitations we propose:

- ▶ **A new model of deeply programmable packet-switching node (DPPSN) based on the hybrid FPGA/CPU architecture**

- ▶ FPGA for high-speed processing
- ▶ CPU for high level of flexibility

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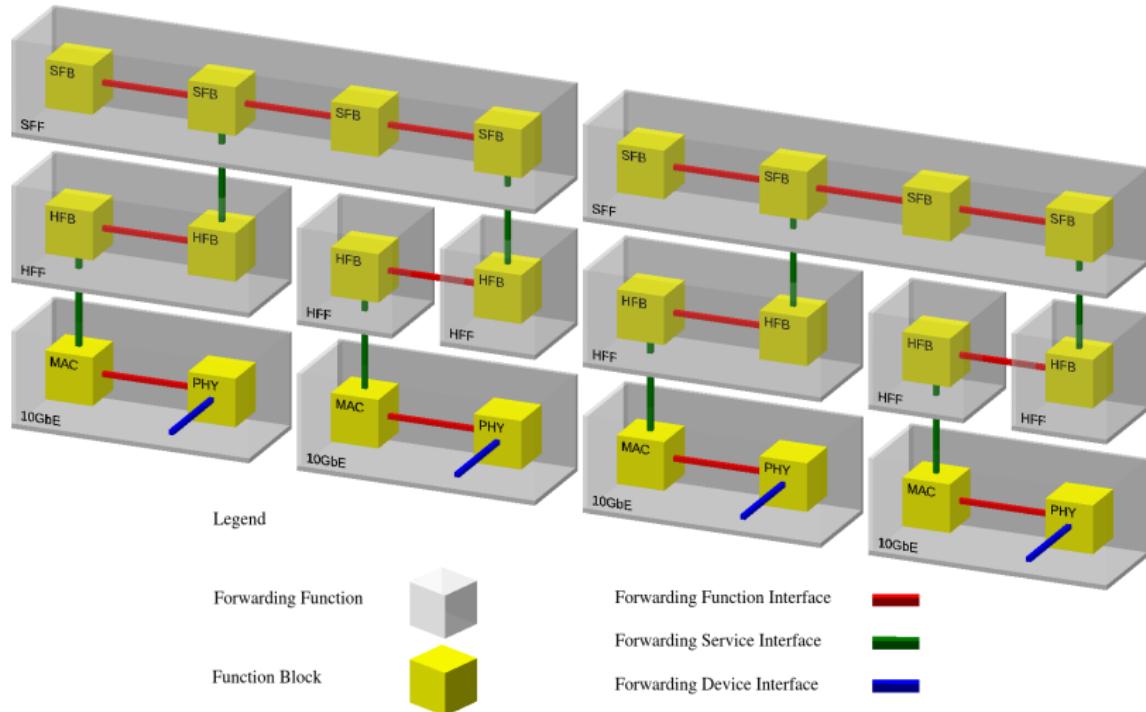
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Deeply programmable packet-switching node

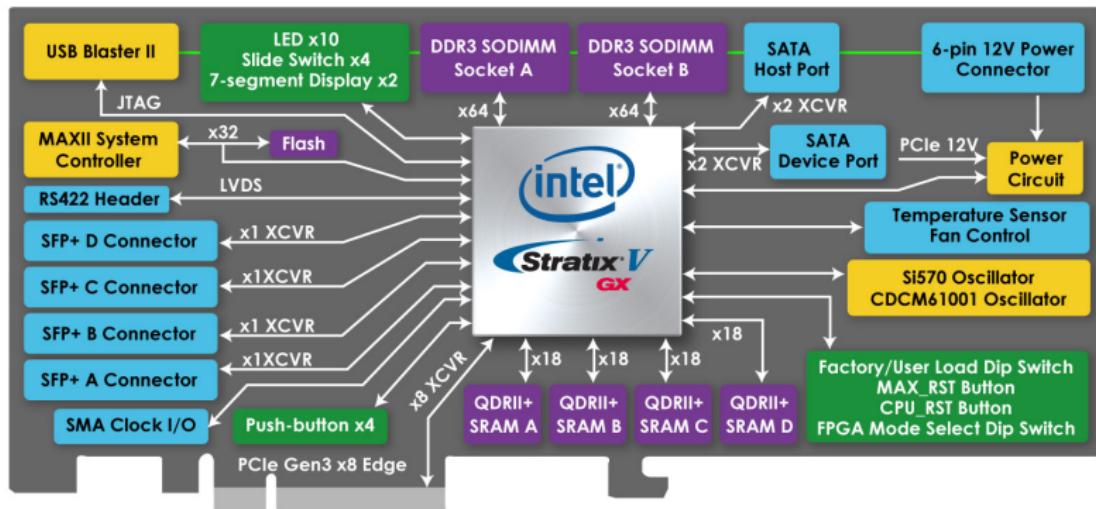
Generic architecture



Deeply programmable packet-switching node

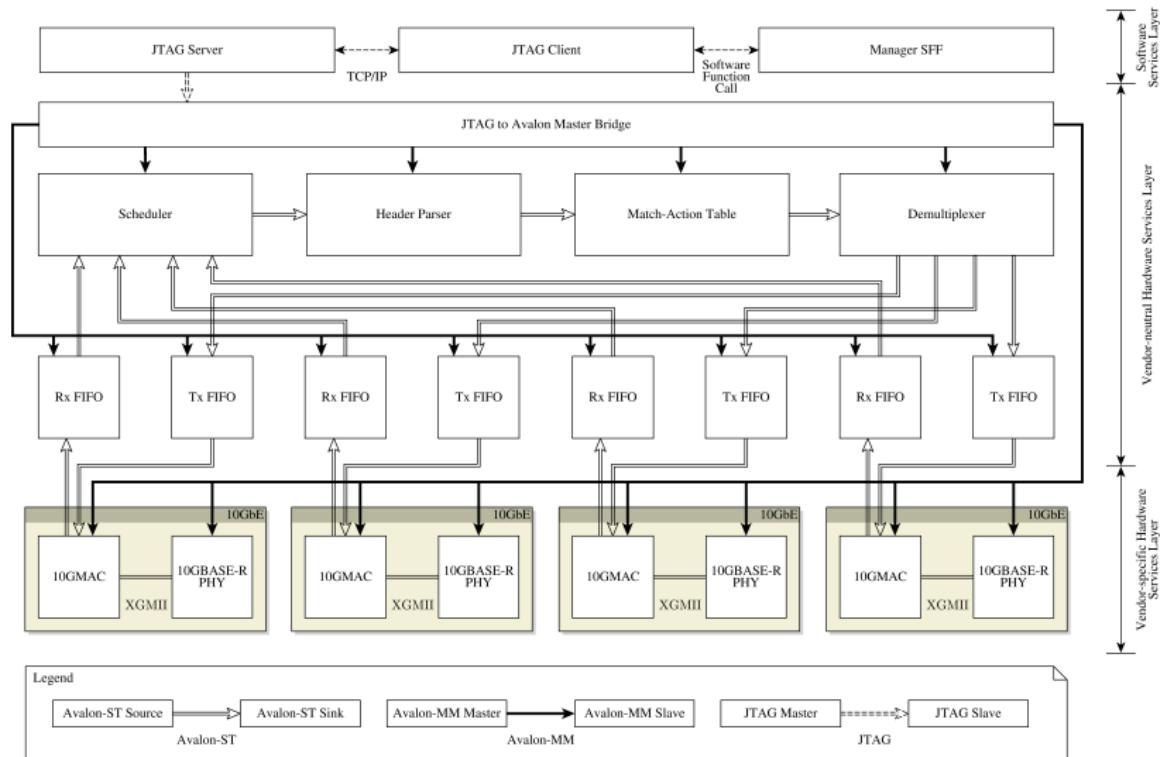
Experimental SDN switch implementation – Target platform

DE5-Net based on Intel (Altera) Stratix V GX FPGA



Deeply programmable packet-switching node

Experimental SDN switch implementation – Architecture



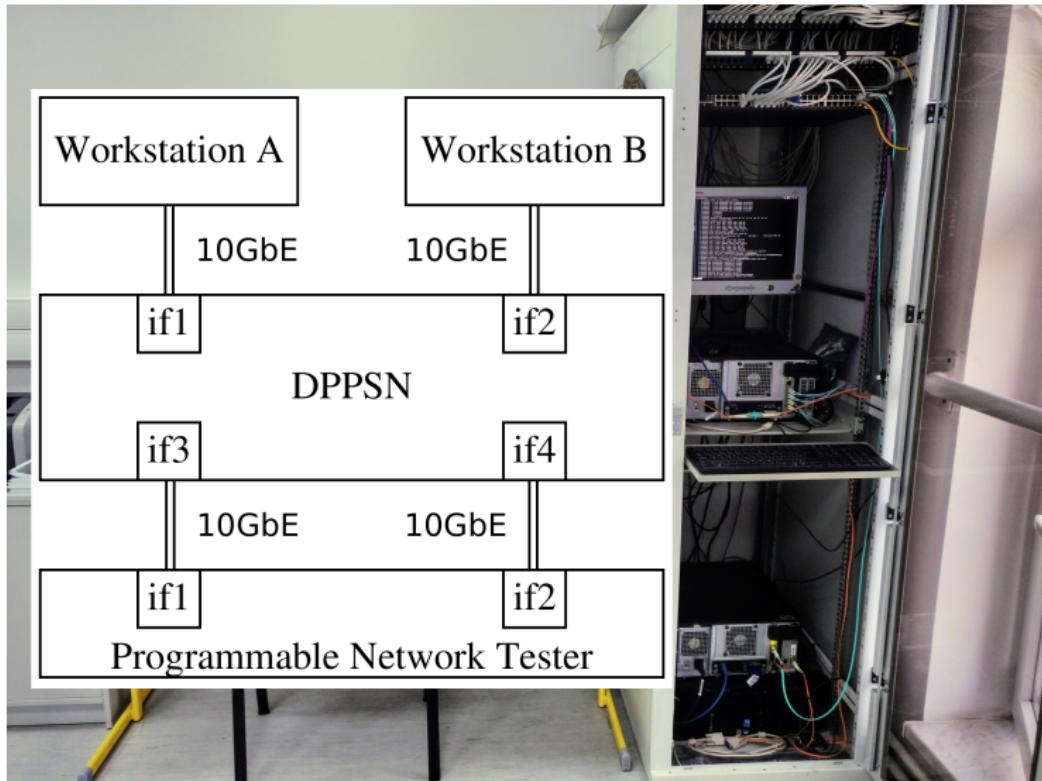
Experimental evaluation

Testbed



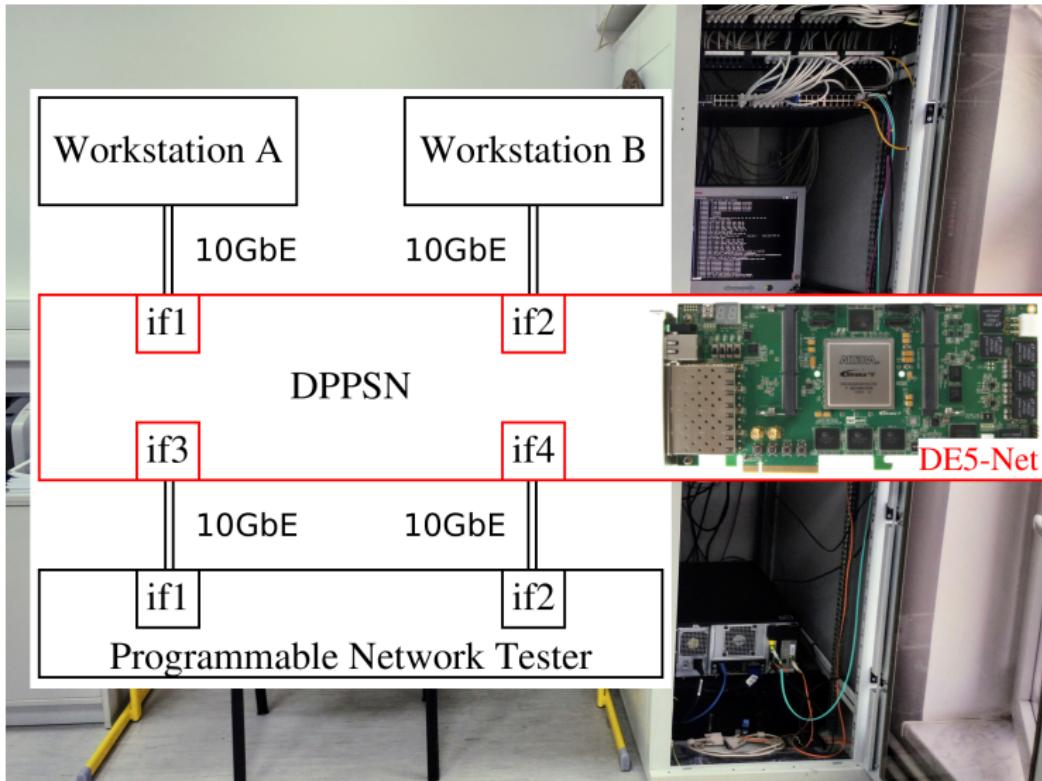
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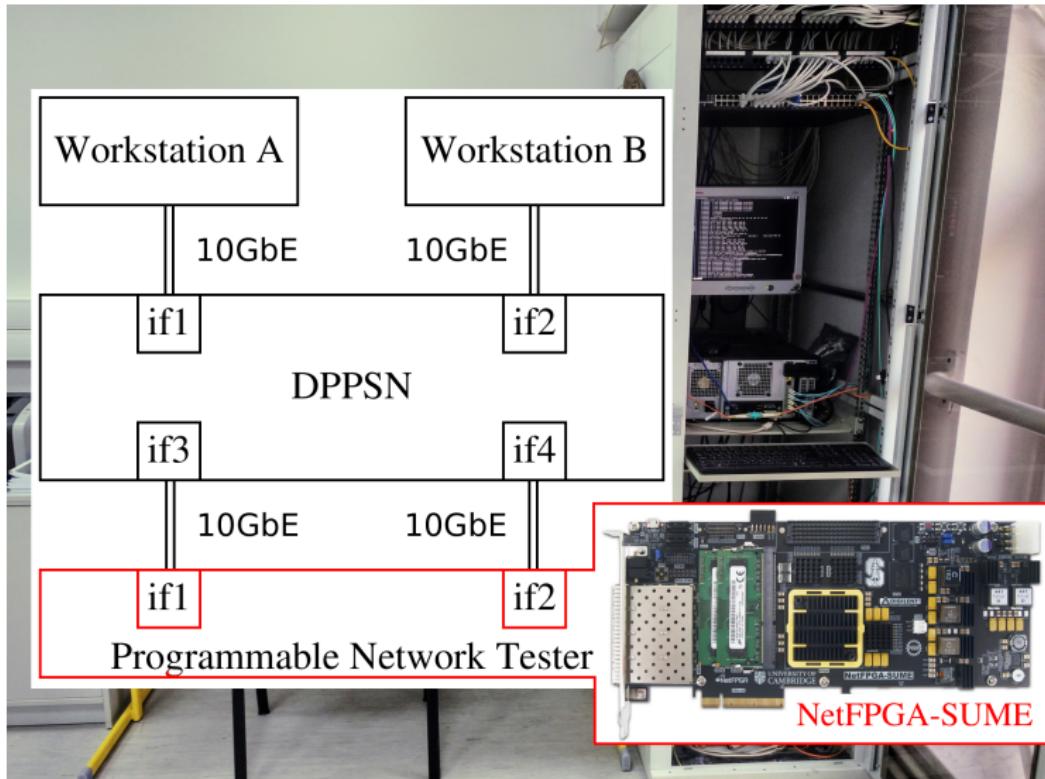
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Experimental evaluation

Measurements – Reconfiguration latency

Parameter	Value
Protocol	ICMP
Packet size	64 octets
Traffic rate	10 packets/second
Number of sent packets	600
Number of received packets	485
Testing duration	60818 ms
Reconfiguration latency	11657 ms

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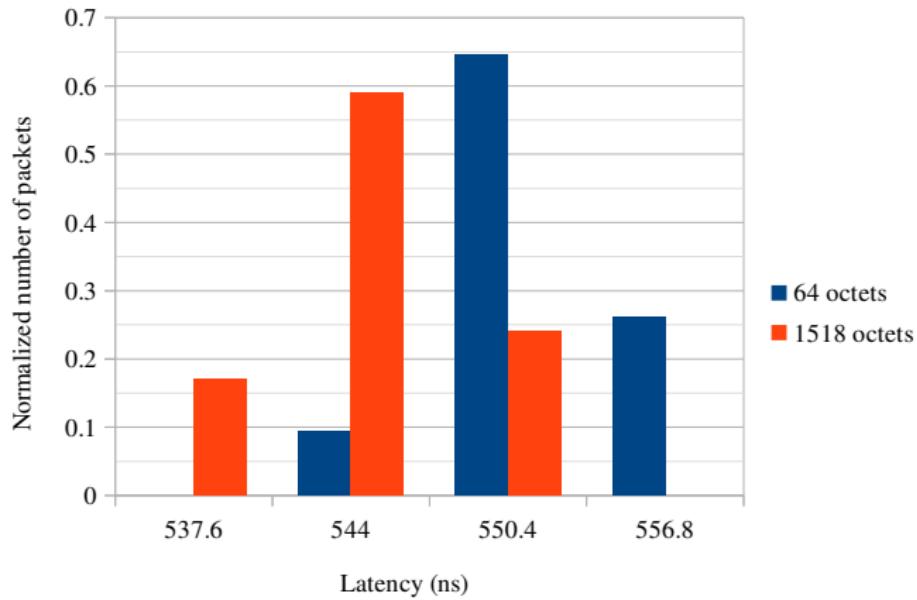
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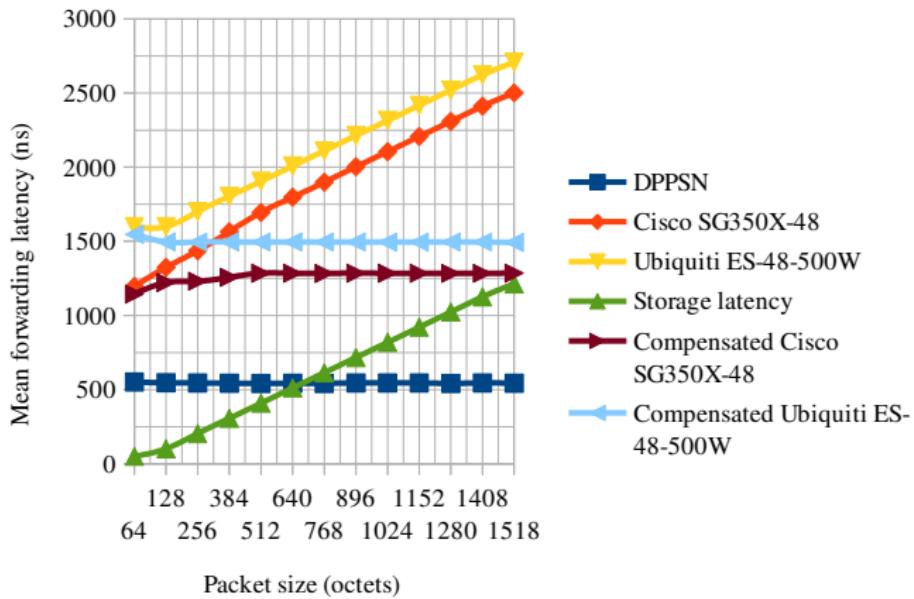
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Measurements – Forwarding latency



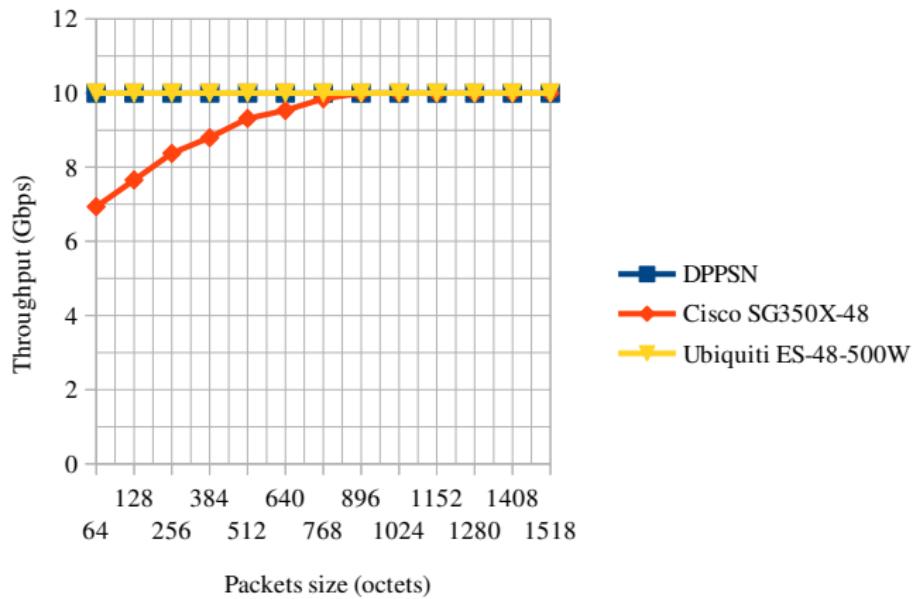
Experimental evaluation

Measurements – Forwarding latency



Experimental evaluation

Measurements – Throughput



Conclusion

The goal of this paper — **to overcome the limitations of OpenFlow** — is achieved by the proposal of a new hybrid FPGA/CPU architecture of a deeply programmable packet-switching node.

Experimental results have shown following:

- ▶ it is possible to implement SDN switch based on the proposed architecture,
- ▶ performances of implemented switch are comparable (or even better) with the performances of commodity switches.

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Questions?

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